# DIABLO CANYON POWER PLANT
# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
# JANUARY 1 – DECEMBER 31, 2000

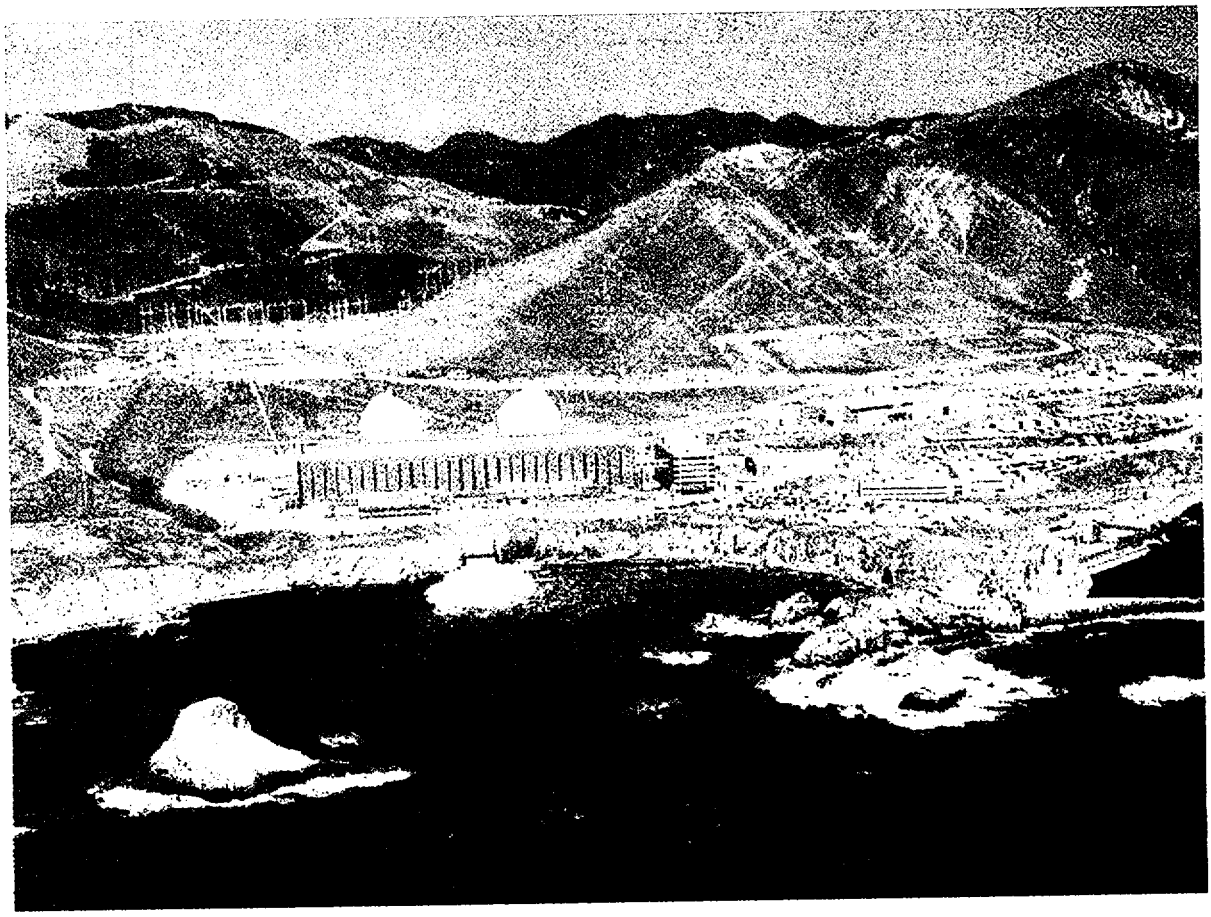
Enclosure 2
PG&E Letter DCL-01-047

# DIABLO CANYON POWER PLANT
# 2000 ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

January 1 - December 31, 2000

# DIABLO CANYON POWER PLANT

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT



## JANUARY 1 - DECEMBER 31, 2000

# DIABLO CANYON POWER PLANT

## Annual Radioactive Effluent Release Report
## January 1, 2000 Through December 31, 2000

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# DIABLO CANYON POWER PLANT

## Annual Radioactive Effluent Release Report
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## Attachments

1. Radiological Monitoring and Controls Program, CY2 Revision 3
2. Radioactive Effluent Controls Program, CY2.ID1 Revision 4
3. Radioactive Effluent Controls Program, CY2.ID1 Revision 5
4. Environmental Radiological Monitoring Procedure, RP1.ID11 Revision 5
5. Off-Site Dose Calculations, CAP A-8 Revision 24
6. 2000 Land Use Census

# DIABLO CANYON POWER PLANT

## 2000 Annual Radioactive Effluent Release Report

### Introduction

The 2000 Annual Radioactive Effluent Release Report summarizes gaseous and liquid effluent releases from Diablo Canyon Power Plant (DCPP) Units 1 and 2. The report includes the dose due to release of radioactive liquid and gaseous effluents and summarizes solid radwaste shipments. The report contains information required by Units 1 and 2 Technical Specification (TS) 5.6.3 and is presented in the general format of Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water Nuclear Power Plants," Appendix B, "Effluent and Waste Disposal Report." Procedure revisions which implement the Radiological Monitoring and Controls Program (RMCP), Radioactive Effluent Control Procedure (RECP), Off-Site Dose Calculation Procedure (ODCP), and Process Control Program (PCP), and one diskette containing meteorological data are attached.

In all cases, the plant effluent releases were well below TS limits for the report period.

# I. Supplemental Information

## A. Regulatory Limits

### 1. Gaseous Effluents

a. Noble Gas Dose Rate Limit

The dose rate in areas at or beyond the site boundary due to radioactive noble gases released in gaseous effluents is limited to less than or equal to 500 millirem (mR) per year to the total body and less than or equal to 3000 mR per year to the skin. (RECP 6.1.6.1.a.)

b. Particulate and Iodine Dose Rate Limit

The dose rate in areas at or beyond the site boundary due to iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents, is limited to less than or equal to 1500 mR per year to any organ. (RECP 6.1.6.1.b)

c. Noble Gas Dose Limit

The air dose due to noble gases released in gaseous effluents from each reactor unit to areas at or beyond the site boundary is limited to the following:

| Radiation Type | Calendar Quarter Limit RECP 6.1.7.1.a | Calendar Year Limit RECP 6.1.7.1.b |
|---|---|---|
| Gamma | 5 millirad | 10 millirad |
| Beta | 10 millirad | 20 millirad |

d. Particulate and Iodine Dose Limit

The dose to an individual from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released from each reactor unit to areas at or beyond the site boundary is limited to less than or equal to 7.5 mR to any organ in any calendar quarter, and less than or equal to 15 mR to any organ during a calendar year. (RECP 6.1.8.1)

### 2. Liquid Effluents

a. Concentration

The concentration of radioactive material released from the site is limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table 2, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration is limited to $2 \times 10^{-4}$ microcuries/milliliter ($\mu$Ci/ml) total activity. (RECP 6.1.3.1)

b. Dose

The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released from each reactor unit to areas at or beyond the site boundary is limited to the following:

| Dose Type | Calendar Quarter Limit RECP 6.1.4.1.a | Calendar Year Limit RECP 6.1.4.1.b |
|---|---|---|
| Total Body | 1.5 millirem | 3 millirem |
| Any Organ | 5 millirem | 10 millirem |

B. Maximum Permissible Concentrations

1. Gaseous Effluents

Maximum permissible concentrations are not used for determining allowable release rates for gaseous effluents at DCPP.

2. Liquid Effluents

The concentrations listed in 10 CFR 20, Appendix B, Table 2, Column 2, for radionuclides other than dissolved or entrained noble gases are used for determining the allowable release concentration at the point of discharge from the site for liquid effluents. For dissolved or entrained noble gases, the allowable release concentration at the point of discharge is limited to $2 \times 10^{-4}$ $\mu$Ci/ml total activity for liquid effluents.

C. Measurements and Approximations of Total Radioactivity

1. Gaseous Effluents

a. Fission and Activation Gases

The gaseous radioactivity released from the plant vent is monitored by a pair of off-line monitors equipped with beta scintillator detectors. The monitor readings are correlated to isotopic concentration based on laboratory isotopic analysis of grab samples using a germanium detector.

For plant vent noble gas releases, grab sample results are used to quantify releases. The individual batch release data are used to quantify the radioactivity discharged from the gas decay tanks and containment.

A noble gas grab sample is obtained and analyzed at least weekly. The isotopic mixture is assumed to remain constant between grab sample analyses.

Containment purges, gas decay tank releases, and air ejector discharges are released via the plant vent.

The gaseous radioactivity released from the steam generator blowdown tank vent is measured by analyzing liquid or steam condensate grab samples with a germanium detector. A factor R, a ratio of unit masses between water flashing to steam and water entering the tank, is used to calculate the activity. The isotopic concentrations are assumed to remain constant between grab samples.

Other potential pathways for releasing gaseous radioactivity are periodically monitored by collecting grab samples and analyzing these samples with a germanium detector system.

b. Iodines and Particulates

Radioiodines released from the plant vent are monitored by continuous sample collection on silver zeolite cartridges. The cartridges are changed at least weekly and analyzed with a germanium detector. The radioiodine releases are averaged over the period of cartridge sample collection.

Other potential pathways for releasing radioiodines are periodically monitored by collecting samples using charcoal or silver zeolite cartridges and analyzing with a germanium detector.

Radioactive materials in particulate form released from the plant vent are monitored by continuous sample collection on particulate filters. The filters are changed at least weekly and analyzed with a germanium detector. The particulate radioactivity is averaged over the period of particulate filter sample collection. Each filter is analyzed for alpha emitters using an internal proportional counter. Plant vent particulate filters collected during a quarter are used for the composite analysis for strontium-89 and -90, which is counted on an internal proportional counter after chemical separation.

Other potential pathways for releasing radioactive particulate are periodically monitored by collecting samples using particulate filters and analyzing these filters with a germanium detector.

c. Tritium

Tritium released from the plant vent is monitored by passing a measured volume of plant vent sample through a water column and determining the tritium increase in the water. An aliquot of the water is counted in a liquid scintillation spectrometer. The minimum routine sample frequency for tritium is weekly. The tritium concentration is assumed to remain constant between samples.

d. Estimations of Overall Error

Sources of error considered for batch release are: (1) calibration source; (2) calibration counting; (3) sampling; (4) sample counting; and (5) gas decay tank pressure gauge/containment exhaust fan flow rate.

Sources of error for continuous release are: (1) calibration source; (2) calibration counting; (3) sampling; (4) sample counting; (5) process monitor (RE-14) reading (fission gases only); and (6) plant vent exhaust fan flow rate.

Total error = $(\sigma^2_1 + \sigma^2_2 + \sigma^2_3 + \ldots \sigma^2_i)^{1/2}$

Where $\sigma_i$ = error associated with each component

2. Liquid Effluents

a. Batch Releases

Each tank of liquid radwaste is analyzed for principal gamma emitters using a germanium detector prior to release. A monthly prerelease analysis includes dissolved and entrained gases. Volume proportional monthly and quarterly composites are prepared from aliquots of each tank volume discharged. The monthly composite is analyzed for tritium using a liquid scintillation spectrometer and gross alpha radioactivity using an internal proportional counter. The quarterly composite is analyzed for iron-55 using a liquid scintillation spectrometer and for strontium-89 and -90 using an internal proportional detector following chemical separations.

b. Continuous releases

For the continuous liquid releases of the steam generator blowdown tank and turbine building sump oily water separator, daily grab samples are collected and aliquots are proportioned for weekly, monthly, and quarterly composites.

The oily water separator weekly composite is analyzed for principal gamma emitters using a germanium detector. The steam generator blowdown tank weekly composite is analyzed for principal gamma emitters and iodine-131.

The steam generator blowdown tank monthly composite is analyzed for tritium using a liquid scintillation spectrometer and for gross alpha using an internal proportional counter.

The steam generator blowdown tank quarterly composite is analyzed for iron-55 using a liquid scintillation spectrometer and for strontium-89 and strontium-90 using an internal proportional counter following chemical separation. The results for each of the composites are averaged over the period of the composite.

In addition, one grab sample of the steam generator blowdown tank is analyzed monthly for dissolved and entrained gases using a germanium detector. The results of this analysis are assumed to remain constant over the period of one month.

On a routine basis, a grab sample of the steam generator blowdown is collected at least weekly and analyzed for gamma activity using a germanium detector. This analysis is used to monitor activity, however, is not used in effluent calculations unless a significant change is detected.

Note on Dilution volume:

Tables 4A, 4B, and 4C, "Liquid Effluents - Summation Of All Releases," item F., lists the "Volume of circulating water used during release periods" in liters. This value is calculated by multiplying the discharge duration by the circulating water flow rate. The values listed in the tables are the summation of the circulating water discharge volume calculated for each individual batch and continuous discharge period. Therefore, in the case where two or more simultaneous discharges into the same circulating water are occurring, the calculated volume of circulating water is duplicated, and therefore the sum of the dilution volumes for the batch releases and continuous releases are greater than the actual dilution volume since each discharge incorporates the circulating discharge flow rate in its own dose calculation.

c. Estimation of Overall Error

Sources of error considered are: (1) calibration source error; (2) calibration counting error; (3) sampling error; (4) sample counting error; and (5) volume of waste release error.

These sources of error are independent; thus the total error is calculated according to the following formula:

Total error = $(\sigma^2_1 + \sigma^2_2 + \sigma^2_3 + \ldots \sigma^2_i)^{1/2}$

Where $\sigma_i$ = error associated with each component

D. Batch Releases

1. Liquid

a. Number of batch releases..... 643

b. Total time period for batch releases..... 1733.29 hours

c. Maximum time period for a batch release..... 24.00 hours

d. Average time period for a batch release..... 2.70 hours

e. Minimum time period for a batch release..... 0.333 hours

f. Average saltwater flow during batch releases..... 1.45E+6 gpm

2. Gaseous

a. Number of batch releases..... 112

b. Total time period for batch releases..... 776.92 hours

c. Maximum time period for a batch release..... 70.00 hours

d. Average time period for a batch release..... 6.94 hours

e. Minimum time period for a batch release..... 0.150 hours

E. Abnormal Release (Gaseous and Liquid)

1. On December 26, 2000, an unplanned but monitored release from the Unit 2 Gas Decay Tank 2-1 occurred due to a leak on rupture disk CVCS-2-RV-54. During this event, 3.12 E-2 curies of noble gas was released. The percent of release rate limit was 3.93 E-3 percent of the limits of the RECP IDAP CY2.ID1, step 6.1.6.1.a.

2. The sample for liquid radwaste discharge batch 2000-0-95 was misplaced prior to adding a portion of the sample to the monthly composite for September and 3rd quarter composite. This sample represented Process Waste Receiver 0-1, sampled September 12, 2000. The overall error attributed to this missing batch is estimated to be approximately 0.7 percent.

## II. Major Changes to Liquid, Gaseous and Solid Radwaste Treatment System

There were no major changes to liquid, gaseous, and solid radwaste treatment systems during the report period.

## III. Changes to the Radiological Monitoring and Controls Program (RMCP)

CY2, "Radiological Monitoring And Controls Program," was revised during the report period. Revision 3 made the following changes:

This revision incorporates references to Improved TS.

The Plant Staff Review Committee (PSRC) reviewed the change on May 5, 2000; however, it did not receive the appropriate approval by the Plant Manager as required by TS 5.5.1. This issue was identified during the Nuclear Quality Services 2001 Radioactive Effluent Audit and was reviewed during the NRC Radiation Monitoring Instrumentations and Effluents Inspection. A copy of the revised procedure is included as Attachment 1.

## IV. Changes to the Radiological Environmental Controls Program (RECP)

CY2.ID1, "Radioactive Effluents Control Program," was revised during the report period.

A. Revision 4 made the following changes:

This revision incorporates references to Improved TS.

Step 2.2 was clarified with respect to the definition of Offsite Dose Calculation Procedure (ODCM).

- Appendix 6.2 has been added to define how high alarm setpoints for fuel handling building and control room ventilation systems are controlled.

The change was reviewed by the PSRC and approved by the Plant Manager on April 26, 2000 (Attachment 2).

B. Revision 5 made the following changes:

Deleted old TS references.

Added responsibility for ensuring preparation, review, and approval of Non-routine Radiological Environmental Operating Report to Section 3.2.4, Director, Radiation Protection.

Section 4.2.1.b.2 was clarified with respect to the definition of unplanned release.

The change was reviewed by the PSRC and approved by the Plant Manager on December 1, 2000 (Attachment 3).

## V. Changes to the Environmental Radiological Monitoring Procedure (ERMP)

RP1.ID11, "Environmental Radiological Monitoring Procedure," was revised during the report period. Revision 5 made the following changes:

Section 1, "scope" was changed to incorporate new TS numbering.

Added responsibility for maintaining Interlaboratory Cross Checks to section 4.2, Director, Chemical and Environmental, TES.

Section 4.3 was updated to account for changes in position titles.

Section 7.6.1 was clarified with respect to the retention of records related to program reviews.

The change was reviewed by the PSRC and approved by the Plant Manager on February 4, 2000 (Attachment 4).

## VI. Changes to the Offsite Dose Calculation Procedure (ODCP)

CAP A-8, "Off-Site Dose Calculations," was revised. Revision 24 made the following changes:

Sections 6.1.7 and 6.2.10 were clarified with respect to the report requirement.

A programmatic trigger is added to Section 6.2.9 to update tables, which are needed for dose projection.

Section 6.2.2.b.4 was clarified with respect to the constant of "1500," which defined as "for Iodine-131, for Iodine-133, for tritium and for all radioactive materials in particular form with half-lives greater than 8 days."

Changed the terms "total body dose" to "skin dose;" "beta dose" to "gamma air dose;" "gamma air dose" to "whole body dose;" and "gamma air dose" to "skin dose." These are solely typographical errors and do not affect the DCPP radioactive Effluent Program. It has been verified that the implementing computer program, "Radioactive Effluent Management System (REMS)," which actually performs the calculation used the correct dose factors, and the incorrect labeling of the dose factor did not affect the REMS.

This change was reviewed by the PSRC and approved by the Plant Manager on December 1, 2000 (Attachment 5).

## VII. Changes to the Process Control Program (PCP)

There were no changes made to RP2.DC2, "Process Control Program," during the report period.

## VIII. Land Use Census

Changes to the Land Use Census Program are included as Attachment 6.

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 1A
## GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

| | Units | First Quarter | Second Quarter | Est.Total Error % |
|---|---|---|---|---|
| A. Fission and activation gases | | | | |
| 1. Total release | Ci | 6.59E-1 | 2.01E+0 | 45% |
| 2. Average release rate for period | µCi/sec | 8.38E-2 | 2.55E-1 | |
| 3. Percent of technical specification limit[1] | % | 3.52E-5 | 1.79E-4 | |
| B. Iodines | | | | |
| 1. Total iodine-131 | Ci | MDA | MDA | 24% |
| 2. Average release rate for period | µCi/sec | MDA | MDA | |
| 3. Percent of technical specification limit[1] | % | MDA | MDA | |
| C. Particulates | | | | |
| 1. Particulates with half-lives >8 days | Ci | 3.23E-4 | 6.36E-5 | 24% |
| 2. Average release rate for period | µCi/sec | 4.11E-5 | 8.09E-6 | |
| 3. Percent of technical specification limit[1] | % | 1.51E-5 | 7.67E-6 | |
| 4. Gross alpha radioactivity | Ci | 6.13E-7 | 1.19E-6 | |
| D. Tritium | | | | |
| 1. Total release | Ci | 5.17E+1 | 3.78E+1 | 13% |
| 2. Average release rate for period | µCi/sec | 6.58E+0 | 4.80E+0 | |
| 3. Percent of technical specification limit[1] | % | 1.40E-5 | 1.02E-5 | |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

[1] RECP 6.1.6.1 Limit

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 1B
## GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

| | Units | Third Quarter | Fourth Quarter | Est.Total Error % |
|---|---|---|---|---|
| A. Fission and activation gases | | | | |
| 1. Total release | Ci | 1.61E+0 | 2.91E+0 | 45% |
| 2. Average release rate for period | μCi/sec | 2.02E-1 | 3.66E-1 | |
| 3. Percent of technical specification limit[1] | % | 9.11E-5 | 7.75E-4 | |
| B. Iodines | | | | |
| 1. Total iodine-131 | Ci | MDA | MDA | 24% |
| 2. Average release rate for period | μCi/sec | MDA | MDA | |
| 3. Percent of technical specification limit[1] | % | MDA | MDA | |
| C. Particulates | | | | |
| 1. Particulates with half-lives >8 days | Ci | 6.47E-6 | 1.15E-4 | 24% |
| 2. Average release rate for period | μCi/sec | 8.14E-7 | 1.45E-5 | |
| 3. Percent of technical specification limit[1] | % | 2.99E-7 | 3.98E-6 | |
| 4. Gross alpha radioactivity | Ci | 2.18E-7 | 1.68E-7 | |
| D. Tritium | | | | |
| 1. Total release | Ci | 2.06E+1 | 1.11E+2 | 13% |
| 2. Average release rate for period | μCi/sec | 2.60E+0 | 1.39E+1 | |
| 3. Percent of technical specification limit[1] | % | 5.51E-6 | 2.95E-5 | |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

[1] RECP 6.1.6.1 Limit

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 1C
## GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

| | Units | Annual Total |
|---|---|---|
| **A. Fission and activation gases** | | |
| 1. Total release | Ci | 7.18E+0 |
| 2. Average release rate for period | µCi/sec | 2.27E-1 |
| 3. Percent of technical specification limit[1] | % | 2.71E-4 |
| **B. Iodines** | | |
| 1. Total iodine-131 | Ci | MDA |
| 2. Average release rate for period | µCi/sec | MDA |
| 3. Percent of technical specification limit[1] | % | MDA |
| **C. Particulates** | | |
| 1. Particulates with half-lives >8 days | Ci | 5.08E-4 |
| 2. Average release rate for period | µCi/sec | 1.61E-5 |
| 3. Percent of technical specification limit[1] | % | 6.74E-6 |
| 4. Gross alpha radioactivity | Ci | 2.18E-6 |
| **D. Tritium** | | |
| 1. Total release | Ci | 2.21E+2 |
| 2. Average release rate for period | µCi/sec | 6.98E+0 |
| 3. Percent of technical specification limit[1] | % | 1.48E-5 |

[1] RECP 6.1.6.1 Limit

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 2A
## GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

| | | First Quarter | | Second Quarter | |
|---|---|---|---|---|---|
| Nuclides Released | Units | Continuous Mode | Batch Mode | Continuous Mode | Batch Mode |
| 1. Fission gases | | | | | |
| argon-41 | Ci | MDA | 3.02E-2 | MDA | 2.91E-2 |
| krypton-85 | Ci | MDA | 6.23E-1 | MDA | 9.07E-2 |
| krypton-85m | Ci | MDA | MDA | MDA | MDA |
| krypton-87 | Ci | MDA | MDA | MDA | MDA |
| krypton-88 | Ci | MDA | MDA | MDA | MDA |
| xenon-131m | Ci | MDA | MDA | MDA | MDA |
| xenon-133 | Ci | MDA | 5.31E-3 | 1.47E+0 | 2.07E-2 |
| xenon-133m | Ci | MDA | MDA | MDA | MDA |
| xenon-135 | Ci | MDA | MDA | 3.98E-1 | 1.28E-5 |
| xenon-135m | Ci | MDA | MDA | MDA | MDA |
| xenon-138 | Ci | MDA | MDA | MDA | MDA |
| TOTAL FOR PERIOD | Ci | MDA | 6.59E-1 | 1.87E+0 | 1.41E-1 |
| 2. Iodines | | | | | |
| iodine-131 | Ci | MDA | | MDA | |
| iodine-133 | Ci | MDA | | MDA | |
| iodine-135 | Ci | MDA | | MDA | |
| TOTAL FOR PERIOD | Ci | MDA | | MDA | |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 2A (Continued)**
**GASEOUS EFFLUENTS - GROUND LEVEL RELEASES**

| | | Continuous Mode | |
|---|---|---|---|
| Nuclides Released | Units | First Quarter | Second Quarter |
| 3. Particulates | | | |
| barium-140 | Ci | MDA | MDA |
| cesium-134 | Ci | MDA | MDA |
| cesium-137 | Ci | MDA | MDA |
| cerium-141 | Ci | MDA | MDA |
| cerium-144 | Ci | MDA | MDA |
| chromium-51 | Ci | MDA | MDA |
| cobalt-57 | Ci | MDA | MDA |
| cobalt-58 | Ci | 3.23E-4 | 4.49E-5 |
| cobalt-60 | Ci | MDA | 1.87E-5 |
| iron-59 | Ci | MDA | MDA |
| lanthanum-140 | Ci | MDA | MDA |
| manganese-54 | Ci | MDA | MDA |
| molybdenum-99 | Ci | MDA | MDA |
| ruthenium-103 | Ci | MDA | MDA |
| strontium-89 | Ci | MDA | MDA |
| strontium-90 | Ci | MDA | MDA |
| zinc-65 | Ci | MDA | MDA |
| zirconium-95 | Ci | MDA | MDA |
| TOTAL FOR PERIOD | Ci | 3.23E-4 | 6.36E-5 |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 2B
## GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

| | | Third Quarter | | Fourth Quarter | |
|---|---|---|---|---|---|
| Nuclides Released | Units | Continuous Mode | Batch Mode | Continuous Mode | Batch Mode |
| 1. Fission gases | | | | | |
| argon-41 | Ci | MDA | 3.56E-2 | MDA | 6.39E-1 |
| krypton-85 | Ci | MDA | 1.76E-1 | MDA | 7.05E-1 |
| krypton-85m | Ci | MDA | MDA | MDA | MDA |
| krypton-87 | Ci | MDA | MDA | MDA | MDA |
| krypton-88 | Ci | MDA | MDA | MDA | MDA |
| xenon-131m | Ci | MDA | MDA | MDA | 3.50E-4 |
| xenon-133 | Ci | 1.38E+0 | 2.20E-2 | 1.31E+0 | 1.96E-1 |
| xenon-133m | Ci | MDA | MDA | MDA | MDA |
| xenon-135 | Ci | MDA | 3.54E-5 | MDA | 5.27E-2 |
| xenon-135m | Ci | MDA | MDA | MDA | MDA |
| xenon-138 | Ci | MDA | MDA | MDA | MDA |
| TOTAL FOR PERIOD | Ci | 1.38E+0 | 2.33E-1 | 1.31E+0 | 1.59E+0 |
| 2. Iodines | | | | | |
| iodine-131 | Ci | MDA | | MDA | |
| iodine-133 | Ci | MDA | | MDA | |
| iodine-135 | Ci | MDA | | MDA | |
| TOTAL FOR PERIOD | Ci | MDA | | MDA | |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 2B (Continued)**
**GASEOUS EFFLUENTS - GROUND LEVEL RELEASES**

| | | Continuous Mode | |
|---|---|---|---|
| Nuclides Released | Units | Third Quarter | Fourth Quarter |
| 3. Particulates | | | |
| barium-140 | Ci | MDA | MDA |
| cesium-134 | Ci | MDA | MDA |
| cesium-137 | Ci | MDA | MDA |
| cerium-141 | Ci | MDA | MDA |
| cerium-144 | Ci | MDA | MDA |
| chromium-51 | Ci | MDA | 2.95E-5 |
| cobalt-57 | Ci | MDA | MDA |
| cobalt-58 | Ci | 6.47E-6 | 8.56E-5 |
| cobalt-60 | Ci | MDA | MDA |
| iron-59 | Ci | MDA | MDA |
| lanthanum-140 | Ci | MDA | MDA |
| manganese-54 | Ci | MDA | MDA |
| molybdenum-99 | Ci | MDA | MDA |
| ruthenium-103 | Ci | MDA | MDA |
| strontium-89 | Ci | MDA | MDA |
| strontium-90 | Ci | MDA | MDA |
| zinc-65 | Ci | MDA | MDA |
| zirconium-95 | Ci | MDA | MDA |
| TOTAL FOR PERIOD | Ci | 6.47E-6 | 1.15E-4 |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 3
## GASEOUS EFFLUENTS - LOWER LIMITS OF DETECTION

| | | | Batch Mode | |
|---|---|---|---|---|
| Nuclide | Units | Continuous Mode | Containment Purge | Gas Decay Tank |
| 1. Fission gases | | | | |
| argon-41 | µCi/ml | 1.66E-8 | 1.66E-8 | 1.66E-8 |
| krypton-85 | µCi/ml | 2.44E-6 | 2.44E-6 | 2.44E-6 |
| krypton-85m | µCi/ml | 6.35E-9 | 6.35E-9 | 6.35E-9 |
| krypton-87 | µCi/ml | 2.56E-8 | 2.56E-8 | 2.56E-8 |
| krypton-88 | µCi/ml | 2.57E-8 | 2.57E-8 | 2.57E-8 |
| xenon-131m | µCi/ml | 2.37E-7 | 2.37E-7 | 2.37E-7 |
| xenon-133 | µCi/ml | 1.77E-8 | 1.77E-8 | 1.77E-8 |
| xenon-133m | µCi/ml | 4.69E-8 | 4.69E-8 | 4.69E-8 |
| xenon-135 | µCi/ml | 7.88E-9 | 7.88E-9 | 7.88E-9 |
| xenon-135m | µCi/ml | 2.06E-7 | 2.06E-7 | 2.06E-7 |
| xenon-138 | µCi/ml | 6.58E-7 | 6.58E-7 | 6.58E-7 |
| 2. Tritium | | | | |
| hydrogen-3 | µCi/ml | 4.18E-9 | 4.18E-9 | N/A |
| 3. Iodines | | | | |
| iodine-131 | µCi/ml | 4.48E-13 | N/A | |
| iodine-133 | µCi/ml | 5.52E-13 | N/A | |
| iodine-135 | µCi/ml | 2.41E-12 | N/A | |

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 3 (Continued)**
**GASEOUS EFFLUENTS - LOWER LIMITS OF DETECTION**

| Nuclide | Units | Continuous Mode |
|---|---|---|
| 4. Particulates | | |
| barium-140 | µCi/ml | 1.65E-12 |
| cesium-134 | µCi/ml | 3.64E-13 |
| cesium-137 | µCi/ml | 3.25E-13 |
| cerium-141 | µCi/ml | 3.58E-13 |
| cerium-144 | µCi/ml | 1.49E-12 |
| chromium-51 | µCi/ml | 2.31E-12 |
| cobalt-57 | µCi/ml | 2.07E-13 |
| cobalt-58 | µCi/ml | 4.98E-13 |
| cobalt-60 | µCi/ml | 6.90E-13 |
| iron-59 | µCi/ml | 9.59E-13 |
| lanthanum-140 | µCi/ml | 5.48E-13 |
| manganese-54 | µCi/ml | 4.18E-13 |
| molybdenum-99 | µCi/ml | 2.20E-13 |
| ruthenium-103 | µCi/ml | 3.60E-13 |
| strontium-89 | µCi/ml | 3.34E-14 |
| strontium-90 | µCi/ml | 7.20E-15 |
| zinc-65 | µCi/ml | 1.05E-12 |
| zirconium-95 | µCi/ml | 6.66E-13 |
| gross alpha | µCi/ml | 1.34E-15 |

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 4A
## LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

| | Units | First Quarter | Second Quarter | Est.Total Error % |
|---|---|---|---|---|
| **A. Fission and activation products** | | | | |
| 1. Total release (not including tritium, gases, alpha) | Ci | 7.96E-2 | 2.50E-2 | 24% |
| 2. Average diluted concentration during period | µCi/ml | 2.71E-11 | 9.78E-12 | |
| 3. Percent of applicable limit[1] | % | 2.38E-4 | 1.04E-4 | |
| **B. Tritium** | | | | |
| 1. Total release | Ci | 1.74E+2 | 2.80E+2 | 13% |
| 2. Average diluted concentration during period | µCi/ml | 5.95E-8 | 1.10E-7 | |
| 3. Percent of applicable limit[1] | % | 5.95E-3 | 1.10E-2 | |
| **C. Dissolved and entrained gasses** | | | | |
| 1. Total release | Ci | 7.17E-4 | 1.49E-4 | 24% |
| 2. Average diluted concentration during period | µCi/ml | 2.44E-13 | 5.83E-14 | |
| 3. Percent of applicable limit[1] | % | 1.22E-7 | 2.92E-8 | |
| **D. Gross Alpha** | | | | |
| 1. Total release | Ci | MDA | 3.41E-5 | 61% |
| **E.** Volume of waste release (prior to dilution) | liters | 9.36E+7 | 8.12E+7 | 5% |
| **F.** Volume of circulating saltwater used during release periods | liters | 2.93E+12 | 2.55E+12 | 7% |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

[1] RECP 6.1.3.1 Limit

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 4B
## LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

| | Units | Third Quarter | Fourth Quarter | Est.Total Error % |
|---|---|---|---|---|
| A. Fission and activation products | | | | |
| 1. Total release (not including tritium, gases, alpha) | Ci | 1.17E-2 | 3.23E-2 | 24% |
| 2. Average diluted concentration during period | µCi/ml | 4.48E-12 | 1.47E-11 | |
| 3. Percent of applicable limit[1] | % | 5.44E-5 | 1.29E-4 | |
| B. Tritium | | | | |
| 1. Total release | Ci | 9.16E+2 | 4.27E+2 | 13% |
| 2. Average diluted concentration during period | µCi/ml | 3.50E-7 | 1.95E-7 | |
| 3. Percent of applicable limit[1] | % | 3.50E-2 | 1.95E-2 | |
| C. Dissolved and entrained gasses | | | | |
| 1. Total release | Ci | 7.78E-5 | 1.82E-3 | 24% |
| 2. Average diluted concentration during period | µCi/ml | 2.97E-14 | 8.33E-13 | |
| 3. Percent of applicable limit[1] | % | 1.48E-8 | 4.17E-7 | |
| D. Gross Alpha | | | | |
| 1. Total release | Ci | MDA | MDA | 61% |
| E. Volume of waste release (prior to dilution) | liters | 8.56E+7 | 7.58E+7 | 5% |
| F. Volume of circulating saltwater used during release periods | liters | 2.62E+12 | 2.19E+12 | 7% |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

[1] RECP 6.1.3.1 Limit

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 4C
## LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

| | Units | Annual Total |
|---|---|---|
| **A. Fission and activation products** | | |
| 1. Total release (not including tritium, gases, alpha) | Ci | 1.49E-1 |
| 2. Average diluted concentration during period | µCi/ml | 1.44E-11 |
| 3. Percent of applicable limit[1] | % | 1.35E-4 |
| **B. Tritium** | | |
| 1. Total release | Ci | 1.80E+3 |
| 2. Average diluted concentration during period | µCi/ml | 1.75E-7 |
| 3. Percent of applicable limit[1] | % | 1.75E-2 |
| **C. Dissolved and entrained gasses** | | |
| 1. Total release | Ci | 2.77E-3 |
| 2. Average diluted concentration during period | µCi/ml | 2.69E-13 |
| 3. Percent of applicable limit[1] | % | 1.34E-7 |
| **D. Gross Alpha** | | |
| 1. Total release | Ci | MDA |
| **E.** Volume of waste release (prior to dilution) | liters | 3.36E+8 |
| **F.** Volume of circulating saltwater used during release periods | liters | 1.03E+13 |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

[1] RECP 6.1.3.1 Limit

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 5A**
**LIQUID EFFLUENTS - NUCLIDES RELEASED**

| | | First Quarter | | Second Quarter | |
|---|---|---|---|---|---|
| Nuclides Released | Units | Continuous Mode | Batch Mode | Continuous Mode | Batch Mode |
| antimony-122 | Ci | MDA | MDA | MDA | 1.53E-5 |
| antimony-124 | Ci | MDA | MDA | MDA | 1.31E-4 |
| antimony-125 | Ci | MDA | 3.13E-3 | MDA | 4.84E-3 |
| barium-140 | Ci | MDA | MDA | MDA | MDA |
| beryllium-7 | Ci | MDA | MDA | MDA | MDA |
| bromine-82 | Ci | MDA | MDA | MDA | MDA |
| cerium-141 | Ci | MDA | MDA | MDA | MDA |
| cerium-143 | Ci | MDA | MDA | MDA | MDA |
| cerium-144 | Ci | MDA | MDA | MDA | MDA |
| cesium-134 | Ci | MDA | 1.84E-4 | MDA | MDA |
| cesium-136 | Ci | MDA | MDA | MDA | MDA |
| cesium-137 | Ci | MDA | 2.53E-4 | MDA | 2.31E-5 |
| cesium-138 | Ci | MDA | MDA | MDA | MDA |
| chromium-51 | Ci | MDA | 9.91E-4 | MDA | 1.81E-3 |
| cobalt-57 | Ci | MDA | 1.37E-4 | MDA | 3.14E-5 |
| cobalt-58 | Ci | 2.33E-4 | 1.78E-2 | MDA | 5.70E-3 |
| cobalt-60 | Ci | MDA | 1.20E-2 | MDA | 3.66E-3 |
| iron-55 | Ci | MDA | 3.88E-2 | MDA | 5.67E-3 |
| iron-59 | Ci | MDA | 3.04E-4 | MDA | 2.06E-5 |
| lanthanum-140 | Ci | MDA | MDA | MDA | MDA |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 5A (CONTINUED)**
**LIQUID EFFLUENTS - NUCLIDES RELEASED**

| | | First Quarter | | Second Quarter | |
|---|---|---|---|---|---|
| Nuclides Released | Units | Continuous Mode | Batch Mode | Continuous Mode | Batch Mode |
| lanthanum-142 | Ci | MDA | MDA | MDA | MDA |
| manganese-54 | Ci | MDA | 5.37E-4 | MDA | 1.28E-4 |
| manganese-56 | Ci | MDA | MDA | MDA | MDA |
| molybdenum-99 | Ci | MDA | 4.89E-5 | MDA | 1.43E-5 |
| niobium-95 | Ci | MDA | 6.73E-4 | MDA | 2.91E-5 |
| neodymium-147 | Ci | MDA | MDA | MDA | MDA |
| rubidium-89 | Ci | MDA | MDA | MDA | MDA |
| ruthenium-103 | Ci | MDA | MDA | MDA | MDA |
| silver-110m | Ci | MDA | 1.54E-4 | MDA | 3.21E-4 |
| sodium-24 | Ci | MDA | 7.91E-5 | MDA | 9.35E-6 |
| strontium-89 | Ci | MDA | MDA | MDA | MDA |
| strontium-90 | Ci | MDA | MDA | MDA | MDA |
| strontium-91 | Ci | MDA | MDA | MDA | MDA |
| strontium-92 | Ci | MDA | 6.22E-5 | MDA | 3.83E-5 |
| tellurium-129m | Ci | MDA | MDA | MDA | 7.46E-4 |
| tellurium-131 | Ci | MDA | MDA | MDA | MDA |
| tellurium-132 | Ci | MDA | MDA | MDA | MDA |
| tin-113 | Ci | MDA | 2.85E-5 | MDA | MDA |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 5A (CONTINUED)**
**LIQUID EFFLUENTS - NUCLIDES RELEASED**

| | | First Quarter | | Second Quarter | |
|---|---|---|---|---|---|
| Nuclides Released | Units | Continuous Mode | Batch Mode | Continuous Mode | Batch Mode |
| tin-117m | Ci | MDA | MDA | MDA | MDA |
| tungsten-187 | Ci | MDA | MDA | MDA | MDA |
| zinc-65 | Ci | MDA | 3.01E-3 | MDA | 1.23E-3 |
| zirconium-95 | Ci | MDA | 1.84E-4 | MDA | MDA |
| iodine-131 | Ci | MDA | 3.35E-4 | MDA | 4.47E-4 |
| iodine-132 | Ci | MDA | MDA | MDA | MDA |
| iodine-133 | Ci | MDA | 5.53E-4 | MDA | 8.75E-5 |
| iodine-134 | Ci | MDA | MDA | MDA | MDA |
| iodine-135 | Ci | MDA | 1.16E-4 | MDA | MDA |
| TOTAL FOR PERIOD | Ci | 2.33E-4 | 7.93E-2 | MDA | 2.50E-2 |

**DISSOLVED AND ENTRAINED GASES**

| | | | | | |
|---|---|---|---|---|---|
| xenon-133 | Ci | MDA | 5.48E-4 | MDA | 1.33E-4 |
| xenon-133m | Ci | MDA | MDA | MDA | MDA |
| xenon-135 | Ci | MDA | 1.69E-4 | MDA | 1.59E-5 |
| krypton-85 | Ci | MDA | MDA | MDA | MDA |
| krypton-87 | Ci | MDA | MDA | MDA | MDA |
| krypton-88 | Ci | MDA | MDA | MDA | MDA |
| TOTAL FOR PERIOD | Ci | MDA | 7.17E-4 | MDA | 1.49E-4 |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 5B**
**LIQUID EFFLUENTS - NUCLIDES RELEASED**

| | | Third Quarter | | Fourth Quarter | |
|---|---|---|---|---|---|
| Nuclides Released | Units | Continuous Mode | Batch Mode | Continuous Mode | Batch Mode |
| antimony-122 | Ci | MDA | MDA | MDA | 2.19E-4 |
| antimony-124 | Ci | MDA | MDA | MDA | 2.62E-4 |
| antimony-125 | Ci | MDA | 1.31E-3 | MDA | 2.99E-3 |
| barium-140 | Ci | MDA | MDA | MDA | MDA |
| beryllium-7 | Ci | MDA | MDA | MDA | MDA |
| bromine-82 | Ci | MDA | MDA | MDA | MDA |
| cerium-141 | Ci | MDA | MDA | MDA | MDA |
| cerium-143 | Ci | MDA | MDA | MDA | MDA |
| cerium-144 | Ci | MDA | MDA | MDA | MDA |
| cesium-134 | Ci | MDA | MDA | MDA | MDA |
| cesium-136 | Ci | MDA | MDA | MDA | MDA |
| cesium-137 | Ci | MDA | 1.33E-5 | MDA | 2.57E-5 |
| cesium-138 | Ci | MDA | MDA | MDA | MDA |
| chromium-51 | Ci | MDA | 1.04E-5 | MDA | 1.18E-3 |
| cobalt-57 | Ci | MDA | 1.64E-5 | MDA | 2.80E-5 |
| cobalt-58 | Ci | MDA | 4.65E-3 | MDA | 1.30E-2 |
| cobalt-60 | Ci | MDA | 1.65E-3 | MDA | 3.49E-3 |
| iron-55 | Ci | MDA | 2.74E-3 | MDA | 6.79E-3 |
| iron-59 | Ci | MDA | MDA | MDA | 2.91E-5 |
| lanthanum-140 | Ci | MDA | MDA | MDA | MDA |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 5B (CONTINUED)**
**LIQUID EFFLUENTS - NUCLIDES RELEASED**

| | | Third Quarter | | Fourth Quarter | |
|---|---|---|---|---|---|
| Nuclides Released | Units | Continuous Mode | Batch Mode | Continuous Mode | Batch Mode |
| lanthanum-142 | Ci | MDA | MDA | MDA | MDA |
| manganese-54 | Ci | MDA | 5.98E-5 | MDA | 1.42E-4 |
| manganese-56 | Ci | MDA | MDA | MDA | MDA |
| molybdenum-99 | Ci | MDA | 1.52E-6 | MDA | 1.98E-5 |
| niobium-95 | Ci | MDA | 1.62E-5 | MDA | 2.02E-4 |
| neodymium-147 | Ci | MDA | MDA | MDA | MDA |
| rubidium-89 | Ci | MDA | MDA | MDA | MDA |
| ruthenium-103 | Ci | MDA | MDA | MDA | MDA |
| silver-110m | Ci | MDA | 1.23E-4 | MDA | 5.39E-4 |
| sodium-24 | Ci | MDA | MDA | MDA | MDA |
| strontium-89 | Ci | MDA | MDA | MDA | MDA |
| strontium-90 | Ci | MDA | MDA | MDA | MDA |
| strontium-91 | Ci | MDA | MDA | MDA | MDA |
| strontium-92 | Ci | MDA | 3.09E-5 | MDA | 6.71E-5 |
| tellurium-129m | Ci | MDA | MDA | MDA | 1.14E-3 |
| tellurium-131 | Ci | MDA | MDA | MDA | MDA |
| tellurium-132 | Ci | MDA | MDA | MDA | 4.01E-5 |
| tin-113 | Ci | MDA | MDA | MDA | MDA |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 5B (CONTINUED)**
**LIQUID EFFLUENTS - NUCLIDES RELEASED**

| | | Third Quarter | | Fourth Quarter | |
|---|---|---|---|---|---|
| Nuclides Released | Units | Continuous Mode | Batch Mode | Continuous Mode | Batch Mode |
| tin-117m | Ci | MDA | MDA | MDA | 4.58E-6 |
| tungsten-187 | Ci | MDA | MDA | MDA | MDA |
| zinc-65 | Ci | MDA | 6.72E-4 | MDA | 1.73E-3 |
| zirconium-95 | Ci | MDA | 7.58E-6 | MDA | 7.03E-5 |
| iodine-131 | Ci | MDA | 3.94E-4 | MDA | 1.14E-4 |
| iodine-132 | Ci | MDA | MDA | MDA | 6.20E-5 |
| iodine-133 | Ci | MDA | 4.88E-5 | MDA | 8.88E-5 |
| iodine-134 | Ci | MDA | MDA | MDA | MDA |
| iodine-135 | Ci | MDA | MDA | MDA | MDA |
| TOTAL FOR PERIOD | Ci | MDA | 1.17E-2 | MDA | 3.23E-2 |

**DISSOLVED AND ENTRAINED GASES**

| | | | | | |
|---|---|---|---|---|---|
| xenon-133 | Ci | MDA | 7.33E-5 | MDA | 1.81E-3 |
| xenon-133m | Ci | MDA | MDA | MDA | MDA |
| xenon-135 | Ci | MDA | 4.57E-6 | MDA | 1.46E-5 |
| krypton-85 | Ci | MDA | MDA | MDA | MDA |
| krypton-87 | Ci | MDA | MDA | MDA | MDA |
| krypton-88 | Ci | MDA | MDA | MDA | MDA |
| TOTAL FOR PERIOD | Ci | MDA | 7.78E-5 | MDA | 1.82E-3 |

MDA = Less than the "a posteriori" minimum detectable activity (microcuries per unit mass or volume). This note applies to all tables.

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 6**
**LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION**

| Nuclide | Units | LLD |
|---|---|---|
| antimony-122 | µCi/ml | 5.00E-8 |
| antimony-124 | µCi/ml | 2.82E-8 |
| antimony-125 | µCi/ml | 8.26E-8 |
| barium-140 | µCi/ml | 1.39E-7 |
| beryllium-7 | µCi/ml | 2.61E-7 |
| bromine-82 | µCi/ml | 4.11E-8 |
| cerium-141 | µCi/ml | 4.03E-8 |
| cerium-143 | µCi/ml | 6.73E-8 |
| cerium-144 | µCi/ml | 1.57E-7 |
| cesium-134 | µCi/ml | 2.90E-8 |
| cesium-136 | µCi/ml | 4.57E-8 |
| cesium-137 | µCi/ml | 3.44E-8 |
| cesium-138 | µCi/ml | 2.64E-7 |
| chromium-51 | µCi/ml | 2.03E-7 |
| cobalt-57 | µCi/ml | 1.89E-8 |
| cobalt-58 | µCi/ml | 3.98E-8 |
| cobalt-60 | µCi/ml | 6.42E-8 |
| iron-55 | µCi/ml | 3.00E-7 |
| iron-59 | µCi/ml | 6.65E-8 |
| lanthanum-140 | µCi/ml | 5.45E-8 |
| lanthanum-142 | µCi/ml | 1.25E-7 |
| manganese-54 | µCi/ml | 4.16E-8 |
| manganese-56 | µCi/ml | 1.94E-7 |
| molybdenum-99 | µCi/ml | 2.07E-8 |
| niobium-95 | µCi/ml | 3.33E-8 |

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 6 (CONTINUED)**
**LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION**

| Nuclide | Units | LLD |
|---|---|---|
| neodymium-147 | µCi/ml | 1.06E-7 |
| rubidium-89 | µCi/ml | 1.78E-6 |
| ruthenium-103 | µCi/ml | 2.48E-8 |
| silver-110m | µCi/ml | 2.68E-8 |
| sodium-24 | µCi/ml | 3.85E-8 |
| strontium-89 | µCi/ml | 4.78E-8 |
| strontium-90 | µCi/ml | 2.03E-8 |
| strontium-91 | µCi/ml | 5.66E-8 |
| strontium-92 | µCi/ml | 6.77E-8 |
| tellurium-129m | µCi/ml | 1.17E-6 |
| tellurium-131 | µCi/ml | 1.74E-7 |
| tellurium-132 | µCi/ml | 2.17E-8 |
| tin-113 | µCi/ml | 3.94E-8 |
| tin-117m | µCi/ml | 2.41E-8 |
| tungsten-187 | µCi/ml | 9.23E-8 |
| zinc-65 | µCi/ml | 7.18E-8 |
| zirconium-95 | µCi/ml | 4.73E-8 |
| gross alpha | µCi/ml | 9.33E-8 |
| hydrogen-3 | µCi/ml | 4.27E-6 |

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 6 (CONTINUED)**
**LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION**

| Nuclide | Units | LLD |
|---|---|---|
| iodine-131 | µCi/ml | 3.36E-8 |
| iodine-132 | µCi/ml | 4.38E-8 |
| iodine-133 | µCi/ml | 3.01E-8 |
| iodine-134 | µCi/ml | 9.26E-8 |
| iodine-135 | µCi/ml | 2.39E-7 |
| xenon-133 | µCi/ml | 5.82E-8 |
| xenon-133m | µCi/ml | 1.95E-7 |
| xenon-135 | µCi/ml | 2.31E-8 |
| krypton-85 | µCi/ml | 9.62E-6 |
| krypton-87 | µCi/ml | 8.93E-8 |
| krypton-88 | µCi/ml | 1.09E-7 |

# X. Solid Radwaste Shipments

## X. Solid Radwaste Shipments

### Solid Waste and Irradiated Fuel Shipment

### A. Solid Waste Shipped Offsite for Burial or Disposal (Not irradiated fuel)

| 1. Type of Waste | Unit | 12 Month Period | Est. Total Error, % |
|---|---|---|---|
| a. Spent Resins, Filter Sludges, Evaporator Bottoms, etc. | $m^3$<br>Ci | 1.27E+1<br>3.99E+2 | 0.00E+0<br>4.92E+0 |
| b. Dry Compressible Waste, Contaminated Equipment, etc. | $m^3$<br>Ci | 1.29E+1<br>1.36E+0 | 0.00E+0<br>1.00E+1 |
| c. Irradiated Components, Control Rods, etc. | $m^3$<br>Ci | 2.38E-2<br>2.01E-2 | 0.00E+0<br>0.00E+0 |
| d. Other | $m^3$<br>Ci | 0.00E+0<br>0.00E+0 | 0.00E+0<br>0.00E+0 |

### 2. Estimate of Major Nuclide Composition (by type of waste)

a.

| | | |
|---|---|---|
| Fe-55 | % | 12 |
| Co-60 | % | 44 |
| Ni-63 | % | 16 |
| Zn-65 | % | 14 |
| Co-58 | % | 7 |

b.

| | | |
|---|---|---|
| Fe-55 | % | 35 |
| Co-58 | % | 7 |
| Co-60 | % | 11 |
| Zr-95 | % | 7 |
| Ni-63 | % | 6 |
| Nb-95 | % | 5 |
| H-3 | % | 14 |
| C-14 | % | 5 |
| Cs-137 | % | 5 |

c.

| | | |
|---|---|---|
| Fe-55 | % | 63 |
| Co-60 | % | 20 |
| Zn-65 | % | 11 |

d.

| | | |
|---|---|---|
| Not Applicable | % | N/A |

**Solid Waste and Irradiated Fuel Shipment (Continued)**

3. **Solid Waste Disposition**

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| 7 | Truck | Barnwell, SC |
| 25 | Truck | Environcare, UT |
| 5 | Rail | Environcare, UT |

4. **Supplemental Information Required by TS 6.9.1.6**

| Solidification Agent | Type of Container | Number of Containers | 10 CFR 61 Waste Class | Shipping Type |
|---|---|---|---|---|
| Cement | Strong Tight | 1 | C | LSA II |
| Metal | Metal HIC | 1 | B | LSA II (Type A Cask) |
| None | Poly HIC | 1 | AS | LSA II (Type A Cask) |
| None | Type A, Poly HIC | 3 | B | Type B Cask |
| None | Strong Tight | 31 | AU | LSA II |

**B. Irradiated Fuel Shipments (Disposition)**

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| None | N/A | N/A |

## XI. Radiation Dose Due to Gaseous and Liquid Effluents

### Radiation Doses

### A. Radiation Doses from Radioactive Liquid Effluents

The radiation dose contributions due to releases of radioactive liquid effluents to the total body and each individual organ for the maximum exposed adult have been calculated in accordance with the methodology in the ODCP. Dose contributions listed in Table 7 show conformance to RECP 6.1.4.1.

### B. Radiation Doses from Radioactive Gaseous Effluents

The radiation dose contributions due to radioactive gaseous effluents at the site boundary for the land sectors have been calculated in accordance with the calculation methodology in the ODCP. Each unit's dose contribution has been calculated separately. The latest five-year historical average meteorology conditions were used in these calculations. In addition to the site boundary doses, the dose to an individual (critical receptor) due to radioiodines, tritium, and particulates released in gaseous effluents with half-lives greater than 8 days is determined in accordance with the methodology in the ODCP based on the methodology described in NUREG 0133. Dose contributions listed in Table 8, which represents the maximum dose for age groups, organs, and geographic locations for the report period, show conformance to RECP 6.1.6.1, 6.1.7.1, and 6.1.8.1.

### C. Radiation Doses from Direct Radiation (Line-of-Sight Plus Sky-Shine) - Closest Site Boundary (800 m)

For the report period, the radiation dose is evaluated to be 5.84E-3 mrem due to the presence of radioactive waste containers outside of plant buildings and the storage of contaminated tools and equipment inside plant buildings.

### D. Radiation Doses from Chemistry Laboratory Radioactive Gaseous Effluents - Closest Site Boundary (800m)

The radiation doses due to chemistry laboratory radioactive gaseous effluents for the report period is evaluated to be 2.34E-6 mrem.

### E. Radiation Doses from Post accident Sampling System Radioactive Gaseous Effluents - Closest Site Boundary (800m)

The radiation doses due to post accident sampling system radioactive gaseous effluents for the report period is evaluated to be 1.78E-6 mrem.

## F. 40 CFR 190 Considerations

The release of radioactivity in liquid and gaseous effluents resulted in doses that are small percentages of the TS limits as shown in Tables 9 and 10. This, coupled with the fact that there are no other uranium fuel cycle sources within eight kilometers of the DCPP, shows conformance to 40 CFR 190.

## G. Radiation Doses from Radioactive Liquid And Gaseous Effluents to Members of the Public Due To Their Activities Inside The Site Boundary

1. Liquid Effluents

   The radiation dose to members of the public within the site boundary due to the release of radioactive liquid effluents is negligible because the discharge piping for liquid radwaste is mostly imbedded in concrete, located in remote or inaccessible areas, or is underground. In addition, the quantity of radioactivity released was very low.

2. Gaseous Effluents

   The radiation dose to members of the public within the site boundary due to the release of radioactive gaseous effluents are listed in Table 11.

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 7
## RADIATION DOSE DUE TO THE RELEASE OF RADIOACTIVE LIQUID EFFLUENTS

| | millirem | | | | |
|---|---|---|---|---|---|
| | First Quarter | Second Quarter | Third Quarter | Fourth Quarter | Annual Total |
| Total Body | 5.83E-04 | 2.20E-04 | 1.83E-04 | 3.54E-04 | 1.34E-03 |
| Bone | 1.28E-03 | 2.67E-04 | 1.34E-04 | 4.22E-04 | 2.10E-03 |
| Liver | 1.55E-03 | 4.89E-04 | 3.20E-04 | 7.69E-04 | 3.13E-03 |
| Thyroid | 3.41E-05 | 4.68E-05 | 9.99E-05 | 6.11E-05 | 2.42E-04 |
| Kidney | 5.42E-04 | 2.60E-04 | 2.03E-04 | 4.10E-04 | 1.42E-03 |
| Lung | 4.14E-04 | 8.53E-05 | 1.11E-04 | 1.50E-04 | 7.59E-04 |
| G.I. LLI | 1.89E-03 | 5.57E-04 | 3.42E-04 | 1.07E-03 | 3.86E-03 |

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE 8A
## RADIATION DOSE[1] DUE TO THE RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS (UNIT 1)

| | | First Quarter Dose | Second Quarter Dose | Third Quarter Dose | Fourth Quarter Dose | Annual Total Dose |
|---|---|---|---|---|---|---|
| Site Boundary | | | | | | |
| Noble Gas | | | | | | |
| Gamma Air Dose | mrad | 3.16E-5 | 2.93E-5 | 3.93E-5 | 9.48E-4 | 1.05E-3 |
| Beta Air Dose | mrad | 1.12E-5 | 3.82E-5 | 6.78E-5 | 4.68E-4 | 5.85E-4 |

| | | First Quarter Dose | Second Quarter Dose | Third Quarter Dose | Fourth Quarter Dose | Annual Total Dose |
|---|---|---|---|---|---|---|
| Nearest Residence - NNW | | | | | | |
| I ,P, T[2,3] | | | | | | |
| Critical Receptor (Highest Organ) | mrem | 3.04E-4 | 3.41E-4 | 1.38E-4 | 1.41E-3 | 2.19E-3 |

| | | First Quarter Dose | Second Quarter Dose | Third Quarter Dose | Fourth Quarter Dose | Annual Total Dose |
|---|---|---|---|---|---|---|
| Nearest Vegetable Garden - ESE | | | | | | |
| I ,P, T[2,4] | | | | | | |
| Critical Receptor (Highest Organ) | mrem | 2.73E-4 | 3.06E-4 | 1.24E-4 | 1.25E-3 | 1.95E-3 |

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000

## TABLE 8B

## RADIATION DOSE[1] DUE TO THE RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS (UNIT 2)

| | | First Quarter Dose | Second Quarter Dose | Third Quarter Dose | Fourth Quarter Dose | Annual Total Dose |
|---|---|---|---|---|---|---|
| Site Boundary | | | | | | |
| Noble Gas | | | | | | |
| Gamma Air Dose | mrad | 1.46E-5 | 2.17E-4 | 9.11E-5 | 9.03E-5 | 4.13E-4 |
| Beta Air Dose | mrad | 1.97E-4 | 4.05E-4 | 2.36E-4 | 3.50E-4 | 1.19E-3 |

| | | First Quarter Dose | Second Quarter Dose | Third Quarter Dose | Fourth Quarter Dose | Annual Total Dose |
|---|---|---|---|---|---|---|
| Nearest Residence - NNW | | | | | | |
| I ,P, T[2,3] | | | | | | |
| Critical Receptor (Highest Organ) | mrem | 4.10E-4 | 2.09E-4 | 1.41E-4 | 2.14E-4 | 9.75E-4 |

| | | First Quarter Dose | Second Quarter Dose | Third Quarter Dose | Fourth Quarter Dose | Annual Total Dose |
|---|---|---|---|---|---|---|
| Nearest Vegetable Garden - ESE | | | | | | |
| I ,P, T[2,4] | | | | | | |
| Critical Receptor (Highest Organ) | mrem | 3.70E-4 | 1.83E-4 | 1.27E-4 | 1.93E-4 | 8.73E-4 |

**Notes for Tables 8A and 8B**

1. This represents the maximum dose of age groups, organs, and geographic locations for the quarter and the year.

2. Radioiodines, radioactive material in particulate form, and radionuclides other than noble gases with half-lives greater than eight days.

3. The inhalation and ground plane pathways are included for this location.

4. The inhalation, ground plane, and vegetable pathways are included for this location. An occupancy factor of 0.5 was used for the inhalation and ground plane pathways. The teen age group had the highest calculated dose for this location.

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 9**
**PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE LIQUID EFFLUENTS**

| | Percent | | | | |
|---|---|---|---|---|---|
| | First Quarter | Second Quarter | Third Quarter | Fourth Quarter | Annual Total |
| Total Body | 3.89E-02 | 1.47E-02 | 1.22E-02 | 2.36E-02 | 4.47E-02 |
| Bone | 2.55E-02 | 5.34E-03 | 2.68E-03 | 8.43E-03 | 2.10E-02 |
| Liver | 3.10E-02 | 9.78E-03 | 6.39E-03 | 1.54E-02 | 3.13E-02 |
| Thyroid | 6.81E-04 | 9.36E-04 | 2.00E-03 | 1.22E-03 | 2.42E-03 |
| Kidney | 1.08E-02 | 5.19E-03 | 4.07E-03 | 8.20E-03 | 1.42E-02 |
| Lung | 8.27E-03 | 1.71E-03 | 2.21E-03 | 2.99E-03 | 7.59E-03 |
| G.I. LLI | 3.78E-02 | 1.11E-02 | 6.85E-03 | 2.14E-02 | 3.86E-02 |

**NOTE:**

**[1]RECP 6.1.4.1**

# DIABLO CANYON POWER PLANT
## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000
## TABLE10A
## PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 1)

| | | First Quarter % of TS Limit | Second Quarter % of TS Limit | Third Quarter % of TS Limit | Fourth Quarter % of TS Limit | Annual Total % of TS Limit |
|---|---|---|---|---|---|---|
| Site Boundary | | | | | | |
| Noble Gas | | | | | | |
| Gamma Air Dose | mrad | 6.33E-4 | 5.87E-4 | 7.85E-4 | 1.90E-2 | 1.05E-2 |
| Beta Air Dose | mrad | 1.12E-4 | 3.82E-4 | 6.78E-4 | 4.68E-3 | 2.92E-3 |

| | | First Quarter % of TS Limit | Second Quarter % of TS Limit | Third Quarter % of TS Limit | Fourth Quarter % of TS Limit | Annual Total % of TS Limit |
|---|---|---|---|---|---|---|
| Nearest Residence - NNW | | | | | | |
| I,P, T | | | | | | |
| Critical Receptor (Highest Organ) | mrem | 4.05E-3 | 4.54E-3 | 1.84E-3 | 1.88E-2 | 1.46E-2 |

| | | First Quarter % of TS Limit | Second Quarter % of TS Limit | Third Quarter % of TS Limit | Fourth Quarter % of TS Limit | Annual Total % of TS Limit |
|---|---|---|---|---|---|---|
| Nearest Vegetable Garden - ESE | | | | | | |
| I,P, T | | | | | | |
| Critical Receptor (Highest Organ) | mrem | 3.64E-3 | 4.09E-3 | 1.65E-3 | 1.66E-2 | 1.30E-2 |

**NOTE:**
**[1]RECP 6.1.6.1, 6.1.7.1 and 6.1.8.1**

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 10B**
**PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 2)**

| | | First Quarter % of TS Limit | Second Quarter % of TS Limit | Third Quarter % of TS Limit | Fourth Quarter % of TS Limit | Annual Total % of TS Limit |
|---|---|---|---|---|---|---|
| Site Boundary | | | | | | |
| Noble Gas | | | | | | |
| Gamma Air Dose | mrad | 2.93E-4 | 4.33E-3 | 1.82E-3 | 1.81E-3 | 4.13E-3 |
| Beta Air Dose | mrad | 1.97E-3 | 4.05E-3 | 2.36E-3 | 3.50E-3 | 5.94E-3 |

| | | First Quarter % of TS Limit | Second Quarter % of TS Limit | Third Quarter % of TS Limit | Fourth Quarter % of TS Limit | Annual Total % of TS Limit |
|---|---|---|---|---|---|---|
| Nearest Residence - NNW | | | | | | |
| I ,P, T | | | | | | |
| Critical Receptor (Highest Organ) | mrem | 5.47E-3 | 2.79E-3 | 1.88E-3 | 2.86E-3 | 6.50E-3 |

| | | First Quarter % of TS Limit | Second Quarter % of TS Limit | Third Quarter % of TS Limit | Fourth Quarter % of TS Limit | Annual Total % of TS Limit |
|---|---|---|---|---|---|---|
| Nearest Vegetable Garden - ESE | | | | | | |
| I ,P, T (ESE) | | | | | | |
| Critical Receptor (Highest Organ) | mrem | 4.93E-3 | 2.44E-3 | 1.70E-3 | 2.58E-3 | 5.82E-3 |

**NOTE:**
**[1]RECP 6.1.6.1, 6.1.7.1 and 6.1.8.1**

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 11A**
**RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS**
**FIRST QUARTER, 2000**
**ON-SITE DOSE TO MEMBERS OF THE PUBLIC (SPECIAL INTEREST GROUPS)**

| | | | | External Dose | | | Internal Dose |
|---|---|---|---|---|---|---|---|
| | | | | Noble Gas | | Iodines, Particulates, and Tritium | |
| Specific Activity | Exposure Location (Sectors) | Exposure Closest Dist. (meters) | Exposure Time (Hours) | Whole Body | Skin | Ground Plane | Inhalation |
| Police at Shooting Range | SE | 700 | 52.0 | 1.77E-6 | 7.86E-6 | 7.35E-6 | 2.12E-4 |
| Tour Participants | | | | | | | |
| (a) Simulator Bldg. | S | 310 | 1.00 | 2.32E-8 | 1.03E-7 | 5.10E-8 | 2.78E-6 |
| (b) Bio Lab | SSE | 460 | 1.50 | 3.47E-8 | 1.55E-7 | 1.16E-7 | 4.17E-6 |
| (c) Overlook | E | 210 | 0.25 | 1.61E-8 | 7.18E-8 | 1.66E-8 | 1.94E-6 |
| American Indians | NW | 200 | 24.0 | 6.39E-6 | 2.85E-5 | 7.59E-6 | 7.68E-4 |
| at Burial Grounds | NNW | 200 | 24.0 | 4.47E-6 | 1.99E-5 | 4.33E-6 | 5.37E-4 |
| Ranch Hands driving | NW | 250 | 0.25 | 4.46E-8 | 1.99E-7 | 5.58E-8 | 5.36E-6 |
| cattle around site | NNW | 350 | 0.25 | 1.71E-8 | 7.61E-8 | 1.88E-8 | 2.05E-6 |
| | N | 320 | 0.25 | 1.13E-8 | 5.05E-8 | 9.47E-9 | 1.36E-6 |
| | NNE | 450 | 0.25 | 4.44E-9 | 1.98E-8 | 4.08E-9 | 5.33E-7 |
| | NE | 630 | 0.25 | 2.26E-9 | 1.01E-8 | 2.51E-9 | 2.71E-7 |

**NOTE: All doses are in mrem.**

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 11B**
**RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS**
**SECOND QUARTER, 2000**
**ON-SITE DOSE TO MEMBERS OF THE PUBLIC (SPECIAL INTEREST GROUPS)**

| | | | | External Dose | | | Internal Dose |
|---|---|---|---|---|---|---|---|
| | | | | Noble Gas | | Iodines, Particulates, and Tritium | |
| Specific Activity | Exposure Location (Sectors) | Exposure Closest Dist. (meters) | Exposure Time (Hours) | Whole Body | Skin | Ground Plane | Inhalation |
| Police at Shooting Range | SE | 700 | 52.0 | 8.97E-6 | 1.97E-5 | 2.51E-5 | 1.54E-4 |
| Tour Participants | | | | | | | |
| (a) Simulator Bldg. | S | 310 | 1.00 | 1.18E-7 | 2.58E-7 | 1.74E-7 | 2.02E-6 |
| (b) Bio Lab | SSE | 460 | 1.50 | 1.76E-7 | 3.88E-7 | 3.96E-7 | 3.03E-6 |
| (c) Overlook | E | 210 | 0.25 | 8.19E-8 | 1.80E-7 | 5.68E-8 | 1.41E-6 |
| American Indians | NW | 200 | 24.0 | 3.25E-5 | 7.14E-5 | 2.59E-5 | 5.59E-4 |
| at Burial Grounds | NNW | 200 | 24.0 | 2.27E-5 | 4.99E-5 | 1.48E-5 | 3.91E-4 |
| Ranch Hands driving | NW | 250 | 0.25 | 2.27E-7 | 4.98E-7 | 1.90E-7 | 3.90E-6 |
| cattle around site | NNW | 350 | 0.25 | 8.68E-8 | 1.91E-7 | 6.42E-8 | 1.49E-6 |
| | N | 320 | 0.25 | 5.77E-8 | 1.27E-7 | 3.23E-8 | 9.92E-7 |
| | NNE | 450 | 0.25 | 2.26E-8 | 4.96E-8 | 1.39E-8 | 3.88E-7 |
| | NE | 630 | 0.25 | 1.15E-8 | 2.52E-8 | 8.56E-9 | 1.97E-7 |

**NOTE: All doses are in mrem.**

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 11C**
**RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS**
**THIRD QUARTER, 2000**
## ON-SITE DOSE TO MEMBERS OF THE PUBLIC (SPECIAL INTEREST GROUPS)

| | | | | External Dose | | | Internal Dose |
|---|---|---|---|---|---|---|---|
| | | | | Noble Gas | | Iodines, Particulates, and Tritium | |
| Specific Activity | Exposure Location (Sectors) | Exposure Closest Dist. (meters) | Exposure Time (Hours) | Whole Body | Skin | Ground Plane | Inhalation |
| Police at Shooting Range | SE | 700 | 52.0 | 4.50E-6 | 1.03E-5 | 1.47E-7 | 8.37E-5 |
| Tour Participants | | | | | | | |
| (a) Simulator Bldg. | S | 310 | 1.00 | 5.90E-8 | 1.35E-7 | 1.02E-9 | 1.10E-6 |
| (b) Bio Lab | SSE | 460 | 1.50 | 8.85E-8 | 2.03E-7 | 2.32E-9 | 1.65E-6 |
| (c) Overlook | E | 210 | 0.25 | 4.11E-8 | 9.40E-8 | 3.33E-10 | 7.64E-7 |
| American Indians | NW | 200 | 24.0 | 1.63E-5 | 3.73E-5 | 1.52E-7 | 3.03E-4 |
| at Burial Grounds | NNW | 200 | 24.0 | 1.14E-5 | 2.61E-5 | 8.67E-8 | 2.12E-4 |
| Ranch Hands driving | NW | 250 | 0.25 | 1.14E-7 | 2.60E-7 | 1.12E-9 | 2.12E-6 |
| cattle around site | NNW | 350 | 0.25 | 4.35E-8 | 9.97E-8 | 3.76E-10 | 8.11E-7 |
| | N | 320 | 0.25 | 2.89E-8 | 6.62E-8 | 1.90E-10 | 5.38E-7 |
| | NNE | 450 | 0.25 | 1.13E-8 | 2.59E-8 | 8.16E-11 | 2.11E-7 |
| | NE | 630 | 0.25 | 5.75E-9 | 1.32E-8 | 5.02E-11 | 1.07E-7 |

**NOTE: All doses are in mrem.**

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 11D**
**RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS**
**FOURTH QUARTER, 2000**
**ON-SITE DOSE TO MEMBERS OF THE PUBLIC (SPECIAL INTEREST GROUPS)**

| | | | | External Dose | | | Internal Dose |
|---|---|---|---|---|---|---|---|
| | | | | Noble Gas | | Iodines, Particulates, and Tritium | |
| Specific Activity | Exposure Location (Sectors) | Exposure Closest Dist. (meters) | Exposure Time (Hours) | Whole Body | Skin | Ground Plane | Inhalation |
| Police at Shooting Range | SE | 700 | 52.0 | 3.93E-5 | 6.63E-5 | 1.95E-6 | 4.49E-4 |
| Tour Participants | | | | | | | |
| (a) Simulator Bldg. | S | 310 | 1.00 | 5.15E-7 | 8.69E-7 | 1.36E-8 | 5.88E-6 |
| (b) Bio Lab | SSE | 460 | 1.50 | 7.73E-7 | 1.30E-6 | 3.08E-8 | 8.83E-6 |
| (c) Overlook | E | 210 | 0.25 | 3.58E-7 | 6.05E-7 | 4.43E-9 | 4.10E-6 |
| American Indians | NW | 200 | 24.0 | 1.42E-4 | 2.40E-4 | 2.02E-6 | 1.62E-3 |
| at Burial Grounds | NNW | 200 | 24.0 | 9.95E-5 | 1.68E-4 | 1.15E-6 | 1.14E-3 |
| Ranch Hands driving | NW | 250 | 0.25 | 9.93E-7 | 1.68E-6 | 1.48E-8 | 1.13E-5 |
| cattle around site | NNW | 350 | 0.25 | 3.80E-7 | 6.41E-7 | 5.00E-9 | 4.34E-6 |
| | N | 320 | 0.25 | 2.53E-7 | 4.26E-7 | 2.52E-9 | 2.88E-6 |
| | NNE | 450 | 0.25 | 9.88E-8 | 1.67E-7 | 1.08E-9 | 1.13E-6 |
| | NE | 630 | 0.25 | 5.02E-8 | 8.48E-8 | 6.67E-10 | 5.74E-7 |

**NOTE: All doses are in mrem.**

**DIABLO CANYON POWER PLANT**
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 2000**
**TABLE 11E**
**RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS**
**ANNUAL TOTAL, 2000**
**ON-SITE DOSE TO MEMBERS OF THE PUBLIC (SPECIAL INTEREST GROUPS)**

| | | | | External Dose | | | Internal Dose |
|---|---|---|---|---|---|---|---|
| | | | | Noble Gas | | Iodines, Particulates, and Tritium | |
| Specific Activity | Exposure Location (Sectors) | Exposure Closest Dist. (meters) | Exposure Time (Hours) | Whole Body | Skin | Ground Plane | Inhalation |
| Police at Shooting Range | SE | 700 | 208.0 | 5.45E-5 | 1.04E-4 | 3.45E-5 | 8.99E-4 |
| Tour Participants | | | | | | | |
| (a) Simulator Bldg. | S | 310 | 4.00 | 7.15E-7 | 1.37E-6 | 2.40E-7 | 1.18E-5 |
| (b) Bio Lab | SSE | 460 | 6.00 | 1.07E-6 | 2.05E-6 | 5.45E-7 | 1.77E-5 |
| (c) Overlook | E | 210 | 1.00 | 4.98E-7 | 9.50E-7 | 7.82E-8 | 8.20E-6 |
| American Indians | NW | 200 | 96.0 | 1.97E-4 | 3.77E-4 | 3.57E-5 | 3.25E-3 |
| at Burial Grounds | NNW | 200 | 96.0 | 1.38E-4 | 2.64E-4 | 2.04E-5 | 2.28E-3 |
| Ranch Hands driving | NW | 250 | 1 | 1.38E-6 | 2.63E-6 | 2.62E-7 | 2.27E-5 |
| cattle around site | NNW | 350 | 1 | 5.28E-7 | 1.01E-6 | 8.84E-8 | 8.70E-6 |
| | N | 320 | 1 | 3.50E-7 | 6.69E-7 | 4.45E-8 | 5.78E-6 |
| | NNE | 450 | 1 | 1.37E-7 | 2.62E-7 | 1.92E-8 | 2.26E-6 |
| | NE | 630 | 1 | 6.97E-8 | 1.33E-7 | 1.18E-8 | 1.15E-6 |

**NOTE: All doses are in mrem.**

# XII. Meteorological Data

## Meteorological Data

The hour-by-hour listing of wind speed, wind direction, atmospheric stability, and precipitation is contained on the diskette with this submittal in accordance with TS 5.6.3.

# Attachment 1

## Radiological Monitoring and Controls Program
## (Procedure CY2, Revision 3)

**TITLE: Radiological Monitoring and Controls Program**

**APPROVED:** _____ **05/16/00** **05/18/00**
**DATE** **EFFECTIVE DATE**

**SPONSORING ORGANIZATION: CHEMISTRY CLASSIFICATION: QUALITY RELATED**

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## 1. PROGRAM OVERVIEW

It is the policy of Nuclear Power Generation (NPG) that the release of radioactive materials to the environment be in compliance with Federal regulations and be "As Low As Reasonably Achievable" (ALARA). The overall objectives are to protect the health and safety of the public from undue radiation exposure and to minimize the amount of radioactive effluents resulting from the operation of the Diablo Canyon Power Plant.

This PD defines the overall policies and general requirements related to the Radiological Monitoring and Controls Program (RMCP). This includes the Radiological Environmental Monitoring Program (REMP), and the Radioactive Effluent Controls Program (RECP).

The scope of this PD is focused on the control of releases of radioactive material to the environment, and minimizing radiological impact on the general public. Radiation protection of plant workers and visitors within the restricted area of the plant is within the scope of RP1, "Radiation Protection."

Figure 1 illustrates the hierarchy of procedures associated with this PD.

**FIGURE 1**

**CY2**
**Hierarchy of Procedures**

**CY2**

Radiological Monitoring and Controls Program

**IDAPs**

Radioactive Effluent Control Program
Environmental Radiological Monitoring Procedure

**DLAPs**

Department Specific Administrative Controls

2. APPLICABILITY

This PD is applicable to all persons involved in radioactive effluent control, monitoring, and management activities. This includes all NPG personnel, personnel matrixed to NPG from other PG&E organizations, personnel in other PG&E organizations that are engaged in activities in support of NPG, and contractor personnel that are working under NPG supervision.

3. DEFINITIONS

3.1 ALARA (acronym for "as low as reasonably achievable") - A term that means making every reasonable effort to maintain exposures to radiation as far below the dose limits of 10 CFR 20 as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and in relation to utilization of nuclear energy and licensed materials in the public interest. The specific objectives of achieving ALARA effluents are based on those described in 10 CFR 50, Appendix I.

3.2 The Radiological Monitoring and Controls Program (RMCP) - Contains the Radioactive Effluent Controls and Radiological Environmental Monitoring Programs required by Technical Specification 6.8.4 (ITS 5.5.1, 5.5.4) and descriptions of the information that should be included in the Annual Radiological Environmental Operating and Annual Radioactive Effluent Release Reports required by Technical Specifications 6.9.1.5 (ITS 5.6.2) and 6.9.1.6 (ITS 5.6.3).

3.3 Offsite Dose Calculation Procedure (ODCP) - Contains the methodology and parameters used in the calculation of offsite doses due to radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints.

3.4 Environmental Radiological Monitoring Procedure (ERMP) - Contains a description of sample locations, types of sample locations, methods and frequency of analysis, and reporting requirements.

4. PROGRAM OBJECTIVES AND REQUIREMENTS

4.1 Program Objectives

The NPG Radiological Monitoring and Controls Program is established to meet the following objectives:

4.1.1 Ensure that systems, methods, and controls are established to meet applicable regulatory requirements and objectives for release of radioactive effluents.

Liquid and gaseous radioactive waste processing systems provide the means for controlling radioactive releases. It is also important to establish administrative controls with clear delineation of responsibilities to ensure that monitoring, measurement, and release activities are properly sequenced, authorized, and controlled.

4.2 Program Requirements

The basic requirement for the Radiological Monitoring and Controls Program shall be to maintain radioactive releases to the unrestricted areas surrounding the plant in conformance with applicable Federal regulations and ALARA. The following sections provide additional requirements for various elements of the program.

4.2.1 Changes to the RMCP (including ODCP, ERMP and RECP) shall be processed in accordance with the requirements of DCPP Technical Specification Section 6.14.2 (ITS 5.5.1).

4.2.2 Radiological Environmental Monitoring Program

a. A Radiological Environmental Monitoring Program (REMP) shall be established and maintained to comply with the DCPP Technical Specification 6.8.4.h (ITS 5.5.1), Radiological Environmental Monitoring Program requirements. The program shall be provided to monitor the radiation and radionuclides in the environs of the plant, and shall address the following:

1. Monitoring, sampling, analysis, and reporting of radiation and radionuclides in the environment in accordance with the methodology and parameters in the Environmental Radiological Monitoring Procedure (ERMP),

2. A Land Use Census to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the monitoring program are made if required by the results of this census, and

3. Participation in an Interlaboratory Comparison Program to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in the environmental sample matrices are performed as part of the quality assurance program for environmental monitoring.

4.2.3 Radioactive Effluent Control Program

a. Monitoring requirements shall be established and maintained for all major and potentially significant paths for release of radioactive material during normal plant operation, including anticipated operational occurrences, to comply with Regulatory Guide 1.21, Revision 1, June 1974, requirements.

b. Procedures shall be established and maintained to define the methods and requirements for control of liquid and gaseous radioactive discharges within the limits of DCPP Technical Specification Sections 6.8.4.g (ITS 5.5.4). These procedures shall address the following:

1. Limitations on the operability of radioactive liquid and gaseous monitoring instrumentation including surveillance requirements and setpoint determination in accordance with methodology in the Off-site Dose Calculation Procedure, (ODCP).

2. Limitations on the concentrations of radioactive material released in liquid effluents to UNRESTRICTED AREAS conforming to 10 CFR Part 20, Appendix B, Table 2, Column 2,

3. Monitoring, sampling, and analysis of radioactive liquid and gaseous effluents in accordance with 10 CFR 20.1302 and with the methodology and parameters in the ODCP,

4. Limitations on the annual and quarterly doses or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released from each unit to UNRESTRICTED AREAS conforming to Appendix I to 10 CFR Part 50,

5. Determination of cumulative and projected dose contributions from radioactive effluents for the current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCP at least every 31 days,

6. Limitations on the operability and use of the liquid and gaseous effluent treatment systems to ensure that the appropriate portions of these systems are used to reduce releases of radioactivity when the projected doses in a 31-day period would exceed 2 percent of the guidelines for the annual dose or dose commitment conforming to Appendix I to 10 CFR Part 50,

7. Limitations on the dose rate resulting from radioactive material released in gaseous effluents from the site to areas at or beyond the SITE BOUNDARY shall be limited to the following:

   a) For noble gases: Less than or equal to a dose rate of 500 mrem/yr to the whole body and less than or equal to a dose rate of 3000 mrem/yr to the skin, and

   b) For Iodine-131, for Iodine-133, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days: Less than or equal to a dose rate of 1500 mrem/yr to any organ.

8. Limitations on the annual and quarterly air doses resulting from noble gases released in gaseous effluents from each unit to areas beyond the SITE BOUNDARY conforming to Appendix I to 10 CFR Part 50,

9. Limitations on the annual and quarterly doses to MEMBERS OF THE PUBLIC from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released from each unit to areas beyond the SITE BOUNDARY conforming to Appendix I to 10 CFR Part 50, and

10. Limitations on the annual dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources conforming to 40 CFR Part 190.

11. The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Radioactive Effluent Controls Program Surveillance Frequency.

c. Sampling and analysis methods associated with effluent monitoring activities shall be controlled in accordance with CY1.DC4, " Control of Material and Equipment Used For Analysis for Chemistry and Radiochemistry Program."

d. Systems that are known pathways for radioactive releases shall be explicitly addressed. Periodic sampling of systems with the potential of becoming radioactively contaminated should also be addressed.

e. An onsite meteorological program shall be established and maintained in accordance with the requirements of Regulatory Guide 1.23, February 1972, to provide sufficient data for the performance of dose assessments.

f. The collection and processing of technical data required to support the Annual Radioactive Effluent Release Report and non-routine reports to the NRC to comply with DCPP Technical Specifications Sections 6.9.1.6 (ITS 5.6.3) shall be defined as part of this program. The processing of these reports shall be performed in accordance with XI1, "Regulatory Interface."

4.2.4 Offsite Dose Calculation Procedures

a. Offsite Dose Calculation Procedures (ODCP) shall be established and maintained to define and control the methods for determining offsite doses. NRC Regulatory Guide 1.109, Revision 1, October 1977, as well as its interpretation through NUREG 0133, should be used as guidance for establishing acceptable methods. These procedures shall address the following:

1. Methods for determining monitoring instrumentation alarm setpoints are addressed in accordance with a Department-Level Administrative Procedure (DLAP) under CY2.
2. Methods for determining effluent concentrations.
3. Methods for calculating doses to persons in unrestricted areas surrounding the plant from all exposure pathways.

b. Changes to the ODCP shall be processed in accordance with the requirements of ITS 5.5.1.

4.2.5 Environmental Radiological Monitoring Procedure

a. An Environmental Radiological Monitoring Procedure (ERMP) shall be established and shall contain a description of sample locations, types of sample locations, methods and frequency of analysis, and reporting requirements.

4.2.6 Radwaste Treatment Systems

a. Radwaste Treatment Systems shall be provided to control the processing and release of radioactive materials in gaseous and liquid effluent in compliance with Technical Specification requirements. The design of these systems shall be controlled in accordance with CF3, "Design Control," and the requirements of Regulatory Guide 1.143, October 1979.

b. Approval of changes to the Radwaste Treatment Systems shall be processed in accordance with the requirements of CF4, "Modification Control."

4.2.7 Quality Assurance Requirements

In addition to requirements specified in earlier sections and those requirements utilizing procedures in the section 6.2 of this PD, the Control Program shall be subject to the Quality Assurance requirements specified in CY1, "Chemistry/Radiochemistry."

5. RESPONSIBILITIES

5.1 The Senior Vice President, Generation and Chief Nuclear Officer - is responsible for establishing the policy and general requirements for the Radiological Monitoring and Controls Program, for providing management support and guidance for the program's implementation, and ensuring compliance with all regulatory requirements is maintained.

5.2 The Vice President, Diablo Canyon Operations and Plant Manager - is responsible for the overall development, implementation, and maintenance of the Radiological Monitoring and Controls Program in accordance with the requirements of this PD.

5.3 The Vice President, Nuclear Technical Services, NPG - is responsible for ensuring that support from reporting departments is provided for the Radiological Monitoring and Controls Program.

5.4 The Manager - DCPP Operations Services - is responsible for the direct implementation of the Radiological Monitoring and Controls Program with the exception of the design of radwaste treatment and effluent monitoring systems.

5.5 The Manager - Engineering Services and the Manager, Regulatory and Design Services (R&DS) - are responsible for maintaining the design bases for installed plant radwaste treatment and effluent monitoring systems, structures, and components and providing technical support to the plant for the operation and maintenance of these systems.

5.6 The Manager - Technical and Ecological Services (TES) - is responsible for performing radiological laboratory analysis for the Radiological Environmental Monitoring Program and preparing and reviewing the Annual Radiological Environmental Operating Report.

5.7 Other PG&E Departments - called upon to support NPG activities associated with the Radioactive Effluent Control program are responsible for performing their activities in accordance with the requirements of this PD.

5.8 The Manager - Nuclear Quality Services (NQS) - is responsible for auditing the Radiological Monitoring and Controls Program at least once every 12 months.

5.9 The Manager - Maintenance Services - is responsible for maintaining the radiation monitoring systems and the hardware and software for the Rad Effluent program.

## 6. KEY IMPLEMENTING DOCUMENTS

6.1 Inter-Departmental Administrative Procedures (IDAPs)

Inter-Department Administrative Procedures shall be developed to address the following aspects of the Radiological Monitoring and Controls Program:

6.1.1 An IDAP shall be developed to define the requirements and responsibilities associated with the Radioactive Effluent Control Program.

6.1.2 An IDAP shall be developed to define the requirements and responsibilities associated with the Environmental Radiological Monitoring Procedure.

6.2 Department-Level Administrative Procedures (DLAPs)

Departments responsible for performing activities related to the Radioactive Effluent Control program shall develop DLAPs as appropriate to control program activities.

## 7. CLOSELY RELATED PROGRAMS

### 7.1 Interfaces

This section describes each of the principal interfaces and boundaries between this Program Directive and other management processes.

#### 7.1.1 AD10, "Records"

"Records" provides for the retention of Radiological Monitoring and Controls Program records.

#### 7.1.2 CF3, "Design Control"

"Design Control" addresses the implementation of design activities for installed radwaste treatment and effluent monitoring systems in accordance with the requirements of NRC Regulatory Guide 1.143.

#### 7.1.3 CF4, "Modification Control"

"Modification Control" addresses the implementation of modification activities for installed effluent monitoring systems.

#### 7.1.4 CY1, "Chemistry/Radiochemistry"

"Chemistry/Radiochemistry" addresses the methods for chemistry/radiochemistry sampling and analysis of liquid and gaseous radioactive effluents in support of this PD.

#### 7.1.5 OM7, "Problem Resolution"

"Problem Resolution" addresses deficiencies identified during the implementation of the radioactive effluent control program. OM7 also addresses evaluating nonconformances for reportability in accordance with Technical Specifications.

#### 7.1.6 TQ1, "Personnel Training and Qualification"

"Personnel Training and Qualification" identifies training and qualification requirements for personnel.

#### 7.1.7 XI1, "Regulatory Interface"

"Regulatory Interface" addresses the process for required reporting and communication with outside agencies.

#### 7.1.8 CY2.ID1, "Radioactive Effluent Controls Program"

"Radioactive Effluent Controls Program" contains the general program requirements to ensure the requirements of 10 CFR Part 20 and 10 CFR Part 50, Appendix I, are met.

## 8. RECORDS

None

9. APPENDICES

9.1 Graded Quality Assurance Requirements for Radiological Monitoring and Controls Program

10. ATTACHMENTS

None

11. REFERENCES

11.1 Title 10, Code of Federal Regulations,

11.1.1 Part 20, "Standards for Protection Against Radiation"

11.1.2 Part 50, Appendix I,

11.1.3 Part 50, Appendix A, GDC 60, 64,

11.1.4 Part 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors"

11.2 Title 40, Code of Federal Regulations, "Environmental Radiation Protection Standards for Nuclear Power Operations."

11.3 Regulatory Guide 1.109, Revision 1, October 1977, "Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50 Appendix I."

11.4 Regulatory Guide 1.143, October 1979, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants."

11.5 Regulatory Guide 1.21, Revision 1, June 1974, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluent from Light-Water-Cooled Nuclear Power Plants."

11.6 Regulatory Guide 1.23, February 1972, "Onsite Meteorological Programs."

11.7 Regulatory Guide 4.15, Revision 1, February 1979, "Quality Assurance For Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment."

11.8 Regulatory Guide 4.1, Revision 1, April 1975, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants."

11.9 Diablo Canyon Nuclear Power Plant Facility Operating Licenses (Unit 1, Unit 2)

12. SPONSOR

Fidel Guerra

## APPENDIX 9.1

## GRADED QA REQUIREMENTS FOR RADIOLOGICAL MONITORING AND CONTROLS PROGRAM

The basis for these Graded QA requirements is to comply with the regulations of 10 CFR 20, 10 CFR 50, 40 CFR 190, the Technical Specifications and Regulatory Guides 1.21, and 4.15.

1. GRADED ITEMS

Radioactive Effluent monitoring instruments are classified as Category 2 or Category 3 items per Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident." These instruments are used for detection and assessment of releases and possibly detection of containment breach with accomplishment of mitigation of the breach. These items fall under Graded QA requirements.

2. GRADED ACTIVITIES

2.1 Installed radiation monitors required per the Technical Specifications 3/4.3.3.6 (ITS 3.3.3), and 6.8.4.b (ITS deleted) for monitoring radioactive effluents during plant operations or accidents shall be calibrated at prescribed intervals.

2.2 Sampling and analysis of liquid and gaseous effluents shall be performed in accordance with CY1, "Chemistry/Radiochemistry."

2.3 Calculations, computer programs, and procedures for evaluating the dose associated with radioactive effluents shall be performed in accordance with approved quality related procedures.

3. GRADED REQUIREMENTS

3.1 Effluent releases shall be maintained ALARA and shall be performed in accordance with the requirements of this Program Directive (CY2) to limit the concentrations, doses and doserates as specified in DCPP Technical Specifications 6.8.4 (ITS 5.5.4), NRC regulations 10 CFR 20, 10 CFR 50 Appendix I, and EPA regulation 40 CFR 190.

3.2 The Annual Radiological Environmental Operating Report shall be developed in accordance with Technical Specification 6.9.1.5 (ITS 5.6.2).

3.3 The Annual Radioactive Effluent Release Report shall be developed in accordance with Technical Specification 6.9.1.6 (ITS 5.6.3).

3.4 Records that support and document radioactive effluent releases and dose evaluations shall be controlled in accordance with AD10, "Records."

3.5 Personnel involved in direct implementation of Chemistry/Radiochemistry, Operations, or Radiation Protection activities in support of the Radiological Monitoring and Controls Program are qualified in accordance with the requirements of TQ1, "Personnel Training and Qualification."

APPENDIX 9.1 (Continued)

3.6 Notifications and reports to and correspondence with regulatory agencies shall be done in accordance with XI1, "Regulatory Interface."

3.7 Written plans, procedures and instructions for implementing Radiological Monitoring and Controls Program shall be prepared, processed, and controlled in accordance with AD1, "Administrative Control Program."

3.8 Procurement of quality-related equipment or services shall be in accordance with written procedures. Applicable regulatory requirements, design bases, and any other requirements necessary to assure adequate quality shall be included in or invoked by reference in documents for procurement of items or services. Test or acceptance requirements and documentation to be submitted by the supplier shall be identified in the procurement documents. Receipt inspection requirements, if required, shall be identified in the procurement documents.

3.9 Deficiencies identified during implementation of this program shall be documented and controlled in accordance with OM7, "Problem Resolution."

3.10 Periodic assessments shall be performed at least annually to review the content and implementation of the Radiological Monitoring and Controls Program.

# Attachment 2

## Radioactive Effluents Controls Program
## (Procedure CY2.ID1, Revision 4)

**SPONSORING ORGANIZATION: CHEMISTRY**
**PROCEDURE CLASSIFICATION: QUALITY RELATED**
**REVIEW LEVEL: "A"**

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1. SCOPE

1.1 This procedure contains the general program requirements of the Radioactive Effluent Controls Program. This program ensures that the requirements of 10 CFR Part 20 and 10 CFR Part 50 Appendix I are met.

2. DISCUSSION

2.1 This procedure provides the general requirements for Radioactive Effluent Controls Program in accordance with the Technical Specifications and the implementation Generic Letter 89-01, "Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Off-Site Dose Calculation Manual or to the Process Control Program."

2.2 The following Technical Specification definitions are applicable: T.S. Section 5.5.1

2.2.1 The Offsite Dose Calculation Manual (ODCM) shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of radiological environmental monitoring program; and

2.2.2 The ODCM shall contain the radioactive effluent controls and radiological environmental monitoring activities, and the description of the information that should be included in the Annual Radiological Environmental Operating, and the Radioactive Effluent Release Reports required by Technical Specification 5.6.2 and 5.6.3.

2.2.3 The Diablo Canyon ODCM is made up of the following procedures:

CAP A-8, "Offsite Dose Calculation Procedure"

CY2.ID1, "Radioactive Effluent Controls Program"

RP1.ID11, "Environmental Radiological Monitoring Procedure"

CY2, "Radiological Monitoring and Controls Program"

Changes to each of these procedures shall be processed in accordance with the requirements of DCPP Technical Specification Section 6.1.4.2 (ITS 5.5.1).

2.3 The specific methodology and parameters used in the calculation of off-site doses resulting from radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints, is contained in CAP A-8, "Off-Site Dose Calculations Procedure (ODCP)." As such, CAP A-8 is incorporated in this procedure by reference. Therefore, the requirements for revisions to this procedure also apply to CAP A-8.

3. RESPONSIBILITIES

3.1 The Director, Chemistry is responsible for:

3.1.1 Implementation of the Off-Site Dose Calculation Procedure in a manner that meets regulatory requirements and preparing the Annual Radiological Effluent Release Report.

3.1.2 Providing direction to the Operations Staff in the processing of radioactive waste streams.

3.1.3 Ensuring preparation, review and approval of the Nonroutine Radiological Environmental Operating Report when required by Appendix 6.1.11.1. TES notifies DCPP in accordance with 3.5.

3.1.4 Ensuring that a comparison of the Annual Radioactive Effluent Release Report and the Annual Radiological Environmental Operating Report is performed.

3.1.5 Ensuring that dose commitment increases due to the Land Use Census in accordance with Appendix 6.1.12.1 are determined and communicated promptly to RP.

3.2 The Director, Radiation Protection is responsible for:

3.2.1 Ensuring the performance of the annual land use census and that the results are provided to Chemistry so that Chemistry can established the dose requirements of Appendix 6.1.12.1.

3.2.2 Ensuring that the results of the annual Land Use Census are provided to TES for inclusion in the Annual Radiological Environmental Operating Report.

3.2.3 Ensuring that changes to the Environmental Radiological Monitoring Procedure are provided to Chemistry for inclusion in the Annual Radiological Effluent Release Report.

3.3 The Director, Chemical and Environmental, TES is responsible for ensuring that REMP sample results exceeding the criteria of Appendix 6.1.11.1 are communicated promptly to the Director, Chemistry and the Director, RP at DCPP.

4. INSTRUCTIONS

4.1 Administrative Requirements

4.1.1 Appendix 6.1 of this procedure contains the operational requirements of the Radioactive Effluent Controls Program.

4.1.2 The operational requirements are implemented by equipment control guidelines (reference OP1.DC16), CAP A-8, and XI1.ID2, "Regulatory Reporting Requirements and Reporting Process."

a. The Equipment Control Guidelines implement those requirements that are related to equipment and have specific allowed outage times or operator actions.

b. CAP A-8 includes the methodology and parameters used in the calculation of off-site doses resulting from radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints.

c. XI1.ID2 implements the reporting requirements.

4.2 Reporting Requirements

4.2.1 Annual Radioactive Effluent Release Report

a. Report Schedule

1. Annual Radioactive Effluent Release Reports covering the operation of the unit during the previous calendar year shall be submitted before May 1 of each year, in accordance with 10CR50.36a.

b. The Annual Radioactive Effluent Release Reports shall include:

1. A summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974, with data summarized on a quarterly basis following the format of Appendix B thereof. For solid wastes, the format for Table 3 in Appendix B shall be supplemented with three additional categories; class of solid wastes (as defined by 10 CFR Part 61), type of container (e.g., LSA, Type A, Type B, Large Quantity) and SOLIDIFICATION agent or absorbent (e.g., cement, urea formaldehyde);

2. A list and description of unplanned releases from the site to UNRESTRICTED AREAS of radioactive materials in gaseous and liquid effluents made during the reporting period;

3. Any changes made during the reporting period to the PCP, RMCP, ERMP, and ODCP, pursuant to Specifications (ITS 5.5.1).

   **NOTE:** An FSAR update may be used in lieu of the ARERR for communicating changes to the NRC, regarding the PCP.

4. A listing of new locations for dose calculations and/or environmental monitoring identified by the Land Use Census pursuant to Appendix 6.1.

5. An explanation as to why the inoperability of liquid or gaseous effluent monitoring instrumentation was not corrected within the time specified in Appendix 6.1; and

6. Description of the events leading to liquid holdup tanks or gas storage tanks exceeding the limits of Technical Specifications 3.11.1.4 (ECG 19.1) or 3.11.2.6 (ECG 24.3).

c. A discussion of major changes to the Radwaste Treatment Systems (liquid, gaseous and solid). The discussion of each change shall contain:

1. A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR 50.59;

2. Sufficient detailed information to totally support the reason for the change without benefit of additional or supplemental information;

3. A detailed description of the equipment, components and processes involved and the interfaces with other plant systems;

4. An evaluation of the change which shows the predicted releases of radioactive materials in liquid and gaseous effluents and/or quantity of solid waste that differ from those previously predicted in the License application and amendments thereto;

5. An evaluation of the change which shows the expected maximum exposures to a MEMBER OF THE PUBLIC in the UNRESTRICTED AREA and to the general population that differ from those previously estimated in the License application and amendments thereto;

6. A comparison of the predicted releases of radioactive materials, in liquid and gaseous effluents and in solid waste, to the actual releases for the period prior to when the changes are to be make;

7. An estimate of the exposure to plant operating personnel as a result of the change; and

8. Documentation of the fact that the change was reviewed and found acceptable by the PSRC.

Otherwise the above information may be submitted as part of the annual FSAR update.

d. In addition, the Annual Radioactive Effluent Release Report shall also include:

1. An annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape/hard disk or other media of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability or the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request;

2. An assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year;

3. An assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY (see FSAR Figure 2.1-2) during the report period;

4. All assumptions used in making these assessments, i.e., specific activity, exposure time and location. The meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents, as determined by sampling frequency and measurement, shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the methodology and parameters in the OFF-SITE DOSE CALCULATION PROCEDURE (ODCP); and

5. An assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operation." Acceptable methods for calculating the dose contribution from liquid and gaseous effluents are given in Regulatory Guide 1.109, Rev. 1, October 1977.

e. A single submittal may be made for a multiple unit plant. The submittal should combine those sections that are common to all units at the plant; however, for units with separate radwaste system, the submittal shall specify the releases of radioactive material from each unit.

4.3 Revisions to the RECP

4.3.1 The requirements for revision to the RECP also apply to CAP A-8.

4.3.2 The requirements are provided in Technical Specification 6.14.2 (ITS 5.5.1).

4.4 Major changes to Liquid, Gaseous, and Solid Radwaste Treatment Systems

4.4.1 Major changes to the liquid, gaseous, and solid radwaste treatment systems shall become effective upon review and acceptance by the PSRC provided the change could be made in accordance with 10 CFR 50.59.

5. RECORDS

5.1 Data Sheets and records will be maintained in the Records Management System (RMS) in accordance with CY1.DC1, "Analytical Data Processing Responsibilities."

6. APPENDICES

6.1 Operational Requirements of the Radioactive Effluent Controls Program

6.2 High Alarm Setpoints for Fuel Building and Control Room Ventilation Systems Actuation Instrumentation

7. REFERENCES

7.1 CAP A-8, "Off-site Dose Calculation Procedure (ODCP)."

7.2 CAP A-5, "Liquid Radwaste Discharge Management."

7.3 CAP A-6, "Gaseous Radwaste Discharge Management."

7.4 RP1.ID11, "Environmental Radiological Monitoring Procedure."

7.5 OP1.DC16, "Control of Plant Equipment Not Required by the Technical Specifications."

7.6 XI1.ID2, "Regulatory Reporting Requirements and Reporting Process."

7.7 Regulatory Guide 1.21, Revision 1, June 1974.

7.8 Regulatory Guide 1.109, Revision 1, October 1977.

7.9 License Amendment Request 93-04.

7.10 10CFR20.1302

7.11 40CFR190

7.12 10CFR50.36a

7.13 10CFR50 Appendix I

7.14 CY2, "Radiological Monitoring and Controls Program"

8. SPONSOR

David Chen

APPENDIX 6.1

OPERATIONAL REQUIREMENTS OF THE RADIOACTIVE EFFLUENT CONTROLS PROGRAM

6.1.1 Radioactive Liquid Effluent Monitoring Instrumentation (Also covered by ECG 39.3)

Commitment for Operation

6.1.1.1 The radioactive liquid effluent monitoring instrumentation channels shown in Table 6.1.1-1 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of Commitment 6.1.3.1 are not exceeded. The Alarm/Trip Setpoints of these channels shall be determined in accordance with the methodology and parameters in the OFF-SITE DOSE CALCULATION PROCEDURE (ODCP).

Applicability: At all times.

Action:

a. With a radioactive liquid effluent monitoring instrumentation channel Alarm/Trip Setpoint less conservative than required by the above Commitment, immediately suspend the release of radioactive liquid effluents monitored by the affected channel or declare the channel inoperable.

b. With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 6.1.1-1. Restore the inoperable instrumentation to OPERABLE status within the time specified in the ACTION, or explain in the next Annual Radioactive Effluent Release Report why this inoperability was not corrected within the time specified.

Surveillance Requirements

6.1.1.2 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST at the frequencies shown in Table 6.1.1-2.

6.1.1.3 At least one saltwater pump shall be determined operating and providing dilution to the discharge structure at least once per 4 hours whenever dilution is required to meet the limits of Commitment 6.1.3.1.

APPENDIX 6.1 (Continued)

TABLE 6.1.1-1
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

| | INSTRUMENT | MINIMUM CHANNELS OPERABLE | ACTION |
|---|---|---|---|
| 1. | Radioactivity Monitors Providing Alarm and Automatic Termination of Release | | |
| | a. Liquid Radwaste Effluent Line (RM-18)# | 1 | 1 |
| | b. Steam Generator Blowdown Tank (RM-23) | 1 | 2 |
| 2. | Flow Rate Measurement Devices | | |
| | a. Liquid Radwaste Effluent Line (FR-20)# | 1 | 4 |
| | b. Steam Generator Blowdown Effluent Lines (FR-53) | 1 | 4 |
| | c. Oily Water Separator Effluent Line (FR-251)# | 1 | 4 |
| 3. | Radioactivity Monitor Not Providing Automatic Termination of Release | | |
| | Oily Water Separator Effluent Line (RM-3)# | 1 | 3 |

# This Radioactive Liquid Effluent Monitoring Instrumentation is common to both units.

APPENDIX 6.1 (Continued)

TABLE 6.1.1-1 (Continued)
ACTION STATEMENTS

ACTION 1 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 14 days provided that prior to initiating a release:

a. At least two independent samples are analyzed in accordance with Commitment 6.1.3.2.

b. At least two technically qualified members of the facility staff independently verify the release rate calculations and discharge line valvings.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 2 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided grab samples are analyzed for radioactivity (beta or gamma) at a lower limit of detection of no more than $10^{-7}$ microcuries/ml:

a. At least once per 12 hours when the specific activity of the secondary coolant is greater than 0.01 microcuries/gram DOSE EQUIVALENT I-131, or

b. At least once per 24 hours when the specific activity of the secondary coolant is less than or equal to 0.01 microcuries/gram DOSE EQUIVALENT I-131.

ACTION 3 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided that, at least once per 12 hours, grab samples are collected and analyzed for radioactivity (beta or gamma) at a lower limit of detection of no more than $10^{-7}$ microcuries/ml or transfer the oily water separator effluent to the Liquid Radwaste Treatment System.

ACTION 4 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided the flow rate is estimated at least once per 4 hours during actual releases. Pump performance curves may be used to estimate flow.

APPENDIX 6.1. (Continued)

TABLE 6.1.1-2
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| Instrument | Channel Check | Source Check | Channel Calibration | Channel Functional Test |
|---|---|---|---|---|
| 1. Radioactivity Monitors Providing Alarm and Automatic Termination of Release | | | | |
| a. Liquid Radwaste Effluent Line (RM-18) | D | P | R(3) | Q(1) |
| b. Steam Generator Blowdown Tank (RM-23) | D | M | R(3) | Q(1) |
| 2. Flow Rate Measurement Devices | | | | |
| a. Liquid Radwaste Effluent Line (FR-20) | D(4) | N.A. | R | Q |
| b. Steam Generator Blowdown Effluent Line (FR-53) | D(4) | N.A. | R | Q |
| c. Oily Water Separator Effluent Line (FR-251) | Daily(4) | N.A. | R | Q |
| 3. Radioactivity Monitor Not Providing Automatic Termination of Release | | | | |
| Oily Water Separator Effluent Line (RM-3) | D | M | R(3) | Q(2) |

APPENDIX 6.1 (Continued)

TABLE 6.1.1-2
TABLE NOTATION

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and Control Room alarm annunciation occurs if any of the following conditions exits:

a. Instrument indicates measured levels above the Alarm/Trip Setpoint (isolation and alarm), or
b. Relay control circuit failure (isolation only), or
c. Instrument indicates a downscale failure (alarm only), or
d. Instrument controls not set in operate mode (alarm only).

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that Control Room alarm annunciation occurs if any of the following conditions exist:

a. Instrument indicates measured levels above the Alarm Setpoint, or
b. Circuit failure, or
c. Instrument indicates a downscale failure, or
d. Instrument controls not set in operate mode.

(3) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.

(4) CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK for FR-251 shall be made once per calendar day*, and for FR-20 and FR-53 shall be made at least once per 24 hours on days on which continuous, periodic, or batch releases are made.

(5) Frequency Notation

| Notation | Frequency |
|---|---|
| D | At least once per 24 hours |
| Daily | At lease once per calendar day* |
| M | At least once per 31 days |
| Q | At least once per 92 days |
| R | At least once per 18 months |
| P | Completed prior to each release |
| N.A. | Not Applicable |

* The frequency "once per calendar day" could result in two successive channel checks nearly 48 hours apart over a two day period. This frequency is different from and should not be confused with the frequency notation "D" (at least once per 24 hours) defined in Technical Specifications.

APPENDIX 6.1 (Continued)

6.1.2 Radioactive Gaseous Effluent Monitoring Instrumentation (Also covered by ECG 39.4)

Commitment for Operation

6.1.2.1 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 6.1.2-1 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of Commitment 6.1.6.1 is not exceeded. The Alarm/Trip Setpoints of these channels meeting Commitment 6.1.6.1 shall be determined and adjusted in accordance with the methodology and parameters in the ODCP.

Applicability: As shown in Table 6.1.2-1.

Action:

a. With a radioactive gaseous effluent monitoring instrumentation channel Alarm/Trip Setpoint less conservative than required by the above Commitment, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel, or declare the channel inoperable.

b. With the number of OPERABLE radioactive gaseous effluent monitoring instrumentation channels less than the Minimum Channels OPERABLE, take the ACTION shown in Table 6.1.2-1. Restore the inoperable instrumentation to OPERABLE status within the time specified in the ACTION or explain in the next Annual Radioactive Effluent Release Report why this inoperability was not corrected within the time specified.

Surveillance Requirements

6.1.2.2 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST at the frequencies shown in Table 6.1.2-2.

APPENDIX 6.1 (Continued)

TABLE 6.1.2-1
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

| Instrument | Minimum Channel Operable | Applicability | Action |
|---|---|---|---|
| 1. Gaseous Radwaste System | | | |
| Noble Gas Activity Monitor - Providing | | | |
| Alarm and Automatic Termination of Release (RM-22) | 1 | * | 5 |
| 2. Plant Vent system | | | |
| a. Noble Gas Activity Monitor Providing Alarm (RM-14 or RM-14R) | 1 | * | 7 |
| b. Iodine Sampler | 1 | * | 9 |
| c. Particulate Sampler | 1 | * | 9 |
| d. Flow Rate Monitor (FR-12) | 1 | * | 6 |
| e. Iodine Sampler Flow Rate Monitor | 1 | * | 6 |
| 3. Containment Purge System | | | |
| Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release (RM-44A or 44B) | 2(1) | ** | 8 |

(1) 2 channels required in Modes 1, 2, 3 and 4. Only 1 channel required in Mode 6 during Core Alterations or movement of irradiated fuel within containment.

APPENDIX 6.1 (Continued)

TABLE 6.1.2-1 (Continued)
TABLE NOTATIONS

*At all times.
**MODES 1-4; also MODE 6 during CORE ALTERATIONS or movement of irradiated fuel within containment.

ACTION 5 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank(s) may be released to the environment for up to 14 days provided that prior to initiating the release:

a. At least two independent samples of the tank's contents are analyzed, and
b. At least two technically qualified members of the facility staff independently verify the release rate calculations and discharge valve lineup.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 6 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided the flow rate is estimated at least once per 4 hours.

ACTION 7 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided grab samples are taken at least once per 12 hours and these samples are analyzed for radioactivity within 24 hours.

ACTION 8 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, immediately suspend containment PURGING of radioactive effluents via this pathway.

ACTION 9 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continue for up to 30 days provided samples are continuously collected with auxiliary sampling equipment as required in Commitment Table 6.1.6-1.

**NOTE FOR ACTION 9:** To respond to the low flow alarm, determine that a simple fix cannot be made and that an auxiliary sampler is needed. Move the sampler in, hook up and verify operation, a maximum of two hours is considered a reasonable time. Over two hours should be considered as exceeding the time limitation of the commitment for operation (PSRC Interpretation 85-07).

APPENDIX 6.1 (Continued)

TABLE 6.1.2-2
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| Instrument | Channel Check | Source Check | Channel Calibration | Channel Functional Test | Modes for Which Surveillance Is Required |
|---|---|---|---|---|---|
| 1. Gaseous Radwaste System | | | | | |
| Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release (RM-22) | P | P | R(3) | Q(1) | * |
| 2. Plant Vent System | | | | | |
| a. Noble Gas Activity Monitor Providing Alarm (RM-14 or RM-14R) | D | M | R(3) | Q(2) | * |
| b. Iodine Sampler | W(4) | N.A. | N.A. | N.A. | * |
| c. Particulate Sampler | W(4) | N.A. | N.A. | N.A. | * |
| d. Flow Rate Monitor (FR-12) | D | N.A. | R | Q | * |
| e. Iodine Sampler Flow Rate Monitor | D | N.A. | R | Q | * |
| 3. Containment Purge System | | | | | |
| Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release (RM-44A or 44B) | D | P | R(3) | Q(1) | ** |

APPENDIX 6.1 (Continued)

TABLE 6.1.2-2 (Continued)
TABLE NOTATIONS

* At all times.

** MODES 1-4; also MODE 6 during CORE ALTERATIONS or movement of irradiated fuel within containment.

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if any of the following conditions exists:

a. Instrument indicates measured levels above the Alarm/Trip Setpoint (isolation and alarm), or
b. Instrument indicates a downscale failure (alarm only), or
c. Instrument controls not set in operate mode (alarm only).

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exist:

a. Instrument indicates measured levels above the Alarm Setpoint, or
b. Circuit failure, or
c. Instrument indicates a downscale failure, or
d. Instrument controls not set in operate mode.

(3) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.

(4) The CHANNEL CHECK shall consist of verifying that the iodine cartridge and particulate filter are installed in the sample holders.

(5) Frequency Notation

| Notation | Frequency |
|---|---|
| D | At least once per 24 hours |
| W | At least once per 7 days |
| M | At least once per 31 days |
| Q | At least once per 92 days |
| R | At least once per 18 months |
| P | Completed prior to each release |
| N.A. | Not Applicable |

APPENDIX 6.1 (Continued)

6.1.3 Liquid Effluents - CONCENTRATION

Commitment for Operation

6.1.3.1 The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS (see TS Figure 5.1-3) shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to $2 \times 10^{-4}$ microcurie/ml total activity.

Applicability: At all times.

Action:

With the concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS exceeding the above limits, immediately restore the concentration to within the above limits.

Surveillance Requirements

6.1.3.2 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analysis program of Table 6.1.3-1.

6.1.3.3 The results of the radioactivity analyses shall be used in accordance with the methodology and parameters in the ODCP to assure that the concentrations at the point of release are maintained within the limits of Commitment 6.1.3.1.

APPENDIX 6.1 (Continued)

TABLE 6.1.3-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

| LIQUID RELEASE TYPE | SAMPLING FREQUENCY | MINIMUM ANALYSIS FREQUENCY | TYPE OF ACTIVITY ANALYSIS | LOWER LIMIT OF DETECTION (LLD) (μCi/ml)[1] |
|---|---|---|---|---|
| 1. Batch Waste Release Tanks [4] | P<br>Each Batch | P<br>Each Batch | Principal Gamma Emitters [6] | $5x10^{-7}$ |
| | | | I-131 | $1x10^{-6}$ |
| | P<br>One Batch/M | M | Dissolved and Entrained Gases (Gamma emitters) | $1x10^{-5}$ |
| | P<br>Each Batch | M<br>Composite[2] | H-3<br>Gross Alpha | $1x10^{-5}$<br>$1x10^{-7}$ |
| | P<br>Each Batch | Q<br>Composite[2] | Sr-89, Sr-90<br>Fe-55 | $5x10^{-8}$<br>$1x10^{-6}$ |
| 2. Continuous Releases[5] | D<br>Grab Sample | W<br>Composite[3] | Principal Gamma Emitters [6] | $5x10^{-7}$ |
| | | | I-131 | $1x10^{-6}$ |
| Steam Generator Blowdown Tank | M<br>Grab Sample | M | Dissolved and Entrained Gases (Gamma emitters) | $1x10^{-5}$ |
| | D<br>Grab Sample | M<br>Composite[3] | H-3<br>Gross Alpha | $1x10^{-5}$<br>$1x10^{-7}$ |
| | D<br>Grab Sample | Q<br>Composite[3] | Sr-89, Sr-90<br>Fe-55 | $5x10^{-8}$<br>$1x10^{-6}$ |
| 3. Continuous Releases[5] | D<br>Grab Sample | W<br>Composite[3] | Principal Gamma Emitters[6] | $5x10^{-7}$ |
| Oily Water Separator Effluent | | | | |

APPENDIX 6.1 (Continued)

TABLE 6.1.3-1 (Continued)
TABLE NOTATIONS

(1) The LLD is defined, for the purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\ s_b}{E * V * 2.22 \times 10^6 * Y * \exp(-\lambda \Delta t)}$$

Where:

| | | |
|---|---|---|
| LLD | = | the "a priori" lower limit of detection (microcuries per unit mass or volume), |
| $s_b$ | = | the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute), |
| E | = | the counting efficiency (counts per disintegration), |
| V | = | the sample size (units of mass or volume), |
| $2.22 \times 10^6$ | = | the number of disintegrations per minute per microcurie, |
| Y | = | the fractional radiochemical yield, when applicable, |
| $\lambda$ | = | the radioactive decay constant for the particular radionuclide ($sec^{-1}$), and |
| $\Delta t$ | = | the elapsed time between the midpoint of sample collection and the time of counting (sec). |

Typical values of E, V, Y, and $\Delta t$ should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posterior (after the fact) limit for a particular measurement.

(2) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.

(3) To be representative of the quantities and concentrations of radioactive materials in liquid effluents, samples shall be composited in proportion to the rate of flow of the effluent stream. Prior to analyses, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.

(4) A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed, by a method described in the ODCP, to assure representative sampling.

APPENDIX 6.1 (Continued)

TABLE 6.1.3-1 (Continued)
TABLE NOTATIONS

(5) A continuous release is the discharge of liquid wastes of a nondiscrete volume; e.g., from a volume of system that has an input flow during the continuous release.

(6) The principal gamma emitters for which the LLD specification applies include the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, and Ce-141. Ce-144 shall also be measured but with an LLD of $5x10^{-6}$. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radioactive Effluent Release Report.

(7) Frequency Notation:

| Notation | Frequency |
|---|---|
| D | At least once per 24 hours. |
| W | At least once per 7 days. |
| M | At least once per 31 days. |
| Q | At least once per 92 days. |
| P | Completed prior to each release. |

6.1.4 Liquid Effluents - Dose

Commitment for Operation

6.1.4.1 The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to UNRESTRICTED AREAS (see FSAR Figure 5.1-3) shall be limited:

a. During any calendar quarter to less than or equal to 1.5 mrem to the whole body and to less than or equal to 5 mrem to any organ, and

b. During any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

Applicability: At all times.

Action:

a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

APPENDIX 6.1 (Continued)

Surveillance Requirements

6.1.4.2 Cumulative dose contributions from liquid effluents for the current calendar quarter and the current calendar year shall be determined in accordance with the methodology and parameters in the ODCP at least once per 31 days.

6.1.5 Liquid Radwaste Treatment System

Commitment for Operation

6.1.5.1 The Liquid Radwaste Treatment System* shall be OPERABLE and appropriate portions of the system shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the projected doses due to the liquid effluent, from each unit, to UNRESTRICTED AREAS (see FSAR Figure 2.1-2) would exceed 0.06 mrem to the whole body or 0.2 mrem to any organ in a 31-day period.

Applicability: At all times.

Action:

a. With any portion of the Liquid Radwaste Treatment System not in operation and with radioactive liquid waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report which includes the following information:

1. Explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reason for the inoperability,
2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and
3. Summary description of action(s) taken to prevent a recurrence.

Surveillance Requirements

6.1.5.2 Doses due to liquid releases from each unit to UNRESTRICTED AREAS shall be projected at least once per 31 days, in accordance with the methodology and parameters in the ODCP when Liquid Radwaste Treatment Systems are not being fully utilized.

6.1.5.3 The installed Liquid Radwaste Treatment System shall be considered OPERABLE by meeting Commitments 6.1.3.1 and 6.1.4.1.

* The Liquid Radwaste Treatment System is common to both units.

APPENDIX 6.1 (Continued)

6.1.6 Gaseous Effluents - Dose Rate

Commitment for Operation

6.1.6.1 The dose rate due to radioactive materials released in gaseous effluents from the site to areas at or beyond the SITE BOUNDARY (see FSAR Figure 2.1-2) shall be limited to the following:

a. For noble gases: Less than or equal to 500 mrem/yr to the whole body and less than or equal to 3000 mrem/yr to the skin, and

b. For Iodine-131, for Iodine-133, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.

Applicability: At all times.

Action:

With the dose rate(s) exceeding the above limits, immediately decrease the release rate to within the above limit(s).

Surveillance Requirements

6.1.6.2 The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with the methodology and procedures of the ODCP.

6.1.6.3 The dose rate due to Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents shall be determined to be within the above limits in accordance with the methodology and procedures of the ODCP by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 6.1.6-1.

APPENDIX 6.1 (Continued)

TABLE 6.1.6-1
RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

| GASEOUS RELEASE TYPE | SAMPLING FREQUENCY | MINIMUM ANALYSIS FREQUENCY | TYPE OF ACTIVITY ANALYSIS | LOWER LIMIT OF DETECTION (LLD) (μCi/ml) (1) |
|---|---|---|---|---|
| 1. Waste Gas Decay Tank | P Each Tank Grab Sample | P Each Tank | Principal Gamma Emitters(7) (noble gases) | $1x10^{-4}$ |
| 2. Containment Purge | P Each Purge(2) Grab Sample | P Each Purge(2) | Principal Gamma Emitters(7) (noble gases) | $1x10^{-4}$ |
| | | | I-131, I-133 | $1x10^{-9}$ |
| | | | Principal Gamma Emitters (particulates) | $1x10^{-9}$ |
| | | | H-3 | $1x10^{-6}$ |
| 3. Plant Vent | M(2) Grab Sample | M(2) | Principal Gamma Emitters(7) (noble gases) | $1x10^{-4}$ |
| | M(3)(5) Grab Sample | W | H-3 | $1x10^{-6}$ |
| 4. All Release Types as listed in 1., 2., 3., above, at the plant vent | Continuous(6) | W(4) Charcoal Sample | I-131 | $1x10^{-12}$ |
| | | | I-133 | $1x10^{-10}$ |
| | Continuous(6) | W(4) Particulate Sample | Principal Gamma Emitters(7) | $1x10^{-11}$ |
| | Continuous(6) | M Composite Particulate Sample | Gross Alpha | $1x10^{-11}$ |
| | Continuous(6) | Q Composite Particulate Sample | Sr-89, Sr-90 | $1x10^{-11}$ |
| 5. Steam Generator Blowdown Tank Vent | M(8) | M(8) | Principal Gamma Emitters(7) (noble gases) | $1x10^{-4}$ |

APPENDIX 6.1 (Continued)

TABLE 6.1.6-1 (Continued)
TABLE NOTATIONS

(1) The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\ s_b}{E V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

| | | |
|---|---|---|
| LLD | = | the "a priori" lower limit of detection (microcuries per unit mass or volume), |
| $s_b$ | = | the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute), |
| E | = | the counting efficiency (counts per disintegration), |
| V | = | the sample size (units of mass or volume), |
| $2.22 \times 10^6$ | = | the number of disintegrations per minute per microcurie, |
| Y | = | the fractional radiochemical yield, when applicable, |
| $\lambda$ | = | the radioactive decay constant for the particular radionuclide ($sec^{-1}$), and |
| $\Delta t$ | = | the elapsed time between the midpoint of sample collection and the time of counting (sec). |

Typical values of E, V, Y, and $\Delta t$ should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posterior (after the fact) limit for a particular measurement.

(2) Sampling and analyses shall also be performed following shutdown, startup, or a THERMAL POWER change exceeding 15% of the RATED THERMAL POWER within a 1-hour period.

(3) Tritium grab samples shall be taken a least once per 24 hours when the refueling canal is flooded.

APPENDIX 6.1 (Continued)

TABLE 6.1.6-1 (Continued)
TABLE NOTATIONS (Continued)

(4) Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing or after removal from sampler. Sampling shall also be performed at least once per 24 hours for at least 7 days following each shutdown, startup or THERMAL POWER change exceeding 15% of RATED THERMAL POWER within a 1-hour period and analyses shall be completed within 48 hours of changing. When samples collected for 24 hours are analyzed, the corresponding LLD's may be increased by a factor of 10. This requirement does not apply if: (1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the reactor coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

(5) Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel pool area, whenever spent fuel is in the spent fuel pool.

(6) The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Commitments 6.1.6.1, 6.1.7.1, and 6.1.8.1.

(7) The principal gamma emitters for which the LLD specification applies include the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 in noble gas releases and Mn-54 , Fe-59, Co-58, Co-60, Zn-65, Mo-99, I-131, Cs-134, Cs-137, Ce-141, and Ce-144 in Iodine and particulate releases. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radioactive Effluent Release Report.

(8) Grab samples shall be taken and analyzed at least once per 31 days whenever there is flow through the steam generator blowdown tank. Releases of radioiodines shall be estimated based on secondary coolant concentration and partitioning factors during releases or shall be measured.

(9) Frequency Notation

| Notation | Frequency |
|---|---|
| W | At least once per 7 days |
| M | At least once per 31 days |
| Q | At least once per 92 days |
| P | Completed prior to each release |

APPENDIX 6.1 (Continued)

6.1.7 Dose - Noble Gases

Commitment for Operation

6.1.7.1 The air dose due to noble gases released in gaseous effluents, from each unit, to areas at or beyond the SITE BOUNDARY (see TS Figure 5.1-3) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and

b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

Applicability: At all times.

Action:

a. With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that identifies the cause(s) for exceeding the limit(s), defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

Surveillance Requirements

6.1.7.2 Cumulative dose contributions for the current calendar quarter and current calendar year for noble gases shall be determined in accordance with the methodology and parameters in the ODCP at least once per 31 days.

6.1.8 Dose - Iodine-131, Iodine-133, Tritium, and Radioactive Material in Particulate Form

Commitment for Operation

6.1.8.1 The dose to a MEMBER OF THE PUBLIC from Iodine-131, Iodine-133, tritium and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released, from each unit, to areas at and beyond the SITE BOUNDARY (see TS Figure 5.1-3) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ and,

b. During any calendar year: Less than or equal to 15 mrem to any organ.

Applicability: At all times.

APPENDIX 6.1 (Continued)

Action:

a. With the calculated dose from the release of Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that identifies the cause(s) for exceeding the limit(s), defines the corrective actions that have been taken to reduce the releases and the proposed actions to be taken to assure that subsequent releases will be in compliance with the above limits.

Surveillance Requirements

6.1.8.2 Cumulative dose contributions for the current calendar quarter and current calendar year for Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days shall be determined in accordance with the methodology and parameters in the ODCP at least once per 31 days.

6.1.9 Gaseous Radwaste Treatment System

Commitment for Operation

6.1.9.1 The GASEOUS RADWASTE SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM shall be OPERABLE. The appropriate portions of these systems shall be used to reduce releases of radioactivity when the projected doses in 31 days due to gaseous effluent releases, from each unit, to areas at and beyond the SITE BOUNDARY (see FSAR Figure 2.1-2), would exceed 0.2 mrad to air from gamma radiation or 0.4 mrad to air from beta radiation or 0.3 mrem to any organ of a MEMBER OF THE PUBLIC.

Applicability: At all times.

Action:

a. With radioactive gaseous waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that includes the following information:

1. Identification of the inoperable equipment or subsystems and the reason for inoperability,
2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and
3. Summary description of action(s) taken to prevent a recurrence.

APPENDIX 6.1 (Continued)

Surveillance Requirements

6.1.9.2 Doses due to gaseous releases from each unit to areas at and beyond the SITE BOUNDARY shall be projected at least once per 31 days, in accordance with the methodology and parameters in the ODCP when Gaseous Radwaste Treatment Systems are not being fully utilized.

6.1.9.3 The installed VENTILATION EXHAUST TREATMENT SYSTEM and GASEOUS RADWASTE SYSTEM shall be considered OPERABLE by meeting Commitments 6.1.6.1 and 6.1.7.1 or 6.1.8.1.

6.1.10 Total Dose

Commitment for Operation

6.1.10.1 The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems.

Applicability: At all times.

Action:

a. With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Commitments 6.1.4.1.a, 6.1.4.1.b, 6.1.7.1.a, 6.1.7.1.b, 6.1.8.1.a, or 6.1.8.1.b, calculations shall be made including direct radiation contributions from the units and from outside storage tanks to determine whether the above limits of Regulatory Commitment 6.1.10.1 have been exceeded. If such is the case, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the above limits and includes the schedule for achieving conformance with the above limits. This Special Report, as defined in 10 CFR 20.2203(a), shall include an analysis that estimates the radiation exposure (dose) to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathway and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations. If the estimated dose(s) exceeds the above limits, and if the release condition resulting in violation of 40 CFR Part 190 has not already been corrected, the Special Report shall include a request for a variance in accordance with the provisions of 40 CFR Part 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete.

APPENDIX 6.1 (Continued)

Surveillance Requirements

6.1.10.2 Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Commitments 6.1.4.2, 6.1.7.2, and 6.1.8.2, and in accordance with the methodology and parameters in the ODCP.

6.1.10.3 Cumulative dose contributions from direct radiation from the units and from outside storage tanks shall be determined in accordance with the methodology and parameters in the ODCP. This requirement is applicable only under conditions set forth in ACTION a. of Commitment 6.1.10.1.

6.1.11 Radiological Environmental Monitoring

6.1.11.1 Commitment for Operation - The Radiological Environmental Monitoring Program shall be conducted as specified in RP1.ID11, "Environmental Radiological Monitoring Procedure."

Applicability: At all times.

Action:

a. With the confirmed level of radioactivity as the result of plant effluents in an environmental sampling medium at a specified location exceeding the "Reporting Levels for Nonroutine Operating Reports" in RP1.ID11 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days from the end of the quarter, pursuant to 10 CFR 50.4, a Nonroutine Radiological Environmental Operating Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose to a MEMBER OF THE PUBLIC is less than the calendar year limits of Commitment 6.1.4.1, 6.1.7.1, or 6.1.8.1. A confirmatory reanalysis of the original, a duplicate, or a new sample may be desirable, as appropriate. The results of the confirmatory analysis shall be completed at the earliest time consistent with the analysis, but in any case within 30 days. When more than one of the radionuclides from "Reporting Levels for Nonroutine Operating Reports" in RP1.ID11 are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{concentration (1)}}{\text{reporting level (1)}} + \frac{\text{concentration (2)}}{\text{reporting level (2)}} + \ldots \geq 1.0$$

APPENDIX 6.1 (Continued)

When radionuclides other than those in the "Reporting Levels for Nonroutine Operating Reports" in RP1.ID11 are detected and are the result of plant effluents, a Nonroutine Radiological Environmental Operating Report shall be submitted if the potential annual dose to a MEMBER OF THE PUBLIC from all radionuclides is equal to or greater than the calendar year limits of Commitment 6.1.4.1, 6.1.7.1, or 6.1.8.1. This report shall include an evaluation of any release conditions, environmental factors, or other aspects necessary to explain the anomalous result.

6.1.12 LAND USE CENSUS

6.1.12.1 A Land Use Census shall be conducted as specified in RP1.ID11, "Environmental Radiological Monitoring Procedure."

Applicability: At all times.

Action:

a. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in Commitment 6.1.8.2, identify the new location(s) in the next Annual Radioactive Effluent Release Report.

b. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with Commitment 6.1.11.1, add the new location(s) within 30 days to the Radiological Environmental Monitoring Program given in the ERMP. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after October 31 of the year in which this Land Use Census was conducted. Submit in the next Annual Radioactive Effluent Release Report documentation for a change in the ERMP including a revised figure(s) and table(s) for the ERMP reflecting the new location(s) with information supporting the change in sampling locations.

Bases

6.1.1 Radioactive Liquid Effluent Monitoring Instrumentation

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCP to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

APPENDIX 6.1 (Continued)

6.1.2 Radioactive Gaseous Effluent Monitoring Instrumentation

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCP to ensure that the alarm/trip will occur prior to exceeding the limits of NUREG 0133. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50. The sensitivity of any noble gas activity monitors used to show compliance with the gaseous effluent release requirements of Regulatory Commitment 6.1.7.1 shall be such that concentrations as low as $1 \times 10^{-5}$ μCi/ml are measurable.

6.1.3 Liquid Effluents - Concentration

This Regulatory Commitment is provided to ensure that the concentration of radioactive materials released in liquid waste effluents to UNRESTRICTED AREAS will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table 2, Column 2. This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will result in exposures within: (1) the Section II.A design objectives of Appendix I, 10 CFR Part 50, to a MEMBER OF THE PUBLIC, and (2) the limits of 10 CFR 20.1301(e) to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its Effluent Concentration Limit (ECL) in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2.

This Regulatory Commitment applies to the release of radioactive materials in liquid effluents from all units at the site.

The required detection capabilities for radioactive materials in liquid waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD, and other detection limits can be found in Currie, L.A., "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300 (revised annually).

APPENDIX 6.1 (Continued)

6.1.4 Liquid Effluents - Dose

This Regulatory Commitment is provided to implement the requirements of Sections II.A, III.A and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.A of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in liquid effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The dose calculation methodology and parameters in the ODCP implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCP for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

This Regulatory Commitment applies to the release of radioactive materials in liquid effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the liquid effluents from the shared system are to be proportioned among the units sharing that system.

6.1.5 Liquid Radwaste Treatment System

The OPERABILITY of the Liquid Radwaste Treatment System ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the environment. The requirement that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and the design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the Liquid Radwaste Treatment System were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

This Regulatory Commitment applies to the release of radioactive materials in liquid effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the liquid effluents from the shared system are to be proportioned among the units sharing that system.

APPENDIX 6.1 (Continued)

6.1.6 Gaseous Effluents - Dose Rate

This Regulatory Commitment is provided to ensure that the dose at any time at and beyond the SITE BOUNDARY from gaseous effluents from all units on the site will be within the annual dose limits of NUREG 0133 to UNRESTRICTED AREAS. The annual dose limits are the doses to be associated with the concentrations of 10 CFR Part 20, Appendix B, Table 2, Column 1. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of a MEMBER OF THE PUBLIC in an UNRESTRICTED AREA, either within or outside the SITE BOUNDARY, to average concentrations exceeding the limits to be specified in Appendix B, Table 2 of 10 CFR Part 20 (10 CFR Part 20.1302(c)). For MEMBERS OF THE PUBLIC who may at times be within the SITE BOUNDARY, the occupancy of that MEMBER OF THE PUBLIC will usually be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY. Examples of calculations for such MEMBERS OF THE PUBLIC, with the appropriate occupancy factors, shall be given in the ODCP. The specified release rate limits of NUREG 0133 restrict, presently, the corresponding gamma and beta dose rates above background to a MEMBER OF THE PUBLIC at or beyond the SITE BOUNDARY to less than or equal to 500 mrems/year to the whole body or to less than or equal to 3000 mrems/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to a child via the inhalation pathway to less than or equal to 1500 mrems/year.

This Regulatory Commitment applies to the release of radioactive materials in gaseous effluents from all units at the site.

The required detection capabilities for radioactive material in gaseous waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD, and other detection limits can be found in Currie, L.A., "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300 (revised annually).

APPENDIX 6.1 (Continued)

6.1.7 Dose - Noble Gases

This Regulatory Commitment is provided to implement the requirements of Sections II.B, III.A and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.B of Appendix I. The ACTION statements provide the required operation flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The dose calculation methodology and parameters established in the ODCP for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977. The ODCP equations provided for determining the air doses at and beyond the SITE BOUNDARY are based upon the historical average atmospheric conditions.

This Regulatory Commitment applies to the release of radioactive materials in gaseous effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the gaseous effluents from the shared system are proportioned among the units sharing the system.

APPENDIX 6.1 (Continued)

6.1.8 Dose - Iodine-131, Iodine-133, Tritium, and Radioactive Material in Particulate Form

This Regulatory Commitment is provided to implement the requirements of Sections II.C, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Limiting Conditions for Operation are the guides set forth in Section II.C of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The ODCP calculational methods specified in the Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The ODCP calculational methodology and parameters for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors,: Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days are dependent upon the existing radionuclide pathways to man in the areas at and beyond the SITE BOUNDARY. The pathways that were examined in the development of the calculations were: (1) individual inhalation of airborne radionuclides, (2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man, (3) deposition onto grassy areas where milk animals and meat-producing animals graze with consumption of the milk and meat by man, and (4) deposition on the ground with subsequent exposure of man.

This Regulatory Commitment applies to the release of radioactive materials in gaseous effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the gaseous effluents from the shared system are proportioned among the units sharing that system.

APPENDIX 6.1 (Continued)

6.1.9 Gaseous Radwaste Treatment System

The OPERABILITY of the GASEOUS RADWASTE SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM ensures that the systems will be available for use whenever gaseous effluents require treatment prior to release to the environment. The requirement that the appropriate portions of these systems be used, when specified, provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents.

This Regulatory Commitment applies to the release of radioactive materials in gaseous effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the gaseous effluents from the shared system are proportioned among the units sharing that system.

6.1.10 Total Dose

This Regulatory Commitment is provided to meet the dose limitations of 40 CFR Part 190 that have been incorporated into 10 CFR Part 20 by 46 FR 18525. The specification requires the preparation and submittal of a Special Report whenever the calculated doses due to releases of radioactivity and to radiation from uranium fuel cycle sources exceed 25 mrems to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems. For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the units and from outside storage tanks are kept small. The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contribution from other nuclear fuel cycle facilities at the same site or within a radius of 8 km must be considered. If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provisions of 40 CFR 190.11 and 10 CFR 20.2203(a), is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in Regulatory Commitment 6.1.3.1 and 6.1.6.1. An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.

APPENDIX 6.2

HIGH ALARM SETPOINTS FOR FUEL BUILDING AND CONTROL ROOM VENTILATION SYSTEMS ACTUATION INSTRUMENTATION

6.2.1 Fuel Building Ventilation System (FBVS) Instrumentation, RE-58 and RE-59

6.2.1.1 RE-58 Nomial Setpoint ≤ 75 mr/hr

Bases

6.2.1.2 Fuel Handling Accident in Fuel Handling Building

a. The basis for the RE-58 high alarm setpoint is to initiate actions to mitigate offside dose consequences from air borne releases resulting from a fuel handling accident in the Spent Fuel Pool area. Routing ventilation exhaust from the Spent Fuel Pool area through the charcoal filter, thus stripping halogens (principally iodine isotopes) mitigates offsite dose consequences. The rerouting of the ventilation is accomplished automatically upon receipt of a RE-58 high alarm. Receipt of the high alarm also signals personnel to evacuate the area. PG&E performed a calculation (RA-90-1-0 "High and Alert Alarm Setpoint for RE-58") to base the high alarm setpoint of RE-58 on the airborne radioactivity concentration in the fuel Handling Building for the FSAR Update Expected Case accident release during a fuel handling accident. The Expected Case Accident consequence presented in the FSAR Update is a less severe, but more probable accident than the FSAR Update Design Basis Case fuel handling accident. This resulted in a more conservative (lower) setpoint than that for the Design Basis Accident Case. This calculation analyzed the detector sensitivity to the various release nuclides as presented in the FSAR Update.

b. The high alarm setpoint is set to a value more consistent with the Expected Case Accident dose rates which eliminates spurious ESF actuation while limiting the offsite consequences due to this accident. A ≤ 75mr/hr setpoint equates to a site boundary whole body dose of 1.46mr for the duration of the accident, which has been evaluated as being acceptable.

6.2.1.3 Inadvertent Criticality in the Spent Fuel Pool

a. The high density Spent Fuel Pool racks were redesigned to assure that a $K_{eff}$ equal to or less than 0.95 is maintained with the racks fully loaded with fuel of the highest anticipated reactivity in each of two regions, and flooded with unborated water at a temperature corresponding to the highest reactivity. PG&E submitted PG&E Letter No. DCL-85-30, "Re-racking of Spent Fuel Pools," on September 19, 1985. The results of the criticality analysis for normal and abnormal operations were evaluated in this report. LAR 85-13 (PG&E Letter No. DCL-85-333) was submitted on October 30, 1985, and summarized the results of the Spent Fuel Pool re-racking report. Postulated events that could potentially involve accidental criticality were examined and it was concluded that the limiting value for criticality ($K_{eff}$ of 0.95) would not be exceeded. Therefore, an inadvertent criticality in the Spent Fuel Pool is not considered a credible accident and an evaluation of the effect of raising the actuation setpoint on RE-58 was not required.

APPENDIX 6.2 (Continued)

b. Radiation monitor RE-59, which monitors the new fuel storage vault area, also provides indication of inadvertent criticality and changes in dose rate for radiation protection purposes.

6.2.1.4 RE-59 Nominal Setpoint ≤ 15mr/hr

a. In DCPP FSAR update in Chapter 12, Table 12.1-1, "Plant Zone Classifications," the Fuel Handling Building areas in which RE-59 is located is classified as Zone III, "Controlled Assess Requiring Short-Term Occupancy" as indicated in Design Criteria Memorandum DCM-T20.

b. The Zone III design maximum dose rate is≤ 15mr/hr. If the radiation flux reaches this value, the high alarm will be actuated and the ventilation mode will change as indicated above with the RE-58 high alarm actuation.

6.2.2 Control Room Ventilation System (CRVS) Instrumentation, RS-25A and RS-26A

6.2.2.1 RS-25A/RS-26A Nominal Setpoint ≤ 2 mr/hr

Bases

6.2.2.2 Per calculations DV-1-23 and DV-2-23 attachment 2:

a. The applicable NRC requirement for the radiation exposure (dose) to personnel in the Main Control Room is 10CFR20.105 "Permissible Level of Radiation in Unrestricted Areas" (superseded). Section b (1) of 10CFR20.105 limits the radiation dose for unrestricted areas to 2mr/hr and Section b (2) limits the dose to 100mr is seven consecutive days. If an operator works in the control room for 48 hours per week (12 hours per day and 4 days per week, a normal operator work week) during a 2mr/hr dose rate, the operator will receive a 96mr dose. This is less than the 100mr/week dose limit of 10CFR20.105 (superseded). Thus, a setpoint of ≤ 2 mr/hr has been established for the Control Room Air Inlet Radiation Monitors. If the radiation flux reaches this value at any of the detectors, a change in the ventilation to Mode 4 will be initiated.

b. 10CFR20.105 has been superseded and any changes to this setpoint will require a basis change to reflect the requirements of 10CFR50 Appendix A Criterion 19.

6.2.3 All of the setpoints are controlled by the setpoint control program CF6.ID1 and require a design change vehicle (request per CF4.ID1) to change. Actual field setpoints are set more conservative to account for instrument errors.

# Attachment 3

## Radioactive Effluents Control Program
## (Procedure CY2.ID1, Revision 5)

**TITLE: Radioactive Effluent Controls Program**

**12/12/00**
**EFFECTIVE DATE**

**PROCEDURE CLASSIFICATION: QUALITY RELATED**
**SPONSORING ORGANIZATION: CHEMISTRY**
**REVIEW LEVEL: "A"**

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1. SCOPE

1.1 This procedure contains the general program requirements of the Radioactive Effluent Controls Program. This program ensures that the requirements of 10 CFR Part 20 and 10 CFR Part 50 Appendix I are met.

2. DISCUSSION

2.1 This procedure provides the general requirements for Radioactive Effluent Controls Program in accordance with the Technical Specifications and the implementation Generic Letter 89-01, "Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Off-Site Dose Calculation Manual or to the Process Control Program."

2.2 The following Technical Specification definitions are applicable: T.S. Section 5.5.1

2.2.1 The Offsite Dose Calculation Manual (ODCM) shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of radiological environmental monitoring program; and

2.2.2 The ODCM shall contain the radioactive effluent controls and radiological environmental monitoring activities, and the description of the information that should be included in the Annual Radiological Environmental Operating, and the Radioactive Effluent Release Reports required by Technical Specification 5.6.2 and 5.6.3.

2.2.3 The Diablo Canyon ODCM is made up of the following procedures:

CAP A-8, "Offsite Dose Calculation Procedure"

CY2.ID1, "Radioactive Effluent Controls Program"

RP1.ID11, "Environmental Radiological Monitoring Procedure"

CY2, "Radiological Monitoring and Controls Program"

Changes to each of these procedures shall be processed in accordance with the requirements of DCPP Technical Specification Section 5.5.1.

2.3 The specific methodology and parameters used in the calculation of off-site doses resulting from radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints, is contained in CAP A-8, "Off-Site Dose Calculations Procedure (ODCP)." As such, CAP A-8 is incorporated in this procedure by reference. Therefore, the requirements for revisions to this procedure also apply to CAP A-8.

3. RESPONSIBILITIES

3.1 The Director, Chemistry is responsible for:

3.1.1 Implementation of the Off-Site Dose Calculation Procedure in a manner that meets regulatory requirements and preparing the Annual Radiological Effluent Release Report.

3.1.2 Providing direction to the Operations Staff in the processing of radioactive waste streams.

3.1.3 Ensuring that a comparison of the Annual Radioactive Effluent Release Report and the Annual Radiological Environmental Operating Report is performed.

3.1.4 Ensuring that dose commitment increases due to the Land Use Census in accordance with Appendix 6.1.12.1 are determined and communicated promptly to RP.

3.2 The Director, Radiation Protection is responsible for:

3.2.1 Ensuring the performance of the annual land use census and that the results are provided to Chemistry so that Chemistry can established the dose requirements of Appendix 6.1.12.1.

3.2.2 Ensuring that the results of the annual Land Use Census are provided to TES for inclusion in the Annual Radiological Environmental Operating Report.

3.2.3 Ensuring that changes to the Environmental Radiological Monitoring Procedure are provided to Chemistry for inclusion in the Annual Radiological Effluent Release Report.

3.2.4 Ensuring preparation, review and approval of the Nonroutine Radiological Environmental Operating Report when required by Appendix 6.1.11.1

3.3 The Director, Chemical and Environmental, TES is responsible for ensuring that REMP sample results exceeding the criteria of Appendix 6.1.11.1 are communicated promptly to the Director, Chemistry and the Director, RP at DCPP.

4. INSTRUCTIONS

4.1 Administrative Requirements

4.1.1 Appendix 6.1 of this procedure contains the operational requirements of the Radioactive Effluent Controls Program.

4.1.2 The operational requirements are implemented by equipment control guidelines (reference OP1.DC16), CAP A-8, and XI1.ID2, "Regulatory Reporting Requirements and Reporting Process."

a. The Equipment Control Guidelines implement those requirements that are related to equipment and have specific allowed outage times or operator actions.

b. CAP A-8 includes the methodology and parameters used in the calculation of off-site doses resulting from radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints.

c. XI1.ID2 implements the reporting requirements.

4.2 Reporting Requirements

4.2.1 Annual Radioactive Effluent Release Report

a. Report Schedule

1. Annual Radioactive Effluent Release Reports covering the operation of the unit during the previous calendar year shall be submitted before May 1 of each year, in accordance with 10CR50.36a.

b. The Annual Radioactive Effluent Release Reports shall include:

1. A summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974, with data summarized on a quarterly basis following the format of Appendix B thereof. For solid wastes, the format for Table 3 in Appendix B shall be supplemented with three additional categories; class of solid wastes (as defined by 10 CFR Part 61), type of container (e.g., LSA, Type A, Type B, Large Quantity) and SOLIDIFICATION agent or absorbent (e.g., cement, urea formaldehyde);

2. A list and description of unplanned releases as defined in ODCP from the site to UNRESTRICTED AREAS of radioactive materials in gaseous and liquid effluents made during the reporting period;

3. Any changes made during the reporting period to the PCP, RMCP, ERMP, and ODCP, pursuant to Technical Specification 5.5.1.

   **NOTE:** An FSAR update may be used in lieu of the ARERR for communicating changes to the NRC, regarding the PCP.

4. A listing of new locations for dose calculations and/or environmental monitoring identified by the Land Use Census pursuant to Appendix 6.1.

5. An explanation as to why the inoperability of liquid or gaseous effluent monitoring instrumentation was not corrected within the time specified in Appendix 6.1; and

6. Description of the events leading to liquid holdup tanks or gas storage tanks exceeding the limits of ECG 19.1 or ECG 24.3.

c. A discussion of major changes to the Radwaste Treatment Systems (liquid, gaseous and solid). The discussion of each change shall contain:

1. A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR 50.59;

2. Sufficient detailed information to totally support the reason for the change without benefit of additional or supplemental information;

3. A detailed description of the equipment, components and processes involved and the interfaces with other plant systems;

4. An evaluation of the change which shows the predicted releases of radioactive materials in liquid and gaseous effluents and/or quantity of solid waste that differ from those previously predicted in the License application and amendments thereto;

5. An evaluation of the change which shows the expected maximum exposures to a MEMBER OF THE PUBLIC in the UNRESTRICTED AREA and to the general population that differ from those previously estimated in the License application and amendments thereto;

6. A comparison of the predicted releases of radioactive materials, in liquid and gaseous effluents and in solid waste, to the actual releases for the period prior to when the changes are to be make;

7. An estimate of the exposure to plant operating personnel as a result of the change; and

8. Documentation of the fact that the change was reviewed and found acceptable by the PSRC.

Otherwise the above information may be submitted as part of the annual FSAR update.

d. In addition, the Annual Radioactive Effluent Release Report shall also include:

1. An annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape/hard disk or other media of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability or the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request;

2. An assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year;

3. An assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY (see FSAR Figure 2.1-2) during the report period;

4. All assumptions used in making these assessments, i.e., specific activity, exposure time and location. The meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents, as determined by sampling frequency and measurement, shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the methodology and parameters in the OFF-SITE DOSE CALCULATION PROCEDURE (ODCP); and

5. An assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operation." Acceptable methods for calculating the dose contribution from liquid and gaseous effluents are given in Regulatory Guide 1.109, Rev. 1, October 1977.

e. A single submittal may be made for a multiple unit plant. The submittal should combine those sections that are common to all units at the plant; however, for units with separate radwaste system, the submittal shall specify the releases of radioactive material from each unit.

4.3 Revisions to the RECP

4.3.1 The requirements for revision to the RECP also apply to CAP A-8.

4.3.2 The requirements are provided in Technical Specification 5.5.1.

4.4 Major changes to Liquid, Gaseous, and Solid Radwaste Treatment Systems

4.4.1 Major changes to the liquid, gaseous, and solid radwaste treatment systems shall become effective upon review and acceptance by the PSRC provided the change could be made in accordance with 10 CFR 50.59.

5. RECORDS

5.1 Data Sheets and records will be maintained in the Records Management System (RMS) in accordance with CY1.DC1, "Analytical Data Processing Responsibilities."

6. APPENDICES

6.1 Operational Requirements of the Radioactive Effluent Controls Program

6.2 High Alarm Setpoints for Fuel Building and Control Room Ventilation Systems Actuation Instrumentation

7. REFERENCES

7.1 CAP A-8, "Off-site Dose Calculation Procedure (ODCP)."

7.2 CAP A-5, "Liquid Radwaste Discharge Management."

7.3 CAP A-6, "Gaseous Radwaste Discharge Management."

7.4 RP1.ID11, "Environmental Radiological Monitoring Procedure."

7.5 OP1.DC16, "Control of Plant Equipment Not Required by the Technical Specifications."

7.6 XI1.ID2, "Regulatory Reporting Requirements and Reporting Process."

7.7 Regulatory Guide 1.21, Revision 1, June 1974.

7.8 Regulatory Guide 1.109, Revision 1, October 1977.

7.9 License Amendment Request 93-04.

7.10 10CFR20.1302

7.11 40CFR190

7.12 10CFR50.36a

7.13 10CFR50 Appendix I

7.14 CY2, "Radiological Monitoring and Controls Program"

8. SPONSOR

John Knemeyer

## APPENDIX 6.1

## OPERATIONAL REQUIREMENTS OF THE RADIOACTIVE EFFLUENT CONTROLS PROGRAM

6.1.1 Radioactive Liquid Effluent Monitoring Instrumentation (Also covered by ECG 39.3)

Commitment for Operation

6.1.1.1 The radioactive liquid effluent monitoring instrumentation channels shown in Table 6.1.1-1 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of Commitment 6.1.3.1 are not exceeded. The Alarm/Trip Setpoints of these channels shall be determined in accordance with the methodology and parameters in the OFF-SITE DOSE CALCULATION PROCEDURE (ODCP).

Applicability: At all times.

Action:

a. With a radioactive liquid effluent monitoring instrumentation channel Alarm/Trip Setpoint less conservative than required by the above Commitment, immediately suspend the release of radioactive liquid effluents monitored by the affected channel or declare the channel inoperable.

b. With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 6.1.1-1. Restore the inoperable instrumentation to OPERABLE status within the time specified in the ACTION, or explain in the next Annual Radioactive Effluent Release Report why this inoperability was not corrected within the time specified.

Surveillance Requirements

6.1.1.2 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST at the frequencies shown in Table 6.1.1-2.

6.1.1.3 At least one saltwater pump shall be determined operating and providing dilution to the discharge structure at least once per 4 hours whenever dilution is required to meet the limits of Commitment 6.1.3.1.

APPENDIX 6.1 (Continued)

TABLE 6.1.1-1
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

| | INSTRUMENT | MINIMUM CHANNELS OPERABLE | ACTION |
|---|---|---|---|
| 1. | Radioactivity Monitors Providing Alarm and Automatic Termination of Release | | |
| | a. Liquid Radwaste Effluent Line (RM-18)# | 1 | 1 |
| | b. Steam Generator Blowdown Tank (RM-23) | 1 | 2 |
| 2. | Flow Rate Measurement Devices | | |
| | a. Liquid Radwaste Effluent Line (FR-20)# | 1 | 4 |
| | b. Steam Generator Blowdown Effluent Lines (FR-53) | 1 | 4 |
| | c. Oily Water Separator Effluent Line (FR-251)# | 1 | 4 |
| 3. | Radioactivity Monitor Not Providing Automatic Termination of Release | | |
| | Oily Water Separator Effluent Line (RM-3)# | 1 | 3 |

# This Radioactive Liquid Effluent Monitoring Instrumentation is common to both units.

APPENDIX 6.1 (Continued)

TABLE 6.1.1-1 (Continued)
ACTION STATEMENTS

ACTION 1 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 14 days provided that prior to initiating a release:

a. At least two independent samples are analyzed in accordance with Commitment 6.1.3.2.

b. At least two technically qualified members of the facility staff independently verify the release rate calculations and discharge line valvings.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 2 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided grab samples are analyzed for radioactivity (beta or gamma) at a lower limit of detection of no more than $10^{-7}$ microcuries/ml:

a. At least once per 12 hours when the specific activity of the secondary coolant is greater than 0.01 microcuries/gram DOSE EQUIVALENT I-131, or

b. At least once per 24 hours when the specific activity of the secondary coolant is less than or equal to 0.01 microcuries/gram DOSE EQUIVALENT I-131.

ACTION 3 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided that, at least once per 12 hours, grab samples are collected and analyzed for radioactivity (beta or gamma) at a lower limit of detection of no more than $10^{-7}$ microcuries/ml or transfer the oily water separator effluent to the Liquid Radwaste Treatment System.

ACTION 4 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided the flow rate is estimated at least once per 4 hours during actual releases. Pump performance curves may be used to estimate flow.

APPENDIX 6.1. (Continued)

TABLE 6.1.1-2
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| Instrument | Channel Check | Source Check | Channel Calibration | Channel Functional Test |
|---|---|---|---|---|
| 1. Radioactivity Monitors Providing Alarm and Automatic Termination of Release | | | | |
| a. Liquid Radwaste Effluent Line (RM-18) | D | P | R(3) | Q(1) |
| b. Steam Generator Blowdown Tank (RM-23) | D | M | R(3) | Q(1) |
| 2. Flow Rate Measurement Devices | | | | |
| a. Liquid Radwaste Effluent Line (FR-20) | D(4) | N.A. | R | Q |
| b. Steam Generator Blowdown Effluent Line (FR-53) | D(4) | N.A. | R | Q |
| c. Oily Water Separator Effluent Line (FR-251) | Daily(4) | N.A. | R | Q |
| 3. Radioactivity Monitor Not Providing Automatic Termination of Release | | | | |
| Oily Water Separator Effluent Line (RM-3) | D | M | R(3) | Q(2) |

APPENDIX 6.1 (Continued)

TABLE 6.1.1-2
TABLE NOTATION

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and Control Room alarm annunciation occurs if any of the following conditions exits:

a. Instrument indicates measured levels above the Alarm/Trip Setpoint (isolation and alarm), or
b. Relay control circuit failure (isolation only), or
c. Instrument indicates a downscale failure (alarm only), or
d. Instrument controls not set in operate mode (alarm only).

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that Control Room alarm annunciation occurs if any of the following conditions exist:

a. Instrument indicates measured levels above the Alarm Setpoint, or
b. Circuit failure, or
c. Instrument indicates a downscale failure, or
d. Instrument controls not set in operate mode.

(3) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.

(4) CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK for FR-251 shall be made once per calendar day*, and for FR-20 and FR-53 shall be made at least once per 24 hours on days on which continuous, periodic, or batch releases are made.

(5) Frequency Notation

| Notation | Frequency |
|---|---|
| D | At least once per 24 hours |
| Daily | At lease once per calendar day* |
| M | At least once per 31 days |
| Q | At least once per 92 days |
| R | At least once per 18 months |
| P | Completed prior to each release |
| N.A. | Not Applicable |

* The frequency "once per calendar day" could result in two successive channel checks nearly 48 hours apart over a two day period. This frequency is different from and should not be confused with the frequency notation "D" (at least once per 24 hours) defined in Technical Specifications.

APPENDIX 6.1 (Continued)

6.1.2 Radioactive Gaseous Effluent Monitoring Instrumentation (Also covered by ECG 39.4)

Commitment for Operation

6.1.2.1 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 6.1.2-1 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of Commitment 6.1.6.1 is not exceeded. The Alarm/Trip Setpoints of these channels meeting Commitment 6.1.6.1 shall be determined and adjusted in accordance with the methodology and parameters in the ODCP.

Applicability: As shown in Table 6.1.2-1.

Action:

a. With a radioactive gaseous effluent monitoring instrumentation channel Alarm/Trip Setpoint less conservative than required by the above Commitment, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel, or declare the channel inoperable.

b. With the number of OPERABLE radioactive gaseous effluent monitoring instrumentation channels less than the Minimum Channels OPERABLE, take the ACTION shown in Table 6.1.2-1. Restore the inoperable instrumentation to OPERABLE status within the time specified in the ACTION or explain in the next Annual Radioactive Effluent Release Report why this inoperability was not corrected within the time specified.

Surveillance Requirements

6.1.2.2 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST at the frequencies shown in Table 6.1.2-2.

APPENDIX 6.1 (Continued)

TABLE 6.1.2-1
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

| Instrument | Minimum Channel Operable | Applicability | Action |
|---|---|---|---|
| 1. Gaseous Radwaste System | | | |
| Noble Gas Activity Monitor - Providing | | | |
| Alarm and Automatic Termination of Release (RM-22) | 1 | * | 5 |
| 2. Plant Vent system | | | |
| a. Noble Gas Activity Monitor Providing Alarm (RM-14 or RM-14R) | 1 | * | 7 |
| b. Iodine Sampler | 1 | * | 9 |
| c. Particulate Sampler | 1 | * | 9 |
| d. Flow Rate Monitor (FR-12) | 1 | * | 6 |
| e. Iodine Sampler Flow Rate Monitor | 1 | * | 6 |
| 3. Containment Purge System | | | |
| Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release (RM-44A or 44B) | 2(1) | ** | 8 |

(1) 2 channels required in Modes 1, 2, 3 and 4. Only 1 channel required in Mode 6 during Core Alterations or movement of irradiated fuel within containment.

APPENDIX 6.1 (Continued)

TABLE 6.1.2-1 (Continued)
TABLE NOTATIONS

*At all times.
** MODES 1-4; also MODE 6 during CORE ALTERATIONS or movement of irradiated fuel within containment.

ACTION 5 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank(s) may be released to the environment for up to 14 days provided that prior to initiating the release:

a. At least two independent samples of the tank's contents are analyzed, and
b. At least two technically qualified members of the facility staff independently verify the release rate calculations and discharge valve lineup.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 6 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided the flow rate is estimated at least once per 4 hours.

ACTION 7 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided grab samples are taken at least once per 12 hours and these samples are analyzed for radioactivity within 24 hours.

ACTION 8 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, immediately suspend containment PURGING of radioactive effluents via this pathway.

ACTION 9 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continue for up to 30 days provided samples are continuously collected with auxiliary sampling equipment as required in Commitment Table 6.1.6-1.

**NOTE FOR ACTION 9:** To respond to the low flow alarm, determine that a simple fix cannot be made and that an auxiliary sampler is needed. Move the sampler in, hook up and verify operation, a maximum of two hours is considered a reasonable time. Over two hours should be considered as exceeding the time limitation of the commitment for operation (PSRC Interpretation 85-07).

APPENDIX 6.1 (Continued)

TABLE 6.1.2-2
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| Instrument | Channel Check | Source Check | Channel Calibration | Channel Functional Test | Modes for Which Surveillance Is Required |
|---|---|---|---|---|---|
| 1. Gaseous Radwaste System | | | | | |
| Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release (RM-22) | P | P | R(3) | Q(1) | * |
| 2. Plant Vent System | | | | | |
| a. Noble Gas Activity Monitor Providing Alarm (RM-14 or RM-14R) | D | M | R(3) | Q(2) | * |
| b. Iodine Sampler | W(4) | N.A. | N.A. | N.A. | * |
| c. Particulate Sampler | W(4) | N.A. | N.A. | N.A. | * |
| d. Flow Rate Monitor (FR-12) | D | N.A. | R | Q | * |
| e. Iodine Sampler Flow Rate Monitor | D | N.A. | R | Q | * |
| 3. Containment Purge System | | | | | |
| Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release (RM-44A or 44B) | D | P | R(3) | Q(1) | ** |

APPENDIX 6.1 (Continued)

TABLE 6.1.2-2 (Continued)
TABLE NOTATIONS

* At all times.
** MODES 1-4; also MODE 6 during CORE ALTERATIONS or movement of irradiated fuel within containment.

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if any of the following conditions exists:

a. Instrument indicates measured levels above the Alarm/Trip Setpoint (isolation and alarm), or
b. Instrument indicates a downscale failure (alarm only), or
c. Instrument controls not set in operate mode (alarm only).

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exist:

a. Instrument indicates measured levels above the Alarm Setpoint, or
b. Circuit failure, or
c. Instrument indicates a downscale failure, or
d. Instrument controls not set in operate mode.

(3) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.

(4) The CHANNEL CHECK shall consist of verifying that the iodine cartridge and particulate filter are installed in the sample holders.

(5) Frequency Notation

| Notation | Frequency |
|---|---|
| D | At least once per 24 hours |
| W | At least once per 7 days |
| M | At least once per 31 days |
| Q | At least once per 92 days |
| R | At least once per 18 months |
| P | Completed prior to each release |
| N.A. | Not Applicable |

APPENDIX 6.1 (Continued)

6.1.3 Liquid Effluents - CONCENTRATION

Commitment for Operation

6.1.3.1 The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS (see TS Figure 5.1-3) shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to $2 \times 10^{-4}$ microcurie/ml total activity.

Applicability: At all times.

Action:

With the concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS exceeding the above limits, immediately restore the concentration to within the above limits.

Surveillance Requirements

6.1.3.2 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analysis program of Table 6.1.3-1.

6.1.3.3 The results of the radioactivity analyses shall be used in accordance with the methodology and parameters in the ODCP to assure that the concentrations at the point of release are maintained within the limits of Commitment 6.1.3.1.

APPENDIX 6.1 (Continued)

TABLE 6.1.3-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

| LIQUID RELEASE TYPE | SAMPLING FREQUENCY | MINIMUM ANALYSIS FREQUENCY | TYPE OF ACTIVITY ANALYSIS | LOWER LIMIT OF DETECTION (LLD) (μCi/ml)[1] |
|---|---|---|---|---|
| 1. Batch Waste Release Tanks [4] | P Each Batch | P Each Batch | Principal Gamma Emitters [6] | $5x10^{-7}$ |
| | | | I-131 | $1x10^{-6}$ |
| | P One Batch/M | M | Dissolved and Entrained Gases (Gamma emitters) | $1x10^{-5}$ |
| | P Each Batch | M Composite[2] | H-3 | $1x10^{-5}$ |
| | | | Gross Alpha | $1x10^{-7}$ |
| | P Each Batch | Q Composite[2] | Sr-89, Sr-90 | $5x10^{-8}$ |
| | | | Fe-55 | $1x10^{-6}$ |
| 2. Continuous Releases[5] Steam Generator Blowdown Tank | D Grab Sample | W Composite[3] | Principal Gamma Emitters [6] | $5x10^{-7}$ |
| | | | I-131 | $1x10^{-6}$ |
| | M Grab Sample | M | Dissolved and Entrained Gases (Gamma emitters) | $1x10^{-5}$ |
| | D Grab Sample | M Composite[3] | H-3 | $1x10^{-5}$ |
| | | | Gross Alpha | $1x10^{-7}$ |
| | D Grab Sample | Q Composite[3] | Sr-89, Sr-90 | $5x10^{-8}$ |
| | | | Fe-55 | $1x10^{-6}$ |
| 3. Continuous Releases[5] Oily Water Separator Effluent | D Grab Sample | W Composite[3] | Principal Gamma Emitters[6] | $5x10^{-7}$ |

APPENDIX 6.1 (Continued)

TABLE 6.1.3-1 (Continued)
TABLE NOTATIONS

(1) The LLD is defined, for the purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 s_b}{E * V * 2.22 \times 10^6 * Y * \exp(-\lambda \Delta t)}$$

Where:

| | | |
|---|---|---|
| LLD | = | the "a priori" lower limit of detection (microcuries per unit mass or volume), |
| $s_b$ | = | the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute), |
| E | = | the counting efficiency (counts per disintegration), |
| V | = | the sample size (units of mass or volume), |
| $2.22 \times 10^6$ | = | the number of disintegrations per minute per microcurie, |
| Y | = | the fractional radiochemical yield, when applicable, |
| $\lambda$ | = | the radioactive decay constant for the particular radionuclide ($sec^{-1}$), and |
| $\Delta t$ | = | the elapsed time between the midpoint of sample collection and the time of counting (sec). |

Typical values of E, V, Y, and $\Delta t$ should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posterior (after the fact) limit for a particular measurement.

(2) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.

(3) To be representative of the quantities and concentrations of radioactive materials in liquid effluents, samples shall be composited in proportion to the rate of flow of the effluent stream. Prior to analyses, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.

(4) A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed, by a method described in the ODCP, to assure representative sampling.

APPENDIX 6.1 (Continued)

TABLE 6.1.3-1 (Continued)
TABLE NOTATIONS

(5) A continuous release is the discharge of liquid wastes of a nondiscrete volume; e.g., from a volume of system that has an input flow during the continuous release.

(6) The principal gamma emitters for which the LLD specification applies include the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, and Ce-141. Ce-144 shall also be measured but with an LLD of $5x10^{-6}$. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radioactive Effluent Release Report.

(7) Frequency Notation:

| Notation | Frequency |
|---|---|
| D | At least once per 24 hours. |
| W | At least once per 7 days. |
| M | At least once per 31 days. |
| Q | At least once per 92 days. |
| P | Completed prior to each release. |

6.1.4 Liquid Effluents - Dose

Commitment for Operation

6.1.4.1 The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to UNRESTRICTED AREAS (see FSAR Figure 5.1-3) shall be limited:

a. During any calendar quarter to less than or equal to 1.5 mrem to the whole body and to less than or equal to 5 mrem to any organ, and

b. During any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

Applicability: At all times.

Action:

a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

APPENDIX 6.1 (Continued)

Surveillance Requirements

6.1.4.2 Cumulative dose contributions from liquid effluents for the current calendar quarter and the current calendar year shall be determined in accordance with the methodology and parameters in the ODCP at least once per 31 days.

6.1.5 Liquid Radwaste Treatment System

Commitment for Operation

6.1.5.1 The Liquid Radwaste Treatment System* shall be OPERABLE and appropriate portions of the system shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the projected doses due to the liquid effluent, from each unit, to UNRESTRICTED AREAS (see FSAR Figure 2.1-2) would exceed 0.06 mrem to the whole body or 0.2 mrem to any organ in a 31-day period.

Applicability: At all times.

Action:

a. With any portion of the Liquid Radwaste Treatment System not in operation and with radioactive liquid waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report which includes the following information:

1. Explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reason for the inoperability,
2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and
3. Summary description of action(s) taken to prevent a recurrence.

Surveillance Requirements

6.1.5.2 Doses due to liquid releases from each unit to UNRESTRICTED AREAS shall be projected at least once per 31 days, in accordance with the methodology and parameters in the ODCP when Liquid Radwaste Treatment Systems are not being fully utilized.

6.1.5.3 The installed Liquid Radwaste Treatment System shall be considered OPERABLE by meeting Commitments 6.1.3.1 and 6.1.4.1.

* The Liquid Radwaste Treatment System is common to both units.

APPENDIX 6.1 (Continued)

6.1.6 Gaseous Effluents - Dose Rate

Commitment for Operation

6.1.6.1 The dose rate due to radioactive materials released in gaseous effluents from the site to areas at or beyond the SITE BOUNDARY (see FSAR Figure 2.1-2) shall be limited to the following:

a. For noble gases: Less than or equal to 500 mrem/yr to the whole body and less than or equal to 3000 mrem/yr to the skin, and

b. For Iodine-131, for Iodine-133, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.

Applicability: At all times.

Action:

With the dose rate(s) exceeding the above limits, immediately decrease the release rate to within the above limit(s).

Surveillance Requirements

6.1.6.2 The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with the methodology and procedures of the ODCP.

6.1.6.3 The dose rate due to Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents shall be determined to be within the above limits in accordance with the methodology and procedures of the ODCP by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 6.1.6-1.

APPENDIX 6.1 (Continued)

TABLE 6.1.6-1
RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

| GASEOUS RELEASE TYPE | SAMPLING FREQUENCY | MINIMUM ANALYSIS FREQUENCY | TYPE OF ACTIVITY ANALYSIS | LOWER LIMIT OF DETECTION (LLD) (μCi/ml) (1) |
|---|---|---|---|---|
| 1. Waste Gas Decay Tank | P Each Tank Grab Sample | P Each Tank | Principal Gamma Emitters(7) (noble gases) | $1x10^{-4}$ |
| 2. Containment Purge | P Each Purge(2) Grab Sample | P Each Purge(2) | Principal Gamma Emitters(7) (noble gases) | $1x10^{-4}$ |
| | | | I-131, I-133 | $1x10^{-9}$ |
| | | | Principal Gamma Emitters (particulates) | $1x10^{-9}$ |
| | | | H-3 | $1x10^{-6}$ |
| 3. Plant Vent | M(2) Grab Sample | M(2) | Principal Gamma Emitters(7) (noble gases) | $1x10^{-4}$ |
| | M(3) (5) Grab Sample | W | H-3 | $1x10^{-6}$ |
| 4. All Release Types as listed in 1., 2., 3., above, at the plant vent | Continuous(6) | W(4) Charcoal Sample | I-131 | $1x10^{-12}$ |
| | | | I-133 | $1x10^{-10}$ |
| | Continuous(6) | W(4) Particulate Sample | Principal Gamma Emitters(7) | $1x10^{-11}$ |
| | Continuous(6) | M Composite Particulate Sample | Gross Alpha | $1x10^{-11}$ |
| | Continuous(6) | Q Composite Particulate Sample | Sr-89, Sr-90 | $1x10^{-11}$ |
| 5. Steam Generator Blowdown Tank Vent | M(8) | M(8) | Principal Gamma Emitters(7) (noble gases) | $1x10^{-4}$ |

APPENDIX 6.1 (Continued)

TABLE 6.1.6-1 (Continued)
TABLE NOTATIONS

(1) The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 s_b}{E * V * 2.22 \times 10^6 * Y * \exp(-\lambda \Delta t)}$$

Where:

| | | |
|---|---|---|
| LLD | = | the "a priori" lower limit of detection (microcuries per unit mass or volume), |
| $s_b$ | = | the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute), |
| E | = | the counting efficiency (counts per disintegration), |
| V | = | the sample size (units of mass or volume), |
| $2.22 \times 10^6$ | = | the number of disintegrations per minute per microcurie, |
| Y | = | the fractional radiochemical yield, when applicable, |
| $\lambda$ | = | the radioactive decay constant for the particular radionuclide ($sec^{-1}$), and |
| $\Delta t$ | = | the elapsed time between the midpoint of sample collection and the time of counting (sec). |

Typical values of E, V, Y, and $\Delta t$ should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posterior (after the fact) limit for a particular measurement.

(2) Sampling and analyses shall also be performed following shutdown, startup, or a THERMAL POWER change exceeding 15% of the RATED THERMAL POWER within a 1-hour period.

(3) Tritium grab samples shall be taken a least once per 24 hours when the refueling canal is flooded.

APPENDIX 6.1 (Continued)

TABLE 6.1.6-1 (Continued)
TABLE NOTATIONS (Continued)

(4) Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing or after removal from sampler. Sampling shall also be performed at least once per 24 hours for at least 7 days following each shutdown, startup or THERMAL POWER change exceeding 15% of RATED THERMAL POWER within a 1-hour period and analyses shall be completed within 48 hours of changing. When samples collected for 24 hours are analyzed, the corresponding LLD's may be increased by a factor of 10. This requirement does not apply if: (1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the reactor coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

(5) Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel pool area, whenever spent fuel is in the spent fuel pool.

(6) The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Commitments 6.1.6.1, 6.1.7.1, and 6.1.8.1.

(7) The principal gamma emitters for which the LLD specification applies include the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 in noble gas releases and Mn-54 , Fe-59, Co-58, Co-60, Zn-65, Mo-99, I-131, Cs-134, Cs-137, Ce-141, and Ce-144 in Iodine and particulate releases. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radioactive Effluent Release Report.

(8) Grab samples shall be taken and analyzed at least once per 31 days whenever there is flow through the steam generator blowdown tank. Releases of radioiodines shall be estimated based on secondary coolant concentration and partitioning factors during releases or shall be measured.

(9) Frequency Notation

| Notation | Frequency |
|---|---|
| W | At least once per 7 days |
| M | At least once per 31 days |
| Q | At least once per 92 days |
| P | Completed prior to each release |

APPENDIX 6.1 (Continued)

6.1.7 Dose - Noble Gases

Commitment for Operation

6.1.7.1 The air dose due to noble gases released in gaseous effluents, from each unit, to areas at or beyond the SITE BOUNDARY (see TS Figure 5.1-3) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and

b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

Applicability: At all times.

Action:

a. With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that identifies the cause(s) for exceeding the limit(s), defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

Surveillance Requirements

6.1.7.2 Cumulative dose contributions for the current calendar quarter and current calendar year for noble gases shall be determined in accordance with the methodology and parameters in the ODCP at least once per 31 days.

6.1.8 Dose - Iodine-131, Iodine-133, Tritium, and Radioactive Material in Particulate Form

Commitment for Operation

6.1.8.1 The dose to a MEMBER OF THE PUBLIC from Iodine-131, Iodine-133, tritium and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released, from each unit, to areas at and beyond the SITE BOUNDARY (see TS Figure 5.1-3) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ and,

b. During any calendar year: Less than or equal to 15 mrem to any organ.

Applicability: At all times.

APPENDIX 6.1 (Continued)

Action:

a. With the calculated dose from the release of Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that identifies the cause(s) for exceeding the limit(s), defines the corrective actions that have been taken to reduce the releases and the proposed actions to be taken to assure that subsequent releases will be in compliance with the above limits.

Surveillance Requirements

6.1.8.2 Cumulative dose contributions for the current calendar quarter and current calendar year for Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days shall be determined in accordance with the methodology and parameters in the ODCP at least once per 31 days.

6.1.9 Gaseous Radwaste Treatment System

Commitment for Operation

6.1.9.1 The GASEOUS RADWASTE SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM shall be OPERABLE. The appropriate portions of these systems shall be used to reduce releases of radioactivity when the projected doses in 31 days due to gaseous effluent releases, from each unit, to areas at and beyond the SITE BOUNDARY (see FSAR Figure 2.1-2), would exceed 0.2 mrad to air from gamma radiation or 0.4 mrad to air from beta radiation or 0.3 mrem to any organ of a MEMBER OF THE PUBLIC.

Applicability: At all times.

Action:

a. With radioactive gaseous waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that includes the following information:

1. Identification of the inoperable equipment or subsystems and the reason for inoperability,
2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and
3. Summary description of action(s) taken to prevent a recurrence.

APPENDIX 6.1 (Continued)

Surveillance Requirements

6.1.9.2 Doses due to gaseous releases from each unit to areas at and beyond the SITE BOUNDARY shall be projected at least once per 31 days, in accordance with the methodology and parameters in the ODCP when Gaseous Radwaste Treatment Systems are not being fully utilized.

6.1.9.3 The installed VENTILATION EXHAUST TREATMENT SYSTEM and GASEOUS RADWASTE SYSTEM shall be considered OPERABLE by meeting Commitments 6.1.6.1 and 6.1.7.1 or 6.1.8.1.

6.1.10 Total Dose

Commitment for Operation

6.1.10.1 The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems.

Applicability: At all times.

Action:

a. With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Commitments 6.1.4.1.a, 6.1.4.1.b, 6.1.7.1.a, 6.1.7.1.b, 6.1.8.1.a, or 6.1.8.1.b, calculations shall be made including direct radiation contributions from the units and from outside storage tanks to determine whether the above limits of Regulatory Commitment 6.1.10.1 have been exceeded. If such is the case, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 50.4, a Special Report that defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the above limits and includes the schedule for achieving conformance with the above limits. This Special Report, as defined in 10 CFR 20.2203(a), shall include an analysis that estimates the radiation exposure (dose) to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathway and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations. If the estimated dose(s) exceeds the above limits, and if the release condition resulting in violation of 40 CFR Part 190 has not already been corrected, the Special Report shall include a request for a variance in accordance with the provisions of 40 CFR Part 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete.

APPENDIX 6.1 (Continued)

Surveillance Requirements

6.1.10.2 Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Commitments 6.1.4.2, 6.1.7.2, and 6.1.8.2, and in accordance with the methodology and parameters in the ODCP.

6.1.10.3 Cumulative dose contributions from direct radiation from the units and from outside storage tanks shall be determined in accordance with the methodology and parameters in the ODCP. This requirement is applicable only under conditions set forth in ACTION a. of Commitment 6.1.10.1.

6.1.11 Radiological Environmental Monitoring

6.1.11.1 Commitment for Operation - The Radiological Environmental Monitoring Program shall be conducted as specified in RP1.ID11, "Environmental Radiological Monitoring Procedure."

Applicability: At all times.

Action:

a. With the confirmed level of radioactivity as the result of plant effluents in an environmental sampling medium at a specified location exceeding the "Reporting Levels for Nonroutine Operating Reports" in RP1.ID11 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days from the end of the quarter, pursuant to 10 CFR 50.4, a Nonroutine Radiological Environmental Operating Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose to a MEMBER OF THE PUBLIC is less than the calendar year limits of Commitment 6.1.4.1, 6.1.7.1, or 6.1.8.1. A confirmatory reanalysis of the original, a duplicate, or a new sample may be desirable, as appropriate. The results of the confirmatory analysis shall be completed at the earliest time consistent with the analysis, but in any case within 30 days. When more than one of the radionuclides from "Reporting Levels for Nonroutine Operating Reports" in RP1.ID11 are detected in the sampling medium, this report shall be submitted if:

$$\frac{concentration(1)}{reportinglevel(1)} + \frac{concentration(2)}{reportinglevel(2)} + \ldots \geq 1.0$$

APPENDIX 6.1 (Continued)

When radionuclides other than those in the "Reporting Levels for Nonroutine Operating Reports" in RP1.ID11 are detected and are the result of plant effluents, a Nonroutine Radiological Environmental Operating Report shall be submitted if the potential annual dose to a MEMBER OF THE PUBLIC from all radionuclides is equal to or greater than the calendar year limits of Commitment 6.1.4.1, 6.1.7.1, or 6.1.8.1. This report shall include an evaluation of any release conditions, environmental factors, or other aspects necessary to explain the anomalous result.

6.1.12 LAND USE CENSUS

6.1.12.1 A Land Use Census shall be conducted as specified in RP1.ID11, "Environmental Radiological Monitoring Procedure."

Applicability: At all times.

Action:

a. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in Commitment 6.1.8.2, identify the new location(s) in the next Annual Radioactive Effluent Release Report.

b. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with Commitment 6.1.11.1, add the new location(s) within 30 days to the Radiological Environmental Monitoring Program given in the ERMP. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after October 31 of the year in which this Land Use Census was conducted. Submit in the next Annual Radioactive Effluent Release Report documentation for a change in the ERMP including a revised figure(s) and table(s) for the ERMP reflecting the new location(s) with information supporting the change in sampling locations.

Bases

6.1.1 Radioactive Liquid Effluent Monitoring Instrumentation

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCP to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

APPENDIX 6.1 (Continued)

6.1.2 Radioactive Gaseous Effluent Monitoring Instrumentation

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCP to ensure that the alarm/trip will occur prior to exceeding the limits of NUREG 0133. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50. The sensitivity of any noble gas activity monitors used to show compliance with the gaseous effluent release requirements of Regulatory Commitment 6.1.7.1 shall be such that concentrations as low as $1 \times 10^{-5}$ μCi/ml are measurable.

6.1.3 Liquid Effluents - Concentration

This Regulatory Commitment is provided to ensure that the concentration of radioactive materials released in liquid waste effluents to UNRESTRICTED AREAS will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table 2, Column 2. This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will result in exposures within: (1) the Section II.A design objectives of Appendix I, 10 CFR Part 50, to a MEMBER OF THE PUBLIC, and (2) the limits of 10 CFR 20.1301(e) to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its Effluent Concentration Limit (ECL) in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2.

This Regulatory Commitment applies to the release of radioactive materials in liquid effluents from all units at the site.

The required detection capabilities for radioactive materials in liquid waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD, and other detection limits can be found in Currie, L.A., "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300 (revised annually).

APPENDIX 6.1 (Continued)

6.1.4 Liquid Effluents - Dose

This Regulatory Commitment is provided to implement the requirements of Sections II.A, III.A and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.A of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in liquid effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The dose calculation methodology and parameters in the ODCP implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCP for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

This Regulatory Commitment applies to the release of radioactive materials in liquid effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the liquid effluents from the shared system are to be proportioned among the units sharing that system.

6.1.5 Liquid Radwaste Treatment System

The OPERABILITY of the Liquid Radwaste Treatment System ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the environment. The requirement that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and the design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the Liquid Radwaste Treatment System were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

This Regulatory Commitment applies to the release of radioactive materials in liquid effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the liquid effluents from the shared system are to be proportioned among the units sharing that system.

APPENDIX 6.1 (Continued)

6.1.6 Gaseous Effluents - Dose Rate

This Regulatory Commitment is provided to ensure that the dose at any time at and beyond the SITE BOUNDARY from gaseous effluents from all units on the site will be within the annual dose limits of NUREG 0133 to UNRESTRICTED AREAS. The annual dose limits are the doses to be associated with the concentrations of 10 CFR Part 20, Appendix B, Table 2, Column 1. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of a MEMBER OF THE PUBLIC in an UNRESTRICTED AREA, either within or outside the SITE BOUNDARY, to average concentrations exceeding the limits to be specified in Appendix B, Table 2 of 10 CFR Part 20 (10 CFR Part 20.1302(c)). For MEMBERS OF THE PUBLIC who may at times be within the SITE BOUNDARY, the occupancy of that MEMBER OF THE PUBLIC will usually be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY. Examples of calculations for such MEMBERS OF THE PUBLIC, with the appropriate occupancy factors, shall be given in the ODCP. The specified release rate limits of NUREG 0133 restrict, presently, the corresponding gamma and beta dose rates above background to a MEMBER OF THE PUBLIC at or beyond the SITE BOUNDARY to less than or equal to 500 mrems/year to the whole body or to less than or equal to 3000 mrems/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to a child via the inhalation pathway to less than or equal to 1500 mrems/year.

This Regulatory Commitment applies to the release of radioactive materials in gaseous effluents from all units at the site.

The required detection capabilities for radioactive material in gaseous waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD, and other detection limits can be found in Currie, L.A., "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300 (revised annually).

APPENDIX 6.1 (Continued)

6.1.7 Dose - Noble Gases

This Regulatory Commitment is provided to implement the requirements of Sections II.B, III.A and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.B of Appendix I. The ACTION statements provide the required operation flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The dose calculation methodology and parameters established in the ODCP for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977. The ODCP equations provided for determining the air doses at and beyond the SITE BOUNDARY are based upon the historical average atmospheric conditions.

This Regulatory Commitment applies to the release of radioactive materials in gaseous effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the gaseous effluents from the shared system are proportioned among the units sharing the system.

APPENDIX 6.1 (Continued)

6.1.8 Dose - Iodine-131, Iodine-133, Tritium, and Radioactive Material in Particulate Form

This Regulatory Commitment is provided to implement the requirements of Sections II.C, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Limiting Conditions for Operation are the guides set forth in Section II.C of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The ODCP calculational methods specified in the Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The ODCP calculational methodology and parameters for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors,: Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days are dependent upon the existing radionuclide pathways to man in the areas at and beyond the SITE BOUNDARY. The pathways that were examined in the development of the calculations were: (1) individual inhalation of airborne radionuclides, (2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man, (3) deposition onto grassy areas where milk animals and meat-producing animals graze with consumption of the milk and meat by man, and (4) deposition on the ground with subsequent exposure of man.

This Regulatory Commitment applies to the release of radioactive materials in gaseous effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the gaseous effluents from the shared system are proportioned among the units sharing that system.

APPENDIX 6.1 (Continued)

6.1.9 Gaseous Radwaste Treatment System

The OPERABILITY of the GASEOUS RADWASTE SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM ensures that the systems will be available for use whenever gaseous effluents require treatment prior to release to the environment. The requirement that the appropriate portions of these systems be used, when specified, provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents.

This Regulatory Commitment applies to the release of radioactive materials in gaseous effluents from each unit at the site. For units with shared Radwaste Treatment Systems, the gaseous effluents from the shared system are proportioned among the units sharing that system.

6.1.10 Total Dose

This Regulatory Commitment is provided to meet the dose limitations of 40 CFR Part 190 that have been incorporated into 10 CFR Part 20 by 46 FR 18525. The specification requires the preparation and submittal of a Special Report whenever the calculated doses due to releases of radioactivity and to radiation from uranium fuel cycle sources exceed 25 mrems to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems. For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the units and from outside storage tanks are kept small. The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contribution from other nuclear fuel cycle facilities at the same site or within a radius of 8 km must be considered. If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provisions of 40 CFR 190.11 and 10 CFR 20.2203(a), is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in Regulatory Commitment 6.1.3.1 and 6.1.6.1. An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.

## APPENDIX 6.2

## HIGH ALARM SETPOINTS FOR FUEL BUILDING AND CONTROL ROOM VENTILATION SYSTEMS ACTUATION INSTRUMENTATION

6.2.1 Fuel Building Ventilation System (FBVS) Instrumentation, RE-58 and RE-59

6.2.1.1 RE-58 Nominal Setpoint ≤ 75 mr/hr

Bases

6.2.1.2 Fuel Handling Accident in Fuel Handling Building

a. The basis for the RE-58 high alarm setpoint is to initiate actions to mitigate offside dose consequences from air borne releases resulting from a fuel handling accident in the Spent Fuel Pool area. Routing ventilation exhaust from the Spent Fuel Pool area through the charcoal filter, thus stripping halogens (principally iodine isotopes) mitigates offsite dose consequences. The rerouting of the ventilation is accomplished automatically upon receipt of a RE-58 high alarm. Receipt of the high alarm also signals personnel to evacuate the area. PG&E performed a calculation (RA-90-1-0 "High and Alert Alarm Setpoint for RE-58") to base the high alarm setpoint of RE-58 on the airborne radioactivity concentration in the fuel Handling Building for the FSAR Update Expected Case accident release during a fuel handling accident. The Expected Case Accident consequence presented in the FSAR Update is a less severe, but more probable accident than the FSAR Update Design Basis Case fuel handling accident. This resulted in a more conservative (lower) setpoint than that for the Design Basis Accident Case. This calculation analyzed the detector sensitivity to the various release nuclides as presented in the FSAR Update.

b. The high alarm setpoint is set to a value more consistent with the Expected Case Accident dose rates which eliminates spurious ESF actuation while limiting the offsite consequences due to this accident. A ≤ 75mr/hr setpoint equates to a site boundary whole body dose of 1.46mr for the duration of the accident, which has been evaluated as being acceptable.

6.2.1.3 Inadvertent Criticality in the Spent Fuel Pool

a. The high density Spent Fuel Pool racks were redesigned to assure that a $K_{eff}$ equal to or less than 0.95 is maintained with the racks fully loaded with fuel of the highest anticipated reactivity in each of two regions, and flooded with unborated water at a temperature corresponding to the highest reactivity. PG&E submitted PG&E Letter No. DCL-85-30, "Re-racking of Spent Fuel Pools," on September 19, 1985. The results of the criticality analysis for normal and abnormal operations were evaluated in this report. LAR 85-13 (PG&E Letter No. DCL-85-333) was submitted on October 30, 1985, and summarized the results of the Spent Fuel Pool re-racking report. Postulated events that could potentially involve accidental criticality were examined and it was concluded that the limiting value for criticality ($K_{eff}$ of 0.95) would not be exceeded. Therefore, an inadvertent criticality in the Spent Fuel Pool is not considered a credible accident and an evaluation of the effect of raising the actuation setpoint on RE-58 was not required.

APPENDIX 6.2 (Continued)

b. Radiation monitor RE-59, which monitors the new fuel storage vault area, also provides indication of inadvertent criticality and changes in dose rate for radiation protection purposes.

6.2.1.4 RE-59 Nominal Setpoint ≤ 15mr/hr

a. In DCPP FSAR update in Chapter 12, Table 12.1-1, "Plant Zone Classifications," the Fuel Handling Building areas in which RE-59 is located is classified as Zone III, "Controlled Assess Requiring Short-Term Occupancy" as indicated in Design Criteria Memorandum DCM-T20.

b. The Zone III design maximum dose rate is ≤ 15mr/hr. If the radiation flux reaches this value, the high alarm will be actuated and the ventilation mode will change as indicated above with the RE-58 high alarm actuation.

6.2.2 Control Room Ventilation System (CRVS) Instrumentation, RS-25A and RS-26A

6.2.2.1 RS-25A/RS-26A Nominal Setpoint ≤ 2 mr/hr

Bases

6.2.2.2 Per calculations DV-1-23 and DV-2-23 attachment 2:

a. The applicable NRC requirement for the radiation exposure (dose) to personnel in the Main Control Room is 10CFR20.105 "Permissible Level of Radiation in Unrestricted Areas" (superseded). Section b (1) of 10CFR20.105 limits the radiation dose for unrestricted areas to 2mr/hr and Section b (2) limits the dose to 100mr is seven consecutive days. If an operator works in the control room for 48 hours per week (12 hours per day and 4 days per week, a normal operator work week) during a 2mr/hr dose rate, the operator will receive a 96mr dose. This is less than the 100mr/week dose limit of 10CFR20.105 (superseded). Thus, a setpoint of ≤ 2 mr/hr has been established for the Control Room Air Inlet Radiation Monitors. If the radiation flux reaches this value at any of the detectors, a change in the ventilation to Mode 4 will be initiated.

b. 10CFR20.105 has been superseded and any changes to this setpoint will require a basis change to reflect the requirements of 10CFR50 Appendix A Criterion 19.

6.2.3 All of the setpoints are controlled by the setpoint control program CF6.ID1 and require a design change vehicle (request per CF4.ID1) to change. Actual field setpoints are set more conservative to account for instrument errors.

# Attachment 4

## Environmental Radiological Monitoring Procedure
## (Procedure RP1.ID11, Revision 5)

**TITLE: Environmental Radiological Monitoring Procedure**

**06/27/00**
**EFFECTIVE DATE**

**SPONSORING ORGANIZATION: RADIATION PROTECTION**
**PROCEDURE CLASSIFICATION: QUALITY RELATED**
**REVIEW LEVEL: "A"**

1. SCOPE

This procedure constitutes the Environmental Radiological Monitoring Procedure (ERMP) and implements the requirements of the Radiological Environmental Monitoring Program (REMP) for Diablo Canyon Power Plant in accordance with Technical Specification 5.6.2 and 5.5.1.

2. DISCUSSION

2.1 This procedure describes the minimum required program, describing sample locations, types of sample locations, methods and frequency of analysis, reporting requirements, performance of Land Use Census and participation in an Interlaboratory Comparison Program.

2.2 This procedure also contains the state of California Department of Health Services (DHS) cross-check program.

2.3 The program described by this procedure provides measurements of radiation and of radioactive materials in those exposure pathways and for those nuclides that lead to the highest potential radiation exposures of Members of the Public resulting from plant operation. This monitoring program implements section IV.B.2, IV.B.3 and IV.C of Appendix I to 10 CFR 50 and supplements the Radioactive Effluent Control Program. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Radiological Environmental Monitoring, revision 1, November, 1979.

3. DEFINITIONS

3.1 Broadleaf Vegetation - means the leafy portion of plants such as lettuce, cabbage, spinach, or other similar leafy plants, typically used for human consumption.

3.2 Supplemental Sample - means samples that should be collected when available, but when they are not available, they are not subject to the substitution requirements of Table 1 Note 1. These types of samples are specifically designated as "supplemental" in Table 1.

4. RESPONSIBILITIES

4.1 The Director, Radiation Protection is responsible for ensuring implementation of the Environmental Radiological Monitoring Procedure, including:

4.1.1 Ensuring the performance of the annual Land Use Census and that the results are provided to CEO so that CEO can establish the dose requirements of Appendix 6.1.12.1 of CY2.ID1," Radioactive Effluent Controls Program."

4.1.2 Ensuring that the results of the annual Land Use Census and environmental TLD results are provided to TES for inclusion in the Annual Radiological Environmental Operating Report.

4.1.3 Ensuring that changes to the ERMP are provided to CEO for inclusion in the Annual Radiological Effluent Release Report.

4.1.4 Ensuring that the required sampling and monitoring program is performed.

4.1.5 Approving the Annual Radiological Environmental Operating Report prior to its submittal to the NRC.

4.1.6 Ensuring that the environmental TLD program is maintained.

4.2 The Director, Chemical and Environmental, TES is responsible for:

4.2.1 Ensuring analysis is performed for the samples as required by the ERMP.

4.2.2 Ensuring that summaries, interpretations and trends required for the Annual Radiological Environmental Operating Report are performed and that the Report is prepared and reviewed.

4.2.3 Ensuring that participation is maintained in an Interlaboratory Comparison Program sufficient to satisfy step 7.3.1 of this procedure.

4.2.4 Ensuring that ERMP sample results exceeding the criteria of Appendix 6.1.11.1 of CY2.ID1, "Radioactive Effluent Controls Program" are communicated promptly to the Director , CEO and the Director, RP at DCPP.

4.2.5 Ensuring that appropriate procedures are established and maintained for sample handling, sample analysis and all associated laboratory equipment.

4.3 The Manager, Nuclear Assessment and Licensing is responsible for ensuring that reports required by the ERMP are submitted to the appropriate recipients in accordance with XI1.ID2, "Regulatory Reporting Requirements and Reporting Process."

4.4 The REMP Engineer is responsible for ensuring that the personnel responsible for the management and for the implementation of the REMP receive training on the changes to the REMP at least annually. Such training should consist of topics related to the changes in the DCPP REMP procedures, industry events, any changes in technology that pertain to REMP sampling techniques or to the analysis of REMP samples and the nature and goals of the quality assurance program. Proficiency of personnel who perform activities affecting the quality of the REMP shall be maintained by retraining, reexamining, recertifying, or by periodic performance reviews as appropriate. Initial training will be provided on an as needed basis to new personnel responsible for quality related REMP activities.

5. PREREQUISITES

None

6. PRECAUTIONS

None

7. INSTRUCTIONS

Sampling and Monitoring

7.1 Environmental samples shall be collected and analyzed according to Table 1 at the locations shown in Table 5 and Figures 1 and 2. Analytical techniques used will be such that the detection capabilities in Table 2 are routinely achieved. The sampling frequencies specified in Table 1 are allowed an extension of 25 percent.

7.2 Land Use Census

7.2.1 This Census satisfies the requirements of section IV.B.3 of Appendix I to 10 CFR 50. Restricting the Census to gardens of greater than 500 square feet provides assurance that significant exposure pathways via broadleaf vegetation will be identified and monitored as necessary. The size of the garden is the minimum to produce the quantity of 26 kg/year of broadleaf assumed in Regulatory Guide 1.109 for consumption by a child.

7.2.2 A Land Use Census will be conducted at least once per year, during the growing season, which will determine the locations in each of the 16 meteorological sectors within a distance of 8 km (5 mi) for:

a. The nearest milk animal, and

b. The nearest residence, and

c. The nearest garden of greater than 50 square meters (500 sq. ft.) producing broadleaf vegetation

NOTE: Broadleaf vegetation sampling may be performed at the Site Boundary in a sector with the highest D/Q in lieu of the garden census portion of the Land Use Census.

7.2.3 The Land Use Census will be conducted using that information which will provide the best results, which typically consists of discussions with landowners/tenants in conjunction with an aerial survey. Local agricultural authorities may also be consulted.

7.2.4 If the Land Use Census identifies a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in accordance with Appendix 6.1.12 of CY2.ID1, the new location(s) shall be identified in the next Annual Radioactive Effluent Release Report.

7.2.5 If the Land Use Census identifies a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20 percent greater than at a location from which samples are currently being obtained in accordance with Appendix 6.1.11 of CY2.ID1, add the new location(s) within 30 days to the Radiological Environmental Monitoring Program given in this ERMP. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after October 31 of the year in which this Land Use Census was conducted. Documentation for a change in the ERMP will be submitted in the next Annual Radioactive Effluent Release Report including a revised figure(s) and table(s) for the ERMP reflecting the new location(s) with information supporting the change in sampling locations.

7.3 Cross-check Programs

7.3.1 Participation will be maintained in an Interlaboratory Comparison Program. This participation will include each of the determinations (sample medium-radionuclide combination) as described in Table 1 to ensure independent checks on the precision and accuracy of the measurements of radioactive materials in the ERMP samples.

7.3.2 Participation will be maintained in a split-sampling program with the State of California Department of Health Services (DHS) as required by DHS. The program will consist of radiological analyses of duplicate samples or replicate analyses of the same sample by both TES and DHS. The results of TES's analyses of the samples will be transmitted to DHS as soon as practicable after the end of the quarter in which the samples were collected. The sample types, analyses performed, and frequencies of collection are given in Table 6.

7.4 Annual Radiological Environmental Operating Report

7.4.1 A report on the Radiological Environmental Monitoring Program will be prepared annually and submitted to the NRC prior to May 1 of the following year.

7.4.2 The Annual Radiological Environmental Operating Report shall include:

a. summaries, interpretations, and an analysis of trends of the results of the Radiological Environmental Monitoring Program activities for the report period

b. a comparison with preoperational studies, operational controls (as appropriate), and previous environmental surveillance reports

c. an assessment of the observed impacts of the plant operation on the environment

d. the results of Land Use Census

e. the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in tables and figures in this ERMP as well as summarized and tabulated results of these analyses and measurements in the format of Table 3 or equivalent

f. a summary description of the Radiological Environmental Monitoring Program

g. legible maps covering all sampling locations keyed to a table giving distances and directions from the centerline of Unit One Reactor

h. the results of licensee participation in the Interlaboratory Comparison Program and the corrective action taken if the specified program is not being performed as required

i. the reason for not conducting the Radiological Environmental Monitoring Program as required, and discussion of all deviations from the sampling schedule of Table 1, including plans for preventing a recurrence

j. a discussion of environmental sample measurements that exceed the reporting levels of Table 4, but are not the result of plant effluents (i.e., demonstrated by comparison with a control station or with preoperational data)

k. a discussion of all analyses in which the LLD required by Table 2 was not achievable

7.5 Nonroutine Reports

7.5.1 Supplementary Report

a. In the event that some results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a Supplementary Report.

7.5.2 Nonroutine Radiological Environmental Operating Report

a. If a measured radionuclide concentration resulting from plant effluents in an environmental sampling medium, averaged over any calendar quarter sampling period, exceeds the reporting level given in Table 4, or when radionuclides other than those in Table 4 are detected and are the result of plant effluents where the potential annual dose to a Member of the Public from all radionuclides is equal to or greater than the calendar year limits of Appendix I of 10 CFR 50, a Nonroutine Radiological Environmental Operating Report shall be prepared in accordance with CY2.ID1. This report is not required if the measured level of radioactivity was not the result of plant effluents, however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report.

7.6 ERMP Changes

7.6.1 Changes to the ERMP shall be documented and the records of reviews performed shall be retained for the duration of the Operating License, as required by FSAR Chapter 17. This documentation shall contain:

a. Sufficient information to support the change together with the appropriate analyses or evaluations justifying the change(s) and

b. A determination that the change will maintain the level of radioactive effluent control required by 10 CFR 20.1301, 40 CFR 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50 and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations.

7.6.2 Shall become effective after review and acceptance by the PSRC and the approval of the Plant Manager.

7.6.3 Shall be submitted to the Nuclear Regulatory Commission in the form of a complete, legible copy of the entire ERMP as part of or concurrent with the Annual Radioactive Effluent Release Report for the period of the report in which any change to the ERMP was made. Each change shall be identified by:

a. markings in the margin of the affected pages

b. clearly indicating the area of the page that was changed

c. indicating the date (e.g., month/year) the change was implemented

7.6.4 Notification of Sample Unavailability

a. If milk or vegetation sampling is not being performed as required by Table 1, identify specific locations for obtaining replacement samples and add them within 30 days to the Radiological Environmental Monitoring Program given in the ERMP. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Submit in the next Annual Radioactive Effluent Release Report documentation for a change in the ERMP including a revised figure(s) and table for the ERMP reflecting the new location(s) with supporting information identifying the cause of the unavailability of samples and justifying the selection of the new location(s) for obtaining samples.

**NOTE:** The currently approved ERMP allows for substitution of milk and broadleaf vegetation sampling with additional air sampling in two sectors.

8. RECORDS

8.1 Performance of the Land Use Census shall be documented, including as a minimum the names of persons contacted and dates of contact. This documentation does not need to appear in the required reports, but should be entered into the Records Management System.

8.2 Changes to the ERMP shall be retained in the Records Management System for the duration of the plant Operating License.

8.3 REMP training shall be documented and recorded in PIMS. Training records shall also be placed in the Records Management System (RMS) for the duration of the plant Operating License.

9. APPENDICES

None

10. ATTACHMENTS

None

11. REFERENCES

11.1 CY2, "Radiological Monitoring and Controls Program."

11.2 CY2.ID1, "Radioactive Effluent Control Program."

11.3 10 CFR 50 Appendix I

11.4 DCPP, Units 1 & 2, Plant Manual, Licenses, Amendments & Tech Specs, Volume 4A.

12. SPONSOR

D.P. Royer

**Table 1**
**Radiological Environmental Monitoring Program**

| Exposure Pathway and/or Sample | Number of Representative Samples and Sample Locations[1] | Sampling and Collection Frequency | Type of Analysis |
|---|---|---|---|
| 1. Direct Radiation[2] | Thirty-one routine monitoring stations[3] containing thermoluminescent dosimeters (TLDs) such that at least two (2) phosphors are present at each station, placed as follows:<br><br>An inner ring of stations, one in each terrestrial meteorological sector in the general area of the SITE BOUNDARY;<br><br>An outer ring of stations, one in each terrestrial meteorological sector in the 2.5 to 12 km range from the site; and<br><br>The balance of the stations to be placed in special interest areas such as population centers, nearby residences, schools, and in one or two areas to serve as control stations. | Quarterly | Gamma dose. |

**Table 1 (Continued)**
**Radiological Environmental Monitoring Program**

| Exposure Pathway and/or Sample | Number of Representative Samples and Sample Locations[1] | Sampling and Collection Frequency | Type of Analysis |
|---|---|---|---|
| 2. Airborne | | | |
| (Radioiodine and particulates) | Samples from five locations:<br>Three samples from close to the three SITE BOUNDARY locations, in different sectors, of the highest calculated annual average ground level D/Q. (Historically these have been: MT1, OS2 and 8S1).<br>One sample (7D1) from the vicinity of a community having the highest calculated annual average ground level D/Q;<br>One sample (5F1) from a control location. | Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading. | Radioiodine Cartridge:<br>I-131 analysis.<br>Particulate Sample:<br>Gross beta radio-activity analysis following filter change[4] and gamma isotopic analysis[5] of composite (by location) consisting of approximately 12 filters. Perform gamma isotopic analysis on composite (by location) quarterly. |
| 3. Waterborne | | | |
| a. Surface | One sample from the plant Outfall (OUT), Diablo Cove (DCM) and an area not influenced by plant discharge (7C2). | Monthly grab sample. | Gamma isotopic analysis[5]. Tritium analysis (quarterly). |
| b. Drinking | One sample of plant drinking water (DW1) and one from Diablo Creek (5S2). | Monthly grab sample. | I-131, gamma isotopic analysis[5]. Tritium analysis (quarterly). |
| c. Sediment | One sample (from DCM and 7C2). | Annual sample. | Gamma isotopic. |
| d. Marine Flora[6] | One sample of kelp (from DCM, PON, POS and 7C2). | Quarterly, when available. | Gamma isotopic. |
| | One sample of intertidal algae (from DCM and 7C2). | Quarterly, when available. | Gamma isotopic. |

**Table 1 (Continued)**
**Radiological Environmental Monitoring Program**

| Exposure Pathway and/or Sample | Number of Representative Samples and Sample Locations[1] | Sampling and Collection Frequency | Type of Analysis |
|---|---|---|---|
| 4. Ingestion | | | |
| a. Milk | Samples from milking animals in three locations within 5 km distance having the highest dose potential. If there are none, then one sample from milking animals in each of three areas between 5 to 8 km distance where doses are calculated to be greater than 1 mrem per year. One sample from milking animals at a control location 15 to 30 km distant and in the least prevalent wind direction. | Semimonthly when animals are on pasture; monthly at other times. | Gamma isotopic[5] and I-131 analysis. |
| | **Note:** The sample (5F2)[6] should be taken monthly even if there are no indicator samples available. | | |
| b. Fish and Invertebrates | One sample of rock fish (Sebastes), one sample of perch (Family Embiotocidae), and one sample of mussel (Mytilus), (from DCM, PON[6], POS[6] and 7C2). | Sample quarterly. | Gamma isotopic analysis[5] on edible portions of each sample. |
| | One sample of market fish[6] (from 7D3 or 2F1). | Sample quarterly. | |
| | One sample of red abalone[6] (from DCM and 7C2). | Sample semiannually, when available. | |
| c. Broadleaf Vegetation[7] | Three samples of broadleaf vegetation grown nearest off-site locations of highest calculated annual average ground level D/Q IF milk sampling is not performed. | Monthly, when available. | Gamma isotopic analysis[5] (that includes I-131) on edible portion. |
| | One sample of each of the similar broadleaf vegetation grown 15 to 30 km distant in the least prevalent wind direction IF milk sampling is not performed. | Monthly, when available. | |

**Table 1 (Continued)**
**Radiological Environmental Monitoring Program**

| Exposure Pathway and/or Sample | Number of Representative Samples and Sample Locations[1] | Sampling and Collection Frequency | Type of Analysis |
|---|---|---|---|
| d. Vegetative Crops[6] | One sample of broadleaf vegetation or vegetables or fruit (from 5F2, 6C1, 7G1 and 7C1). | Monthly, when available.<br>(6C1 is sampled quarterly) | Gamma isotopic analysis[5] of edible portion. |

**Table Notations**

1. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to circumstances such as hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunction, effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances, suitable specific alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the Radiological Environmental Monitoring Program, and submitted in the next Annual Radioactive Effluent Release Report, including a revised figure(s) and table for the ERMP reflecting the new location(s) with supporting information identifying the cause of the unavailability of samples for that pathway and justifying the section of the new location(s) for obtaining samples.
2. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor. There are normally three calcium sulfate phosphors in an environmental TLD BADGE. Film badges shall not be used as dosimeters for measuring direct radiation.
3. Inner ring stations: 0S1, WN1, 0S2, 1S1, 2S1, 3S1, 4S1, 5S1, 5S3, 6S1, 7S1, 8S1, 8S2, 9S1, and MT1.

   Outer ring stations: 1A1, 0B1, 1C1, 2D1, 3D1, 4C1, 5C1, 6D1, and 7C1.

   Special interest stations: 4D1, 7F1, 7D1, 7D2, 7G2, and 5F3.

   Control station: 5F1.
4. Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than 10 times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.
5. Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.
6. Supplemental sample.
7. If food products are unavailable, additional air sampling as specified in Table 1, Part 2 will be done in the SE (Station 8S2) and NNW (station 1S1) sectors.

## Table 2

**Detection Capabilities for Environmental Sample Analysis (1) (2)**
**Lower Limits of Detection (LLD) (3)**

| Analysis | Water (pCi/L) | Airborne Particulate or Gases (pCi/m$^3$) | Fish (pCi/kg, wet) | Milk (pCi/L) | Food Products (pCi/kg, wet) | Sediment (pCi/kg, dry) |
|---|---|---|---|---|---|---|
| Gross beta | 4 | 0.01 | | | | |
| H-3 | 2000* | | | | | |
| Mn-54 | 15 | | 130 | | | |
| Fe-59 | 30 | | 260 | | | |
| Co-58, 60 | 15 | | 130 | | | |
| Zn-65 | 30 | | 260 | | | |
| Zr-Nb-95 | 15 | | | | | |
| I-131 | 1** | 0.07 | | 1 | 60 | |
| Cs-134 | 15 | 0.05 | 130 | 15 | 60 | 150 |
| Cs-137 | 18 | 0.06 | 150 | 18 | 80 | 180 |
| Ba-La-140 | 15 | | | 15 | | |

**Table Notations**

(1) This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report.

(2) Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13, Revision 1, July 1977.

(3) The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95 percent probability with only 5 percent probability of falsely concluding that a blank observation represents a "real" signal.

*For surface water samples, a value of 3000 pCi/L may be used.

** If no drinking water pathway exists, a value of 15 pCi/L may be used.

## Table 2 (Continued)

**Table Notations**

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 s_b}{E \times V \times 2.22 \times Y \times \exp(-\lambda t)}$$

Where:

| | | |
|---|---|---|
| LLD | = | the "a priori" the lower limit of detection as defined above (as pCi per unit mass or volume) |
| $S_b$ | = | the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute) |
| E | = | the counting efficiency (as counts per transformation) |
| V | = | the sample size (in units of mass or volume) |
| 2.22 | = | the number of transformations per minute per picocurie |
| Y | = | the fractional radiochemical yield (when applicable) |
| $\lambda$ | = | the radioactive decay constant for the particular radionuclide |
| t | = | the elapsed time between sample collection (or end of the sample collection period) and time of counting |

The value of $S_b$ used in the calculation of the LLD for a detection system will be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background will include the typical contributions of other radionuclides normally present in the samples (e.g., potassium-40 in milk samples).

Analyses will be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors will be identified and described in the Annual Environmental Radiological Operating Report.

Typical values of E, V, Y and t should be used in the calculation. It should be recognized that the LLD is defined as a priori (before the fact) limit representing the capability of a measurement system and not as a posteriori (after the fact) limit for a particular measurement.

## Table 3

### Environmental Radiological Monitoring Program Summary

Name of Facility _____ Docket No. _____

Location of Facility (County, State) _____ Reporting Period _____

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection(a) (LLD) | Location with Highest Annual Mean | | All Indicator Locations Mean (1)(b) Range (b) | Control Locations Mean(1)(b) Range(b) | Number of Reportable Occurrences |
|---|---|---|---|---|---|---|---|
| | | | Name, Distance and Direction | Mean (1)(b) Range (b) | | | |

(a) Unless indicated the LLDs specified in Table 2 were met.

(b) Mean and the range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (1); e.g., (10/12) means that 10 out of 12 samples contained detectable activity.

## Table 4

**Reporting Levels for Radioactivity Concentrations in Environmental Samples**

| Analysis | Water (pCi/L) | Airborne Particulate or Gases (pCi/m$^3$) | Fish (pCi/kg, wet) | Milk (pCi/L) | Food Products (pCi/kg, wet) |
|---|---|---|---|---|---|
| H-3 | 20,000* | | | | |
| Mn-54 | 1,000 | | 30,000 | | |
| Fe-59 | 400 | | 10,000 | | |
| Co-58 | 1,000 | | 30,000 | | |
| Co-60 | 300 | | 10,000 | | |
| Zn-65 | 300 | | 20,000 | | |
| Zr-Nb-95 | 400 | | | | |
| I-131 | 2** | 0.9 | | 3 | 100 |
| Cs-134 | 30 | 10 | 1,000 | 60 | 1,000 |
| Cs-137 | 50 | 20 | 2,000 | 70 | 2,000 |
| Ba-La-140 | 200 | | | 300 | |

* For drinking water samples. This is the 40CFR141 value. If no drinking water pathway exists, a value of 30,000 pCi/L may be used.

** If no drinking water pathway exists, a value of 20 pCi/L may be used.

## Table 5

**Distances and Directions to Environmental Monitoring Stations**
**(Stations are shown on Figures 1 and 2)**

| Station Code* | Station Name | Radial Direction (True Heading) (Degrees) | Radial Distance from Plant km (Miles) | |
|---|---|---|---|---|
| 0S1 | Exclusion Fence-Northwest Corner | 320 | .16 | (0.1) |
| 0S2 | North Gate | 320 | .8 | (0.5) |
| 1S1 | Wastewater Pond | 330 | .64 | (0.4) |
| 2S1 | Back Road-300 m North of Plant | 0 | .32 | (0.2) |
| 3S1 | Road NW of 230 kv Switchyard | 23 | .64 | (0.4) |
| 4S1 | Back Road Between Switchyards | 43 | .8 | (0.5) |
| 5S1 | 400 kv Switchyard | 58 | .64 | (0.4) |
| 5S2 | Diablo Creek Weir | 65 | .96 | (0.6) |
| 5S3 | Microwave Tower Road | 70 | 1.02 | (0.7) |
| 6S1 | Microwave Tower | 94 | .8 | (0.5) |
| 7S1 | Overlook Road | 112 | .48 | (0.3) |
| 8S1 | Target Range | 125 | .8 | (0.5) |
| 8S2 | Southwest Site Boundary | 128 | 1.76 | (1.1) |
| 9S1 | South Cove | 167 | .64 | (0.4) |
| MT1 | Meteorological Tower | 185 | .32 | (0.2) |
| DCM | Diablo Cove Marine | 270 | .32 | (0.2) |
| WN1 | Northwest Guard Shack | 290 | .32 | (0.2) |
| 1A1 | Crowbar Canyon | 327 | 2.56 | (1.6) |
| 0B1 | Point Buchon | 325 | 5.76 | (3.6) |
| 1C1 | Montana de Oro Campground | 336 | 7.52 | (4.7) |
| 4C1 | Clark Valley Gravel Pit | 45 | 9.28 | (5.8) |
| 6C1 | Household Garden | 98 | 7.24 | (4.5) |
| 5C1 | Junction Prefumo/See Canyon Roads | 64 | 7.52 | (4.7) |
| 7C1 | Pecho Creek Ruins (Mello Farm) | 120 | 6.56 | (4.1) |
| 7C2 | Rattlesnake Canyon | 124 | 7.52 | (4.7) |
| 2D1 | Sunnyside School | 10 | 11.04 | (6.9) |
| 3D1 | Clark Valley | 24 | 9.92 | (6.2) |
| 4D1 | Los Osos School | 36 | 12.16 | (7.6) |
| 6D1 | Junction See/Davis Canyon Roads | 89 | 12.0 | (7.5) |
| 7D1 | Avila Gate | 118 | 10.56 | (6.6) |
| 7D2 | Avila Beach | 110 | 12.16 | (7.6) |
| 7D3 | Avila Pier | 120 | 11.0 | (6.9) |
| 2F1 | Morro Bay (Commercial Landing) | 0 | 17.44 | (10.9) |
| 5F1 | SLO Zone I Substation | 68 | 17.92 | (11.2) |
| 5F2 | Cal Poly Farm | 60 | 20.16 | (12.6) |
| 5F3 | SLO County Health Department | 70 | 20.32 | (12.7) |
| 7F1 | Shell Beach | 110 | 17.28 | (10.8) |

**Table 5 (Continued)**

**Distances and Directions to Environmental Monitoring Stations**
**(Stations are shown on Figures 1 and 2)**

| Station Code* | Station Name | Radial Direction (True Heading) (Degrees) | Radial Distance from Plant km (Miles) | |
|---|---|---|---|---|
| 7G1 | Arroyo Grande (Kawaoka Farm) | 115 | 26.88 | (16.8) |
| 7G2 | Oceano Substation | 118 | 27.68 | (17.3) |
| OUT | Plant Outfall | 270 | .32 | (0.2) |
| DW1 | Drinking Water from Plant Potable Water System | Bio Lab | --- | --- |
| PON | Pacific Ocean North of Diablo Cove | 305 | 2.4 | (1.5) |
| POS | Pacific Ocean South of Diablo Cove | 145 | 1.28 | (0.8) |

*Station Code (XYZ):

X - First number (0-9) represents the radial sector in which the station is located:

| | | | |
|---|---|---|---|
| 0 | - Northwest | 5 | - East-northeast |
| 1 | - North-northwest | 6 | - East |
| 2 | - North | 7 | - East-southeast |
| 3 | - North-northeast | 8 | - Southeast |
| 4 | - Northeast | 9 | - South-southeast |

Y - Letter (S, A-H) represents the distance from the plant:

S - On-site
A - 0-2 miles from plant (but off-site)
B - 2-4 miles from plant
C - 4-6 miles from plant
D - 6-8 miles from plant
E - 8-10 miles from plant
F - 10-15 miles from plant
G - 15-20 miles from plant
H - Greater than 20 miles from plant

Z - Second number represents the station number within the zone.

*Station Codes (DCM, MT1, WN1, PON, POS, OUT, DW1):

The following stations do not follow the coding system: Diablo Cove Marine (DCM), Meteorological Tower (MT1), Northwest guard shack (WN1), Pacific Ocean North (PON), Pacific Ocean South (POS), Plant outfall (OUT), and Drinking water (DW1).

**Table 6**

**Summary of Cross-Check Program with State of California**

| Sample Type | Station No. | Frequency* | Radioanalyses |
|---|---|---|---|
| Milk (supplemental) | 5F2 | Monthly | Gamma Isotopic (incl. I-131 and K-40) |
| Drinking Water | DW1 | Monthly | Gamma Isotopic (incl. I-131), H-3 |
| Outfall Water | OUT | Monthly | Gamma Isotopic, H-3 |
| Diablo Creek | 5S2 | Monthly | Gamma Isotopic, H-3 |
| Vegetative Crops (supplemental) | 7G1 | Quarterly | Gamma Isotopic |
| Fish or Invertebrate | DCM | Quarterly | Gamma Isotopic |
| Air Particulates and Radioiodine | 5F1, 7D1 | Weekly<br>Quarterly | Gross Beta, I-131<br>Gamma Isotopic (composite airborne particulate samples) |
| Sediment | DCM | Annually | Gamma Isotopic |
| Direct Radiation (TLD) | MT1, 4D1, 5F3, 7D1, 7C1 | Quarterly | Gamma Exposure (mR) |
| Kelp (supplemental) | DCM | Quarterly | Gamma Isotopic |

*When available

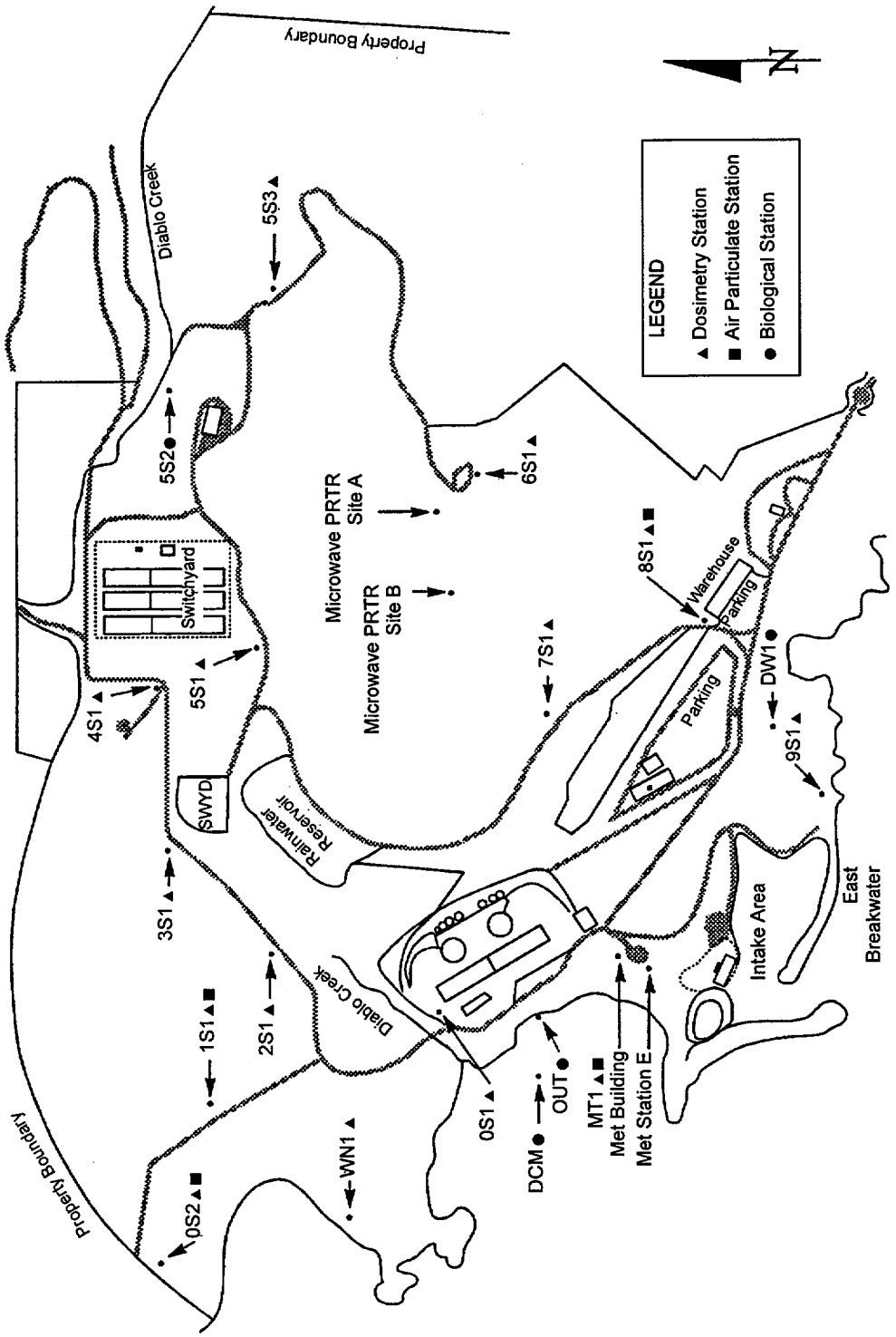


Figure 1 - DCPP Onsite ERMP Stations

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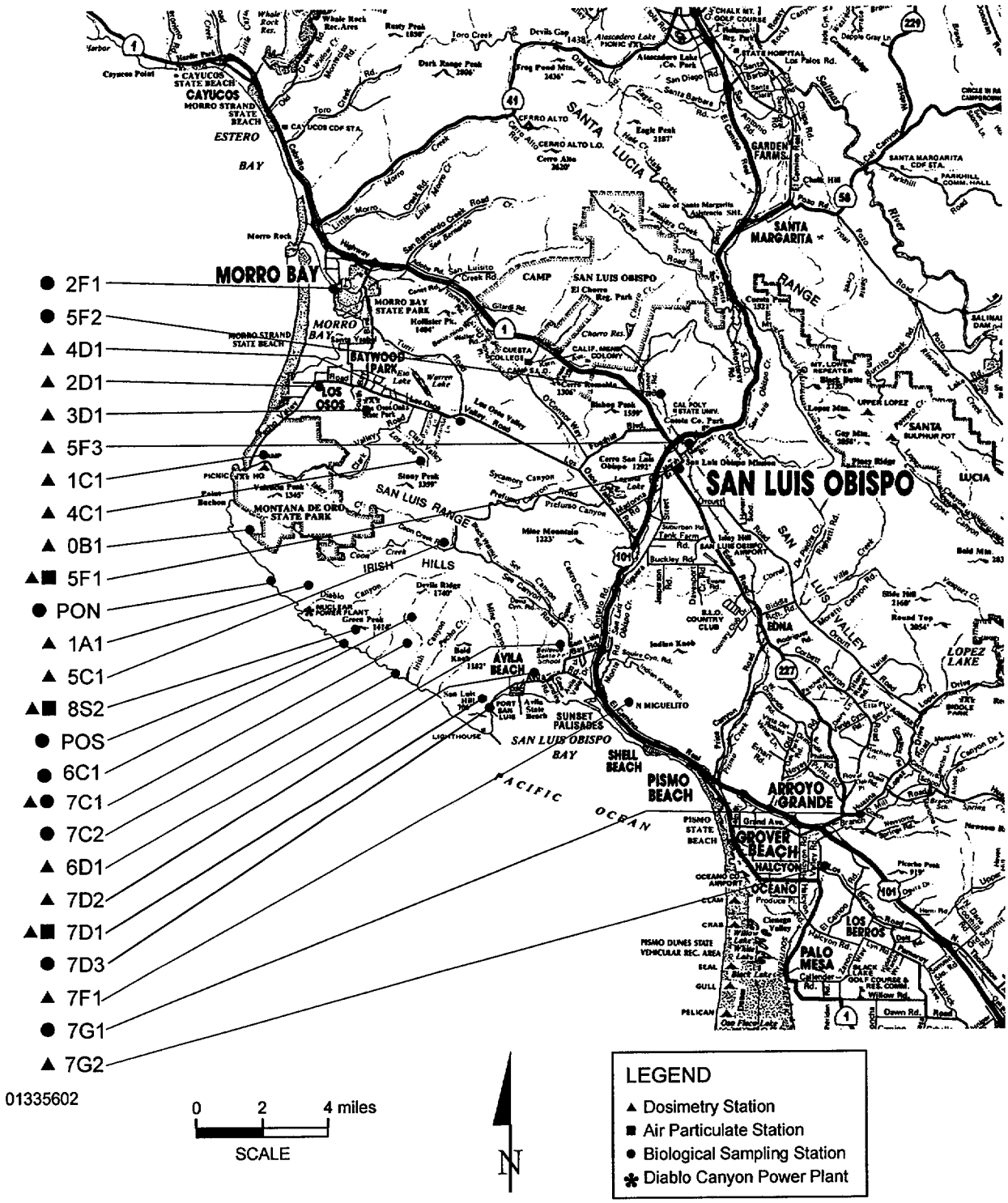


Figure 2 - DCPP Offsite ERMP Stations