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SUBJECT: Forwards "Semiannual Radioactive Effluent Release Rept Jan-June 1991 for Diablo Canyon Units 1 & 2." & corrected pages to "Semiannual Effluent Release Rept Second Half 1990."

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Lawrence F. Womack
Manager
Nuclear Operations Support

August 29, 1991

PG&E Letter No. DCL-91-216

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Semiannual Radioactive Effluent Release Report

Gentlemen:

Enclosed is the Diablo Canyon Semiannual Radioactive Effluent Release Report.

Enclosure 1 contains correction pages to the Diablo Canyon Power Plant Units 1 and 2 Semiannual Radioactive Effluent Release Report for the second half of 1990. The corrections are small increase adjustments (less than 10 percent) to the quantity of dry compressible solid radioactive waste volume and curie content, based on information that became available after the close of the report period.

Enclosure 2 is the Diablo Canyon Power Plant Units 1 and 2 Semiannual Radioactive Effluent Release Report for the first half of 1991. The report describes the quantities of radioactive gaseous and liquid effluents released from the plant during the period January 1 through June 30, 1991, and the solid radioactive waste shipments during the same period. Attachments 1 and 2 contain Revisions 16 and 17, respectively, of the Process Control Program. Attachment 3 contains Revision 10 of the offsite dose calculation procedure.

This report is required by 10 CFR 50.36a(2) and Section 6.9.1.6 of the Diablo Canyon Technical Specifications.

Sincerely,

L. F. Womack

JE48

cc: Robert M. Carr
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Enclosures

5452S/0085K/EMG/649

DIABLO CANYON POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JULY 1 - DECEMBER 31, 1991

DIABLO CANYON POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT REPORT

JULY 1, 1991 - DECEMBER 31, 1991

DIABLO CANYON POWER PLANT

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DIABLO CANYON POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

INTRODUCTION

This Semiannual Radioactive Effluent Release Report summarizes the gaseous and liquid effluent releases made from Diablo Canyon Power Plant's Units 1 and 2 for the third and fourth quarters of 1991. This report also includes the doses due to the release of radioactive liquid and gaseous effluents and a summary of solid radwaste shipments. This report contains the information required by Unit 1 and 2 Technical Specification 6.9.1.6 and is presented in the general format of Regulatory Guide 1.21, Appendix B.

In all cases, the plant effluent releases were well below Technical Specifications for the report period.

The Unit 1 reactor operated at full power throughout the report period except for short power reductions required for maintenance. The Unit 2 Refueling and Maintenance Outage commenced on August 31, and the reactor began power ascension on October 25.

I. SUPPLEMENTAL INFORMATION

A. Regulatory Limits

1. Gaseous Effluents

a. Noble Gas Dose Rate Limit

The dose rate in unrestricted areas due to radioactive noble gases released in gaseous effluents is limited to less than or equal to 500 millirem per year to the total body and less than or equal to 3000 millirem per year to the skin. (Technical Specification 3.11.2.1.a.)

b. Particulate and Iodine Dose Rate Limit

The dose rate in unrestricted areas 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 millirem per year to any organ. (Technical Specification 3.11.2.1.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:

	CALENDAR QUARTER	CALENDAR YEAR
Gamma radiation	5 millirad	10 millirad
Beta radiation	10 millirad	20 millirad

(Technical Specification 3.11.2.2)

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 millirem to any organ in any calendar quarter and less than or equal to 15 millirem to any organ during a calendar year. (Technical Specification 3.11.2.3)

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 II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration is limited to 2×10^{-4} microcuries/ml total activity. (Technical Specification 3.11.1.1)

b. Dose

The dose or dose commitment to an individual from radioactive materials in liquid effluents released, from each reactor unit, to areas at or beyond the site boundary, is limited to the following:

	CALENDAR QUARTER	CALENDAR YEAR
Total Body	1.5 millirem	3 millirem
Any Organ	5 millirem	10 millirem

(Technical Specification 3.11.1.2)

B. Maximum Permissible Concentrations

1. Gaseous Effluents

Maximum permissible concentrations are not used in the methodology for determining allowable release rates for gaseous effluents at Diablo Canyon Power Plant.

2. Liquid Effluents

The concentrations listed in 10 CFR 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases are used for determining the allowable release rate at the point of discharge from the site for liquid effluents. For dissolved or entrained noble gases, the allowable release rate concentration at the point of discharge is limited to 2×10^{-4} microcuries per milliliter 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 each equipped with Geiger-Mueller detectors. These monitor readings are correlated to isotopic concentration based on laboratory isotopic analysis of grab samples using a germanium detector.

When the plant vent measurements as indicated by the process monitors are below the lower limit of detection, the results of the grab samples are used to quantify releases. In addition, 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 grab samples with a germanium detector. 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

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 cartridges and analyzing these cartridges 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. All of the 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 particulates 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.

2. Liquid Effluents

a. Batch Releases

Each tank of liquid radwaste is analyzed for principal gamma emitters using a germanium detector prior to release. The prerelease analysis includes dissolved and entrained gases. Volume proportional monthly and quarterly composites are prepared from aliquots of each tank released. 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 gross gamma and 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 -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.

D. Batch Releases

1. Liquid

a. Number of batch releases..... 318

b. Total time period for batch releases..... 919 hours

c. Maximum time period for a batch release..... 12.06 hours

d. Average time period for a batch release..... 2.89 hours

e. Minimum time period for a batch release..... 0.250 hours

f. Average saltwater flow during batch releases 1.42 E+6 GPM

2. Gaseous

a. Number of batch releases..... 74

b. Total time period for batch releases..... 866 hours

c. Maximum time period for a batch release..... 72.0 hours

d. Average time period for a batch release..... 11.70 hours

e. Minimum time period for a batch release..... 1.400 hours

E. Abnormal Releases

On July 24, 1991, an unplanned but monitored release from Unit 1 waste gas system occurred when valve CVCS-1-523 was inadvertently left open. The release was monitored by the plant vent monitors. During this event, 1.56 E-2 curies of Xe-133 and 3.44 E-3 curies of Xe-135 were released. The total activity of the release was 1.90 E-2 curies. The percent of release rate limit was 3.69 E-4 percent of the limits of Technical Specification 3.11.2.1.a, "Gaseous Effluent Dose Rates."

On September 3, 1991, an unplanned but monitored release from the Unit 1 waste gas system occurred when the control switch of level control valve LCV-105 malfunctioned. The release was monitored by the plant vent monitors. During this event, 3.36 E-1 curies of Xe-133, 4.08 E-3 curies of Xe-133m, and 1.12 E-3 curies of Xe-135 were released. The total activity of the release was 3.41 E-1 curies. The percent of release rate limit was 1.51 E-2 percent of the limits of Technical Specification 3.11.2.1.a., "Gaseous Effluent Dose Rates."

II. MAJOR CHANGES TO LIQUID, GASEOUS AND SOLID RADWASTE TREATMENT SYSTEMS

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

III. CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

The radioactive waste packaging Process Control Program (PCP), as promulgated in DCPP Administrative Procedure AP C-253 and AP C-253S1, was revised once during the report period. Revision 5 to AP C-253S1, "Dewatering Control Program" incorporated a revision to the vendor procedure to enable the dewatering of a new inorganic ion exchange media. This revision was reviewed and found acceptable by the Plant Staff Review Committee (PSRC) on November 27, 1991. A copy of the revised PCP is included as Attachment 3.

IV. CHANGES TO THE ENVIRONMENTAL RADIOLOGICAL MONITORING PROCEDURE (ERMP)

There were no changes to the Environmental Radiological Monitoring Procedure (ERMP) during this report period.

V. CHANGES TO THE OFF-SITE DOSE CALCULATION PROCEDURE (ODCP)

There were no changes to the Off-site Dose Calculation Procedure (ODCP) during the report period.

VI. 1991 LAND USE CENSUS

The 1991 Land Use Census results are included as Attachment 1. There is only one change in the Land Use Census from the census taken in 1990. One of the residences (Field's property) is no longer considered a permanent residence since the property has been purchased by PG&E.

VII. GASEOUS AND LIQUID EFFLUENTS

DIABLO CANYON POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

TABLE 1

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Units	Third Quarter	Fourth Quarter	Est. Total Error,%
A. Fission & activation gases				
1. Total release	Ci	2.74 E+1	3.04 E-1	2.4 E+1
2. Average release rate for period	µCi/sec	3.45 E+0	3.82 E-2	
3. Percent of technical specification limit[2]	%	1.09 E-3	3.45 E-5	
B. Iodines				
1. Total iodine-131	Ci	4.24 E-4	5.46 E-6	2.4 E+1
2. Average release rate for period	µCi/sec	5.33 E-5	6.87 E-7	
3. Percent of technical specification limit[2]	%	6.14 E-4	7.81 E-6	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	5.50 E-7	MDA	2.4 E+1
2. Average release rate for period	µCi/sec	6.92 E-8	MDA	
3. Percent of technical specification limit[2]	%	6.71 E-8	MDA	
4. Gross alpha radioactivity	Ci	2.08 E-7	1.17 E-6	
D. Tritium				
1. Total release	Ci	3.02 E+1	3.49 E+1	1.3 E+1
2. Average release rate for period	µCi/sec	3.80 E+0	4.39 E+0	
3. Percent of technical specification limit[2]	%	1.40 E-3	1.61 E-3	

NOTE:

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

[2] Technical Specification 3.11.2.1 Limit

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TABLE 2

GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES

		Third Quarter		Fourth Quarter	
Nuclides Released	Unit	Continuous Mode	Batch Mode	Continuous Mode	Batch Mode
1. Fission gases					
argon-41	Ci	MDA	4.69 E-2	MDA	3.48 E-2
krypton-85	Ci	MDA	2.97 E-1	MDA	2.41 E-1
krypton-85m	Ci	MDA	2.32 E-4	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	3.52 E-1	2.56 E+1	MDA	2.83 E-2
xenon-133m	Ci	4.08 E-3	9.19 E-4	MDA	MDA
xenon-135	Ci	4.56 E-3	1.11 E+0	MDA	6.98 E-5
xenon-135m	Ci	MDA	MDA	MDA	MDA
xenon-138	Ci	MDA	MDA	MDA	MDA
TOTAL FOR PERIOD	Ci	3.61 E-1	2.71 E+1	MDA	3.04 E-1

2. Iodines

iodine-131	Ci	4.24 E-4	5.46 E-6
iodine-133	Ci	4.93 E-4	MDA
iodine-135	Ci	MDA	MDA
TOTAL FOR PERIOD	Ci	9.17 E-4	5.46 E-6

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

TABLE 2 (Continued)

GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES

		CONTINUOUS MODE	
Nuclides Released	Unit	Third Quarter	Fourth Quarter
3. Particulates			
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	5.50 E-7	MDA
cobalt-60	Ci	MDA	MDA
manganese-54	Ci	MDA	MDA
ruthenium-103	Ci	MDA	MDA
strontium-89	Ci	MDA	MDA
strontium-90[1]	Ci	MDA	MDA
zinc-65	Ci	MDA	MDA
zirconium-95[1]	Ci	MDA	MDA
TOTAL FOR PERIOD	Ci	5.50 E-7	MDA

NOTE:

[1] Includes Daughters

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TABLE 3

GASEOUS EFFLUENTS - LOWER LIMITS OF DETECTION

Nuclide	Unit	Continuous Mode	Batch Mode	
			Containment Purge	Gas Decay Tank
1. Fission gases				
krypton-85	µCi/ml	7.43 E-6	7.43 E-6	1.75 E-3
krypton-85m	µCi/ml	2.21 E-8	2.21 E-8	6.45 E-6
krypton-87	µCi/ml	6.69 E-8	6.69 E-8	1.77 E-5
krypton-88	µCi/ml	8.72 E-8	8.72 E-8	2.09 E-5
xenon-131m	µCi/ml	8.00 E-7	8.00 E-7	2.27 E-4
xenon-133	µCi/ml	8.50 E-8	8.50 E-8	1.85 E-5
xenon-133m	µCi/ml	2.12 E-7	2.12 E-7	5.19 E-5
xenon-135	µCi/ml	2.25 E-8	2.25 E-8	6.53 E-6
xenon-135m	µCi/ml	5.67 E-7	5.67 E-7	4.67 E-5
xenon-138	µCi/ml	9.88 E-7	9.88 E-7	6.73 E-5
argon-41	µCi/ml	7.73 E-8	7.73 E-8	1.37 E-5
2. Tritium				
hydrogen-3	µCi/ml	1.27 E-8	1.27 E-8	
3. Iodines				
iodine-131	µCi/ml	3.34 E-13		
iodine-133	µCi/ml	5.37 E-13		
iodine-135	µCi/ml	5.94 E-12		

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

TABLE 3 (Continued)

GASEOUS EFFLUENTS - LOWER LIMITS OF DETECTION

Nuclide	Unit	Continuous Mode
4. Particulates		
cesium-134	µCi/ml	2.46 E-13
cesium-137	µCi/ml	4.04 E-13
cerium-141	µCi/ml	2.69 E-13
cerium-144	µCi/ml	1.18 E-12
chromium-51	µCi/ml	1.67 E-12
cobalt-57	µCi/ml	1.31 E-13
cobalt-58	µCi/ml	3.85 E-13
cobalt-60	µCi/ml	4.40 E-13
manganese-54	µCi/ml	3.50 E-13
ruthenium-103	µCi/ml	2.10 E-13
strontium-89	µCi/ml	1.37 E-14
strontium-90[1]	µCi/ml	6.36 E-15
zinc-65	µCi/ml	9.68 E-13
zirconium-95[1]	µCi/ml	4.94 E-13
gross alpha	µCi/ml	9.32 E-16

NOTE:

[1] Includes daughters

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TABLE 4

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Est Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	2.54 E-1	1.58 E-1	2.4 E+1
2. Average diluted concentration during period	µCi/ml	1.72 E-9	1.07 E-9	
3. Percent of applicable limit[1]	%	9.37 E-2	4.35 E-3	
B. Tritium				
1. Total release	Ci	2.49 E+2	1.23 E+2	1.3 E+1
2. Average diluted concentration during period	µCi/ml	1.69 E-6	8.32 E-7	
3. Percent of applicable limit[1]	%	5.63 E-2	2.77 E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	1.78 E-2	6.01 E-4	2.4 E+1
2. Average diluted concentration during period	µCi/ml	1.21 E-10	4.05 E-12	
3. Percent of applicable limit[1]	%	6.05 E-5	2.02 E-6	
D. Gross alpha radioactivity				
1. Total release	Ci	MDA	MDA	6.0 E+1

[1] Technical Specification 3.11.1.1 Limit

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

TABLE 4 (Continued)

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

		Unit	Third Quarter	Fourth Quarter	Est Total Error, %
E.	Volume of waste released (prior to dilution)	liters	1.00 E+8	1.05 E+8	5.0 E0
F.	Volume of circulating saltwater used during release	liters	1.47 E+11	1.48 E+11	6.5 E0

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TABLE 5

LIQUID EFFLUENTS - NUCLIDES RELEASED

		Third Quarter		Fourth Quarter	
Nuclides Released	Unit	Continuous Mode	Batch Mode	Continuous Mode	Batch Mode
antimony-122	Ci	MDA	2.14 E-4	MDA	MDA
antimony-124	Ci	MDA	5.10 E-3	MDA	2.92 E-3
antimony-125	Ci	MDA	4.56 E-2	MDA	3.07 E-2
beryllium-7	Ci	MDA	2.38 E-4	MDA	1.94 E-5
bromine-82	Ci	MDA	1.40 E-3	MDA	MDA
cerium-141	Ci	MDA	MDA	MDA	MDA
cerium-144	Ci	MDA	MDA	MDA	MDA
cesium-134	Ci	MDA	3.29 E-3	MDA	2.70 E-4
cesium-136	Ci	MDA	5.84 E-5	MDA	MDA
cesium-137	Ci	MDA	5.78 E-3	MDA	8.70 E-4
chromium-51	Ci	MDA	1.37 E-3	MDA	3.65 E-4
cobalt-57	Ci	MDA	3.78 E-4	MDA	3.11 E-4
cobalt-58	Ci	MDA	9.04 E-2	MDA	5.76 E-2
cobalt-60	Ci	MDA	1.61 E-2	MDA	2.23 E-2
iron-55	Ci	MDA	1.98 E-2	MDA	3.57 E-2
iron-59	Ci	MDA	6.49 E-5	MDA	MDA
lanthanum-140[1]	Ci	MDA	1.28 E-3	MDA	MDA
manganese-54	Ci	MDA	9.95 E-3	MDA	4.75 E-3
manganese-56	Ci	MDA	MDA	MDA	MDA

NOTE:

[1] Includes daughters

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

TABLE 5 (CONTINUED)

LIQUID EFFLUENTS - NUCLIDES RELEASED

		Third Quarter		Fourth Quarter	
Nuclides Released	Unit	Continuous Mode	Batch Mode	Continuous Mode	Batch Mode
molybdenum-99[1]	Ci	MDA	1.78 E-3	MDA	8.14 E-5
neodymium-147	Ci	MDA	9.71 E-5	MDA	MDA
ruthenium-103	Ci	MDA	MDA	MDA	MDA
silver-110m	Ci	MDA	3.36 E-5	MDA	MDA
sodium-24	Ci	MDA	1.39 E-3	MDA	2.58 E-4
strontium-89	Ci	MDA	1.04 E-3	MDA	1.19 E-4
strontium-90[1]	Ci	MDA	3.12 E-5	MDA	MDA
strontium-92	Ci	MDA	MDA	MDA	MDA
tellurium-129m	Ci	MDA	3.12 E-4	MDA	MDA
tellurium-132	Ci	MDA	2.19 E-5	MDA	MDA
tin-113[1]	Ci	MDA	1.08 E-5	MDA	MDA
tin-117m	Ci	MDA	MDA	MDA	MDA
tungsten-187	Ci	MDA	1.40 E-4	MDA	MDA
zirconium-95[1]	Ci	MDA	1.76 E-4	MDA	5.00 E-4
iodine-131	Ci	MDA	3.72 E-2	MDA	1.15 E-3
iodine-132	Ci	MDA	4.29 E-6	MDA	2.05 E-7

NOTE:

[1] Includes daughters

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TABLE 5 (CONTINUED)

LIQUID EFFLUENTS - NUCLIDES RELEASED

		Third Quarter		Fourth Quarter	
Nuclides Released	Unit	Continuous Mode	Batch Mode	Continuous Mode	Batch Mode
iodine-133	Ci	MDA	1.01 E-2	MDA	5.44 E-4
iodine-134	Ci	MDA	7.62 E-15	MDA	MDA
iodine-135	Ci	MDA	6.12 E-4	MDA	3.52 E-6
TOTAL FOR PERIOD	Ci	MDA	2.54 E-1	MDA	1.58 E-1

DISSOLVED AND ENTRAINED GASES

xenon-133	Ci	MDA	1.60 E-2	MDA	5.07 E-4
xenon-133m	Ci	MDA	2.35 E-4	MDA	MDA
xenon-135	Ci	MDA	1.59 E-3	MDA	9.39 E-5
krypton-85	Ci	MDA	MDA	MDA	MDA
TOTAL FOR PERIOD	Ci	MDA	1.78 E-2	MDA	6.01 E-4

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TABLE 6

LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION (LLD)

Nuclide	Unit	LLD
antimony-122	µCi/ml	7.74 E-8
antimony-124	µCi/ml	1.79 E-7
antimony-125	µCi/ml	1.60 E-7
beryllium-7	µCi/ml	4.13 E-7
bromine-82	µCi/ml	6.59 E-8
cerium-141	µCi/ml	6.30 E-8
cerium-144	µCi/ml	2.43 E-7
cesium-134	µCi/ml	5.60 E-8
cesium-136	µCi/ml	5.93 E-8
cesium-137	µCi/ml	6.68 E-8
chromium-51	µCi/ml	3.13 E-7
cobalt-57	µCi/ml	3.29 E-8
cobalt-58	µCi/ml	6.53 E-8
cobalt-60	µCi/ml	8.47 E-8
iron-55	µCi/ml	3.00 E-7
iron-59	µCi/ml	1.35 E-7
lanthanum-140[1]	µCi/ml	2.36 E-7
manganese-54	µCi/ml	6.03 E-8
manganese-56	µCi/ml	4.53 E-7
molybdenum-99[1]	µCi/ml	3.08 E-8
neodymium-147	µCi/ml	1.68 E-7

NOTE:

[1] Includes Daughters

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TABLE 6 (CONTINUED)

LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION (LLD)

Nuclide	Unit	LLD
ruthenium-103	µCi/ml	5.09 E-8
silver-110m	µCi/ml	6.68 E-8
sodium-24	µCi/ml	7.92 E-8
strontium-89	µCi/ml	1.57 E-8
strontium-90	µCi/ml	7.79 E-9
strontium-92	µCi/ml	1.43 E-7
tellurium-129m	µCi/ml	2.15 E-6
tellurium-132	µCi/ml	3.90 E-8
tin-113[1]	µCi/ml	5.58 E-8
tin-117m	µCi/ml	2.85 E-8
tungsten-187	µCi/ml	1.57 E-7
zirconium-95[1]	µCi/ml	1.00 E-7
gross alpha	µCi/ml	6.60 E-8
hydrogen-3	µCi/ml	5.52 E-6
iodine-131	µCi/ml	4.95 E-8
iodine-132	µCi/ml	5.93 E-8
iodine-133	µCi/ml	5.18 E-8
iodine-134	µCi/ml	1.36 E-7
iodine-135	µCi/ml	2.40 E-7

NOTE:

[1] Includes Daughters

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TABLE 6 (CONTINUED)

LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION (LLD)

Nuclide	Unit	LLD
xenon-133	µCi/ml	1.54 E-7
xenon-133m	µCi/ml	3.53 E-7
xenon-135	µCi/ml	4.56 E-8
krypton-85	µCi/ml	1.45 E-5

VIII. SOLID RADWASTE SHIPMENTS

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SOLID WASTE AND IRRADIATED FUEL SHIPMENT

A. Solid Waste Shipped Off-site for Burial or Disposal (Not irradiated fuel)

1. Type of Waste	Unit	6-Month Period	Est. Total Error, %
a. Spent Resins, Filter Sludges, Evaporator Bottoms, etc.	m^3 Ci	3.68 E+1 5.02 E+2	1.09 E+1
b. Dry Compressible Waste, Contaminated Equipment, etc.	m^3 Ci	5.72 E+1 3.80 E+0	2.26 E+0
c. Irradiated Components, Control Rods, etc.	m^3 Ci	0 0	N/A
d. Other	m^3 Ci	0 0	N/A

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

a.

Mn-54	%	4.02 E+0
Fe-55	%	4.11 E+1
Co-58	%	3.51 E+0
Co-60	%	2.67 E+1
Ni-63	%	2.13 E+1
Cs-137	%	1.35 E+0

b.

H-3	%	2.35 E+1
Cr-51	%	4.83 E+0
Fe-55	%	2.45 E+1
Co-58	%	2.54 E+1
Co-60	%	5.74 E+0
Ni-63	%	4.04 E+0
Zr-95	%	3.79 E+0
Nb-95	%	5.46 E+0

c.

NOT APPLICABLE	%	N/A

d.

NOT APPLICABLE	%	N/A

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SOLID WASTE AND IRRADIATED FUEL SHIPMENT

A. Solid Waste Shipped Off-site for Burial or Disposal (Not irradiated fuel) (Continued)

3. Supplemental Information Required by Technical Specification 6.9.1.6

Solidification Agent	Container Type	Shipping Package Type	Number of Containers	10 CFR 61 Waste Class
Cement	Strong Tight	Type A	2	C
Cement	Strong Tight	LSA > Type A	1	A Unstable
None	Type A - HIC	LSA > Type A	1	B
None	Strong Tight	LSA	176	A Unstable

4. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
22	Truck	Barnwell, SC
49	Truck	Beatty, NV
5	Truck	Richland, WA

B. Irradiated Fuel Shipments (Disposition)

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

IX. RADIATION DOSE DUE TO GASEOUS AND LIQUID EFFLUENTS

RADIATION DOSES

A. Radiation doses due to 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 Off-site Dose Calculation Procedure. Dose contributions, listed in Table 7, show conformance to Technical Specification 3.11.1.2.

B. Radiation doses due to 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 calculational methodology in the Off-site Dose Calculation Procedure. Each unit's dose contribution has been calculated separately. The meteorology conditions concurrent with the time of discharge were used in these calculations. In addition to the site boundary doses, the dose to all age groups at the nearest residence within the low population zone for each of the land sectors and a five mile infant milk dose in each of the land sectors is included. Dose contributions, listed in Table 8 which represents the maximum dose for age groups, organs, and geographic locations for the Third and Fourth Quarters, show conformance to Technical Specifications 3.11.2.2 and 3.11.2.3.

C. Radiation doses due to direct radiation (Line-of-Sight Plus Sky-Shine) - Closest Site Boundary (800 m)

For the Third and Fourth Quarters of 1991, the radiation dose is evaluated to be 3.53 E-2 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 Due to 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 4.65 E-7 mrem.

E. 40 CFR 190 Considerations

The release of radioactivity in liquid and gaseous effluents during 1991 resulted in doses that are small percentages of the Technical Specification 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 Diablo Canyon Nuclear Power Plant shows conformance to 40 CFR 190.

F. 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. This is 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 during 1991.

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 for the year of 1991.

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TABLE 7

RADIATION DOSE DUE TO THE RELEASE OF RADIOACTIVE LIQUID EFFLUENTS

	millirem				
ORGAN	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Total
Total Body	1.33 E-3	1.98 E-4	4.24 E-4	3.18 E-4	2.27 E-3
Bone	6.54 E-3	4.21 E-4	8.04 E-4	1.20 E-3	8.97 E-3
Liver	4.74 E-3	3.84 E-4	8.02 E-4	9.14 E-4	6.84 E-3
Thyroid	9.75 E-4	2.81 E-4	3.65 E-3	1.16 E-4	5.02 E-3
Kidney	1.54 E-4	3.83 E-5	1.21 E-4	3.33 E-5	3.47 E-4
Lung	2.62 E-3	1.89 E-4	3.44 E-4	4.86 E-4	3.64 E-3
G.I. LLI	4.11 E-3	1.30 E-3	2.37 E-3	1.80 E-3	9.58 E-3

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TABLE 8A

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

		First Quarter		Second Quarter	
		Sector[2]	Dose	Sector	Dose
Site Boundary					
Noble Gas					
Gamma air dose	mrad	NW	5.79 E-3	ESE	2.00 E-5
Beta air dose	mrad	NW	7.61 E-3	SE	2.37 E-5
I,P,T[3]					
Teen[4] (Thyroid)	mrem	NW	6.44 E-3	NW	4.69 E-4
Residence					
Noble Gas					
Gamma air dose	mrad	NNW	2.97 E-4	ESE	3.76 E-6
Beta air dose	mrad	NNW	3.33 E-4	ESE	5.44 E-6
I,P,T					
Child[5] (Thyroid)	mrem	NNW	9.32 E-4	ESE	3.26 E-4
Five Mile Dairy					
I,P,T					
Infant (Thyroid)	mrem	ESE	7.79 E-4	ESE	2.39 E-5

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

TABLE 8A (Continued)

RADIATION DOSE1 DUE THE RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS (UNIT 1)

		Third Quarter		Fourth Quarter		Annual Total	
		Sector[2]	Dose	Sector	Dose	Sector	Dose
Site Boundary							
Noble Gas							
Gamma air dose	mrad	NNW	7.52 E-5	NNW	1.15 E-4	NW	5.85 E-3
Beta air dose	mrad	NNW	3.25 E-5	NNW	4.99 E-5	NW	7.63 E-3
I,P,T[3]							
Teen[4] (Thyroid)	mrem	NNW	2.41 E-3	NW	6.76 E-3	NW	1.48 E-2
Residence							
Noble Gas							
Gamma air dose	mrad	NNW	8.86 E-6	NNW	2.14 E-5	NNW	3.27 E-4
Beta air dose	mrad	NNW	3.89 E-6	NNW	9.23 E-6	NNW	3.46 E-4
I,P,T							
Child[5] (Thyroid)	mrem	ESE	1.24 E-3	ESE	1.42 E-3	ESE	3.90 E-3
Five Mile Dairy							
I,P,T							
Infant (Thyroid)	mrem	ESE	1.20 E-4	NNW	2.15 E-4	ESE	1.07 E-3

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

TABLE 8B

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

		First Quarter		Second Quarter	
		Sector[2]	Dose	Sector	Dose
Site Boundary					
Noble Gas					
Gamma air dose	mrad	NNE	4.52 E-5	NNW	7.49 E-5
Beta air dose	mrad	NNE	6.54 E-5	NNW	1.35 E-4
I,P,T[3]					
Teen[4] (Thyroid)	mrem	NNW	1.62 E-3	NNW	2.27 E-4
Residence					
Noble Gas					
Gamma air dose	mrad	ESE	2.79 E-6	NNW	1.14 E-5
Beta air dose	mrad	ESE	4.88 E-6	NNW	2.04 E-5
I,P,T					
Child[5] (Thyroid)	mrem	ESE	4.28 E-4	ESE	1.53 E-4
Five Mile Dairy					
I,P,T					
Infant (Thyroid)	mrem	NNW	1.27 E-4	ESE	1.11 E-5

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TABLE 8B (Continued)

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

		Third Quarter		Fourth Quarter		Annual Total	
		Sector[2]	Dose	Sector	Dose	Sector	Dose
Site Boundary							
Noble Gas							
Gamma air dose	mrad	NW	3.37 E-3	NNW	1.73 E-5	NW	3.38 E-3
Beta air dose	mrad	NW	8.83 E-3	NNW	5.78 E-4	NW	9.26 E-3
I,P,T[3]							
Teen[4] (Thyroid)	mrem	NW	4.80 E-3	NNW	4.16 E-3	NW	1.06 E-2
Residence							
Noble Gas							
Gamma air dose	mrad	ESE	1.93 E-4	NNW	2.30 E-6	ESE	1.99 E-4
Beta air dose	mrad	ESE	5.08 E-4	NNW	7.23 E-5	ESE	5.18 E-4
I,P,T							
Child[5] (Thyroid)	mrem	ESE	4.35 E-3	ESE	9.89 E-4	ESE	5.92 E-3
Five Mile Dairy							
I,P,T							
Infant (Thyroid)	mrem	ESE	3.02 E-3	NNW	1.99 E-4	ESE	3.28 E-3

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NOTES FOR TABLES 8A AND 8B

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

2. The ocean sectors SSE, S, SSW, SW, WSW, W, and WNW are not included.

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

4. The inhalation, ground plane and animal-meat pathways are included in this dose calculation.

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

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TABLE 9

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE LIQUID EFFLUENTS

	Percent				
ORGAN	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Total
Total Body	8.87 E-2	1.32 E-2	2.83 E-2	2.12 E-2	7.57 E-2
Bone	1.31 E-1	8.42 E-3	1.61 E-2	2.40 E-2	8.97 E-2
Liver	9.48 E-2	7.68 E-3	1.60 E-2	1.83 E-2	6.84 E-2
Thyroid	1.95 E-2	5.62 E-3	7.30 E-2	2.32 E-3	5.02 E-2
Kidney	3.08 E-3	7.66 E-4	2.42 E-3	6.66 E-4	3.47 E-3
Lung	5.24 E-2	3.78 E-3	6.88 E-3	9.72 E-3	3.64 E-2
G.I. LLI	8.22 E-2	2.60 E-2	4.74 E-2	3.60 E-2	9.58 E-2

NOTE:

[1] Technical Specification 3.11.1.2

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TABLE 10A

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 1)

		First Quarter		Second Quarter	
		Sector	% of TS Limit	Sector	% of TS Limit
Site Boundary					
Noble Gas					
Gamma air dose	mrad	NW	1.16 E-1	ESE	4.00 E-4
Beta air dose	mrad	NW	7.61 E-2	SE	2.37 E-4
I,P,T					
Teen (Thyroid)	mrem	NW	8.59 E-2	NW	6.25 E-3
Residence					
Noble Gas					
Gamma air dose	mrad	NNW	5.94 E-3	ESE	7.52 E-5
Beta air dose	mrad	NNW	3.33 E-3	ESE	5.44 E-5
I,P,T					
Child (Thyroid)	mrem	NNW	1.24 E-2	ESE	4.35 E-3
Five Mile Dairy					
I,P,T					
Infant (Thyroid)	mrem	ESE	1.04 E-2	ESE	3.19 E-4

NOTE:

[1] Technical Specification 3.11.2.2 and 3.11.2.3

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

TABLE 10A (Continued)

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 1)

		Third Quarter		Fourth Quarter		Annual Total	
		Sector	% of TS Limit	Sector	% of TS Limit	Sector	% of TS Limit
Site Boundary							
Noble Gas							
Gamma air dose	mrad	NNW	1.50 E-3	NNW	2.30 E-3	NW	5.85 E-2
Beta air dose	mrad	NNW	3.25 E-4	NNW	4.99 E-4	NW	3.82 E-2
I,P,T							
Teen (Thyroid)	mrem	NNW	3.21 E-2	NW	9.01 E-2	NW	9.87 E-2
Residence							
Noble Gas							
Gamma air dose	mrad	NNW	1.77 E-4	NNW	4.28 E-4	NNW	3.27 E-3
Beta air dose	mrad	NNW	3.89 E-5	NNW	9.23 E-5	NNW	1.73 E-3
I,P,T							
Child (Thyroid)	mrem	ESE	1.65 E-2	ESE	1.89 E-2	ESE	2.60 E-2
Five Mile Dairy							
I,P,T							
Infant (Thyroid)	mrem	ESE	1.60 E-3	NNW	2.87 E-3	ESE	7.13 E-3

NOTE:

[1] Technical Specification 3.11.2.2 and 3.11.2.3

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TABLE 10B

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 2)

		First Quarter		Second Quarter	
		Sector	% of TS Limit	Sector	% of TS Limit
Site Boundary					
Noble Gas					
Gamma air dose	mrad	NNE	9.04 E-4	NNW	1.50 E-3
Beta air dose	mrad	NNE	6.54 E-4	NNW	1.35 E-3
I,P,T					
Teen (Thyroid)	mrem	NNW	2.16 E-2	NNW	3.03 E-3
Residence					
Noble Gas					
Gamma air dose	mrad	ESE	5.58 E-5	NNW	2.28 E-4
Beta air dose	mrad	ESE	4.88 E-5	NNW	2.04 E-4
I,P,T					
Child (Thyroid)	mrem	ESE	5.71 E-3	ESE	2.04 E-3
Five Mile Dairy					
I,P,T					
Infant (Thyroid)	mrem	NNW	1.69 E-3	ESE	1.48 E-4

NOTE:

[1] Technical Specification 3.11.2.2 and 3.11.2.3

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991

TABLE 10B (Continued)

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 2)

		Third Quarter		Fourth Quarter		Annual Total	
		Sector	% of TS Limit	Sector	% of TS Limit	Sector	% of TS Limit
Site Boundary							
Noble Gas							
Gamma air dose	mrad	NW	6.74 E-2	NNW	3.46 E-4	NW	3.38 E-2
Beta air dose	mrad	NW	8.83 E-2	NNW	5.78 E-3	NW	4.63 E-2
I,P,T							
Teen (Thyroid)	mrem	NW	6.40 E-2	NNW	5.55 E-2	NW	7.07 E-2
Residence							
Noble Gas							
Gamma air dose	mrad	ESE	3.86 E-3	NNW	4.60 E-5	ESE	1.99 E-3
Beta air dose	mrad	ESE	5.08 E-3	NW	7.23 E-4	ESE	2.59 E-3
I,P,T							
Child (Thyroid)	mrem	ESE	5.80 E-2	ESE	1.32 E-2	ESE	3.95 E-2
Five Mile Dairy							
I,P,T							
Infant (Thyroid)	mrem	ESE	4.03 E-2	NNW	2.65 E-3	ESE	2.19 E-2

NOTE:

[1] Technical Specification 3.11.2.2 and 3.11.2.3

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TABLE 11A

RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS
FIRST QUARTER, 1991
ON-SITE DOSE TO MEMBERS OF THE PUBLIC
(SPECIAL INTEREST GROUPS)

				External Dose (mrem)			Internal Dose (mrem)
				Noble Gas		Iodines, Particulates, and Tritium	
Specific Activity	Exposure Location (Sectors)	Exposure Closest Distance	Exposure Time (Hours)	Whole Body	Skin	Ground Plane	Inhalation
Police at Shooting Range	SE	700m	52	2.51 E-5	5.53 E-5	4.52 E-7	6.91 E-5
Tour Participants							
(a) Simulator Bldg.	S	310m	1.0				
(b) Bio Lab	SSE	460m	1.5	2.73 E-6	5.98 E-6	9.32 E-8	7.59 E-6
(c) Overlook	E	210m	0.25				
American Indians at Burial Grounds	NW NNW	200m 200m	24 24	3.30 E-4	6.08 E-4	5.81 E-7	6.11 E-4
Ranch Hands driving cattle around site	NW NNW N NNE NE	250m 350m 320m 450m 630m	0.25 0.25 0.25 0.25 0.25	2.67 E-6	4.94 E-6	4.10 E-9	5.09 E-6

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1991
TABLE 11B

RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS
SECOND QUARTER, 1991
ON-SITE DOSE TO MEMBERS OF THE PUBLIC
(SPECIAL INTEREST GROUPS)

				External Dose (mrem)			Internal Dose (mrem)
				Noble Gas		Iodines, Particulates, and Tritium	
Specific Activity	Exposure Location (Sectors)	Exposure Closest Distance	Exposure Time (Hours)	Whole Body	Skin	Ground Plane	Inhalation
Police at Shooting Range	SE	700m	52	2.12 E-6	4.96 E-6	0	2.25 E-5
Tour Participants							
(a) Simulator Bldg.	S	310m	1.0				
(b) Bio Lab	SSE	460m	1.5	2.25 E-7	5.23 E-7	0	2.60 E-6
(c) Overlook	E	210m	0.25				
American Indians at Burial Grounds	NW NNW	200m 200m	24 24	3.59 E-6	7.03 E-6	0	6.51 E-5
Ranch Hands driving cattle around site	NW NNW N NNE NE	250m 350m 320m 450m 630m	0.25 0.25 0.25 0.25 0.25	2.46 E-8	4.56 E-8	0	5.64 E-7

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TABLE 11C

RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS
THIRD QUARTER, 1991
ON-SITE DOSE TO MEMBERS OF THE PUBLIC
(SPECIAL INTEREST GROUPS)

				External Dose (mrem)			Internal Dose (mrem)
				Noble Gas		Iodines, Particulates, and Tritium	
Specific Activity	Exposure Location (Sectors)	Exposure Closest Distance	Exposure Time (Hours)	Whole Body	Skin	Ground Plane	Inhalation
Police at Shooting Range	SE	700m	52	1.63 E-4	3.87 E-4	1.57 E-6	3.42 E-4
Tour Participants							
(a) Simulator Bldg.	S	310m	1.0				
(b) Bio Lab	SSE	460m	1.5	1.73 E-5	4.12 E-5	3.23 E-7	3.69 E-5
(c) Overlook	E	210m	0.25				
American Indians at Burial Grounds	NW NNW	200m 200m	24 24	1.75 E-4	4.01 E-4	1.22 E-6	6.80 E-4
Ranch Hands driving cattle around site	NW NNW N NNE NE	250m 350m 320m 450m 630m	0.25 0.25 0.25 0.25 0.25	1.40 E-6	3.21 E-6	8.74 E-9	5.93 E-6

DIABLO CANYON POWER PLANT
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TABLE 11D

RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS
FOURTH QUARTER, 1991
ON-SITE DOSE TO MEMBERS OF THE PUBLIC
(SPECIAL INTEREST GROUPS)

				External Dose (mrem)			Internal Dose (mrem)
				Noble Gas		Iodines, Particulates, and Tritium	
Specific Activity	Exposure Location (Sectors)	Exposure Closest Distance	Exposure Time (Hours)	Whole Body	Skin	Ground Plane	Inhalation
Police at Shooting Range	SE	700m	52	6.04 E-7	8.97 E-7	1.53 E-8	1.33 E-4
Tour Participants							
(a) Simulator Bldg.	S	310m	1.0				
(b) Bio Lab	SSE	460m	1.5	6.62 E-8	9.83 E-8	3.16 E-9	1.51 E-5
(c) Overlook	E	210m	0.25				
American Indians at Burial Grounds	NW NNW	200m 200m	24 24	8.53 E-6	4.92 E-5	1.46 E-8	1.10 E-3
Ranch Hands driving cattle around site	NW NNW N NNE NE	250m 350m 320m 450m 630m	0.25 0.25 0.25 0.25 0.25	5.71 E-8	3.24 E-7	1.17 E-10	9.32 E-6

X. METEOROLOGICAL DATA

METEOROLOGICAL DATA

The hour-by-hour listing of wind speed, wind direction, atmospheric stability and precipitation is being submitted on magnetic tape in accordance with Technical Specification 6.9.1.6 (Attachment 2).

ATTACHMENT 1

ATTACHMENT 1

1991 LAND USE CENSUS

(DIABLO CANYON LAND USE CENSUS)

PG&E's Technical and Ecological Services (TES) conducted the annual land use census in the vicinity of Diablo Canyon Power Plant. This census for 1991 was completed by September 20. The land use census is required by the Nuclear Regulatory Commission, Regulatory Guide 4.8 Environmental Technical Specifications for Nuclear Power Plants, and by Diablo Canyon Power Plant Technical Specification 3.12.2. These both require that a census be conducted at least once per year during the growing season, i.e., between June 1 and October 1 for the Diablo Canyon Environ. The census is to identify the nearest residence, the nearest milk animal, and the nearest garden greater than 50 square meters (500 square feet) producing broad leaf vegetation in each of the 16 meteorological sectors within a 5 mile radius from the plant.

The methods for conducting the census were direct contact with individual land owners or tenants, aerial survey, and property visits. The land owners were identified from the county records. The land owners and tenants were contact personally or by phone between June 30 and September 20, 1991.

Results

Contact with the land owners or tenants and the property visits identified no household gardens greater than 500 square feet. Much of the area surrounding the plant site is used for cattle grazing. The only farm greater than 500 square feet is in the east-southeast sector (along with site access road) producing legumes and cereal grass (grains). This farm is located on the coastal plateau; it starts at approximately 2 miles from the plant and extends 4.5 miles from the plant.

No milk animals were identified within the first 5 miles in any sector or on any of the properties. A total of 6 permanent residences were identified within the 5 mile radius of the plant. The total number of permanent residences was reduced by 1 (compared to 1990 census) because the property (Field's Property) was purchased by PG&E. The attached table and map summarize the land use census results for 1991.

ATTACHMENT 1

TABLE 1

1991 LAND USE CENSUS

DISTANCES FROM THE UNIT 1 CENTER LINE TO THE
NEAREST MILK ANIMAL, RESIDENCE, VEGETABLE GARDEN

22-1/2 Degree* Radial Sector	Nearest Milk Animal	Nearest Residence Km (mi)	Residence Azimuth Degree	Nearest Vegetable Garden Km (mi)
NW	None	5.95 (3.7)	326	None
N	None	None	---	None
NNE	None	5.30 (3.3)	018.5	None
NE	None	8.15 (5.06)	037	None
ENE	None	7.15 (4.44)	062.5	None
E	None	7.25 (4.5)	096.5	None
ESE	None	None	---	3.3 (2)**
SE	None	None	---	None

* Sectors not shown contain no land beyond the site boundary, other than islets not used for the purposes indicated in this table.

** The vegetable garden indicated is the farm along the site access road.

ATTACHMENT 1

FIGURE 1: UNITS 1 AND 2 DIABLO CANYON POWER PLANT - LAND USE CENSUS

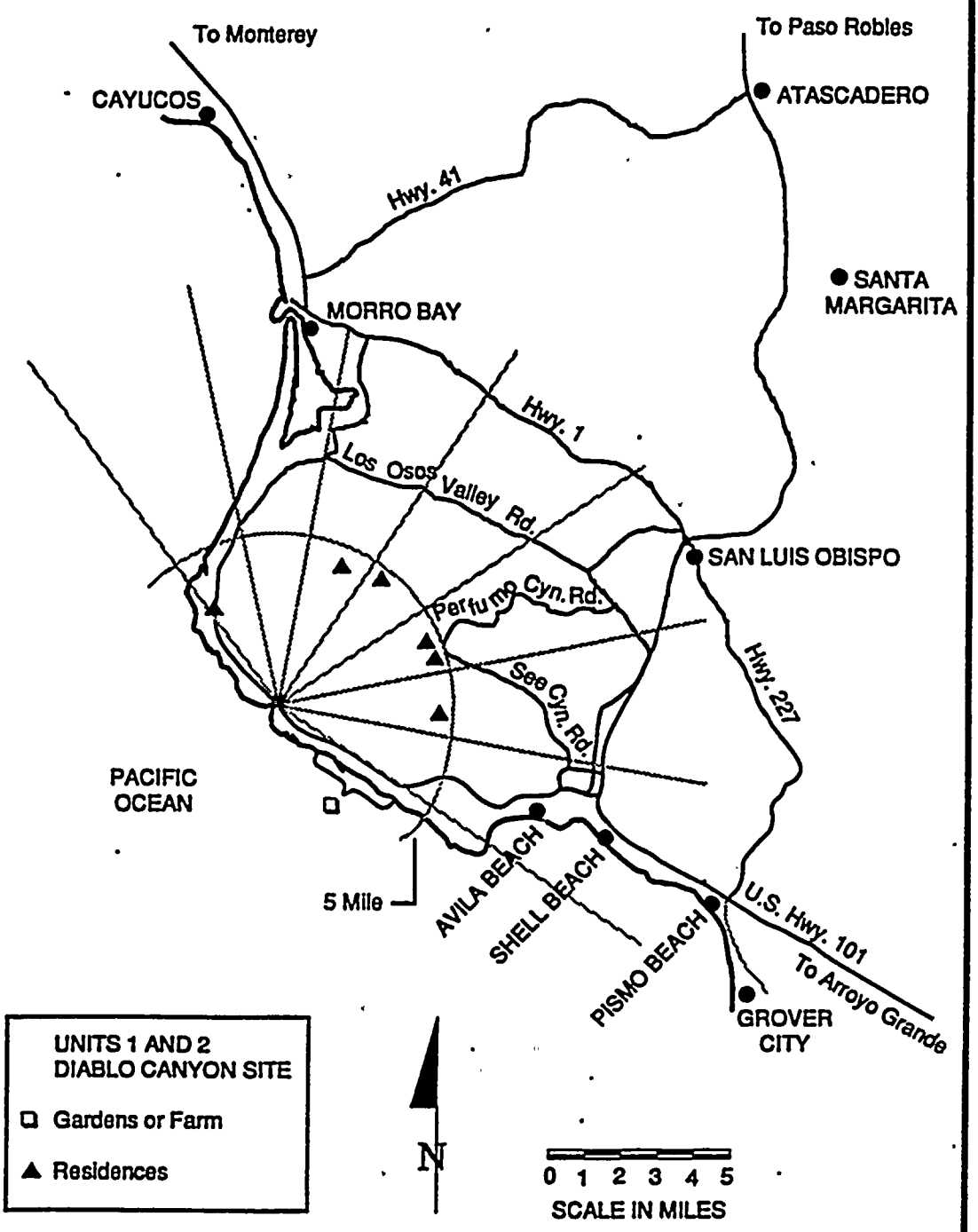

Figure 1. Units 1 and 2 Diablo Canyon Power Plant - Land Use Census.

ATTACHMENT 2

ATTACHMENT 2

METEOROLOGICAL DATA IN MAGNETIC TAPE FORMAT

ATTACHMENT 3

CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

TITLE: ADMINISTRATIVE PROCEDURE
DEWATERING CONTROL PROGRAM

APPROVED: [signature] 11/27/91 DATE 12-4-91 EFFECTIVE DATE

** PROCEDURE CLASSIFICATION - QUALITY RELATED **

1.0 SCOPE

1.1 The purpose of the Radwaste Dewatering Control Program is to assure that all dewatering of vendor containers meets State and Federal Regulations as well as Burial Site Criteria for Free Standing Water (FSW).

1.2 This Dewatering Process Control Program applies to all vendor dewatering liners and High Integrity Containers (HICs) containing ion exchange and filter media.

1.3 This procedure and changes thereto require PSRC review and Plant Manager approval.

2.0 DISCUSSION

2.1 The dewatering system consists of a pump with necessary hoses for connection to the liner or HIC and to the plant interface piping. Liners or HICs supplied by a vendor are preassembled with a hub and/or lateral assembly for dewatering and media retention. Procedures for dewatering are dependent on the waste material to be dewatered and/or the container type.

2.2 These procedures, specific to the container and waste material provide instruction for the pumping and settling time sequences as well as; pump rate, total times pumped, and acceptance criteria. Additional contingencies are provided for vessels or liners requiring further steps to meet acceptance criteria and the means of verification of compliance. Methods for recording dewatering data are included in the specific procedure.

3.0 RESPONSIBILITIES

3.1 The Radiation Protection Section Director is responsible for implementation of the requirements of this program.

3.2 The Radwaste Engineer is responsible for the development and review of procedures relating to the requirements of this program.

3.3 The Radwaste Foreman is responsible for implementation of the procedures relating to the requirements of this program.

3.4 QC is responsible for verification of compliance with the Quality requirements of the dewatering procedures.

4.0 PREREQUISITES

None

5.0 PRECAUTIONS

None

6.0 INSTRUCTIONS

6.1 The Dewatering Control Program for Liners and HICs, shall consist of DCPP PSRC reviewed and Plant Manager approved procedures.

6.2 These procedures shall contain the specific instructions for:

6.2.1 Pumping Time Cycles

6.2.2 Pump Rate

6.2.3 Total Time to be Pumped

6.2.4 Temperature monitoring

6.2.5 Acceptance Criteria of Free Standing Water (FSW)

6.2.6 Pressure Monitoring when Gas Generation is Suspected

6.2.7 Documentation and Records of Dewatering Activities

6.3 These procedures shall also specify the type of container and waste media that may be dewatered. Contingencies are provided for additional steps that may be necessary to meet FSW criteria.

6.4 GENERAL CONTROL PARAMETERS

6.4.1 Carbon Steel liners are not to be loaded with material:

a. Over 1 µCi/cc of nuclides with half lives greater than five years for shipment to Richland or Barnwell.

b. Above Class A for shipment to Beatty.

6.4.2 Waste temperature is monitored to mitigate exothermic chemical reactions which are possible when dewatering organic ion exchange materials.

6.4.3 At the end of the appropriate pump cycle, as outlined by the procedure, a measurement of displaced liquid is made.

6.4.4 Records as outlined by the dewatering procedure shall be maintained for all dewatered containers prior to shipment. Copies are delivered to the Radwaste Foreman for indexing with radwaste shipping paper work.

7.0 REFERENCES

7.1 AP C-257, "Mobile Service Operating Procedure for Low-Level Radioactive Waste Processing."

7.2 NRC Information Notice No. 83-14: Dewatered Spent Ion Exchange Resin Susceptibility to Exothermic Chemical Reaction.

7.3 NRC Information Notice No. 89-27: Limitations on the Use of Waste Forms and High Integrity Containers for the Disposal of Low-Level Radioactive Waste.

7.4 QAP-2.L, "Radioactive Waste Management."

7.5 NRC Information Notice No. 90-50: Minimization of Methane Gas in Plant Systems and Radwaste Shipping Containers.

8.0 RECORDS

8.1 Records of dewatering activities shall be submitted to the Records Management System on a shipment basis by container per RCP RW-4.

9.0 APPENDICES

None

10.0 ATTACHMENTS

10.1 Test Report: LN Technologies, Corp. LN 87-008, DB Series Dewatering Containers, Rev. A.

10.2 Test Report: LN Technologies, Corp. EN-009, Powdered Resin Dewatering with a Sandpiper Pump, Rev. A.

10.3 Test Report: Scientific Ecology Group, Inc. EN-005, Summary Test Report Durasil 70 and DT-80 Dewatering Testing, Rev. B.

10.4 Topical Report for LN Composite High Integrity Container LN-89-001, Rev. 1, January 1989, Docket Number WM-93.

10.5 NRC Technical Evaluation Report LN Composite High-Integrity Container Manufactured by LN Technologies Corporation, Docket Number WM-93.

NOTE: The above attachments are maintained in Document Control Master File, Catalog No. TK 9400/SEG-1.

11.0 RECORD OF REVIEWS

11.1 Prepared by: C. Clint Miller

11.2 Sponsored by: C. Clint Miller

11.3 Independent Technical Review by: Mark O. Somerville

DIABLO CANYON POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

PG&E

JULY 1 - DECEMBER 31, 1990

DIABLO CANYON POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT REPORT

JULY 1, 1990 - DECEMBER 31, 1990

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990

INTRODUCTION

This Semiannual Radioactive Effluent Release Report summarizes the gaseous and liquid effluent releases made from Diablo Canyon Power Plant's Units 1 and 2 for the third and fourth quarters of 1990. This report also includes the doses due to the release of radioactive liquid and gaseous effluents and a summary of solid radwaste shipments. This report contains the information required by Unit 1 and 2 Technical Specification 6.9.1.6 and is presented in the general format of Regulatory Guide 1.21, Appendix B.

In all cases, the plant effluent releases were well below Technical Specifications for the report period.

The Unit 1 reactor operated at full power throughout the report period except for short power reductions required for maintenance and short outage periods in December. The Unit 2 reactor operated at full power throughout the report period except for short power reductions required for maintenance.

I. SUPPLEMENTAL INFORMATION

A. Regulatory Limits

1. Gaseous Effluents

a. Noble Gas Dose Rate Limit

The dose rate in unrestricted areas due to radioactive noble gases released in gaseous effluents is limited to less than or equal to 500 millirem per year to the total body and less than or equal to 3000 millirem per year to the skin. (Technical Specification 3.11.2.1.a.)

b. Particulate and Iodine Dose Rate Limit

The dose rate in unrestricted areas 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 millirem per year to any organ. (Technical Specification 3.11.2.1.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:

	CALENDAR QUARTER	CALENDAR YEAR
Gamma radiation	5 millirad	10 millirad
Beta radiation	10 millirad	20 millirad

(Technical Specification 3.11.2.2)

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 millirem to any organ in any calendar quarter and less than or equal to 15 millirem to any organ during a calendar year. (Technical Specification 3.11.2.3)

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 II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration is limited to 2×10^{-4} microcuries/ml total activity. (Technical Specification 3.11.1.1)

b. Dose

The dose or dose commitment to an individual from radioactive materials in liquid effluents released, from each reactor unit, to areas at or beyond the site boundary, is limited to the following:

	CALENDAR QUARTER	CALENDAR YEAR
Total Body	1.5 millirem	3 millirem
Any Organ	5 millirem	10 millirem

(Technical Specification 3.11.1.2)

B. Maximum Permissible Concentrations

1. Gaseous Effluents

Maximum permissible concentrations are not used in the methodology for determining allowable release rates for gaseous effluents at Diablo Canyon Power Plant.

2. Liquid Effluents

The concentrations listed in 10 CFR 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases are used for determining the allowable release rate at the point of discharge from the site for liquid effluents. For dissolved or entrained noble gases, the allowable release rate concentration at the point of discharge is limited to 2×10^{-4} microcuries per milliliter 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 each equipped with Geiger-Mueller detectors. These monitor readings are correlated to isotopic concentration based on laboratory isotopic analysis of grab samples using a germanium detector.

When the plant vent measurements as indicated by the process monitors are below the lower limit of detection, the results of the grab samples are used to quantify releases. In addition, 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 grab samples with a germanium detector. 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

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 cartridges and analyzing these cartridges with a germanium detector.

c. Particulates

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. All of the 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 particulates are periodically monitored by collecting samples using particulate filters and analyzing these filters with a germanium detector.

d. 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. Tritium is determined at a minimum weekly sample frequency. The tritium concentration is assumed to remain constant between samples.

2. Liquid Effluents

a. Batch Releases

Each tank of liquid radwaste is analyzed for principal gamma emitters using a germanium detector prior to release. The prerelease analysis includes dissolved and entrained gases. Volume proportional monthly and quarterly composites are prepared from aliquots of each tank released. 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 gross gamma and 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 -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.

D. Batch Releases

1. Liquid

a. Number of batch releases..... 360

b. Total time period for batch releases..... 944 hours

c. Maximum time period for a batch release..... 9.50 hours

d. Average time period for a batch release..... 2.62 hours

e. Minimum time period for a batch release..... 0.017 hours

f. Average saltwater flow during batch releases 1.69 E+6 GPM

2. Gaseous

a. Number of batch releases..... 47

b. Total time period for batch releases..... 128 hours

c. Maximum time period for a batch release..... 11.75 hours

d. Average time period for a batch release..... 2.73 hours

e. Minimum time period for a batch release..... 1.417 hours

II. MAJOR CHANGES TO LIQUID, GASEOUS AND SOLID RADWASTE TREATMENT SYSTEMS

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

III. CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

There were no changes to the radioactive waste packaging Process Control Program (PCP) during this report period.

IV. CHANGES TO THE ENVIRONMENTAL RADIOLOGICAL MONITORING PROCEDURE (ERMP)

There were no changes to the Environmental Radiological Monitoring Procedure (ERMP) during this report period.

V. CHANGES TO THE OFF-SITE DOSE CALCULATION PROCEDURE (ODCP)

There were no changes to the Off-site Dose Calculation Procedure (ODCP) during the report period.

VI. 1990 LAND USE CENSUS

There were no changes from the 1989 land use census. The 1990 Land Use Census results are included as Attachment 1.

VII. GASEOUS AND LIQUID EFFLUENTS

DIABLO CANYON POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990

TABLE 1

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Units	Third Quarter	Fourth Quarter	Est. Total Error,%
A. Fission & activation gases				
1. Total release	Ci	1.77 E+0	2.38 E+0	2.7 E+1
2. Average release rate for period	μCi/sec	2.23 E-1	2.99 E-1	
3. Percent of technical specification limit[2]	%	1.38 E-4	1.25 E-4	
B. Iodines				
1. Total iodine-131	Ci	MDA	MDA	2.4 E+1
2. Average release rate for period	μCi/sec	MDA	MDA	
3. Percent of technical specification limit[2]	%	MDA	MDA	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	MDA	MDA	2.4 E+1
2. Average release rate for period	μCi/sec	MDA	MDA	
3. Percent of technical specification limit[2]	%	MDA	MDA	
4. Gross alpha radioactivity	Ci	MDA	1.07 E-6	
D. Tritium				
1. Total release	Ci	8.21 E+0	8.69 E+0	1.3 E+1
2. Average release rate for period	μCi/sec	1.03 E+0	1.09 E+0	
3. Percent of technical specification limit[2]	%	3.78 E-4	4.00 E-4	

NOTE:

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

[2] Technical Specification 3.11.2.1 Limit

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TABLE 2

GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES

		Third Quarter		Fourth Quarter	
Nuclides Released	Unit	Continuous Mode	Batch Mode	Continuous Mode	Batch Mode
1. Fission gases					
argon-41	Ci	MDA	3.04 E-2	MDA	5.14 E-2
krypton-85	Ci	MDA	4.24 E-1	MDA	5.78 E-1
krypton-85m	Ci	MDA	MDA	MDA	7.65 E-5
krypton-87	Ci	MDA	MDA	MDA	MDA
krypton-88	Ci	MDA	MDA	MDA	MDA
xenon-131m	Ci	MDA	MDA	MDA	3.06 E-2
xenon-133	Ci	4.88 E-1	5.41 E-1	MDA	1.70 E+0
xenon-133m	Ci	MDA	1.33 E-3	MDA	2.14 E-3
xenon-135	Ci	2.78 E-1	7.09 E-3	MDA	1.42 E-2
xenon-135m	Ci	MDA	MDA	MDA	MDA
xenon-138	Ci	MDA	MDA	MDA	MDA
TOTAL FOR PERIOD	Ci	7.66 E-1	1.00 E+0	MDA	2.38 E+0
2. Iodines					
iodine-131	Ci	MDA		MDA	
iodine-133	Ci	MDA		MDA	
iodine-135	Ci	MDA		MDA	
TOTAL FOR PERIOD	Ci	MDA		MDA	

DIABLO CANYON POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990

TABLE 2 (Continued)

GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES

		CONTINUOUS MODE	
Nuclides Released	Unit	Third Quarter	Fourth Quarter
3. Particulates			
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	MDA	MDA
cobalt-60	Ci	MDA	MDA
manganese-54	Ci	MDA	MDA
ruthenium-103	Ci	MDA	MDA
strontium-89	Ci	MDA	MDA
strontium-90[1]	Ci	MDA	MDA
zinc-65	Ci	MDA	MDA
zirconium-95[1]	Ci	MDA	MDA
TOTAL FOR PERIOD	Ci	MDA	MDA

NOTE:

[1] Includes Daughters

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TABLE 3

GASEOUS EFFLUENTS - LOWER LIMITS OF DETECTION

Nuclide	Unit	Continuous Mode	Batch Mode	
			Containment Purge	Gas Decay Tank
1. Fission gases				
krypton-85	μCi/ml	7.82 E-6	7.82 E-6	2.84 E-3
krypton-85m	μCi/ml	1.95 E-8	1.95 E-8	6.53 E-6
krypton-87	μCi/ml	6.73 E-8	6.73 E-8	1.58 E-5
krypton-88	μCi/ml	6.97 E-8	6.97 E-8	1.98 E-5
xenon-131m	μCi/ml	6.35 E-7	6.35 E-7	2.07 E-4
xenon-133	μCi/ml	6.33 E-8	6.33 E-8	1.78 E-5
xenon-133m	μCi/ml	1.92 E-7	1.92 E-7	4.75 E-5
xenon-135	μCi/ml	1.75 E-8	1.75 E-8	5.47 E-6
xenon-135m	μCi/ml	3.74 E-7	3.74 E-7	3.80 E-5
xenon-138	μCi/ml	1.06 E-6	1.06 E-6	7.65 E-5
argon-41	μCi/ml	5.31 E-8	5.31 E-8	1.36 E-5
2. Tritium				
hydrogen-3	μCi/ml	1.39 E-8	1.39 E-8	
3. Iodines				
iodine-131	μCi/ml	3.24 E-13		
iodine-133	μCi/ml	5.11 E-13		
iodine-135	μCi/ml	6.23 E-12		

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TABLE 3 (Continued)

GASEOUS EFFLUENTS - LOWER LIMITS OF DETECTION

Nuclide	Unit	Continuous Mode
4. Particulates		
cesium-134	μCi/ml	2.48 E-13
cesium-137	μCi/ml	3.11 E-13
cerium-141	μCi/ml	2.72 E-13
cerium-144	μCi/ml	1.08 E-12
chromium-51	μCi/ml	1.72 E-12
cobalt-57	μCi/ml	1.55 E-13
cobalt-58	μCi/ml	2.49 E-13
cobalt-60	μCi/ml	3.48 E-13
manganese-54	μCi/ml	2.83 E-13
ruthenium-103	μCi/ml	2.37 E-13
strontium-89	μCi/ml	1.15 E-14
strontium-90[1]	μCi/ml	4.18 E-15
zinc-65	μCi/ml	8.42 E-13
zirconium-95[1]	μCi/ml	4.32 E-13
gross alpha	μCi/ml	1.44 E-14

NOTE:

[1] Includes daughters

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TABLE 4

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Est Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	2.06 E-1	2.78 E-1	2.4 E+1
2. Average diluted concentration during period	μCi/ml	1.22 E-9	1.44 E-9	
3. Percent of applicable limit[1]	%	2.45 E-3	1.59 E-2	
B. Tritium				
1. Total release	Ci	1.33 E+2	3.52 E+2	1.3 E+1
2. Average diluted concentration during period	μCi/ml	7.85 E-7	1.82 E-6	
3. Percent of applicable limit[1]	%	2.62 E-2	6.06 E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	1.02 E-3	5.39 E-3	2.4 E+1
2. Average diluted concentration during period	μCi/ml	6.03 E-12	2.79 E-11	
3. Percent of applicable limit[1]	%	3.02 E-6	1.39 E-5	
D. Gross alpha radioactivity				
1. Total release	Ci	MDA	MDA	6.1 E+1

[1] Technical Specification 3.11.1.1 Limit

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TABLE 4 (Continued)

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

		Unit	Third Quarter	Fourth Quarter	Est Total Error, %
E.	Volume of waste released (prior to dilution)	liters	1.45 E+8	1.32 E+8	5.0 E0
F.	Volume of circulating saltwater used during release	liters	1.69 E+11	1.93 E+11	6.5 E0

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TABLE 5

LIQUID EFFLUENTS - NUCLIDES RELEASED

		Third Quarter		Fourth Quarter	
Nuclides Released	Unit	Continuous Mode	Batch Mode	Continuous Mode	Batch Mode
antimony-122	Ci	MDA	2.23 E-7	MDA	MDA
antimony-124	Ci	MDA	2.12 E-4	MDA	MDA
antimony-125	Ci	MDA	1.71 E-2	MDA	1.17 E-2
beryllium-7	Ci	MDA	1.54 E-5	MDA	9.43 E-4
bromine-82	Ci	MDA	MDA	MDA	3.00 E-5
cerium-141	Ci	MDA	MDA	MDA	MDA
cerium-144	Ci	MDA	MDA	MDA	MDA
cesium-134	Ci	MDA	4.11 E-3	MDA	1.44 E-2
cesium-136	Ci	MDA	MDA	MDA	4.12 E-6
cesium-137	Ci	MDA	5.07 E-3	MDA	1.60 E-2
chromium-51	Ci	MDA	1.54 E-4	MDA	MDA
cobalt-57	Ci	MDA	4.92 E-4	MDA	3.03 E-4
cobalt-58	Ci	MDA	5.76 E-2	MDA	3.26 E-2
cobalt-60	Ci	MDA	2.22 E-2	MDA	3.73 E-2
iron-55	Ci	MDA	9.60 E-2	MDA	1.49 E-1
iron-59	Ci	MDA	MDA	MDA	MDA
lanthanum-140[1]	Ci	MDA	6.70 E-6	MDA	2.38 E-4
manganese-54	Ci	MDA	2.10 E-3	MDA	3.08 E-3
manganese-56	Ci	MDA	MDA	MDA	MDA

NOTE:

[1] Includes daughters

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TABLE 5 (CONTINUED)

LIQUID EFFLUENTS - NUCLIDES RELEASED

		Third Quarter		Fourth Quarter	
Nuclides Released	Unit	Continuous Mode	Batch Mode	Continuous Mode	Batch Mode
molybdenum-99[1]	Ci	MDA	1.56 E-5	MDA	6.82 E-4
ruthenium-103	Ci	MDA	MDA	MDA	MDA
silver-110m	Ci	MDA	6.21 E-5	MDA	9.71 E-4
sodium-24	Ci	MDA	1.63 E-5	MDA	4.34 E-4
strontium-89	Ci	MDA	MDA	MDA	1.53 E-4
strontium-90[1]	Ci	MDA	3.19 E-5	MDA	3.50 E-5
strontium-92	Ci	MDA	MDA	MDA	1.46 E-6
tellurium-129m	Ci	MDA	MDA	MDA	MDA
tellurium-132	Ci	MDA	MDA	MDA	MDA
tin-113[1]	Ci	MDA	MDA	MDA	MDA
tin-117m	Ci	MDA	MDA	MDA	MDA
tungsten-187	Ci	MDA	MDA	MDA	MDA
zirconium-95[1]	Ci	MDA	1.78 E-4	MDA	3.45 E-4
iodine-131	Ci	MDA	4.14 E-4	MDA	7.02 E-3
iodine-132	Ci	MDA	4.45 E-6	MDA	2.33 E-7

NOTE:

[1] Includes daughters

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TABLE 5 (CONTINUED)

LIQUID EFFLUENTS - NUCLIDES RELEASED

		Third Quarter		Fourth Quarter	
Nuclides Released	Unit	Continuous Mode	Batch Mode	Continuous Mode	Batch Mode
iodine-133	Ci	MDA	2.25 E-4	MDA	2.79 E-3
iodine-134	Ci	MDA	2.76 E-8	MDA	MDA
iodine-135	Ci	MDA	5.70 E-5	MDA	1.44 E-4
TOTAL FOR PERIOD	Ci	MDA	2.06 E-1	MDA	2.78 E-1

DISSOLVED AND ENTRAINED GASES

xenon-133	Ci	MDA	9.77 E-4	MDA	5.02 E-3
xenon-133m	Ci	MDA	MDA	MDA	MDA
xenon-135	Ci	MDA	4.27 E-5	MDA	3.70 E-4
krypton-85	Ci	MDA	MDA	MDA	MDA
TOTAL FOR PERIOD	Ci	MDA	1.02 E-3	MDA	5.39 E-3

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TABLE 6

LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION (LLD)

Nuclide	Unit	LLD
antimony-122	μCi/ml	5.89 E-8
antimony-124	μCi/ml	9.67 E-8
antimony-125	μCi/ml	1.50 E-7
beryllium-7	μCi/ml	4.12 E-7
bromine-82	μCi/ml	6.09 E-8
cerium-141	μCi/ml	5.86 E-8
cerium-144	μCi/ml	2.28 E-7
cesium-134	μCi/ml	4.53 E-8
cesium-136	μCi/ml	4.90 E-8
cesium-137	μCi/ml	6.30 E-8
chromium-51	μCi/ml	4.00 E-7
cobalt-57	μCi/ml	2.97 E-8
cobalt-58	μCi/ml	5.27 E-8
cobalt-60	μCi/ml	7.15 E-8
iron-55	μCi/ml	3.00 E-7
iron-59	μCi/ml	1.18 E-7
lanthanum-140[1]	μCi/ml	2.18 E-7
manganese-54	μCi/ml	5.68 E-8
manganese-56	μCi/ml	3.45 E-7
molybdenum-99[1]	μCi/ml	3.22 E-8
ruthenium-103	μCi/ml	5.38 E-8

NOTE:

[1] Includes Daughters

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TABLE 6 (CONTINUED)

LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION (LLD)

Nuclide	Unit	LLD
silver-110m	μCi/ml	5.52 E-8
sodium-24	μCi/ml	7.67 E-8
strontium-89	μCi/ml	1.93 E-8
strontium-90	μCi/ml	8.23 E-9
strontium-92	μCi/ml	1.23 E-7
tellurium-129m	μCi/ml	1.74 E-6
tellurium-132	μCi/ml	2.89 E-8
tin-113[1]	μCi/ml	5.43 E-8
tin-117m	μCi/ml	3.33 E-8
tungsten-187	μCi/ml	1.45 E-7
zirconium-95[1]	μCi/ml	9.18 E-8
gross alpha	μCi/ml	9.79 E-8
hydrogen-3	μCi/ml	5.56 E-6
iodine-131	μCi/ml	4.31 E-8
iodine-132	μCi/ml	7.13 E-8
iodine-133	μCi/ml	5.49 E-8
iodine-134	μCi/ml	1.36 E-7
iodine-135	μCi/ml	2.37 E-7

NOTE:

[1] Includes Daughters

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TABLE 6 (CONTINUED)

LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION (LLD)

Nuclide	Unit	LLD
xenon-133	μCi/ml	1.22 E-7
xenon-133m	μCi/ml	2.90 E-7
xenon-135	μCi/ml	3.70 E-8
krypton-85	μCi/ml	1.57 E-5

VIII. SOLID RADWASTE SHIPMENTS

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SOLID WASTE AND IRRADIATED FUEL SHIPMENT

A. Solid Waste Shipped Off-site for Burial or Disposal (Not irradiated fuel)

1. Type of Waste	Unit	6-Month Period	Est. Total Error, %
a. Spent Resins, Filter Sludges, Evaporator Bottoms, etc.	m^3 Ci	1.03 E+1 1.26 E+1	8.00 E+0
b. Dry Compressible Waste, Contaminated Equipment, etc.	m^3 Ci	2.82 E+1 8.80 E-1	1.00 E+1
c. Irradiated Components, Control Rods, etc.	m^3 Ci	0.00 E+0 0.00 E+0	N/A
d. Other	m^3 Ci	0.00 E+0 0.00 E+0	N/A

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

a.

H-3	%	9.54 E+0
C-14	%	1.01 E+1
Fe-55	%	1.28 E+1
Co-58	%	3.74 E+0
Co-60	%	1.33 E+1
Ni-63	%	1.28 E+1
Cs-134	%	1.16 E+1
Cs-137	%	2.45 E+1

b.

H-3	%	7.10 E+1
Fe-55	%	1.79 E+1
Co-58	%	1.18 E+0
Co-60	%	4.67 E+0
Ni-63	%	3.18 E+0

c.

NOT APPLICABLE	%	N/A

d.

NOT APPLICABLE	%	N/A

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SOLID WASTE AND IRRADIATED FUEL SHIPMENT

A. Solid Waste Shipped Off-site for Burial or Disposal (Not irradiated fuel) (Continued)

3. Supplemental Information Required by Technical Specification 6.9.1.6

Solidification Agent	Container Type	Shipping Package Type	Number of Containers	10 CFR 61 Waste Class
None	Type A - HIC	LSA>Type A	1	A-Stable
None	Strong Tight	LSA	40	A-Unstable
None	Strong Tight	LQ	3	A-Unstable

4. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
2	Truck	Richland, WA
16	Truck	Barnwell, SC

B. Irradiated Fuel Shipments (Disposition)

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

IX. RADIATION DOSE DUE TO GASEOUS AND LIQUID EFFLUENTS

RADIATION DOSES

A. Radiation doses due to 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 Off-site Dose Calculation Procedure. Dose contributions, listed in Table 7, show conformance to Technical Specification 3.11.1.2.

B. Radiation doses due to 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 calculational methodology in the Off-site Dose Calculation Procedure. Each unit's dose contribution has been calculated separately. The meteorology conditions concurrent with the time of discharge were used in these calculations. In addition to the site boundary doses, the dose to all age groups at the nearest residence within the low population zone for each of the land sectors and a five mile infant milk dose in each of the land sectors is included. Dose contributions, listed in Table 8 which represents the maximum dose for age groups, organs, and geographic locations for the Third and Fourth Quarters, show conformance to Technical Specifications 3.11.2.2 and 3.11.2.3.

C. Radiation doses due to direct radiation (Line-of-Sight Plus Sky-Shine) - Closest Site Boundary (800 m)

For the Third and Fourth Quarters of 1990, the radiation dose is evaluated to be 9.30 E-2 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 Due to 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 1.76 E-6 mrem.

E. 40 CFR 190 Considerations

The release of radioactivity in liquid and gaseous effluents during 1990 resulted in doses that are small percentages of the Technical Specification 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 Diablo Canyon Nuclear Power Plant shows conformance to 40 CFR 190.

F. 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. This is 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 during 1990.

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 for the year of 1990.

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TABLE 7

RADIATION DOSE DUE TO THE RELEASE OF RADIOACTIVE LIQUID EFFLUENTS

	millirem				
ORGAN	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Total
Total Body	6.73 E-3	2.88 E-3	5.55 E-4	9.88 E-4	1.12 E-2
Bone	3.50 E-2	1.62 E-2	2.54 E-3	4.24 E-3	5.80 E-2
Liver	2.50 E-2	1.14 E-2	1.85 E-3	3.18 E-3	4.14 E-2
Thyroid	9.61 E-4	5.78 E-5	4.28 E-5	4.82 E-4	1.54 E-3
Kidney	2.82 E-4	5.09 E-5	4.31 E-5	1.36 E-4	5.12 E-4
Lung	1.35 E-2	6.30 E-3	9.90 E-4	1.66 E-3	2.25 E-2
G.I. LLI	2.17 E-2	9.59 E-3	1.89 E-3	3.15 E-3	3.63 E-2

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TABLE 8A

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

		First Quarter		Second Quarter	
		Sector[2]	Dose	Sector	Dose
Site Boundary					
Noble Gas					
Gamma air dose	mrad	NNW	5.89 E-4	NNW	2.94 E-4
Beta air dose	mrad	NNW	3.29 E-3	NNW	1.34 E-4
I,P,T[3]					
Teen[4] (Thyroid)	mrem	NW	1.31 E-3	NNW	9.05 E-4
Residence					
Noble Gas					
Gamma air dose	mrad	NNW	1.12 E-4	NNW	4.40 E-5
Beta air dose	mrad	NNW	7.17 E-4	NNW	2.02 E-5
I,P,T					
Child[5] (Thyroid)	mrem	ESE	4.92 E-4	ESE	5.00 E-4
Five Mile Dairy					
I,P,T					
Infant (Thyroid)	mrem	NNW	1.14 E-4	ESE	6.12 E-5

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TABLE 8A (Continued)

RADIATION DOSE1 DUE THE RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS (UNIT 1)

		Third Quarter		Fourth Quarter		Annual Total	
		Sector[2]	Dose	Sector	Dose	Sector	Dose
Site Boundary							
Noble Gas							
Gamma air dose	mrad	ENE	2.31 E-5	N	8.24 E-5	NNW	9.10 E-4
Beta air dose	mrad	NW	2.40 E-3	N	2.80 E-4	N	3.51 E-3
I,P,T[3]							
Teen[4] (Thyroid)	mrem	NNW	2.61 E-4	NW	2.41 E-4	NW	2.61 E-3
Residence							
Noble Gas							
Gamma air dose	mrad	ENE	1.76 E-6	NNW	6.22 E-6	NNW	1.62 E-4
Beta air dose	mrad	NW	2.55 E-5	NE	4.51 E-6	NNW	7.40 E-4
I,P,T							
Child[5] (Thyroid)	mrem	ESE	1.96 E-4	ESE	1.11 E-4	ESE	1.30 E-3
Five Mile Dairy							
I,P,T							
Infant (Thyroid)	mrem	ESE	2.18 E-5	ESE	1.03 E-5	NNW	1.74 E-4

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TABLE 8B

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

		First Quarter		Second Quarter	
		Sector[2]	Dose	Sector	Dose
Site Boundary					
Noble Gas					
Gamma air dose	mrad	NNW	2.87 E-3	NNW	3.12 E-5
Beta air dose	mrad	NNW	4.98 E-3	ESE	9.96 E-5
I,P,T[3]					
Teen[4] (Thyroid)	mrem	NW	1.99 E-3	NW	1.67 E-3
Residence					
Noble Gas					
Gamma air dose	mrad	NNW	3.75 E-4	NNW	3.97 E-6
Beta air dose	mrad	NNW	6.67 E-4	ESE	1.43 E-5
I,P,T					
Child[5] (Thyroid)	mrem	ESE	7.33 E-4	ESE	6.77 E-4
Five Mile Dairy					
I,P,T					
Infant (Thyroid)	mrem	NNW	2.03 E-4	ESE	6.03 E-5

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TABLE 8B (Continued)

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

		Third Quarter		Fourth Quarter		Annual Total	
		Sector[2]	Dose	Sector	Dose	Sector	Dose
Site Boundary							
Noble Gas							
Gamma air dose	mrad	NW	8.83 E-4	NW	2.37 E-4	NW	3.47 E-3
Beta air dose	mrad	NW	1.50 E-3	NW	4.04 E-4	NW	6.23 E-3
I,P,T[3]							
Teen[4] (Thyroid)	mrem	NNW	9.76 E-4	NW	2.20 E-3	NW	6.61 E-3
Residence							
Noble Gas							
Gamma air dose	mrad	NNW	5.85 E-5	NW	7.13 E-6	NNW	4.41 E-4
Beta air dose	mrad	NNW	9.91 E-5	NNW	1.90 E-5	NNW	7.88 E-4
I,P,T							
Child[5] (Thyroid)	mrem	ESE	5.68 E-4	ESE	5.03 E-4	ESE	2.48 E-3
Five Mile Dairy							
I,P,T							
Infant (Thyroid)	mrem	ESE	4.74 E-5	NNW	8.32 E-5	NNW	3.72 E-4

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NOTES FOR TABLES 8A AND 8B

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

2. The ocean sectors SSE, S, SSW, SW, WSW, W, and WNW are not included.

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

4. The inhalation, ground plane and animal-meat pathways are included in this dose calculation.

5. The inhalation, ground plane, animal-meat and vegetable pathways are included for this location. An occupancy factor of 0.5 was used for the inhalation and ground plane pathways. The child age group had the highest calculated does for this location.

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TABLE 9

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE LIQUID EFFLUENTS

	Percent				
ORGAN	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Total
Total Body	4.49 E-1	1.92 E-1	3.70 E-2	6.59 E-2	3.73 E-1
Bone	7.00 E-1	3.24 E-1	5.08 E-2	8.48 E-2	5.80 E-1
Liver	5.00 E-1	2.28 E-1	3.70 E-2	6.36 E-2	4.14 E-1
Thyroid	1.92 E-2	1.16 E-3	8.56 E-4	9.64 E-3	1.54 E-2
Kidney	5.64 E-3	1.02 E-3	8.62 E-4	2.72 E-3	5.12 E-3
Lung	2.70 E-1	1.26 E-1	1.98 E-2	3.32 E-2	2.25 E-1
G.I. LLI	4.34 E-1	1.92 E-1	3.78 E-2	6.30 E-2	3.63 E-1

NOTE:

[1] Technical Specification 3.11.1.2

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TABLE 10A

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 1)

		First Quarter		Second Quarter	
		Sector	% of TS Limit	Sector	% of TS Limit
Site Boundary					
Noble Gas					
Gamma air dose	mrad	NNW	1.18 E-2	NNW	5.88 E-3
Beta air dose	mrad	NNW	3.29 E-2	NNW	1.34 E-3
I,P,T					
Teen (Thyroid)	mrem	NW	1.75 E-2	NNW	1.21 E-2
Residence					
Noble Gas					
Gamma air dose	mrad	NNW	2.24 E-3	NNW	8.80 E-4
Beta air dose	mrad	NNW	7.17 E-3	NNW	2.02 E-4
I,P,T					
Child (Thyroid)	mrem	ESE	6.56 E-3	ESE	6.67 E-3
Five Mile Dairy					
I,P,T					
Infant (Thyroid)	mrem	NNW	1.52 E-3	ESE	8.16 E-4

NOTE:

[1] Technical Specification 3.11.2.2 and 3.11.2.3

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TABLE 10A (Continued)

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 1)

		Third Quarter		Fourth Quarter		Annual Total	
		Sector	% of TS Limit	Sector	% of TS Limit	Sector	% of TS Limit
Site Boundary							
Noble Gas							
Gamma air dose	mrad	ENE	4.62 E-4	N	1.65 E-3	NNW	9.10 E-3
Beta air dose	mrad	NW	2.40 E-2	N	2.80 E-3	N	1.76 E-2
I,P,T							
Teen (Thyroid)	mrem	NNW	3.48 E-3	NW	3.21 E-3	NW	1.74 E-2
Residence							
Noble Gas							
Gamma air dose	mrad	ENE	3.52 E-5	NNW	1.24 E-4	NNW	1.62 E-3
Beta air dose	mrad	NW	2.55 E-4	NE	4.51 E-5	NNW	3.70 E-3
I,P,T							
Child (Thyroid)	mrem	ESE	2.61 E-3	ESE	1.48 E-3	ESE	8.67 E-3
Five Mile Dairy							
I,P,T							
Infant (Thyroid)	mrem	ESE	2.91 E-4	ESE	1.37 E-4	NNW	1.16 E-3

NOTE:

[1] Technical Specification 3.11.2.2 and 3.11.2.3

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990

TABLE 10B

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 2)

		First Quarter		Second Quarter	
		Sector	% of TS Limit	Sector	% of TS Limit
Site Boundary					
Noble Gas					
Gamma air dose	mrad	NNW	5.74 E-2	NNW	6.24 E-4
Beta air dose	mrad	NNW	4.98 E-2	ESE	9.96 E-4
I,P,T					
Teen (Thyroid)	mrem	NW	2.65 E-2	NW	2.23 E-2
Residence					
Noble Gas					
Gamma air dose	mrad	NNW	7.50 E-3	NNW	7.94 E-5
Beta air dose	mrad	NNW	6.67 E-3	ESE	1.43 E-4
I,P,T					
Child (Thyroid)	mrem	ESE	9.77 E-3	ESE	9.03 E-3
Five Mile Dairy					
I,P,T					
Infant (Thyroid)	mrem	NNW	2.71 E-3	ESE	8.04 E-4

NOTE:

[1] Technical Specification 3.11.2.2 and 3.11.2.3

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SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990

TABLE 10B (Continued)

PERCENT OF TECHNICAL SPECIFICATION LIMITS[1] FOR RADIOACTIVE GASEOUS EFFLUENTS (UNIT 2)

		Third Quarter		Fourth Quarter		Annual Total	
		Sector	% of TS Limit	Sector	% of TS Limit	Sector	% of TS Limit
Site Boundary							
Noble Gas							
Gamma air dose	mrad	NW	1.77 E-2	NW	4.74 E-3	NW	3.47 E-2
Beta air dose	mrad	NW	1.50 E-2	NW	4.04 E-3	NW	3.12 E-2
I,P,T							
Teen (Thyroid)	mrem	NNW	1.30 E-2	NW	2.93 E-2	NW	4.41 E-2
Residence							
Noble Gas							
Gamma air dose	mrad	NNW	1.17 E-3	NW	1.43 E-4	NNW	4.41 E-3
Beta air dose	mrad	NNW	9.91 E-4	NNW	1.90 E-4	NNW	3.94 E-3
I,P,T							
Child (Thyroid)	mrem	ESE	7.57 E-3	ESE	6.71 E-3	ESE	1.65 E-2
Five Mile Dairy							
I,P,T							
Infant (Thyroid)	mrem	ESE	6.32 E-4	NNW	1.11 E-3	NNW	2.48 E-3

NOTE:

[1] Technical Specification 3.11.2.2 and 3.11.2.3

DIABLO CANYON POWER PLANT
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
TABLE 11A

RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS
FIRST QUARTER, 1990
ON-SITE DOSE TO MEMBERS OF THE PUBLIC
(SPECIAL INTEREST GROUPS)

				External Dose (mrem)			Internal Dose (mrem)
				Noble Gas		Iodines, Particulates, and Tritium	
Specific Activity	Exposure Location (Sectors)	Exposure Closest Distance	Exposure Time (Hours)	Whole Body	Skin	Ground Plane	Inhalation
Police at Shooting Range	SE	700m	52	9.50 E-5	2.84 E-4	1.23 E-5	9.99 E-5
Tour Participants							
(a) Simulator Bldg.	S	310m	1.0				
(b) Bio Lab	SSE	460m	1.5	1.08 E-5	3.19 E-5	2.52 E-6	1.14 E-5
(c) Overlook	E	210m	0.25				
American Indians at Burial Grounds	NW NNW	200m 200m	24 24	4.06 E-4	1.01 E-3	1.30 E-5	4.58 E-4
Ranch Hands driving cattle around site	NW NNW N NNE NE	250m 350m 320m 450m 630m	0.25 0.25 0.25 0.25 0.25	3.02 E-6	7.93 E-6	8.40 E-8	3.50 E-6

DIABLO CANYON POWER PLANT
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TABLE 11B

RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS
SECOND QUARTER, 1990
ON-SITE DOSE TO MEMBERS OF THE PUBLIC
(SPECIAL INTEREST GROUPS)

				External Dose (mrem)			Internal Dose (mrem)
				Noble Gas		Iodines, Particulates, and Tritium	
Specific Activity	Exposure Location (Sectors)	Exposure Closest Distance	Exposure Time (Hours)	Whole Body	Skin	Ground Plane	Inhalation
Police at Shooting Range	SE	700m	52	7.29 E-6	1.78 E-5	1.43 E-5	1.04 E-4
Tour Participants							
(a) Simulator Bldg.	S	310m	1.0				
(b) Bio Lab	SSE	460m	1.5	8.48 E-7	2.02 E-6	2.94 E-6	1.16 E-5
(c) Overlook	E	210m	0.25				
American Indians at Burial Grounds	NW NNW	200m 200m	24 24	3.39 E-5	5.08 E-5	2.79 E-7	3.54 E-4
Ranch Hands driving cattle around site	NW NNW N NNE NE	250m 350m 320m 450m 630m	0.25 0.25 0.25 0.25 0.25	2.50 E-7	3.75 E-7	1.89 E-9	2.75 E-6

DIABLO CANYON POWER PLANT
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TABLE 11C

RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS
THIRD QUARTER, 1990
ON-SITE DOSE TO MEMBERS OF THE PUBLIC
(SPECIAL INTEREST GROUPS)

				External Dose (mrem)			Internal Dose (mrem)
				Noble Gas		Iodines, Particulates, and Tritium	
Specific Activity	Exposure Location (Sectors)	Exposure Closest Distance	Exposure Time (Hours)	Whole Body	Skin	Ground Plane	Inhalation
Police at Shooting Range	SE	700m	52	4.66 E-6	9.69 E-6	0	7.19 E-5
Tour Participants							
(a) Simulator Bldg.	S	310m	1.0				
(b) Bio Lab	SSE	460m	1.5	5.39 E-7	1.12 E-6	0	8.00 E-6
(c) Overlook	E	210m	0.25				
American Indians at Burial Grounds	NW NNW	200m 200m	24 24	7.97 E-5	2.92 E-4	0	1.52 E-4
Ranch Hands driving cattle around site	NW NNW N NNE NE	250m 350m 320m 450m 630m	0.25 0.25 0.25 0.25 0.25	6.64 E-7	2.36 E-6	0	1.27 E-6

DIABLO CANYON POWER PLANT
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
TABLE 11D

RADIATION DOSE DUE TO RELEASE OF RADIOACTIVE GASEOUS EFFLUENTS
FOURTH QUARTER, 1990
ON-SITE DOSE TO MEMBERS OF THE PUBLIC
(SPECIAL INTEREST GROUPS)

				External Dose (mrem)			Internal Dose (mrem)
				Noble Gas		Iodines, Particulates, and Tritium	
Specific Activity	Exposure Location (Sectors)	Exposure Closest Distance	Exposure Time (Hours)	Whole Body	Skin	Ground Plane	Inhalation
Police at Shooting Range	SE	700m	52	5.22 E-6	9.16 E-6	0	4.32 E-5
Tour Participants							
(a) Simulator Bldg.	S	310m	1.0				
(b) Bio Lab	SSE	460m	1.5	5.67 E-7	9.96 E-7	0	4.94 E-6
(c) Overlook	E	210m	0.25				
American Indians at Burial Grounds	NW NNW	200m 200m	24 24	2.25 E-5	5.34 E-5	0	3.32 E-4
Ranch Hands driving cattle around site	NW NNW N NNE NE	250m 350m 320m 450m 630m	0.25 0.25 0.25 0.25 0.25	1.91 E-7	4.58 E-7	0	2.78 E-6

X. METEOROLOGICAL DATA

METEOROLOGICAL DATA

The hour-by-hour listing of wind speed, wind direction, atmospheric stability and precipitation is being submitted on magnetic tape in accordance with Technical Specification 6.9.1.6 (Attachment 2).

ATTACHMENT 1

ATTACHMENT 1

1990 LAND USE CENSUS

(DIABLO CANYON LAND USE CENSUS)

TES conducted the annual land use census in the vicinity of Diablo Canyon Power Plant. This census for 1990 was completed on September 7. The land use census is required by the Nuclear Regulatory Commission, Regulatory Guide 4.8 Environmental Technical Specifications for Nuclear Power Plants, and by Diablo Canyon Power Plant Technical Specification 3.12.2. These both require that a census be conducted at least once per year during the growing season, i.e., between June 1 and October 1 for the Diablo Canyon environ. The census is to identify the nearest residence, the nearest milk animal, and the nearest garden greater than 50 square meters (500 square feet) producing broad leaf vegetation in each of the 16 meteorological sectors within a 5 mile radius from the plant.

The methods for conducting the census were direct contact with individual land owners or tenants, aerial survey, and property visits. The land owners were identified from the county records. The land owners and tenants were contacted personally or by phone between June 30 and September 30, 1990.

Results

Contact with the land owners or tenants and the property visits identified no household gardens greater than 500 square feet. Much of the area surrounding the plant site is used for cattle grazing. The only farm greater than 500 square feet is in the east-southeast sector (along the site access road) producing legumes and cereal grass (grains). This farm is located on the coastal plateau; it starts at approximately 2 miles from the plant and extends 4.5 miles from the plant.

No milk animals were identified within the first 5 miles in any sector or on any of the properties. The nearest residence is 1.55 miles north-northwest of the plant. A total of 7 permanent residences were identified within the 5 mile radius of the plant. The attached table and map summarize the land use census results for 1990.

ATTACHMENT 1

TABLE 1

1990 LAND USE CENSUS

DISTANCES FROM THE UNIT 1 CENTER LINE TO THE
NEAREST MILK ANIMAL, RESIDENCE, VEGETABLE GARDEN

22-1/2 Degree* Radial Sector	Nearest Milk Animal	Nearest Residence Km (mi)	Residence Azimuth Degree	Nearest Vegetable Garden Km (mi)
NW	None	5.95 (3.7)	326	None
NNW	None	2.50 (1.55)	333	None
N	None	None	---	None
NNE	None	5.30 (3.3)	018.5	None
NE	None	8.15 (5.06)	037	None
ENE	None	7.15 (4.44)	062.5	None
E	None	7.25 (4.5)	096.5	None
ESE	None	None	---	3.3 (2)**
SE	None	None	---	None

* Sectors not shown contain no land beyond the site boundary, other than islets not used for the purposes indicated in this table.

** The vegetable garden indicated is the farm along the site access road.

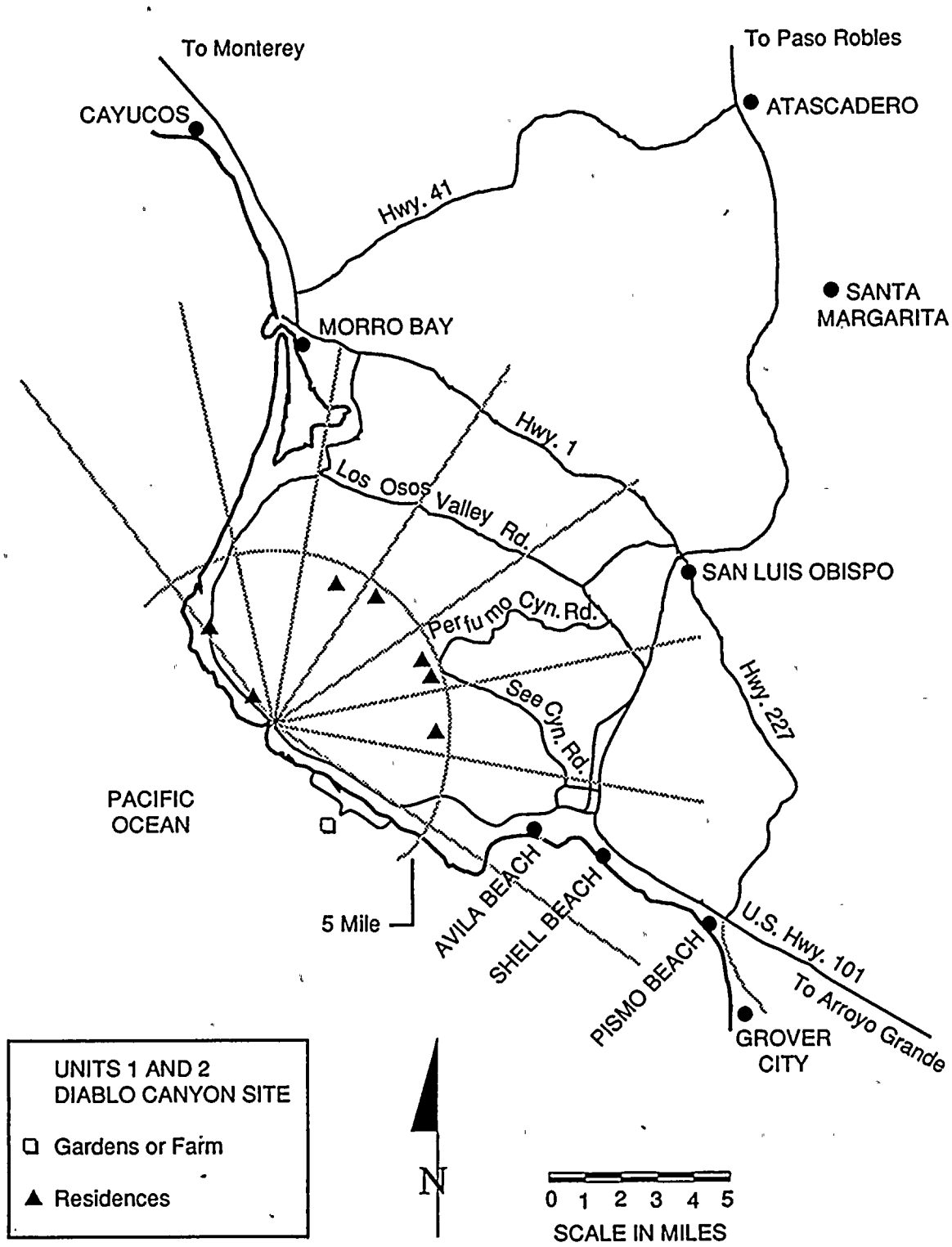

Figure 1. Units 1 and 2 Diablo Canyon Power Plant - Land Use Census.

ATTACHMENT 2

ATTACHMENT 2

METEOROLOGICAL DATA IN MAGNETIC TAPE FORMAT

62-3304 (REV. 11-68)

PG and E

INTRA-COMPANY MEMORANDUM

Date January 18, 1991

TO: ~~Fer. Mgr~~ Earl Kendall Location 1401, 77 Beale Ext. 2-4872

FROM: Gene Shelver Location 1601, 77 Beale Ext. 3-4532

SUBJECT: Meteorological Data for NRC 1990 Effluent Report

The attached tape contains the 1990 DCPP meteorological data required for the Radioactive Effluent Report. The data conform to NRC Reg. Guide 1.23 format. Please call me if you have any questions.

Gene

cc: RM Swanson

REPLY

Date

(USE REVERSE SIDE WHERE NECESSARY)