



**SAN ONOFRE
NUCLEAR GENERATING STATION**

**ANNUAL RADIOACTIVE EFFLUENT
RELEASE REPORT**

JANUARY TO DECEMBER 1993

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Southern California Edison Company

SAN ONOFRE NUCLEAR GENERATING STATION

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PREFACE

San Onofre Nuclear Generating Station is located next to San Onofre State Beach, adjoining Camp Pendleton Marine Corps Base, in San Diego County, 64 miles south of Los Angeles, California. There are two operating pressurized water reactors with a total rated capacity of 2254 net megawatts electrical.

Unit 1, rated at 410 net megawatts electrical, was supplied by Westinghouse Electric Company and began commercial operation on January 1, 1968. The unit was permanently shutdown on November 30, 1992. It is owned by Southern California Edison (80%) and San Diego Gas and Electric (20%).

Unit 2 and Unit 3 were supplied by Combustion Engineering, Inc., with turbine generators supplied by G.E.C. Turbine Generators, Ltd., of England. The units began commercial operation on August 18, 1983, and April 1, 1984, respectively and are rated at 1127 net megawatts electrical each. The twin units are owned by Southern California Edison (75.05%), San Diego Gas and Electric (20%), City of Anaheim (3.16%), and the City of Riverside (1.79%).

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ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

January - December

SECTION A. INTRODUCTION

This Annual Radioactive Effluent Release Report summarizes the gaseous and liquid radioactive effluent releases and radwaste shipments made from the San Onofre Nuclear Generating Station, Unit 1. This report is prepared in the general format of USNRC Regulatory Guide 1.21 and includes:

1. Quarterly Summaries of Gaseous and Liquid Effluents for "Continuous" and "Batch" Modes of Release
2. Percent of Applicable Limits
3. Estimated Total Percent Error
4. Lower Limit of Detection Concentrations
5. Batch Release Summaries
6. Previous Radioactive Effluent Release Report Addendum
7. Radwaste Shipments
8. 10 CFR 50 Appendix I Requirements
9. Changes to Offsite Dose Calculation Manual

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SECTION B. GASEOUS EFFLUENTS

Table 1A, "Gaseous Effluents-Summation of All Releases," provides a detailed listing of gaseous effluents released quarterly in four categories: fission and activation gases, iodine-131, particulates with half-lives greater than eight days, and tritium. Listed for each of the four categories are:

- (1) the total curies released
- (2) the average release rate
- (3) the percent of applicable limit
- (4) the estimated total error

In addition, the particulate category lists the gross alpha radioactivity released for each quarter.

The methodology used to calculate the percent of Applicable Limit is presented in Section F of this report. The methodology used in Table 1A to calculate the estimated total error is presented in Section G of this report.

Table 1B, "Gaseous Effluents-Elevated Release," has not been included in this report since San Onofre Nuclear Generating Station Unit 1 does not conduct elevated releases.

Table 1C, "Gaseous Effluents-Ground Level Releases," provides the systematic listing by radionuclide for the quantity of radioactivity released in three categories: fission gases, iodines, and particulates. The total radioactivity for each radionuclide is listed for each quarterly period by both "continuous" and "batch" modes of release.

Waste gas decay tank and monitor calibration releases are considered to be "batch" releases. Containment purges and plant stack releases are considered to be "continuous" releases. As of 8/4/93, releases were no longer allowed from the Containment Purge and Waste Gas Decay Tank release points because of the permanent shutdown of the reactor.

Table 1D, "Gaseous Effluents-Lower Limit of Detection," provides a listing of lower limit of detection concentrations for radionuclides not detected in Tables 1A and 1C.

Table 1E, "Gaseous Effluents-Radiation Doses at the Site Boundary," provides a quarterly summary of doses at the site boundary for this report period.

Table 1F, "Gaseous Effluents-Batch Release Summary," provides summary information regarding batch releases conducted during this report period from San Onofre Nuclear Generating Station Unit 1.

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TABLE 1A

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	4.16E+2	3.90E+0	3.00E+1
2. Average release rate for period	μCi/sec	5.35E+1	4.96E-1	
3. Percent of applicable limit	%	2.31E-1	2.15E-3	
B. Iodines				
1. Total iodine-131	Ci	2.91E-4	3.01E-6	1.90E+1
2. Average release rate for period	μCi/sec	3.74E-5	3.83E-7	
3. Percent of applicable limit	%	1.67E-10	1.71E-12	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	5.00E-6	1.60E-6	1.60E+1
2. Average release rate for period	μCi/sec	6.43E-7	2.04E-7	
3. Percent of applicable limit	%	1.68E-6	5.74E-7	
4. Gross alpha activity	Ci	7.74E-8	2.06E-7	5.00E+1
D. Tritium				
1. Total release	Ci	5.83E+0	2.08E+0	2.50E+1
2. Average release rate for period	μCi/sec	7.50E-1	2.65E-1	
3. Percent of applicable limit	%	4.87E-3	1.72E-3	

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TABLE 1A (Continued)

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	<LLD	<LLD	3.00E+1
2. Average release rate for period	μCi/sec	0.00E+0	0.00E+0	
3. Percent of applicable limit	%	0.00E+0	0.00E+0	
B. Iodines				
1. Total iodine-131	Ci	<LLD	<LLD	1.90E+1
2. Average release rate for period	μCi/sec	0.00E+0	0.00E+0	
3. Percent of applicable limit	%	0.00E+0	0.00E+0	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	6.47E-8	1.93E-7	1.60E+1
2. Average release rate for period	μCi/sec	8.14E-9	2.43E-8	
3. Percent of applicable limit	%	1.59E-8	1.58E-8	
4. Gross alpha activity	Ci	5.45E-7	3.27E-7	5.00E+1
D. Tritium				
1. Total release	Ci	2.90E+0	1.05E+0	2.50E+1
2. Average release rate for period	μCi/sec	3.65E-1	1.32E-1	
3. Percent of applicable limit	%	2.37E-3	8.59E-4	

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TABLE 1C

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES
CONTINUOUS MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation gases					
krypton-85	Ci	1.33E+2	<LLD	<LLD	<LLD
krypton-85m	Ci	<LLD	<LLD	<LLD	<LLD
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	<LLD	<LLD
xenon-133	Ci	1.27E+2	3.90E+0	<LLD	<LLD
xenon-133m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	2.60E+2	3.90E+0	<LLD	<LLD
2. Iodines					
iodine-131	Ci	2.91E-4	3.01E-6	<LLD	<LLD
iodine-133	Ci	<LLD	<LLD	<LLD	<LLD
iodine-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	2.91E-4	3.01E-6	<LLD	<LLD
3. Particulates					
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	7.02E-8	1.66E-7	<LLD	<LLD
cesium-137	Ci	4.93E-6	1.30E-6	4.71E-8	<LLD
cobalt-57	Ci	<LLD	<LLD	1.76E-8	<LLD
cobalt-58	Ci	<LLD	<LLD	<LLD	1.93E-7
cobalt-60	Ci	<LLD	1.37E-7	<LLD	<LLD
iron-59	Ci	<LLD	<LLD	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	<LLD	<LLD	<LLD	<LLD
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95m	Ci	3.58E-7	3.15E-7	<LLD	<LLD
strontium-89	Ci	<LLD	<LLD	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD

LLD Lower Limit of Detection; see Table 1D.

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TABLE 1C (Continued)

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES
BATCH MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation gases					
krypton-85	Ci	1.50E+2	<LLD	<LLD	<LLD
krypton-85m	Ci	<LLD	<LLD	<LLD	<LLD
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	<LLD	<LLD
xenon-131m	Ci	2.63E+0	<LLD	<LLD	<LLD
xenon-133	Ci	3.38E+0	<LLD	<LLD	<LLD
xenon-133m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	1.56E+2	<LLD	<LLD	<LLD

D Lower Limit of Detection; see Table 1D.

* Iodines and particulates are not analyzed prior to release via batch mode.

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TABLE 1D

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD ($\mu\text{Ci/cc}$)
1. Fission and activation gases	
krypton-85	2.00E-5
krypton-85m	4.80E-8
krypton-87	2.50E-7
krypton-88	1.70E-7
xenon-133	1.20E-7
xenon-133m	3.90E-7
xenon-135	5.00E-8
xenon-135m	2.00E-6
xenon-138	3.30E-6
2. Iodines	
iodine-131	1.90E-13
iodine-133	1.20E-12
iodine-135	3.20E-11
3. Particulates	
barium-140	3.00E-13
cerium-141	4.90E-14
cerium-144	2.00E-13
cesium-134	1.20E-13
cesium-137	9.60E-14
cobalt-57	2.50E-14
cobalt-58	1.10E-13
cobalt-60	1.70E-13
iron-59	2.60E-13
lanthanum-140	6.30E-13
manganese-54	1.10E-13
molybdenum-99	5.20E-14
niobium-95m	2.00E-13
strontium-89	1.00E-14
strontium-90	1.00E-15
zinc-65	2.80E-13
4. gross alpha	1.00E-14

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TABLE 1D (Continued)

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD ($\mu\text{Ci/cc}$)
1. Fission and activation gases	
krypton-85	1.30E-3
krypton-85m	2.60E-6
krypton-87	1.30E-5
krypton-88	9.20E-6
xenon-131m	9.40E-5
xenon-133	6.80E-6
xenon-133m	2.30E-5
xenon-135	3.00E-6
xenon-135m	4.00E-5
xenon-138	5.70E-5

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TABLE 1E

GASEOUS EFFLUENTS-RADIATION DOSES AT THE SITE BOUNDARY

	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A. Noble Gas					
1. Gamma Air Dose	mrad	2.12E-2	5.67E-4	0.00E+0	0.00E+0
2. Percent Applicable Limit	%	4.23E-1	1.13E-2	0.00E+0	0.00E+0
3. Beta Air Dose	mrad	2.85E-1	1.69E-3	0.00E+0	0.00E+0
4. Percent Applicable Limit	%	2.85E+0	1.69E-2	0.00E+0	0.00E+0
B. Tritium, Iodine, Particulates (at the nearest receptor)					
5. Organ Dose	mrem	3.41E-4	7.74E-5	1.03E-4	3.72E-5
6. Percent Applicable Limit	%	4.54E-3	1.03E-3	1.37E-3	4.96E-4

NOTE: Calculations performed in accordance with the ODCM utilizing the historical X/Q.

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TABLE 1F

GASEOUS EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	10 releases
2. Total time period for batch releases:	5724 minutes
3. Maximum time period for a batch release:	1089 minutes
4. Average time period for a batch release:	572 minutes
5. Minimum time period for a batch release:	252 minutes

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SECTION C. LIQUID EFFLUENTS

Table 2A, "Liquid Effluents-Summation of All Releases," provides a detailed summary of liquid effluents released quarterly in three categories: fission and activation products, tritium, and dissolved and entrained gases. Listed for each of the three categories are:

- (1) the total curies released
- (2) the average diluted concentration
- (3) the percent of applicable limit
- (4) the estimated total error

In addition, Table 2A lists:

- (1) the gross alpha radioactivity
- (2) the volume of waste released (prior to dilution)
- (3) the volume of dilution water

The methodology used to calculate the percent of applicable limit is presented in Section F of this report. The methodology used to calculate the estimated total error in Table 2A is presented in Section G of this report.

Table 2B, "Liquid Effluents," provides the systematic listing by radionuclide for the quantity of radioactivity released in each category. The total radioactivity of each radionuclide released is listed for each quarterly period by both "continuous" "batch" modes of release.

Table 2C, "Liquid Effluents-Lower Limit of Detection," provides a listing of lower limit of detection concentrations for radionuclides not detected in Table 2B.

Table 2D, "Liquid Effluents-Radiation Doses at the Liquid Site Boundary," presents a quarterly summary of doses at the Liquid Site Boundary for this report period.

Table 2E, "Liquid Effluents-Batch Release Summary," provides summary information regarding batch releases conducted during this report period from San Onofre Nuclear Generating Station Unit 1.

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TABLE 2A

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	4.57E-2	1.07E+0	1.90E+1
2. Average diluted concentration during period	μCi/ml	6.41E-10	1.59E-8	
3. Percent of applicable limit	%	3.40E-3	1.17E-1	
B. Tritium				
1. Total release	Ci	8.37E+1	3.61E+2	1.90E+1
2. Average diluted concentration during period	μCi/ml	1.17E-6	5.35E-6	
3. Percent of applicable limit	%	3.91E-2	1.78E-1	
C. Dissolved and entrained gases				
1. Total release	Ci	<LLD	7.75E-2	1.90E+1
2. Average diluted concentration during period	μCi/ml	0.00E+0	1.15E-9	
3. Percent of applicable limit	%	0.00E+0	5.74E-4	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (prior to dilution)	liters	5.64E+5	2.49E+6	5.00E+0
F. Volume of dilution water used during period	liters	7.13E+10	6.75E+10	5.00E+0

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TABLE 2A (Continued)

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	4.20E-4	2.37E-2	1.90E+1
2. Average diluted concentration during period	μCi/ml	2.39E-10	1.38E-8	
3. Percent of applicable limit	%	2.00E-3	8.93E-2	
B. Tritium				
1. Total release	Ci	1.58E-3	6.80E-3	1.90E+1
2. Average diluted concentration during period	μCi/ml	8.98E-10	3.95E-9	
3. Percent of applicable limit	%	2.99E-5	1.32E-4	
C. Dissolved and entrained gases				
1. Total release	Ci	3.66E-5	<LLD	1.90E+1
2. Average diluted concentration during period	μCi/ml	2.08E-11	0.00E+0	
3. Percent of applicable limit	%	1.04E-5	0.00E+0	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (prior to dilution)	liters	3.79E+4	0.00E+0	5.00E+0
F. Volume of dilution water used during period	liters	1.76E+9	1.72E+9	5.00E+0

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TABLE 2B

LIQUID EFFLUENTS
CONTINUOUS MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation products					
antimony-125	Ci	<LLD	3.94E-6	<LLD	<LLD
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	5.87E-5	<LLD	<LLD	<LLD
cesium-134	Ci	4.23E-3	2.30E-3	1.35E-4	5.96E-3
cesium-137	Ci	5.60E-3	2.83E-3	2.28E-4	1.67E-2
chromium-51	Ci	<LLD	<LLD	1.73E-5	<LLD
cobalt-57	Ci	<LLD	1.58E-6	<LLD	<LLD
cobalt-58	Ci	6.04E-5	8.80E-6	1.75E-5	2.75E-5
cobalt-60	Ci	3.47E-5	5.24E-5	1.31E-5	9.40E-4
iodine-131	Ci	9.27E-5	<LLD	<LLD	3.78E-7
iron-55	Ci	<LLD	<LLD	<LLD	<LLD
iron-59	Ci	<LLD	<LLD	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	4.66E-5	<LLD	8.52E-7	<LLD
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	<LLD	<LLD	<LLD	<LLD
strontium-89	Ci	<LLD	<LLD	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
technetium-99m	Ci	<LLD	<LLD	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	<LLD	<LLD	2.14E-6	<LLD
Total for period	Ci	1.01E-2	5.21E-3	4.14E-4	2.37E-2
2. Dissolved and entrained gases					
krypton-85	Ci	<LLD	<LLD	3.66E-5	<LLD
xenon-133	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	<LLD	<LLD	3.66E-5	<LLD

LLD Lower Limit of Detection; see Table 2C.

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TABLE 2B (Continued)

LIQUID EFFLUENTS
BATCH MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation products					
antimony-124	Ci	4.35E-5	4.40E-4	<LLD	<LLD
antimony-125	Ci	<LLD	2.28E-4	<LLD	<LLD
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	1.19E-5	8.03E-5	<LLD	<LLD
cerium-144	Ci	4.17E-4	3.62E-3	<LLD	<LLD
cesium-134	Ci	4.64E-3	4.52E-1	<LLD	<LLD
cesium-137	Ci	6.04E-3	5.01E-1	5.69E-7	<LLD
chromium-51	Ci	5.27E-5	6.23E-4	<LLD	<LLD
cobalt-57	Ci	1.74E-5	7.78E-5	<LLD	<LLD
cobalt-58	Ci	4.79E-3	1.78E-2	2.32E-6	<LLD
cobalt-60	Ci	8.83E-3	4.08E-2	1.51E-6	<LLD
iodine-131	Ci	<LLD	<LLD	2.42E-6	<LLD
iron-55	Ci	9.28E-3	3.95E-2	<LLD	<LLD
iron-59	Ci	8.31E-5	7.27E-4	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	1.62E-4	1.78E-3	<LLD	<LLD
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	9.09E-5	5.06E-4	<LLD	<LLD
niobium-95m	Ci	5.02E-7	<LLD	<LLD	<LLD
niobium-97	Ci	1.42E-5	<LLD	<LLD	<LLD
ruthenium-103	Ci	4.14E-5	3.45E-4	<LLD	<LLD
ruthenium-106	Ci	6.33E-4	2.58E-3	<LLD	<LLD
silver-110m	Ci	1.92E-5	2.85E-3	<LLD	<LLD
strontium-89	Ci	<LLD	1.36E-4	<LLD	<LLD
strontium-90	Ci	1.46E-5	1.76E-4	<LLD	<LLD
strontium-92	Ci	3.88E-4	<LLD	<LLD	<LLD
technetium-99m	Ci	<LLD	<LLD	<LLD	<LLD
tin-117m	Ci	3.89E-5	1.18E-4	<LLD	<LLD
zinc-65	Ci	1.62E-5	5.57E-5	<LLD	<LLD
zirconium-95	Ci	1.40E-5	2.68E-4	<LLD	<LLD
Total for period	Ci	3.56E-2	1.07E+0	6.82E-6	<LLD

LLD Lower Limit of Detection; see Table 2C.

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TABLE 2B (Continued)

LIQUID EFFLUENTS BATCH MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2. Dissolved and entrained gases					
xenon-131m	Ci	<LLD	7.75E-2	<LLD	<LLD
xenon-133	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	<LLD	7.75E-2	<LLD	<LLD

LLD Lower Limit of Detection; see Table 2C.

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TABLE 2C

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD ($\mu\text{Ci/cc}$)
1. Fission and activation products	
antimony-125	1.80E-7
barium-140	4.10E-7
cerium-141	6.70E-8
cerium-144	2.70E-7
chromium-51	4.70E-7
cobalt-57	3.50E-8
iodine-131	8.10E-8
iron-55	1.00E-6
iron-59	2.30E-7
lanthanum-140	7.50E-7
manganese-54	9.60E-8
molybdenum-99	8.80E-8
niobium-95	9.70E-8
strontium-89	5.00E-8
strontium-90	1.00E-8
technetium-99m	9.00E-8
zinc-65	2.40E-7
zirconium-95	1.70E-7
2. Dissolved and entrained gases	
krypton-85	4.30E-5
xenon-133	3.00E-7
xenon-135	1.30E-7
3. gross alpha	1.00E-7

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TABLE 2C (Continued)

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD ($\mu\text{Ci/cc}$)
1. Fission and activation products	
antimony-124	3.20E-7
antimony-125	1.80E-7
barium-140	3.20E-7
cerium-141	6.10E-8
cerium-144	2.70E-7
cesium-134	1.10E-7
cesium-137	9.10E-8
chromium-51	4.20E-7
cobalt-57	3.50E-8
cobalt-58	9.30E-8
cobalt-60	1.40E-7
iodine-131	5.70E-8
iron-55	1.00E-6
iron-59	2.10E-7
lanthanum-140	1.70E-7
manganese-54	9.50E-8
molybdenum-99	3.40E-8
niobium-95	8.90E-8
niobium-95m	1.30E-7
niobium-97	9.40E-8
ruthenium-103	6.90E-8
ruthenium-106	7.40E-7
silver-110m	1.40E-7
strontium-89	5.00E-8
strontium-90	1.00E-8
strontium-92	5.00E-7
technetium-99m	3.40E-8
tin-117m	3.40E-8
zinc-65	2.40E-7
zirconium-95	1.60E-7
2. Dissolved and entrained gases	
xenon-131m	4.50E-6
xenon-133	3.00E-7
xenon-135	1.30E-7
3. gross alpha	1.00E-7

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TABLE 2D

LIQUID EFFLUENTS-RADIATION DOSES AT THE LIQUID SITE BOUNDARY

	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A.					
1. Total body dose	mrem	1.07E-2	3.16E-1	4.60E-3	2.70E-1
2. Percent Applicable Limit	%	7.14E-1	2.11E+1	3.07E-1	1.80E+1
B.					
1. Limiting organ dose	-mrem	2.20E-2	4.54E-1	6.27E-3	3.78E-1
2. Percent Applicable Limit	%	4.41E-1	9.08E+0	1.25E-1	7.56E+0
3. Limiting organ for period		GI-LLI	Liver	Liver	Liver

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TABLE 2E

LIQUID EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	23 releases
2. Total time period for batch releases:	28336 minutes
3. Maximum time period for a batch release:	3440 minutes
4. Average time period for a batch release:	1232 minutes
5. Minimum time period for a batch release:	106 minutes
6. Average saltwater flow during batch releases:	150000 gpm

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SECTION D. PREVIOUS RADIOACTIVE EFFLUENT RELEASE REPORT ADDENDUM

1. The July - December 1992 Semiannual Radioactive Effluent Release Report values for composite gross alpha, Sr-89, Sr-90, and Fe-55 (Tables 1A and 1C, Gaseous Effluents, Tables 2A and 2B, Liquid Effluents) were incomplete due to data not available at report time. The values not reported were for the fourth quarter of 1992. The values are as follows:

GASEOUS EFFLUENTS (Fourth Quarter, 1992)

Radionuclides Released	Unit	Continuous Mode	Batch Mode
		Fourth Quarter	Fourth Quarter
strontium-89	Ci	<LLD	*
strontium-90	Ci	<LLD	*
Gross alpha	Ci	2.73E-7	*

Sr-89 LLD = $1.00\text{E-}14 \mu\text{Ci/cc}$ Sr-90 LLD = $1.00\text{E-}15 \mu\text{Ci/cc}$

- * All "batch" gaseous releases made from S.O.N.G.S. 1 are vented through the Plant Vent Stack, therefore, gross alpha, Sr-89, and Sr-90 are analyzed by "continuous" mode only.

LIQUID EFFLUENTS (Fourth Quarter, 1992)

Radionuclides Released	Unit	Continuous Mode	Batch Mode
		Fourth Quarter	Fourth Quarter
iron-55	Ci	<LLD	4.30E-4
strontium-89	Ci	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD
tritium	Ci	**	<LLD
Gross alpha	Ci	<LLD	<LLD

Fe-55 LLD = $1.00\text{E-}6 \mu\text{Ci/ml}$ Sr-89 LLD = $5.00\text{E-}8 \mu\text{Ci/ml}$ Sr-90 LLD = $1.00\text{E-}8 \mu\text{Ci/ml}$ H-3 LLD = $1.00\text{E-}8 \mu\text{Ci/ml}$ Gross alpha LLD = $1.00\text{E-}7 \mu\text{Ci/ml}$

- ** Only composites from sewage sludge are analyzed for tritium. All other liquid pathways are analyzed for tritium onsite with the resultant curies enumerated in Table 2B.

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GASEOUS EFFLUENT-RADIATION DOSES AT THE SITE BOUNDARY

For the fourth quarter of 1992 (Sr-89 and Sr-90).

	Unit	Fourth Quarter
A. Tritium, Iodine, Particulates (at the nearest receptor)		
1. Organ dose	mrem	0.00E+0
2. Percent Applicable Limit	%	0.00E+0

NOTE: Calculations performed in accordance with the ODCM utilizing the historical X/Q.

3. LIQUID EFFLUENT-RADIATION DOSES AT THE SITE BOUNDARY

For the fourth quarter of 1992 (Sr-89, Sr-90, and Fe-55).

	Unit	Fourth Quarter
A.		
1. Total body dose	mrem	6.08E-5
2. Percent Applicable Limit	%	4.05E-3
B.		
1. Limiting organ (bone)	mrem	3.77E-4
2. Percent Applicable Limit	%	7.53E-3

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SECTION E. RADWASTE SHIPMENTS

TABLE 3

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	Estimated total error (%)
a. Spent resins, filter sludges (*)	m ³	1.85E+1	3.0E+1
	Ci	6.39E+3	
b. Dry active waste (DAW), compactable and non-compactable	m ³	N/A	N/A
	Ci	N/A	
c. Irradiated components, control rods	m ³	N/A	N/A
	Ci	N/A	
d. Other (filters)	m ³	N/A	N/A
	Ci	N/A	

NOTE: Total curie content estimated.

* Material packaged into High Integrity Containers and shipped in a Type B Cask (C of C 9208) or Type A Cask (C of C 9176) or Type A Cask (C of C 9159).

N/A No shipment made.

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TABLE 3 (Continued)

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not Irradiated fuel)

2. Estimate of major nuclide composition (by type of waste)		
a. carbon-14	%	5.47E-3
cesium-134	%	4.13E+1
cesium-137	%	4.39E+1
cobalt-58	%	5.24E+0
cobalt-60	%	5.16E+0
iodine-129	%	1.24E-5
iron-55	%	2.43E+0
manganese-54	%	7.61E-2
nickel-63	%	1.87E+0
plutonium-241	%	1.96E-2
strontium-90	%	4.74E-2
technetium-99	%	1.20E-5
tritium	%	1.83E-3
b. not applicable	%	0.00E+0
c. not applicable	%	0.00E+0
d. not applicable	%	0.00E+0

3. Solid Waste Disposition

See COMMON section of this report

B. IRRADIATED FUEL SHIPMENTS (Disposition)

See COMMON section of this report

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SECTION F. APPLICABLE LIMITS

Gaseous Effluents - Applicable Limits

The percent of Applicable Limits, tabulated in Sections A.3, B.3, C.3, and D.3 of Table 1A, was calculated using the following equation:

$$\% \text{ Applicable Limit} = \frac{(\text{Rel Rate}) (X/Q) (100)}{\text{MPC}_{\text{eff}}}$$

where: Rel Rate = total curies released in each category and each quarter, divided by the seconds in a quarter; the value in Sections A.2, B.2, C.2 and D.2 of Table 1A, $\mu\text{Ci/sec}$.

X/Q = $1.30\text{E}-5 \text{ sec/m}^3$; the annual average atmospheric dispersion defined in the Unit 1 ODCM, Rev. 9.

The MPC_{eff} is defined as:

$$\frac{1}{\sum_{i=1}^n \frac{F_i}{\text{MPC}_i}}$$

where: F_i = fractional abundance of the i th radionuclide obtained by dividing the activity (curies) for each radionuclide, C_i , by the sum of all the isotopic activity, C_T .

n = total number of radionuclides identified

MPC_i = MPC of the i th radionuclide

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Liquid Effluents - Applicable Limits

The percent of Applicable Limits, tabulated in Sections A.3, B.3, and C.3 of Table 2A, was calculated using the following equation:

$$\% \text{ Applicable Limit} = \frac{(\text{Dil Conc}) (100)}{\text{MPC}_{\text{eff}}}$$

where: Dil Conc = total curies released in each category and each quarter divided by the total volume released (sum of Sections E and F in Table 2A); the value in Sections A.2, B.2, and C.2 of Table 2A, $\mu\text{Ci/ml}$.

The MPC_{eff} is defined as:

$$\frac{1}{\sum_{i=1}^n \frac{F_i}{\text{MPC}_i}}$$

where: F_i = fractional abundance of the i th radionuclide obtained by dividing the activity (curies) for each radionuclide, C_i , by the sum of all the isotopic activity, C_T .

n = total number of radionuclides identified

MPC_i = MPC of the i th radionuclide

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SECTION G. ESTIMATION OF ERROR

Estimations of the error in reported values of gaseous and liquid effluents releases have been made.

Sources of error for gaseous effluents - batch releases are:

- (1) tank volumes
- (2) sampling
- (3) counting
- (4) calibration

Sources of error for gaseous effluents - continuous releases are:

- (1) fan flow rate
- (2) sampling
- (3) counting
- (4) calibration
- (5) differential pressure drop

Sources of error for liquid effluents - batch releases are:

- (1) tank volumes
- (2) sampling
- (3) counting
- (4) calibration

Sources of error for liquid effluents - continuous releases are:

- (1) dilution flow rate
- (2) sampling
- (3) counting
- (4) calibration

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

$$\text{Total Error} = \sqrt{\sigma_1^2 + \sigma_2^2 + \sigma_3^2 + \dots + \sigma_i^2}$$

where: σ_i = Error associated with each component.

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SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS

Table 1 in Section H presents the quarterly and annual maximum dose to an individual. Six different categories are presented:

- (1) Liquid Effluents - Whole Body
- (2) Liquid Effluents - Organ
- (3) Airborne Effluents - Tritium, Iodines and Particulates
- (4) Noble Gases - Gamma
- (5) Noble Gases - Beta
- (6) Direct Radiation

The doses for categories 1 and 2 were calculated using the methodology of the ODCM, this data is also presented in Table 2D. Categories 3, 4, and 5 were calculated utilizing RRRGS (Radioactive Release Report Generating System) software, Regulatory Guide 1.109 methodology, and concurrent meteorology. Table 1E of gaseous effluents previously presented, however, lists data similar to categories 3, 4 and 5 using methods described in the ODCM and the historical meteorology (X/Q). Category 6 presents direct dose data measured by TLD dosimeters. Each portion of each category is footnoted to briefly describe each maximum individual dose presented.

For individuals who may, at times, be within the site boundary, the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the site boundary. For members of the public who traverse the site boundary via highway I-5, the residency time shall be considered negligible and hence the dose "0".

Table 2 in Section H presents the percent of Applicable Limits for each dose presented in Table 1.

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TABLE 1

	Dose* (millirems)				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS	1)	2)	3)	4)	5)
Whole Body	1.07E-2	3.16E-1	4.60E-3	2.70E-1	6.01E-1
Organ	6)	7)	8)	9)	10)
	2.20E-2	4.54E-1	6.27E-3	3.78E-1	8.59E-1
AIRBORNE EFFLUENTS	11)	12)	13)	14)	15)
Tritium, Iodines, and Particulates	5.24E-3	1.72E-3	2.97E-3	7.13E-4	1.02E-2
NOBLE GASES **	16)	17)	18)	19)	20)
Gamma	1.12E-2	4.98E-4	0.00E+0	0.00E+0	1.16E-1
Beta	21)	22)	23)	24)	25)
	1.69E-1	1.48E-3	0.00E+0	0.00E+0	1.70E-1
DIRECT RADIATION	26)	27)	28)	29)	30)
	5.62E-1	1.14E+0	4.44E-1	3.90E-1	6.33E-1

* The numbered footnotes below briefly explain how each maximum dose was calculated, including the organ and the predominant pathway(s).

** Noble gas doses due to airborne effluent are in units of mrad, reflecting the air dose.

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- This data was calculated using the methodology of the ODCM.
2. This data was calculated using the methodology of the ODCM.
 3. This data was calculated using the methodology of the ODCM.
 4. This data was calculated using the methodology of the ODCM.
 5. This data was calculated using the methodology of the ODCM.
 6. This data was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.
 7. This data was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.
 8. This data was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.
 9. This data was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.
 10. This data was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.
 11. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
 12. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
 13. The maximum organ dose was to a child's thyroid and was located in the NNW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
 14. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
 15. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
 16. A maximum air dose of $9.43\text{E}-2$ mrad for gamma radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the NW sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
 17. A maximum air dose of $3.13\text{E}-3$ mrad for gamma radiation was located in the SW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the WNW sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
 18. There was no activity detected during the release period, therefore the reported air dose for gamma radiation was $0.00\text{E}+0$ mrad.
 19. There was no activity detected during the release period, therefore the reported air dose for gamma radiation was $0.00\text{E}+0$ mrad.
 20. A maximum air dose of $9.51\text{E}-2$ mrad for gamma radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the NW sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

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21. A maximum air dose of $1.32\text{E}+0$ mrad for beta radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for beta radiation was located in the NW sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
22. A maximum air dose of $9.32\text{E}-3$ mrad for beta radiation was located in the SW sector, a seaward direction. The reported maximum air dose for beta radiation was located in the WNW sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
23. There was no activity detected during the release period, therefore the reported air dose for beta radiation was $0.00\text{E}+0$ mrad.
24. There was no activity detected during the release period, therefore the reported air dose for beta radiation was $0.00\text{E}+0$ mrad.
25. A maximum air dose of $1.32\text{E}+0$ mrad for beta radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for beta radiation was located in the NW sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
26. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.
27. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.
28. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.
29. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.
30. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.

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TABLE 2

SOURCE	Percent Applicable Limit				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS					
Whole Body	7.14E-1	2.11E+1	3.07E-1	1.80E+1	2.00E+1
Organ	4.41E-1	9.08E+0	1.25E-1	7.56E+0	8.59E+0
AIRBORNE EFFLUENTS					
Tritium, Iodines, and Particulates	6.99E-2	2.29E-2	3.96E-2	9.51E-3	6.80E-2
NOBLE GASES					
Gamma	2.24E-1	9.96E-3	0.00E+0	0.00E+0	1.16E-1
Beta	1.69E+0	1.48E-2	0.00E+0	0.00E+0	8.50E-1

NOTE: Direct Radiation is not specifically addressed in the Applicable Limits.

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SECTION I. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

On August 4, 1993 Revision 9 to the Unit 1 Offsite Dose Calculation Manual (ODCM) was adopted and published. This revision accomplished several tasks, chief among them is the modification of the ODCM to reflect the permanent shutdown of Unit 1. With the permanent shutdown, the following systems were removed from service and were deleted from the ODCM: steam generator blowdown, containment purge, waste gas storage system and various instrumentation associated with the plant vent stack monitoring system. Also incorporated into this revision were the updates of tables used in the gaseous dose calculations that resulted specifically from the 1992 Land Use Census. Further, extensive changes were made as a result of an evaluation of the Radiological Environmental Monitoring Program. None of the above changes have any impact on the accuracy or reliability of methods for determining dose or setpoint values.

A complete list of the changes is attached to this letter and safety reviews have been performed for the following changes:

- o delete Containment Purge from sampling and analysis program
- o deletion of the following items from the Plant Vent Stack Monitoring System:
 - a. R-1214, Gross Activity Monitor/Setpoint Determination/Surveillance requirements.
 - b. R-1220, Particulate Monitor
 - c. R-1221, Iodine Monitor
 - d. R-1212, Noble Gas Monitor, maybe aligned to Stack or containment (normally aligned to containment atmosphere)/Setpoint Determination/ Surveillance Requirements
 - e. R-1211, Particulate Monitor, maybe aligned to stack or containment (normally aligned to containment atmosphere)/Surveillance Requirements
 - f. Delete requirement for R-1254 high range. Require the mid-range to be in service (including recalibration) only during times of fuel handling or load handling by crane in the fuel handling building. Low range is required to be in service at times to satisfy ODCM requirements
- o delete Component Cooling Water Monitor, R-1217

No positive findings were found in any of the safety evaluations.

No safety evaluations were performed for updating radiation monitor calibration constants or implementing changes from the 1992 Land Use Census. These changes reflect results from routine surveillances and as such do not constitute a modification in methodology for determining activity released from the site and subsequent dose to a member of the public.

Per NRC Generic Letter 89-01, no safety review was required or performed for the correction of typographical errors.

The following is a complete list of the changes:

- * Indicates typographical, sequential sectional and page numbering, and format changes
- * The 1992 Land Use Census revealed increased occupancy factors in two locations, enlisted beach camp ground (Sector Q, 0.9 mile) and San Clemente Ranch Administration Offices (Sector Q, 2.3 miles). Correspondingly, the dose parameters for all affected age groups were increased in those two locations. The occupancy factors increased from 0.1014 to 0.1233 and from 0.2283 to 0.3425, respectively. Further, an evaluation of the Radiological Environmental Monitoring Program showed 21 TLD locations could be deleted. One air sampler location was also deleted, while a new one was added. This information was formally transmitted in two letters: 1) E.M. Goldin to J.R. Clark dated 9/28/92 "Submittal of 1992 Dose Parameters for SONGS Unit 1 and Units 2/3 ODCMs" and 2) E.M. Goldin to J.R. Clark dated 12/2/92 "Revision of Radiological Environmental Monitoring Sample Locations, ODCM Table 5-4, SONGS Units 1,2, and 3".

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Revised and deleted several sections based on the safety evaluation performed for the permanent shutdown configuration for Unit 1. The proposed permanently defueled technical specifications (PDTS) reflect the plant conditions following defueling of Unit 1 reactor. The approved Unit 1 facility change evaluation "Post Core Offload Operations and Maintenance Transition Plan", FCE # 1-93-001 rev 0, dated 3/4/93, (with its safety evaluation), provides an evaluation of the plant systems configuration following core offload until the PDTS. In order to reflect the PDTS, the FCE and the shutdown plant configuration, the following systems were deleted from the ODCM in this revision: steam generator blowdown, containment purge, waste gas storage, and air ejector system.

- 1-3^f Deleted SGBD system.
- 1-13^f Deleted SGBD system.
- 1-14 Rearranged equation 1-5 for clarification.
- 1-15# Deleted SGBD system.
- 1-17^f Deleted section 1.4.1.2, on RT-1216, SGBD.
- 1-18^f Deleted SGBD system.
- 1-19# Deleted SGBD system.
- 1-20^f Deleted section 1.4.2.1 on SGBD, RT-1216.
- 1-21# Deleted SGBD system and added the term "R" to equation 1-11 to more correctly take into account the dilution factor.
- 1-22# Deleted SGBD system and added the term "R" to equation 1-12 to more correctly take into account the dilution factor.
- 1-23^f Deleted RT-1216 from Table 1-2.
- 1-24 Added parenthetical terminology to dilution factor F_j .
- 1-25^a Corrected typographical errors and added reference.
- 1-26^a Corrected typographical errors and added reference.
- 2-3^f Deleted WGST and Containment Purge systems.
- 2-5^f Deleted notes concerned with thermal power change sampling and tritium sampling when the refueling canal is flooded.
- 2-10^f Deleted section 2.4.1 on Gaseous Radwaste Treatment.
- 2-11^f Deleted section 2.4.2, surveillance for Gaseous Radwaste Treatment system.
- 2-12^f Deleted RT-1214 and RT-1212.
- 2-16^f Deleted section 2.5.2, Containment Purge, RT-1212.
- 2-17^f Deleted section 2.5.3, Waste Gas Header, RT-1219.
- 2-18^f Deleted section 2.5.3, Waste Gas Header, RT-1219.
- 2-19^f Deleted RT-1212.
- 2-20^a Added parenthesis to equation 2-8.
- 2-24 X/Q for H-3 added for completeness.

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- 2-30* Clarified the pathway name.
- 2-32* Clarified the pathway name and corrected typographical error.
- 2-34* Enlisted beach campground occupancy factor increased from 0.1014 to 0.1233 (Sector Q, 0.9 mile), thereby changing the dose parameters.
- 2-38* San Clemente Ranch Administration Offices occupancy factor increased from 0.2283 to 0.3425 (Sector Q, 2.3 miles), thereby changing dose parameters.
- 2-39* Deleted typographical error.
- 2-41* Clarified the pathway name.
- 2-42* Clarified the pathway name.
- 2-45* Clarified the pathway name.
- 2-46* Clarified the pathway name.
- 2-48* Clarified the pathway name.
- 2-49* Clarified the pathway name.
- 2-53* Clarified the pathway name.
- 2-54* Clarified the pathway name.
- 2-56* Clarified the pathway name.
- 2-57* Clarified the pathway name.
- 2-59* Clarified the pathway name.
- 2-60* Clarified the pathway name.
- 2-62* Clarified the pathway name.
- 2-63* Clarified the pathway name.
- 2-68* Clarified the pathway name.
- 3-1^f Deleted the gaseous dose projection requirement which was based on the WGD_T system.
- 3-2^a Corrected referenced specification number.
- 3-5 Corrected typographical error and provided correct references under equation 3-2.
- 3-6 Provided correct references under equation 3-3.
- 3-7** Corrected typographical error on equation reference and changed the number of TLD locations around site. Included additional examples of occupancy factors.
- 4-1 Revised a reference from Semiannual reporting period for the Radioactive Effluent Release Report to Annual. This is in accordance with PCN-260, approved by NRC February 17, 1993.
- 4-2^f Deleted SGBD and CCW.
- 4-3^f Deleted action statement 17 (SGBD) and 19 (CCW).
- 4-5^f Deleted SGBD and CCW; modified Table 4-2 to reflect the new terminology for "18M" char calibration frequency.

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Revised a reference from Semiannual reporting period for the Radioactive Effluent Release Report to Annual. This is in accordance with PCN-260, approved by NRC February 17, 1993. Also remove the descriptive "process" from gaseous effluents.

- 4-8' Deleted RT-1214, RT-1219, RT-1220, and RT-1221 monitors as well as RT-1220 particulate sampler. Also added notes dealing with the new criteria for RT-1254.
- 4-9' Deleted action 21 (gross activity monitors deleted on p. 4-8).
- 4-11' Deleted RT-1214, RT-1212, and RT-1211 sampler.
- 4-13' Modified Figure 4-1.
- 4-14' Modified Figure 4-2.
- 4-15 Modified Figure 4-3 to reflect current solid radwaste procedures.
- 5-16 Removed notation implying "operating" the unit.
- 5-18* Deleted these TLD locations.
 - 5. Camp Las Pulgas
 - 7. Old Route 101 (E-NE)
 - 9. Basilone Road/I-5 Freeway Offramp
 - 20. San Clemente Pier
 - 21. Concordia Elementary School - San Clemente
 - 24. San Clemente High School
- 5-19* Deleted these TLD locations.
 - 25. Convalescent Home - San Clemente
 - 26. Dana Hills High School
 - 27. US Post Office - Dana Point
 - 28. Doheny Fire Station - Capistrano Beach
 - 29. San Juan Capistrano Fire Station
 - 30. Laguna Beach Fire Station
 - 32. Santa Ana Police Dept
 - 37. Laguna Niguel Fire Station
 - 39. Basilone Road Trailer Park (MCB, Camp Pendleton)
 - 42. Horne Canyon (MCB, Camp Pendleton)
 - 43. Edson range (MCB, Camp Pendleton)
 - 45. Interstate 5 Weigh Station
 - 48. Mainside (MCB, Camp Pendleton)
- 5-20* Deleted these TLD locations.
 - 51. Carlsbad Fire Station
 - 52. Vista Fire Station
- 5-21* Deleted one Airborne location, added one Airborne location and made three sampling sites control locations.
 - 6. SONGS Meteorological Tower (DELETED)
 - 7. AWS Roof (ADDED)
 - 3. Huntington Beach Generating Station (Airborne Control)
 - 4. Huntington Beach Generating Station (Soil Control)
 - D. Newport Beach (Ocean Water Control)
- 5-22* Made three sites control locations.
 - 3. Huntington Beach (Drinking Water Control)
 - 4. Newport Beach (Shoreline Control)
 - 2. Southeast of Oceanside (Crops Control)
- 5-23* Renamed three locations from Newport Beach to Laguna Beach. The physical locations remain the same.
- 5-26* Revised Figure 5-1.

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- 5-27* Revised Figure 5-2.
- 5-28* Revised Figure 5-3.
- 6-1' Deleted Dose Equivalent I-131 definition.
- 6-2' Deleted Gaseous Radwaste Treatment System definition.
- 6-3' Deleted Operational Mode, Purge/Purging, Rated Thermal Power and Thermal Power definitions.
- 6-4' Deleted Ventilation Exhaust Treatment System and Venting definitions.
- 6-5' Deleted Table 6-1 (Operational Modes).
- 6-6' Deleted S/U frequency and revised "R" frequency to be "18M" on Table 6-2, Frequency Notation.
- 6-9 Revised all references from Semiannual reporting period for the Radioactive Effluent Release Report to Annual. This is in accordance with PCN-260, approved by NRC February 17, 1993. Also removed notation implying "operating" the unit.
- 6-10 Revised all references from Semiannual reporting period for the Radioactive Effluent Release Report to Annual. This is in accordance with PCN-260, approved by NRC February 17, 1993.
- 6-11 Revised all references from Semiannual reporting period for the Radioactive Effluent Release Report to Annual. This is in accordance with PCN-260, approved by NRC February 17, 1993.
- 6-15 Deleted section 6.4.10, Gaseous Radwaste Treatment.

SECTION J. CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

In November 1992, Unit 1 was permanently shut down. As a result, the Unit 1 ODCM was revised to reflect the elimination of certain credited release points and abandonment in place of the gaseous radwaste treatment system. That revision (Rev. 9) is included in this ARERR under section I. The safety evaluation for no longer using the gaseous radwaste treatment system follows:

EVALUATION OF ELIMINATION OF UNIT 1 WASTE GAS TREATMENT SYSTEM

The waste gas treatment system was originally designed to retain gases vented from the reactor coolant system (RCS), allowing decay of short-lived isotopes prior to release, thereby maintaining airborne releases from Unit 1 ALARA. On 4/24/93 after the entire gaseous radwaste treatment system was flushed and evacuated, it was placed in SAFSTOR per S01-4-51, Attachment 5.

As a result of changing from an operating unit to a permanently shutdown, defueled, and depressurized condition, there are no known sources of radioactive gas remaining at Unit 1 which would benefit from holdup for decay prior to discharge. Any references to the Waste Gas Decay Tanks as a release point, or to use, operability or surveillance of the Gaseous Radwaste Treatment system have been deleted from the ODCM. Requirements to have a designed means of terminating batch releases from the waste gas treatment system in response to a high activity alarm have also been deleted due to the removal of the WGDs as a source. Sampling and analysis of the waste gas decay tanks is no longer necessary.

Even with the WGDs permanently vented and not collecting any radioactive gas, two noble gas monitors remain on the plant vent stack. These two monitors measure all noble gas effluents from Unit 1, including the vented ambient air flow through the waste gas piping and surge tank in their safe storage conditions. There are also redundant particulate and iodine samplers on the plant vent stack.

This configuration is consistent with NRC requirements and as shown by this safety evaluation, poses no adverse safety or health impact to the public nor will it result in any increased dose.

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S.O.N.G.S. 1

50.59 SAFETY EVALUATION

1. **May the proposed activity increase the probability of occurrence of an accident evaluated in the safety analysis report?**

No. Given the condition of the Unit - defueled and permanently shutdown - only two accidents previously analyzed in Chapter 15 of the SONGS 1 Updated Final Safety Analysis Report (UFSAR) remain relevant: (1) loss of offsite power and (2) a fuel handling accident. This has been discussed and approved in the Unit 1 "Post Core Offload Operations and Maintenance Transition Plan", FCE # 1-93-001 rev 0, dated 3/4/93. The safety significance of both of these accidents is reduced during the permanently defueled mode. Also, it has been determined that no new accidents are introduced by permanently defueling the plant. The Permanently Defueled Technical Specifications (Amendment 155 approved by the NRC on 12/28/93) as well as the approved Post Core Offload Operations and Maintenance Transition Plan facility change evaluation concur with this position. This system change will be evaluated against these two scenarios.

The waste gas treatment system was placed in SAFSTOR on 4/24/93 and will not be operated again due to administrative controls. Since the unit is non-operational, there is no generation of radioactive airborne materials that might require treatment. With the system permanently out of service, the rupture of piping or a waste gas storage tank as considered in Unit 1's FSAR Section 8.7 is no longer plausible, thereby removing the probability of either situation occurring.

2. **May the proposed activity increase the consequences of an accident evaluated previously in the safety analysis report?**

No. Chapter 15 of the FSAR under operating conditions considered the rupture of a waste gas decay tank (WGDT) as an accident scenario. Since no noble gases are being generated, the waste gas treatment system has been removed from service. A WGDT rupture is no longer considered a credible accident. There are therefore no postulated dose consequences for a WGDT rupture or failure to terminate a batch release from the WGDT.

The atmosphere of the spent fuel handling building (SFB) is vented directly to the plant vent stack, a monitored, credited release point. Any loss of power or fuel handling accident would be sampled and monitored by instruments in accordance with the ODCM. Since the SFB has not ever been routed to Waste Gas Decay Tanks for isotope decay, removal of the system does not in any way increase the consequences of the two credible accidents evaluated in the FSAR.

3. **May the proposed activity increase the probability of occurrence of a malfunction of equipment important to safety evaluated previously in the safety analysis report?**

No. The only safety related component in the waste gas treatment and discharge system was R1254, the Plant Vent Stack Wide Range Gas Monitor. The waste gas treatment system isolation valve, while not safety related itself, could be shut by either Plant Vent Stack monitor R1219 or R1254, on alarm.

This isolation function has been removed now that no waste gas decay tank release is necessary. Consequently, removing the waste gas treatment system from service will not increase the probability of occurrence of a malfunction of equipment important to safety evaluated previously in the safety analysis report.

4. **May the proposed activity increase the consequence of a malfunction of equipment important to safety evaluated previously in the safety analysis report?**

No. Storage and discharge of noble gases through the gaseous radwaste treatment system did not involve the use of equipment considered important to safety. The only component in the system that was considered safety related is R1254, the Plant Vent Stack Wide Range Gas Monitor. The plant vent stack will maintain its required monitoring and sampling capability. The only active control function the plant vent stack monitors had in isolating a WGDT release is no longer needed. Under the shutdown condition, the only possible source of airborne activity from Unit 1 is the spent fuel, which is stored in a building vented directly to the Plant Vent Stack. Therefore, removing the waste gas treatment system from service will not increase the consequence of a malfunction of equipment important to safety.

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S.O.N.G.S. 1

5. **May the proposed activity create the possibility of an accident of a different type than any evaluated previously in the safety analysis report?**

No. Maintaining a permanently defueled plant does not create the possibility of a new different kind of accident from any previously considered. Most of the existing plant systems and functions are no longer be required during the permanently defueled mode since power operations is not allowed and all of the fuel at SONGS 1 is stored in the SFP. All systems required for safe storage of the fuel pool will remain in service. Operation and surveillance requirements and administrative controls are in place which ensure that the required systems and components remain operable throughout SAFSTOR.

Only two of the accidents previously evaluated in Chapter 15 of the SONGS 1 UFSAR remain applicable to the Permanently Defueled Mode: an LOP and a fuel handling accident. As discussed in the above response to question no.1, the safety significance of both of these accidents is reduced during the Permanently Defueled Mode. No new accidents are introduced by operating the permanently defueled plant.

The only possible new accident that this modification could have caused would result from removing the automatic isolation of a waste gas decay tank release. This possibility is avoided because the waste gas treatment system is no longer necessary since radioactive gas can no longer be collected for decay. Therefore, no new accident of a different type than any evaluated in the FSAR is possible.

6. **May the proposed activity create the possibility of a malfunction of equipment important to safety of a different type than any evaluated previously in the safety analysis report?**

No. This change, which permanently shuts down the waste gas treatment system, does not adversely impact any equipment important to safety. Only two accidents are valid in the permanent shutdown mode per the Unit 1 "Post Core Offload Operations and Maintenance Transition Plan", FCE # 1-93-001 rev 0, dated 3/4/93; loss of power and fuel handling accident. No new accidents have been introduced by permanently defueling the plant.

The waste gas treatment system is not necessary for plant operation in the final shutdown configuration. Consequently, this change will not create the possibility of a malfunction of equipment important to safety of a different type than any evaluated previously in the safety analysis report.

7. **Does the proposed activity reduce the margin of safety as defined in the basis for technical specification?**

No. The basis for the waste gas treatment system has been removed from the technical specifications and the ODCM (Revision 9). The requirements were founded on minimizing exposure to the public in unrestricted areas. Since all the fuel is contained in the spent fuel pool for long term storage, there is no benefit to be gained from decaying the minuscule volumes of airborne activity that may evolve from the fuel rods. The resultant removal of the waste gas treatment system from service and deletion of the implementing procedures will not result in any increase in public dose or releases to the environment. Radioactive airborne discharges from Unit 1 will remain ALARA as recommended in 10 CFR 50.36a and there will be no reduction in the margin of safety as originally considered in Radioactive Effluent Specifications.

Based on the responses to the above questions, removing the waste gas treatment system from service will not result in any increase of radioactive releases nor impact the health and safety of the public.

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S.O.N.G.S. 1

SECTION K. MISCELLANEOUSo Unplanned, Uncontrolled Release from Yard Drain Sump

In 1993, the Unit 1 Yard Drain Sump overflowed to the PMF Catch Basin on the following occasions:

Start Date/Time	Stop Date/Time	Duration (minutes)	Estimated Curies Released	Estimated Whole Body Dose (mrem)	Estimated Liver Dose (mrem)
01/07/93 @ 0040	01/07/93 @ 0110	30	7.8E-3	1.3E-6	2.0E-6
01/16/93 @ 1255 1459	01/16/93 @ 1322 1705	153	3.0E-2	1.7E-4	2.7E-4
02/07/93 @ 2245	02/08/93 @ 0031	106	9.8E-2	3.0E-4	4.0E-4
02/23/93 @ 1744	02/23/93 @ 1752	8	8.8E-3	1.7E-6	2.5E-6
06/05/93 @ 1203	06/05/93 @ 1208	5	1.0E-3	1.6E-5	2.2E-5

These events were due to heavy amount of rainfall. 1993 was an extremely wet year with recorded rainfall and storm duration well above average. Around the vicinity of SONGS, the recorded total rain duration was 238 hours. The Yard Drain Sump overflow duration was about 2% of the recorded raining duration. It should be noted that the Yard Drain Sump and pumps are routinely cleaned, and during the rainy season, sandbags are placed to redirect runoff away from the Yard Drain Sump. These measures are successful in minimizing the duration and frequency of overflow. Based on extremely conservative assumptions, there were no significant dose consequences as a result of these releases.

o Unplanned, Uncontrolled Release from CCW Heat Exchanger

The Unit 1 Component Cooling Water (CCW) System contains low level of activity and interfaces with several plant systems. One of the interfacing systems is the Saltwater Cooling System via the CCW heat exchangers. A CCW leak to the outfall through the CCW heat exchangers is considered an unplanned and uncontrolled release. In 1993, there were two instances of CCW heat exchanger tube leaks:

On 8/27/93, a leaking tube was confirmed in the Upper CCW Heat Exchanger (ME20A). Total activity released was conservatively estimated at 1.53E-5 Ci. There were no significant dose consequences as a result of this release. A Chemistry Division Investigation Report (CDIR 93-005) was written to document this event and to provide for corrective actions. Dose consequences from this activity were conservatively estimated at 3.3E-4 mrem whole body, and 4.6E-4 mrem liver.

On 11/04/93, a leaking tube was confirmed in the Upper CCW Heat Exchanger (ME20A). Total activity released was conservatively estimated at 4.73E-5 Ci. There were no significant dose consequences as a result of this release. A Chemistry Division Investigation Report (CDIR 93-011) was written to document this event and to provide for corrective actions. Dose consequences from this activity were conservatively estimated at 5.9E-4 mrem whole body, and 8.1E-4 mrem liver.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 1

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 1993 - December 31, 1993

S.O.N.G.S. 1			
Monitor	Inoperability Period	Inoperability Cause	Explanation
R-1211 Containment Particulate Sampler	12/18/92 - 08/07/93	Electrical problems failed instrument	Removed from service due to permanent plant shutdown. ODCM Rev 9, issued 08/04/93, removed sampler from required operability.
R-1212 Containment Noble Gas Monitor	04/09/93 - 08/07/93	Inoperable due to permanent shutdown	Permanent plant shutdown lineup makes monitor inoperable. ODCM Rev 9, issued 08/04/93, removed monitor from required operability.
R-1214 Plant Vent Stack, Noble Gas Monitor	06/13/86 - 8/7/93	Removed from service	Maintained out of service due to permanent plant shutdown. ODCM Rev 9, issued 08/04/93, removed monitor from required operability.
R-1216 Steam Generator Blowdown Monitor	11/30/92 - 08/07/93	Removed from service	No steam generator pressure or steam flow due to permanent plant shutdown. ODCM Rev 9, issued 08/04/93, removed monitor from required operability.
R-1254 Plant Vent Stack, Process Flow Monitor	08/12/88 - present	Process flow indication	Process flow instrumentation is inadequate. Design change to correct flow measurement canceled due to permanent plant shutdown. Radiation monitor functions operable.
R-2101 Yard Drain Sump Monitor	11/05/93 - Present	Gasket leak and component degradation; monitor power failure	New parts are ordered and require fabrication by manufacturer.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 1

SECTION L. S O.N.G.S. 1 CONCLUSIONS

- o Gaseous effluent releases, excluding tritium, totaled $4.20\text{E}+2$ curies with 32% of the total being Xe-133.
- o The radiation doses from gaseous releases are: (a) gamma air dose: $1.16\text{E}-2$ mrad at the site boundary, (b) beta air dose: $1.70\text{E}-1$ mrad at the site boundary, (c) organ dose: $1.02\text{E}-2$ mrem at the nearest receptor.
- o Liquid releases totaled $4.46\text{E}+2$ curies of which tritium was $4.45\text{E}+2$ Ci, noble gases were $7.75\text{E}-2$ Ci, and particulates and iodines were $1.14\text{E}+0$ Ci.
- o The radiation doses from liquid releases are: (a) total body: $6.01\text{E}-1$ mrem, (b) limiting organ: $8.59\text{E}-1$ mrem.
- o The radioactive releases and resulting doses generated from Unit 1 were below the Applicable Limits for both gaseous and liquid effluents.

1. The first part of the document is a list of names and addresses, which are arranged in a columnar format. The names are written in a cursive script, and the addresses are written in a more formal, printed style. The list is headed by the word "List" in a large, bold font.

2. The second part of the document is a list of names and addresses, which are arranged in a columnar format. The names are written in a cursive script, and the addresses are written in a more formal, printed style. The list is headed by the word "List" in a large, bold font.

3. The third part of the document is a list of names and addresses, which are arranged in a columnar format. The names are written in a cursive script, and the addresses are written in a more formal, printed style. The list is headed by the word "List" in a large, bold font.

4. The fourth part of the document is a list of names and addresses, which are arranged in a columnar format. The names are written in a cursive script, and the addresses are written in a more formal, printed style. The list is headed by the word "List" in a large, bold font.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

January - December

SECTION A. INTRODUCTION

This Annual Radioactive Effluent Release Report summarizes the gaseous and liquid radioactive effluent releases and radwaste shipments made from the San Onofre Nuclear Generating Station, Units 2 and 3. This report is prepared in the general format of USNRC Regulatory Guide 1.21 and includes:

1. Quarterly Summaries of Gaseous and Liquid Effluents for "Continuous" and "Batch" Modes of Release
2. Percent of Applicable Limits
3. Estimated Total Percent Error
4. Lower Limit of Detection Concentrations
5. Batch Release Summaries
6. Previous Radioactive Effluent Release Report Addendum
7. Radwaste Shipments
8. 10 CFR 50 Appendix I Requirements
9. Changes to Offsite Dose Calculation Manual

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

SECTION B. GASEOUS EFFLUENTS

Table 1A, "Gaseous Effluents-Summation of All Releases," provides a detailed listing of gaseous effluents released quarterly in four categories: fission and activation gases, iodine-131, particulates with half-lives greater than eight days, and tritium. Listed for each of the four categories are:

- (1) the total curies released
- (2) the average release rate
- (3) the percent of applicable limit
- (4) the estimated total error

In addition, the particulate category lists the gross alpha radioactivity released for each quarter.

The methodology used to calculate the percent of Applicable Limit is presented in Section F of this report. The methodology used in Table 1A to calculate the estimated total error is presented in Section G of this report.

Table 1B, "Gaseous Effluents-Elevated Release," has not been included in this report since San Onofre Nuclear Generating Station Units 2 and 3 do not conduct elevated releases.

Table 1C, "Gaseous Effluents-Ground Level Releases," provides the systematic listing radionuclide for the quantity of radioactivity released in three categories: fission gases, iodines, and particulates. The total radioactivity for each radionuclide is listed for each quarterly period by both "continuous" and "batch" modes of release.

Waste gas decay tank and monitor calibration releases are considered to be "batch" releases. Containment purges and plant stack releases are considered to be "continuous" releases.

Table 1D, "Gaseous Effluents-Lower Limit of Detection," provides a listing of lower limit of detection concentrations for radionuclides not detected in Tables 1A and 1C.

Table 1E, "Gaseous Effluents-Radiation Doses at the Site Boundary," provides a quarterly summary of doses at the site boundary for this report period.

Table 1F, "Gaseous Effluents-Batch Release Summary," provides summary information regarding batch releases conducted during this report period from San Onofre Nuclear Generating Station Units 2 and 3.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 1A

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	3.31E+2	6.25E+2	3.00E+1
2. Average release rate for period	μCi/sec	4.26E+1	7.95E+1	
3. Percent of applicable limit	%	7.72E-2	1.54E-1	
B. Iodines ⁽¹⁾				
1. Total iodine-131	Ci	1.24E-3	1.76E-2	1.90E+1
2. Average release rate for period	μCi/sec	1.59E-4	2.24E-3	
3. Percent of applicable limit	%	7.65E-4	1.07E-2	
C. Particulates ⁽¹⁾				
1. Particulates with half-lives > 8 days	Ci	5.57E-5	1.67E-4	1.60E+1
2. Average release rate for period	μCi/sec	7.16E-6	2.12E-5	
3. Percent of applicable limit	%	8.75E-6	1.08E-5	
4. Gross alpha activity	Ci	<LLD	<LLD	5.00E+1
D. Tritium				
1. Total release	Ci	8.89E+0	2.62E+1	2.50E+1
2. Average release rate for period	μCi/sec	1.14E+0	3.33E+0	
3. Percent of applicable limit	%	2.74E-3	8.00E-3	

⁽¹⁾ Unit 3 Condenser Air Ejector particulate and iodine samples from 06/10/93 @ 0400 to 0600 were not collected. Results have been ratioed to account for the missing interval. See CDIR 93-004.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 1A (Continued)

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	3.96E+2	1.90E+2	3.00E+1
2. Average release rate for period	μCi/sec	4.98E+1	2.39E+1	
3. Percent of applicable limit	%	1.43E-1	6.07E-2	
B. Iodines				
1. Total iodine-131	Ci	9.77E-3	1.94E-2	1.90E+1
2. Average release rate for period	μCi/sec	1.23E-3	2.44E-3	
3. Percent of applicable limit	%	5.90E-3	1.17E-2	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	1.02E-3	6.07E-4	1.60E+1
2. Average release rate for period	μCi/sec	1.28E-4	7.64E-5	
3. Percent of applicable limit	%	3.40E-5	2.10E-5	
4. Gross alpha activity	Ci	4.14E-6	1.16E-6	5.00E+1
D. Tritium				
1. Total release	Ci	7.20E+0	7.81E+0	2.50E+1
2. Average release rate for period	μCi/sec	9.06E-1	9.83E-1	
3. Percent of applicable limit	%	2.17E-3	2.36E-3	

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 1C

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES
CONTINUOUS MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation gases					
argon-41	Ci	1.83E+0	4.52E+0	1.05E+1	4.13E+0
krypton-85	Ci	5.82E-1	<LLD	<LLD	<LLD
krypton-85m	Ci	1.26E+0	1.42E+0	2.67E+0	9.42E-1
krypton-87	Ci	2.10E-1	8.62E-1	1.85E+0	8.03E-1
krypton-88	Ci	4.04E-1	2.12E+0	5.46E+0	1.49E+0
xenon-131m	Ci	2.77E-1	2.41E-1	1.66E+0	1.16E+0
xenon-133	Ci	3.17E+2	5.98E+2	3.40E+2	1.64E+2
xenon-133m	Ci	2.20E-1	1.26E+0	2.28E+0	1.11E+0
xenon-135	Ci	9.22E+0	1.10E+1	1.69E+1	4.86E+0
xenon-135m	Ci	2.46E-1	3.90E+0	9.46E+0	3.41E+0
xenon-138	Ci	<LLD	8.60E-1	2.27E+0	1.16E+0
Total for period	Ci	3.31E+2	6.23E+2	3.93E+2	1.83E+2
2. Iodines ⁽¹⁾					
iodine-131	Ci	1.24E-3	1.76E-2	9.77E-3	1.94E-2
iodine-132	Ci	9.71E-5	1.18E-3	1.86E-3	3.73E-3
iodine-133	Ci	1.40E-3	1.65E-3	6.87E-3	6.86E-4
iodine-134	Ci	<LLD	5.04E-6	1.53E-3	5.08E-5
iodine-135	Ci	3.52E-4	2.34E-4	4.06E-3	3.22E-4
Total for period	Ci	3.09E-3	2.07E-2	2.41E-2	2.42E-2

LLD Lower Limit of Detection; see Table 1D.

⁽¹⁾ Unit 3 Condenser Air Ejector particulate and iodine samples from 06/10/93 @ 0400 to 0600 were not collected. Results have been ratioed to account for the missing interval. See CDIR 93-004.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 1C (Continued)

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES
CONTINUOUS MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
3. Particulates ⁽¹⁾					
antimony-125	Ci	<LLD	6.36E-6	<LLD	<LLD
barium-139	Ci	9.16E-6	8.09E-5	3.00E-3	1.62E-4
barium-140	Ci	3.74E-8	<LLD	9.82E-8	<LLD
bromine-82	Ci	2.37E-5	3.34E-5	7.71E-5	4.05E-5
cerium-141	Ci	<LLD	<LLD	<LLD	1.77E-8
cerium-143	Ci	4.37E-10	<LLD	1.31E-7	<LLD
cerium-144	Ci	5.34E-6	<LLD	<LLD	<LLD
cesium-134	Ci	2.43E-5	<LLD	8.28E-8	<LLD
cesium-137	Ci	2.29E-5	8.93E-6	1.86E-7	1.47E-6
cesium-138	Ci	7.12E-3	1.44E-2	2.18E-1	2.89E-2
chromium-51	Ci	3.64E-7	1.45E-8	3.32E-5	6.09E-5
cobalt-57	Ci	<LLD	<LLD	<LLD	2.16E-6
cobalt-58	Ci	<LLD	1.25E-4	9.41E-4	4.91E-4
cobalt-60	Ci	2.50E-6	2.74E-5	2.33E-5	2.61E-5
iron-59	Ci	<LLD	<LLD	4.71E-7	<LLD
lanthanum-140	Ci	<LLD	<LLD	8.12E-10	<LLD
manganese-54	Ci	<LLD	3.73E-6	3.78E-6	4.50E-6
molybdenum-99	Ci	4.80E-8	<LLD	1.47E-8	<LLD
niobium-95	Ci	<LLD	1.94E-6	1.29E-5	2.09E-5
niobium-95m	Ci	<LLD	<LLD	2.11E-7	<LLD
niobium-97	Ci	<LLD	1.95E-7	<LLD	<LLD
rubidium-88	Ci	3.11E-2	1.18E-1	5.30E-1	6.64E-2
rubidium-89	Ci	2.95E-4	9.88E-4	3.02E-2	6.00E-3
strontium-89	Ci	8.56E-8	6.56E-7	4.85E-6	1.86E-6
strontium-90	Ci	<LLD	<LLD	3.80E-9	<LLD
strontium-92	Ci	1.32E-9	1.35E-7	5.56E-7	<LLD
technetium-99m	Ci	4.90E-8	<LLD	1.50E-8	<LLD
tellurium-132	Ci	6.72E-10	2.09E-7	5.92E-7	1.96E-6
tin-113	Ci	2.24E-7	<LLD	<LLD	<LLD
yttrium-92	Ci	7.67E-8	<LLD	8.80E-5	3.09E-6
zinc-65	Ci	<LLD	<LLD	4.93E-7	<LLD
zirconium-95	Ci	<LLD	<LLD	6.26E-6	<LLD

LLD Lower Limit of Detection; see Table 1D.

Unit 3 Condenser Air Ejector particulate and iodine samples from 06/10/93 @ 0400 to 0600 were not collected. Results have been ratioed to account for the missing interval. See CDIR 93-004.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 1C (Continued)

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES
BATCH MODE *

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation gases					
krypton-85	Ci	2.91E-1	1.53E+0	2.60E+0	6.87E+0
krypton-85m	Ci	<LLD	<LLD	<LLD	<LLD
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	<LLD	<LLD
xenon-131m	Ci	<LLD	<LLD	<LLD	9.47E-2
xenon-133	Ci	2.50E-2	3.08E-2	3.57E-2	1.47E-1
xenon-133m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	3.16E-1	1.56E+0	2.64E+0	7.11E+0

LLD Lower Limit of Detection; see Table 1D.

* Iodines and particulates are not analyzed prior to release via batch mode.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

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TABLE 1D

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD ($\mu\text{Ci/cc}$)
1. Fission and activation gases	
krypton-85	2.00E-5
xenon-138	3.30E-6
2. Iodines	
iodine-134	2.00E-10
3. Particulates	
antimony-125	3.70E-13
barium-140	6.60E-13
cerium-141	1.20E-13
cerium-143	6.90E-13
cerium-144	4.70E-13
cesium-134	2.50E-13
cobalt-57	5.90E-14
cobalt-58	2.20E-13
iron-59	5.40E-13
lanthanum-140	1.30E-12
manganese-54	2.20E-13
molybdenum-99	1.20E-13
niobium-95	2.20E-13
niobium-95m	4.60E-13
niobium-97	5.90E-11
strontium-90	1.00E-14
strontium-92	1.60E-11
technetium-99m	1.20E-13
tin-113	1.60E-13
yttrium-92	9.00E-11
zinc-65	5.80E-13
zirconium-95	3.80E-13
4. gross alpha	1.00E-13

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 1D (Continued)

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD ($\mu\text{Ci/cc}$)
1. Fission and activation gases	
krypton-85m	2.60E-6
krypton-87	1.30E-5
krypton-88	9.20E-6
xenon-131m	9.40E-5
xenon-133m	2.30E-5
xenon-135	3.00E-6
xenon-135m	4.00E-5
xenon-138	5.70E-5

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TABLE 1E

GASEOUS EFFLUENTS-RADIATION DOSES AT THE SITE BOUNDARY

	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A. Noble Gas					
1. Gamma Air Dose	mrad	2.29E-2	5.05E-2	6.17E-2	2.38E-2
2. Percent Applicable Limit	%	2.29E-1	5.05E-1	6.17E-1	2.38E-1
3. Beta Air Dose	mrad	5.34E-2	1.06E-1	7.65E-2	3.60E-2
4. Percent Applicable Limit	%	2.67E-1	5.32E-1	3.83E-1	1.80E-1
B. Tritium, Iodine, Particulates (at the nearest receptor)					
5. Organ Dose	mrem	9.32E-4	7.37E-3	5.28E-3	7.54E-3
6. Percent Applicable Limit	%	6.21E-3	4.91E-2	3.52E-2	5.03E-2

NOTE: Calculations performed in accordance with the ODCM utilizing the historical X/Q.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 1F

GASEOUS EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	10 releases
2. Total time period for batch releases:	4228 minutes
3. Maximum time period for a batch release:	545 minutes
4. Average time period for a batch release:	423 minutes
5. Minimum time period for a batch release:	200 minutes

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SECTION C. LIQUID EFFLUENTS

Table 2A, "Liquid Effluents-Summation of All Releases," provides a detailed summary of liquid effluents released quarterly in three categories: fission and activation products, tritium, and dissolved and entrained gases. Listed for each of the three categories are:

- (1) the total curies released
- (2) the average diluted concentration
- (3) the percent of applicable limit
- (4) the estimated total error

In addition, Table 2A lists:

- (1) the gross alpha radioactivity
- (2) the volume of waste released (prior to dilution)
- (3) the volume of dilution water

The methodology used to calculate the percent of applicable limit is presented in Section F of this report. The methodology used to calculate the estimated total error in Table 2A is presented in Section G of this report.

Table 2B, "Liquid Effluents," provides the systematic listing by radionuclide for the quantity of radioactivity released in each category. The total radioactivity of each radionuclide released is listed for each quarterly period by both "continuous" and "batch" modes of release.

Table 2C, "Liquid Effluents-Lower Limit of Detection," provides a listing of lower limit of detection concentrations for radionuclides not detected in Table 2B.

Table 2D, "Liquid Effluents-Radiation Doses at the Liquid Site Boundary," presents a quarterly summary of doses at the Liquid Site Boundary for this report period.

Table 2E, "Liquid Effluents-Batch Release Summary," provides summary information regarding batch releases conducted during this report period from San Onofre Nuclear Generating Station Units 2 and 3.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 2A

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	1.86E-2	1.84E-2	1.90E+1
2. Average diluted concentration during period	μCi/ml	2.47E-11	2.78E-11	
3. Percent of applicable limit	%	2.40E-4	4.95E-4	
B. Tritium				
1. Total release	Ci	3.92E+2	2.54E+2	1.90E+1
2. Average diluted concentration during period	μCi/ml	5.21E-7	3.84E-7	
3. Percent of applicable limit	%	1.74E-2	1.28E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	6.01E-3	3.65E-1	1.90E+1
2. Average diluted concentration during period	μCi/ml	7.98E-12	5.52E-10	
3. Percent of applicable limit	%	3.99E-6	2.76E-4	
D. Gross alpha radioactivity				
1. Total release	Ci	1.10E-5	<LLD	5.00E+1
E. Volume of waste released (prior to dilution)	liters	8.77E+6	1.01E+7	5.00E+0
F. Volume of dilution water used during period	liters	7.53E+11	6.61E+11	5.00E+0

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 2A (Continued)

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	5.29E-2	2.04E-1	1.90E+1
2. Average diluted concentration during period	μCi/ml	7.68E-11	3.70E-10	
3. Percent of applicable limit	%	5.23E-4	5.39E-3	
B. Tritium				
1. Total release	Ci	2.44E+2	8.84E+1	1.90E+1
2. Average diluted concentration during period	μCi/ml	3.54E-7	1.60E-7	
3. Percent of applicable limit	%	1.18E-2	5.34E-3	
C. Dissolved and entrained gases				
1. Total release	Ci	3.76E-1	5.18E-1	1.90E+1
2. Average diluted concentration during period	μCi/ml	5.46E-10	9.38E-10	
3. Percent of applicable limit	%	2.73E-4	4.69E-4	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (prior to dilution)	liters	3.01E+7	2.38E+7	5.00E+0
F. Volume of dilution water used during period	liters	6.89E+11	5.52E+11	5.00E+0

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TABLE 2B

LIQUID EFFLUENTS
CONTINUOUS MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation products					
antimony-125	Ci	<LLD	<LLD	<LLD	4.32E-6
barium-140	Ci	<LLD	<LLD	<LLD	1.24E-4
cerium-141	Ci	<LLD	<LLD	<LLD	7.18E-5
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	<LLD	<LLD	3.56E-5	7.43E-3
cesium-136	Ci	<LLD	<LLD	<LLD	1.07E-4
cesium-137	Ci	1.03E-4	<LLD	7.13E-4	1.28E-2
chromium-51	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-58	Ci	<LLD	<LLD	1.53E-3	7.64E-4
cobalt-60	Ci	<LLD	<LLD	<LLD	2.57E-4
iodine-131	Ci	2.03E-4	<LLD	4.16E-4	4.51E-3
iodine-133	Ci	<LLD	<LLD	<LLD	2.25E-4
iodine-135	Ci	<LLD	<LLD	<LLD	6.42E-4
iron-55	Ci	<LLD	<LLD	<LLD	<LLD
iron-59	Ci	<LLD	<LLD	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	3.93E-5
manganese-54	Ci	<LLD	<LLD	<LLD	2.21E-4
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	<LLD	<LLD	<LLD	<LLD
strontium-89	Ci	<LLD	<LLD	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
technetium-99m	Ci	<LLD	<LLD	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	3.06E-4	<LLD	2.69E-3	2.92E-2
2. Dissolved and entrained gases					
xenon-133	Ci	<LLD	<LLD	<LLD	9.30E-5
xenon-135	Ci	<LLD	<LLD	<LLD	5.39E-4
Total for period	Ci	<LLD	<LLD	<LLD	6.32E-4

LLD Lower Limit of Detection; see Table 2C.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 2B (Continued)

LIQUID EFFLUENTS
BATCH MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation products					
antimony-124	Ci	3.55E-5	3.60E-6	1.88E-5	8.64E-4
antimony-125	Ci	1.07E-3	1.59E-3	1.33E-3	1.62E-2
barium-140	Ci	<LLD	<LLD	<LLD	7.02E-5
cerium-141	Ci	<LLD	<LLD	3.33E-6	5.92E-5
cerium-144	Ci	1.51E-5	<LLD	1.51E-5	6.39E-4
cesium-134	Ci	1.26E-4	1.57E-4	1.87E-3	1.21E-2
cesium-136	Ci	<LLD	<LLD	<LLD	2.99E-4
cesium-137	Ci	7.58E-4	8.07E-4	4.24E-3	1.92E-2
chromium-51	Ci	2.13E-4	1.61E-3	8.81E-3	1.53E-2
cobalt-57	Ci	3.78E-5	9.23E-6	4.45E-5	2.30E-4
cobalt-58	Ci	1.64E-3	4.40E-3	1.91E-2	4.93E-2
cobalt-60	Ci	8.23E-3	2.40E-3	2.61E-3	1.56E-2
iodine-131	Ci	2.07E-4	8.53E-4	3.64E-4	1.46E-3
iodine-133	Ci	3.25E-5	1.86E-4	2.07E-5	2.13E-5
iodine-135	Ci	<LLD	<LLD	4.11E-6	<LLD
iron-55	Ci	3.75E-3	5.00E-3	4.83E-3	1.34E-2
iron-59	Ci	<LLD	3.63E-5	4.52E-4	1.12E-3
lanthanum-140	Ci	1.09E-5	7.26E-5	3.35E-5	9.03E-5
manganese-54	Ci	5.37E-4	2.43E-4	6.54E-4	2.76E-3
molybdenum-99	Ci	5.37E-5	5.09E-5	<LLD	<LLD
niobium-95	Ci	4.79E-4	2.03E-4	3.30E-3	8.50E-3
niobium-97	Ci	4.78E-5	2.00E-5	7.24E-6	3.38E-3
ruthenium-103	Ci	<LLD	<LLD	1.12E-4	3.03E-4
ruthenium-106	Ci	4.16E-5	<LLD	<LLD	1.63E-4
silver-110m	Ci	6.15E-4	5.46E-4	1.96E-4	3.62E-3
strontium-89	Ci	<LLD	<LLD	<LLD	4.12E-3
strontium-90	Ci	<LLD	<LLD	2.71E-5	1.41E-4
strontium-92	Ci	1.39E-5	<LLD	<LLD	7.90E-5
technetium-99m	Ci	5.47E-5	5.27E-5	<LLD	<LLD

Lower Limit of Detection; see Table 2C.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 2B (Continued)

LIQUID EFFLUENTS
BATCH MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation products (Continued)					
tin-113	Ci	9.35E-5	2.77E-5	2.30E-4	5.08E-4
tin-117m	Ci	1.78E-6	<LLD	2.89E-6	1.33E-5
tungsten-187	Ci	<LLD	<LLD	<LLD	3.93E-4
zinc-65	Ci	8.58E-6	<LLD	<LLD	4.96E-5
zirconium-95	Ci	2.35E-4	1.28E-4	2.00E-3	4.39E-3
zirconium-97	Ci	<LLD	<LLD	<LLD	1.63E-4
Total for period	Ci	1.83E-2	1.84E-2	5.03E-2	1.75E-1
2. Dissolved and entrained gases					
krypton-85	Ci	<LLD	<LLD	1.05E-1	<LLD
krypton-85m	Ci	<LLD	1.38E-5	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	2.59E-5	<LLD
xenon-131m	Ci	3.02E-4	3.00E-3	2.48E-2	1.24E-2
xenon-133	Ci	5.66E-3	3.52E-1	2.46E-1	5.04E-1
xenon-133m	Ci	3.98E-5	4.84E-3	3.54E-4	8.77E-4
xenon-135	Ci	6.28E-6	5.21E-3	1.02E-5	1.41E-4
Total for period	Ci	6.01E-3	3.65E-1	3.76E-1	5.17E-1

LLD Lower Limit of Detection; see Table 2C.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 2C

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD ($\mu\text{Ci/cc}$)
1. Fission and activation products	
antimony-125	1.80E-7
barium-140	4.10E-7
cerium-141	6.70E-8
cerium-144	2.70E-7
cesium-134	1.10E-7
cesium-136	1.80E-7
cesium-137	9.10E-8
chromium-51	4.70E-7
cobalt-58	9.70E-8
cobalt-60	1.40E-7
iodine-131	8.10E-8
iodine-133	9.50E-7
iodine-135	1.10E-4
iron-55	1.00E-6
iron-59	2.30E-7
lanthanum-140	7.50E-7
manganese-54	9.60E-8
molybdenum-99	8.80E-8
niobium-95	9.70E-8
strontium-89	5.00E-8
strontium-90	1.00E-8
technetium-99m	9.00E-8
zinc-65	2.40E-7
zirconium-95	1.70E-7
2. Dissolved and entrained gases	
xenon-133	3.00E-7
xenon-135	1.30E-7
3. gross alpha	1.00E-7

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

TABLE 2C (Continued)

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD ($\mu\text{Ci/cc}$)
1. Fission and activation products	
barium-140	3.20E-7
cerium-141	6.10E-8
cerium-144	2.70E-7
cesium-136	1.50E-7
iodine-135	7.40E-7
iron-59	2.10E-7
molybdenum-99	3.40E-8
ruthenium-103	6.90E-8
ruthenium-106	7.40E-7
strontium-89	5.00E-8
strontium-90	1.00E-8
strontium-92	5.00E-7
technetium-99m	3.40E-8
tin-117m	3.40E-8
tungsten-187	2.80E-7
zinc-65	2.40E-7
zirconium-97	1.60E-7
2. Dissolved and entrained gases	
krypton-85	4.30E-5
krypton-85m	1.40E-7
krypton-88	4.70E-7
3. gross alpha	1.00E-7

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TABLE 2D

LIQUID EFFLUENTS-RADIATION DOSES AT THE LIQUID SITE BOUNDARY

	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A.					
1. Total body dose	mrem	1.11E-3	8.80E-4	1.47E-3	7.35E-3
2. Percent Applicable Limit	%	3.71E-2	2.93E-2	4.90E-2	2.45E-1
B.					
1. Limiting organ dose	mrem	5.10E-3	4.11E-3	6.15E-3	2.73E-2
2. Percent Applicable Limit	%	5.10E-2	4.11E-2	6.15E-2	2.73E-1
3. Limiting organ for period		GI-LLI	GI-LLI	GI-LLI	GI-LLI

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TABLE 2E

LIQUID EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	198 releases
2. Total time period for batch releases:	52429 minutes
3. Maximum time period for a batch release:	1007 minutes
4. Average time period for a batch release:	265 minutes
5. Minimum time period for a batch release:	65 minutes
6. Average saltwater flow during batch releases:	719444 gpm

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SECTION D. PREVIOUS RADIOACTIVE EFFLUENT RELEASE REPORT ADDENDUM

1. The July - December 1992 Semiannual Radioactive Effluent Release Report values for composite gross alpha, Sr-89, Sr-90, and Fe-55 (Tables 1A and 1C, Gaseous Effluents, Tables 2A and 2B, Liquid Effluents) were incomplete due to data not available at report time. The values not reported were for the fourth quarter of 1992. The values are as follows:

GASEOUS EFFLUENTS (Fourth Quarter, 1992)

Radionuclides Released	Unit	Continuous Mode	Batch Mode
		Fourth Quarter	Fourth Quarter
strontium-89	Ci	3.82E-8	*
strontium-90	Ci	<LLD	*
Gross alpha	Ci	1.56E-6	*

Sr-90 LLD = 1.00E-14 $\mu\text{Ci/cc}$

- * All "batch" gaseous releases made from S.O.N.G.S. 2&3 are vented through the Plant Vent Stack, therefore, gross alpha, Sr-89, and Sr-90 are analyzed by "continuous" mode only.

LIQUID EFFLUENTS (Fourth Quarter, 1992)

Radionuclides Released	Unit	Continuous Mode	Batch Mode
		Fourth Quarter	Fourth Quarter
iron-55	Ci	<LLD	9.42E-3
strontium-89	Ci	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD
Gross alpha	Ci	<LLD	3.38E-5

Fe-55 LLD = 1.00E-6 $\mu\text{Ci/ml}$

Sr-89 LLD = 5.00E-8 $\mu\text{Ci/ml}$

Sr-90 LLD = 1.00E-8 $\mu\text{Ci/ml}$

Gross alpha LLD = 1.00E-7 $\mu\text{Ci/ml}$

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2. GASEOUS EFFLUENT-RADIATION DOSES AT THE SITE BOUNDARY

For the fourth quarter of 1992 (Sr-89 and Sr-90).

	Unit	Fourth Quarter
A. Tritium, Iodine, Particulates (at the nearest receptor)		
1. Organ dose	mrem	5.26E-8
2. Percent Applicable Limit	%	3.50E-7

NOTE: Calculations performed in accordance with the ODCM utilizing the historical X/Q.

3. LIQUID EFFLUENT-RADIATION DOSES AT THE SITE BOUNDARY

For the fourth quarter of 1992 (Sr-89, Sr-90, and Fe-55).

	Unit	Fourth Quarter
A.		
1. Total body dose	mrem	4.61E-4
2. Percent Applicable Limit	%	1.54E-2
B.		
1. Limiting organ (bone)	mrem	2.86E-3
2. Percent Applicable Limit	%	2.86E-2

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SECTION E. RADWASTE SHIPMENTS

TABLE 3

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	Estimated total error (%)
a. Spent resins, filter sludges, evaporator bottoms	m ³	N/A	N/A
	Ci	N/A	
b. Dry compressible waste, contaminated equipment	m ³	N/A	N/A
	Ci	N/A	
c. Irradiated components, control rods	m ³	N/A	N/A
	Ci	N/A	
d. Other	m ³	N/A	N/A
	Ci	N/A	

N/A No shipments made.

2. Estimate of major nuclide composition (by type of waste)		
a. not applicable	%	0.00E+0
b. not applicable	%	0.00E+0
c. not applicable	%	0.00E+0
d. not applicable	%	0.00E+0

3. Solid Waste Disposition

See COMMON section of this report

B. IRRADIATED FUEL SHIPMENTS (Disposition)

See COMMON section of this report

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SECTION F. APPLICABLE LIMITS

Gaseous Effluents - Applicable Limits

The percent of Applicable Limits, tabulated in Sections A.3, B.3, C.3, and D.3 of Table 1A, was calculated using the following equation:

$$\% \text{ Applicable Limits} = \frac{(\text{Rel Rate}) (X/Q) (100)}{\text{MPC}_{\text{eff}}}$$

where: Rel Rate = total curies released in each category and each quarter, divided by the seconds in a quarter; the value in Sections A.2, B.2, C.2 and D.2 of Table 1A, $\mu\text{Ci}/\text{sec}$.

X/Q = $4.80\text{E-}6 \text{ sec}/\text{m}^3$; the annual average atmospheric dispersion defined in the Units 2&3 ODCM, Rev. 26.

The MPC_{eff} is defined as:

$$\frac{1}{\sum_{i=1}^n \frac{F_i}{\text{MPC}_i}}$$

where: F_i = fractional abundance of the i th radionuclide obtained by dividing the activity (curies) for each radionuclide, C_i , by the sum of all the isotopic activity, C_T .

n = total number of radionuclides identified

MPC_i = MPC of the i th radionuclide

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Liquid Effluents - Applicable Limits

The percent of Applicable Limits, tabulated in Sections A.3, B.3, and C.3 of Table 2A, was calculated using the following equation:

$$\% \text{ Applicable Limits} = \frac{(\text{Dil Conc}) (100)}{\text{MPC}_{\text{eff}}}$$

where: Dil Conc = total curies released in each category and each quarter divided by the total volume released (sum of Sections E and F in Table 2A); the value in Sections A.2, B.2, and C.2 of Table 2A, $\mu\text{Ci/ml}$.

The MPC_{eff} is defined as:

$$\frac{1}{\sum_{i=1}^n \frac{F_i}{\text{MPC}_i}}$$

where: F_i = fractional abundance of the i th radionuclide obtained by dividing the activity (curies) for each radionuclide, C_i , by the sum of all the isotopic activity, C_T .

n = total number of radionuclides identified

MPC_i = MPC of the i th radionuclide

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SECTION G. ESTIMATION OF ERROR

Estimations of the error in reported values of gaseous and liquid effluents releases have been made.

Sources of error for gaseous effluents - batch releases are:

- (1) tank volumes
- (2) sampling
- (3) counting
- (4) calibration

Sources of error for gaseous effluents - continuous releases are:

- (1) fan flow rate
- (2) sampling
- (3) counting
- (4) calibration
- (5) differential pressure drop

Sources of error for liquid effluents - batch releases are:

- (1) tank volumes
- (2) sampling
- (3) counting
- (4) calibration

Sources of error for liquid effluents - continuous releases are:

- (1) dilution flow rate
- (2) sampling
- (3) counting
- (4) calibration

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

$$\text{Total Error} = \sqrt{\sigma_1^2 + \sigma_2^2 + \sigma_3^2 + \dots + \sigma_i^2}$$

where: σ_i = Error associated with each component.

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SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS

Table 1 in Section H presents the quarterly and annual maximum dose to an individual. Six different categories are presented:

- (1) Liquid Effluents - Whole Body
- (2) Liquid Effluents - Organ
- (3) Airborne Effluents - Tritium, Iodines and Particulates
- (4) Noble Gases - Gamma
- (5) Noble Gases - Beta
- (6) Direct Radiation

The doses for categories 1 and 2 were calculated using the methodology of the ODCM, this data is also presented in Table 2D. Categories 3, 4, and 5 were calculated utilizing RRRGS (Radioactive Release Report Generating System) software, Regulatory Guide 1.109 methodology, and concurrent meteorology. Table 1E of gaseous effluents previously presented, however, lists data similar to categories 3, 4 and 5 using methods described in the ODCM and the historical meteorology (X/Q). Category 6 presents direct dose data measured by TLD dosimeters. Each portion of each category is footnoted to briefly describe each maximum individual dose presented.

For individuals who may, at times, be within the site boundary, the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the site boundary. For members of the public who traverse the site boundary via highway I-5, the residency time shall be considered negligible and hence the dose "0".

Table 2 in Section H presents the percent of Applicable Limits for each dose presented in Table 1.

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TABLE 1

	Dose* (millirems)				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS	1)	2)	3)	4)	5)
Whole Body	1.11E-3	8.80E-4	1.47E-3	7.35E-3	1.08E-2
Organ	6)	7)	8)	9)	10)
	5.10E-3	4.11E-3	6.15E-3	2.73E-2	4.26E-2
AIRBORNE EFFLUENTS	11)	12)	13)	14)	15)
Tritium, Iodines, and Particulates	4.80E-3	2.18E-2	9.93E-3	2.41E-2	5.51E-2
NOBLE GASES **	16)	17)	18)	19)	20)
Gamma	1.06E-2	2.26E-2	1.12E-1	1.19E-2	1.43E-1
Beta	21)	22)	23)	24)	25)
	2.56E-2	2.19E-2	4.76E-2	1.78E-2	1.06E-1
DIRECT RADIATION	26)	27)	28)	29)	30)
	5.62E-1	1.14E+0	4.44E-1	3.90E-1	6.33E-1

* The numbered footnotes below briefly explain how each maximum dose was calculated, including the organ and the predominant pathway(s).

** Noble gas doses due to airborne effluent are in units of mrad, reflecting the air dose.

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1. This data was calculated using the methodology of the ODCM.
2. This data was calculated using the methodology of the ODCM.
3. This data was calculated using the methodology of the ODCM.
4. This data was calculated using the methodology of the ODCM.
5. This data was calculated using the methodology of the ODCM.
6. This data was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.
7. This data was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.
8. This data was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.
9. This data was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.
10. This data was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.
11. The maximum organ dose was to a child's thyroid and was located in the NNW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
12. The maximum organ dose was to a child's thyroid and was located in the ESE sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
13. The maximum organ dose was to a child's thyroid and was located in the NNW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
14. The maximum organ dose was to a child's thyroid and was located in the NNW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
15. The maximum organ dose was to a child's thyroid and was located in the ESE sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
16. A maximum air dose of $2.05\text{E-}2$ mrad for gamma radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the ENE sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
17. A maximum air dose of $4.49\text{E-}2$ mrad for gamma radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the SE sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
18. A maximum air dose of $1.47\text{E-}1$ mrad for gamma radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the ENE sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
19. A maximum air dose of $8.18\text{E-}2$ mrad for gamma radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the ENE sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

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20. A maximum air dose of $2.94\text{E-}1$ mrad for gamma radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the ENE sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
21. A maximum air dose of $1.91\text{E-}2$ mrad for beta radiation was located in the ENE sector, a seaward direction. The reported maximum air dose for beta radiation was located in the ENE sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
22. A maximum air dose of $4.44\text{E-}2$ mrad for beta radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for beta radiation was located in the E sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
23. A maximum air dose of $1.17\text{E-}1$ mrad for beta radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for beta radiation was located in the E sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
24. A maximum air dose of $6.45\text{E-}2$ mrad for beta radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for beta radiation was located in the ENE sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
25. A maximum air dose of $2.45\text{E-}1$ mrad for beta radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for beta radiation was located in the E sector, a landward sector, at the exclusion area boundary and calculated using the assumptions of the USNRC Regulatory Guide 1.109.
26. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.
27. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.
28. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.
29. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.
30. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.

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TABLE 2

SOURCE	Percent Applicable Limit				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS					
Whole Body	3.71E-2	2.93E-2	4.90E-2	2.45E-1	1.80E-1
Organ	5.10E-2	4.11E-2	6.15E-2	2.73E-1	2.13E-1
AIRBORNE EFFLUENTS					
Tritium, Iodines, and Particulates	3.20E-2	1.45E-1	6.62E-2	1.61E-1	1.84E-1
NOBLE GASES					
Gamma	1.06E-1	2.26E-1	1.12E+0	1.19E-1	7.15E-1
Beta	1.28E-1	1.10E-1	2.38E-1	8.90E-2	2.65E-1

NOTE: Direct Radiation is not specifically addressed in the Applicable Limits.

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SECTION I. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

On December 20, 1993 Revision 26 to the Units 2/3 Offsite Dose Calculation Manual (ODCM) was adopted and published. This revision changed all references from a Semiannual Report to a Annual Radioactive Effluent Release Report in accordance with approved PCN-419 and incorporated updates in tables used in the gaseous dose calculations that resulted specifically from the 1992 Land Use Census. Further, major changes were made as a result of an evaluation of the Radiological Environmental Monitoring Program. None of the above changes have any impact on the accuracy or reliability of methods for determining dose or setpoint values.

Removed from several monitors was the guide to set the setpoint as close to background as possible when not conducting a release. The goal for the radiation monitors and the effluent program as stated in the basis section of the ODCM for liquids is "to ensure that the concentration of radioactive materials released in liquid waste effluents from the site will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II, Column 2", and for gases, "ensure that the dose at any time at the site boundary from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20, for unrestricted areas". The purpose of these bases is accomplished by the effluent program in its present format. Since this particular change did not affect the intent of the program, lessen its regulatory adherence, or affect the methodology used in calculating setpoints, no safety evaluation was required.

DCP 2&3 6191.00BJ installed (among other unrelated components) a flow meter for liquid radwaste monitor, RE-7813. This flow meter is required for monitor operability. It is included on the same signal loop as the radiation monitor, and therefore, will receive all required maintenance as dictated by the existing maintenance schedule. FISL-7813 is being included on individual maintenance procedures. When the radiation monitor "loop" receives its maintenance, the new flow indicating switch is included. Operations procedures ensure the operability of FISL-7813 prior to and during release of liquid radioactive waste. If inoperable, and unable to measure minimum flow requirements, radiation monitor 2/3RT-7813 is deemed inoperable, and the appropriate action step is followed. Because of this method of capturing the essence of the requirement, calling out FISL-7813 individually in Table 4-1 was not warranted. FISL-7813 is now considered to be part of 2/3RT-7813 and thereby does not need individual mention.

To be more consistent within the ODCM itself, two references to 2RT-7865 were removed. Section 2.6.4 allows only 3RT-7865 or 2/3RT-7808 to be used to monitor a waste gas decay tank (WGDT) release. Due to uneven mixing, 2RT-7865 can not be used. 3RT-7865 will see the greater percent of released gas because of the physical layout of the system. This revision deleted reference to 2RT-7865 in Table 4-3 and Table 4-4. Chemistry procedures already require either 3RT-7865 or 2/3RT-7808 for releasing the WGDTs. No procedural changes occurred as a result of this particular change.

No safety evaluations were performed for updating radiation monitor calibration constants or implementing changes from the 1992 Land Use Census. These changes reflect results from routine surveillances and as such do not constitute a modification in methodology for determining activity released from the site subsequent dose to a member of the public.

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Per NRC Generic Letter 89-01, no safety review was required or performed for the correction of typographical errors.

The following is a complete list of the changes:

- ^a Indicates typographical, sequential sectional and page numbering, and format changes.
- ^b Removed guidance calling for the setting of setpoints as close to background as possible when the monitor is not being used for a release. The bases for the radiation monitors and the effluent program as stated in the basis section of the ODCM for liquids is "to ensure that the concentration of radioactive materials released in liquid waste effluents from the site will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II, Column 2", and for gases, "ensure that the dose at any time at the site boundary from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20, for unrestricted areas". The purpose of these bases is accomplished by the effluent program in its present format.
- ^{*} The 1992 Land Use Census revealed increased occupancy factors in two locations, Enlisted Beach Campground (Sector Q, 0.9 mile) and San Clemente Ranch Administration Offices (Sector Q, 2.3 miles). Correspondingly, the dose parameters for all affected age groups were increased in those locations. The occupancy factors increased from 0.1014 to 0.1233 and from 0.2283 to 0.3425, respectively. Further, an evaluation of the Radiological Environmental Monitoring Program showed 21 TLD locations could be deleted. One air sampler location was also deleted, while a new one was added. This information was formally transmitted in two letters: 1) E.M. Goldin to J.R. Clark dated 9/28/92 "Submittal of 1992 Dose Parameters for SONGS Unit 1 and Units 2/3 ODCMs" and 2) E.M. Goldin to J.R. Clark dated 12/2/92 "Revision of Radiological Environmental Monitoring Sample Location, ODCM Table 5-4, SONGS Units 1,2, and 3".
- ^a Revised page numbers.
- Added Figures 5-2 and 5-3 to this page. The figures have always been in the ODCM.
- 1-3 Deleted statement describing the calculation of LLD regarding interference from other nuclides in accordance with NUREG 0472, Rev 3.
- 1-4 Clarified note on blowdown processing sump as a continuous release pathway. Specified that the first sump is to be treated as a batch release.
- 1-6^a Added a missing "comma" punctuation mark.
- 1-10^a Corrected typographical error and moved definitions from p. 1-11 to this page.
- 1-11^a Moved definitions to p. 1-10.
- 1-12 Rearranged equation 1-5 for clarification and accuracy.
- 1-14^b Deleted statement providing guidance on establishing setpoint as close to background as possible whenever no release is in progress.
- 1-15 Revised FFCPD holdup flow rate to more reflect actual conditions and reformatted waste flow rate section of definitions.
- 1-16^b Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.
- 1-20^b Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.
- 1-23^b Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress and added statement describing typical waste release flow rates.

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- 1-25^b Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.
- 1-26 Revised calibration constants.
- 1-27 Added parenthetical terminology to the definition of F_j .
- 1-28 Added ICRP-30 as a reference and corrected reference "0472" to "0172".
- 1-29 Added ICRP-30 as a reference and corrected reference "0472" to "0172".
- 2-3 Deleted statement describing the calculation of LLD regarding interference from other nuclides in accordance with NUREG 0472, Rev 3.
- 2-8^a Added a missing comma.
- 2-10 Corrected title box on Figure 2-2.
- 2-11 Added statement describing administrative values to be ≤ 1 for the site.
- 2-14^b Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.
- 2-15^b Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.
- 2-16^a Added reference paragraph to definitions.
- 2-17^b Deleted statements specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.
- 2-19^a Corrected typographical error.
- 2-20^b Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.
- 2-22^a Condensed the page by formatting the information and deleting blank spots.
- 2-23^a Condensed the page by formatting the information and deleting blank spots. No information was added or deleted.
- 2-24^a Because of reformatting the previous two pages, this page is left blank. No information was deleted.
- 2-25 Revised calibration constants.
- 2-26^a Corrected typographical error on equation 2-12.
- 2-29^a-2-32^a Reformatted these four pages by condensing sections so they are grouped properly. By so doing, p. 2-31 is left blank. No information was deleted.
- 2-32 Changed reference used in definition for R_{ik} .
- 2-33 Added X/Q for H-3 for completeness. Also added the word "individual" to definition of D_0 in equation 2-19.
- 2-38 Clarified the pathway name.
- 2-43 Clarified the pathway name.
- 2-44^{*} Revised dose parameters based on Land Use Census.
- 2-46 Clarified the pathway name.

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- 9* Revised dose parameters based on Land Use Census.
- 2-53 Clarified the pathway name.
- 2-54 Clarified the pathway name.
- 2-56 Clarified the pathway name.
- 2-57 Clarified the pathway name.
- 2-58 Clarified the pathway name.
- 2-59 Clarified the pathway name.
- 2-64 Clarified the pathway name.
- 2-65 Clarified the pathway name.
- 2-67 Clarified the pathway name.
- 2-68 Clarified the pathway name.
- 2-70 Clarified the pathway name.
- 2-71 Clarified the pathway name.
- 2-72^a Added "/" in pathway name.
- 2-74 Clarified the pathway name.
- 5 Clarified the pathway name.
- 2-78 Clarified the pathway name.
- 2-79 Clarified the pathway name.
- 2-80^a Corrected typographical error in equation 2-21 by adding a missing " Σ " and removing subscript "1".
- 2-81 Provide proper references for terms in equations 2-21 and 2-22.
- 2-82 Revised the number of TLD locations around site per Land Use Census Report. Included additional examples of occupancy factors. Clarified the method to calculate direct radiation from the site.
- 4-1 Replaced Semiannual with Annual.
- 4-5^a Added a missing "period" punctuation mark.
- 4-6 Replaced Semiannual with Annual.
- 4-7 Deleted WRGM 2RT-7865 under WGDT in order to be consistent with section 2.6.4.
- 4-8^a Corrected typographical error.
- 4-9 Deleted Action 39. It is not referenced in Table 4-3 and had no noted action steps.
- 4-10 Deleted WRGM 2RT-7865 under WGDT in order to be consistent with section 2.6.4.
- 11^a Corrected typographical error in title of Table 4-4.
- 12 Revised the name of NBS to NIST, National Institute of Standards and Technology.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

- 4-14 Added FFCPD holdup tank to Figure 4-5.
- 4-15* Figure 4-6 was redrawn with extraneous wording deleted.
- 4-16 Revised Figure 4-7 to reflect current solid waste handling methodology.
- 5-9* Corrected a typographical error.
- 5-15* Deleted the following TLD locations per REMP:
 - 5. Camp Las Pulgas (MCB, Camp Pendleton)
 - 7. Old Route 101 (East - Northeast)
 - 9. Basilone Road/I-5 Freeway Offramp
 - 20. San Clemente Pier
 - 21. Concordia Elementary School - San Clemente
 - 24. San Clemente High School
- 5-16* Deleted the following TLD locations per REMP:
 - 25. Convalescent Home - San Clemente
 - 26. Dana Hills High School
 - 27. US Post Office - Dana Point
 - 28. Doheny Fire Station - Capistrano Beach
 - 29. San Juan Capistrano Fire Station
 - 30. Laguna Beach Fire Station
 - 32. Santa Ana Police Department
 - 37. Laguna Niguel Fire Station
 - 39. Basilone Road Trailer Park (MCB, Camp Pendleton)
 - 42. Horno Canyon (MCB, Camp Pendleton)
 - 43. Edson Range (MCB, Camp Pendleton)
 - 45. Interstate 5 Weigh Station
 - 48. Mainside (MCB, Camp Pendleton)
- 5-17* Deleted two TLD locations per REMP.
 - 51. Carlsbad Fire Station
 - 52. Vista Fire Station
- 5-18* Deleted one airborne sampling location, added one airborne sample location and labeled three locations as Control locations.
 - 3. Huntington Beach Generating Station (Control)
 - 6. SONGS Meteorological Tower (DELETED)
 - 7. AWS Roof (ADDED)
 - 4. Huntington Beach Generating Station (Control)
 - D. Newport Beach (Control)
- 5-19* Labeled three samples a Control Locations
 - 3. Huntington Beach
 - 4. Newport Beach (North end)
 - 2. Southeast of Oceanside
- 5-20* Changed the name of three sampling locations from Newport Beach to Laguna Beach (Control). The physical location of the samples remain the same.
- 5-23* Revised drawings to reflect revised TLD and sample locations.
- 5-24* Revised drawings to reflect revised TLD and sample locations. Also added title to page.
- 5-25* Revised drawings to reflect revised TLD and sample locations. Also added title to page.
- 6-7 Revised all references from Semiannual reporting period for the Radioactive Effluent Release Report to Annual. This is in accordance with PCN-419. Also deleted a statement requiring the first such report upon initial criticality. Also added a note which was removed from page to coincide with the reference.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

Revised all references from Semiannual reporting period for the Radioactive Effluent Release Report to Annual. This is in accordance with PCN-419. And also deleted a note which was transferred to page 6-7.

- 6-9 Added note regarding reporting major changes to the radioactive waste treatment system.

SECTION J. CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

- o There were no changes to the Units 2 and 3 Radioactive Waste Treatment Systems during the reporting period, January 1, 1993 to December 31, 1993.

SECTION K. MISCELLANEOUS

- o Unplanned, Uncontrolled Release from Surge/Waste Gas Decay Tank

A slow continuous release of the Surge Tank/on-line Waste Gas Decay Tank occurred from 07/31/93 to 08/01/93 for about 28 hours, due to a Waste Gas System isolation valve inadvertently left in the open position. Although unplanned, this release was monitored, sampled, and quantified as part of the Plant Vent Stack flowpath. Total activity released was conservatively estimated at 2.8 curies for a potential gamma dose of $1.5E-4$ mrad. Compared to site airborne discharges, there were no significant dose consequences as a result of this release. An Operations Division Experience Report (ODER 2-93-22) was written to document this event and to provide for corrective actions.

- o Unplanned, Uncontrolled Release from Unit 2 High Conductivity Sump

The Unit 2 High Conductivity Sump (HCS) is considered a liquid batch release point. The Offsite Dose Calculation Manual requires that it be sampled and analyzed prior to each release.

On 12/23/93, due to personnel errors, about 9000 gallons of the Unit 2 HCS were released to the outfall without prior sampling and analysis. Subsequent sampling and analysis of the remaining water in the HCS indicated that there was no detectable activity. Therefore, there were no dose consequences as a result of this release. A Chemistry Division Investigation Report (CDIR 93-009) was written to document this event and to provide for corrective actions.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 1993 - December 31, 1993

S.O.N.G.S. 2&3			
Monitor	Inoperability Period	Inoperability Cause	Explanation
2/3RT-7813 Liquid Radwaste Discharge Line Monitor	05/18/92 - 05/05/93	Inadequate sample flow	Installed flow meter modifications per design change package.
	11/12/93 - present	High background reading	Required decontamination and corrective work on two isolation valves.
S.O.N.G.S. 2			
Monitor	Inoperability Period	Inoperability Cause	Explanation
2RT-6753/ 2RT-6759 Steam Generator Blowdown Monitor	06/05/93 - 07/27/93	No sample flow	No steam generator pressure or steam flow due to Unit being in a refueling outage.
2RT-7818B Condenser Air Ejector High Range Monitor	01/25/88 - present	Detector design deficiency	Design flaw in 2RT-7818 causes channel B to be inoperable. Design change in progress to replace monitor.
2RT-7828 Containment Purge Process Flow Monitor	06/05/93 - 07/21/93	Flow meter malfunction	Substitute flow value installed during outage. Radiation monitor functions operable.
2RT-7865 Plant Vent Stack Process Flow Monitor	04/22/92 - present	Process flow indication	Flow probe calibration process deficiencies identified. Procuring new calibration equipment. Radiation monitor functions operable.
	06/19/92 - 11/17/93	Inadequate mixing in exhaust plenum.	Revised procedures to address inadequate mixing.
2RT-7870 Condenser Air Ejector Process Flow Monitor	02/18/89 - 11/03/93	Inconsistent process flow indication.	Design change to replace existing circuitry was installed during last refueling outage. Required further work after initial installation. Radiation monitor functions operable.
	06/08/93 - 07/31/93	Install new process flow design change	Installed during refueling outage, monitor not required per Mode 6 specifications.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 1993 - December 31, 1993

S.O.N.G.S. 3			
Monitor	Inoperability Period	Inoperability Cause	Explanation
3RT-6753/ 3RT-6759 Steam Generator Blowdown Monitor	10/08/93 - present	No sample flow	No steam generator pressure or steam flow due to Unit being in a refueling outage
3RT-7817 BPS/FFCPD Discharge Monitor	12/05/91 - present	Removed from service	Installed flow meter modifications per design change package. Retest showed need for further design change.
3RT-7818B Condenser Air Ejector High Range Monitor	01/25/88 - present	Detector design deficiency	Design flaw in 3RT-7818 causes channel B to be inoperable. Design change being generated to replace monitor.
3RT-7821 Turbine Plant Sump Monitor	04/29/92 - 02/08/93	Lack of sample flow	Installed modifications to visually ensure sample flow. Further design being evaluated.
3RT-7865 Plant Vent Stack Process Flow Monitor	08/02/91 - present	Process flow indication	Flow probe calibration process deficiencies identified. Procuring new calibration equipment. Radiation monitor functions operable.
	06/19/92 - 11/17/93	Inadequate mixing in exhaust plenum.	Revised procedures to address inadequate mixing.
3RT-7870 Condenser Air Ejector Process Flow Monitor	03/03/89 - present	Inconsistent process flow indication.	Design change to replace existing circuitry was installed during last refueling outage. Required further work after initial installation. Radiation monitor functions operable.
	10/13/93 - 12/03/93	Install new process flow design change	Installed during refueling outage; monitor not required per Mode 6 specifications.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

S.O.N.G.S. 2 and 3

SECTION L. S O.N.G.S. 2 and 3 CONCLUSIONS

- o Gaseous effluent releases, excluding tritium, totaled $1.54\text{E}+3$ curies with 92% of the total being Xe-133.
- o The radiation doses from gaseous releases are: (a) gamma air dose: $1.43\text{E}-1$ mrad at the site boundary, (b) beta air dose: $1.06\text{E}-1$ mrad at the site boundary, (c) organ dose: $5.51\text{E}-2$ mrem at the nearest receptor.
- o Liquid releases totaled $9.80\text{E}+2$ curies of which tritium was $9.78\text{E}+2$ Ci, noble gases were $1.27\text{E}+0$ Ci, and particulates and iodines were $2.94\text{E}-1$ Ci.
- o The radiation doses from liquid releases are: (a) total body: $1.08\text{E}-2$ mrem, (b) limiting organ: $4.26\text{E}-2$ mrem.
- o The radioactive releases and resulting doses generated from Units 2 and 3 were below the Applicable Limits for both gaseous and liquid effluents.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

COMMON

COMMON RADWASTE SHIPMENTS

TABLE 3

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	Estimated total error (%)
a. Spent resins, filter sludges, evaporator bottoms	m ³	N/A	N/A
	Ci	N/A	
b. Dry active waste (DAW), compactable and non-compactable (*,#)	m ³	7.18E+1	3.00E+1
	Ci	8.74E+0	
c. Irradiated components, control rods	m ³	N/A	N/A
	Ci	N/A	
d. Other (filters) (*)	m ³	2.12E+0	3.00E+1
	Ci	3.87E+1	

NOTE: Total curie content estimated.

* Material packaged into High Integrity Containers and shipped in a Type B Cask (C of C 9208) or Type A Cask (C of C 9176) or Type A Cask (C of C 9159).

Material packaged in strong, tight containers of various sizes.

N/A No shipment made.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

COMMON

TABLE 3 (Continued)

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not Irradiated fuel)

2. Estimate of major nuclide composition (by type of waste)		
a.	Not Applicable	% 0.00E+0
b.	antimony-125	% 1.63E-1
	carbon-14	% 2.01E+0
	cesium-134	% 7.78E+0
	cesium-137	% 3.01E+1
	cobalt-58	% 2.58E+0
	cobalt-60	% 7.06E+0
	iodine-129	% 5.96E-3
	iron-55	% 3.90E+1
	manganese-54	% 1.89E-1
	nickel-63	% 7.86E+0
	plutonium-241	% 1.31E+0
	technetium-99	% 8.55E-4
	tritium	% 1.86E+0
	strontium-90	% 2.89E-2
c.	Not Applicable	% 0.00E+0
d.	antimony-125	% 1.14E+0
	carbon-14	% 4.39E+0
	cesium-137	% 3.82E-1
	chromium-51	% 2.46E+0
	cobalt-58	% 2.16E+1
	cobalt-60	% 9.79E+0
	iodine-129	% 6.65E-4
	iron-55	% 4.81E+1
	manganese-54	% 1.81E+0
	nickel-63	% 7.10E+0
	niobium-95	% 1.22E+0
	plutonium-241	% 1.74E-1
	strontium-90	% 2.57E-2
	technetium-99	% 5.16E-4
	tritium	% 1.08E-1
	zirconium-95	% 1.83E+0

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

COMMON

TABLE 3 (Continued)

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not Irradiated fuel)

3. Solid Waste Disposition (S.O.N.G.S. 1, 2, and 3)		
Number of Shipments	Mode of Transportation	Destination
4 *	Tri-State Motor Transit Truck/Type A Cask	Barnwell, SC
2 *	Tri-State Motor Transit Truck/Type B Cask	Barnwell, SC
90 #	Hitman Transport Truck/Trailer	Barnwell, SC
3 #	Tri-State Motor Transit Truck/Trailer	Barnwell, SC

* All waste packaged at SONGS is staged at one location. There are no independent shipments of dry active waste made for Unit 1 or Units 2&3, and are not reported separately.

SONGS maintains contracts with vendors that provide volume reduction services. These shipments were made from their processing facilities. The 90 shipments made from the SEG facility included waste from other generators. Edison's waste volume was a small fraction of the total waste volume of these shipments.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

COMMON

TABLE 3 (Continued)

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
None	No shipments were made	N/A

C. DEWATERING

Number of Containers	Solidification Agent
5	N/A

D. CHANGES TO THE PROCESS CONTROL PROGRAM AT SAN ONOFRE UNITS 1, 2 & 3

During the reporting period January 1, 1993 through December 31, 1993, a change to the Process Control Program via procedure S0123-VII-8.5.1 was approved for implementation. Please find attached an explanation of the changes and the justification for making the changes.

REFERENCES:

- 1) Unit 1 Technical Specifications, section 6.13.2.
- 2) Units 2 and 3 Technical Specifications, section 6.13.2.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

COMMON

CHANGES TO THE PROCESS CONTROL PROGRAM AT SAN ONOFRE UNITS 1, 2 & 3 (Continued)

MEMORANDUM FOR FILE

April 21, 1993

SUBJECT: Notification of Change to the Process Control Program for
San Onofre Unit 1, 2, and 3

Health Physics has initiated changes to the Process Control Program via procedure SO123-VII-8.5.1. The following provides an explanation of the TCN and justification for the change(s).

Description of Change: A TCN was initiated to add new procedure numbers to two current procedure references, as follows: (1) Existing procedure reference SO123-VII-3, ALARA Job Review is under revision, and will be issued as SO123-VII-20.4.3, ALARA Radiological Work Planning and Job Reviews. (2) Existing procedure reference SO123-VII-3.5, ALARA Program is under revision, and will be issued as SO123-VII-20.4, ALARA Program. These procedure revisions will be included with the existing references, and noted as "when issued."

Rationale for Change: The revision to 10 CFR Part 20, Standards for Protection Against Radiation, necessitates a revision to the current ALARA Program and implementing procedures. As part of the revision, these procedures will be issued as new, with the above mentioned numbering sequence.

Justification That the Change Does Not Reduce Conformance of the Solidified Waste to Existing Criteria: The change to the ALARA Program and implementing procedures is made to ensure compliance with the new 10 CFR Part 20 revision, and does not affect conformance of the Process Control Program for San Onofre Units 1, 2, and 3.

APPROVED BY: 

Health Physics Manager

DATE: 4-23-93-

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

COMMON

COMMON 40 CFR 190 REQUIREMENTS

Table 1 below presents the annual site-wide doses and percent of ODCM Specification limits to members of the public. These values are calculated utilizing doses resulting from all effluent pathways and direct radiation. The different categories presented are: (1) Total Body, (2) Limiting Organ, and (3) Thyroid.

Dose Category	Units	Year
1. Total Body		
a. Total Body Dose	mrem	1.23E+0
b. Percent ODCM Specification Limit	%	4.91E+0
2. Limiting Organ		
a. Organ Dose (Liver)	mrem	8.64E-1
b. Percent ODCM Specification Limit	%	3.46E+0
3. Thyroid		
a. Thyroid Dose	mrem	6.50E-2
b. Percent ODCM Specification Limit	%	8.66E-2

In addition to the dose calculated in the table above, one additional pathway exists for radiation exposure to a member of the public. Southern California Edison collects marine benthic material from the screens of its circulating water intake structure. Because of the potential for this benthic material to contain radioactive substances previously discharged to the environment as liquid waste, Southern California Edison performs a survey to confirm that no plant-related radioactive materials are detectable. The lower limit of detection (LLD) of the survey is established so that, with due consideration of the potential future use of the land disposal site, the maximum annual dose to an individual after 40 years of continued disposal is within the limits specified by 40 CFR 190. In that LLD determination, the disposal site, 20 miles distant from San Onofre, is considered to be outside the sphere of influence of gaseous and liquid pathways.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

COMMON

COMMON CONCLUSIONS

- o Radioactive releases from S.O.N.G.S. 1, 2 and 3 totaled $1.96\text{E}+3$ curies for gaseous effluents, 79% of which was Xe-133. Curies discharged for liquid effluents were: tritium, $1.42\text{E}+3$ curies; noble gases, $1.34\text{E}+0$ curies; particulates and iodines, $1.43\text{E}+0$ curies.
- o Radioactive releases and resulting doses generated from S.O.N.G.S. 1, 2 and 3 were below the Applicable Limits for both gaseous and liquid effluents.
- o S.O.N.G.S. 1, 2 and 3 made 99 radwaste shipments to Barnwell, SC. Total volume was $9.24\text{E}+1$ cubic meters containing $6.44\text{E}+3$ curies of radioactivity.
- o Meteorological conditions during the year were typical for S.O.N.G.S. Meteorological dispersion was good 44% of the time, fair 34% of the time and poor 22% of the time.
- o The net result from the analysis of these effluent releases indicates that the operation of S.O.N.G.S. 1, 2 and 3 has met all the requirements of the applicable regulations and therefore has not resulted in any detrimental effects on the environment.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

COMMON

APPENDIX A

GASEOUS EFFLUENTS - APPLICABLE LIMITS

- A. Table 1A lists the total curies released and the release rate. The percent of applicable limit compares the released concentrations to the concentration limits of 10 CFR 20, Appendix B, Table II, Column 1.
- B. Table 1E lists the air doses as calculated using the historical X/Q. The air dose due to noble gases released in gaseous effluents from S.O.N.G.S. (per reactor) to areas at and beyond the site boundary shall be limited to the following values:
1. During any calendar quarter: ≤ 5 mrad for gamma radiation and ≤ 10 mrad for beta radiation.
 2. During any calendar year: ≤ 10 mrad for gamma radiation and ≤ 20 mrad for beta radiation.
- C. The dose to a Member of the Public from iodines, tritium, and all radionuclides in particulate form with half-lives greater than eight days in gaseous effluents released from S.O.N.G.S. (per reactor) to areas at and beyond site boundary shall be limited to the following values:
1. During any calendar quarter: ≤ 7.5 mrem to any organ.
 2. During any calendar year: ≤ 15 mrem to any organ.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

COMMON

APPENDIX A (Continued)

LIQUID EFFLUENTS - APPLICABLE LIMITS

- A. Table 2A lists the total curies released, the diluted concentration, and percent of the applicable limit. The percent of applicable limit compares the diluted concentration of radioactive material released to the concentrations specified in 10 CFR 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 $2.00\text{E-}4 \mu\text{Ci/ml}$.
- B. Table 2D lists doses due to liquid releases. The dose commitment to a Member of the Public from radioactive materials in liquid effluents released from S.O.N.G.S. (per reactor) to unrestricted areas shall be limited to the following values:
1. During any calendar quarter: ≤ 1.5 mrem to the total body and
 ≤ 5 mrem to any organ.
 2. During any calendar year: ≤ 3 mrem to the total body and
 ≤ 10 mrem to any organ.

METEOROLOGY

The meteorology of the San Onofre Nuclear Generating Station for each of the four quarters, 1993 is described in this section. Meteorological measurements have been made according to the guidance provided in USNRC Regulatory Guide 1.23, "Onsite Meteorological Programs." A summary report of the meteorological measurements taken during each calendar quarter are presented in Table 4A as joint frequency distribution (JFD) of wind direction and wind speed by atmospheric stability class.

Hourly meteorological data for batch releases have been recorded for the periods of actual release. This data is available, as well as the hourly data for the Annual Report, but has not been included in this report because of the bulk of data records.

Table 4A lists the joint frequency distribution for each quarter, 1993. Each page of Table 4A represents the data for the individual stability classes: A, B, C, D, E, F, and G. The last page of each section is the JFD for all the stability classes. The wind speeds have been measured at the 10-meter level, and the stability classes are defined by the temperature differential between the 10-meter and 40-meter levels.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 92123124-93033123

EXTREMELY UNSTABLE (DT/DZ < -1.9 °C/100 METERS)

PASQUILL A

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	0	1	2	1	0	0	0	0	0	4
NNE	0	0	0	0	0	2	0	0	0	0	0	0	2
NE	0	0	0	0	0	0	1	0	0	0	0	0	1
ENE	0	0	0	0	1	0	1	0	0	0	0	0	2
E	0	0	0	0	0	0	2	0	0	0	0	0	2
ESE	0	0	0	0	0	0	2	2	3	0	0	0	7
SE	0	0	0	0	0	1	7	6	7	0	0	0	21
SSE	0	0	0	1	2	4	12	5	7	2	2	0	35
S	0	1	0	1	5	10	21	9	6	0	0	0	53
SSW	0	0	0	3	7	13	17	4	0	0	0	0	44
SW	0	0	1	1	5	17	15	5	2	2	0	0	48
WSW	0	0	0	2	19	30	27	5	2	1	0	0	86
W	0	0	2	4	9	57	58	7	1	0	0	0	138
WNW	0	0	0	2	2	10	24	8	1	0	0	0	47
NW	0	0	0	0	0	6	10	1	1	0	0	0	18
NNW	0	0	0	1	0	1	1	0	1	0	0	0	4
TOTALS	0	1	3	15	51	153	199	52	31	5	2	0	512

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 7
 NUMBER OF VALID HOURS 512
 TOTAL HOURS FOR THE PERIOD 2160

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 92123124-93033123
 MODERATELY UNSTABLE ($-1.9 < DT/DZ \leq -1.7$ °C/100 METERS)
 PASQUILL B
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	2	2	0	0	0	0	0	0	0	4
NE	0	0	0	0	1	1	0	0	0	0	0	0	2
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	1	2	0	0	0	0	0	3
ESE	0	0	1	1	0	0	1	1	1	0	0	0	5
SE	0	0	0	0	0	3	3	2	0	0	0	0	8
SSE	0	0	0	0	2	4	4	3	5	0	0	0	18
S	0	0	0	0	1	4	4	0	1	0	0	0	10
SSW	0	0	0	0	3	4	5	2	1	0	0	0	15
SW	0	0	1	2	1	2	3	1	0	0	0	0	10
WSW	0	0	1	2	1	2	2	1	0	0	0	0	9
W	0	0	0	4	1	1	0	2	0	0	0	0	8
WNW	0	0	0	1	0	3	3	2	1	0	0	0	10
NW	0	0	0	0	0	1	0	0	0	0	0	0	1
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	3	12	12	26	27	14	9	0	0	0	103

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 7
 NUMBER OF VALID HOURS 103
 TOTAL HOURS FOR THE PERIOD 2160

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 92123124-93033123
 SLIGHTLY UNSTABLE ($-1.7 < DT/TZ \leq -1.5$ °C/100 METERS)

PASQUILL C

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	3	3	2	1	0	0	0	0	0	0	9
NNE	0	1	0	1	0	2	1	0	0	0	0	0	5
NE	0	0	0	1	0	0	0	0	0	0	0	0	1
ENE	0	0	1	1	0	0	0	0	0	0	0	0	2
E	0	1	0	0	0	1	4	0	0	0	0	0	6
ESE	0	0	0	0	0	1	6	1	1	0	0	0	9
SE	0	1	0	0	1	1	10	7	3	1	0	0	24
SSE	0	0	0	2	4	4	3	1	5	8	0	0	27
S	0	0	0	0	7	6	3	2	1	0	0	0	19
SSW	0	0	0	1	3	3	7	1	0	0	0	0	15
SW	0	0	1	1	1	1	5	0	0	0	0	0	9
WSW	0	0	0	0	1	1	4	0	1	0	0	0	7
W	0	0	0	0	1	1	1	0	0	0	0	0	3
WNW	0	0	0	2	1	5	3	2	4	0	0	0	17
NW	0	0	1	0	0	3	1	0	5	0	0	0	10
NNW	0	0	1	0	3	2	1	0	1	0	0	0	8
TOTALS	0	3	7	12	24	32	49	14	21	9	0	0	171

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 7
 NUMBER OF VALID HOURS 171
 TOTAL HOURS FOR THE PERIOD 2160

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 92123124-93033123
 NEUTRAL ($-1.5 < DT/DZ \leq -0.5$ °C/100 METERS)
 PASQUILL D
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	5	5	7	4	2	0	0	0	0	0	23
NNE	0	0	5	4	10	6	3	0	0	0	0	0	28
NE	0	0	1	2	1	5	1	0	0	0	0	0	10
ENE	0	0	0	0	2	2	1	2	0	0	0	0	7
E	0	0	0	1	1	2	7	0	0	0	0	0	11
ESE	0	2	1	0	1	8	18	9	0	0	0	0	39
SE	0	0	1	2	3	14	20	11	9	1	0	0	61
SSE	1	1	0	3	5	8	4	15	23	4	0	0	64
S	1	0	1	1	3	1	2	3	6	0	0	0	18
SSW	0	1	1	1	3	3	1	1	0	0	0	0	11
SW	0	0	2	4	0	2	4	1	0	0	0	0	13
WSW	0	0	0	0	2	2	4	2	0	0	0	0	10
W	0	1	0	1	0	8	6	4	3	0	0	0	23
WNW	0	0	1	0	4	3	9	4	2	0	0	0	23
NW	0	0	2	3	4	5	9	4	0	0	0	0	27
NNW	1	1	1	5	6	2	4	0	0	0	0	0	20
TOTALS	3	6	21	32	52	75	95	56	43	5	0	0	388

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 7
 NUMBER OF VALID HOURS 388
 TOTAL HOURS FOR THE PERIOD 2160

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 92123124-93033123
 SLIGHTLY STABLE ($-0.5 < DT/DZ \leq -1.5$ °C/100 METERS)

PASQUILL E

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22-.50	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-5.0	5.1-7.0	7.1-10.0	10.1-13.0	13.1-18.0	>18	TOTAL
N	0	2	0	6	7	11	1	0	0	0	0	0	27
NNE	0	0	3	17	35	31	8	3	0	0	0	0	97
NE	0	2	3	5	4	8	9	1	0	0	0	0	32
ENE	0	1	2	6	0	1	3	1	0	0	0	0	14
E	0	0	0	7	3	1	0	1	2	0	0	0	14
ESE	0	0	0	0	3	3	2	0	1	2	0	0	11
SE	0	0	1	1	1	2	6	6	5	1	0	0	23
SSE	0	0	1	2	3	0	6	5	5	1	2	0	25
S	0	0	1	2	2	1	1	11	2	2	0	0	22
SSW	0	0	1	3	0	3	2	2	0	2	0	0	13
SW	0	0	1	1	6	2	5	2	0	0	0	0	17
WSW	0	1	1	0	3	0	0	1	3	0	0	0	9
W	0	0	1	1	4	9	7	0	0	0	0	0	22
WNW	0	0	0	1	0	6	7	1	1	0	0	0	16
NW	0	0	0	1	1	2	1	0	0	0	0	0	5
NNW	0	2	1	3	3	2	1	0	0	0	0	0	12
TOTALS	0	8	16	56	75	82	59	34	19	8	2	0	359

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 7
 NUMBER OF VALID HOURS 359
 TOTAL HOURS FOR THE PERIOD 2160

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 92123124-93033123
 MODERATELY STABLE ($1.5 \leq DT/DZ \leq -0.5$ °C/100 METERS)
 PASQUILL F
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	1	1	2	4	10	9	4	0	0	0	0	31
NNE	0	0	3	14	41	71	13	1	0	0	0	0	143
NE	0	4	2	12	8	10	8	0	0	0	0	0	44
ENE	0	0	3	3	3	6	0	0	0	0	0	0	15
E	0	1	0	3	0	1	0	0	0	0	0	0	5
ESE	0	0	0	1	0	0	0	0	0	0	0	0	1
SE	0	0	0	1	1	0	0	1	2	1	0	0	6
SSE	0	0	0	1	1	1	1	1	2	3	3	0	13
S	0	0	1	0	0	0	1	0	6	0	0	0	8
SSW	0	0	0	1	1	0	0	0	1	0	0	0	3
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	0	1	0	0	0	0	0	0	0	0	1
W	0	2	0	0	1	1	1	0	0	0	0	0	5
WNW	0	1	1	1	1	2	2	0	0	0	0	0	8
NW	0	0	0	1	0	1	2	0	0	0	0	0	4
NNW	0	0	0	1	1	3	1	0	0	0	0	0	6
TOTALS	0	9	11	42	62	106	38	7	11	4	3	0	293

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 7
 NUMBER OF VALID HOURS 293
 TOTAL HOURS FOR THE PERIOD 2160

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 92123124-93033123
 EXTREMELY STABLE (DT/DZ > 4.0 °C/100 METERS)

PASQUILL G

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	2	0	3	12	2	0	0	0	0	19
NNE	0	2	1	5	19	133	86	2	0	0	0	0	248
NE	0	0	1	3	2	7	6	0	0	0	0	0	19
ENE	0	0	2	4	0	5	1	0	0	0	0	0	12
E	0	1	0	0	0	0	0	0	0	0	0	0	1
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	1	0	0	0	1	0	1	0	0	0	3
SSE	0	0	0	0	0	0	0	1	3	2	2	0	8
S	0	0	0	2	0	0	0	0	0	0	0	0	2
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	0	0	1	0	1	0	0	0	0	0	2
W	0	0	0	0	0	3	2	1	0	0	0	0	6
WNW	0	0	0	0	0	0	3	0	0	0	0	0	3
NW	0	0	1	0	1	1	0	0	0	0	0	0	3
NNW	0	0	0	0	1	0	0	0	0	0	0	0	1
TOTALS	0	3	6	16	24	152	112	6	4	2	2	0	327

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 7
 NUMBER OF VALID HOURS 327
 TOTAL HOURS FOR THE PERIOD 2160

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 92123124-93033123

ALL STABILITY CLASSES, ALL DT/DZ
WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	3	9	18	21	31	25	6	0	0	0	0	113
NNE	0	3	12	43	107	245	111	6	0	0	0	0	527
NE	0	6	7	23	16	31	25	1	0	0	0	0	109
ENE	0	1	8	14	6	14	6	3	0	0	0	0	52
E	0	3	0	11	4	6	15	1	2	0	0	0	42
ESE	0	2	2	2	4	12	29	13	6	2	0	0	72
SE	0	1	3	4	6	21	47	33	27	4	0	0	146
SSE	1	1	1	9	17	21	30	31	50	20	9	0	190
S	1	1	3	6	18	22	32	25	22	2	0	0	132
SSW	0	1	2	9	17	26	32	10	2	2	0	0	101
SW	0	0	6	9	13	24	32	9	2	2	0	0	97
WSW	0	1	2	5	27	35	38	9	6	1	0	0	124
W	0	3	3	10	16	80	75	14	4	0	0	0	205
WNW	0	1	2	7	8	29	51	17	9	0	0	0	124
NW	0	0	4	5	6	19	23	5	6	0	0	0	68
NNW	1	3	3	10	14	10	8	0	2	0	0	0	51
TOTALS	3	30	67	185	300	626	579	183	138	33	9	0	2153

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 7
 NUMBER OF VALID HOURS 2153
 TOTAL HOURS FOR THE PERIOD 2160

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93033124-93063023

EXTREMELY UNSTABLE (DT/DZ < -1.9 °C/100 METERS)

PASQUILL A

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	0	1	2	2	0	0	0	0	0	5
NNE	0	0	0	2	6	7	3	0	0	0	0	0	18
NE	0	0	0	3	3	5	2	0	0	0	0	0	13
ENE	0	0	0	2	2	0	1	0	0	0	0	0	5
E	0	0	0	1	1	1	2	1	0	0	0	0	6
ESE	0	0	0	0	0	1	1	1	0	0	0	0	3
SE	0	0	0	0	0	1	2	3	0	0	0	0	6
SSE	0	0	1	0	1	4	9	14	5	0	0	0	34
S	0	0	1	0	4	17	39	20	3	1	0	0	85
SSW	0	0	0	0	7	26	36	5	1	0	0	0	75
SW	0	0	0	1	8	38	34	1	0	0	0	0	82
WSW	0	1	0	1	6	52	55	1	0	0	0	0	116
W	0	0	1	3	18	77	88	5	1	0	0	0	193
WNW	0	0	0	4	8	48	102	18	1	0	0	0	181
NW	0	0	1	1	4	7	14	17	1	0	0	0	45
NNW	0	0	0	0	1	3	5	4	0	0	0	0	13
TOTALS	0	1	4	18	70	289	395	90	12	1	0	0	880

NUMBER OF CALMS 1
 NUMBER OF INVALID HOURS 31
 NUMBER OF VALID HOURS 880
 TOTAL HOURS FOR THE PERIOD 2184

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93033124-93063023
 MODERATELY UNSTABLE ($-1.9 < DT/DZ \leq -1.7$ °C/100 METERS)

PASQUILL B

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	1	0	1	1	0	0	0	0	0	3
NNE	0	1	0	3	2	2	0	0	0	0	0	0	8
NE	0	1	0	1	3	2	1	0	0	0	0	0	8
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	2	2	0	0	0	0	0	4
ESE	0	0	0	0	0	2	1	0	0	0	0	0	3
SE	0	0	0	0	0	2	0	1	0	0	0	0	3
SSE	0	0	0	0	0	1	4	10	1	0	0	0	16
S	0	0	0	2	0	3	4	5	2	0	0	0	16
SSW	0	0	0	2	1	2	4	1	0	0	0	0	10
SW	0	0	1	2	0	2	2	0	0	0	0	0	7
WSW	0	0	0	3	0	0	1	0	0	0	0	0	4
W	0	0	1	0	3	1	3	0	0	0	0	0	8
WNW	0	1	1	0	7	6	2	0	0	0	0	0	17
NW	1	0	1	2	6	15	6	0	0	0	0	0	31
NNW	0	0	0	3	2	4	2	0	0	0	0	0	11
TOTALS	1	3	4	19	24	45	33	17	3	0	0	0	149

NUMBER OF CALMS 1
 NUMBER OF INVALID HOURS 31
 NUMBER OF VALID HOURS 149
 TOTAL HOURS FOR THE PERIOD 2184

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93033124-93063023
 SLIGHTLY UNSTABLE ($-1.7 < DT/TZ \leq -1.5$ °C/100 METERS)
 PASQUILL C
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	1	0	0	1	1	0	0	0	0	0	0	3
NNE	0	0	1	4	3	7	2	0	0	0	0	0	17
NE	0	0	0	3	4	4	1	0	0	0	0	0	12
ENE	0	0	0	3	0	1	2	0	0	0	0	0	6
E	0	0	0	0	0	3	1	0	0	0	0	0	4
ESE	0	0	1	0	3	5	4	0	0	0	0	0	13
SE	0	2	0	1	0	3	4	2	0	0	0	0	12
SSE	0	0	1	2	2	5	6	5	2	0	0	0	23
S	0	0	1	3	4	6	10	1	0	0	0	0	25
SSW	0	0	2	0	2	2	3	0	0	0	0	0	9
SW	0	0	0	2	3	2	3	0	0	0	0	0	10
WSW	0	0	0	2	0	1	1	0	0	0	0	0	4
W	0	0	1	3	2	2	0	0	0	0	0	0	8
WNW	0	2	1	5	2	1	1	0	0	0	0	0	12
NW	0	1	0	3	5	2	2	0	0	0	0	0	13
NNW	0	0	0	1	0	0	3	0	0	0	0	0	4
TOTALS	0	6	8	32	31	45	43	8	2	0	0	0	175

NUMBER OF CALMS 1
 NUMBER OF INVALID HOURS 31
 NUMBER OF VALID HOURS 175
 TOTAL HOURS FOR THE PERIOD 2184

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93033124-93063023
NEUTRAL ($-1.5 < DT/DZ \leq -0.5$ °C/100 METERS)PASQUILL D
WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	4	1	2	0	0	0	0	0	0	7
NNE	1	2	2	6	4	4	0	0	0	0	0	0	19
NE	1	1	0	5	9	7	2	0	0	0	0	0	25
ENE	0	0	1	0	4	1	5	0	0	0	0	0	11
E	0	0	0	1	2	7	1	0	0	0	0	0	11
ESE	0	1	0	2	5	4	18	1	0	0	0	0	31
SE	0	0	2	1	5	11	24	0	0	0	0	0	43
SSE	0	0	0	5	6	15	30	9	0	0	0	0	65
S	0	1	2	3	2	14	16	5	3	0	0	0	46
SSW	0	1	2	0	4	9	9	1	0	0	0	0	26
SW	0	0	0	4	4	5	13	1	1	0	0	0	28
WSW	1	0	1	2	3	4	3	1	0	0	0	0	15
W	0	0	2	2	3	5	1	0	0	0	0	0	13
WNW	1	1	3	5	3	5	9	1	0	0	0	0	28
NW	1	0	5	8	3	8	7	5	0	0	0	0	37
NNW	0	1	0	3	4	5	0	0	0	0	0	0	13
TOTALS	5	8	20	51	62	106	138	24	4	0	0	0	418

NUMBER OF CALMS 1
 NUMBER OF INVALID HOURS 31
 NUMBER OF VALID HOURS 418
 TOTAL HOURS FOR THE PERIOD 2184

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93033124-93063023
 SLIGHTLY STABLE ($-0.5 < DT/DZ \leq -1.5$ °C/100 METERS)

PASQUILL E

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	2	1	0	3	0	0	0	0	0	0	6
NNE	0	2	4	8	12	10	2	0	0	0	0	0	38
NE	1	3	1	11	10	13	0	0	0	0	0	0	39
ENE	0	0	1	1	1	2	0	0	0	0	0	0	5
E	0	1	2	2	2	7	1	0	0	0	0	0	15
ESE	0	0	2	2	2	6	2	1	0	0	0	0	15
SE	0	1	1	2	3	4	5	0	0	0	0	0	16
SSE	0	0	1	2	1	7	9	2	0	0	0	0	22
S	0	1	1	1	0	2	1	7	0	0	0	0	13
SSW	0	0	0	1	0	0	0	0	1	0	0	0	2
SW	0	0	0	0	0	0	4	1	0	0	0	0	5
WSW	0	0	0	0	1	3	3	1	0	0	0	0	8
W	1	0	0	0	0	0	0	0	0	0	0	0	1
WNW	0	0	1	4	0	5	2	0	0	0	0	0	12
NW	0	1	0	2	1	2	3	1	0	0	0	0	10
NNW	0	3	0	2	1	9	2	0	0	0	0	0	17
TOTALS	2	12	16	39	34	73	34	13	1	0	0	0	224

NUMBER OF CALMS 1
 NUMBER OF INVALID HOURS 31
 NUMBER OF VALID HOURS 224
 TOTAL HOURS FOR THE PERIOD 2184

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93033124-93063023
 MODERATELY STABLE ($1.5 \leq DT/DZ \leq -0.5$ °C/100 METERS)
 PASQUILL F
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	2	0	2	0	0	0	0	0	0	4
NNE	0	1	1	9	12	10	8	0	0	0	0	0	41
NE	1	0	2	21	30	17	1	0	0	0	0	0	72
ENE	0	0	1	3	2	4	0	0	0	0	0	0	10
E	0	0	0	0	3	2	1	0	0	0	0	0	6
ESE	0	1	1	1	5	2	2	0	0	0	0	0	12
SE	0	0	2	1	0	3	0	0	0	0	0	0	6
SSE	0	1	0	2	3	1	0	0	0	0	0	0	7
S	0	0	0	0	0	1	2	2	0	0	0	0	5
SSW	0	0	0	0	0	0	1	0	0	0	0	0	1
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	0	1	3	0	0	0	0	0	0	0	4
W	0	0	1	0	1	1	0	0	0	0	0	0	3
WNW	0	0	0	0	0	1	1	0	0	0	0	0	2
NW	0	0	1	0	0	2	0	0	0	0	0	0	3
NNW	0	0	0	1	2	2	0	0	0	0	0	0	5
TOTALS	1	3	9	41	61	48	16	2	0	0	0	0	181

NUMBER OF CALMS 1
 NUMBER OF INVALID HOURS 31
 NUMBER OF VALID HOURS 181
 TOTAL HOURS FOR THE PERIOD 2184

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93033124-93063023
 EXTREMELY STABLE (DT/DZ EXCEEDS 4.0 °C/100 METERS)
 PASQUILL G
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	0	0	0	1	1	0	0	0	0	2
NNE	0	0	0	0	1	16	7	0	0	0	0	0	24
NE	0	1	1	3	15	55	9	0	0	0	0	0	84
ENE	0	0	0	0	1	2	0	0	0	0	0	0	3
E	0	0	0	0	0	2	0	0	0	0	0	0	2
ESE	0	0	0	0	0	1	0	0	0	0	0	0	1
SE	0	0	0	0	0	1	1	0	0	0	0	0	2
SSE	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	1	0	0	0	0	1
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	0	0	0	0	1	0	0	0	0	0	0	0	1
WSW	0	0	0	0	0	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	0	0	1	0	0	0	0	0	0	0	1
NW	0	0	0	0	0	1	0	0	0	0	0	0	1
NNW	0	0	0	0	1	1	1	1	0	0	0	0	4
TOTALS	0	1	1	3	20	79	19	3	0	0	0	0	126

NUMBER OF CALMS 1
 NUMBER OF INVALID HOURS 31
 NUMBER OF VALID HOURS 126
 TOTAL HOURS FOR THE PERIOD 2184

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93033124-93063023

ALL STABILITY CLASSES, ALL DT/DZ
WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	1	2	8	3	11	4	1	0	0	0	0	30
NNE	1	6	8	32	40	56	22	0	0	0	0	0	165
NE	3	6	4	47	74	103	16	0	0	0	0	0	253
ENE	0	0	3	9	10	10	8	0	0	0	0	0	40
E	0	1	2	4	8	24	8	1	0	0	0	0	48
ESE	0	2	4	5	15	21	28	3	0	0	0	0	78
SE	0	3	5	5	8	25	36	6	0	0	0	0	88
SSE	0	1	3	11	13	33	58	40	8	0	0	0	167
S	0	2	5	9	10	43	72	41	8	1	0	0	191
SSW	0	1	4	3	14	39	53	7	2	0	0	0	123
SW	0	0	1	9	16	47	56	3	1	0	0	0	133
WSW	1	1	1	9	13	60	63	3	0	0	0	0	151
W	1	0	6	8	27	86	92	5	1	0	0	0	226
WNW	1	4	6	18	21	66	117	19	1	0	0	0	253
NW	2	2	8	16	19	37	32	23	1	0	0	0	140
NNW	0	4	0	10	11	24	13	5	0	0	0	0	67
TOTALS	9	34	62	203	302	685	678	157	22	1	0	0	2153

NUMBER OF CALMS 1
 NUMBER OF INVALID HOURS 31
 NUMBER OF VALID HOURS 2153
 TOTAL HOURS FOR THE PERIOD 2184

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93063024-93093023

EXTREMELY UNSTABLE (DT/DZ < -1.9 °C/100 METERS)

PASQUILL A

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	1	1	0	0	0	0	0	0	2
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	1	0	0	0	0	0	0	1
SE	0	0	0	0	1	2	4	2	0	0	0	0	9
SSE	0	0	0	1	1	4	4	2	0	0	0	0	12
S	0	0	0	2	6	17	39	6	0	0	0	0	70
SSW	0	0	0	2	4	28	46	2	0	0	0	0	82
SW	0	0	1	5	6	42	62	3	0	0	0	0	119
WSW	0	0	0	4	15	84	107	2	0	0	0	0	212
W	0	0	0	5	19	75	165	1	0	0	0	0	265
WNW	0	0	0	0	3	21	41	7	1	0	0	0	73
NW	0	0	0	0	0	0	2	0	0	0	0	0	2
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	1	19	56	275	470	25	1	0	0	0	847

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 847
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93063024-93093023
 MODERATELY UNSTABLE ($-1.9 < DT/DZ \leq -1.7$ °C/100 METERS)

PASQUILL B

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	1	1	0	1	0	0	0	0	0	3
NE	0	0	0	0	1	0	0	0	0	0	0	0	1
ENE	0	0	0	0	0	4	0	0	0	0	0	0	4
E	0	0	0	0	0	1	0	0	0	0	0	0	1
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	1	5	6	0	0	0	0	0	12
SSE	0	0	0	0	2	5	3	2	0	0	0	0	12
S	0	0	1	1	1	3	5	0	0	0	0	0	11
SSW	0	0	0	2	3	9	4	1	0	0	0	0	19
SW	0	0	0	1	3	7	0	0	0	0	0	0	11
WSW	0	0	0	1	3	0	0	1	0	0	0	0	5
W	0	0	0	8	8	7	0	0	0	0	0	0	23
WNW	0	0	0	5	9	10	8	0	0	0	0	0	32
NW	0	0	0	1	1	1	4	0	0	0	0	0	7
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	1	20	33	52	31	4	0	0	0	0	141

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 141
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93063024-93093023

SLIGHTLY UNSTABLE ($-1.7 < DT/TZ \leq -1.5$ °C/100 METERS)

PASQUILL C

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	2	3	5	2	0	0	0	0	0	0	12
NNE	0	1	1	5	5	8	0	0	0	0	0	0	20
NE	0	0	0	0	3	2	0	0	0	0	0	0	5
ENE	0	0	1	0	0	5	0	0	0	0	0	0	6
E	0	0	0	0	1	5	4	0	0	0	0	0	10
ESE	0	0	0	0	0	2	0	0	0	0	0	0	2
SE	0	1	0	1	3	11	13	2	0	0	0	0	31
SSE	0	0	0	5	5	9	15	4	0	0	0	0	38
S	0	1	1	4	2	15	12	0	0	0	0	0	35
SSW	0	0	0	6	6	3	3	1	0	0	0	0	19
SW	0	0	1	2	3	4	0	0	0	0	0	0	10
WSW	0	1	0	7	8	0	1	0	0	0	0	0	17
W	0	0	4	9	3	4	0	0	0	0	0	0	20
WNW	0	0	3	6	4	7	6	0	0	0	0	0	26
NW	0	0	0	4	2	5	6	1	0	0	0	0	18
NNW	0	0	1	2	1	2	0	0	0	0	0	0	6
TOTALS	0	4	14	54	51	84	60	8	0	0	0	0	275

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 275
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93063024-93093023
NEUTRAL ($-1.5 < DT/DZ \leq -0.5$ °C/100 METERS)PASQUILL D
WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	1	4	6	22	15	5	3	0	0	0	0	0	56
NNE	0	3	3	19	19	30	0	0	0	0	0	0	74
NE	1	0	2	1	3	2	1	0	0	0	0	0	10
ENE	0	0	0	3	0	6	0	0	0	0	0	0	9
E	1	0	1	3	0	5	3	0	0	0	0	0	13
ESE	0	2	2	3	2	6	4	0	0	0	0	0	19
SE	0	0	1	5	13	40	42	2	0	0	0	0	103
SSE	0	0	1	11	11	27	21	7	0	0	0	0	78
S	0	1	0	4	7	4	4	0	0	0	0	0	20
SSW	0	0	1	5	5	1	0	1	0	0	0	0	13
SW	0	1	2	10	3	0	0	0	0	0	0	0	16
WSW	1	1	1	5	3	7	5	0	0	0	0	0	23
W	1	2	3	5	3	3	5	0	0	0	0	0	22
WNW	0	1	1	3	5	2	1	0	0	0	0	0	13
NW	0	0	3	7	7	7	2	0	0	0	0	0	26
NNW	1	0	6	13	7	6	1	0	0	0	0	0	34
TOTALS	6	15	33	119	103	151	92	10	0	0	0	0	529

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 529
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93063024-93093023
 SLIGHTLY STABLE ($-0.5 < DT/DZ \leq -1.5$ °C/100 METERS)

PASQUILL E

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	2	2	8	8	4	1	0	0	0	0	0	25
NNE	0	5	7	25	14	18	0	0	0	0	0	0	69
NE	0	2	2	2	3	2	0	0	0	0	0	0	11
ENE	0	0	0	2	2	1	0	0	0	0	0	0	5
E	0	1	0	0	0	0	0	0	0	0	0	0	1
ESE	0	0	1	0	2	1	0	0	0	0	0	0	4
SE	0	0	0	2	0	1	0	0	0	0	0	0	3
SSE	0	0	2	0	3	3	0	0	0	0	0	0	8
S	0	0	0	0	1	3	1	0	0	0	0	0	5
SSW	0	1	0	1	3	1	0	0	0	0	0	0	6
SW	1	2	0	2	7	2	0	0	0	0	0	0	14
WSW	0	0	0	1	4	8	0	0	0	0	0	0	13
W	0	0	1	2	2	17	19	1	0	0	0	0	42
WNW	0	0	1	0	0	3	10	4	0	0	0	0	18
NW	0	1	0	0	0	0	2	0	0	0	0	0	3
NNW	1	1	0	0	2	0	0	0	0	0	0	0	4
TOTALS	2	15	16	45	51	64	33	5	0	0	0	0	231

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 231
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93063024-93093023
 MODERATELY STABLE ($1.5 \leq DT/DZ \leq -0.5$ °C/100 METERS)
 PASQUILL F
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	2	1	10	1	0	0	0	0	0	14
NNE	0	0	2	16	17	15	0	0	0	0	0	0	50
NE	0	1	0	2	0	1	0	0	0	0	0	0	4
ENE	0	0	0	0	1	1	0	0	0	0	0	0	2
E	0	1	0	0	0	0	0	0	0	0	0	0	1
ESE	0	0	0	1	0	0	0	0	0	0	0	0	1
SE	0	0	0	0	3	1	0	0	0	0	0	0	4
SSE	0	1	0	0	1	1	0	0	0	0	0	0	3
S	0	0	0	1	1	1	0	0	0	0	0	0	3
SSW	0	0	0	1	1	0	0	0	0	0	0	0	2
SW	0	0	0	1	0	0	0	0	0	0	0	0	1
WSW	0	0	0	1	0	0	0	0	0	0	0	0	1
W	0	1	0	0	2	2	0	0	0	0	0	0	5
WNW	0	0	0	1	2	5	0	0	0	0	0	0	8
NW	0	0	0	0	0	2	0	0	0	0	0	0	2
NNW	0	0	0	1	2	1	0	0	0	0	0	0	4
TOTALS	0	4	2	27	31	40	1	0	0	0	0	0	105

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 105
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93063024-93093023
 EXTREMELY STABLE (DT/DZ > 4.0 °C/100 METERS)
 PASQUILL G
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	1	0	1	0	9	5	0	0	0	0	0	16
NNE	0	0	1	1	7	31	3	0	0	0	0	0	43
NE	0	0	0	0	0	1	0	0	0	0	0	0	1
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	1	0	0	0	0	0	0	0	0	1
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	1	0	1	1	0	0	0	0	0	0	0	3
S	0	0	0	1	0	0	0	0	0	0	0	0	1
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	1	0	0	0	0	0	0	0	0	0	0	0	1
WSW	0	1	0	0	0	0	0	0	0	0	0	0	1
W	0	0	0	0	0	0	2	0	0	0	0	0	2
WNW	0	0	0	0	1	2	2	0	0	0	0	0	5
NW	0	0	0	0	2	1	0	0	0	0	0	0	3
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	1	3	1	5	11	44	12	0	0	0	0	0	77

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 77
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93063024-93093023

ALL STABILITY CLASSES, ALL DT/DZ
WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	1	7	10	36	29	30	10	0	0	0	0	0	123
NNE	0	9	14	67	63	102	4	0	0	0	0	0	259
NE	1	3	4	5	10	8	1	0	0	0	0	0	32
ENE	0	0	1	5	4	18	0	0	0	0	0	0	28
E	1	2	1	4	1	11	7	0	0	0	0	0	27
ESE	0	2	3	4	4	10	4	0	0	0	0	0	27
SE	0	1	1	8	21	60	65	6	0	0	0	0	162
SSE	0	2	3	18	24	49	43	15	0	0	0	0	154
S	0	2	2	13	18	43	61	6	0	0	0	0	145
SSW	0	1	1	17	22	42	53	5	0	0	0	0	141
SW	2	3	4	21	22	55	62	3	0	0	0	0	172
WSW	1	3	1	19	33	99	113	3	0	0	0	0	272
W	1	3	8	29	37	108	191	2	0	0	0	0	379
WNW	0	1	5	15	24	50	68	11	1	0	0	0	175
NW	0	1	3	12	12	16	16	1	0	0	0	0	61
NNW	2	1	7	16	12	9	1	0	0	0	0	0	48
TOTALS	9	41	68	289	336	710	699	52	1	0	0	0	2205

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 2205
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93093024-93123123
 EXTREMELY UNSTABLE (DT/DZ < -1.9 °C/100 METERS)

PASQUILL A

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	0	0	0	0	0	1	0	0	0	1
NNE	0	0	0	0	0	0	1	3	0	0	0	0	4
NE	0	0	0	0	0	0	0	1	0	0	0	0	1
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	1	9	0	1	0	0	0	11
SSE	0	0	0	2	1	10	4	2	0	0	0	0	19
S	0	0	0	5	6	17	12	2	0	0	0	0	42
SSW	0	0	0	5	5	9	8	0	1	0	0	0	28
SW	0	0	0	6	11	16	9	1	0	0	0	0	43
WSW	0	0	2	6	20	37	29	0	0	0	0	0	94
W	0	0	0	3	17	74	74	7	1	0	0	0	176
WNW	0	0	0	0	1	8	21	5	0	0	0	0	35
NW	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	2	27	61	172	167	21	4	0	0	0	454

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 1
 NUMBER OF VALID HOURS 454
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93093024-93123123
 MODERATELY UNSTABLE ($-1.9 < DT/DZ \leq -1.7$ °C/100 METERS)

PASQUILL B

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	0	0	1	0	0	0	0	0	0	1
NNE	0	0	0	0	0	0	1	0	0	0	0	0	1
NE	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	1	0	1	2	1	0	0	0	0	5
SSE	0	0	0	2	2	1	3	3	0	0	0	0	11
S	0	0	1	0	1	1	0	0	0	0	0	0	3
SSW	0	0	0	2	0	0	0	0	0	0	0	0	2
SW	0	0	1	2	1	1	0	0	0	0	0	0	5
WSW	0	0	0	0	0	1	1	0	0	0	0	0	2
W	0	0	0	0	4	3	0	0	0	0	0	0	7
WNW	0	0	1	1	2	7	5	1	0	0	0	0	17
NW	0	0	0	0	0	0	0	1	0	0	0	0	1
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	3	8	10	16	12	6	0	0	0	0	55

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 1
 NUMBER OF VALID HOURS 55
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93093024-93123123

SLIGHTLY UNSTABLE ($-1.7 < DT/TZ \leq -1.5$ °C/100 METERS)

PASQUILL C

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	0	1	0	0	1	1	0	0	0	3
NNE	0	0	0	0	0	0	4	0	0	0	0	0	4
NE	0	0	0	0	0	0	1	0	0	0	0	0	1
ENE	0	0	0	1	0	0	1	0	0	0	0	0	2
E	0	0	0	0	0	4	0	0	0	0	0	0	4
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	2	1	1	6	2	1	0	0	0	13
SSE	0	0	1	2	2	5	3	1	0	1	0	0	15
S	0	0	0	2	4	2	4	0	0	0	0	0	12
SSW	0	0	0	4	1	0	0	0	0	0	0	0	5
SW	0	1	1	0	1	0	1	0	0	0	0	0	4
WSW	0	1	0	0	0	2	1	0	0	0	0	0	4
W	0	0	0	0	1	3	0	0	1	0	0	0	5
WNW	0	0	0	2	2	3	2	1	0	0	0	0	10
NW	0	0	0	1	0	0	1	0	0	0	0	0	2
NNW	0	0	0	1	0	0	0	0	0	0	0	0	1
TOTALS	0	2	2	15	13	20	24	5	3	1	0	0	85

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 1
 NUMBER OF VALID HOURS 85
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93093024-93123123
 NEUTRAL ($-1.5 < DT/DZ \leq -0.5$ °C/100 METERS)

PASQUILL D

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	1	0	1	9	4	7	5	1	0	0	0	0	28
NNE	0	1	2	8	12	6	6	1	0	0	0	0	36
NE	0	1	1	1	3	2	5	1	0	0	0	0	14
ENE	0	0	0	3	0	4	0	0	0	0	0	0	7
E	0	0	0	0	1	1	2	0	0	0	0	0	4
ESE	0	1	2	2	4	6	4	0	0	0	0	0	19
SE	0	2	1	4	7	14	25	4	0	0	0	0	57
SSE	0	0	1	4	5	7	10	8	0	0	0	0	35
S	0	0	2	2	5	7	5	3	1	0	0	0	25
SSW	0	0	0	2	2	3	5	3	1	0	0	0	16
SW	0	2	0	3	1	2	1	1	2	0	0	0	12
WSW	0	2	1	5	3	3	4	5	3	0	0	0	26
W	0	0	3	5	6	8	2	3	3	0	0	0	30
WNW	0	2	1	5	4	10	8	1	3	0	0	0	34
NW	0	0	1	3	5	19	12	0	1	0	0	0	41
NNW	0	0	4	6	6	10	2	1	0	0	0	0	29
TOTALS	1	11	20	62	68	109	96	32	14	0	0	0	413

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 1
 NUMBER OF VALID HOURS 413
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93093024-93123123

SLIGHTLY STABLE ($-0.5 < DT/DZ \leq -1.5$ °C/100 METERS)

PASQUILL E

WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	2	1	9	11	20	13	2	0	0	0	0	58
NNE	1	0	2	21	24	34	13	4	1	0	0	0	100
NE	0	3	7	10	1	1	5	7	7	0	0	0	41
ENE	0	3	1	10	1	0	1	0	0	0	0	0	16
E	0	1	5	0	5	0	0	0	0	0	0	0	11
ESE	0	0	0	2	0	3	1	0	0	0	0	0	6
SE	1	1	2	6	2	3	7	1	0	0	0	0	23
SSE	0	0	0	5	3	2	6	0	0	0	0	0	16
S	0	0	0	3	4	0	0	0	0	0	0	0	7
SSW	0	2	0	0	1	0	0	0	0	0	0	0	3
SW	0	1	0	1	1	2	0	0	0	0	0	0	5
WSW	0	0	2	1	0	1	2	0	0	0	0	0	6
W	0	0	2	4	4	7	1	0	0	0	0	0	18
WNW	0	0	0	0	5	6	1	3	2	0	0	0	17
NW	1	0	1	0	1	2	5	0	0	0	0	0	10
NNW	0	1	2	2	5	6	1	0	0	0	0	0	17
TOTALS	3	14	25	74	68	87	56	17	10	0	0	0	354

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 1
 NUMBER OF VALID HOURS 354
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93093024-93123123
 MODERATELY STABLE ($1.5 \leq \Delta T/\Delta Z \leq -0.5$ °C/100 METERS)
 PASQUILL F
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	2	5	4	11	12	1	0	0	0	0	35
NNE	0	3	5	21	65	54	26	3	0	0	0	0	177
NE	1	2	2	15	1	1	3	1	0	0	0	0	26
ENE	0	0	2	3	5	0	1	0	0	0	0	0	11
E	0	0	0	2	3	0	0	0	0	0	0	0	5
ESE	0	1	1	3	0	0	0	0	0	0	0	0	5
SE	0	0	1	0	0	1	1	0	0	0	0	0	3
SSE	0	0	0	0	0	1	1	0	0	0	0	0	2
S	0	0	1	1	0	1	0	0	0	0	0	0	3
SSW	0	0	0	1	0	0	0	0	0	0	0	0	1
SW	0	0	1	0	1	0	0	0	0	0	0	0	2
WSW	0	0	0	0	0	2	0	0	0	0	0	0	2
W	0	0	0	3	1	3	0	0	0	0	0	0	7
WNW	0	0	0	1	1	3	1	0	0	0	0	0	6
NW	0	0	1	2	0	0	0	0	0	0	0	0	3
NNW	0	0	1	1	2	5	0	0	0	0	0	0	9
TOTALS	1	6	17	58	83	82	45	5	0	0	0	0	297

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 1
 NUMBER OF VALID HOURS 297
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93093024-93123123
 EXTREMELY STABLE (DT/DZ EXCEEDS 4.0 °C/100 METERS)
 PASQUILL G
 WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	0	0	0	1	2	13	28	6	0	0	0	0	50
NNE	0	0	0	11	36	205	166	3	0	0	0	0	421
NE	0	2	1	8	7	6	7	1	0	0	0	0	32
ENE	0	0	2	2	3	5	0	0	0	0	0	0	12
E	0	0	0	3	0	1	1	0	0	0	0	0	5
ESE	0	0	1	0	1	0	0	0	0	0	0	0	2
SE	0	1	0	0	0	0	1	0	0	0	0	0	2
SSE	0	0	0	1	1	0	0	0	0	0	0	0	2
S	0	0	1	0	0	1	0	0	0	0	0	0	2
SSW	0	0	0	1	0	0	0	0	0	0	0	0	1
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	1	0	0	0	0	0	0	0	0	0	1
W	0	0	0	0	1	2	0	0	0	0	0	0	3
WNW	0	0	0	0	0	2	3	1	0	0	0	0	6
NW	0	0	1	0	2	0	0	0	0	0	0	0	3
NNW	0	1	0	0	1	2	3	0	0	0	0	0	7
TOTALS	0	4	7	27	54	237	209	11	0	0	0	0	549

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 1
 NUMBER OF VALID HOURS 549
 TOTAL HOURS FOR THE PERIOD 2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1993)

METEOROLOGY

January - December

TABLE 4A

SITE: SAN ONOFRE

PERIOD OF RECORD: 93093024-93123123

ALL STABILITY CLASSES, ALL DT/DZ
WIND SPEED (M/S) AT 10 METER LEVEL

WIND DIR	.22- .50	.51- .75	.76- 1.0	1.1- 1.5	1.6- 2.0	2.1- 3.0	3.1- 5.0	5.1- 7.0	7.1- 10.0	10.1- 13.0	13.1- 18.0	>18	TOTAL
N	1	2	4	24	22	52	58	11	2	0	0	0	176
NNE	1	4	9	61	137	299	217	14	1	0	0	0	743
NE	1	8	11	34	12	10	21	11	7	0	0	0	115
ENE	0	3	5	19	9	9	3	0	0	0	0	0	48
E	0	1	5	5	9	6	3	0	0	0	0	0	29
ESE	0	2	4	7	5	9	5	0	0	0	0	0	32
SE	1	4	4	13	10	21	51	8	2	0	0	0	114
SSE	0	0	2	16	14	26	27	14	0	1	0	0	100
S	0	0	5	13	20	29	21	5	1	0	0	0	94
SSW	0	2	0	15	9	12	13	3	2	0	0	0	56
SW	0	4	3	12	16	21	11	2	2	0	0	0	71
WSW	0	3	6	12	23	46	37	5	3	0	0	0	135
W	0	0	5	15	34	100	77	10	5	0	0	0	246
WNW	0	2	2	9	15	39	41	12	5	0	0	0	125
NW	1	0	4	6	8	21	18	1	1	0	0	0	60
NNW	0	2	7	10	14	23	6	1	0	0	0	0	63
TOTALS	5	37	76	271	357	723	609	97	31	1	0	0	2207

NUMBER OF CALMS 0
 NUMBER OF INVALID HOURS 1
 NUMBER OF VALID HOURS 2207
 TOTAL HOURS FOR THE PERIOD 2208