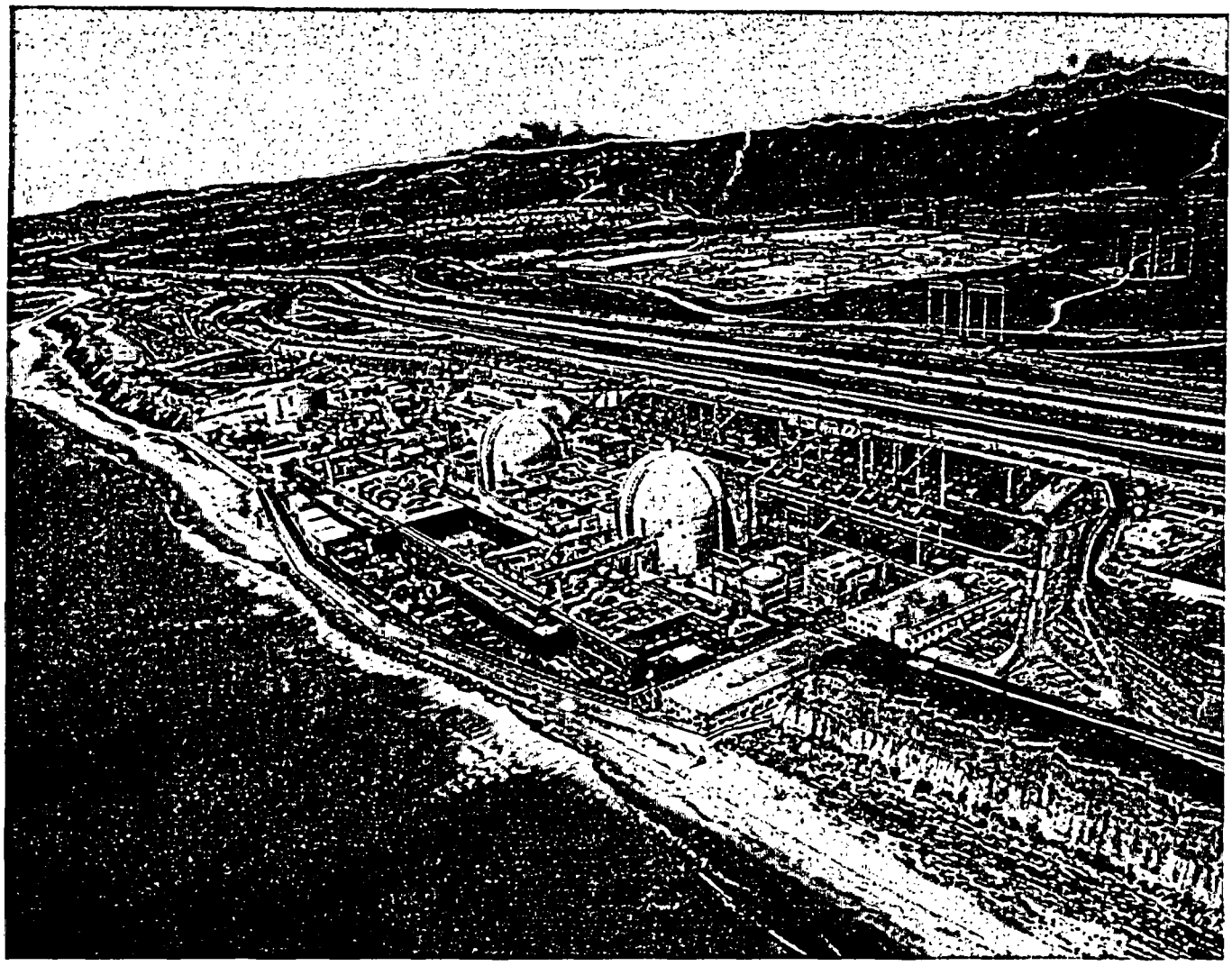

SAN ONOFRE NUCLEAR GENERATING STATION

Annual Radioactive Effluent Release Report

2004

January - December

SOUTHERN CALIFORNIA
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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. By August 31, 2004, all fuel was transferred to the Independent Spent Fuel Storage Installation (ISFSI). Unit 1 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%).

P.O. Box 128
San Clemente, CA 92674-0128

S.O.N.G.S. 1

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ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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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

As of the fourth quarter of 2004, the noble gas and iodine source terms no longer exist, and therefore are no longer measured. All the fuel is stored in the ISFSI and the plant is being demolished.

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 "continuous" mode of release. Plant stack releases are considered to be "continuous" releases. As of 8/4/93, "batch" mode releases are no longer conducted because of the permanent shutdown of the reactor. As of the fourth quarter of 2004, the noble gas and iodine source terms no longer exist, and therefore are no longer measured. All the fuel is stored in the ISFSI and the plant is being demolished.

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 for continuous mode releases only.

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," has been deleted. "Batch" mode releases are no longer conducted as of 8/4/93, due to the permanent shutdown of the reactor.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

S.O.N.G.S. 1

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	<LLD	2.75E+0	3.00E+1
2. Average release rate for period	μCi/sec	0.00E+0	3.50E-1	
3. Percent of applicable limit	% MPC	0.00E+0	1.52E-3	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	6.50E-4	
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	% MPC	0.00E+0	0.00E+0	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	0.00E+0	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	<LLD	<LLD	1.60E+1
2. Average release rate for period	μCi/sec	0.00E+0	0.00E+0	
3. Percent of applicable limit	% MPC	0.00E+0	0.00E+0	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	0.00E+0	
5. Gross alpha activity	Ci	<LLD	<LLD	5.00E+1
D. Tritium				
1. Total release	Ci	<LLD	2.27E-1	2.50E+1
2. Average release rate for period	μCi/sec	0.00E+0	2.89E-2	
3. Percent of applicable limit	% MPC	0.00E+0	1.88E-4	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	3.75E-4	

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

S.O.N.G.S. 1

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	1.62E+0	N/A	3.00E+1
2. Average release rate for period	μCi/sec	2.04E-1	N/A	
3. Percent of applicable limit	% MPC	8.83E-4	N/A	
4. Percent Effluent Concentration Limit	% ECL	3.78E-4	N/A	
B. Iodines				
1. Total iodine-131	Ci	<LLD	N/A	1.90E+1
2. Average release rate for period	μCi/sec	0.00E+0	N/A	
3. Percent of applicable limit	% MPC	0.00E+0	N/A	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	N/A	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	8.01E-6	1.91E-6	1.60E+1
2. Average release rate for period	μCi/sec	1.01E-6	2.40E-7	
3. Percent of applicable limit	% MPC	2.62E-6	6.25E-7	
4. Percent Effluent Concentration Limit	% ECL	6.55E-6	1.56E-6	
5. Gross alpha activity	Ci	<LLD	<LLD	5.00E+1
D. Tritium				
1. Total release	Ci	<LLD	<LLD	2.50E+1
2. Average release rate for period	μCi/sec	0.00E+0	0.00E+0	
3. Percent of applicable limit	% MPC	0.00E+0	0.00E+0	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	0.00E+0	

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

S.O.N.G.S. 1

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	<LLD	2.75E+0	1.62E+0	N/A
krypton-85m	Ci	<LLD	<LLD	<LLD	N/A
krypton-87	Ci	<LLD	<LLD	<LLD	N/A
krypton-88	Ci	<LLD	<LLD	<LLD	N/A
xenon-133	Ci	<LLD	<LLD	<LLD	N/A
xenon-133m	Ci	<LLD	<LLD	<LLD	N/A
xenon-135	Ci	<LLD	<LLD	<LLD	N/A
xenon-135m	Ci	<LLD	<LLD	<LLD	N/A
xenon-138	Ci	<LLD	<LLD	<LLD	N/A
Total for period	Ci	<LLD	2.75E+0	1.62E+0	N/A
2. Iodines					
iodine-131	Ci	<LLD	<LLD	<LLD	N/A
iodine-133	Ci	<LLD	<LLD	<LLD	N/A
iodine-135	Ci	<LLD	<LLD	<LLD	N/A
Total for period	Ci	<LLD	<LLD	<LLD	N/A
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	<LLD	<LLD	<LLD	<LLD
cesium-137	Ci	<LLD	<LLD	8.01E-6	1.91E-6
cobalt-58	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-60	Ci	<LLD	<LLD	<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
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.

NOTE: Due to the permanent shutdown of S.O.N.G.S. 1, "BATCH MODE" releases are no longer conducted.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

S.O.N.G.S. 1

TABLE 1D

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation gases	
krypton-85	1.50E-5
krypton-85m	3.80E-8
krypton-87	1.90E-7
krypton-88	1.40E-7
xenon-133	8.10E-8
xenon-133m	3.10E-7
xenon-135	4.00E-8
xenon-135m	1.50E-6
xenon-138	2.60E-6
2. Iodines	
iodine-131	2.20E-13
iodine-133	2.10E-12
iodine-135	1.50E-10
3. Particulates	
barium-140	4.30E-13
cerium-141	5.50E-14
cerium-144	2.20E-13
cesium-134	1.20E-13
cesium-137	1.00E-13
cobalt-58	1.10E-13
cobalt-60	1.80E-13
iron-59	2.80E-13
lanthanum-140	9.00E-13
manganese-54	1.10E-13
molybdenum-99	6.50E-14
strontium-89	1.00E-11
strontium-90	1.00E-11
zinc-65	3.00E-13
4. alpha	1.00E-11
5. tritium	7.20E-8

NOTE: Due to the permanent shutdown of S.O.N.G.S. 1, "BATCH MODE" releases are no longer conducted.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

S.O.N.G.S. 1

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	0.00E+0	7.19E-6	4.24E-6	0.00E+0
2. Percent Applicable Limit	%	0.00E+0	1.44E-4	8.48E-5	0.00E+0
3. Beta Air Dose	mrad	0.00E+0	8.15E-4	4.81E-4	0.00E+0
4. Percent Applicable Limit	%	0.00E+0	8.15E-3	4.81E-3	0.00E+0
B. Tritium, Iodine, Particulates (at the nearest receptor)					
1. Organ Dose	mrem	0.00E+0	1.55E-5	3.88E-5	9.24E-6
2. Percent Applicable Limit	%	0.00E+0	2.06E-4	5.18E-4	1.23E-4

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

TABLE 1F

GASEOUS EFFLUENTS-BATCH RELEASE SUMMARY

NOTE: Due to the permanent shutdown of S.O.N.G.S. 1, "BATCH MODE" releases are no longer conducted.

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

As of the fourth quarter of 2004, the noble gas and iodine source terms no longer exist, and therefore are no longer measured. All the fuel is stored in the ISFSI and the plant is being demolished.

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. As of the fourth quarter of 2004, the noble gas and iodine source terms no longer exist, and therefore are no longer measured. All the fuel is stored in the ISFSI and the plant is being demolished.

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.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

S.O.N.G.S. 1

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	1.08E-4	1.91E-5	1.90E+1
2. Average diluted concentration during period	μCi/ml	6.52E-11	1.18E-11	
3. Percent of applicable limit	% MPC	3.33E-4	5.90E-5	
4. Percent Effluent Concentration Limit	% ECL	6.53E-3	1.18E-3	
B. Tritium				
1. Total release	Ci	6.50E-3	3.10E-4	1.90E+1
2. Average diluted concentration during period	μCi/ml	3.92E-9	1.92E-10	
3. Percent of applicable limit	% MPC	1.31E-4	6.38E-6	
4. Percent Effluent Concentration Limit	% ECL	3.92E-4	1.92E-5	
C. Dissolved and entrained gases				
1. Total release	Ci	<LLD	<LLD	1.90E+1
2. Average diluted concentration during period	μCi/ml	0.00+0	0.00+0	
3. Percent of applicable limit	% MPC	0.00+0	0.00+0	
4. Percent Effluent Concentration Limit	% ECL	0.00+0	0.00+0	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)	liters	4.67E+6	2.18E+5	5.00E+0
F. Volume of dilution water used during period	liters	1.66E+9	1.62E+9	5.00E+0

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

S.O.N.G.S. 1

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	6.10E-6	5.32E-3	1.90E+1
2. Average diluted concentration during period	μCi/ml	3.69E-12	1.88E-9	
3. Percent of applicable limit	% MPC	1.85E-5	8.59E-3	
4. Percent Effluent Concentration Limit	% ECL	3.69E-4	1.04E-1	
B. Tritium				
1. Total release	Ci	8.17E-5	5.29E-1	1.90E+1
2. Average diluted concentration during period	μCi/ml	4.95E-11	1.87E-7	
3. Percent of applicable limit	% MPC	1.65E-6	6.22E-3	
4. Percent Effluent Concentration Limit	% ECL	4.95E-6	1.87E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	<LLD	N/A	1.90E+1
2. Average diluted concentration during period	μCi/ml	<LLD	N/A	
3. Percent of applicable limit	% MPC	<LLD	N/A	
4. Percent Effluent Concentration Limit	% ECL	<LLD	N/A	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	1.53E-5	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)	liters	1.10E+5	8.91E+6	5.00E+0
F. Volume of dilution water used during period	liters	1.65E+9	2.83E+9	5.00E+0

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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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					
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	1.99E-6	<LLD	<LLD	<LLD
cesium-137	Ci	1.06E-4	1.91E-5	6.10E-6	5.23E-7
chromium-51	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-58	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-60	Ci	<LLD	<LLD	<LLD	<LLD
iodine-131	Ci	<LLD	<LLD	<LLD	N/A
iron-55	Ci	<LLD	<LLD	<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-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	1.08E-4	1.91E-5	6.10E-6	5.23E-7
2. Dissolved and entrained gases					
xenon-133	Ci	<LLD	<LLD	<LLD	N/A
xenon-135	Ci	<LLD	<LLD	<LLD	N/A
Total for period	Ci	<LLD	<LLD	<LLD	N/A

LLD Lower Limit of Detection; see Table 2C.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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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					
barium-140	Ci	N/A	N/A	N/A	<LLD
cerium-141	Ci	N/A	N/A	N/A	<LLD
cerium-144	Ci	N/A	N/A	N/A	<LLD
cesium-134	Ci	N/A	N/A	N/A	4.14E-5
cesium-137	Ci	N/A	N/A	N/A	2.61E-3
chromium-51	Ci	N/A	N/A	N/A	<LLD
cobalt-58	Ci	N/A	N/A	N/A	<LLD
cobalt-60	Ci	N/A	N/A	N/A	7.10E-4
iodine-131	Ci	N/A	N/A	N/A	N/A
iron-55	Ci	N/A	N/A	N/A	1.90E-3
iron-59	Ci	N/A	N/A	N/A	<LLD
lanthanum-140	Ci	N/A	N/A	N/A	<LLD
manganese-54	Ci	N/A	N/A	N/A	<LLD
molybdenum-99	Ci	N/A	N/A	N/A	<LLD
niobium-95	Ci	N/A	N/A	N/A	<LLD
strontium-89	Ci	N/A	N/A	N/A	3.49E-5
strontium-90	Ci	N/A	N/A	N/A	2.12E-5
technetium-99m	Ci	N/A	N/A	N/A	<LLD
zinc-65	Ci	N/A	N/A	N/A	<LLD
zirconium-95	Ci	N/A	N/A	N/A	<LLD
Total for period	Ci	N/A	N/A	N/A	5.32E-3
2. Dissolved and entrained gases					
xenon-133	Ci	N/A	N/A	N/A	N/A
xenon-135	Ci	N/A	N/A	N/A	N/A
Total for period	Ci	N/A	N/A	N/A	N/A

N/A No releases conducted
LLD Lower Limit of Detection; see Table 2C.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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TABLE 2C

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation products	
barium-140	2.70E-7
cerium-141	4.30E-8
cerium-144	1.70E-7
cesium-134	6.80E-8
chromium-51	3.30E-7
cobalt-58	6.20E-8
cobalt-60	8.90E-8
iodine-131	5.70E-8
iron-55	1.00E-6
iron-59	1.40E-7
lanthanum-140	4.90E-7
manganese-54	6.10E-8
molybdenum-99	5.60E-8
niobium-95	6.20E-8
strontium-89	5.00E-8
strontium-90	5.00E-8
technetium-99m	5.70E-8
zinc-65	1.50E-7
zirconium-95	1.10E-7
2. Dissolved and entrained gases	
xenon-133	1.90E-7
xenon-135	8.90E-8
3. gross alpha	1.00E-7

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

S.O.N.G.S. 1

TABLE 2C (Continued)

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation products	
barium-140	2.30E-7
cerium-141	4.00E-8
cerium-144	1.70E-7
chromium-51	3.00E-7
cobalt-58	6.00E-8
iodine-131	4.30E-8
iron-59	1.40E-7
lanthanum-140	1.60E-7
manganese-54	6.00E-8
molybdenum-99	2.70E-8
niobium-95	5.80E-8
technetium-99m	2.70E-8
zinc-65	1.50E-7
zirconium-95	1.00E-7
2. Dissolved and entrained gases	
xenon-133	1.90E-7
xenon-135	8.90E-8
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	1.16E-3	2.04E-4	6.50E-5	1.31E-2
2. Percent Applicable Limit	%	7.72E-2	1.36E-2	4.33E-3	8.74E-1
B.					
1. Limiting organ dose	mrem	1.76E-3	3.12E-4	9.94E-5	4.02E-2
2. Percent Applicable Limit	%	3.52E-2	6.24E-3	1.99E-3	8.04E-1
3. Limiting organ for period		Liver	Liver	Liver	Bone

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TABLE 2E

LIQUID EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	1 release
2. Total time period for batch releases:	1127 minutes
3. Maximum time period for a batch release:	1127 minutes
4. Average time period for a batch release:	1127 minutes
5. Minimum time period for a batch release:	1127 minutes
6. Average saltwater flow during batch releases:	13500 gpm

SECTION D. PREVIOUS RADIOACTIVE EFFLUENT RELEASE REPORT ADDENDUM (2003)

A review of shipping data showed an error in the Unit 1 DAW shipments of reported isotopes. The corrected isotopes and % composition from Table 3 are:

TABLE 3

SOLID WASTE AND IRRADIATED FUEL SHIPMENT

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

2. Estimate of major nuclide composition (by type of waste)		
b. silver-110m	%	3.84E-3
tin-113	%	<LLD

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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	1.25E-1	3.00E+1
	Ci	8.75E-2	
b. Dry active waste (DAW), compactable and non-compactable (incl. demolition rubble) **	m^3	1.02E+3	3.00E+1
	Ci	8.45E+0	
c. Irradiated components (Reactor insulation) *	m^3	1.09E+1	3.00E+1
	Ci	1.82E+2	
d. Other: (Mechanical filters) #	m^3	3.54E+0	3.00E+1
	Ci	6.28E+1	

NOTE: Total curie content estimated.

* Material packaged in Type A or Type B casks.

** Material packaged in Type A or Type B casks or strong tight containers of various sizes.

\# Material packaged in Type B casks.

2. Estimate of major nuclide composition (by type of waste)		
a. americium-241	%	1.39E-4
carbon-14	%	4.04E-2
cerium-144	%	5.45E-3
cesium-134	%	2.59E-3
cesium-137	%	1.38E-1
cobalt-58	%	2.18E-6
cobalt-60	%	6.03E+1
curium-242	%	2.14E-8
curium-243/244	%	5.10E-5
iron-55	%	1.79E+1
manganese-54	%	4.75E-3
nickel-59	%	1.58E-1
nickel-63	%	2.15E+1
niobium-94	%	5.06E-4
plutonium-238	%	8.00E-7
plutonium-239/240	%	2.16E-7
plutonium-241	%	1.50E-5
strontium-90	%	5.02E-4
technetium-99	%	1.16E-4
tritium	%	2.01E-3

2. Estimate of major nuclide composition (by type of waste)		
b. americium-241	%	4.06E-2
antimony-125	%	2.21E-3
carbon-14	%	3.59E-1
cerium-144	%	6.96E-2
cesium-134	%	3.74E-1
cesium-137	%	8.64E+0
cobalt-57	%	2.20E-6
cobalt-58	%	5.99E-2
cobalt-60	%	4.66E+1
curium-242	%	2.35E-4
curium-243/244	%	1.14E-2
europium-155	%	1.68E-4
iron-55	%	2.39E+1
manganese-54	%	1.46E-2
nickel-59	%	1.37E-1
nickel-63	%	1.83E+1
niobium-94	%	1.04E-2
niobium-95	%	2.86E-2
plutonium-238	%	5.00E-2
plutonium-239/240	%	1.45E-2
plutonium-241	%	9.45E-1
plutonium-242	%	4.04E-5
ruthenium-106	%	3.14E-4
silver-110m	%	4.95E-3
strontium-89	%	1.46E-5
strontium-90	%	3.09E-1
technetium-99	%	1.41E-3
thorium-228	%	1.69E-5
thorium-230	%	1.68E-5
tritium	%	7.63E-2
uranium-233	%	1.47E-5
zirconium-95	%	3.90E-2

2. Estimate of major nuclide composition (by type of waste)		
c. americium-241	%	6.51E-5
carbon-14	%	3.55E-2
cerium-144	%	1.08E-3
cesium-134	%	5.17E-4
cesium-137	%	2.79E-2
cobalt-60	%	5.57E+1
curium-242	%	3.62E-9
curium-243/244	%	2.60E-5
iron-55	%	9.23E+0
manganese-54	%	1.17E-4
nickel-59	%	2.10E-1
nickel-63	%	2.63E+1
niobium-94	%	8.46E-4
plutonium-238	%	5.49E-5
plutonium-239/240	%	2.09E-5
plutonium-241	%	1.21E-3
silver-108m	%	8.29E+0
strontium-90	%	1.47E-4
technetium-99	%	1.94E-4
tritium	%	1.70E-1

2. Estimate of major nuclide composition (by type of waste)		
d. americium-241	%	2.11E-6
carbon-14	%	3.41E-2
cerium-144	%	3.69E-6
cesium-137	%	3.97E-6
cobalt-58	%	4.99E-5
cobalt-60	%	5.25E+1
curium-242	%	3.15E-8
curium-243/244	%	1.24E-6
iron-55	%	2.32E+1
manganese-54	%	6.83E-3
nickel-59	%	1.72E-1
nickel-63	%	2.41E+1
niobium-94	%	5.06E-4
plutonium-238	%	3.52E-6
plutonium-239/240	%	9.51E-7
plutonium-241	%	6.71E-5
strontium-90	%	6.88E-6
technetium-99	%	1.07E-4
tritium	%	3.37E-7

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

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
3	RSB and TAG Transport Truck	Barnwell, SC
16	TAG Transport Truck	EnviroCare, UT
42	MHF Logistical Solutions Rail	EnviroCare, UT
2 *	TAG Transport Truck	Duratek/EnviroCare UT

* SONGS maintains a contract with Duratek that provides volume reduction services. The processed volume was shipped from the Duratek facility to EnviroCare using 13 shipments. Those 13 shipments included waste from other generators. SCE's waste volume was a small fraction of the total waste volume of these shipments.

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
None	N/A

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:

- **% Applicable Limit** = $\frac{\text{(Rel Rate) (X/Q) (100)}}{MPC_{eff}}$

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, μCi/sec.

X/Q = 1.30E-5 sec/m^3; the annual average atmospheric dispersion defined in the Unit 1 ODCM.

- MPC_{eff} = $\frac{1}{\sum_{i=1}^{n} \frac{F_i}{MPC_i}}$

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 = Maximum Permissible Concentration (MPC) of the i^{th} radionuclide from 10 CFR 20 (20.1-20.602), Appendix B, Table II, Column 1.

- **% ECL** = $\frac{\text{(Rel Rate) (X/Q) (100)}}{ECL_{eff}}$

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, μCi/sec.

X/Q = 1.30E-5 sec/m^3; the annual average atmospheric dispersion defined in the Unit 1 ODCM.

- ECL_{eff} = $\frac{1}{\sum_{i=1}^{n} \frac{F_i}{ECL_i}}$

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

ECL_i = Effluent Concentration Limit (ECL) of the i^{th} radionuclide from 10 CFR 20 (20.1001-20.2402), Appendix B, Table 2, Column 1.

Liquid Effluents - Applicable Limits

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

- **% Applicable Limit** = $\frac{\text{(Dil Conc) (100)}}{MPC_{eff}}$

  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, μCi/ml.

  - MPC_{eff} = $\frac{1}{\sum_{i=1}^{n} \frac{F_i}{MPC_i}}$

    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 = Maximum Permissible Concentration (MPC) of the i^{th} radionuclide from 10 CFR 20 (20.1-20.602), Appendix B, Table II, Column 2.

- **% ECL** = $\frac{\text{(Dil Conc) (100)}}{ECL_{eff}}$

  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, μCi/ml.

  - ECL_{eff} = $\frac{1}{\sum_{i=1}^{n} \frac{F_i}{ECL_i}}$

    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

    ECL_i = Effluent Concentration Limit (ECL) of the i^{th} radionuclide from 10 CFR 20 (20.1001-20.2402), Appendix B, Table 2, Column 2.

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:

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

where: σ_i = Error associated with each component.

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; these data are also presented in Table 2D. Categories 3, 4, and 5 were calculated utilizing RETDAS (Radioactive Effluent Tracking and Dose Assessment 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 members of the public, per the ODCM, who may at times be within the site boundary[1], 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.

[1] ODCM Figure 6-1.

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TABLE 1

SOURCE	Dose * (millirems) First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS	1)	2)	3)	4)	5)
Whole Body	1.16E-3	2.04E-4	6.50E-5	1.31E-2	1.45E-2
	6)	7)	8)	9)	10)
Organ	1.76E-3	3.12E-4	9.94E-5	4.02E-2	4.18E-2
AIRBORNE EFFLUENTS	11)	12)	13)	14)	15)
Tritium, Iodines, and Particulates	0.00E+0	9.80E-5	3.37E-4	1.50E-4	5.24E-4
NOBLE GASES **	16)	17)	18)	19)	20)
Gamma	0.00E+0	2.09E-5	1.61E-5	0.00E+0	3.48E-5
	21)	22)	23)	24)	25)
Beta	0.00E+0	2.37E-3	1.83E-3	0.00E+0	3.94E-3
	26)	27)	28)	29)	30)
DIRECT RADIATION	1.07E-1	8.21E-2	1.18E-1	9.45E-2	3.68E-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.

1. This value was calculated using the methodology of the ODCM.

2. This value was calculated using the methodology of the ODCM.

3. This value was calculated using the methodology of the ODCM.

4. This value was calculated using the methodology of the ODCM.

5. This value was calculated using the methodology of the ODCM.

6. This value was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.

7. This value was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.

8. This value was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.

9. This value was calculated using the methodology of the ODCM; the bone received the maximum dose primarily by the saltwater fish pathway.

10. This value was calculated using the methodology of the ODCM; the bone received the maximum dose primarily by the saltwater fish pathway.

11. There was no activity detected during the release period, therefore the reported organ dose was 0.00E+0 mrem.

12. The maximum organ dose was to a teen's liver and was located in the NNE sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.

13. The maximum organ dose was to the skin (all age groups) and was located in the NNE sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.

14. The maximum organ dose was to the skin (all age groups) and was located in the NNE sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.

15. The maximum organ dose was to a teen's liver and was located in the NNE sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.

16. There was no activity detected during the release period, therefore the reported air dose for gamma radiation was 0.00E+0 mrad.

17. The maximum air dose for gamma radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

18. The maximum air dose for gamma radiation was located in the W sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

19. There was no activity detected during the release period, therefore the reported air dose for gamma radiation was 0.00E+0 mrad.

20. The maximum air dose for gamma radiation was located in the W sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

21. There was no activity detected during the release period, therefore the reported air dose for beta radiation was 0.00E+0 mrad.

22. The maximum air dose for beta radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

23. The maximum air dose for beta radiation was located in the W sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

24. There was no activity detected during the release period, therefore the reported air dose for beta radiation was 0.00E+0 mrad.

25. The maximum air dose for beta radiation was located in the W 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 W 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 S 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 W 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 W 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 W sector.

TABLE 2

SOURCE	Percent Applicable Limit				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS Whole Body	7.72E-2	1.36E-2	4.33E-3	8.74E-1	4.85E-1
Organ	3.52E-2	6.24E-3	1.99E-3	8.04E-1	4.18E-1
AIRBORNE EFFLUENTS Tritium, Iodines, and Particulates	0.00E+0	1.31E-3	4.49E-3	2.00E-3	3.49E-3
NOBLE GASES Gamma	0.00E+0	4.17E-4	3.22E-4	0.00E+0	3.48E-4
Beta	0.00E+0	2.37E-2	1.83E-2	0.00E+0	1.97E-2

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

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SECTION I. CHANGES TO OFFSITE DOSE CALCULATION MANUAL

On February 26, 2004, Revision 21 to the Unit 1 Offsite Dose Calculation Manual (ODCM) was adopted and published. This change incorporated 1) Removal of the reference to the specific software used to calculate off-site airborne doses using concurrent meteorology, 2) Updated two sections to reflect the completed installation of MGPI radiation monitors, 3) Incorporated updates related to the recent Land Use Census (LUC), 4) Identified members of the public staying at Camp Mesa, and 5) Corrected a reference in section 6.

Per NRC Generic Letter 89-01, no Effluent/ODCM Evaluation or 50.59 reviews were required or performed for editorial changes made to reflect actual plant operation.

None of the changes impact the accuracy or reliability of effluent dose or setpoint calculations. The level of radioactive effluent control required by 10CFR20, 40CFR190, 10CFR50.36a, and Appendix I to 10CFR50 will be maintained.

Throughout the document, change bars are marked in one of four ways as follows:

A	Addition	F	Editorial/Format change
D	Deletion	R	Revision

Page	Change	Reason
1-19	Deleted Table 1-2 as MGPI monitors don't have calibration constants	D
2-16	Removed reference to type of software used to calculate offsite dose using concurrent meteorology. This item is controlled by site programs and procedures.	R
2-18	Removed reference to type of software used to calculate offsite dose using concurrent meteorology. This item is controlled by site programs and procedures.	R
2-21	Changed Controlling Location Factors per LUC and corrected footnote format	R
2-24	Per LUC, outage workers are no longer at this location	D
2-25	Renumbered pages for sector Q	F
2-26	Renumbered pages for sector Q	F
2-27	Per LUC, this location is renamed Beach Complex and renumbered pages for sector Q	R
2-31	Per LUC, this location renamed Camp Mesa	R
4-2	Removed note 2 as all MGPI radiation monitors are turned over to station	R
4-5	Removed note (7) as the MGPI radiation monitors are turned over to station	R
4-6	Clarified wording accounting for installation of MGPI monitors and removed note (7)	R
5-18	Changed name of TLD # 23 to better reflect location	R
6-2	Added Camp Mesa residents to the category of Member of the Public	R
6-10	Changed reference to Quality Assurance Program from deleted Tech Spec section	R

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On September 3, 2004, Revision 22 to the Unit 1 Offsite Dose Calculation Manual (ODCM) was adopted and published.

Per NRC Generic Letter 89-01, no Effluent/ODCM Evaluation or 50.59 reviews were required or performed for editorial changes. Effluent ODCM Evaluations (EOE) or screens were performed as separate actions under AR 040501435. This revision to the ODCM:

1) Removed the reheater pit sump (RPS) system as a credited release point and the associated requirements for continuous monitoring (R-2100) and periodic sampling and analysis. This supports ECP 040500364 that physically removed the system and all components from the plant as part of decommissioning. The deletion was evaluated in action 1 of the AR.
2) Removed the Plant Vent Stack Monitor (R-1254) gas channels and the associated surveillance and planned maintenance once all fuel was transferred to the ISFSI. As discussed in detail in action 2 of the AR, the transfer of the spent fuel removed the last potential source of noble gas.
3) Deleted requirements for iodine sampling for the airborne release point, the Plant Vent Stack, to reflect the absence of an iodine source term due to radioactive decay since the plant was shutdown in November 1992. The deletion was evaluated in action 14 of the AR.
4) Removed requirement for sampling and analysis of dissolved and entrained gases for liquid releases once the transfer of spent fuel to the ISFSI was completed. Once the last potential source of noble gas was removed, the requirement to perform sampling and analysis of liquid effluents for dissolved and entrained gases no longer applied. This was evaluated in action 13 of the AR.
5) Removed a missed reference to the radwaste system monitor tanks, editorial change.
6) Added note allowing for the use of additional dilution to support decommissioning efforts, particularly during final draindown of the spent fuel pool and decommissioning of the liquid radwaste processing system. This change was screened in action 4 of the AR.
7) Modified compensatory action for an out of service sample flow measuring device on the Plant Vent Stack to reflect the removal of noble gas channel from R-1254. This was evaluated in action 15 of the AR, and
8) Updated PVS fan flow rate per AR 030600106.

None of the changes impacted the accuracy or reliability of effluent dose or setpoint calculations. The level of radioactive effluent control required by 10CFR120, 40CFR190, 10CFR50.36a and Appendix I to 10CFR50 will be maintained.

Throughout the document, change bars are marked in one of four ways as follows:

A Addition
D Deletion
F Editorial/Format change
R Revision

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Page	Change	Reason
ii	Removed the RPS system name from section 1.4.2.1. to reflect ECP 040500364	D
iii	Revised Titles for 2.3 and 2.6.2 to remove iodine.	R
1-1	Added note stating the noble gas source term will no longer exist once fuel is transferred to the ISFSI so the dissolved and entrained gas limit will become not applicable.	A
1-3	Removed the RPS from Table 1-1. Added footnote (g) to the sampling requirement of dissolved and entrained gases.	D & R
1-5	Added footnote (g) stating the requirement for dissolved and entrained gases becomes not applicable once transfer of all of the spent fuel to the ISFSI has been completed and AR 040501435-16 is closed.	A
1-11	Added note to allow increased dilution flow	A
1-13	Deleted obsolete step 4 for cpm monitors and added to the note that once transfer of spent fuel to the ISFSI is completed, dissolved and entrained gas limit will not be applicable.	D & A
1-14	Removed the RPS and deleted line about the previously removed radwaste system monitor tanks. Added note to allow increased dilution flow	D,A & R
1-15	Removed the RPS	R
1-16	Removed the RPS and removed obsolete step 4 for cpm monitors	D & R
1-17	Removed the RPS	D
1-18	Removed the RPS	D
2-1	Noted that once all fuel is transferred to the ISFSI, Specification A.1 is not required. Removed I-131/I-133 requirement as the iodine source no longer exists.	A & D
2-2	Noted Specification 2.1.2.A is not applicable once all of the spent fuel has been transferred to the ISFSI. Removed I-131/I-133 requirement as the iodine source no longer exists.	A & D
2-3	Added note "f" to Table 2-1 deleting sampling requirements for noble gas and continuous monitoring once transfer of all of the spent fuel to the ISFSI has been completed. Removed I-131/I-133 sampling requirement as the iodine source no longer exists.	A & D
2-5	Added note "f" to Table 2-1 deleting requirements for noble gas monitoring and noble gas sampling once transfer of all of the spent fuel to the ISFSI has been completed.	A
2-6	Changed applicability for specification 2.2.1 from "at all times" to "not required once transfer of all of the spent fuel to the ISFSI has been completed".	A
2-7	Changed applicability for specification 2.2.2 from "at all times" to "not required once transfer of all of the spent fuel to the ISFSI has been completed".	A
2-8	Removed I-131/I-133 requirement as the iodine source no longer exists.	D

2-9	Removed I-131/I-133 requirement as the iodine source no longer exists.	D
2-10	Noted the section on calculating setpoints for R-1254 is not applicable once transfer of all of the spent fuel to the ISFSI has been completed.	A
2-11	Changed applicability for specification 2.5.1 from "at all times" to "not required once transfer of all of the spent fuel to the ISFSI has been completed". Changed PVS flow rate based on AR 030600106.	A & R
2-12	Changed applicability for specification 2.5.1 from "at all times" to "not required once transfer of all of the spent fuel to the ISFSI has been completed". Changed PVS flow rate based on AR 030600106.	A & R
2-13	Changed applicability for specification 2.6.1 from "at all times" to "not required once transfer of all of the spent fuel to the ISFSI has been completed".	A
2-14	Removed I-131/I-133 requirement as the iodine source no longer exists.	D
2-15	Changed applicability for specification 2.7.1 from "at all times" to "not required once transfer of all of the spent fuel to the ISFSI has been completed".	A
2-16	Changed applicability for specification 2.7.1 from "at all times" to "not required once transfer of all of the spent fuel to the ISFSI has been completed".	A
2-17	Removed I-131/I-133 requirement as the iodine source no longer exists.	D
2-18	Removed I-131/I-133 requirement as the iodine source no longer exists.	D
4-2	Removed the RPS	D
4-5	Removed the RPS	D
4-7	Changed applicability for specification 4.2.1.B.1 from "at all times" to "not required once transfer of all of the spent fuel to the ISFSI has been completed".	A
4-8	Added footnote (7) to Table 4-3 to state that "once transfer of the spent fuel to the ISFSI is completed, the noble gas monitor is not required." Added Action 24 to item 2 to be consistent with the Action definitions. Deleted the charcoal sampler as the iodine source term no longer exists. Deleted footnote (6) that discussed the installation of monitors and PIMS as no longer relevant.	A & D
4-9	Changed action 22 of Table 4-4 to "not required once transfer of all of the spent fuel to the ISFSI has been completed". Also, removed the iodine reference in Action 24. Modified action 26 to reflect the fact that the PIMS R-1254 alarm window will have only the sample flow measuring device input once fuel has been completely transferred to the ISFSI and should therefore have the same 12 hour time interval as Action 24.	A & D
4-10	Changed applicability for specification 4.2.2.A from "at all times" to "not required once transfer of all of the spent fuel to the ISFSI has been completed".	A

4-11	Added footnote (7) to Table 4-4 to state that "once transfer of the spent fuel to the ISFSI is completed, the noble gas monitor is not required." Removed surveillance requirements for the iodine sampler. Deleted footnote 6 that discussed station turnover of PIMS as no longer relevant.	A & D
4-13	Removed the RPS from figure 4-1 and corrected the flow path and other typos.	D & R
4-14	Modified figure 4-2 to reflect configuration of reactor building ventilation per ECP 030600106-1.	R
5-26 thru 5-30	Replaced Figures with newer versions.	F
6-12	Modified Basis 6.4.5 to reflect that once transfer of the spent fuel to the ISFSI is completed, the noble gas source term no longer exists and therefore the limitations of gamma and beta dose rates due to noble gas are not applicable.	A
6-13	Modified Basis 6.4.7 to reflect that once transfer of the spent fuel to the ISFSI is completed, the noble gas source term no longer exists and therefore this basis is not applicable. Also removed reference to I-131 & I-133 from bases 6.4.8 and 6.4.9.	A & D
6-14	Removed reference to I-131 and I-133 from base 6.4.9.	D
6-15	Modified Basis 6.4.14 to reflect that once transfer of the spent fuel to the ISFSI is completed, the noble gas source term no longer exists and therefore this basis is not applicable.	A

SECTION J. CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

Change 1

Demolition of Reheater Pit Sump

On August 30, 2004, the Reheater Pit Sump (RPS) system was permanently removed from service. The reheater sump, sump pumps and radiation monitoring system skid (RE-2100) were all removed to facilitate turbine building removal. These systems are no longer functionally necessary, and encumber demolition activities in the area.

Unit 1 has reached the point in its decommissioning where systems are being physically removed. To support future demolition of the turbine building, the RPS system components, including the radiation monitoring system, were removed. All of the piped sources of wastewater to the RPS were permanently cut and filled or routed to the Yard Drain Sump (YDS), the single remaining Unit 1 ODCM-credited continuous liquid release point.

The RPS was designed to collect area drainage from the turbine building and secondary side equipment leaks. A radiation monitoring system was installed because of the potential for contamination from primary-to-secondary leaks, and the discharge was routed through an oil-water separator to ensure compliance with the NPDES permit. As part of decommissioning, secondary side systems have been removed and the majority of the turbine building itself has been decontaminated and free-released by Health Physics.

The issue of rainwater accumulation and run-off from contaminated areas is addressed in AR 040500364-48. Run-off from those areas that continue to have low levels of detectable contamination, such as the north extension, crane deck, and feedwater pump pedestals, are being routed to the YDS. The water management plan requires sampling of any water that may accumulate from free-released areas to confirm <MDA. In the unlikely event that a sample has measurable activity, the water will be routed to the YDS.

The water accumulation in the RPS sump area is expected to be much less than historically collected due to the plugging and routing of existing drains to the yard drain sump. There will be no unmonitored release of radioactive liquid effluents and no resultant increase in radioactive liquid effluents from Unit 1. There will be no expected change in exposure to plant personnel or to a member of the public due to this change.

This change was reviewed and approved acceptable pursuant to Quality Assurance Program Description (SCE-1-A), subsection 17.2.20.3.1.i per ECP 040500364.

Change 2

R-1254 changes to delete noble gas and iodine sampling and monitoring

On November 8, 2004, certain portions of the Plant Vent Stack radmonitoring system were modified and are no longer used. On August 31, 2004, the last of the fuel from the Unit 1 spent fuel pool was transferred to the Independent Spent Fuel Storage Installation (ISFSI). Additionally, any iodine source term has decayed away since Unit 1 was permanently shut down in 1992. The noble gas and iodine source terms no longer exist at Unit 1, as detailed in AR 040501435. Accordingly, with no gas or iodine source term remaining, the need to sample for those species no longer exists. Therefore, the monitoring and sampling requirements for noble gas and iodine were removed from the Unit 1 ODCM and chemistry procedures. A similar change was made to the Unit 1 DSAR. This change included deletion of the requirement for compensatory actions for an inoperable gas monitor as well as maintenance requirements for the gas channel. The requirement to sample for particulates remain unchanged.

The only potential source of noble gas remaining at Unit 1 was the spent fuel. The spent fuel has now been transferred from the spent fuel pool to the ISFSI. There has been no noble gas released from Unit 1 since the end of 1993 except for Kr-85 from damaged assemblies during vacuum drying operations as part of the transfer of the spent fuel to the ISFSI. As described more fully in AR 040501435, once the transfer was completed, there no longer remains a source of noble gases. The ISFSI itself is designed to prevent airborne and/or liquid releases.

The ISFSI design precludes any release of radioactive materials, so no release is expected. The iodine source term has decayed away. Since the noble gas and iodine source terms no longer exist, there is no dose increase to plant personnel or to a member of the public from this change.

This change to the ODCM and the effluent program was reviewed and found acceptable pursuant to Quality Assurance Program Description (SCE-1-A), subsection 17.2.20.3.1.i.

Change 3

Modification of Plant Vent Stack flow paths at Unit 1 by addition of fan A-21

In April 2004, the plant ventilation system was modified by adding fan A-21. The sole function of A-21 is to take suction on the containment building and exhaust into the existing Plant Vent Stack (PVS) system. Previously, the containment building was just one of many loads of fan A-22 or A-24. With fan A-21 now dedicated to the containment building, better air flow will result, creating a system enhancement. Either fan A-22 or A-24 is required to be on. The containment ventilation system contains filtering capability.

Fan A-21 exhausts into the existing Plant Vent Stack system, and will therefore be sampled by existing radiation monitor R-1254. This design change creates no new source term or release path, does not remove any sampling or monitoring requirements. As such, no increase in airborne activity is expected as a result of this change. No dose to a plant personnel or a member of the public will result from this change.

This change was reviewed and approved acceptable pursuant to Quality Assurance Program Description (SCE-1-A), subsection 17.2.20.3.1.i per ECP 030600106.

SECTION K. MISCELLANEOUS

- Yard Drain Sump Overflow

The Unit 1 Yard Drain sump overflowed to the PMF Catch Basin due to heavy rainfall on three different days in 2004. Since there was no detectable activity in the grab samples taken during the overflows, there were no dose consequences to a member of the public as a result of these unplanned, unmonitored releases. These events are documented in ARs 040202013, 041001767, and 041002348.

Start Date/Time	Stop Date/Time	Duration (min)	Activity (μCi/ml)	Estimated Release (Curies)	Estimated Whole Body Dose (mrem)	Estimated Organ Dose (mrem)
02/23/04 @ 0145	2/23/04 @ 0205	20	<MDA	0.00E+0	0.00E+0	0.00E+0
10/20/04 @ 0757	10/20/04 @ 0910	73	<MDA	0.00E+0	0.00E+0	0.00E+0
10/20/04 @ 0953	10/20/04 @ 1028	35	<MDA	0.00E+0	0.00E+0	0.00E+0
10/27/04 @ 0155	10/27/02 @ 0410	135	<MDA	0.00E+0	0.00E+0	0.00E+0
10/27/04 @ 0610	10/27/04 @ 0705	55	<MDA	0.00E+0	0.00E+0	0.00E+0
10/27/04 @ 2030	10/27/04 @ 2143	73	<MDA	0.00E+0	0.00E+0	0.00E+0

- Sample Line Hose Leak on Plant Vent Stack (PVS) Monitor R-1254

On 9/3/04, a stainless steel braided hose on the R-1254 sample line was found to be leaking. This resulted in slight dilution of the air sample upstream of the sample media and detector. The hose was replaced and the skid verified to be leak tight. The leak was discovered during the channel function test (CFT). The previous successfully conducted leak check was in May, marking that point as the earliest failure date. Evaluation of sample results from the monitor during this time period revealed there was minimal or no in-leakage during normal operation. Therefore there were no dose consequences to members of the public as a result of this event. This event is documented in AR 040900118.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

S.O.N.G.S. 1

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 2004 - December 31, 2004

S.O.N.G.S. 1			
Monitor	Inoperability Period	Inoperability Cause	Explanation
R-2100 Reheater Pit Sump Monitor	12/15/03 - 02/24/04	Sample flowpath plugged & electronic monitor failure	Demolition debris clogged sample lines and degraded electronic components. Sample lines were cleared and the the local processing unit (LPU) and cable were replaced. Monitor was calibrated.
	03/27/04 - 06/09/04	Monitor failure	Concrete dust blanketed monitor and electrical components. Mechanical vibrations from demolition activities degraded instrumentation. Electrical components were cleaned and a high voltage adjustment corrected calibration drift.
	06/24/04 - 09/03/04	Monitor failure alarm won't reset	LPU failed again due to demolition activities and debris. Replaced LPU and cleaned components. Reheater pit sump system removed from service prior to work being completed.

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

- Gaseous releases totaled 4.60E+0 curies of which noble gases were 4.37E+0 curies, iodines were 0.00E+0 curies, particulates were 9.92E-6 curies, and tritium was 2.27E-1 curies.

- The radiation doses from gaseous releases were: (a) gamma air dose: 3.48E-5 mrad at the site boundary, (b) beta air dose: 3.94E-3 mrad at the site boundary, organ dose: 5.24E-4 mrem at the nearest receptor.

- Liquid releases totaled 5.41E-1 curies of which particulates and iodines were 5.45E-3 curies, tritium was 5.36E-1 curies, and noble gases were 0.00E+0 curies.

- The radiation doses from liquid releases were: (a) total body: 1.45E-2 mrem, (b) limiting organ: 4.18E-2 mrem.

- The radioactive releases and resulting doses generated from Unit 1 were below the Applicable Limits for both gaseous and liquid effluents.

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

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ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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

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 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 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 (2004)

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	3.86E+1	2.26E+1	3.00E+1
2. Average release rate for period	μCi/sec	4.90E+0	2.87E+0	
3. Percent of applicable limit	% MPC	1.28E-2	6.78E-3	
4. Percent Effluent Concentration Limit	% ECL	2.68E-2	1.26E-2	
B. Iodines				
1. Total iodine-131	Ci	2.55E-4	3.88E-5	1.90E+1
2. Average release rate for period	μCi/sec	3.24E-5	4.93E-6	
3. Percent of applicable limit	% MPC	1.56E-4	2.37E-5	
4. Percent Effluent Concentration Limit	% ECL	7.78E-5	1.18E-5	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	2.15E-4	3.14E-5	1.60E+1
2. Average release rate for period	μCi/sec	2.74E-5	4.00E-6	
3. Percent of applicable limit	% MPC	9.35E-6	1.29E-6	
4. Percent Effluent Concentration Limit	% ECL	2.73E-5	2.76E-6	
5. Gross alpha activity	Ci	<LLD	<LLD	5.00E+1
D. Tritium				
1. Total release	Ci	1.62E+1	1.36E+1	2.50E+1
2. Average release rate for period	μCi/sec	2.06E+0	1.73E+0	
3. Percent of applicable limit	% MPC	4.95E-3	4.15E-3	
4. Percent Effluent Concentration Limit	% ECL	9.89E-3	8.30E-3	

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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	2.14E+1	3.99E+1	3.00E+1
2. Average release rate for period	μCi/sec	2.69E+0	5.02E+0	
3. Percent of applicable limit	% MPC	9.62E-3	8.07E-3	
4. Percent Effluent Concentration Limit	% ECL	2.66E-2	4.84E-3	
B. Iodines				
1. Total iodine-131	Ci	3.26E-4	5.45E-3	1.90E+1
2. Average release rate for period	μCi/sec	4.10E-5	6.86E-4	
3. Percent of applicable limit	% MPC	1.97E-4	3.29E-3	
4. Percent Effluent Concentration Limit	% ECL	9.84E-5	1.65E-3	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	1.53E-5	2.00E-4	1.60E+1
2. Average release rate for period	μCi/sec	1.92E-6	2.52E-5	
3. Percent of applicable limit	% MPC	1.56E-6	1.05E-5	
4. Percent Effluent Concentration Limit	% ECL	7.24E-6	3.90E-5	
5. Gross alpha activity	Ci	<LLD	<LLD	5.00E+1
D. Tritium				
1. Total release	Ci	1.36E+1	1.78E+1	2.50E+1
2. Average release rate for period	μCi/sec	1.71E+0	2.24E+0	
3. Percent of applicable limit	% MPC	4.11E-3	5.37E-3	
4. Percent Effluent Concentration Limit	% ECL	8.21E-3	1.07E-2	

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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	3.72E+0	1.65E+0	4.06E+0	2.64E-2
krypton-85	Ci	4.26E-1	<LLD	<LLD	1.69E+0
krypton-85m	Ci	<LLD	<LLD	<LLD	<LLD
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	<LLD	<LLD
xenon-133	Ci	3.07E+1	1.97E+1	1.68E+1	3.57E+1
xenon-133m	Ci	9.75E-2	<LLD	<LLD	1.61E-1
xenon-135	Ci	6.31E-3	<LLD	<LLD	1.24E-2
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	3.50E+1	2.13E+1	2.08E+1	3.75E+1
2. Iodines					
iodine-131	Ci	2.55E-4	3.88E-5	3.26E-4	5.45E-3
iodine-132	Ci	1.22E-6	<LLD	6.59E-5	1.28E-4
iodine-133	Ci	5.91E-5	2.70E-5	4.47E-5	1.96E-5
iodine-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	3.16E-4	6.58E-5	4.36E-4	5.60E-3

LLD Lower Limit of Detection; see Table 1D.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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					
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
bromine-82	Ci	2.23E-4	6.04E-5	4.81E-5	8.87E-6
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	1.27E-6	6.82E-7	<LLD	8.54E-8
cesium-137	Ci	2.09E-5	2.75E-6	2.92E-6	7.81E-6
cesium-138	Ci	<LLD	3.28E-6	<LLD	<LLD
chromium-51	Ci	3.08E-5	<LLD	<LLD	1.84E-6
cobalt-57	Ci	1.20E-7	<LLD	<LLD	<LLD
cobalt-58	Ci	1.45E-4	2.80E-5	7.47E-6	1.56E-4
cobalt-60	Ci	8.95E-6	<LLD	4.89E-6	2.21E-5
iron-59	Ci	7.52E-7	<LLD	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	1.58E-6	<LLD	<LLD	2.88E-6
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	3.68E-6	<LLD	<LLD	9.28E-6
niobium-95m	Ci	<LLD	<LLD	<LLD	6.29E-6
sodium-24	Ci	<LLD	<LLD	3.99E-7	<LLD
strontium-89	Ci	<LLD	<LLD	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	2.31E-6	<LLD	<LLD	1.30E-7

LLD Lower Limit of Detection; see Table 1D.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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	3.57E+0	1.24E+0	5.02E-1	2.31E+0
krypton-85m	Ci	<LLD	<LLD	<LLD	<LLD
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	1.49E-3	<LLD
xenon-131m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-133	Ci	4.69E-3	6.38E-3	<LLD	1.82E-2
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	3.57E+0	1.25E+0	5.03E-1	2.33E+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 (2004)

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

TABLE 1D

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation gases	
krypton-85	1.50E-5
krypton-85m	3.80E-8
krypton-87	1.90E-7
krypton-88	1.40E-7
xenon-133m	3.10E-7
xenon-135	4.00E-8
xenon-135m	1.50E-6
xenon-138	2.60E-6
2. Iodines	
iodine-132	8.40E-10
iodine-135	1.00E-10
3. Particulates	
barium-140	2.90E-13
cerium-141	3.60E-14
cerium-144	1.40E-13
cesium-134	8.20E-14
cesium-138	1.70E-10
chromium-51	3.20E-13
cobalt-57	1.80E-14
cobalt-60	1.20E-13
iron-59	1.90E-13
lanthanum-140	6.00E-13
manganese-54	7.40E-14
molybdenum-99	4.40E-14
niobium-95	7.40E-14
niobium-95m	1.70E-13
sodium-24	1.00E-12
strontium-89	1.00E-11
strontium-90	1.00E-11
zinc-65	2.00E-13
zirconium-95	1.30E-13
4. alpha	1.00E-11

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TABLE 1D (Continued)

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation gases	
krypton-85m	2.00E-6
krypton-87	8.70E-6
krypton-88	7.10E-6
xenon-131m	7.30E-5
xenon-133	4.40E-6
xenon-133m	1.80E-5
xenon-135	2.20E-6
xenon-135m	2.70E-5
xenon-138	4.30E-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	6.94E-3	3.39E-3	6.65E-3	1.98E-3
2. Percent Applicable Limit	%	6.94E-2	3.39E-2	6.65E-2	1.98E-2
3. Beta Air Dose	mrad	7.98E-3	4.33E-3	4.86E-3	6.94E-3
4. Percent Applicable Limit	%	3.99E-2	2.17E-2	2.43E-2	3.47E-2
B. Tritium, Iodine, Particulates (at the nearest receptor)					
1. Organ Dose	mrem	1.78E-3	9.28E-4	1.21E-3	5.97E-3
2. Percent Applicable Limit	%	1.19E-2	6.19E-3	8.04E-3	3.98E-2

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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TABLE 1F

GASEOUS EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	8 releases
2. Total time period for batch releases:	3506 minutes
3. Maximum time period for a batch release:	598 minutes
4. Average time period for a batch release:	438 minutes
5. Minimum time period for a batch release:	306 minutes

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.

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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]				
1. Total release (not including tritium, gases, alpha)	Ci	3.47E-2	2.44E-3	1.90E+1
2. Average diluted concentration during period	μCi/ml	5.63E-11	3.21E-12	
3. Percent of applicable limit	% MPC	1.20E-4	3.77E-6	
4. Percent Effluent Concentration Limit	% ECL	1.27E-3	2.10E-5	
B. Tritium				
1. Total release	Ci	1.12E+3	7.63E+1	1.90E+1
2. Average diluted concentration during period	μCi/ml	1.82E-6	1.00E-7	
3. Percent of applicable limit	% MPC	6.06E-2	3.35E-3	
4. Percent Effluent Concentration Limit	% ECL	1.82E-1	1.00E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	2.69E-1	1.62E-2	1.90E+1
2. Average diluted concentration during period	μCi/ml	4.37E-10	2.13E-11	
3. Percent of applicable limit	% MPC	2.19E-4	1.07E-5	
4. Percent Effluent Concentration Limit	% ECL	2.19E-4	1.07E-5	
D. Gross alpha radioactivity [1]				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)	liters	5.47E+7	7.00E+7	5.00E+0
F. Volume of dilution water used during period	liters	6.16E+11	7.60E+11	5.00E+0

(1) The sample for T076 released on 3/24/04 was discarded prior to use in the monthly composite for offsite analysis for alpha, Fe-55 and Sr-89/90. The March radwaste composite was comprised of 3 other tanks released that month. The missing sample had been analyzed and used to generate permit # 4L-85-0. This event is documented in AR 040400853.

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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]				
1. Total release (not including tritium, gases, alpha)	Ci	1.75E-2	7.96E-3	1.90E+1
2. Average diluted concentration during period	μCi/ml	2.37E-11	1.49E-11	
3. Percent of applicable limit	% MPC	3.12E-5	2.34E-5	
4. Percent Effluent Concentration Limit	% ECL	2.39E-4	1.66E-4	
B. Tritium				
1. Total release	Ci	4.54E+2	2.38E+2	1.90E+1
2. Average diluted concentration during period	μCi/ml	6.17E-7	4.46E-7	
3. Percent of applicable limit	% MPC	2.06E-2	1.49E-2	
4. Percent Effluent Concentration Limit	% ECL	6.17E-2	4.46E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	2.26E-1	2.02E-4	1.90E+1
2. Average diluted concentration during period	μCi/ml	3.08E-10	3.78E-13	
3. Percent of applicable limit	% MPC	1.54E-4	1.89E-7	
4. Percent Effluent Concentration Limit	% ECL	1.54E-4	1.89E-7	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)	liters	7.66E+7	7.78E+7	5.00E+0
F. Volume of dilution water used during period	liters	7.36E+11	5.34E+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					
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	<LLD	<LLD	<LLD	<LLD
cesium-137	Ci	<LLD	<LLD	<LLD	<LLD
chromium-51	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-58	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-60	Ci	<LLD	<LLD	<LLD	<LLD
iodine-131	Ci	<LLD	<LLD	<LLD	<LLD
iron-55	Ci	<LLD	<LLD	<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-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	<LLD	<LLD	<LLD	<LLD
2. Dissolved and entrained gases					
xenon-133	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	<LLD	<LLD	<LLD	<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	<LLD	<LLD	<LLD	2.20E-5
antimony-125	Ci	3.81E-3	1.40E-4	1.77E-3	1.15E-3
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	5.58E-4	<LLD	5.42E-5	1.04E-5
cesium-137	Ci	2.52E-3	4.60E-6	3.01E-4	3.47E-4
chromium-51	Ci	8.65E-4	6.43E-4	4.22E-4	4.17E-4
cobalt-57	Ci	6.12E-5	<LLD	7.59E-6	<LLD
cobalt-58	Ci	5.36E-3	8.00E-4	2.78E-3	2.03E-3
cobalt-60	Ci	1.20E-2	2.44E-4	2.65E-3	7.41E-4
iodine-131	Ci	<LLD	<LLD	<LLD	6.14E-6
iron-55	Ci	7.38E-3	<LLD	5.71E-3	2.08E-3
iron-59	Ci	1.93E-4	6.91E-5	8.33E-5	7.76E-4
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	6.85E-4	9.60E-5	7.59E-4	1.05E-4
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	2.76E-4	2.82E-4	1.37E-3	9.83E-5
niobium-97	Ci	<LLD	<LLD	2.08E-5	8.11E-6
silver-110m	Ci	8.21E-4	4.28E-6	8.56E-4	1.67E-4
strontium-89	Ci	<LLD	<LLD	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
technetium-99m	Ci	<LLD	<LLD	<LLD	<LLD
tin-117m	Ci	6.21E-6	5.43E-6	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	1.33E-4	1.52E-4	6.64E-4	<LLD
zirconium-97	Ci	<LLD	<LLD	2.88E-5	<LLD
Total for period	Ci	3.47E-2	2.44E-3	1.75E-2	7.96E-3
2. Dissolved and entrained gases					
krypton-85	Ci	1.06E-1	1.59E-2	5.51E-2	<LLD
xenon-131m	Ci	4.96E-3	<LLD	4.57E-3	<LLD
xenon-133	Ci	1.58E-1	3.64E-4	1.66E-1	2.02E-4
xenon-133m	Ci	2.65E-4	<LLD	7.70E-4	<LLD
xenon-135	Ci	2.33E-5	<LLD	<LLD	<LLD
Total for period	Ci	2.69E-1	1.62E-2	2.26E-1	2.02E-4

LLD Lower Limit of Detection; see Table 2C.

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TABLE 2C

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation products	
barium-140	2.70E-7
cerium-141	4.30E-8
cerium-144	1.70E-7
cesium-134	6.80E-8
cesium-137	5.90E-8
chromium-51	3.30E-7
cobalt-58	6.20E-8
cobalt-60	8.90E-8
iodine-131	5.70E-8
iron-55	1.00E-6
iron-59	1.40E-7
lanthanum-140	4.90E-7
manganese-54	6.10E-8
molybdenum-99	5.60E-8
niobium-95	6.20E-8
strontium-89	5.00E-8
strontium-90	5.00E-8
technetium-99m	5.70E-8
zinc-65	1.50E-7
zirconium-95	1.10E-7
2. Dissolved and entrained gases	
xenon-133	1.90E-7
xenon-135	8.90E-8
3. gross alpha	1.00E-7

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TABLE 2C (Continued)

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation products	
antimony-124	2.10E-7
barium-140	2.30E-7
cerium-141	4.00E-8
cerium-144	1.70E-7
cesium-134	6.80E-8
cobalt-57	2.20E-8
iodine-131	4.30E-8
iron-55	1.00E-6
lanthanum-140	1.60E-7
molybdenum-99	2.70E-8
niobium-97	1.40E-7
strontium-89	5.00E-8
strontium-90	5.00E-8
technetium-99m	2.70E-8
tin-117m	2.30E-8
zinc-65	1.50E-7
zirconium-95	1.00E-7
zirconium-97	1.50E-7
2. Dissolved and entrained gases	
krypton-85	2.90E-5
xenon-131m	3.00E-6
xenon-133m	6.90E-7
xenon-135	8.90E-8
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	2.82E-3	1.71E-4	1.20E-3	8.90E-4
2. Percent Applicable Limit	%	9.39E-2	5.70E-3	3.99E-2	2.97E-2
B.					
1. Limiting organ dose	mrem	9.01E-3	5.58E-4	5.49E-3	4.43E-3
2. Percent Applicable Limit	%	9.01E-2	5.58E-3	5.49E-2	4.43E-2
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:	117 releases
2. Total time period for batch releases:	19995 minutes
3. Maximum time period for a batch release:	475 minutes
4. Average time period for a batch release:	171 minutes
5. Minimum time period for a batch release:	45 minutes
6. Average saltwater flow during batch releases:	735256 gpm

SECTION D. PREVIOUS RADIOACTIVE EFFLUENT RELEASE REPORT ADDENDUM

None.

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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	1.84E+0	
	Ci	5.09E+1	3.00E+1
b. Dry active waste (DAW), compactable and non-compactable **	m^3	4.23E+1	
	Ci	9.63E-1	3.00E+1
c. Irradiated components, control rods	m^3	N/A	
	Ci	N/A	N/A
d. Other: Filters **	m^3	1.80E-1	
	Ci	1.00E-3	3.00E+1

Note: Total curie content estimated.

* Material packaged in Type A containers.

** Material packaged in strong tight containers of various sizes.

N/A No shipment made.

2. Estimate of major nuclide composition (by type of waste)		
a. americium-241	%	7.00E-4
antimony-125	%	2.17E+0
carbon-14	%	1.65E+0
cerium-144	%	3.35E-2
cesium-134	%	1.65E+0
cesium-137	%	1.98E+1
chromium-51	%	8.10E-3
cobalt-57	%	7.31E-2
cobalt-58	%	3.60E-3
cobalt-60	%	7.74E+0
curium-243/244	%	7.00E-4
iodine-129	%	7.20E-3
iron-55	%	8.24E+0
manganese-54	%	4.07E-2
nickel-63	%	5.85E+1
plutonium-238	%	7.00E-4
plutonium-239/240	%	3.00E-4
plutonium-241	%	1.67E-2
strontium-89	%	7.00E-4
strontium-90	%	1.06E-1
technetium-99	%	1.60E-3
tritium	%	4.38E-2

2. Estimate of major nuclide composition (by type of waste)		
b. americium-241	%	1.70E-3
antimony-124	%	1.73E-1
antimony-125	%	1.36E+0
carbon-14	%	1.98E+0
cerium-144	%	1.71E-1
cesium-134	%	2.04E+0
cesium-137	%	8.09E+0
chromium-51	%	6.05E+0
cobalt-57	%	1.37E-1
cobalt-58	%	2.03E+1
cobalt-60	%	8.48E+0
curium-242	%	1.00E-3
curium-243/244	%	2.30E-3
iodine-129	%	1.00E-4
iron-55	%	2.25E+1
iron-59	%	1.18E+0
manganese-54	%	1.50E+0
nickel-59	%	1.42E-1
nickel-63	%	2.12E+1
niobium-95	%	2.74E+0
plutonium-238	%	1.20E-3
plutonium-239/240	%	1.00E-3
plutonium-241	%	9.36E-2
strontium-89	%	4.10E-3
strontium-90	%	3.32E-2
technetium-99	%	2.20E-3
tritium	%	1.39E-1
uranium-233/234	%	1.00E-4
zirconium-95	%	1.64E+0
c. not applicable	%	N/A
d. antimony-125	%	3.59E-1
carbon-14	%	2.65E+0
cesium-134	%	9.07E-1
cesium-137	%	5.60E+1
cobalt-60	%	6.19E+0
iron-55	%	1.36E+1
manganese-54	%	1.00E-2
nickel-63	%	2.01E+1
plutonium-241	%	1.79E-1
strontium-90	%	1.00E-2
tritium	%	3.98E-2

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

3. Solid Waste Disposition		
Number of Shipments	Mode of Transportation	Destination
9 *	TAG Transport Truck/Flatbed Trailer	Duratek/EnviroCare, UT
2 **	TAG Transport Truck/Flatbed Trailer	Studsvik/EnviroCare, UT
		Studsvik/Barnwell, SC
1	TAG Transport Truck/Flatbed Trailer	EnviroCare, UT

* SONGS maintains a contract with Duratek that provides volume reduction services. The processed volume was shipped from the Duratek facility to EnviroCare using 61 shipments. Those 61 shipments included waste from other generators. SCE's waste volume was a small fraction of the total waste volume of these shipments.

** SONGS maintains a contract with Studsvik that provides volume reduction services. The processed volume was shipped from the Studsvik facility to EnviroCare and Barnwell using 1 and 6 shipments, respectively. Those 7 shipments included waste from other generators. SCE's waste volume was a small fraction of the total waste volume of these shipments.

A. 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
None	N/A

SECTION F. APPLICABLE LIMITS

Gaseous Effluents - Applicable Limits

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

- **% Applicable Limit** = $\frac{\text{(Rel Rate) (X/Q) (100)}}{MPC_{eff}}$

  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, μCi/sec.

  X/Q = 4.80E-6 sec/m^3; the annual average atmospheric dispersion defined in the Units 2&3 ODCM.

  - MPC_{eff} = $\frac{1}{\sum_{i=1}^{n} \frac{F_i}{MPC_i}}$

    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 = Maximum Permissible Concentration (MPC) of the i^{th} radionuclide from 10 CFR 20 (20.1-20.602), Appendix B, Table II, Column 1.

- **% ECL** = $\frac{\text{(Rel Rate) (X/Q) (100)}}{ECL_{eff}}$

  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, μCi/sec.

  X/Q = 4.80E-6 sec/m^3; the annual average atmospheric dispersion defined in the Units 2&3 ODCM.

  - ECL_{eff} = $\frac{1}{\sum_{i=1}^{n} \frac{F_i}{ECL_i}}$

    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

    ECL_i = Effluent Concentration Limit (ECL) of the i^{th} radionuclide from 10 CFR 20 (20.1001-20.2402), Appendix B, Table 2, Column 1.

Liquid Effluents - Applicable Limits

The percent of Applicable Limits, tabulated in Sections A, B, and C of Table 2A, were calculated using the following equations:

- **% Applicable Limit** = $\frac{\text{(Dil Conc) (100)}}{MPC_{eff}}$

  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, μCi/ml.

- MPC_{eff} = $\frac{1}{\sum_{i=1}^{n} \frac{F_i}{MPC_i}}$

  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 = Maximum Permissible Concentration (MPC) of the i^{th} radionuclide from 10 CFR 20 (20.1-20.602), Appendix B, Table II, Column 2.

- **% ECL** = $\frac{\text{(Dil Conc) (100)}}{ECL_{eff}}$

  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, μCi/ml.

- ECL_{eff} = $\frac{1}{\sum_{i=1}^{n} \frac{F_i}{ECL_i}}$

  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

  ECL_i = Effluent Concentration Limit (ECL) of the i^{th} radionuclide from 10 CFR 20 (20.1001-20.2402), Appendix B, Table 2, Column 2.

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:

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

where: σ_i = Error associated with each component.

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; these data are also presented in Table 2D. Categories 3, 4, and 5 were calculated utilizing RETDAS (Radioactive Effluent Tracking and Dose Assessment 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 members of the public, per the ODCM, who may at times be within the site boundary[1], 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.

[1] ODCM Figures 1-2 & 2-2.

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

TABLE 1

SOURCE	Dose * (millirems) First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS	1)	2)	3)	4)	5)
Whole Body	2.82E-3	1.71E-4	1.20E-3	8.90E-4	5.07E-3
	6)	7)	8)	9)	10)
Organ	9.01E-3	5.58E-4	5.49E-3	4.43E-3	1.95E-2
AIRBORNE EFFLUENTS	11)	12)	13)	14)	15)
Tritium, Iodines, and Particulates	1.56E-3	5.89E-4	1.07E-3	1.11E-2	1.29E-2
NOBLE GASES **	16)	17)	18)	19)	20)
Gamma	3.57E-2	7.46E-3	2.76E-2	1.04E-2	8.11E-2
	21)	22)	23)	24)	25)
Beta	3.76E-2	9.39E-3	1.76E-2	3.57E-2	1.00E-1
	26)	27)	28)	29)	30)
DIRECT RADIATION	1.07E-1	8.21E-2	1.18E-1	9.45E-2	3.68E-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.

1. This value was calculated using the methodology of the ODCM.

2. This value was calculated using the methodology of the ODCM.

3. This value was calculated using the methodology of the ODCM.

4. This value was calculated using the methodology of the ODCM.

5. This value was calculated using the methodology of the ODCM.

6. This value was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.

7. This value was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.

8. This value was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.

9. This value was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.

10. This value 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 an teen'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 teen's thyroid and was located in the NNW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.

13. The maximum organ dose was to a teen's thyroid and was located in the NNE sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.

14. The maximum organ dose was to an infant's thyroid and was located in the NNE sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.

15. The maximum organ dose was to an infant's thyroid and was located in the NNE sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.

16. The maximum air dose for gamma radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

17. The maximum air dose for gamma radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

18. The maximum air dose for gamma radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

19. The maximum air dose for gamma radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

20. The maximum air dose for gamma radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

21. The maximum air dose for beta radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

22. The maximum air dose for beta radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

23. The maximum air dose for beta radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

24. The maximum air dose for beta radiation was located in the NNE sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

25. The maximum air dose for beta radiation was located in the NNE 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 W 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 S 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 W 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 W 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 W sector.

TABLE 2

SOURCE	Percent Applicable Limit				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS					
Whole Body	9.39E-2	5.70E-3	3.99E-2	2.97E-2	8.46E-2
Organ	9.01E-2	5.58E-3	5.49E-2	4.43E-2	9.75E-2
AIRBORNE EFFLUENTS					
Tritium, Iodines, and Particulates	1.04E-2	3.93E-3	7.10E-3	7.41E-2	4.29E-2
NOBLE GASES					
Gamma	3.57E-1	7.46E-2	2.76E-1	1.04E-1	4.06E-1
Beta	1.88E-1	4.69E-2	8.78E-2	1.79E-1	2.51E-1

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

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

SECTION I. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

On February 26, 2004, Revision 39 to the Units 2/3 Offsite Dose Calculation Manual (ODCM) was adopted and published. This change incorporated 1) Removing the reference to the specific software used to calculate off-site doses using concurrent meteorology ; 2) Updates related to the recent Land Use Census (LUC), and 3) Identified members of the public staying at Camp Mesa.

Per NRC Generic Letter 89-01, no Effluent/ODCM Evaluation or 50.59 reviews were required or performed for editorial changes made to reflect actual plant operation.

None of the changes impact the accuracy or reliability of effluent dose or setpoint calculations. The level of radioactive effluent control required by 10CFR20, 40CFR190, 10CFR50.36a, and Appendix I to 10CFR50 will be maintained.

Throughout the document, change bars are marked in one of four ways as follows:

- A Addition
- D Deletion
- F Editorial/Format change
- R Revision

Page	Change	Reason
2-26	Removed reference to type of software used to calculate offsite dose using concurrent meteorology. This item is controlled by site programs and procedures.	R
2-28	Removed reference to type of software used to calculate offsite dose using concurrent meteorology. This item is controlled by site programs and procedures.	R
2-31	Changed Controlling Location Factors per LUC and corrected footnote format	R
2-34 to 2-39	Renumbered sector Q page numbers due to deletion of a table	F
2-37	Per LUC, outage worker is no longer at this location so this page is deleted	D
2-39	Per LUC, this location is renamed Beach Complex	R
2-42	Per LUC, this location is renamed Camp Mesa	R
2-54	Clarified footnote format on Table 2-17	F
5-15	Changed name of TLD # 23 to better reflect location	R
6-2	Added Camp Mesa residents to category of Members of the Public	R

SECTION J. CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

- There were no changes to the Units 2&3 Radioactive Waste Treatment Systems during the reporting period, January 1, 2004 to December 31, 2004.

SECTION K. MISCELLANEOUS

- Unplanned leakage from the Waste Gas System

At approximately 0630 on 6/28/04, the oncoming radwaste operator noted that the in service decay tank pressure was decreasing. The valve lineup was immediately verified and then a more extensive walkdown of the waste gas system performed. At 1205, the leaking valve was identified and closed. A vent path for a clearance in the PASS lab was established at 0343 on 6/28/04 and allowed a previously unidentified leaking isolation valve to vent the in-service waste gas decay tank.

A PVS gas grab sample taken at 1012 during the release identified Xe-133 at 2.14E-7 uCi/cc. The curies and dose inadvertently released during this event were accounted for in permit # 4G-102-0; gamma dose of 8.17E-5 mrad, beta dose of 2.43E-4 mrad. The release was below the assumed continuous release rates via the PVS and the monitor did not alarm at any point during the release. In addition, the release would not have exceeded any of the setpoints that would have been calculated in a release permit. This event is documented in AR 040601883.

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

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 2004 - December 31, 2004

S.O.N.G.S. 2			
Monitor	Inoperability Period	Inoperability Cause	Explanation
2RT-7870 Condenser Air Ejector Process Flow Monitor	04/17/00 - present	Inoperable process flow measuring device whenever vacuum pump is running.	Design deficiency causes process flow instrument to be inoperable while the vacuum pump is running. Substitute flow value is automatically inserted whenever the vacuum pump is running as high flow values are not sensed. Flow monitor works properly during normal operations. This event is documented in ARs 000101252 and 000400960.
2RT-7817 BPS/FFCPD Discharge Monitor	02/18/04 - 4/23/04	Detector components damaged from rainwater.	Floor plug above monitor removed for unrelated maintenance allowed rain water to damage monitor. Individual electrical components checked for operability. Found flow meter also required corrective action. Protective shelters are being fabricated. This event is documented in ARs 040201606, 040301998 and 040202006.
	05/01/04 - 06/10/04	Flow meter inoperable	Cleaned debris from sensing lines. Performed calibration. This event is documented in AR 040500018.
2RT-7821 Turbine Plant Sump Monitor	10/5/03 - 01/09/04	Low sample flow	System required piping replacement to resolve pipe blockage. During this time period Unit 2 TPS was routed to Unit 3 TPS. This event is documented in AR 031101279.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 2004 - December 31, 2004

S.O.N.G.S. 3			
Monitor	Inoperability Period	Inoperability Cause	Explanation
3RT-7870 Condenser Air Ejector Process Flow Monitor	04/17/00 - present	Inoperable process flow measuring device whenever vacuum pump is running.	Design deficiency causes process flow instrument to be inoperable while the vacuum pump is running. Substitute flow value is automatically inserted whenever the vacuum pump is running as high flow values are not sensed. Flow monitor works properly during normal operations. This event is documented in ARs 000101252 and 000400960.
3RT-7817 BPS/FFCPD Discharge Monitor	10/20/04 - 12/28/04	Inoperable process flow measuring device	Flow integrator records flow with none in progress. Repairs were made but required a release to verify instrument calibration. Due to the outage, no releases were made for several weeks. This event is documented in ARs 041001845 and 041002248.

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

- Gaseous releases totaled 1.83E+2 curies of which noble gases were 1.22E+2 curies, iodines were 6.42E-3 curies, particulates were 4.62E-4 curies, and tritium was 6.12E+1 curies.

- The radiation doses from gaseous releases were: (a) gamma air dose: 8.11E-2 mrad at the site boundary, (b) beta air dose: 1.00E-1 mrad at the site boundary, (c) organ dose: 1.29E-2 mrem at the nearest receptor.

- Liquid releases totaled 1.89E+3 curies of which particulates and iodines were 6.25E-2 curies, tritium was 1.89E+3 curies, and noble gases were 5.12E-1 curies.

- The radiation doses from liquid releases were: (a) total body: 5.07E-3 mrem, (b) limiting organ: 1.95E-2 mrem.

- The radioactive releases and resulting doses generated from Units 2 and 3 were below the Applicable Limits for both gaseous and liquid effluents.

COMMON

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

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	N/A	N/A
	Ci	N/A	
c. Irradiated components	m^3	N/A	N/A
	Ci	N/A	
d. Other (filters)	m^3	N/A	N/A
	Ci	N/A	

N/A No shipment made.

2. Estimate of major nuclide composition (by type of waste)		
a. not applicable	%	N/A
b. not applicable	%	N/A
c. not applicable	%	N/A
d. not applicable	%	N/A

COMMON

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
None	N/A	N/A

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
None	N/A

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

None.

REFERENCES:

1. Unit 1 Technical Specifications, section D6.13.2.

2. Units 2 and 3 License Controlled Specifications, section 5.0.103.2.2.

COMMON RADWASTE SHIPMENTS ADDENDUM 2003

A review of 2003 shipping data showed that a shipment of common DAW should have been characterized as "Other: filters". The entire, corrected common shipment section is reproduced:

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	4.79E+1	3.00E+1
	Ci	4.18E-2	
c. Irradiated components (Reactor insulation)	m^3	N/A	N/A
	Ci	N/A	
d. Other: (Filters) #	m^3	8.92E+0	3.00E+1
	Ci	2.20E-2	

NOTE: Total curie content estimated.

* Material packaged in Type A casks or strong tight containers of various sizes.

\# Material packaged in strong tight containers.

N/A No shipment made.

COMMON RADWASTE SHIPMENTS ADDENDUM 2003 (Cont'd)

2. Estimate of major nuclide composition (by type of waste) 2003 Common		
a. not applicable	%	N/A
b. americium-241	%	6.92E-2
carbon-14	%	2.89E-2
cerium-144	%	5.79E-2
cesium-134	%	1.35E-2
cesium-137	%	6.82E-2
cobalt-58	%	5.07E-1
cobalt-60	%	8.20E+1
curium-242	%	2.97E-4
curium-243/244	%	2.20E-2
iron-55	%	9.00E+0
manganese-54	%	9.52E-2
neptunium-237	%	1.78E-1
nickel-59	%	2.92E-2
nickel-63	%	6.36E+0
plutonium-238	%	1.08E-1
plutonium-239/240	%	3.81E-2
plutonium-241	%	1.31E+0
plutonium-242	%	2.85E-4
strontium-90	%	1.56E-1
technetium-99	%	3.64E-2
tritium	%	2.85E-3
c. not applicable	%	N/A

COMMON RADWASTE SHIPMENTS ADDENDUM 2003 (Cont'd)

2. Estimate of major nuclide composition (by type of waste) 2003 Common		
d. americium-241	%	8.95E-2
antimony-125	%	6.27E-1
carbon-14	%	1.02E+0
cerium-144	%	8.77E-2
cesium-134	%	4.37E+0
cesium-137	%	1.37E+1
cobalt-57	%	1.14E-1
cobalt-58	%	7.14E+0
cobalt-60	%	2.84E+1
curium-242	%	9.27E-3
curium-243/244	%	4.55E-2
iron-55	%	3.11E+1
manganese-54	%	1.51E+0
nickel-63	%	5.36E+0
niobium-95	%	6.32E-1
plutonium-238	%	6.45E-2
plutonium-239/240	%	2.00E-2
plutonium-241	%	1.75E+0
plutonium-242	%	1.27E-4
ruthenium-106	%	1.02E-1
silver-110m	%	2.41E-1
strontium-90	%	1.07E+0
tin-113	%	2.00E-1
tritium	%	1.30E-1
uranium-233/234	%	5.73E-4
uranium-235	%	2.60E-5
uranium-238	%	1.77E-4
zinc-65	%	1.85E+0
zirconium-95	%	4.55E-1

COMMON RADWASTE SHIPMENTS ADDENDUM (Cont'd)

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

3. Solid Waste Disposition (2003 Common)		
Number of Shipments	Mode of Transportation	Destination
3	TAG Transport Truck	EnviroCare, UT

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
None	N/A

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 were 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	4.09E-1
b. Percent ODCM Specification Limit	%	1.64E+0
2. Limiting Organ		
a. Organ Dose (Bone)	mrem	5.71E-2
b. Percent ODCM Specification Limit	%	2.28E-1
3. Thyroid		
a. Thyroid Dose	mrem	1.32E-2
b. Percent ODCM Specification Limit	%	1.76E-2

COMMON CONCLUSIONS

- Gaseous releases from S.O.N.G.S. 1, 2 and 3 totaled 1.88E+2 curies of which noble gases were 1.26E+2 curies, iodines were 6.42E-3 curies, particulates were 4.72E-4 curies, and tritium was 6.14E+1 curies.

- Liquid releases from S.O.N.G.S. 1, 2 and 3 totaled 1.89E+3 curies of which particulates and iodines were 6.80E-2 curies, tritium was 1.89E+3 curies, and noble gases were 5.12E-1 curies.

- 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.

- S.O.N.G.S. 1, 2 and 3 made 71 radwaste shipments to Envirocare, UT and 4 shipments to Barnwell, SC. Total volume was 1.08E+3 cubic meters containing 3.05E+2 curies of radioactivity.

- Meteorological conditions during the year were typical for S.O.N.G.S. Meteorological dispersion was good 36% of the time, fair 40% of the time and poor 24% of the time.

- 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 to a member of the public.

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 the 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.

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 gases. For dissolved or entrained noble gases, the concentration is limited to 2.00E-4 μCi/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: $\leq$ 1.5 mrem to the total body and
   $\leq$ 5 mrem to any organ.

2. During any calendar year: $\leq$ 3 mrem to the total body and
   $\leq$ 10 mrem to any organ.

METEOROLOGY

METEOROLOGY

The meteorology of the San Onofre Nuclear Generating Station for each of the four quarters, 2004 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. These data are available, as well as the hourly data for the Annual Report, but have not been included in this report because of the bulk of data records.

Table 4A lists the joint frequency distribution for each quarter, 2004. 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.

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METEOROLOGY

January - March
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04010100-04033123
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL A
EXTREMELY UNSTABLE (DT/DZ ≤ -1.9 °C/100 METERS)

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	1	0	2	0	0	0	0	0	0	0	3
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	1	0	0	1	0	1	1	0	0	0	0	4
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	1	0	0	0	0	0	0	1
SE	0	0	0	1	0	2	3	0	0	0	0	0	6
SSE	0	0	0	0	2	4	8	2	0	0	0	0	16
S	0	0	0	0	2	13	12	1	0	0	0	0	28
SSW	0	0	0	3	2	10	12	0	0	0	0	0	27
SW	0	0	0	1	9	48	10	0	0	0	0	0	68
WSW	0	0	0	4	14	48	8	0	0	0	0	0	74
W	0	0	0	0	13	83	57	4	0	0	0	0	157
WNW	0	0	0	0	5	25	39	10	0	0	0	0	79
NW	0	0	0	0	3	2	4	0	0	0	0	0	9
NNW	0	0	0	0	1	0	0	0	0	0	0	0	1
TOTALS	0	1	1	9	54	236	154	18	0	0	0	0	473

NUMBER OF VALID HOURS 473
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 473

PASQUILL B
MODERATELY UNSTABLE (-1.9 < DT/DZ ≤ -1.7 °C/100 METERS)

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	2	0	0	0	0	0	0	0	2
NNE	0	0	0	2	0	1	0	0	0	0	0	0	3
NE	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	1	0	0	0	0	0	0	0	1
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	2	0	0	0	0	0	2
SSE	0	0	0	0	0	0	5	0	0	0	0	0	5
S	0	0	0	1	1	0	4	1	0	0	0	0	7
SSW	0	0	0	1	0	4	4	0	0	0	0	0	9
SW	0	0	0	2	2	1	5	1	0	0	0	0	11
WSW	0	0	0	1	2	0	1	0	0	0	0	0	4
W	0	0	1	0	0	0	0	0	0	0	0	0	1
WNW	0	0	0	0	1	3	0	1	0	0	0	0	5
NW	0	0	0	0	0	1	1	0	0	0	0	0	2
NNW	0	0	0	1	0	0	0	0	0	0	0	0	1
TOTALS	0	0	1	9	9	10	22	3	0	0	0	0	54

NUMBER OF VALID HOURS 54
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 54

METEOROLOGY

January - March
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04010100-04033123
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL C
SLIGHTLY UNSTABLE (-1.7 < DT/DZ ≤ -1.5 °C/100 METERS)

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	0	0	0	0	0	0	3
NNE	0	0	0	0	0	2	0	0	0	0	0	0	2
NE	0	0	0	1	0	0	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	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	1	1	1	0	0	0	0	0	0	3
SE	0	0	0	0	0	1	1	0	1	0	0	0	3
SSE	0	0	0	0	1	7	6	2	0	0	0	0	16
S	0	0	0	1	3	1	10	3	0	0	0	0	18
SSW	0	0	0	1	2	4	1	0	0	0	0	0	8
SW	0	0	0	1	1	0	2	0	0	0	0	0	4
WSW	0	0	0	5	3	0	0	0	0	0	0	0	8
W	0	0	1	1	3	5	0	0	0	0	0	0	10
WNW	0	0	0	2	1	7	0	0	0	0	0	0	10
NW	0	0	0	1	1	1	3	0	0	0	0	0	6
NNW	0	0	1	1	1	1	0	0	0	0	0	0	4
TOTALS	0	0	2	15	18	32	23	5	1	0	0	0	96

NUMBER OF VALID HOURS 96
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 96

PASQUILL D
NEUTRAL (-1.5 < DT/DZ ≤ -0.5 °C/100 METERS)

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	7	8	10	6	0	0	0	0	0	31
NNE	0	0	1	5	6	16	14	4	0	0	0	0	46
NE	0	0	0	2	2	5	1	1	0	0	0	0	11
ENE	0	0	0	1	1	1	1	0	0	0	0	0	4
E	0	0	1	3	3	7	1	1	0	0	0	0	16
ESE	0	0	2	4	2	10	8	5	2	0	0	0	33
SE	0	0	1	5	7	15	44	14	7	0	0	0	93
SSE	0	0	0	2	1	19	37	21	6	1	0	0	87
S	0	0	0	1	3	13	13	6	4	1	0	0	41
SSW	0	0	0	1	3	5	6	1	2	0	0	0	18
SW	0	0	3	5	4	2	1	0	0	1	0	0	16
WSW	0	0	1	6	3	1	6	0	0	0	0	0	17
W	0	0	1	1	3	7	7	2	0	0	0	0	21
WNW	0	0	0	5	8	7	19	6	2	0	0	0	47
NW	0	0	1	6	1	17	15	2	0	0	0	0	42
NNW	1	0	0	10	7	13	1	0	0	0	0	0	32
TOTALS	1	0	11	64	62	148	180	63	23	3	0	0	555

NUMBER OF VALID HOURS 555
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 555

METEOROLOGY

January - March
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04010100-04033123
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL E
SLIGHTLY STABLE (-0.5 < DT/DZ ≤ 1.5 °C/100 METERS)

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	5	10	6	0	0	0	0	0	28
NNE	0	1	0	8	22	36	12	1	0	0	0	0	80
NE	0	0	0	7	4	2	1	1	1	0	0	0	16
ENE	0	0	1	3	4	2	1	0	0	0	0	0	11
E	0	0	0	5	4	7	2	0	0	0	0	0	18
ESE	0	0	0	2	1	5	4	0	1	0	0	0	13
SE	0	0	0	4	4	0	9	0	0	0	0	0	17
SSE	0	0	0	2	0	0	1	1	0	0	0	0	4
S	0	0	0	0	3	1	0	0	0	0	0	0	4
SSW	0	0	0	1	2	1	1	0	0	0	0	0	5
SW	0	0	0	3	2	1	0	0	0	0	0	0	6
WSW	0	0	0	1	2	3	0	0	0	0	0	0	6
W	0	1	0	2	3	2	0	0	0	0	0	0	8
WNW	0	0	1	1	6	6	2	1	0	0	0	0	17
NW	0	2	0	3	5	5	3	3	2	0	0	0	23
NNW	0	0	2	2	1	6	4	0	0	0	0	0	15
TOTALS	0	4	6	49	68	87	46	7	4	0	0	0	271

NUMBER OF VALID HOURS 271
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 271

PASQUILL F
MODERATELY STABLE (1.5 < DT/DZ ≤ 4.0 °C/100 METERS)

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	4	5	6	2	0	0	0	0	0	19
NNE	0	0	3	10	33	65	13	1	0	0	0	0	125
NE	0	0	1	7	7	6	1	1	0	0	0	0	23
ENE	0	0	0	4	6	3	1	0	0	0	0	0	14
E	0	0	0	5	4	5	0	0	0	0	0	0	14
ESE	0	0	1	0	2	2	0	0	0	0	0	0	5
SE	0	0	1	1	1	2	0	0	0	0	0	0	5
SSE	0	0	0	0	1	3	1	0	0	0	0	0	5
S	0	0	0	4	0	0	0	0	0	0	0	0	4
SSW	0	0	0	1	0	1	1	0	0	0	0	0	3
SW	0	0	0	2	3	1	0	0	0	0	0	0	6
WSW	0	0	0	1	1	1	0	0	0	0	0	0	3
W	0	0	0	2	4	2	0	0	0	0	0	0	8
WNW	0	0	0	2	1	5	0	0	0	0	0	0	8
NW	0	0	0	2	3	4	4	0	0	0	0	0	13
NNW	0	1	2	5	2	2	0	0	0	0	0	0	12
TOTALS	0	2	9	50	73	108	23	2	0	0	0	0	267

NUMBER OF VALID HOURS 267
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 267

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

METEOROLOGY

January - March
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04010100-04033123
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL G
EXTREMELY STABLE (DT/DZ > 4.0 °C/100 METERS)

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	3	5	2	7	5	0	0	0	0	0	23
NNE	0	0	1	8	26	135	131	8	0	0	0	0	309
NE	0	0	1	5	13	19	8	0	0	0	0	0	46
ENE	0	2	2	6	2	2	1	0	0	0	0	0	15
E	0	1	2	1	2	1	2	0	0	0	0	0	9
ESE	0	0	1	0	6	2	0	0	0	0	0	0	9
SE	0	0	1	1	0	4	2	0	0	0	0	0	8
SSE	0	0	0	1	1	1	0	0	0	0	0	0	3
S	0	0	1	2	2	0	0	0	0	0	0	0	5
SSW	0	1	1	1	0	2	2	0	0	0	0	0	7
SW	0	0	0	1	2	0	0	0	0	0	0	0	3
WSW	0	2	0	2	0	0	2	0	0	0	0	0	6
W	0	0	0	4	2	3	1	0	0	0	0	0	10
WNW	0	0	1	0	1	2	1	0	0	0	0	0	5
NW	1	0	1	2	1	0	0	0	0	0	0	0	5
NNW	0	0	0	0	1	3	1	0	0	0	0	0	5
TOTALS	2	6	15	39	61	181	156	8	0	0	0	0	468

NUMBER OF VALID HOURS 468
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 468

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	1	7	21	25	35	19	0	0	0	0	0	109
NNE	0	1	5	33	87	255	170	14	0	0	0	0	565
NE	0	1	2	22	27	32	12	4	1	0	0	0	101
ENE	0	2	3	14	14	8	4	0	0	0	0	0	45
E	0	1	3	15	13	20	5	1	0	0	0	0	58
ESE	0	0	4	7	12	21	12	5	3	0	0	0	64
SE	0	0	3	12	12	24	61	14	8	0	0	0	134
SSE	0	0	0	5	6	34	58	26	6	1	0	0	136
S	0	0	1	9	14	28	39	11	4	1	0	0	107
SSW	0	1	1	9	9	27	27	1	2	0	0	0	77
SW	0	0	3	15	23	53	18	1	0	1	0	0	114
WSW	0	2	1	20	25	53	17	0	0	0	0	0	118
W	0	1	3	10	28	102	65	6	0	0	0	0	215
WNW	0	0	2	10	23	55	61	18	2	0	0	0	171
NW	1	2	2	14	14	30	30	5	2	0	0	0	100
NNW	1	1	5	19	13	25	6	0	0	0	0	0	70
TOTALS	3	13	45	235	345	802	604	106	28	3	0	0	2184

NUMBER OF VALID HOURS 2184
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 2184

METEOROLOGY

April - June
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04040100-04063023
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL A
EXTREMELY UNSTABLE (DT/DZ ≤ -1.9 °C/100 METERS)

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	0	0	0	0	0	0	0	2
NNE	0	0	0	0	0	1	0	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	3	0	0	0	0	0	0	3
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0	1	0	0	0	0	1
SSE	0	0	0	1	0	1	4	7	4	0	0	0	17
S	0	0	0	0	3	10	45	22	1	0	0	0	81
SSW	0	0	1	0	5	11	62	11	0	0	0	0	90
SW	0	0	0	2	7	35	69	3	0	0	0	0	116
WSW	0	0	0	1	8	76	72	0	1	0	0	0	158
W	0	0	0	0	7	47	92	0	0	0	0	0	146
WNW	0	0	0	0	1	11	40	3	0	0	0	0	55
NW	0	0	0	1	0	3	4	2	0	0	0	0	10
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	1	7	31	198	388	49	6	0	0	0	680

NUMBER OF VALID HOURS 680
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 680

PASQUILL B
MODERATELY UNSTABLE (-1.9 < DT/DZ ≤ -1.7 °C/100 METERS)

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	1	0	0	0	0	0	0	0	0	1
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	0	0	1	2	0	0	0	0	3
SSE	0	0	0	1	0	4	3	2	3	0	0	0	13
S	0	0	0	0	1	4	7	7	1	0	0	0	20
SSW	0	0	0	2	2	3	12	2	0	0	0	0	21
SW	0	0	0	0	3	6	0	0	0	0	0	0	9
WSW	0	0	0	0	4	4	1	0	1	0	0	0	10
W	0	0	0	0	0	4	0	0	0	0	0	0	4
WNW	0	0	0	0	2	2	2	0	0	0	0	0	6
NW	0	0	0	0	1	1	1	1	0	0	0	0	4
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	0	4	13	29	27	14	5	0	0	0	92

NUMBER OF VALID HOURS 92
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 92

METEOROLOGY

April - June
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04040100-04063023
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL C
SLIGHTLY UNSTABLE (-1.7 < DT/DZ ≤ -1.5 °C/100 METERS)

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	1	0	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	0	0	0	5	1	0	0	0	0	6
SSE	0	0	0	0	0	5	9	5	3	0	0	0	22
S	0	0	0	0	0	6	11	7	0	0	0	0	24
SSW	0	0	0	1	3	8	11	6	0	0	0	0	29
SW	0	0	0	0	1	3	8	1	0	0	0	0	13
WSW	0	0	0	2	5	4	3	0	0	0	0	0	14
W	0	0	0	2	0	2	0	0	0	0	0	0	4
WNW	0	0	0	0	0	3	1	1	0	0	0	0	5
NW	0	0	0	0	1	1	7	0	0	0	0	0	9
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	0	5	10	34	55	21	3	0	0	0	128

NUMBER OF VALID HOURS 128
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 128

PASQUILL D
NEUTRAL (-1.5 < DT/DZ ≤ -0.5 °C/100 METERS)

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	4	9	4	5	0	0	0	0	0	0	23
NNE	0	0	2	8	4	13	2	0	0	0	0	0	29
NE	0	0	0	2	7	4	0	0	0	0	0	0	13
ENE	0	0	1	3	3	1	0	0	0	0	0	0	8
E	0	1	0	0	6	19	5	0	0	0	0	0	31
ESE	0	0	1	2	7	35	15	0	0	0	0	0	60
SE	0	0	2	3	7	33	52	12	0	0	0	0	109
SSE	0	0	1	2	4	28	50	24	1	0	0	0	110
S	0	0	3	7	8	26	56	15	1	0	0	0	116
SSW	0	0	1	4	14	23	34	16	0	0	0	0	92
SW	0	2	1	10	11	24	12	0	0	0	0	0	60
WSW	1	1	4	9	5	6	7	0	0	0	0	0	33
W	0	0	4	9	7	5	8	1	0	0	0	0	34
WNW	0	0	2	11	7	2	7	4	0	0	0	0	33
NW	0	1	1	5	5	7	16	2	0	0	0	0	37
NNW	0	0	4	6	5	2	3	0	0	0	0	0	20
TOTALS	1	6	31	90	104	233	267	74	2	0	0	0	808

NUMBER OF VALID HOURS 808
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 808

METEOROLOGY

April - June
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04040100-04063023
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL E
SLIGHTLY STABLE (-0.5 < DT/DZ ≤ 1.5 °C/100 METERS)

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	1	3	7	2	0	0	0	0	0	0	13
NNE	0	0	1	9	11	10	1	0	0	0	0	0	32
NE	0	1	0	5	0	5	1	0	0	0	0	0	12
ENE	0	0	0	4	3	2	0	0	0	0	0	0	9
E	0	0	0	3	6	15	4	0	0	0	0	0	28
ESE	0	1	0	0	1	6	1	0	0	0	0	0	9
SE	0	0	0	1	2	1	7	0	0	0	0	0	11
SSE	0	0	0	1	3	0	2	0	0	0	0	0	6
S	0	0	0	3	1	2	0	0	0	0	0	0	6
SSW	0	0	0	0	1	1	0	0	0	0	0	0	2
SW	0	0	0	2	0	2	0	0	0	0	0	0	4
WSW	0	0	1	2	0	1	0	0	0	0	0	0	4
W	0	0	0	2	2	0	1	0	0	0	0	0	5
WNW	0	0	0	3	0	4	8	0	0	0	0	0	15
NW	0	0	1	3	1	2	1	0	0	0	0	0	8
NNW	0	1	0	4	2	3	1	0	0	0	0	0	11
TOTALS	0	3	4	45	40	56	27	0	0	0	0	0	175

NUMBER OF VALID HOURS 175
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 175

PASQUILL F
MODERATELY STABLE (1.5 < DT/DZ ≤ 4.0 °C/100 METERS)

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	2	2	0	0	0	0	0	0	8
NNE	1	0	1	5	27	20	3	0	0	0	0	0	57
NE	0	0	1	7	4	2	0	0	0	0	0	0	14
ENE	0	0	1	1	1	4	0	0	0	0	0	0	7
E	0	0	1	0	2	0	0	0	0	0	0	0	3
ESE	0	0	0	1	0	1	0	0	0	0	0	0	2
SE	0	0	0	0	2	1	0	0	0	0	0	0	3
SSE	0	0	0	2	1	0	0	0	0	0	0	0	3
S	0	0	1	2	0	0	0	0	0	0	0	0	3
SSW	0	0	0	2	1	3	0	0	0	0	0	0	6
SW	0	0	0	1	1	0	0	0	0	0	0	0	2
WSW	0	0	1	1	0	0	0	0	0	0	0	0	2
W	0	1	0	1	2	1	0	0	0	0	0	0	5
WNW	0	0	0	2	1	4	0	1	0	0	0	0	8
NW	0	0	1	1	1	2	3	0	0	0	0	0	8
NNW	0	0	0	0	1	0	0	0	0	0	0	0	1
TOTALS	1	1	7	30	46	40	6	1	0	0	0	0	132

NUMBER OF VALID HOURS 132
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 132

METEOROLOGY

April - June
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04040100-04063023
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL G
EXTREMELY STABLE (DT/DZ > 4.0 °C/100 METERS)

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	1	1	0	0	0	0	0	5
NNE	0	0	0	4	6	65	25	1	0	0	0	0	101
NE	0	0	1	4	5	2	0	0	0	0	0	0	12
ENE	0	0	2	0	3	0	0	0	0	0	0	0	5
E	0	0	1	4	1	1	0	0	0	0	0	0	7
ESE	0	0	0	0	1	1	0	0	0	0	0	0	2
SE	0	0	2	2	1	0	0	0	0	0	0	0	5
SSE	0	0	1	1	1	1	1	0	0	0	0	0	5
S	0	0	0	1	1	2	0	0	0	0	0	0	4
SSW	0	0	0	2	0	0	0	0	0	0	0	0	2
SW	0	0	1	2	0	0	0	0	0	0	0	0	3
WSW	0	0	1	1	1	1	0	0	0	0	0	0	4
W	0	0	0	0	3	0	0	0	0	0	0	0	3
WNW	0	0	0	1	0	3	0	0	0	0	0	0	4
NW	0	1	0	0	1	0	2	0	0	0	0	0	4
NNW	0	0	0	0	2	0	1	0	0	0	0	0	3
TOTALS	0	0	9	24	27	77	30	1	0	0	0	0	169

NUMBER OF VALID HOURS 169
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 169

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	5	20	14	11	1	0	0	0	0	0	52
NNE	1	0	4	26	48	110	31	1	0	0	0	0	221
NE	0	1	2	18	16	13	1	0	0	0	0	0	51
ENE	0	0	4	9	10	7	0	0	0	0	0	0	30
E	0	1	2	7	15	39	9	0	0	0	0	0	73
ESE	0	1	1	3	9	43	16	0	0	0	0	0	73
SE	0	0	4	6	12	35	65	16	0	0	0	0	138
SSE	0	0	2	8	9	39	69	38	11	0	0	0	176
S	0	0	4	13	14	50	119	51	3	0	0	0	254
SSW	0	0	2	11	26	49	119	35	0	0	0	0	242
SW	0	2	2	17	23	70	89	4	0	0	0	0	207
WSW	1	1	7	16	23	92	83	0	2	0	0	0	225
W	0	1	4	14	21	59	101	1	0	0	0	0	201
WNW	0	0	2	17	11	29	58	9	0	0	0	0	126
NW	0	2	3	10	10	16	34	5	0	0	0	0	80
NNW	0	1	4	10	10	5	5	0	0	0	0	0	35
TOTALS	2	11	52	205	271	667	800	160	16	0	0	0	2184

NUMBER OF VALID HOURS 2184
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 2184

METEOROLOGY

July - September
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04070100-04093023
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL A
EXTREMELY UNSTABLE (DT/DZ ≤ -1.9 °C/100 METERS)

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	1	0	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	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	1	0	0	0	0	0	0	0	0	1
SE	0	0	0	0	0	0	2	0	0	0	0	0	2
SSE	0	0	0	0	2	4	7	1	1	0	0	0	15
S	0	0	0	1	3	9	27	9	1	0	0	0	50
SSW	0	0	0	1	11	17	32	0	0	0	0	0	61
SW	0	0	0	5	17	48	49	0	0	0	0	0	119
WSW	0	0	0	5	17	104	74	0	0	0	0	0	200
W	0	0	0	4	19	104	149	0	0	0	0	0	276
WNW	0	0	0	2	6	19	28	5	0	0	0	0	60
NW	0	0	0	0	2	1	0	0	1	0	0	0	4
NNW	0	0	0	0	1	0	0	0	0	0	0	0	1
TOTALS	0	0	0	19	79	306	368	15	3	0	0	0	790

NUMBER OF VALID HOURS 790
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 790

PASQUILL B
MODERATELY UNSTABLE (-1.9 < DT/DZ ≤ -1.7 °C/100 METERS)

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	0	0	0	0	0	0	2
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	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	0	1	1	3	1	1	0	0	0	7
S	0	0	0	0	1	4	3	0	0	0	0	0	8
SSW	0	0	0	0	2	4	5	1	0	0	0	0	12
SW	0	0	0	1	3	8	3	0	0	0	0	0	15
WSW	0	0	0	3	2	5	1	0	0	0	0	0	11
W	0	0	0	3	1	6	1	0	0	0	0	0	11
WNW	0	0	0	2	3	3	2	0	0	0	0	0	10
NW	0	0	0	1	0	2	1	0	0	0	0	0	4
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	0	11	14	33	19	2	1	0	0	0	80

NUMBER OF VALID HOURS 80
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 80

METEOROLOGY

July - September
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04070100-04093023
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL C
SLIGHTLY UNSTABLE (-1.7 < DT/DZ ≤ -1.5 °C/100 METERS)

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	2	0	0	0	0	0	0	5
NNE	0	0	0	0	1	1	0	0	0	0	0	0	2
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	0	0	0	0	0	0	0	0
ESE	0	0	0	0	1	0	0	0	0	0	0	0	1
SE	0	0	0	0	0	0	1	1	0	0	0	0	2
SSE	0	0	0	0	1	6	5	2	0	0	0	0	14
S	0	0	0	1	1	2	3	2	2	0	0	0	11
SSW	0	0	0	1	4	6	4	0	0	0	0	0	15
SW	0	0	0	5	8	5	2	1	0	0	0	0	21
WSW	0	0	0	2	5	11	2	0	0	0	0	0	20
W	0	0	0	4	11	3	0	0	0	0	0	0	18
WNW	0	0	1	2	6	2	1	1	0	0	0	0	13
NW	0	0	0	0	0	2	5	0	0	0	0	0	7
NNW	0	0	0	0	0	2	0	0	0	0	0	0	2
TOTALS	0	0	1	16	41	43	23	7	2	0	0	0	133

NUMBER OF VALID HOURS 133
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 133

PASQUILL D
NEUTRAL (-1.5 < DT/DZ ≤ -0.5 °C/100 METERS)

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	3	7	8	1	0	0	0	0	0	0	21
NNE	1	0	3	13	24	15	0	0	0	0	0	0	56
NE	0	0	0	7	8	1	0	0	0	0	0	0	16
ENE	0	0	2	3	1	0	0	0	0	0	0	0	6
E	0	1	2	6	4	6	1	0	0	0	0	0	20
ESE	0	0	4	6	2	16	10	0	0	0	0	0	38
SE	0	0	0	9	7	47	19	8	2	0	0	0	92
SSE	0	0	1	11	15	36	23	6	3	0	0	0	95
S	0	0	2	8	19	25	10	0	0	0	0	0	64
SSW	0	0	3	16	16	16	4	0	0	0	0	0	55
SW	0	5	2	17	10	12	6	0	0	0	0	0	52
WSW	0	3	3	17	14	15	4	0	0	0	0	0	56
W	1	2	8	16	11	3	6	0	0	0	0	0	47
WNW	0	1	4	14	13	6	2	0	0	0	0	0	40
NW	0	0	3	7	5	4	6	0	1	0	0	0	26
NNW	0	2	1	9	8	4	3	0	0	0	0	0	27
TOTALS	2	16	41	166	165	207	94	14	6	0	0	0	711

NUMBER OF VALID HOURS 711
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 711

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

METEOROLOGY

July - September
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04070100-04093023
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL E
SLIGHTLY STABLE (-0.5 < DT/DZ ≤ 1.5 °C/100 METERS)

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	1	4	10	6	0	0	0	0	0	0	0	22
NNE	0	0	3	25	28	27	1	0	0	0	0	0	84
NE	0	0	5	7	6	2	0	0	0	0	0	0	20
ENE	0	0	2	6	1	3	0	0	0	0	0	0	12
E	0	0	0	3	1	3	0	0	0	0	0	0	7
ESE	0	0	1	0	0	2	0	0	0	0	0	0	3
SE	1	1	1	2	2	1	1	0	0	0	0	0	9
SSE	0	1	2	1	1	6	0	0	0	0	0	0	11
S	0	1	0	3	2	1	0	0	0	0	0	0	7
SSW	1	0	1	0	0	1	0	0	0	0	0	0	3
SW	0	2	1	2	0	1	0	0	0	0	0	0	6
WSW	0	0	0	0	1	1	0	0	0	0	0	0	2
W	0	0	2	1	0	1	0	0	0	0	0	0	4
WNW	0	0	1	2	1	1	0	0	0	0	0	0	5
NW	0	0	3	1	1	0	0	0	0	0	0	0	5
NNW	0	0	1	4	1	1	3	0	0	0	0	0	10
TOTALS	3	6	27	67	51	51	5	0	0	0	0	0	210

NUMBER OF VALID HOURS 210
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 210

PASQUILL F
MODERATELY STABLE (1.5 < DT/DZ ≤ 4.0 °C/100 METERS)

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	1	3	4	1	1	0	0	0	0	0	10
NNE	0	0	0	10	36	46	4	0	0	0	0	0	96
NE	0	0	1	3	2	2	0	0	0	0	0	0	8
ENE	0	0	2	1	1	2	0	0	0	0	0	0	6
E	0	0	0	3	0	1	0	0	0	0	0	0	4
ESE	0	0	0	2	0	1	0	0	1	0	0	0	4
SE	0	0	0	0	0	1	0	0	0	0	0	0	1
SSE	0	0	0	0	1	1	0	0	0	0	0	0	2
S	0	0	2	2	2	1	0	0	0	0	0	0	7
SSW	0	0	0	0	1	0	0	0	0	0	0	0	1
SW	0	0	0	0	1	0	0	0	0	0	0	0	1
WSW	0	1	1	0	1	0	0	0	0	0	0	0	3
W	0	0	0	0	0	1	1	0	0	0	0	0	2
WNW	0	0	0	0	0	1	3	0	0	0	0	0	4
NW	0	0	0	0	1	3	0	0	0	0	0	0	4
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	1	7	24	50	61	9	0	1	0	0	0	153

NUMBER OF VALID HOURS 153
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 153

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

METEOROLOGY

July - September
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04070100-04093023
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL G
EXTREMELY STABLE (DT/DZ > 4.0 °C/100 METERS)

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	3	2	0	0	0	0	0	5
NNE	0	0	0	0	5	67	30	0	0	0	0	0	102
NE	0	0	0	0	0	3	1	0	0	0	0	0	4
ENE	0	0	0	1	2	0	0	0	0	0	0	0	3
E	0	0	0	0	1	0	0	0	0	0	0	0	1
ESE	0	0	0	1	1	0	0	0	0	0	0	0	2
SE	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	0	0	2	0	0	0	0	0	0	2
S	0	0	1	1	2	0	0	0	0	0	0	0	4
SSW	0	0	0	1	0	1	0	0	0	0	0	0	2
SW	0	1	0	1	0	0	1	0	0	0	0	0	3
WSW	0	0	0	1	0	0	0	0	0	0	0	0	1
W	0	0	0	1	0	0	0	0	0	0	0	0	1
WNW	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	0	0	0	1	0	0	0	0	0	0	0	0	1
TOTALS	0	1	1	8	11	76	34	0	0	0	0	0	131

NUMBER OF VALID HOURS 131
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 131

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	3	8	21	20	7	3	0	0	0	0	0	63
NNE	1	0	6	49	95	156	35	0	0	0	0	0	342
NE	0	0	6	17	18	9	1	0	0	0	0	0	51
ENE	0	0	6	11	5	5	0	0	0	0	0	0	27
E	0	1	2	12	6	10	1	0	0	0	0	0	32
ESE	0	0	5	10	4	19	10	0	1	0	0	0	49
SE	1	1	1	11	9	49	23	9	2	0	0	0	106
SSE	0	1	3	12	21	56	38	10	5	0	0	0	146
S	0	1	5	16	30	42	43	11	3	0	0	0	151
SSW	1	0	4	19	34	45	45	1	00		0	0	149
SW	0	8	3	31	39	74	61	1	0	0	0	0	217
WSW	0	4	4	28	40	136	81	0	0	0	0	0	293
W	1	2	10	29	42	118	157	0	0	0	0	0	359
WNW	0	1	6	22	29	32	36	6	0	0	0	0	132
NW	0	0	6	9	9	12	12	0	2	0	0	0	50
NNW	0	2	2	14	10	7	6	0	0	0	0	0	41
TOTALS	5	24	77	311	411	777	552	38	13	0	0	0	2208

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

METEOROLOGY

October - December
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04100100-04123123
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL A
EXTREMELY UNSTABLE (DT/DZ ≤ -1.9 °C/100 METERS)

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	1	0	0	0	0	0	0	0	2
NNE	0	0	0	1	0	0	0	2	0	0	0	0	3
NE	0	0	0	0	0	0	1	1	0	0	0	0	2
ENE	0	0	0	0	0	0	1	2	0	0	0	0	3
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	1	0	0	0	0	0	1
SE	0	0	0	0	0	0	0	0	1	0	0	0	1
SSE	0	0	0	0	0	2	12	4	0	0	0	0	18
S	0	0	1	2	8	12	17	5	0	0	1	0	46
SSW	0	0	0	2	9	20	12	0	0	0	0	0	43
SW	0	0	0	6	11	33	10	2	0	0	0	0	62
WSW	0	0	1	3	19	60	20	3	0	0	0	0	106
W	0	0	1	2	12	61	40	0	0	0	0	0	116
WNW	0	0	0	1	4	18	46	5	0	0	0	0	74
NW	0	0	0	1	1	2	3	0	0	0	0	0	7
NNW	0	0	0	0	1	0	2	0	0	0	0	0	3
TOTALS	0	0	3	19	66	208	165	24	1	0	1	0	487

NUMBER OF VALID HOURS 487
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 487

PASQUILL B
MODERATELY UNSTABLE (-1.9 < DT/DZ ≤ -1.7 °C/100 METERS)

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	2	0	0	0	0	3
NE	0	0	0	0	0	0	1	0	0	0	0	0	1
ENE	0	0	0	0	0	0	2	1	0	0	0	0	3
E	0	0	0	0	0	0	1	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	1	0	0	0	1
SSE	0	0	0	0	1	2	7	3	1	0	0	0	14
S	0	0	0	0	0	1	2	1	0	0	0	0	4
SSW	0	0	0	0	0	1	3	0	0	1	0	0	5
SW	0	0	0	3	0	0	0	0	0	0	0	0	3
WSW	0	1	0	0	3	1	1	0	0	0	0	0	6
W	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	1	1	0	0	2	0	0	0	0	0	4
NW	0	0	0	1	1	0	1	0	0	0	0	0	3
NNW	0	0	0	1	0	0	0	0	0	0	0	0	1
TOTALS	0	1	1	6	5	6	21	7	2	1	0	0	50

NUMBER OF VALID HOURS 50
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 50

METEOROLOGY

October - December
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04100100-04123123
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL C
SLIGHTLY UNSTABLE (-1.7 < DT/DZ ≤ -1.5 °C/100 METERS)

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	2	0	0	1	0	0	0	3
NE	0	0	0	0	0	0	0	1	0	0	0	0	1
ENE	0	0	0	1	0	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	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	2	4	5	1	0	0	0	12
SSE	0	0	1	0	0	0	8	6	4	0	2	0	21
S	0	0	0	1	1	3	4	0	1	2	1	0	13
SSW	0	0	0	2	1	1	2	1	0	0	0	0	7
SW	0	0	0	1	0	1	0	1	0	0	0	0	3
WSW	0	0	0	6	0	1	2	0	0	0	0	0	9
W	0	0	0	3	2	1	0	0	0	0	0	0	6
WNW	0	0	0	0	1	1	0	0	0	0	0	0	2
NW	0	0	0	0	1	1	2	0	0	0	0	0	4
NNW	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTALS	0	0	1	14	6	15	23	14	7	2	3	0	85

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

PASQUILL D
NEUTRAL (-1.5 < DT/DZ ≤ -0.5 °C/100 METERS)

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	1	8	7	3	0	0	0	0	0	0	19
NNE	0	0	3	14	13	12	6	1	2	0	0	0	51
NE	0	1	0	0	5	5	5	3	1	0	0	0	20
ENE	1	0	1	1	2	0	2	1	1	0	0	0	9
E	0	0	1	1	2	6	1	2	5	0	0	0	18
ESE	0	0	0	1	1	9	18	12	4	1	0	0	46
SE	0	0	1	4	6	10	37	24	10	1	0	0	93
SSE	0	0	1	3	8	18	20	10	3	11	4	0	78
S	0	2	1	4	3	6	12	5	4	2	5	0	44
SSW	0	0	0	5	4	5	11	9	11	2	0	0	47
SW	0	1	1	5	1	3	7	7	2	1	0	0	28
WSW	0	0	0	2	3	2	6	4	0	0	0	0	17
W	0	0	0	4	9	3	2	1	0	0	0	0	19
WNW	0	0	0	3	2	1	0	0	0	0	0	0	6
NW	0	0	1	6	4	6	6	1	0	0	0	0	24
NNW	0	1	1	5	3	12	3	0	0	0	0	0	25
TOTALS	1	5	12	66	73	101	136	80	43	18	9	0	544

NUMBER OF VALID HOURS 544
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 544

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

METEOROLOGY

October - December
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04100100-04123123
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL E
SLIGHTLY STABLE (-0.5 < DT/DZ ≤ 1.5 °C/100 METERS)

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	4	5	9	6	2	0	0	0	0	0	27
NNE	0	0	1	11	15	14	6	4	1	0	0	0	52
NE	0	1	1	2	0	3	5	6	3	0	0	0	21
ENE	0	2	2	6	2	2	2	2	0	0	0	0	18
E	0	0	0	3	0	5	3	0	0	0	0	0	11
ESE	0	1	2	1	4	8	1	0	1	0	0	0	18
SE	0	1	0	1	5	1	1	1	0	0	0	0	10
SSE	0	0	0	1	1	1	3	0	0	0	0	0	6
S	0	0	1	0	1	2	0	0	0	0	0	0	4
SSW	0	0	0	0	1	0	0	0	0	0	0	0	1
SW	0	0	0	1	0	4	0	0	0	0	0	0	5
WSW	0	0	0	0	2	1	0	0	0	0	0	0	3
W	1	0	0	0	5	2	0	1	0	0	0	0	9
WNW	0	0	0	3	1	2	1	1	0	0	0	0	8
NW	0	0	0	4	2	2	0	0	0	0	0	0	8
NNW	0	1	1	6	5	3	3	0	0	0	0	0	19
TOTALS	2	6	12	44	53	56	27	15	5	0	0	0	220

NUMBER OF VALID HOURS 220
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 1
TOTAL HOURS FOR THE PERIOD 221

PASQUILL F
MODERATELY STABLE (1.5 < DT/DZ ≤ 4.0 °C/100 METERS)

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	3	5	3	2	7	0	0	0	0	0	21
NNE	2	0	1	16	38	55	22	5	0	0	0	0	139
NE	0	0	3	5	6	6	12	9	0	0	0	0	41
ENE	0	0	1	1	6	3	1	0	0	0	0	0	12
E	0	0	3	3	1	1	0	0	0	0	0	0	8
ESE	0	0	0	0	0	1	1	0	0	0	0	0	2
SE	0	0	0	1	0	1	0	0	0	0	0	0	2
SSE	0	0	0	2	1	0	0	0	0	0	0	0	3
S	0	0	0	0	1	0	1	0	0	0	0	0	2
SSW	0	0	0	2	0	0	0	0	0	0	0	0	2
SW	0	0	0	3	0	0	1	0	0	0	0	0	4
WSW	0	0	1	4	0	1	0	0	0	0	0	0	6
W	0	2	0	1	2	1	0	0	0	0	0	0	6
WNW	0	0	0	1	1	4	1	0	0	0	0	0	7
NW	0	0	3	0	1	0	0	0	0	0	0	0	4
NNW	0	0	0	2	3	1	0	0	0	0	0	0	6
TOTALS	2	3	15	46	63	76	46	14	0	0	0	0	265

NUMBER OF VALID HOURS 265
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 265

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2004)

METEOROLOGY

October - December
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 04100100-04123123
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL G
EXTREMELY STABLE (DT/DZ > 4.0 °C/100 METERS)

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	3	0	6	4	0	0	0	0	0	13
NNE	1	0	0	6	14	200	239	3	0	0	0	0	463
NE	0	0	0	4	6	9	9	0	0	0	0	0	28
ENE	0	0	2	0	3	1	2	0	0	0	0	0	8
E	0	0	2	1	3	2	0	0	0	0	0	0	8
ESE	0	0	0	0	1	0	2	0	0	0	0	0	3
SE	0	0	0	1	0	0	0	0	0	0	0	0	1
SSE	0	1	0	0	2	0	0	0	0	0	0	0	3
S	0	0	0	0	0	1	0	0	0	0	0	0	1
SSW	0	1	0	0	0	1	0	0	0	0	0	0	2
SW	1	0	0	2	0	0	0	0	0	0	0	0	3
WSW	0	0	0	1	1	1	0	0	0	0	0	0	3
W	0	1	0	2	0	2	0	0	0	0	0	0	5
WNW	0	0	0	0	3	2	1	0	0	0	0	0	6
NW	1	0	0	0	0	1	1	0	0	0	0	0	3
NNW	1	0	0	1	1	1	2	0	0	0	0	0	6
TOTALS	4	3	4	21	34	227	260	3	0	0	0	0	556

NUMBER OF VALID HOURS 556
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 556

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	1	8	22	20	19	13	0	0	0	0	0	84
NNE	3	0	5	48	80	283	274	17	4	0	0	0	714
NE	0	2	4	11	17	23	33	20	4	0	0	0	114
ENE	1	2	6	9	13	7	10	6	1	0	0	0	55
E	0	0	6	8	6	14	5	2	5	0	0	0	46
ESE	0	1	2	2	6	18	23	12	5	1	0	0	70
SE	0	1	1	7	11	14	42	30	13	1	0	0	120
SSE	0	1	2	6	13	23	50	23	8	11	6	0	143
S	0	2	3	7	14	25	36	11	5	4	7	0	114
SSW	0	1	0	11	15	28	28	10	11	3	0	0	107
SW	1	1	1	21	12	41	18	10	2	1	0	0	108
WSW	0	1	2	16	28	67	29	7	0	0	0	0	150
W	1	3	1	12	30	70	42	2	0	0	0	0	161
WNW	0	0	1	9	12	28	51	6	0	0	0	0	107
NW	1	0	4	12	10	12	13	1	0	0	0	0	53
NNW	1	2	2	15	13	17	11	0	0	0	0	0	61
TOTALS	9	18	48	216	300	689	678	157	58	21	13	0	2207

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