



# **SAN ONOFRE NUCLEAR GENERATING STATION**

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## **Annual Radioactive Effluent Release Report**

**2000**

**January - December**

## PREFACE

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

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

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

**S.O.N.G.S. 1**

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# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

January - December

## SECTION A. INTRODUCTION

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

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

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## SECTION B. GASEOUS EFFLUENTS

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

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

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

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

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

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

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.

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TABLE 1A

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	<LLD	<LLD	3.00E+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	
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	7.09E-8	5.00E+1
D. Tritium				
1. Total release	Ci	3.42E-1	<LLD	2.50E+1
2. Average release rate for period	μCi/sec	4.35E-2	0.00E+0	
3. Percent of applicable limit	% MPC	2.83E-4	0.00E+0	
4. Percent Effluent Concentration Limit	% ECL	5.65E-4	0.00E+0	

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TABLE 1A (Continued)

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
<b>A. Fission and activation gases</b>				
1. Total release	Ci	<LLD	<LLD	3.00E+1
2. Average release rate for period	μCi/sec	0.00E+0	0.00E+0	
3. Percent of applicable limit	% MPC	0.00E+0	0.00E+0	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	0.00E+0	
<b>B. Iodines</b>				
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	
<b>C. Particulates <sup>(1)</sup></b>				
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	1.80E-7	7.62E-8	5.00E+1
<b>D. Tritium</b>				
1. Total release	Ci	4.11E-1	9.43E-1	2.50E+1
2. Average release rate for period	μCi/sec	5.17E-2	1.19E-1	
3. Percent of applicable limit	% MPC	3.36E-4	7.71E-4	
4. Percent Effluent Concentration Limit	% ECL	6.72E-4	1.54E-3	

(1) On 7/31/00, for approximately 5 hours Plant Vent Stack Particulate and Iodine sample was not collected. There was no measurable activity in the previous or subsequent samples. An investigation was conducted and documented in Action Request 000701588.

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TABLE 1C

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES  
CONTINUOUS MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation gases					
krypton-85	Ci	<LLD	<LLD	<LLD	<LLD
krypton-85m	Ci	<LLD	<LLD	<LLD	<LLD
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	<LLD	<LLD
xenon-133	Ci	<LLD	<LLD	<LLD	<LLD
xenon-133m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	<LLD	<LLD	<LLD	<LLD
2. Iodines					
iodine-131	Ci	<LLD	<LLD	<LLD	<LLD
iodine-133	Ci	<LLD	<LLD	<LLD	<LLD
iodine-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	<LLD	<LLD	<LLD	<LLD
3. Particulates					
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	<LLD	<LLD	<LLD	<LLD
cesium-137	Ci	<LLD	<LLD	<LLD	<LLD
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	*
strontium-90	Ci	<LLD	<LLD	<LLD	*
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD

LLD Lower Limit of Detection; see Table 1D.

\* Fourth quarter analyses not available at report time; values will be included in the following Annual Report.

**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 (2000)

S.O.N.G.S. 1

TABLE 1D

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION  
CONTINUOUS MODE

Radionuclides	LLD ( $\mu\text{Ci}/\text{cc}$ )
1. Fission and activation gases	
krypton-85	2.50E-5
krypton-85m	6.00E-8
krypton-87	3.10E-7
krypton-88	2.10E-7
xenon-133	1.90E-7
xenon-133m	4.80E-7
xenon-135	6.30E-8
xenon-135m	2.40E-6
xenon-138	4.10E-6
2. Iodines	
iodine-131	2.90E-13
iodine-133	2.80E-12
iodine-135	1.90E-10
3. Particulates	
barium-140	5.90E-13
cerium-141	6.60E-14
cerium-144	2.60E-13
cesium-134	1.70E-13
cesium-137	1.40E-13
cobalt-58	1.50E-13
cobalt-60	2.40E-13
iron-59	3.80E-13
lanthanum-140	1.20E-12
manganese-54	1.50E-13
molybdenum-99	7.90E-14
strontium-89	1.00E-14
strontium-90	1.00E-15
zinc-65	4.00E-13
4. gross alpha	1.00E-14
5. tritium	8.83E-8

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

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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	0.00E+0	0.00E+0	0.00E+0	0.00E+0
2. Percent Applicable Limit	%	0.00E+0	0.00E+0	0.00E+0	0.00E+0
3. Beta Air Dose	mrad	0.00E+0	0.00E+0	0.00E+0	0.00E+0
4. Percent Applicable Limit	%	0.00E+0	0.00E+0	0.00E+0	0.00E+0
B. Tritium, Iodine, Particulates (at the nearest receptor)					
1. Organ Dose	mrem	1.28E-5	0.00E+0	1.54E-5	3.53E-5
2. Percent Applicable Limit	%	1.70E-4	0.00E+0	2.05E-4	4.71E-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.

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## SECTION C. LIQUID EFFLUENTS

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

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

In addition, Table 2A lists:

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

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

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

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

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

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

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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TABLE 2A

## LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
<b>A. Fission and activation products</b>				
1. Total release (not including tritium, gases, alpha)	Ci	1.25E-4	5.21E-6	1.90E+1
2. Average diluted concentration during period	μCi/ml	7.81E-11	3.12E-12	
3. Percent of applicable limit	% MPC	3.91E-4	1.56E-5	
4. Percent Effluent Concentration Limit	% ECL	7.81E-3	3.12E-4	
<b>B. Tritium</b>				
1. Total release	Ci	6.10E-3	1.85E-3	1.90E+1
2. Average diluted concentration during period	μCi/ml	3.81E-9	1.11E-9	
3. Percent of applicable limit	% MPC	1.27E-4	3.69E-5	
4. Percent Effluent Concentration Limit	% ECL	3.81E-4	1.11E-4	
<b>C. Dissolved and entrained gases <sup>(1)</sup></b>				
1. Total release	Ci	<LLD	<LLD	1.90E+1
2. Average diluted concentration during period	μCi/ml	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	
<b>D. Gross alpha radioactivity</b>				
1. Total release	Ci	<LLD	<LLD	5.00E+1
<b>E. Volume of waste released (batch &amp; continuous, prior to dilution)</b>				
	liters	7.53E+6	1.11E+6	5.00E+0
<b>F. Volume of dilution water used during period</b>				
	liters	1.60E+9	1.67E+9	5.00E+0

(1) The Unit 1 monthly April Dissolved & Entrained (D&E) gas analyses for the Yard Drain Sump and Reheater Pit Sump were not performed. These sumps are open to the atmosphere and have historically shown no measurable D&E activity. This event is documented in AR 000500230.

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TABLE 2A (Continued)

## LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	4.61E-4	9.59E-6	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	2.70E-10	5.85E-12	
3. Percent of applicable limit	% MPC	1.62E-3	2.92E-5	
4. Percent Effluent Concentration Limit	% ECL	1.78E-2	5.85E-4	
B. Tritium				
1. Total release	Ci	3.16E+0	2.30E-4	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	1.85E-6	1.40E-10	
3. Percent of applicable limit	% MPC	6.16E-2	4.67E-6	
4. Percent Effluent Concentration Limit	% ECL	1.85E-1	1.40E-5	
C. Dissolved and entrained gases				
1. Total release	Ci	<LLD	<LLD	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	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	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)				
	liters	3.08E+5	9.50E+5	5.00E+0
F. Volume of dilution water used during period				
	liters	1.71E+9	1.64E+9	5.00E+0

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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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	1.25E-4	5.21E-6	6.72E-6	9.59E-6
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	*
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	*
strontium-90	Ci	<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	1.25E-4	5.21E-6	6.72E-6	9.59E-6
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.

\* Fourth quarter analyses not available at report time; values will be included in the following Annual Report.

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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-125	Ci	<LLD	<LLD	3.83E-5	<LLD
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	2.45E-5	<LLD
cesium-137	Ci	<LLD	<LLD	2.01E-4	<LLD
chromium-51	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-58	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-60	Ci	<LLD	<LLD	1.88E-4	<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	2.39E-6	<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	4.55E-4	<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 2C

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION  
CONTINUOUS MODE

Radionuclides	LLD ( $\mu\text{Ci/cc}$ )
1. Fission and activation products	
barium-140	3.30E-7
cerium-141	5.20E-8
cerium-144	2.30E-7
cesium-134	9.90E-8
chromium-51	4.20E-7
cobalt-58	8.70E-8
cobalt-60	1.30E-7
iodine-131	6.00E-8
iron-55	1.00E-6
iron-59	2.00E-7
lanthanum-140	2.40E-7
manganese-54	8.80E-8
molybdenum-99	3.50E-8
niobium-95	8.50E-8
strontium-89	5.00E-8
strontium-90	1.00E-8
technetium-99m	3.50E-8
zinc-65	2.20E-7
zirconium-95	1.50E-7
2. Dissolved and entrained gases	
xenon-133	3.10E-7
xenon-135	1.20E-7
3. gross alpha	1.00E-7

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TABLE 2C (Continued)

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION  
BATCH MODE

Radionuclides	LLD ( $\mu\text{Ci}/\text{cc}$ )
1. Fission and activation products	
antimony-125	1.70E-7
barium-140	3.30E-7
cerium-141	5.20E-8
cerium-144	2.30E-7
cesium-134	9.90E-8
cesium-137	8.60E-8
chromium-51	4.20E-7
cobalt-58	8.70E-8
cobalt-60	1.30E-7
iodine-131	6.00E-8
iron-55	1.00E-6
iron-59	2.00E-7
lanthanum-140	2.40E-7
manganese-54	8.80E-8
molybdenum-99	3.50E-8
niobium-95	8.50E-8
strontium-89	5.00E-8
strontium-90	1.00E-8
technetium-99m	3.50E-8
zinc-65	2.20E-7
zirconium-95	1.50E-7
2. Dissolved and entrained gases	
xenon-133	3.10E-7
xenon-135	1.20E-7
3. gross alpha	1.00E-7

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TABLE 2D

LIQUID EFFLUENTS-RADIATION DOSES AT THE LIQUID SITE BOUNDARY

	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A.					
1. Total body dose	mrem	1.35E-3	5.49E-5	2.70E-3	1.02E-4
2. Percent Applicable Limit	%	9.01E-2	3.66E-3	1.80E-1	6.82E-3
B.					
1. Limiting organ dose	mrem	2.06E-3	8.35E-5	5.24E-3	1.56E-4
2. Percent Applicable Limit	%	4.13E-2	1.67E-3	1.05E-1	3.13E-3
3. Limiting organ for period		Liver	Liver	GI-LLI	Liver

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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:	3015 minutes
3. Maximum time period for a batch release:	3015 minutes
4. Average time period for a batch release:	3015 minutes
5. Minimum time period for a batch release:	3015 minutes
6. Average saltwater flow during batch releases:	6000 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, evaporator bottoms	m <sup>3</sup>	N/A	N/A
	Ci	N/A	
b. Dry active waste (DAW), compactable and non-compactable *	m <sup>3</sup>	5.80E+2	3.00E+1
	Ci	5.09E+0	
c. Irradiated components, control rods	m <sup>3</sup>	N/A	N/A
	Ci	N/A	
d. Other	m <sup>3</sup>	N/A	N/A
	Ci	N/A	

NOTE: Total curie content estimated.

(\*) Material packaged in strong, tight containers of various sizes. One shipment was packaged in a DOT Type A over pack box.

N/A No shipment made.

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2. Estimate of major nuclide composition (by type of waste)		
a. not applicable	%	N/A
b. americium-241	%	1.64E-2
carbon-14	%	6.03E-1
cerium-144	%	2.57E-3
cesium-134	%	5.63E+0
cesium-137	%	4.21E+1
cobalt-60	%	3.22E+1
curium-242	%	7.00E-5
curium-243/244	%	3.90E-3
iron-55	%	1.21E+1
manganese-54	%	1.96E-4
nickel-59	%	4.24E-2
nickel-63	%	5.31E+0
niobium-94	%	1.70E-2
niobium-95	%	1.87E-1
plutonium-242	%	1.14E-5
plutonium-238	%	2.57E-2
plutonium-239/240	%	9.61E-3
plutonium-241	%	6.91E-1
ruthenium-106	%	1.00E-3
silver-110m	%	3.50E-4
strontium-90	%	2.05E-1
technetium-99	%	1.48E-3
tritium	%	3.73E-1
uranium-233	%	2.97E-6
uranium-238	%	2.69E-6
zirconium-95	%	2.34E-1
c. not applicable	%	N/A
d. not applicable	%	N/A

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3. Solid Waste Disposition		
Number of Shipments	Mode of Transportation	Destination
5 *	Kindrick Trucking Company Truck/Trailer	Envirocare, UT
1	Hitman Trucking Company Truck/Trailer	Barnwell, SC
2	Kindrick Trucking Company Truck/Trailer	Envirocare, UT
27	MHFLogistical Solutions Rail	Envirocare, UT

\* SONGS maintains contracts with vendors (ATG/GTS) that provide volume reduction services. These shipments were made from their processing facility. The five shipments made from these facilities 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

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## SECTION F. APPLICABLE LIMITS

### Gaseous Effluents - Applicable Limits

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

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

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

X/Q =  $1.30\text{E}-5 \text{ sec}/\text{m}^3$ ; the annual average atmospheric dispersion defined in the Unit 1 ODCM, Rev. 13.

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

where:  $F_i$  = fractional abundance of the  $i^{\text{th}}$  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

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

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

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

X/Q =  $1.30\text{E}-5 \text{ sec}/\text{m}^3$ ; the annual average atmospheric dispersion defined in the Unit 1 ODCM, Rev. 13.

- $\text{ECL}_{\text{eff}}$  = 
$$\frac{1}{\sum_{i=1}^n \frac{F_i}{\text{ECL}_i}}$$

where:  $F_i$  = fractional abundance of the  $i^{\text{th}}$  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

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

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## Liquid Effluents - Applicable Limits

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

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

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

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

where:  $F_i$  = fractional abundance of the  $i^{\text{th}}$  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

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

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

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

- $\text{ECL}_{\text{eff}}$  = 
$$\frac{1}{\sum_{i=1}^n \frac{F_i}{\text{ECL}_i}}$$

where:  $F_i$  = fractional abundance of the  $i^{\text{th}}$  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

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

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SECTION G. ESTIMATION OF ERROR

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

Sources of error for gaseous effluents - batch releases are:

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

Sources of error for gaseous effluents - continuous releases are:

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

Sources of error for liquid effluents - batch releases are:

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

Sources of error for liquid effluents - continuous releases are:

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

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

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

where:  $\sigma_i$  = Error associated with each component.

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### SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS

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

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

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

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

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

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TABLE 1

SOURCE	Dose * (millirems)				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS	1)	2)	3)	4)	5)
Whole Body	1.35E-3	5.49E-5	2.70E-3	1.02E-4	4.21E-3
Organ	6)	7)	8)	9)	10)
Organ	2.06E-3	8.35E-5	5.24E-3	1.56E-4	5.37E-3
AIRBORNE EFFLUENTS	11)	12)	13)	14)	15)
Tritium, Iodines, and Particulates	1.65E-4	0.00E+0	3.47E-4	6.65E-4	1.18E-3
NOBLE GASES **	16)	17)	18)	19)	20)
Gamma	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Beta	21)	22)	23)	24)	25)
Beta	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
DIRECT RADIATION	26)	27)	28)	29)	30)
DIRECT RADIATION	7.32E-2	1.12E-1	1.25E-1	9.86E-2	3.43E-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.

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6. This value was calculated using the methodology of the ODCM.
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 GI-LLI received the maximum dose primarily by the saltwater fish pathway.
10. This value was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.
11. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
12. There was no activity detected during the release period, therefore the reported organ dose was 0.00E+0 mrem.
13. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
14. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
15. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
16. There was no activity detected during the release period, therefore the reported air dose for gamma radiation was 0.00E+0 mrad.
17. There was no activity detected during the release period, therefore the reported air dose for gamma radiation was 0.00E+0 mrad.
18. There was no activity detected during the release period, therefore the reported air dose for gamma radiation was 0.00E+0 mrad.
19. There was no activity detected during the release period, therefore the reported air dose for gamma radiation was 0.00E+0 mrad.
20. There was no activity detected during the release period, therefore the reported air dose for gamma radiation was 0.00E+0 mrad.
21. There was no activity detected during the release period, therefore the reported air dose for beta radiation was 0.00E+0 mrad.
22. There was no activity detected during the release period, therefore the reported air dose for beta radiation was 0.00E+0 mrad.
23. There was no activity detected during the release period, therefore the reported air dose for beta radiation was 0.00E+0 mrad.
24. There was no activity detected during the release period, therefore the reported air dose for beta radiation was 0.00E+0 mrad.

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25. There was no activity detected during the release period, therefore the reported air dose for beta radiation was 0.00E+0 mrad.
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 W 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	9.01E-2	3.66E-3	1.80E-1	6.82E-3	1.40E-1
Organ	4.13E-2	1.67E-3	1.05E-1	3.13E-3	5.37E-2
AIRBORNE EFFLUENTS					
Tritium, Iodines, and Particulates	2.20E-3	0.00E+0	4.62E-3	8.87E-3	7.87E-3
NOBLE GASES					
Gamma	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Beta	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

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 29, 2000, revision 16 to the Unit 1 Offsite Dose Calculation Manual (ODCM) was adopted and published. This revision incorporated land use census results only.

Minor format changes, correction of typographical errors, and removal of previously blank pages were also made and are described in the attached List of Affected Pages.

Per NRC Generic Letter 89-01, no safety reviews were required or performed for editorial changes or 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

The following is a complete list of the changes:

OLD	NEW	CHANGE	REASON
TOC		Renumbered pages as necessary based on changes in the body of the ODCM.	F
2-21		Corrected a typo in the Cs-137 value of Table 2-5	F
	2-24	Added an R <sub>i</sub> for San Mateo Pt. Homes	A
		Removed previously deleted pages: 2-25, 2-27, 2-28, 2-30, 2-31, 2-32, 2-33, 2-35, 2-36, 2-37, 2-39, 2-41, 2-44, 2-45, 2-47, 2-50, 2-51, 2-53, 2-55.	F

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On July 20, 2000, revision 17 to the Unit 1 Offsite Dose Calculation Manual (ODCM) was adopted and published. Incorporated into this revision were:

1. Revised Liquid Setpoint equation to adjust for low (<100 KeV) energy gamma emitters,
2. Added the Plant Information Monitoring System to Section 4,
3. Deleted the Investigative Report definition,
4. Revised the Source Check definition, and
5. Removed reference to the Monitor Tanks.

Safety evaluations were provided for each of the above changes with the exception of items 3 and 5. The requirement for an Investigative Report was added to the ODCM at the time that the RETS were transferred from the Technical Specifications. There existed a need to document each occurrence of failure to meet Surveillance Requirements and/or Action Statements related to the ODCM. The ODCM will now require performance of an evaluation based on the significance of the event in accordance with the site Corrective Action Program.

The Unit 1 Monitor Tanks were removed and the associated piping was capped as part of the Unit 1 Decommissioning Project under PCA-175-RWL-3. The tanks were previously abandoned under SAFSTOR. The Unit 1 ODCM Table 1-1 and Figure 4-1 are being updated to reflect this new plant configuration.

Minor format changes, correction of typographical errors, and removal of previously blank pages have been made and are described in the attached List of Affected Pages.

Per NRC Generic Letter 89-01, no safety reviews were required or performed for editorial changes or 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

The following is a complete list of the changes:

OLD	NEW	CHANGE	REASON
Throughout Section 1		Changed $\sum_i C_{yi}$ to $\sum_i C'_{yi}$	R
1-3		Removed reference to the Monitor Tanks	D
1-12		Added Factor $C_{xe}$ to equation 1-3	A
		Changed definition of $\sum_i C_{yi}$	R
1-13		Divided STEP 3 into two steps (3 & 4) and reworded	R
		Added equation 1-6 for $CPM_{max}$	A

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1-14	Changed definition of $\Sigma_i C_{yi}$ Corrected misspelled word	R F
1-15	Added Factor $C_{xe}$ to equation 1-3 Changed definition of $\Sigma_i C_{yi}$ Reordered the equation factor definitions to match the order in the equation	A R F
1-16	Divided STEP 3 into two steps (3 & 4) and reworded Added equation 1-6 for $CPM_{max}$	R A
1-17	Changed definition of $\Sigma_i C_{yi}$	R
1-18	Changed definition of $\Sigma_i C_{yi}$	R
1-23	Changed procedure reference and title Single spaced	R F
4-1	Changed 4.1.1.B.3 from Investigative Report to Corrective Action Program	R
4-2	Added 'Effluent Line' to item 1.d. Added PIMS to Table 4-1 Changed '*' to '1' Added note 2	F A F A
4-3	Added ACTION 25	A
4-5	Added PIMS to Table 4-2 Added 'a.' to first item in section 2	A F
4-6	Added Table Notation (5), (6), and (7)	A
4-7	Changed 4.2.1.B.3 from Investigative Report to Corrective Action Program	R
4-8	Added PIMS to Table 4-3 Added note 6	A A
4-9	Added ACTION 26	A
4-11	Added PIMS to Table 4-4 Added Table Notation (4), (5), and (6)	A A
4-13	Updated drawing per U1 Operations	R
6-1	Removed previously deleted line 6.1.5	F
6-2	Deleted INVESTIGATIVE REPORT definition Renumbered equations	R F
6-3	Revised SOURCE CHECK definition, Removed previously deleted lines 6.1.10, 6.1.11, 6.1.13, 6.1.14, and 6.1.18 Renumbered equations	R F F
6-4	Removed previously deleted lines 6.1.21, 6.1.22 Renumbered equations	F F

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## SECTION J. CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

### Permanent Removal of the Liquid Radwaste System Monitor Tanks

The Unit 1 Monitor Tanks, S1-RWL-D-21A&B were abandoned under SAFSTOR and all appropriate procedures changed in March 2000. Later that same year the tanks were physically demolished and removed from site. Unit 1 was permanently shutdown in 1992 with the last monitor tank release occurring in April 1993.

During the period in which the monitor tanks were left unused, residual contamination in the tanks continued to act as a measurable radiation source despite being filled with clean water for shielding purposes. As part of the review of the relocation of the HP control point and control room to the new location in support of decommissioning, it was identified that personnel working in the new 3rd Point Entry and Operations offices would incur unnecessary exposure from these tanks due to the elevated background. The background also interfered with the new radiation monitoring instrumentation. Since the tanks would eventually need to be removed as part of decommissioning of Unit 1, it was decided to proceed with their removal relatively early in the schedule and in keeping with the ALARA principle, reduce worker dose.

The monitor tanks provided a method for segregating low activity waste that contained relatively high concentrations of chemical contaminants, thereby minimizing the potential for premature exhaustion of the ion exchange beds. Each monitor tank had a capacity of 3750 gallons compared to a HUT (3 total) that has a capacity of 55,000 gallons each. Once the plant ceased commercial operation and entered SAFSTOR, there was a concurrent reduction in the volume of liquid radwaste being generated and in the overall system capacity needed to collect and process waste. In addition, the refueling water storage tank (capacity 240,000 gallons) is currently being used as a storage tank for water from the refueling cavity. Estimates of the waste generated by decommissioning activities should not exceed the storage capacity of the HUTs and the rate at which the waste can be processed and released while meeting existing administrative dose limits.

The reduction in liquid radwaste generation experienced to date during Unit 1 decommissioning has eliminated the need for operating alignments that utilize the Monitor Tanks. The Monitor Tanks are no longer needed because the three Holdup Tanks (RLC-C-20A, B and C) are sufficient to receive and store all of the waste that is generated. Removal of the monitor tanks will not increase the amount of activity released in liquid effluents or the resultant dose to a member of the public.

Since the monitor tanks were listed in the Unit 1 ODCM (Table 1-1), they were deleted as a credited release point in Revision 17, issued July 20, 2000, subsequent to their physical removal from site. The removal of the monitor tanks will not affect the processing capacity of the radwaste treatment system and will not result in any increase in the amount of activity released in liquid radwaste during decommissioning. Releases from Unit 1 will continue to be performed in accordance with existing Station procedures and administrative limits and will not exceed the limits of 10CFR20 or 10CFR50 appendix I.

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The following Safety Evaluation was generated for placing the monitor tanks into SAFSTOR, in support of procedure S01-4-51 change package. (March 2000)

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

No.

Only two accidents previously analyzed for the operating license are relevant to the defueled mode: (1) Loss of Offsite Power, and (2) Fuel Handling Accident. The removal of the Monitor Tanks from service impacts only liquid radwaste processing methods, which do not affect any equipment or activities which might initiate one of these accidents.

Most of the liquid radwaste system, including these tanks, is Not Required for Operation (NRO). The components which control the release to the ocean, the radiation monitor, automatic shutoff valve and associated controls, are Required for Operation (RO). The changes to the operating instructions affect only the operation of the NRO portions of the radwaste system. There is no impact on the RO function -- the ability to control the system discharges so that only acceptable amounts and concentrations of radioactive effluent are released to the environment. The procedure changes do not increase the probability of an unacceptable release of liquid radwaste.

The changes to the liquid radwaste operations do not affect fire protection systems; consequently, there is no increase in the probability of initiating a fire.

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

No.

The procedure changes affect only operation of the liquid radwaste system; thus, there is no impact on the consequences of a (1) Loss of Offsite Power or a (2) Fuel Handling Accident.

The tanks will be drained. The lines connected to the tanks will be isolated by closing or de-energizing interfacing valves. The integrity of the radwaste piping systems will be maintained; consequently, the consequences of natural phenomenon, such as a tornado or earthquake, will not be increased by the procedure changes.

The changes will not adversely affect the ability to fight a fire in the area.

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

**No.**

The procedure changes affect only operation of NRO radwaste equipment; consequently, there is no interaction with RO equipment and no increase the probability of its malfunction.

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

**No.**

The procedure changes affect only operation of NRO radwaste equipment. This equipment does not have the potential for mitigating the consequences of a malfunction of any type of RO equipment: thus, the changes will not increase these consequences.

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

**No.**

As discussed in Question 1, the procedure changes will not affect the RO function of the liquid radwaste system which controls the release of radioactive effluent to the environment. There is no impact on RO systems or equipment.

Due to the decreased demand on the radwaste systems during SAFSTOR, the reduced radwaste processing capacity without the two tanks will be adequate. The integrity of the piping systems will be maintained by complete isolation of the tanks. For these reasons, the procedure changes will not create the possibility of a different type of accident, such as a spill or rupture.

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

**No.**

The procedure changes remove the NRO tanks from service. The changes do not affect the RO function of the radwaste system, controlled release of effluent, or any RO equipment. Removing the tanks from service will not challenge the radwaste system because the amount of radwaste generated by the defueled plant is much less than that due to normal operation. Consequently, the changes do not create the possibility of a malfunction of any equipment that is important to safety.

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

No.

The procedure changes will isolate and abandon the radwaste tanks that are no longer needed to process the amount of liquid radwaste generated with the plant permanently defueled. The radwaste system is not mentioned in the Permanently Defueled Technical Specification (PDTS); consequently, there is no reduction in the margin of safety defined by the PDTS.

The liquid radwaste management operations described in the Defueled Safety Analysis Report (DSAR ) do not include use of the Monitor Tanks, consequently, there is no reduction in the margin of safety defined by the DSAR.

Since the tanks had been drained, valved out of the system and abandoned under SAFSTOR, station procedures allowed the removal to be evaluated using only a one-question safety evaluation so long as certain conditions are met. Safety Evaluation per PCA-175-RWL-3/NSR#309:

UNIT 1 10CFR50.59 SAFETY EVALUATION SCREENING

1. Could this decommissioning activity impact the design, function or method of performing the function of an RO SSC as described in the DSAR, through direct, indirect or secondary effects?

NO. Monitor Tanks S1-RWL-D-21A&B create a radiation background level to the monitoring equipment in the new 3rd Point Entry (bldg. A-51). This modification will remove the tanks and cut & cap the associated lines. Per DSAR, these tanks have been drained and abandoned under SAFSTOR. Per the Q-List, the monitor tanks and its associated lines are NSR/NRO, and do not impact the safety function of any RO component. This change does not impact the liquid radwaste discharge flow path through CV-111, a fail closed NSRAQ/RO valve which closes automatically if high radioactivity is sensed in the effluent being discharged to the ocean. The lines being capped are upstream of this valve.

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S.O.N.G.S. 1

SECTION K. MISCELLANEOUS

- Yard Drain Sump Overflow

The Unit 1 Yard Drain sump overflowed to the PMF Catch Basin due to heavy rainfall twice in 2000. Since there was no detectable activity in the grab samples taken during the overflows, there were no dose consequences as a result of these unplanned, unmonitored releases.

Start Date/Time	Stop Date/Time	Duration (minutes)	Activity ( $\mu\text{Ci/ml}$ )	Estimated Release (Curies)	Estimated Whole Body Dose (mrem)	Estimated Organ Dose (mrem)
2/22/00 @ 1440	2/22/00 @ 1600	80	<LLD	0.00E+0	0.00E+0	0.00E+0
2/23/00 @ 1524	2/23/00 @ 1555	31	<LLD	0.00E+0	0.00E+0	0.00E+0

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## EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 2000 - December 31, 2000

S.O.N.G.S. 1			
Monitor	Inoperability Period	Inoperability Cause	Explanation
R-1218 Liquid Radwaste Discharge Line Monitor	06/18/00 - 09/17/00	Erratic behavior	Extensive electrical problems required complete circuit board rework using obsolete parts. Waiting for design upgrade.
	09/17/00 - present	Radmonitor upgrade design change	Design change upgrade modification installed a new instrument and connected to Plant Information Monitoring System (PIMS) in conjunction with relocation of the Control Room.
R-1254 Plant Vent Stack Particulate and Iodine Sampler	06/26/00 - 08/15/00	Decommissioning work of electrical distribution realignment; heat trace inoperable	Electrical bus work to support decommissioning deenergized heat trace making P/I non-functional.
Plant Vent Stack Monitor	07/05/00 - 08/15/00	Radmonitor upgrade design change	Design change upgrade modification installed new instrument communications and connected to PIMS in conjunction with relocation of the Control Room.
R-2100 Reheater Pit Sump Monitor	08/02/00 - 11/16/00	Radmonitor upgrade design change	Design change upgrade modification installed a new instrument and connected to PIMS in conjunction with relocation of the Control Room.
R-2101 Yard Drain Sump Monitor	07/27/00 - 11/16/00	Radmonitor upgrade design change	Design change upgrade modification installed a new instrument and connected to PIMS in conjunction with relocation of the Control Room.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

S.O.N.G.S. 1

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

- Gaseous releases totaled  $1.70\text{E}+0$  curies of which noble gases were  $0.00\text{E}+0$  curies, iodines were  $0.00\text{E}+0$  curies, particulates were  $0.00\text{E}+0$  curies, and tritium was  $1.70\text{E}+0$  curies.
- The radiation doses from gaseous releases were: (a) gamma air dose:  $0.00\text{E}+0$  mrad at the site boundary, (b) beta air dose:  $0.00\text{E}+0$  mrad at the site boundary, organ dose:  $1.18\text{E}-3$  mrem at the nearest receptor.
- Liquid releases totaled  $3.17\text{E}+0$  curies of which particulates and iodines were  $6.02\text{E}-4$  curies, tritium was  $3.17\text{E}+0$  curies, and noble gases were  $0.00\text{E}+0$  curies.
- The radiation doses from liquid releases were: (a) total body:  $4.21\text{E}-3$  mrem, (b) limiting organ:  $5.37\text{E}-3$  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 (2000)

January - December

## SECTION A. INTRODUCTION

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

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

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

## SECTION B. GASEOUS EFFLUENTS

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

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

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

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

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

Table 1C, "Gaseous Effluents-Ground Level Releases," provides the systematic listing 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 (2000)

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	2.66E+1	2.24E+1	3.00E+1
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	3.38E+0	2.85E+0	
3. Percent of applicable limit	% MPC	8.45E-3	8.17E-3	
4. Percent Effluent Concentration Limit	% ECL	1.70E-2	1.91E-2	
B. Iodines				
1. Total iodine-131	Ci	4.37E-5	5.88E-5	1.90E+1
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	5.56E-6	7.48E-6	
3. Percent of applicable limit	% MPC	2.67E-5	3.59E-5	
4. Percent Effluent Concentration Limit	% ECL	1.33E-5	1.79E-5	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	1.32E-5	9.01E-6	1.60E+1
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	1.68E-6	1.15E-6	
3. Percent of applicable limit	% MPC	1.46E-6	1.10E-6	
4. Percent Effluent Concentration Limit	% ECL	3.61E-6	2.75E-6	
5. Gross alpha activity	Ci	4.88E-6	5.77E-6	5.00E+1
D. Tritium				
1. Total release	Ci	1.81E+1	1.80E+1	2.50E+1
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	2.30E+0	2.29E+0	
3. Percent of applicable limit	% MPC	5.53E-3	5.49E-3	
4. Percent Effluent Concentration Limit	% ECL	1.11E-2	1.10E-2	

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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	1.37E+1	4.08E+1	3.00E+1
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	1.73E+0	5.13E+0	
3. Percent of applicable limit	% MPC	8.56E-3	1.26E-2	
4. Percent Effluent Concentration Limit	% ECL	2.78E-2	2.40E-2	
B. Iodines				
1. Total iodine-131	Ci	8.96E-5	1.41E-3	1.90E+1
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	1.13E-5	1.77E-4	
3. Percent of applicable limit	% MPC	5.41E-5	8.51E-4	
4. Percent Effluent Concentration Limit	% ECL	2.71E-5	4.26E-4	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	2.05E-4	3.19E-4	1.60E+1
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	2.58E-5	4.02E-5	
3. Percent of applicable limit	% MPC	2.50E-5	1.85E-5	
4. Percent Effluent Concentration Limit	% ECL	6.60E-5	4.99E-5	
5. Gross alpha activity	Ci	1.03E-5	8.52E-6	5.00E+1
D. Tritium				
1. Total release	Ci	1.87E+1	1.91E+1	2.50E+1
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	2.35E+0	2.40E+0	
3. Percent of applicable limit	% MPC	5.65E-3	5.77E-3	
4. Percent Effluent Concentration Limit	% ECL	1.13E-2	1.15E-2	

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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	2.30E+0	2.73E+0	4.42E+0	3.18E+0
krypton-85	Ci	<LLD	<LLD	<LLD	<LLD
krypton-85m	Ci	<LLD	<LLD	<LLD	<LLD
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	<LLD	<LLD
xenon-133	Ci	2.41E+1	1.94E+1	8.20E+0	3.42E+1
xenon-133m	Ci	<LLD	<LLD	<LLD	6.59E-1
xenon-135	Ci	<LLD	<LLD	2.80E-2	4.80E-1
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	2.64E+1	2.21E+1	1.26E+1	3.85E+1
2. Iodines					
iodine-131	Ci	4.37E-5	5.88E-5	8.96E-5	1.41E-3
iodine-132	Ci	<LLD	<LLD	1.67E-5	1.32E-3
iodine-133	Ci	1.21E-4	1.57E-4	2.08E-4	1.40E-4
iodine-135	Ci	<LLD	<LLD	4.98E-5	1.16E-5
Total for period	Ci	1.65E-4	2.16E-4	3.64E-4	2.88E-3

LLD Lower Limit of Detection; see Table 1D.

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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					
antimony-122	Ci	<LLD	<LLD	6.34E-7	3.86E-7
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
bromine-82	Ci	3.50E-5	3.95E-5	7.13E-5	1.19E-4
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	1.84E-6	<LLD
cesium-134	Ci	<LLD	<LLD	8.74E-6	1.82E-6
cesium-137	Ci	1.15E-5	9.01E-6	1.90E-4	7.99E-5
cesium-138	Ci	<LLD	<LLD	1.26E-4	<LLD
chromium-51	Ci	<LLD	<LLD	<LLD	1.56E-5
cobalt-57	Ci	<LLD	<LLD	<LLD	1.42E-7
cobalt-58	Ci	1.67E-6	<LLD	3.71E-6	2.07E-4
cobalt-60	Ci	<LLD	<LLD	1.82E-7	1.03E-5
iron-59	Ci	<LLD	<LLD	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	<LLD	<LLD	7.29E-7	2.54E-6
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	<LLD	<LLD	<LLD	1.41E-6
niobium-97	Ci	<LLD	<LLD	<LLD	6.61E-7
sodium-24	Ci	<LLD	<LLD	3.40E-5	1.45E-6
strontium-89	Ci	<LLD	<LLD	<LLD	*
strontium-90	Ci	<LLD	<LLD	<LLD	*
technetium-99m	Ci	<LLD	<LLD	5.97E-6	1.30E-6
tungsten-187	Ci	<LLD	<LLD	1.18E-5	1.02E-6
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	<LLD	<LLD	<LLD	6.54E-7

LLD Lower Limit of Detection; see Table 1D.

\* Fourth quarter analyses not available at report time; values will be included in the following Annual Report.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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	1.82E-1	2.68E-1	1.08E+0	1.83E+0
krypton-85m	Ci	<LLD	<LLD	<LLD	<LLD
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	<LLD	<LLD
xenon-131m	Ci	<LLD	<LLD	<LLD	1.75E-2
xenon-133	Ci	<LLD	1.46E-3	<LLD	4.07E-1
xenon-133m	Ci	<LLD	<LLD	<LLD	5.57E-3
xenon-135	Ci	<LLD	<LLD	<LLD	1.67E-3
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	1.82E-1	2.70E-1	1.08E+0	2.26E+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 (2000)

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

TABLE 1D

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION  
CONTINUOUS MODE

Radionuclides	LLD ( $\mu\text{Ci}/\text{cc}$ )
1. Fission and activation gases	
krypton-85	2.50E-5
krypton-85m	6.00E-8
krypton-87	3.10E-7
krypton-88	2.10E-7
xenon-133m	4.80E-7
xenon-135	6.30E-8
xenon-135m	2.40E-6
xenon-138	4.10E-6
2. Iodines	
iodine-132	3.80E-13
iodine-135	1.50E-12
3. Particulates	
antimony-122	9.00E-12
barium-140	3.00E-11
cerium-141	3.90E-12
cerium-144	1.70E-11
cesium-134	1.00E-11
cesium-138	7.80E-10
chromium-51	3.50E-11
cobalt-57	2.20E-12
cobalt-58	9.10E-12
cobalt-60	1.50E-11
iron-59	2.20E-11
lanthanum-140	2.00E-11
manganese-54	9.30E-12
molybdenum-99	2.10E-12
niobium-95	8.60E-12
niobium-97	8.40E-12
sodium-24	1.80E-11
strontium-89	1.00E-13
strontium-90	1.00E-14
technetium-99m	2.90E-12
tungsten-187	2.80E-11
zinc-65	2.50E-11
zirconium-95	1.50E-11

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

TABLE 1D (Continued)

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION  
BATCH MODE

Radionuclides	LLD ( $\mu\text{Ci}/\text{cc}$ )
1. Fission and activation gases	
krypton-85m	2.80E-6
krypton-87	1.30E-5
krypton-88	1.00E-5
xenon-131m	1.00E-4
xenon-133	8.30E-6
xenon-133m	2.50E-5
xenon-135	3.20E-6
xenon-135m	4.10E-5
xenon-138	6.10E-5

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

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	4.56E-3	4.90E-3	6.70E-3	6.53E-3
2. Percent Applicable Limit	%	4.56E-2	4.90E-2	6.70E-2	6.53E-2
3. Beta Air Dose	mrad	5.06E-3	4.54E-3	3.84E-3	7.99E-3
4. Percent Applicable Limit	%	2.53E-2	2.27E-2	1.92E-2	4.00E-2
B. Tritium, Iodine, Particulates (at the nearest receptor)					
1. Organ Dose	mrem	5.73E-4	5.81E-4	8.25E-4	1.80E-3
2. Percent Applicable Limit	%	3.82E-3	3.87E-3	5.50E-3	1.20E-2

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

TABLE 1F

GASEOUS EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	6 releases
2. Total time period for batch releases:	2375.0 minutes
3. Maximum time period for a batch release:	583.0 minutes
4. Average time period for a batch release:	395.8 minutes
5. Minimum time period for a batch release:	174.0 minutes

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

## SECTION C. LIQUID EFFLUENTS

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

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

In addition, Table 2A lists:

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

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

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

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

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

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

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

TABLE 2A

## LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	9.51E-3	1.11E-2	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	1.26E-11	1.46E-11	
3. Percent of applicable limit	% MPC	2.22E-5	3.13E-5	
4. Percent Effluent Concentration Limit	% ECL	1.39E-4	3.32E-4	
B. Tritium				
1. Total release	Ci	1.34E+2	4.04E+2	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	1.77E-7	5.32E-7	
3. Percent of applicable limit	% MPC	5.91E-3	1.77E-2	
4. Percent Effluent Concentration Limit	% ECL	1.77E-2	5.32E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	5.40E-2	8.14E-3	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	7.14E-11	1.07E-11	
3. Percent of applicable limit	% MPC	3.57E-5	5.36E-6	
4. Percent Effluent Concentration Limit	% ECL	3.57E-5	5.36E-6	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)	liters	3.80E+7	3.95E+7	5.00E+0
F. Volume of dilution water used during period	liters	7.56E+11	7.60E+11	5.00E+0

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

TABLE 2A (Continued)

## LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
<b>A. Fission and activation products</b>				
1. Total release (not including tritium, gases, alpha)	Ci	1.44E-2	3.44E-2	1.90E+1
2. Average diluted concentration during period	μCi/ml	1.88E-11	5.53E-11	
3. Percent of applicable limit	% MPC	4.47E-5	7.47E-5	
4. Percent Effluent Concentration Limit	% ECL	4.73E-4	5.77E-4	
<b>B. Tritium</b>				
1. Total release	Ci	1.33E+3	5.33E+2	1.90E+1
2. Average diluted concentration during period	μCi/ml	1.73E-6	8.56E-7	
3. Percent of applicable limit	% MPC	5.77E-2	2.85E-2	
4. Percent Effluent Concentration Limit	% ECL	1.73E-1	8.56E-2	
<b>C. Dissolved and entrained gases <sup>(1)</sup></b>				
1. Total release	Ci	1.02E+0	6.95E-1	1.90E+1
2. Average diluted concentration during period	μCi/ml	1.33E-9	1.11E-9	
3. Percent of applicable limit	% MPC	6.67E-4	5.57E-4	
4. Percent Effluent Concentration Limit	% ECL	6.67E-4	5.57E-4	
<b>D. Gross alpha radioactivity</b>				
1. Total release	Ci	<LLD	<LLD	5.00E+1
<b>E. Volume of waste released (batch &amp; continuous, prior to dilution)</b>				
	liters	4.13E+7	3.68E+7	5.00E+0
<b>F. Volume of dilution water used during period</b>				
	liters	7.68E+11	6.23E+11	5.00E+0

(1) The Unit 3 monthly April Dissolved & Entrained (D&E) gas analysis for the Turbine Plant System was not performed. These sumps are open to the atmosphere and have historically shown no measurable D&E activity. This event is documented in AR 000500230.

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

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	*
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	*
strontium-90	Ci	<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.

\* Fourth quarter analyses not available at report time; values will be included in the following Annual Report.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

TABLE 2B (Continued)

LIQUID EFFLUENTS  
BATCH MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation products					
antimony-122	Ci	<LLD	<LLD	2.02E-5	<LLD
antimony-125	Ci	5.46E-3	4.31E-3	6.52E-3	2.09E-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	1.43E-4	8.13E-4	9.54E-4	4.99E-4
cesium-137	Ci	2.30E-4	1.14E-3	1.53E-3	1.04E-3
chromium-51	Ci	<LLD	<LLD	<LLD	6.99E-3
cobalt-57	Ci	<LLD	<LLD	<LLD	5.83E-5
cobalt-58	Ci	1.90E-4	1.14E-4	4.23E-5	1.78E-2
cobalt-60	Ci	5.60E-4	5.65E-4	2.16E-3	2.44E-3
iodine-131	Ci	<LLD	<LLD	<LLD	<LLD
iron-55	Ci	1.41E-3	3.38E-3	2.66E-3	*
iron-59	Ci	<LLD	<LLD	<LLD	6.29E-4
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	9.10E-5	6.53E-5	2.24E-4	4.97E-4
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	2.86E-5	<LLD	7.22E-6	1.30E-3
niobium-97	Ci	<LLD	6.77E-5	8.16E-6	<LLD
ruthenium-106	Ci	2.21E-4	<LLD	8.78E-5	<LLD
silver-110m	Ci	1.11E-3	6.19E-4	2.15E-4	3.23E-4
strontium-89	Ci	<LLD	<LLD	<LLD	*
strontium-90	Ci	<LLD	<LLD	<LLD	*
strontium-92	Ci	<LLD	<LLD	1.69E-5	<LLD
technetium-99m	Ci	<LLD	<LLD	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	<LLD	<LLD	<LLD	7.63E-4
zirconium-97	Ci	5.63E-5	3.52E-5	4.34E-6	<LLD
Total for period	Ci	9.51E-3	1.11E-2	1.45E-2	3.44E-2

LLD Lower Limit of Detection; see Table 2C.

\* Fourth quarter analyses not available at report time; values will be included in the following Annual Report.

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

TABLE 2B (Continued)

LIQUID EFFLUENTS  
BATCH MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2. Dissolved and entrained gases					
krypton-85	Ci	5.40E-2	8.14E-3	1.32E-1	1.91E-1
xenon-131m	Ci	<LLD	<LLD	1.97E-2	1.66E-2
xenon-133	Ci	<LLD	<LLD	8.70E-1	4.86E-1
xenon-133m	Ci	<LLD	<LLD	2.28E-3	1.03E-3
xenon-135	Ci	<LLD	<LLD	2.14E-5	<LLD
Total for period	Ci	5.40E-2	8.14E-3	1.02E+0	6.95E-1

LLD Lower Limit of Detection; see Table 2C.

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

TABLE 2C

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION  
CONTINUOUS MODE

Radionuclides	LLD ( $\mu\text{Ci}/\text{cc}$ )
1. Fission and activation products	
barium-140	3.30E-7
cerium-141	5.20E-8
cerium-144	2.30E-7
cesium-134	9.90E-8
cesium-137	8.60E-8
chromium-51	4.20E-7
cobalt-58	8.70E-8
cobalt-60	1.30E-7
iodine-131	6.00E-8
iron-55	1.00E-6
iron-59	2.00E-7
lanthanum-140	2.40E-7
manganese-54	8.80E-8
molybdenum-99	3.50E-8
niobium-95	8.50E-8
strontium-89	5.00E-8
strontium-90	1.00E-8
technetium-99m	3.50E-8
zinc-65	2.20E-7
zirconium-95	1.50E-7
2. Dissolved and entrained gases	
xenon-133	3.10E-7
xenon-135	1.20E-7
3. gross alpha	1.00E-7

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

TABLE 2C (Continued)

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION  
BATCH MODE

Radionuclides	LLD ( $\mu\text{Ci/cc}$ )
1. Fission and activation products	
antimony-122	1.20E-7
barium-140	3.30E-7
cerium-141	5.20E-8
cerium-144	2.30E-7
chromium-51	4.20E-7
cobalt-57	2.90E-8
iodine-131	6.00E-8
iron-55	1.00E-6
iron-59	2.00E-7
lanthanum-140	2.40E-7
molybdenum-99	3.50E-8
niobium-95	8.50E-8
niobium-97	2.00E-7
ruthenium-106	7.10E-7
strontium-89	5.00E-8
strontium-90	1.00E-8
strontium-92	7.80E-5
technetium-99m	3.50E-8
zinc-65	2.20E-7
zirconium-95	1.50E-7
zirconium-97	2.20E-7
2. Dissolved and entrained gases	
xenon-131m	3.90E-6
xenon-133	3.10E-7
xenon-133m	9.20E-7
xenon-135	1.20E-7
3. gross alpha	1.00E-7

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

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	3.37E-4	9.78E-4	2.56E-3	1.46E-3
2. Percent Applicable Limit	%	1.12E-2	3.26E-2	8.54E-2	4.86E-2
B.					
1. Limiting organ dose	mrem	4.31E-3	3.25E-3	3.82E-3	6.33E-3
2. Percent Applicable Limit	%	4.31E-2	3.25E-2	3.82E-2	6.33E-2
3. Limiting organ for period		GI-LLI	GI-LLI	GI-LLI	GI-LLI

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

TABLE 2E

LIQUID EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	177 releases
2. Total time period for batch releases:	27516 minutes
3. Maximum time period for a batch release:	540 minutes
4. Average time period for a batch release:	155 minutes
5. Minimum time period for a batch release:	2 minutes
6. Average saltwater flow during batch releases:	734000 gpm

SECTION D. PREVIOUS RADIOACTIVE EFFLUENT RELEASE REPORT ADDENDUM

None.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

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 <sup>(*)</sup>	m <sup>3</sup>	2.89E+1	3.00E+1
	Ci	1.38E+2	
b. Dry active waste (DAW), compactable and non-compactable <sup>(#)</sup>	m <sup>3</sup>	2.77E+1	3.00E+1
	Ci	3.58E+1	
c. Irradiated components, control rods	m <sup>3</sup>	N/A	N/A
	Ci	N/A	
d. Other	m <sup>3</sup>	N/A	N/A
	Ci	N/A	

Note: Total curie content estimated.

(\*) Material packaged in High Integrity Containers and shipped in Type B Cask (C of C 9208).

(#) Material packaged in strong, tight containers of various sizes.

N/A No shipment made.

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

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

2. Estimate of major nuclide composition (by type of waste)		
a. americium-241	%	3.62E-4
antimony-125	%	2.96E-1
carbon-14	%	7.45E-1
cesium-134	%	6.64E+0
cesium-137	%	1.47E+1
cobalt-57	%	2.69E-1
cobalt-58	%	2.54E+1
cobalt-60	%	5.30E+0
curium-242	%	5.14E-5
curium-243/244	%	4.23E-4
iron-55	%	1.04E+1
manganese-54	%	2.38E+0
nickel-59	%	2.14E-1
nickel-63	%	3.35E+1
niobium-94	%	7.13E-3
plutonium-238	%	4.11E-4
plutonium-239/240	%	2.29E-4
plutonium-241	%	1.29E-2
strontium-89	%	3.89E-3
strontium-90	%	3.32E-2
technetium-99	%	7.87E-6
tritium	%	1.18E-1

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

2. Estimate of major nuclide composition (by type of waste)		(Cont'd)
b. americium-241	%	8.42E-4
antimony-124	%	1.49E-1
antimony-125	%	6.51E-1
carbon-14	%	1.04E+0
cerium-141	%	1.17E-1
cerium-144	%	1.21E-1
cesium-134	%	2.73E+0
cesium-137	%	2.50E+1
chromium-51	%	9.01E+0
cobalt-57	%	1.02E-1
cobalt-58	%	1.58E+1
cobalt-60	%	5.34E+0
curium-242	%	1.49E-3
curium-243/244	%	1.78E-3
iodine-129	%	5.49E-2
iron-55	%	2.49E+1
iron-59	%	1.09E+0
manganese-54	%	7.81E-1
nickel-63	%	8.13E+0
niobium-94	%	2.34E-4
niobium-95	%	2.82E+0
plutonium-238	%	7.80E-4
plutonium-239/240	%	6.44E-4
plutonium-241	%	9.64E-2
ruthenium-103	%	1.67E-4
silver-110m	%	2.79E-2
strontium-89	%	1.84E-2
strontium-90	%	7.21E-3
technetium-99	%	3.67E-3
tin-113	%	4.53E-1
tritium	%	5.10E-2
uranium-233/234	%	4.72E-5
uranium-238	%	3.19E-5
zirconium-95	%	1.49E+0
c. not applicable	%	0.00E+0
d. not applicable	%	0.00E+0

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

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

3. Solid Waste Disposition		
Number of Shipments	Mode of Transportation	Destination
33 *	Kindrick Trucking Company Truck/Trailer	Envirocare, UT
6	Hitman Trucking Company Truck/Trailer	Barnwell, SC
2	Kindrick Trucking Company Truck/Trailer	Envirocare, UT

\* SONGS maintains contracts with vendors (ATG/GTS) that provide volume reduction services. These shipments were made from their processing facility. The 33 shipments made from these facilities 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
6	N/A

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

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

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

X/Q =  $4.80\text{E-}6 \text{ sec}/\text{m}^3$ ; the annual average atmospheric dispersion defined in the Units 2&3 ODCM, Rev. 31.

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

where:  $F_i$  = fractional abundance of the  $i^{\text{th}}$  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

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

• % ECL =  $\frac{(\text{Rel Rate}) (X/Q) (100)}{\text{ECL}_{\text{eff}}}$

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

X/Q =  $4.80\text{E-}6 \text{ sec}/\text{m}^3$ ; the annual average atmospheric dispersion defined in the Units 2&3 ODCM, Rev. 31.

◦  $\text{ECL}_{\text{eff}}$  =  $\frac{1}{\sum_{i=1}^n \frac{F_i}{\text{ECL}_i}}$

where:  $F_i$  = fractional abundance of the  $i^{\text{th}}$  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

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

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

### 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 = 
$$\frac{(\text{Dil Conc}) (100)}{\text{MPC}_{\text{eff}}}$$

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

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

where:  $F_i$  = fractional abundance of the  $i^{\text{th}}$  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

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

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

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

- $\text{ECL}_{\text{eff}}$  = 
$$\frac{1}{\sum_{i=1}^n \frac{F_i}{\text{ECL}_i}}$$

where:  $F_i$  = fractional abundance of the  $i^{\text{th}}$  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

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

SECTION G. ESTIMATION OF ERROR

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

Sources of error for gaseous effluents - batch releases are:

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

Sources of error for gaseous effluents - continuous releases are:

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

Sources of error for liquid effluents - batch releases are:

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

Sources of error for liquid effluents - continuous releases are:

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

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

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

where:  $\sigma_i$  = Error associated with each component.

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

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

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

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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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	3.37E-4	9.78E-4	2.56E-3	1.46E-3	5.34E-3
Organ	6)	7)	8)	9)	10)
Organ	4.31E-3	3.25E-3	3.82E-3	6.33E-3	1.77E-2
AIRBORNE EFFLUENTS	11)	12)	13)	14)	15)
Tritium, Iodines, and Particulates	6.65E-3	3.28E-3	3.68E-3	4.75E-3	1.78E-2
NOBLE GASES **	16)	17)	18)	19)	20)
Gamma	1.51E-3	3.45E-3	1.82E-3	1.94E-3	7.18E-3
Beta	21)	22)	23)	24)	25)
Beta	1.39E-3	3.26E-3	1.56E-3	2.12E-3	8.08E-3
DIRECT RADIATION	26)	27)	28)	29)	30)
DIRECT RADIATION	7.32E-2	1.12E-1	1.25E-1	9.86E-2	3.43E-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.

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

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 a child's thyroid and was located in the NNW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
12. The maximum organ dose was to a child's thyroid and was located in the NNW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
13. The maximum organ dose was to a child's thyroid and was located in the E sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
14. The maximum organ dose was to a child's thyroid and was located in the NNW sector. This was calculated using the assumptions of USNRC Regulatory Guide 1.109.
15. The maximum organ dose was to a child's thyroid and was located in the NNW 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 E 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 ENE 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 E 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 E 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 E 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 E 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 ENE 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 ENE 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 E sector, at the exclusion area boundary, and calculated using the assumptions of the USNRC Regulatory Guide 1.109.

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

25. The maximum air dose for beta radiation was located in the ENE 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 W 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	1.12E-2	3.26E-2	8.54E-3	4.86E-2	8.89E-2
Organ	4.31E-2	3.25E-2	3.82E-2	6.33E-2	8.86E-2
AIRBORNE EFFLUENTS					
Tritium, Iodines, and Particulates	4.43E-2	2.19E-2	2.46E-2	3.16E-2	5.94E-2
NOBLE GASES					
Gamma	1.15E-2	3.45E-2	1.82E-2	1.94E-2	3.59E-2
Beta	6.95E-3	1.63E-2	7.79E-3	1.06E-2	2.02E-2

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

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

### SECTION I. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

On February 29, 2000, Revision 35 to the Units 2/3 Offsite Dose Calculation Manual (ODCM) was adopted and published. This change incorporated final turnover items related to DCP 7022 (South Yard Facility radiation monitors), along with some other minor administrative improvements. Incorporated into this revision are:

1. Added setpoint methodology for SYF particulate radiation monitors,
2. Added SYF Data Acquisition System (DAS) and associated ACTION 43 to Section 4, and
3. Changes related to the Land Use Census update.

Safety Evaluations were provided for items 1 and 2.

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

Minor format changes, correction of typographical errors, and removal of previously blank pages were made and are described in the attached List of Affected Pages.

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

The following is a complete list of the changes:

OLD	NEW	CHANGE	REASON
TOC		Renumbered pages as necessary based on changes in the body of the ODCM.	F
2-12		Removed the previously blank page.	D
2-14	2-13	Changed format of equation definitions to be consistent with the rest of the ODCM.	F
	2-20 & 2-21	Added Section 2.6.5 for the South Yard Facility	A
2-31		Corrected a typo in the Cs-137 value of Table 2-6	F
	2-33	Added R <sub>i</sub> Table for San Mateo Pt. Homes	A

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

OLD	NEW	CHANGE	REASON
4-9		Added "SOUTH YARD FACILITY" to item 7.	F
		Added item 8, South Yard Facility Data Acquisition System or Datalink to Main DAS.	A
4-11		Added ACTION 43, associated with the SYF DAS	A
4-14		Added item 8, South Yard Facility Data Acquisition System or Datalink to Main DAS.	A
6-4		Corrected the revision date from 11-03-99 to 11-09-99.	F

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, 2000 to December 31, 2000.

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

### SECTION K. MISCELLANEOUS

- Missed Independent Verification Prior to Radwaste Tank Release

On 10/03/00, radwaste tank T-057 (permit #0L-371-0) was released without performing the required independent verification of the discharge line valving. After the release was completed but prior to the monitor flush, the missed verification was identified and performed satisfactorily. There were no additional dose consequences to the public due to this event which is documented in Action Request (AR) 001000162.

- Missed 4 Hour Channel Check During Purge with DAS Communication Inoperable

On 10/07/00, a Unit 2 Containment purge was in progress using monitor 2RT-7828 with the Data Acquisition System (DAS) communication inoperable. The monitor once per 4 hour channel check for the inoperable DAS at 1205 was missed due to increased Control Room activity during reactor shutdown for refueling outage. The channel check was successfully completed at 1430 with the purge still in progress. There were no dose consequences as a result of this event which is documented in AR 001000377.

- Incorrect Vendor Information on Steam Generator Blowdown Flow Devices

On 11/06/00, it was determined that the vendor supplied calibration data for the Steam Generator blowdown flow devices were incorrect. New calculations showed flow has been underestimated by as much as 25% since plant startup. An evaluation has shown no dose limits were challenged because of this vendor error. An investigation and assessment is documented in AR 001100455.

- Incorrectly Recorded Meteorological Data

On 10/27/00, it was determined the meteorological data collected since 07/27/98 was in error. Subsequent to a hard drive failure, the meteorological data was incorrectly converted (by a factor of 2) for all wind speeds. The meteorological data were corrected for calculations of the year 2000 data. The data collection process will be modified to be checked with more detail after any physical computer failure. An evaluation of previous year's data is ongoing under AR 001002318.

- Unplanned, Unmonitored Release From Unit 2 FFCPD During Resin Backwash

On 12/26/00, the Unit 2 FFCPD experienced a five minute leak due to a broken plexiglass flow sight glass. The break occurred during the initial backwash step of the regeneration process. Approximately 1500 gallons of clean sluice water flowed into the storm drains and directly to the outfall conduits. Analysis of the spilled resin indicated no detectable activity. The sight glasses will be replaced with an improved design. There was no dose to the public as a result of this event which is documented in AR 001201226.

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

- Leaking Unit 2 Steam Generator Blowdown Valves

On 12/13/00, Unit 2 Steam Generators were determined to be leaking past their blowdown isolation valves to the outfall. The maximum leak rate was determined to be 2 gpm. Repairs are planned for the next outage. Compensatory sampling is being performed (samples indicate no detectable activity to date) and release data are being evaluated and documented. This event is documented in AR 001200733.

- Improperly Installed Monitor Setpoints on 3RT-7817

On 12/11/00, it was determined the installed alarm setpoint for the Unit 3 Full Flow Condensate Polishing Demineralizer (FFCPD) discharge line monitor, 3RT-7817, was incorrect. The installed value was erroneously set at 5.00E6 uCi/ml rather than the correct 5.00E-6 uCi/ml. An investigation showed that the error was made during a surveillance performed on 11/08/00. The releases conducted during this time period had no detectible gamma activity (two releases had trace amounts of tritium). There was no additional dose consequence to the public due to this event. The surveillance procedure was modified to add an extra setpoint verification step. An investigation and assessment is documented in AR 001200587.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 2000 - December 31, 2000

S.O.N.G.S. 2			
Monitor	Inoperability Period	Inoperability Cause	Explanation
2RT-7817 BPS/FFCPD Discharge Monitor	08/09/00 - 10/02/00	Failed flow measuring devices	Replaced portions of sample piping which had plugged. Accumulated corrosion buildup had stopped flow.
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.

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 2000 - December 31, 2000

S.O.N.G.S. 3			
Monitor	Inoperability Period	Inoperability Cause	Explanation
3RT-7817 BPS/FFCPD Discharge Monitor	05/04/00 - 06/23/00	Improper sample flow	Replaced portions of sample piping which had plugged. Accumulated corrosion buildup had stopped flow.
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.

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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

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

- Gaseous releases totaled  $1.78E+2$  curies of which noble gases were  $1.04E+2$  curies, iodines were  $3.63E-3$  curies, particulates were  $9.95E-4$  curies, and tritium was  $7.39E+1$  curies.
- The radiation doses from gaseous releases were: (a) gamma air dose:  $7.18E-3$  mrad at the site boundary, (b) beta air dose:  $8.08E-3$  mrad at the site boundary, (c) organ dose:  $1.78E-2$  mrem at the nearest receptor.
- Liquid releases totaled  $2.40E+3$  curies of which particulates and iodines were  $6.95E-2$  curies, tritium was  $2.40E+3$  curies, and noble gases were  $1.78E+0$  curies.
- The radiation doses from liquid releases were: (a) total body:  $5.34E-3$  mrem, (b) limiting organ:  $1.77E-2$  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 (2000)

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 <sup>3</sup>	N/A	N/A
	Ci	N/A	
b. Dry active waste (DAW), compatible and non-compatible	m <sup>3</sup>	N/A	N/A
	Ci	N/A	
c. Irradiated components, control rods	m <sup>3</sup>	N/A	N/A
	Ci	N/A	
d. Other (filters)	m <sup>3</sup>	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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

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	No shipments were made	N/A

B. IRRADIATED FUEL SHIPMENTS (Disposition)

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

C. DEWATERING

See Units 2/3 section of this report.

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 Licensee Controlled Specifications, Section 5.0.103.2.2.

## ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## 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	3.74E-1
b. Percent ODCM Specification Limit	%	1.50E+0
2. Limiting Organ		
a. Organ Dose (GI-LLI)	mrem	2.69E-2
b. Percent ODCM Specification Limit	%	1.07E-1
3. Thyroid		
a. Thyroid Dose	mrem	8.52E-3
b. Percent ODCM Specification Limit	%	1.14E-2

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## COMMON

### COMMON CONCLUSIONS

- Gaseous releases from S.O.N.G.S. 1, 2 and 3 totaled  $1.80E+2$  curies of which noble gases were  $1.02E+2$  curies, iodines were  $3.63E-3$  curies, particulates were  $9.95E-4$  curies, and tritium was  $7.56E+1$  curies.
- Liquid releases from S.O.N.G.S. 1, 2 and 3 totaled  $2.40E+3$  curies of which particulates and iodines were  $7.55E-2$  curies, tritium was  $2.40E+3$  curies, and noble gases were  $1.78E+0$  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 7 radwaste shipments to Barnwell, SC and 69 shipments to Envirocare, UT. Total volume was  $6.37E+2$  cubic meters containing  $1.79E+2$  curies of radioactivity.
- Meteorological conditions during the year were typical for S.O.N.G.S. Meteorological dispersion was good 31% of the time, fair 46% of the time and poor 23% 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 on the environment.

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## 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:  $\leq 5$  mrad for gamma radiation and  $\leq 10$  mrad for beta radiation.
  2. During any calendar year:  $\leq 10$  mrad for gamma radiation and  $\leq 20$  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:  $\leq 7.5$  mrem to any organ.
  2. During any calendar year:  $\leq 15$  mrem to any organ.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

COMMON

APPENDIX A (Continued)

LIQUID EFFLUENTS - APPLICABLE LIMITS

- A. Table 2A lists the total curies released, the diluted concentration, and percent of the applicable limit. The percent of applicable limit compares the diluted concentration of radioactive material released to the concentrations specified in 10 CFR 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained gases. For dissolved or entrained noble gases, the concentration is limited to  $2.00E-4 \mu\text{Ci/ml}$ .
- B. Table 2D lists doses due to liquid releases. The dose commitment to a Member of the Public from radioactive materials in liquid effluents released from S.O.N.G.S. (per reactor) to unrestricted areas shall be limited to the following values:
1. During any calendar quarter:  $\leq 1.5$  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, 2000 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, 2000. Each page of Table 4A represents the data for the individual stability classes: A, B, C, D, E, F, and G. The last page of each section is the JFD for all the stability classes. The wind speeds have been measured at the 10-meter level, and the stability classes are defined by the temperature differential between the 10-meter and 40-meter levels.

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

January - March  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 99123124-00033123  
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	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	0	0	4	1	0	0	0	0	5
S	0	0	2	2	10	10	10	0	0	0	0	0	34
SSW	0	0	1	2	3	10	5	0	0	0	0	0	21
SW	0	1	0	3	8	15	8	0	0	0	0	0	35
WSW	0	0	0	6	12	31	17	0	0	0	0	0	66
W	1	0	0	1	6	55	60	4	1	0	0	0	128
WNW	0	0	0	1	3	16	36	8	1	0	0	0	65
NW	0	0	0	0	0	0	0	2	0	0	0	0	2
NNW	0	0	0	0	0	0	0	0	1	0	0	0	1
<b>TOTALS</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>15</b>	<b>42</b>	<b>137</b>	<b>140</b>	<b>15</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>357</b>

NUMBER OF VALID HOURS                    357  
NUMBER OF INVALID HOURS                 0

NUMBER OF CALMS                                 0  
TOTAL HOURS FOR THE PERIOD                2184

### 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	1	0	0	0	0	0	0	0	0	0	0	0	1
NE	0	0	0	0	0	1	0	0	0	0	0	0	1
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	1	0	0	0	0	1
SE	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	1	0	0	0	1	1	4	2	0	0	0	0	9
S	0	0	0	0	0	2	4	1	0	1	0	0	8
SSW	0	0	0	1	2	4	4	0	0	0	0	0	11
SW	0	0	1	0	1	4	1	0	0	0	0	0	7
WSW	0	0	0	1	0	2	0	0	0	0	0	0	3
W	0	0	0	1	0	0	0	0	0	1	0	0	2
WNW	0	0	0	1	0	2	2	0	0	0	0	0	5
NW	0	0	0	0	1	0	0	2	0	0	0	0	3
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTALS</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>16</b>	<b>15</b>	<b>6</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>51</b>

NUMBER OF VALID HOURS                    51  
NUMBER OF INVALID HOURS                 0

NUMBER OF CALMS                                 0  
TOTAL HOURS FOR THE PERIOD                2184

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

January - March  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 99123124-00033123  
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	0	0	0	0	0	0	0	0	1
NNE	3	0	0	0	0	0	1	1	0	0	0	0	5
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	1	0	0	0	0	0	1
SSE	0	0	0	1	0	3	1	0	0	0	0	0	5
S	0	0	0	0	0	3	4	0	0	0	0	0	7
SSW	0	0	0	0	2	4	3	1	0	0	0	0	10
SW	0	0	1	2	1	2	4	0	0	0	0	0	10
WSW	0	0	0	0	1	0	1	0	0	0	0	0	2
W	0	0	1	2	2	1	2	2	0	0	0	0	10
WNW	2	0	0	2	2	1	2	0	0	0	0	0	9
NW	0	0	0	0	0	1	4	3	0	0	0	0	8
NNW	0	0	0	0	0	1	0	0	0	0	0	0	1
TOTALS	5	0	2	8	8	16	23	7	0	0	0	0	69

NUMBER OF VALID HOURS                    69  
NUMBER OF INVALID HOURS                0

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2184

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	5	1	5	7	11	1	2	0	1	0	34
NNE	0	2	1	7	3	5	4	7	0	1	0	0	30
NE	0	0	2	0	2	2	3	10	0	0	0	0	19
ENE	0	0	0	1	1	1	0	0	0	0	0	0	3
E	0	0	0	1	1	6	2	1	0	0	0	0	11
ESE	0	0	0	2	4	2	12	2	1	0	0	0	23
SE	0	0	1	1	4	20	54	26	8	0	0	0	114
SSE	1	0	1	6	8	24	31	8	13	9	0	0	101
S	0	0	0	5	4	15	10	3	7	6	0	0	50
SSW	0	1	2	5	2	12	10	8	3	1	0	0	44
SW	0	1	3	5	5	5	9	3	1	1	0	0	33
WSW	0	2	1	4	3	6	11	2	1	0	0	0	30
W	0	0	2	7	4	6	13	3	3	0	0	0	38
WNW	0	2	1	4	7	13	16	2	4	0	0	0	49
NW	0	0	1	7	2	20	17	11	0	0	0	0	58
NNW	0	0	0	2	4	8	7	1	0	0	0	0	22
TOTALS	1	9	20	58	59	152	210	88	43	18	1	0	659

NUMBER OF VALID HOURS                    659  
NUMBER OF INVALID HOURS                0

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2184

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

January - March  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 99123124-00033123  
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL E  
SLIGHTLY STABLE ( $-0.5 < DT/DZ \leq -1.5$  °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	6	4	8	9	2	0	0	0	0	30
NNE	0	1	1	15	16	21	17	1	0	0	0	0	72
NE	0	1	5	11	5	6	12	0	0	0	0	0	40
ENE	0	1	3	6	1	3	2	1	1	0	0	0	18
E	0	0	2	2	0	2	2	1	3	2	0	0	14
ESE	0	1	1	3	3	5	3	0	0	1	0	0	17
SE	1	0	0	2	4	4	8	4	0	0	0	0	23
SSE	0	0	0	2	6	8	7	0	0	0	0	0	23
S	0	0	2	2	2	0	1	0	0	0	0	0	7
SSW	0	0	1	3	2	0	0	0	0	0	0	0	6
SW	0	0	1	0	1	0	0	0	0	0	0	0	2
WSW	0	0	1	3	1	0	0	1	0	0	0	0	6
W	0	0	2	1	1	4	10	2	0	0	0	0	20
WNW	1	1	1	3	1	6	3	7	4	0	0	0	27
NW	0	0	1	3	4	6	4	5	0	0	0	0	23
NNW	0	0	1	3	1	6	7	0	0	0	0	0	18
TOTALS	2	5	23	65	52	79	85	24	8	3	0	0	346

NUMBER OF VALID HOURS	346	NUMBER OF CALMS	0
NUMBER OF INVALID HOURS	0	TOTAL HOURS FOR THE PERIOD	2184

PASQUILL F  
MODERATELY STABLE ( $1.5 \leq DT/DZ \leq -0.5$  °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	3	1	4	6	8	0	0	0	0	0	23
NNE	3	0	2	14	42	43	31	1	0	0	0	0	136
NE	0	2	2	18	25	11	2	0	0	0	0	0	60
ENE	0	1	2	5	1	2	1	0	0	0	0	0	12
E	0	0	2	3	1	0	1	0	0	0	0	0	7
ESE	0	0	1	2	0	1	0	0	0	0	0	0	4
SE	0	0	1	0	0	3	1	0	0	0	0	0	5
SSE	0	0	0	0	1	2	1	1	0	0	0	0	5
S	0	1	1	4	1	1	1	0	0	0	0	0	9
SSW	0	0	1	1	1	0	1	0	0	0	0	0	4
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	1	2	1	0	0	0	0	0	0	0	4
W	0	1	0	2	0	5	1	0	0	0	0	0	9
WNW	1	0	0	0	1	2	0	0	0	0	0	0	4
NW	1	0	0	2	1	4	1	0	0	0	0	0	9
NNW	2	0	0	1	1	1	2	0	0	0	0	0	7
TOTALS	7	6	16	55	80	81	51	2	0	0	0	0	298

NUMBER OF VALID HOURS	298	NUMBER OF CALMS	0
NUMBER OF INVALID HOURS	0	TOTAL HOURS FOR THE PERIOD	2184

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

January - March  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 99123124-00033123  
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	1	1	9	8	2	0	0	0	0	21
NNE	1	1	0	3	17	108	133	7	0	0	0	0	270
NE	0	0	1	5	13	21	6	0	0	0	0	0	46
ENE	0	0	1	2	5	0	0	0	0	0	0	0	8
E	0	1	2	2	0	1	0	0	0	0	0	0	6
ESE	0	0	0	1	1	1	0	0	0	0	0	0	3
SE	0	0	0	2	0	0	0	0	0	0	0	0	2
SSE	0	0	1	1	2	1	1	2	0	0	0	0	8
S	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	0	1	0	1	0	0	0	0	0	0	0	0	2
WSW	0	0	0	1	0	0	0	0	0	0	0	0	1
W	1	1	0	1	2	1	0	0	0	0	0	0	6
WNW	4	0	0	0	0	1	3	0	0	0	0	0	8
NW	3	0	0	1	3	2	3	1	0	0	0	0	13
NNW	4	0	1	1	2	2	0	0	0	0	0	0	10
TOTALS	13	4	6	22	46	147	154	12	0	0	0	0	404

NUMBER OF VALID HOURS                   404  
NUMBER OF INVALID HOURS                0

NUMBER OF CALMS                         0  
TOTAL HOURS FOR THE PERIOD       2184

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	2	9	10	14	30	36	5	2	0	1	0	109
NNE	8	4	4	39	78	177	186	17	0	1	0	0	514
NE	0	3	10	34	45	41	23	10	0	0	0	0	166
ENE	0	2	6	14	8	6	3	1	1	0	0	0	41
E	0	1	6	8	2	9	5	2	3	2	0	0	38
ESE	0	1	2	8	8	9	15	2	1	1	0	0	47
SE	1	0	2	5	8	27	64	31	8	0	0	0	146
SSE	2	0	2	10	18	39	49	14	13	9	0	0	156
S	0	1	5	13	17	31	30	4	7	7	0	0	115
SSW	0	1	5	12	12	30	23	9	3	1	0	0	96
SW	0	3	6	11	16	26	22	3	1	1	0	0	89
WSW	0	2	3	17	18	39	29	3	1	0	0	0	112
W	2	2	5	15	15	72	86	11	4	1	0	0	213
WNW	8	3	2	11	14	41	62	17	9	0	0	0	167
NW	4	0	2	13	11	33	29	24	0	0	0	0	116
NNW	6	0	2	7	8	18	16	1	1	0	0	0	59
TOTALS	31	25	71	227	292	628	678	154	54	23	1	0	2184

NUMBER OF VALID HOURS                   2184  
NUMBER OF INVALID HOURS                0

NUMBER OF CALMS                         0  
TOTAL HOURS FOR THE PERIOD       2184

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

April - June  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00033124-00063023  
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	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	1	0	0	2	3	2	0	0	0	0	8
S	0	0	1	0	7	10	27	7	0	0	0	0	52
SSW	0	0	0	3	5	16	26	4	0	0	0	0	54
SW	0	0	1	3	11	35	41	0	0	0	0	0	91
WSW	0	0	2	3	24	71	67	0	0	0	0	0	167
W	0	0	0	0	16	87	125	1	0	0	0	0	229
WNW	0	0	0	0	2	21	65	7	1	0	0	0	96
NW	0	0	0	0	0	0	4	3	0	0	0	0	7
NNW	0	0	0	1	0	0	0	0	0	0	0	0	1
<b>TOTALS</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>10</b>	<b>65</b>	<b>242</b>	<b>358</b>	<b>24</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>705</b>

NUMBER OF VALID HOURS	705	NUMBER OF CALMS	0
NUMBER OF INVALID HOURS	1	TOTAL HOURS FOR THE PERIOD	2184

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

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	1	0	0	0	0	0	0	1
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	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	0	0	0	0	0
SSE	0	0	0	0	0	2	2	1	0	0	0	0	5
S	0	0	0	0	2	2	8	2	0	0	0	0	14
SSW	0	0	0	2	0	5	6	3	0	0	0	0	16
SW	0	0	1	0	1	5	4	0	0	0	0	0	11
WSW	0	0	0	4	1	4	1	0	0	0	0	0	10
W	0	0	0	0	4	2	3	0	0	0	0	0	9
WNW	0	0	0	0	0	6	3	0	0	0	0	0	9
NW	0	0	0	0	1	0	2	2	0	0	0	0	5
NNW	0	0	0	1	0	0	0	0	0	0	0	0	1
<b>TOTALS</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>9</b>	<b>27</b>	<b>30</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>82</b>

NUMBER OF VALID HOURS	82	NUMBER OF CALMS	0
NUMBER OF INVALID HOURS	1	TOTAL HOURS FOR THE PERIOD	2184

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

April - June  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00033124-00063023  
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	0	0	0	0	0	0	0	0
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	2	0	0	0	0	0	0	2
SSE	0	0	0	0	1	2	3	0	0	0	0	0	6
S	0	0	0	1	1	5	8	1	2	0	0	0	18
SSW	0	0	0	1	3	7	7	0	0	0	0	0	18
SW	0	0	1	2	2	2	4	0	0	0	0	0	11
WSW	0	0	1	0	2	2	1	0	0	0	0	0	6
W	0	0	0	4	1	2	1	2	0	0	0	0	10
WNW	1	0	0	0	2	3	2	4	0	0	0	0	12
NW	0	0	0	0	0	3	4	1	0	0	0	0	8
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	1	0	2	8	12	29	30	8	2	0	0	0	92

NUMBER OF VALID HOURS	92	NUMBER OF CALMS	0
NUMBER OF INVALID HOURS	1	TOTAL HOURS FOR THE PERIOD	2184

### 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	4	11	7	6	1	0	0	0	0	0	29
NNE	0	0	2	7	10	9	2	0	0	0	0	0	30
NE	0	1	1	12	7	5	1	0	0	0	0	0	27
ENE	0	2	1	3	4	3	0	0	0	0	0	0	13
E	0	3	0	4	5	9	4	0	0	0	0	0	25
ESE	0	0	1	6	6	24	15	0	0	0	0	0	52
SE	0	0	1	5	17	33	37	6	1	0	0	0	100
SSE	0	2	3	11	24	53	39	9	8	0	0	0	149
S	0	1	4	9	14	30	33	7	1	1	0	0	100
SSW	0	2	7	15	12	15	13	3	2	0	0	0	69
SW	1	1	4	10	6	10	3	3	2	0	0	0	40
WSW	0	2	4	7	7	4	3	1	0	0	0	0	28
W	1	2	4	10	5	8	8	1	1	0	0	0	40
WNW	1	1	1	10	7	11	5	0	0	0	0	0	36
NW	0	1	0	7	14	15	21	2	1	0	0	0	61
NNW	0	2	5	6	4	3	8	0	1	0	0	0	29
TOTALS	3	20	42	133	149	238	193	32	17	1	0	0	828

NUMBER OF VALID HOURS	828	NUMBER OF CALMS	0
NUMBER OF INVALID HOURS	1	TOTAL HOURS FOR THE PERIOD	2184

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

April - June  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00033124-00063023  
WIND SPEED (M/S) AT 10 METER LEVEL

### PASQUILL E SLIGHTLY STABLE ( $-0.5 < DT/DZ \leq -1.5$ °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	2	1	1	8	7	3	0	0	0	0	0	22
NNE	0	02	5	15	26	23	5	0	0	0	0	0	76
NE	0	0	8	7	4	1	0	0	0	0	0	0	20
ENE	0	2	3	5	2	0	0	0	0	0	0	0	12
E	0	0	0	4	4	4	1	0	0	0	0	0	13
ESE	0	1	0	3	1	3	0	0	0	0	0	0	8
SE	0	0	3	2	2	3	4	0	0	0	0	0	14
SSE	0	1	0	2	2	7	1	2	0	0	0	0	15
S	0	2	0	0	0	0	4	0	0	0	0	0	6
SSW	0	0	2	1	0	1	0	0	0	0	0	0	4
SW	0	1	0	0	1	0	0	1	0	0	0	0	3
WSW	0	0	0	0	0	1	0	0	0	0	0	0	1
W	0	1	0	0	1	0	1	0	0	0	0	0	3
WNW	0	0	0	1	0	2	1	0	0	0	0	0	4
NW	0	0	0	0	0	1	4	0	0	0	0	0	5
NNW	1	2	0	2	2	1	1	0	0	0	0	0	9
<b>TOTALS</b>	<b>1</b>	<b>14</b>	<b>22</b>	<b>43</b>	<b>53</b>	<b>54</b>	<b>25</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>215</b>

NUMBER OF VALID HOURS                    215  
NUMBER OF INVALID HOURS                 1

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2184

### PASQUILL F MODERATELY STABLE ( $1.5 \leq DT/DZ \leq -0.5$ °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	2	4	2	1	0	0	0	0	0	9
NNE	0	2	2	13	28	30	7	0	0	0	0	0	82
NE	1	0	6	7	1	7	0	0	0	0	0	0	22
ENE	0	0	2	5	0	0	0	0	0	0	0	0	7
E	0	1	0	1	1	0	0	0	0	0	0	0	3
ESE	0	0	0	0	0	1	0	0	0	0	0	0	1
SE	0	0	1	0	1	0	0	0	0	0	0	0	2
SSE	0	0	0	1	0	0	0	0	0	0	0	0	1
S	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0	1	0	0	0	0	1
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0	0	0	0	0	0	0
W	0	0	0	0	1	1	0	0	0	0	0	0	2
WNW	0	0	0	0	2	2	2	0	0	0	0	0	6
NW	0	0	0	0	0	1	0	0	0	0	0	0	1
NNW	0	0	0	0	1	1	0	0	0	0	0	0	2
<b>TOTALS</b>	<b>1</b>	<b>3</b>	<b>11</b>	<b>29</b>	<b>39</b>	<b>45</b>	<b>10</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>139</b>

NUMBER OF VALID HOURS                    139  
NUMBER OF INVALID HOURS                 1

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2184

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

April - June

TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00033124-00063023  
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	1	2	0	1	0	0	0	0	0	4
NNE	0	0	0	0	8	52	37	1	0	0	0	0	98
NE	0	0	1	2	2	4	0	0	0	0	0	0	9
ENE	0	0	0	1	2	0	0	0	0	0	0	0	3
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	1	0	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	1	0	0	0	0	0	0	1
S	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	0	0	1	0	1	0	0	0	0	0	2
W	0	0	0	0	1	0	0	0	0	0	0	0	1
WNW	0	0	0	0	0	0	1	0	0	0	0	0	1
NW	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTALS	0	0	2	4	17	57	41	1	0	0	0	0	122

NUMBER OF VALID HOURS                    122  
NUMBER OF INVALID HOURS                 1

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2184

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	2	5	15	21	15	6	0	0	0	0	0	64
NNE	0	4	9	35	72	115	51	1	0	0	0	0	287
NE	1	1	16	28	14	18	1	0	0	0	0	0	79
ENE	0	4	6	14	8	3	0	0	0	0	0	0	35
E	0	4	0	9	10	13	5	0	0	0	0	0	41
ESE	0	1	2	9	8	28	15	0	0	0	0	0	63
SE	0	0	5	7	20	38	42	6	1	0	0	0	119
SSE	0	3	4	14	27	67	48	14	8	0	0	0	185
S	0	3	5	10	24	47	80	17	3	1	0	0	190
SSW	0	2	9	22	20	44	52	11	2	0	0	0	162
SW	1	2	7	15	21	52	52	4	2	0	0	0	156
WSW	0	2	7	14	35	82	73	1	0	0	0	0	214
W	1	3	4	14	29	100	138	4	1	0	0	0	294
WNW	2	1	1	11	13	45	79	11	1	0	0	0	164
NW	0	1	0	7	15	20	35	8	1	0	0	0	87
NNW	1	4	5	10	7	5	10	0	1	0	0	0	43
TOTALS	6	37	85	234	344	692	687	77	20	1	0	0	2183

NUMBER OF VALID HOURS                    2183  
NUMBER OF INVALID HOURS                 1

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2184

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

July - September  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00063024-00093023  
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	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	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	1	0	0	0	0	0	0	0	0	1
SSE	0	0	0	0	1	4	7	1	1	0	0	0	14
S	0	0	0	1	5	16	40	6	0	0	0	0	68
SSW	0	0	0	3	3	21	36	0	0	0	0	0	63
SW	0	0	0	5	10	35	34	0	0	0	0	0	84
WSW	0	0	0	5	26	82	59	0	0	0	0	0	172
W	0	0	0	4	9	105	117	0	0	0	0	0	235
WNW	0	0	0	0	4	27	82	3	0	0	0	0	116
NW	0	0	0	1	0	0	12	0	0	0	0	0	13
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTALS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>60</b>	<b>291</b>	<b>387</b>	<b>10</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>770</b>

NUMBER OF VALID HOURS            770  
NUMBER OF INVALID HOURS         0

NUMBER OF CALMS                    0  
TOTAL HOURS FOR THE PERIOD    2208

### 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	1	1	0	0	0	0	0	0	2
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	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	5	2	0	0	0	0	9
S	0	0	0	0	1	5	2	0	0	0	0	0	8
SSW	0	0	0	1	0	2	5	2	0	0	0	0	10
SW	0	0	0	0	0	5	2	0	0	0	0	0	7
WSW	0	0	0	1	0	5	1	0	0	0	0	0	7
W	0	0	0	3	5	5	0	0	0	0	0	0	13
WNW	0	0	0	0	0	1	2	0	0	0	0	0	3
NW	0	0	0	0	0	0	4	1	0	0	0	0	5
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTALS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>9</b>	<b>25</b>	<b>21</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>65</b>

NUMBER OF VALID HOURS            65  
NUMBER OF INVALID HOURS         0

NUMBER OF CALMS                    0  
TOTAL HOURS FOR THE PERIOD    2208



# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

July - September  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00063024-00093023  
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL E  
SLIGHTLY STABLE ( $-0.5 < DT/DZ \leq -1.5$  °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	1	4	5	7	6	0	0	0	0	0	0	23
NNE	0	2	7	32	35	26	3	0	0	0	0	0	105
NE	0	4	4	12	3	3	0	0	0	0	0	0	26
ENE	0	1	2	3	0	0	0	0	0	0	0	0	6
E	1	4	2	2	1	0	0	0	0	0	0	0	10
ESE	0	0	2	3	1	1	0	0	0	0	0	0	7
SE	0	1	2	0	4	4	6	0	0	0	0	0	17
SSE	0	0	2	2	4	5	1	1	0	0	0	0	15
S	0	0	0	2	2	2	0	0	0	0	0	0	6
SSW	1	1	1	0	1	1	1	0	0	0	0	0	6
SW	0	0	0	0	0	1	0	0	0	0	0	0	1
WSW	0	0	1	0	1	0	0	0	0	0	0	0	2
W	0	0	0	0	1	2	0	0	0	0	0	0	3
WNW	0	0	0	3	0	3	0	0	0	0	0	0	6
NW	0	1	0	0	0	2	4	0	0	0	0	0	7
NNW	1	0	2	1	0	2	0	0	0	0	0	0	6
<b>TOTALS</b>	<b>3</b>	<b>15</b>	<b>29</b>	<b>65</b>	<b>60</b>	<b>58</b>	<b>15</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>246</b>

NUMBER OF VALID HOURS                    246  
NUMBER OF INVALID HOURS                 0

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2208

PASQUILL F  
MODERATELY STABLE ( $1.5 \leq DT/DZ \leq -0.5$  °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	0	1	0	0	0	0	0	0	0	2
NNE	0	0	7	9	27	42	8	0	0	0	0	0	93
NE	0	0	0	8	0	0	0	0	0	0	0	0	8
ENE	0	3	1	1	0	0	0	0	0	0	0	0	5
E	0	0	1	0	1	0	0	0	0	0	0	0	2
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	1	0	1	0	0	0	0	0	0	0	2
SSE	1	0	0	0	0	2	1	0	0	0	0	0	4
S	0	0	1	0	0	0	0	0	0	0	0	0	1
SSW	0	0	0	1	1	0	1	0	0	0	0	0	3
SW	0	0	0	1	1	0	0	0	0	0	0	0	2
WSW	0	0	0	0	2	0	0	0	0	0	0	0	2
W	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	0	0	1	0	0	0	0	0	0	0	1
NW	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	0	0	1	0	1	0	1	0	0	0	0	0	3
<b>TOTALS</b>	<b>1</b>	<b>3</b>	<b>13</b>	<b>20</b>	<b>36</b>	<b>44</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>128</b>

NUMBER OF VALID HOURS                    128  
NUMBER OF INVALID HOURS                 0

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2208

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

METEOROLOGY

July - September  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00063024-00093023  
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	1	2	1	1	0	0	0	0	0	5
NNE	0	0	0	2	2	52	35	1	0	0	0	0	92
NE	0	0	1	2	2	3	0	0	0	0	0	0	8
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	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	1	1	0	1	0	0	0	0	0	0	3
SSW	0	0	0	0	0	0	2	0	0	0	0	0	2
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	1	0	0	0	0	0	1
NNW	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTALS	0	0	2	7	7	57	40	1	0	0	0	0	114

NUMBER OF VALID HOURS 114  
NUMBER OF INVALID HOURS 0

NUMBER OF CALMS 0  
TOTAL HOURS FOR THE PERIOD 2208

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	10	26	18	15	3	0	0	0	0	0	73
NNE	0	5	18	59	85	147	51	1	0	0	0	0	366
NE	0	4	6	24	15	10	0	0	0	0	0	0	59
ENE	1	4	3	7	5	2	0	0	0	0	0	0	22
E	1	5	4	5	5	5	0	0	0	0	0	0	25
ESE	0	0	4	8	2	11	2	0	0	0	0	0	27
SE	0	3	5	6	14	26	24	03	0	0	0	0	81
SSE	1	0	4	17	22	54	47	11	2	0	0	0	158
S	0	3	11	19	22	54	76	12	1	0	0	0	198
SSW	1	3	4	20	19	45	64	6	0	0	0	0	162
SW	0	1	6	18	27	56	46	4	0	0	0	0	158
WSW	0	1	7	17	38	96	67	0	0	0	0	0	226
W	0	3	4	31	36	126	123	0	0	0	0	0	323
WNW	0	0	4	15	23	57	94	3	0	0	0	0	196
NW	0	2	3	11	7	22	42	3	1	0	0	0	91
NNW	1	1	8	8	11	8	6	0	0	0	0	0	43
TOTALS	5	36	101	291	349	734	645	43	4	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 (2000)

## METEOROLOGY

October - December  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00093024-00123123  
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	1	1	0	0	0	0	2
NE	0	0	0	0	0	0	1	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	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	2	0	1	0	0	0	3
SSE	0	0	0	0	1	2	5	1	1	0	0	0	10
S	0	0	0	0	1	4	12	1	0	0	0	0	18
SSW	0	0	0	0	2	7	2	0	0	0	0	0	11
SW	0	0	0	3	7	8	4	0	0	0	0	0	22
WSW	0	0	0	5	8	33	13	0	0	0	0	0	59
W	0	0	1	0	9	64	61	4	0	0	0	0	139
WNW	0	0	0	1	3	20	45	5	0	0	0	0	74
NW	0	0	0	0	0	0	1	1	0	0	0	0	2
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTALS</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>9</b>	<b>31</b>	<b>138</b>	<b>147</b>	<b>13</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>341</b>

NUMBER OF VALID HOURS	341	NUMBER OF CALMS	0
NUMBER OF INVALID HOURS	0	TOTAL HOURS FOR THE PERIOD	2208

### 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	1	0	0	0	0	0	0	0	1	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	1	0	1	0	0	0	2
SSE	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	1	0	3	2	0	0	0	0	0	6
SSW	0	0	0	0	1	0	1	0	0	0	0	0	2
SW	0	0	0	0	0	1	1	0	0	0	0	0	2
WSW	0	0	0	0	0	4	1	0	0	0	0	0	5
W	0	0	0	0	6	4	1	0	0	0	0	0	11
WNW	0	0	0	0	0	4	5	1	0	0	0	0	10
NW	0	0	0	0	1	1	3	0	0	0	0	0	5
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTALS</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>8</b>	<b>17</b>	<b>15</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>45</b>

NUMBER OF VALID HOURS	45	NUMBER OF CALMS	0
NUMBER OF INVALID HOURS	0	TOTAL HOURS FOR THE PERIOD	2208



# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

October - December  
TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00093024-00123123  
WIND SPEED (M/S) AT 10 METER LEVEL

PASQUILL E  
SLIGHTLY STABLE ( $-0.5 < DT/DZ \leq -1.5$  °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	7	13	13	3	0	0	0	0	0	38
NNE	1	3	5	15	39	49	19	2	0	0	0	0	133
NE	0	4	7	22	7	4	4	3	1	0	0	0	52
ENE	0	0	3	5	6	0	2	1	1	0	0	0	18
E	0	1	7	2	4	10	1	0	0	0	0	0	25
ESE	1	1	3	5	1	9	3	0	0	0	0	0	23
SE	0	1	1	2	5	9	9	0	0	0	0	0	27
SSE	0	0	2	2	4	3	1	0	0	0	0	0	12
S	0	1	0	4	2	2	0	0	0	0	0	0	9
SSW	0	0	1	1	1	1	0	0	0	0	0	0	4
SW	0	0	2	2	2	0	2	0	0	0	0	0	8
WSW	0	1	0	0	1	0	2	0	0	0	0	0	4
W	1	0	0	1	9	6	1	5	0	0	0	0	23
WNW	0	1	1	5	6	13	11	4	0	0	0	0	41
NW	1	0	4	3	4	8	9	0	0	0	0	0	29
NNW	0	1	1	7	4	5	7	0	0	0	0	0	25
<b>TOTALS</b>	<b>4</b>	<b>14</b>	<b>39</b>	<b>83</b>	<b>108</b>	<b>132</b>	<b>74</b>	<b>15</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>471</b>

NUMBER OF VALID HOURS                    471  
NUMBER OF INVALID HOURS                 0

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2208

PASQUILL F  
MODERATELY STABLE ( $1.5 \leq DT/DZ \leq -0.5$  °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	2	2	5	7	6	0	0	0	0	0	22
NNE	1	2	1	15	41	111	42	2	0	0	0	0	215
NE	0	1	2	19	25	20	7	0	0	0	0	0	74
ENE	0	1	3	4	3	2	0	0	0	0	0	0	13
E	0	0	2	4	1	0	1	0	0	0	0	0	8
ESE	0	0	1	1	3	0	0	0	0	0	0	0	5
SE	0	0	2	2	5	0	1	0	0	0	0	0	10
SSE	0	0	1	1	0	1	0	0	0	0	0	0	3
S	0	0	0	1	0	0	0	0	0	0	0	0	1
SSW	0	0	0	1	0	0	0	0	0	0	0	0	1
SW	0	0	0	2	0	0	0	0	0	0	0	0	2
WSW	0	0	0	0	0	0	0	0	0	0	0	0	0
W	0	1	0	0	1	1	1	0	0	0	0	0	4
WNW	1	0	1	0	2	3	1	0	0	0	0	0	8
NW	0	1	1	0	1	2	1	0	0	0	0	0	6
NNW	0	0	0	1	0	1	2	0	0	0	0	0	4
<b>TOTALS</b>	<b>2</b>	<b>6</b>	<b>16</b>	<b>53</b>	<b>87</b>	<b>148</b>	<b>62</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>376</b>

NUMBER OF VALID HOURS                    376  
NUMBER OF INVALID HOURS                 0

NUMBER OF CALMS                            0  
TOTAL HOURS FOR THE PERIOD            2208

# ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2000)

## METEOROLOGY

October - December

TABLE 4A

SITE: SAN ONOFRE  
PERIOD OF RECORD 00093024-00123123  
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	1	7	6	0	0	0	0	0	14
NNE	4	0	0	3	7	115	179	12	0	0	0	0	320
NE	0	0	0	5	8	10	6	0	0	0	0	0	29
ENE	1	0	0	1	3	2	1	0	0	0	0	0	8
E	0	0	0	0	0	0	1	0	0	0	0	0	1
ESE	0	0	1	0	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	0	0	0	0	0	0	0	0	0	0
S	0	0	0	1	0	0	0	0	0	0	0	0	1
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	0	0	0	0	1	0	0	0	0	0	0	0	1
WSW	0	0	0	1	0	0	0	0	0	0	0	0	1
W	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	0	1	2	4	1	0	0	0	0	0	8
NW	0	0	0	0	1	1	2	0	0	0	0	0	4
NNW	0	0	0	0	1	1	2	0	0	0	0	0	4
TOTALS	5	0	1	12	26	142	198	12	0	0	0	0	396

NUMBER OF VALID HOURS 396  
NUMBER OF INVALID HOURS 0

NUMBER OF CALMS 0  
TOTAL HOURS FOR THE PERIOD 2208

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	0	7	18	27	34	17	0	0	0	0	0	103
NNE	8	5	6	40	94	286	244	17	2	0	0	0	702
NE	1	5	11	48	42	37	20	3	1	0	0	0	168
ENE	1	1	6	11	13	4	6	2	1	0	0	0	45
E	0	1	9	7	7	12	3	0	0	0	0	0	39
ESE	1	1	6	8	4	15	15	1	0	0	0	0	51
SE	0	1	4	4	15	25	50	5	2	0	0	0	106
SSE	0	1	4	8	9	20	25	8	5	0	0	0	80
S	0	1	0	14	6	20	30	6	1	0	0	0	78
SSW	0	0	3	8	14	17	18	2	1	0	0	0	63
SW	0	3	3	16	18	19	17	2	1	0	0	0	79
WSW	0	1	1	16	22	40	21	2	0	0	0	0	103
W	2	3	4	7	33	99	73	14	0	0	0	0	235
WNW	1	1	4	10	23	62	80	15	1	0	0	0	197
NW	2	1	10	5	10	33	33	5	0	0	0	0	99
NNW	0	3	3	14	12	16	12	0	0	0	0	0	60
TOTALS	16	28	81	234	349	739	664	82	15	0	0	0	2208

NUMBER OF VALID HOURS 2208  
NUMBER OF INVALID HOURS 0

NUMBER OF CALMS 0  
TOTAL HOURS FOR THE PERIOD 2208