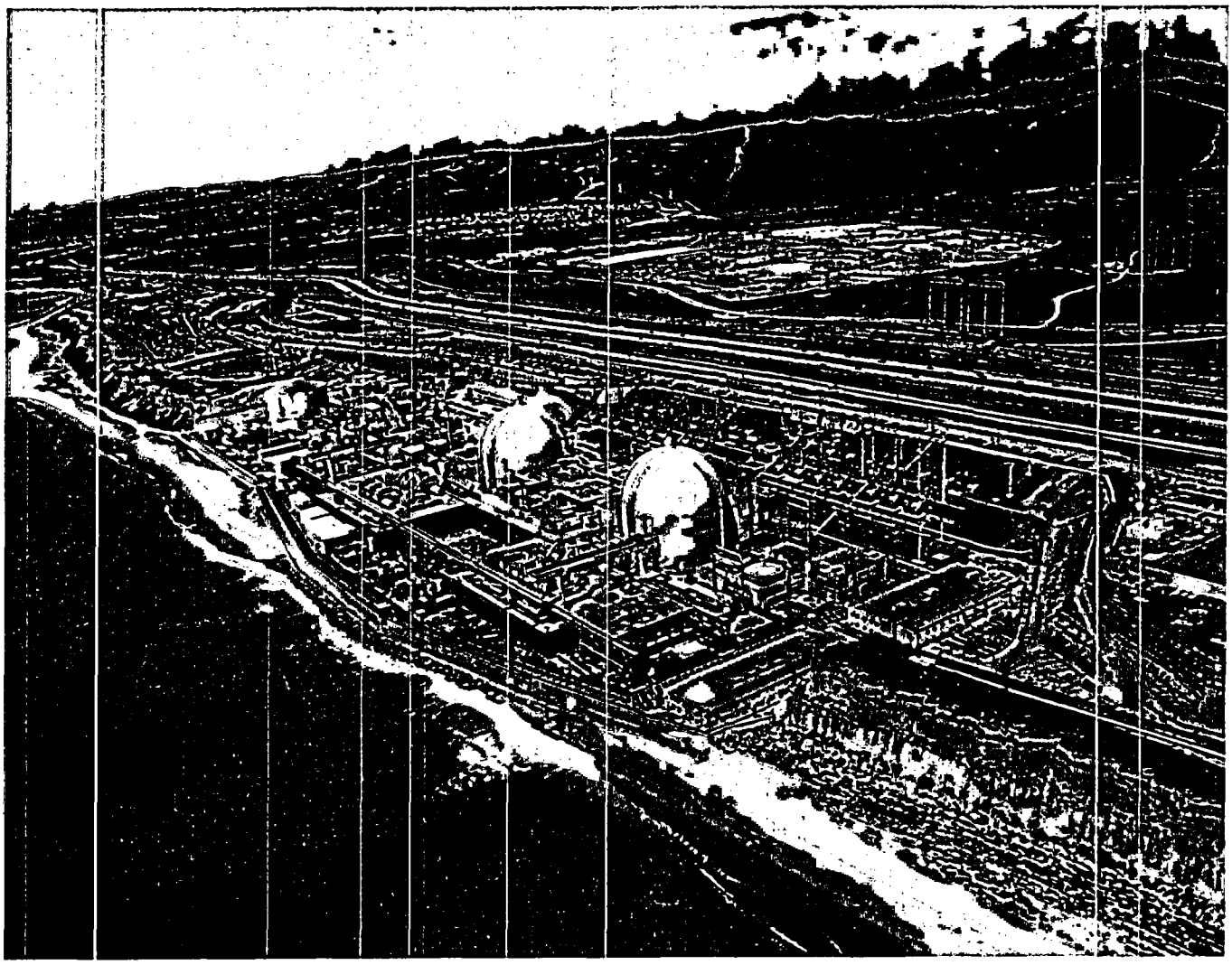

SAN ONOFRE NUCLEAR GENERATING STATION

Annual Radioactive Effluent Release Report

2005

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. By August 31, 2004, all fuel was transferred to the Independent Spent Fuel Storage Installation (ISFSI). Unit 1 is owned by Southern California Edison (80%) and San Diego Gas and Electric (20%).

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

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

S.O.N.G.S. 1

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ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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

SECTION B. GASEOUS EFFLUENTS

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

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

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

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

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

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

Table 1C, "Gaseous Effluents-Ground Level Releases," provides the systematic listing by radionuclide for the quantity of radioactivity released in three categories: fission gases, iodines, and particulates. The total radioactivity for each radionuclide is listed for each quarterly period by "continuous" mode of release. Plant stack releases are considered to be "continuous" releases. As of 8/4/93, "batch" mode releases are no longer conducted because of the permanent shutdown of the reactor. As of the fourth quarter of 2004, the noble gas and iodine source terms no longer exist, and therefore are no longer measured. All the fuel is stored in the ISFSI and the plant is being demolished.

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

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

Table 1F, "Gaseous Effluents-Batch Release Summary," has been deleted. "Batch" mode releases are no longer conducted as of 8/4/93, due to the permanent shutdown of the reactor.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

S.O.N.G.S. 1

TABLE 1A

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	N/A	N/A	N/A
2. Average release rate for period	μCi/sec	N/A	N/A	
3. Percent of applicable limit	% MPC	N/A	N/A	
4. Percent Effluent Concentration Limit	% ECL	N/A	N/A	
B. Iodines				
1. Total iodine-131	Ci	N/A	N/A	N/A
2. Average release rate for period	μCi/sec	N/A	N/A	
3. Percent of applicable limit	% MPC	N/A	N/A	
4. Percent Effluent Concentration Limit	% ECL	N/A	N/A	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	<LLD	4.45E-7	1.60E+1
2. Average release rate for period	μCi/sec	0.00E+0	5.66E-8	
3. Percent of applicable limit	% MPC	0.00E+0	1.47E-7	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	3.68E-7	
5. Gross alpha activity	Ci	<LLD	<LLD	5.00E+1
D. Tritium				
1. Total release	Ci	<LLD	<LLD	2.50E+1
2. Average release rate for period	μCi/sec	0.00E+0	0.00E+0	
3. Percent of applicable limit	% MPC	0.00E+0	0.00E+0	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	0.00E+0	

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

S.O.N.G.S. 1

TABLE 1A (Continued)

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	N/A	N/A	N/A
2. Average release rate for period	μCi/sec	N/A	N/A	
3. Percent of applicable limit	% MPC	N/A	N/A	
4. Percent Effluent Concentration Limit	% ECL	N/A	N/A	
B. Iodines				
1. Total iodine-131	Ci	N/A	N/A	N/A
2. Average release rate for period	μCi/sec	N/A	N/A	
3. Percent of applicable limit	% MPC	N/A	N/A	
4. Percent Effluent Concentration Limit	% ECL	N/A	N/A	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	<LLD	<LLD	1.60E+1
2. Average release rate for period	μCi/sec	0.00E+0	0.00E+0	
3. Percent of applicable limit	% MPC	0.00E+0	0.00E+0	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	0.00E+0	
5. Gross alpha activity	Ci	<LLD	<LLD	5.00E+1
D. Tritium				
1. Total release	Ci	<LLD	<LLD	2.50E+1
2. Average release rate for period	μCi/sec	0.00E+0	0.00E+0	
3. Percent of applicable limit	% MPC	0.00E+0	0.00E+0	
4. Percent Effluent Concentration Limit	% ECL	0.00E+0	0.00E+0	

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

S.O.N.G.S. 1

TABLE 1C

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES
CONTINUOUS MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation gases					
krypton-85	Ci	N/A	N/A	N/A	N/A
krypton-85m	Ci	N/A	N/A	N/A	N/A
krypton-87	Ci	N/A	N/A	N/A	N/A
krypton-88	Ci	N/A	N/A	N/A	N/A
xenon-133	Ci	N/A	N/A	N/A	N/A
xenon-133m	Ci	N/A	N/A	N/A	N/A
xenon-135	Ci	N/A	N/A	N/A	N/A
xenon-135m	Ci	N/A	N/A	N/A	N/A
xenon-138	Ci	N/A	N/A	N/A	N/A
Total for period	Ci	N/A	N/A	N/A	N/A
2. Iodines					
iodine-131	Ci	N/A	N/A	N/A	N/A
iodine-133	Ci	N/A	N/A	N/A	N/A
iodine-135	Ci	N/A	N/A	N/A	N/A
Total for period	Ci	N/A	N/A	N/A	N/A
3. Particulates					
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	<LLD	<LLD	<LLD	<LLD
cesium-137	Ci	<LLD	4.45E-7	<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	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD

LLD Lower Limit of Detection; see Table 1D.

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

S.O.N.G.S. 1

TABLE 1D

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation gases	
krypton-85	N/A
krypton-85m	N/A
krypton-87	N/A
krypton-88	N/A
xenon-133	N/A
xenon-133m	N/A
xenon-135	N/A
xenon-135m	N/A
xenon-138	N/A
2. Iodines	
iodine-131	N/A
iodine-133	N/A
iodine-135	N/A
3. Particulates	
barium-140	4.30E-13
cerium-141	5.50E-14
cerium-144	2.20E-13
cesium-134	1.20E-13
cesium-137	1.00E-13
cobalt-58	1.10E-13
cobalt-60	1.70E-13
iron-59	2.70E-13
lanthanum-140	8.50E-13
manganese-54	1.10E-13
molybdenum-99	6.50E-14
strontium-89	1.00E-11
strontium-90	1.00E-11
zinc-65	2.90E-13
4. alpha	1.00E-11
5. tritium	7.20E-8

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

S.O.N.G.S. 1

TABLE 1E

GASEOUS EFFLUENTS-RADIATION DOSES AT THE SITE BOUNDARY

	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A. Noble Gas					
1. Gamma Air Dose	mrad	N/A	N/A	N/A	N/A
2. Percent Applicable Limit	%	N/A	N/A	N/A	N/A
3. Beta Air Dose	mrad	N/A	N/A	N/A	N/A
4. Percent Applicable Limit	%	N/A	N/A	N/A	N/A
B. Tritium, Iodine, Particulates (at the nearest receptor)					
1. Organ Dose	mrem	0.00E+0	4.80E-6	0.00E+0	0.00E+0
2. Percent Applicable Limit	%	0.00E+0	6.40E-5	0.00E+0	0.00E+0

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

TABLE 1F

GASEOUS EFFLUENTS-BATCH RELEASE SUMMARY

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

SECTION C. LIQUID EFFLUENTS

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

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

In addition, Table 2A lists:

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

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

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

Table 2B, "Liquid Effluents," provides the systematic listing by radionuclide for the quantity of radioactivity released in each category. The total radioactivity of each radionuclide released is listed for each quarterly period by both "continuous" and "batch" modes of release. As of the fourth quarter of 2004, the noble gas and iodine source terms no longer exist, and therefore are no longer measured. All the fuel is stored in the ISFSI and the plant is being demolished. As of the third quarter 2005 there are no longer batch releases being conducted due to the demolition of the liquid radwaste system.

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 (2005)

S.O.N.G.S. 1

TABLE 2A

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	6.09E-3	6.91E-3	1.90E+1
2. Average diluted concentration during period	μCi/ml	1.52E-9	2.18E-12	
3. Percent of applicable limit	% MPC	1.05E-2	9.36E-6	
4. Percent Effluent Concentration Limit	% ECL	1.25E-1	1.08E-4	
B. Tritium				
1. Total release	Ci	1.93E+1	4.74E-1	1.90E+1
2. Average diluted concentration during period	μCi/ml	4.81E-6	1.50E-10	
3. Percent of applicable limit	% MPC	1.60E-1	4.99E-6	
4. Percent Effluent Concentration Limit	% ECL	4.81E-1	1.50E-5	
C. Dissolved and entrained gases				
1. Total release	Ci	N/A	N/A	N/A
2. Average diluted concentration during period	μCi/ml	N/A	N/A	
3. Percent of applicable limit	% MPC	N/A	N/A	
4. Percent Effluent Concentration Limit	% MPC	N/A	N/A	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	5.16E-5	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)	liters	2.16E+7	1.30E+6	5.00E+0
F. Volume of dilution water used during period	liters	4.01E+9	3.17E+12	5.00E+0

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

S.O.N.G.S. 1

TABLE 2A (Continued)

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	9.60E-7	9.70E-4	1.90E+1
2. Average diluted concentration during period	μCi/ml	3.83E-13	9.21E-10	
3. Percent of applicable limit	% MPC	1.91E-6	4.60E-3	
4. Percent Effluent Concentration Limit	% ECL	3.83E-5	9.08E-2	
B. Tritium				
1. Total release	Ci	1.80E-3	1.35E+0	1.90E+1
2. Average diluted concentration during period	μCi/ml	7.18E-10	1.28E-6	
3. Percent of applicable limit	% MPC	2.39E-5	1.22E-1	
4. Percent Effluent Concentration Limit	% ECL	7.18E-5	1.28E-1	
C. Dissolved and entrained gases				
1. Total release	Ci	N/A	N/A	N/A
2. Average diluted concentration during period	μCi/ml	N/A	N/A	
3. Percent of applicable limit	% MPC	N/A	N/A	
4. Percent Effluent Concentration Limit	% ECL	N/A	N/A	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)	liters	5.50E+7	2.02E+8	5.00E+0
F. Volume of dilution water used during period	liters	2.51E+9	1.05E+9	5.00E+0

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

S.O.N.G.S. 1

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	5.03E-6
cesium-137	Ci	<LLD	6.70E-6	9.60E-7	9.44E-4
chromium-51	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-58	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-60	Ci	<LLD	<LLD	<LLD	2.06E-5
iodine-131	Ci	<LLD	<LLD	<LLD	<LLD
iron-55	Ci	<LLD	<LLD	<LLD	<LLD
iron-59	Ci	<LLD	<LLD	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	<LLD	<LLD	<LLD	<LLD
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	<LLD	<LLD	<LLD	<LLD
strontium-89	Ci	<LLD	<LLD	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
technetium-99m	Ci	<LLD	<LLD	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	<LLD	6.70E-6	9.60E-7	9.70E-4
2. Dissolved and entrained gases					
xenon-133	Ci	N/A	N/A	N/A	N/A
xenon-135	Ci	N/A	N/A	N/A	N/A
Total for period	Ci	N/A	N/A	N/A	N/A

LLD Lower Limit of Detection; see Table 2C.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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TABLE 2B (Continued)

LIQUID EFFLUENTS
BATCH MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation products					
barium-140	Ci	<LLD	<LLD	N/A	N/A
cerium-141	Ci	<LLD	<LLD	N/A	N/A
cerium-144	Ci	<LLD	<LLD	N/A	N/A
cesium-134	Ci	4.72E-5	5.74E-5	N/A	N/A
cesium-137	Ci	4.32E-3	1.96E-3	N/A	N/A
chromium-51	Ci	<LLD	<LLD	N/A	N/A
cobalt-58	Ci	<LLD	<LLD	N/A	N/A
cobalt-60	Ci	1.68E-3	4.02E-3	N/A	N/A
iodine-131	Ci	<LLD	<LLD	N/A	N/A
iron-55	Ci	<LLD	8.28E-4	N/A	N/A
iron-59	Ci	<LLD	<LLD	N/A	N/A
lanthanum-140	Ci	<LLD	<LLD	N/A	N/A
manganese-54	Ci	<LLD	<LLD	N/A	N/A
molybdenum-99	Ci	<LLD	<LLD	N/A	N/A
niobium-95	Ci	<LLD	<LLD	N/A	N/A
strontium-89	Ci	<LLD	1.32E-5	N/A	N/A
strontium-90	Ci	4.34E-5	1.56E-5	N/A	N/A
technetium-99m	Ci	<LLD	<LLD	N/A	N/A
zinc-65	Ci	<LLD	<LLD	N/A	N/A
zirconium-95	Ci	<LLD	<LLD	N/A	N/A
Total for period	Ci	6.09E-3	6.90E-3	N/A	N/A
2. Dissolved and entrained gases					
xenon-133	Ci	N/A	N/A	N/A	N/A
xenon-135	Ci	N/A	N/A	N/A	N/A
Total for period	Ci	N/A	N/A	N/A	N/A

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

S.O.N.G.S. 1

TABLE 2C

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation products	
barium-140	2.90E-7
cerium-141	4.30E-8
cerium-144	1.70E-7
cesium-134	7.50E-8
cesium-137	6.40E-8
chromium-51	3.30E-7
cobalt-58	6.80E-8
cobalt-60	1.00E-7
iodine-131	5.70E-8
iron-55	1.00E-6
iron-59	1.60E-7
lanthanum-140	5.60E-7
manganese-54	6.70E-8
molybdenum-99	5.60E-8
niobium-95	6.80E-8
strontium-89	5.00E-8
strontium-90	5.00E-8
technetium-99m	5.70E-8
zinc-65	1.70E-7
zirconium-95	1.20E-7
2. Dissolved and entrained gases	
xenon-133	N/A
xenon-135	N/A
3. gross alpha	1.00E-7

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

S.O.N.G.S. 1

TABLE 2C (Continued)

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation products	
barium-140	2.40E-7
cerium-141	4.00E-8
cerium-144	1.70E-7
chromium-51	3.00E-7
cobalt-58	6.60E-8
iodine-131	4.30E-8
iron-55	1.00E-6
iron-59	1.50E-7
lanthanum-140	1.80E-7
manganese-54	6.70E-8
molybdenum-99	2.70E-8
niobium-95	6.40E-8
strontium-89	5.00E-8
technetium-99m	2.70E-8
zinc-65	1.70E-7
zirconium-95	1.10E-7
2. Dissolved and entrained gases	
xenon-133	N/A
xenon-135	N/A
3. gross alpha	1.00E-7

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

S.O.N.G.S. 1

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	1.61E-2	1.31E-2	7.08E-6	3.09E-3
2. Percent Applicable Limit	%	1.07E+0	8.71E-1	4.72E-4	2.06E-1
B.					
1. Limiting organ dose	mrem	2.11E-2	4.95E-2	1.06E-5	4.52E-3
2. Percent Applicable Limit	%	4.23E-1	9.89E-1	2.12E-4	9.05E-2
3. Limiting organ for period		GI-LLI	GI-LLI	Liver	Liver

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TABLE 2E

LIQUID EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	9 releases
2. Total time period for batch releases:	12875 minutes
3. Maximum time period for a batch release:	1722 minutes
4. Average time period for a batch release:	1431 minutes
5. Minimum time period for a batch release:	990 minutes
6. Average saltwater flow during batch releases:	13222 gpm

SECTION D. PREVIOUS RADIOACTIVE EFFLUENT RELEASE REPORT ADDENDUM

None

SECTION E. RADWASTE SHIPMENTS

TABLE 3

SOLID WASTE AND IRRADIATED FUEL SHIPMENT

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

1. Type of waste	Unit	12 month period	Estimated total error (%)
a. Spent resins, filter sludges, evaporator bottoms *	m^3	1.13E+1	3.00E+1
	Ci	2.59E+2	
b. Dry active waste (DAW), compactable and non-compactable (incl. demolition rubble) **	m^3	3.58E+3	3.00E+1
	Ci	3.68E+0	
c. Irradiated components (Structural members & reactor piping) **	m^3	2.06E+1	3.00E+1
	Ci	1.05E+2	
d. Other: (Mechanical filters)#	m^3	1.45E+0	3.00E+1
	Ci	1.90E+0	

NOTE: Total curie content estimated.

* Material packaged in Type A or Type B casks.

** Material packaged in various General Design, IP-1, USA DOT 7A Type A, or Type A packagings.

\# Material packaged in General Design Packaging.

2. Estimate of major nuclide composition (by type of waste)			
a.	americium-241	%	2.97E-3
	carbon-14	%	6.88E-3
	cerium-144	%	8.43E-2
	cesium-134	%	2.04E+0
	cesium-137	%	8.70E+1
	cobalt-60	%	3.78E+0
	curium-242	%	1.33E-5
	curium-243/244	%	1.09E-3
	iron-55	%	1.65E-1
	nickel-59	%	5.69E-2
	nickel-63	%	6.28E+0
	niobium-94	%	9.16E-3
	plutonium-238	%	2.83E-3
	plutonium-239/240	%	1.04E-3
	plutonium-241	%	5.97E-2
	plutonium-242	%	3.49E-5
	strontium-89	%	1.22E-2
	strontium-90	%	3.11E-1
	technetium-99	%	1.76E-2
	tritium	%	2.87E-3

2. Estimate of major nuclide composition (by type of waste)			
b.	americium-241	%	3.64E-2
	antimony-125	%	9.22E-4
	carbon-14	%	2.16E+0
	cerium-144	%	5.44E-1
	cesium-134	%	2.73E+0
	cesium-137	%	3.87E+1
	cobalt-57	%	8.71E-7
	cobalt-60	%	2.03E+1
	curium-242	%	2.50E-4
	curium-243/244	%	1.16E-2
	europium-155	%	7.09E-5
	iron-55	%	1.72E+1
	manganese-54	%	3.12E-5
	nickel-59	%	1.86E-2
	nickel-63	%	1.79E+1
	niobium-94	%	4.68E-3
	niobium-95	%	5.70E-2
	plutonium-238	%	6.66E-3
	plutonium-239/240	%	2.75E-3
	plutonium-241	%	1.74E-1
	ruthenium-106	%	1.27E-4
	silver-110m	%	6.92E-2
	strontium-90	%	1.55E-1
	tritium	%	4.78E-1
	zirconium-95	%	6.37E-2

2. Estimate of major nuclide composition (by type of waste)		
c. americium-241	%	1.35E-2
carbon-14	%	3.85E-2
cerium-144	%	7.71E-2
cesium-137	%	3.03E-2
cobalt-58	%	6.86E-2
cobalt-60	%	3.32E+1
curium-242	%	2.12E-4
curium-243/244	%	6.79E-3
iodine-129	%	2.22E-4
iron-55	%	5.22E+1
manganese-54	%	3.15E-2
nickel-59	%	1.76E-1
nickel-63	%	1.33E+1
niobium-94	%	2.61E-4
plutonium-238	%	2.12E-2
plutonium-239/240	%	7.30E-3
plutonium-241	%	5.39E-1
strontium-90	%	2.39E-2
technetium-99	%	6.73E-4
tritium	%	4.09E-4

2. Estimate of major nuclide composition (by type of waste)			
d.	americium-241	%	7.32E-2
	carbon-14	%	1.08E+0
	cerium-144	%	3.27E-2
	cesium-134	%	5.37E+0
	cesium-137	%	2.97E+1
	cobalt-57	%	1.70E-3
	cobalt-58	%	5.08E-2
	cobalt-60	%	2.14E+1
	curium-242	%	4.83E-4
	curium-243/244	%	2.29E-2
	europium-154	%	3.65E-2
	iron-55	%	1.59E+1
	manganese-54	%	1.65E-2
	nickel-59	%	1.04E-1
	nickel-63	%	2.47E+1
	niobium-94	%	3.31E-2
	plutonium-238	%	4.88E-2
	plutonium-239/240	%	2.05E-2
	plutonium-241	%	9.89E-1
	strontium-89	%	5.26E-3
	strontium-90	%	7.74E-2
	technetium-99	%	2.56E-3
	tritium	%	1.46E-2

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

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
4	Hittman and TAG Transport Truck	Barnwell, SC
149	Piazza and TAG Transport Truck	Envirocare, UT
85	MHF Logistical Solutions Rail	Envirocare, UT
2 *	TAG Transport Truck	Duratek/Envirocare, UT

* SONGS maintains a contract with Duratek that provides volume reduction services. The processed volume was shipped from the Duratek facility to EnviroCare using 8 shipments. Those 8 shipments included waste from other generators. SCE's waste volume was a small fraction of the total waste volume of these shipments.

B. IRRADIATED FUEL SHIPMENTS (Disposition)

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

C. DEWATERING

Number of Containers	Solidification Agent
3	N/A

SECTION F. APPLICABLE LIMITS

Gaseous Effluents - Applicable Limits

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

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

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

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

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

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

n = total number of radionuclides identified

MPC_i = Maximum Permissible Concentration (MPC) of the ith radionuclide from 10 CFR 20 (20.1-20.602), Appendix B, Table II, Column 1.

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

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

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

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

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

n = total number of radionuclides identified

ECL_i = Effluent Concentration Limit (ECL) of the ith 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** $= \dfrac{(\text{Dil Conc})\ (100)}{MPC_{eff}}$

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

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

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

    n = total number of radionuclides identified

    MPC_i = Maximum Permissible Concentration (MPC) of the ith radionuclide from 10 CFR 20 (20.1-20.602), Appendix B, Table II, Column 2.

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

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

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

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

    n = total number of radionuclides identified

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

SECTION G. ESTIMATION OF ERROR

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

Sources of error for gaseous effluents - batch releases are:

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

Sources of error for gaseous effluents - continuous releases are:

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

Sources of error for liquid effluents - batch releases are:

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

Sources of error for liquid effluents - continuous releases are:

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

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

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

where: σ_i = Error associated with each component.

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS

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

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

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

For members of the public, per the ODCM, who may at times be within the site boundary[1], the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the site boundary. For members of the public who traverse the site boundary via highway I-5, the residency time shall be considered negligible and hence the dose "0".

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

[1] ODCM Figure 6-1.

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TABLE 1

SOURCE	Dose * (millirems)				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS Whole Body	1) 1.61E-2	2) 1.31E-2	3) 7.08E-6	4) 3.09E-3	5) 3.22E-2
Organ	6) 2.11E-2	7) 4.95E-2	8) 1.06E-5	9) 4.52E-3	10) 7.12E-2
AIRBORNE EFFLUENTS Tritium, Iodines, and Particulates	11) 0.00E+0	12) 2.22E-5	13) 0.00E+0	14) 0.00E+0	15) 2.22E-5
NOBLE GASES Gamma	16) N/A	17) N/A	18) N/A	19) N/A	20) N/A
Beta	21) N/A	22) N/A	23) N/A	24) N/A	25) N/A
DIRECT RADIATION	26) 1.65E-1	27) 1.68E-1	28) 1.49E-1	29) 1.62E-1	30) 6.12E-1

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

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

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

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

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

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

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

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

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

9. This value was calculated using the methodology of the ODCM; the liver 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. There was no activity detected during the release period, therefore the reported organ dose was 0.00E+0 mrem.

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

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

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

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

16. Noble Gas sampling no longer required.

17. Noble Gas sampling no longer required.

18. Noble Gas sampling no longer required.

19. Noble Gas sampling no longer required.

20. Noble Gas sampling no longer required.

21. Noble Gas sampling no longer required.

22. Noble Gas sampling no longer required.

23. Noble Gas sampling no longer required.

24. Noble Gas sampling no longer required.

25. Noble Gas sampling no longer required.

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 WSW sector.

28. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the S 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	1.07E+0	8.71E-1	4.72E-4	2.06E-1	1.07E+0
Organ	4.23E-1	9.89E-1	2.12E-4	9.05E-2	7.12E-1
AIRBORNE EFFLUENTS Tritium, Iodines, and Particulates	0.00E+0	2.95E-4	0.00E+0	0.00E+0	1.48E-4
NOBLE GASES Gamma	N/A	N/A	N/A	N/A	N/A
Beta	N/A	N/A	N/A	N/A	N/A

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

SECTION I. CHANGES TO OFFSITE DOSE CALCULATION MANUAL

On February 25, 2005, Revision 23 to the Unit 1 Offsite Dose Calculation Manual (ODCM) was adopted and published. This revision incorporated 1) Removal of all the "notes" and applicable sections from rev 22 regarding the completion of fuel transfer to the ISFSI, 2) Addition of notes supporting the planned demolition of the liquid radwaste treatment system, 3) Updates related to the 2003-2004 Land Use Census, 4) Corrected dilution flowrate values, and 5) A minor change to a REMP sampling location.

A major milestone in the Unit 1 demolition plan, that of storing the last fuel cannister in the ISFSI, was accomplished in August 2004. Revision 22 was issued in advance to support that event. Several notes (dissolved/entrained gases and R-1254 setpoint) added in revision 22 were removed to reflect the completed event. The liquid radwaste treatment system (LRTS) was drained and isolated in 2005 and is currently being demolished. To support the demolition of the LRTS, notes were added in this revision to detail radwaste system specifications that are no longer applicable and instruments that are no longer required once systems were removed from service. Since the monitor was removed, requirements for surveillances and periodic maintenance were also removed. An EOE evaluation was performed for item 2.

The additional dilution flow pumps added in revision 22 originally were believed to have a capacity of 6,000 gpm each. In reality, the pumps are designed at approximately 5,000 gpm.

Per NRC Generic Letter 89-01, no Effluent/ODCM Evaluation or 50.59 reviews were required or performed for editorial changes. The minor REMP sampling location change is administered by that program.

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

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

A Addition
D Deletion
F Editorial/Format change
R Revision

Page	Change	Reason
iii	Revised to reflect removed sections	D
1-1	Removed reference to dissolved or entrained gases	D
1-3	Removed reference to dissolved or entrained gases and I-131.	D
1-5	Removed note (g) which dealt with dissolved or entrained gases	D
1-8	Added note detailing specification 1.3.1.A to no longer be applicable once the LRTS is isolated for demolition.	A

1-11	Corrected dilution flowrate	R
1-12	Added note detailing specification 1.4.1 to no longer be applicable once the LRTS is isolated for demolition. Removed Xe-133 from setpoint equation.	R,A,D
1-13	Removed reference to dissolved or entrained gases	D
1-14	Corrected dilution flowrate and removed Xe-133 from equation.	R
2-1	Removed applicable parts of specification 2.1.1.A.1.	D
2-2	Removed applicable parts of specification 2.1.2.A.	D
2-3	Removed gas grab sample and continuous noble gas monitoring for R-1254.	D,R
2-4	Removed noble gases from note b.	R
2-5	Removed note f. Modified note C to reflect no fuel in SFP.	D,R
2-6	Removed specification 2.2.1.	D
2-7	Removed specification 2.2.2.	D
2-10	Removed specification 2.5.1 on noble gas setpoints.	D
2-11	Removed specification 2.5.1 (continued).	D
2-12	Removed specification 2.5.1 (continued).	D
2-13	Removed specification 2.6.1 on noble gas dose rate.	D
2-15	Removed specification 2.7.1 on noble gas dose.	D
2-21	Per the LUC, updated 4 controlling locations and several factors.	R
2-22	Per the LUC, updated selected Ri values.	R
2-23	Per the LUC, updated selected Ri values.	R
2-24	Added entire page to reflect a new location.	A
2-25	Per the LUC, updated selected Ri values.	R
2-26	Per the LUC, updated selected Ri values.	R
2-27	Modified page number to account for added page in sector Q.	F
2-28	Per the LUC, updated selected Ri values.	R
2-29	Per the LUC, updated selected Ri values.	R
2-30	Per the LUC, updated selected Ri values.	R
2-31	Per the LUC, updated all Ri values.	R
2-32	Per the LUC, updated selected Ri values.	R
2-33	Per the LUC, updated selected Ri values.	R

2-34	Per the LUC, updated selected Ri values.	R
2-35	Per the LUC, updated selected Ri values.	R
2-36	Per the LUC, updated selected Ri values.	R
2-37	Per the LUC, updated selected Ri values.	R
2-38	Per the LUC, updated selected Ri values.	R
4-2	Added note supporting demolition of LRTS instrumentation.	R,A
4-3	Modified Actions 16 and 20 to support demolition of LRTS instrumentation.	A
4-5	Added note 7 to support demolition of LRTS and instruments.	R
4-6	Added note 7 to support demolition of LRTS and instruments.	A
4-7	Removed reference to R-1254 setpoints	D
4-8	Removed reference to R-1254 gaseous channel.	D,R
4-9	Removed reference to R-1254 compensatory actions	D
4-10	Removed reference to R-1254 setpoints and detector source check.	D,R
4-11	Removed reference to R-1254 and removed notes 5 and 7.	D
5-1	Corrected referenced Table number	R
5-23	Modified control location for non-migratory marine animals	R,A
6-3	Removed definitions for REM RAD and Sorrento monitors, neither of which exist any longer at Unit 1.	D
6-8	Modified reference from specific sections in the ODCM to the ODCM in general, to be consistent with Unit 2/3.	F

SECTION J. CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

Demolition of Liquid Radwaste Treatment System

On May 13, 2005, the Liquid Radwaste Treatment System (LRTS) was permanently removed from service. The sump pumps, piping and radiation monitoring system skid (RE-1218) were removed to support the demolition of the radwaste building. Unit 1 has reached the point in its decommissioning where systems and buildings are being physically removed.

The LRTS was designed to collect drainage from primary side equipment leaks, the spent fuel pool and the RCS itself. It consisted of tanks, ion exchangers, filters and pumps used to process waste water to achieve 10CFR20 limits upon release. A radiation monitoring system was installed to satisfy the license and control releases from the system as an ODCM-credited release point.

Removal of the LRTS involved de-energizing the equipment related to the liquid radwaste processing system, placing a flange on the discharge pipe downstream of the pumps (eliminating the discharge line to the unrestricted area) and then removing a section of pipe. Later plans call for the removal of all components and piping as well as filling with concrete the outfall conduit east of the tsunami gates. The plan is to section this contaminated equipment and ship offsite to a licensed burial facility. As part of decommissioning, primary side systems were previously removed. The containment building internals were removed and disposed of as dry active waste (DAW).

All of the piped sources of wastewater to the LRTS have been permanently drained of water and all sources have been either permanently drained and isolated or demolished to prevent any further water intrusion.

Once isolation of the LRTS was completed, approximately 26000 gallons of liquid waste were generated from draindown of the spent fuel pool, flushing of the ion exchangers, demineralizers, and spent resin tank, and cleanout of the holdup tanks. AR 060102024 details the disposal method and evaluation for this water.

However, after the LRTS was drained and released, there was residual water in various low points in the piping. The small quantities of liquid wastes will be dispositioned during dismantlement of the LRTS itself. This water is included in the estimate of 2000 gallons per quarter from decontamination activities and is expected to trend downwards as the demolition of the facility continues. This waste water will include residual water in the piping and tanks as well as water used in the washing and decontamination of system component parts.

The residual water has been and continues to be disposed of per the site program. The various methods to be used to dispose of this residual water may include: 1) lease or purchase a processing skid to reduce the water contamination levels, 2) contract with an offsite vendor to use their treatment equipment to perform the same function, or 3) process it locally and then release through a credited release point to the Unit 2 or Unit 3 outfall. Release of Unit 1 water to the Unit 2 or Unit 3 outfall required a change to the operating license(s). AR 030300754 addresses the disposition of

radioactive liquid wastes including wastes that would have been treated using the LRTS.

The only remaining credited liquid release point at Unit 1 is the Yard Drain Sump. It is still receiving drains from the outside yard including rain runoff and dewatering from the demolition process.

This change was reviewed and approved acceptable pursuant to Quality Assurance Program Description (SCE-1-A), subsection 17.2.20.3.1.i per ECP 041100584.

SECTION K. MISCELLANEOUS

- Yard Drain Sump Overflow

The Unit 1 Yard Drain sump overflowed to the PMF Catch Basin due to heavy rainfall on four different days in 2005. Since there was no detectable activity in the grab samples taken during the overflows, there were no dose consequences to a member of the public as a result of these unplanned, unmonitored releases. These events are documented in ARs 050100436, 050101565, 050401494 and 050600019.

Start Date/Time	Stop Date/Time	Duration (min)	Activity (μCi/ml)	Estimated Release (Curies)	Estimated Whole Body Dose (mrem)	Estimated Organ Dose (mrem)
01/09/05 @ 1620	01/09/05 @ 1720	60	<MDA *	0.00E+0	0.00E+0	0.00E+0
01/26/05 @ 1843	01/26/05 @ 1908	25	<MDA *	0.00E+0	0.00E+0	0.00E+0
01/26/05 @ 1938	01/26/05 @ 2035	57	<MDA *	0.00E+0	0.00E+0	0.00E+0
02/21/05 @ 0153	02/21/05 @ 0210	17	<MDA *	0.00E+0	0.00E+0	0.00E+0
04/28/05 @ 0617	04/28/05 @ 0710	53	<MDA *	0.00E+0	0.00E+0	0.00E+0

* MDA (Minimum Detectable Activity), 95% confidence level, a posteriori

- Unknown Loss of Dilution Flow During Liquid Releases

Between 1/21/05 and 2/3/05, only one of two dilution pumps was providing actual dilution flow for three radwaste "C" Holdup Tank (CHUT) releases conducted during that time frame. The dilution pumps were both submerged in the intake structure with hoses attached directing dilution flow. On 2/3/05, unusual turbulence was observed on the water surface, which after investigation, revealed the disconnected hose. Operations ascertained the disconnect occurred on 1/21/05. The release permit setpoints were calculated using only one of the dilution pumps so all setpoints were valid and appropriately conservative. Post release doses were recalculated using the lower flow rates. The net reported dose impact to a member of the public was minimal with no dose limit reached. The actual dose to the public was controlled in the release by the valid setpoint. This event is documented in AR 050200268.

- Unplanned Release of the Spent Fuel Pool Heat Exchanger Drains

While reviewing Yard Drain Sump (YDS) weekly composite results for the week ending 4/18/05, a slightly higher than expected concentration of tritium was noted. Investigation showed that the spent fuel pool heat exchanger (SFPHX) had been drained to the YDS earlier that week by mistake as the drains were directed to the incorrect yard drain. The plan had been to drain it to the auxiliary building sump and release it as radwaste. The release was monitored and sampled per procedure. The monitor setpoint was appropriately conservative. The dose impact to a member of the public was minimal as the maximum organ dose from this release (bone) was less than 10% of the total for the quarter; whole body was 6% of the quarter total. This event is documented in AR 050401027.

- Incorrect Setpoint on Yard Drain Sump (YDS) Monitor R-2101

On 6/6/2005 Operations discovered that the incorrect setpoint was installed in the YDS monitor, R-2101. On 6/3/2005 the north dilution pump was secured resulting in only 2000 gpm dilution flow. The installed setpoint for R-2101 (based on 3000 gpm dilution and an administrative factor of 0.3), was non-conservative. However, given that the YDS was the only liquid release point in existence at that time, the entire administrative factor (1.0) for Unit 1 could have been allocated to the YDS. As such, a release could not have exceeded the limits of 10CFR20 even with the installed setpoint. Furthermore, the weekly gamma and tritium composite analyses for that time period were <LLD. There was no dose consequences to a member of the public, but if there had been any dose, it would have been included in Table 2D. This event is documented in AR 050600267.

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

On 10/11/05, a skid pump on the R-1254 sample line was found to be leaking during the channel calibration test. Since this leakage was downstream of the sample media, the result was a reduced volume from the plant vent stack being collected. The pump assembly was replaced and the monitor returned to service on 10/14/05. The previous successfully conducted leak check was on 7/15/05 marking that point as the earliest failure date. Leak testing revealed that the inleakage was less than 50%. Note that since all of the spent fuel has been transferred to the ISFSI (fourth quarter 2004), the requirement for a noble gas monitor is not applicable. Evaluation using 50% of the indicated sample flow revealed that all required LLD levels were met. All samples taken during that time period were <MDA. Therefore there were no dose consequences to a member of the public from this event which is documented in AR 051100265.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

S.O.N.G.S. 1

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 2005 - December 31, 2005

S.O.N.G.S. 1			
Monitor	Inoperability Period	Inoperability Cause	Explanation
R-2101 Yard Drain Sump Monitor	07/09/05 - 08/23/05	Detector spiking during no flow condition	Found moisture in detector cable connectors which caused the spiking. Connectors were cleaned and dried and returned to service. This event is documented in AR 050700400.
	10/16/05 - 11/15/05	Detector spiking which tripped pumps off whenever pumps turned on due to high sump level	Repeat symptom. Again found moisture in detector cable connectors but on closer examination found signs of arcing which caused the spiking. Connectors were cleaned and reconnected protected by vulcanized tape and desiccant to prevent moisture intrusion. New cable on order for installation. Monitor forecast to be replaced by summer 2006 with rebuilt monitor for the new YDS as part of demolition. This event is documented in AR 051000726

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

- Gaseous releases totaled 4.45E-7 curies of which particulates were 4.45E-7 curies, and tritium was 0.00E+0 curies. (Noble Gas and Iodine sampling no longer required)

- The radiation doses from gaseous releases were: organ dose: 2.22E-5 mrem at the nearest receptor. (No dose was attributed to Gamma and Beta radiation since noble gas and iodine sampling are no longer required)

- Liquid releases totaled 2.12E+1 curies of which particulates and iodines were 1.40E-2 curies, tritium was 2.12E+1 curies, and noble gases were 0.00E+0 curies.

- The radiation doses from liquid releases were: (a) total body: 3.22E-2 mrem, (b) limiting organ: 7.12E-2 mrem.

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

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

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ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

January - December

SECTION A. INTRODUCTION

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

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

SECTION B. GASEOUS EFFLUENTS

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

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

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

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

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

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

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

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

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

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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	2.72E+1	2.83E+1	3.00E+1
2. Average release rate for period	μCi/sec	3.49E+0	3.61E+0	
3. Percent of applicable limit	% MPC	6.71E-3	9.39E-3	
4. Percent Effluent Concentration Limit	% ECL	8.41E-3	1.98E-2	
B. Iodines (1)(2)				
1. Total iodine-131	Ci	1.13E-5	4.33E-5	1.90E+1
2. Average release rate for period	μCi/sec	1.45E-6	5.51E-6	
3. Percent of applicable limit	% MPC	6.98E-6	2.64E-5	
4. Percent Effluent Concentration Limit	% ECL	3.49E-6	1.32E-5	
C. Particulates (1)(2)				
1. Particulates with half-lives >8 days	Ci	1.08E-4	1.24E-5	1.60E+1
2. Average release rate for period	μCi/sec	1.38E-5	1.58E-6	
3. Percent of applicable limit	% MPC	5.19E-6	5.55E-7	
4. Percent Effluent Concentration Limit	% ECL	1.86E-5	1.23E-6	
5. Gross alpha activity	Ci	<LLD	<LLD	5.00E+1
D. Tritium				
1. Total release	Ci	1.32E+1	2.03E+1	2.50E+1
2. Average release rate for period	μCi/sec	1.70E+0	2.58E+0	
3. Percent of applicable limit	% MPC	4.07E-3	6.20E-3	
4. Percent Effluent Concentration Limit	% ECL	8.15E-3	1.24E-2	

(1) On 1/26/05 for approximately 230 minutes, Unit 3 condenser air ejector particulate and iodine samples were not collected due to inadvertent securing of the skid. Prior and subsequent samples were <MDA. There were no dose consequences to a member of the public due to this event which is documented in AR 050101560.

(2) On 4/13/05 for less than 6 hours, no particulate samples were taken at the South Yard Facility due to an electrical fault. Prior and subsequent samples were <MDA. No work was being performed during this time. There were no dose consequences to a member of the public due to this event which is documented in AR 050401508.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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

TABLE 1A (Continued)

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	2.97E+1	4.29E+1	3.00E+1
2. Average release rate for period	μCi/sec	3.74E+0	5.39E+0	
3. Percent of applicable limit	% MPC	1.15E-2	9.77E-3	
4. Percent Effluent Concentration Limit	% ECL	2.86E-2	1.02E-2	
B. Iodines				
1. Total iodine-131	Ci	4.33E-5	2.55E-5	1.90E+1
2. Average release rate for period	μCi/sec	5.45E-6	3.21E-6	
3. Percent of applicable limit	% MPC	2.61E-5	1.54E-5	
4. Percent Effluent Concentration Limit	% ECL	1.31E-5	7.70E-6	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	1.20E-5	1.06E-5	1.60E+1
2. Average release rate for period	μCi/sec	1.51E-6	1.33E-6	
3. Percent of applicable limit	% MPC	1.09E-6	1.12E-6	
4. Percent Effluent Concentration Limit	% ECL	2.67E-6	2.78E-6	
5. Gross alpha activity	Ci	<LLD	<LLD	5.00E+1
D. Tritium				
1. Total release	Ci	1.21E+1	5.02E+0	2.50E+1
2. Average release rate for period	μCi/sec	1.52E+0	6.32E-1	
3. Percent of applicable limit	% MPC	3.65E-3	1.52E-3	
4. Percent Effluent Concentration Limit	% ECL	7.31E-3	3.03E-3	

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	8.41E-1	2.74E+0	4.22E+0	8.67E-1
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	2.56E+1	2.51E+1	2.55E+1	3.97E+1
xenon-133m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135	Ci	<LLD	<LLD	<LLD	4.48E-3
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	2.64E+1	2.78E+1	2.97E+1	4.06E+1
2. Iodines					
iodine-131	Ci	1.13E-5	4.33E-5	4.33E-5	2.55E-5
iodine-132	Ci	<LLD	<LLD	1.95E-6	<LLD
iodine-133	Ci	1.24E-5	5.48E-5	7.54E-5	1.90E-5
iodine-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	2.37E-5	9.81E-5	1.21E-4	4.45E-5

LLD Lower Limit of Detection; see Table 1D.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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

TABLE 1C (Continued)

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES
CONTINUOUS MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
3. Particulates					
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
bromine-82	Ci	3.43E-5	1.30E-4	8.17E-5	2.86E-5
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	1.92E-6	8.04E-6	8.88E-6
cesium-138	Ci	<LLD	<LLD	4.44E-5	<LLD
cobalt-58	Ci	9.48E-5	1.05E-5	3.97E-6	1.70E-6
cobalt-60	Ci	1.02E-5	<LLD	<LLD	<LLD
iron-59	Ci	<LLD	<LLD	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	2.64E-6	<LLD	<LLD	<LLD
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
strontium-89	Ci	<LLD	<LLD	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	<LLD	<LLD	<LLD	<LLD

LLD Lower Limit of Detection; see Table 1D.

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	7.06E-1	5.05E-1	N/A	2.27E+0
krypton-85m	Ci	<LLD	<LLD	N/A	<LLD
krypton-87	Ci	<LLD	<LLD	N/A	<LLD
krypton-88	Ci	<LLD	<LLD	N/A	<LLD
xenon-133	Ci	3.57E-2	<LLD	N/A	7.81E-3
xenon-133m	Ci	<LLD	<LLD	N/A	<LLD
xenon-135	Ci	<LLD	<LLD	N/A	<LLD
xenon-135m	Ci	<LLD	<LLD	N/A	<LLD
xenon-138	Ci	<LLD	<LLD	N/A	<LLD
Total for period	Ci	7.41E-1	5.05E-1	N/A	2.28E+0

LLD Lower Limit of Detection; see Table 1D.

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

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

TABLE 1D

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation gases	
krypton-85	1.50E-5
krypton-85m	3.80E-8
krypton-87	1.90E-7
krypton-88	1.40E-7
xenon-133m	3.10E-7
xenon-135	4.00E-8
xenon-135m	1.50E-6
xenon-138	2.60E-6
2. Iodines	
iodine-132	1.30E-9
iodine-135	1.40E-10
3. Particulates	
barium-140	4.30E-13
cerium-141	5.50E-14
cerium-144	2.20E-13
cesium-134	1.20E-13
cesium-137	1.00E-13
cesium-138	2.60E-10
cobalt-60	1.70E-13
iron-59	2.70E-13
lanthanum-140	8.50E-13
manganese-54	1.10E-13
molybdenum-99	6.50E-14
strontium-89	1.00E-11
strontium-90	1.00E-11
zinc-65	2.90E-13
zirconium-95	1.90E-13
4. alpha	1.00E-11

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

TABLE 1D (Continued)

GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation gases	
krypton-85m	2.00E-6
krypton-87	9.00E-6
krypton-88	7.20E-6
xenon-133	4.60E-6
xenon-133m	1.80E-5
xenon-135	2.30E-6
xenon-135m	2.80E-5
xenon-138	4.30E-5

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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	2.57E-3	5.22E-3	7.34E-3	1.33E-3
2. Percent Applicable Limit	%	2.57E-2	5.22E-2	7.34E-2	1.33E-2
3. Beta Air Dose	mrad	4.73E-3	5.52E-3	6.18E-3	4.20E-3
4. Percent Applicable Limit	%	2.36E-2	2.76E-2	3.09E-2	2.10E-2
B. Tritium, Iodine, Particulates (at the nearest receptor)					
1. Organ Dose	mrem	2.08E-3	3.24E-3	2.06E-3	8.62E-4
2. Percent Applicable Limit	%	1.38E-2	2.16E-2	1.38E-2	5.74E-3

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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:	2070 minutes
3. Maximum time period for a batch release:	470 minutes
4. Average time period for a batch release:	345 minutes
5. Minimum time period for a batch release:	39 minutes

SECTION C. LIQUID EFFLUENTS

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

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

In addition, Table 2A lists:

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

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

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

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

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

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

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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]				
1. Total release (not including tritium, gases, alpha)	Ci	5.49E-3	1.07E-2	1.90E+1
2. Average diluted concentration during period	μCi/ml	7.41E-12	1.41E-11	
3. Percent of applicable limit	% MPC	8.19E-6	2.19E-5	
4. Percent Effluent Concentration Limit	% ECL	5.90E-5	2.06E-4	
B. Tritium				
1. Total release	Ci	1.35E+2	5.45E+2	1.90E+1
2. Average diluted concentration during period	μCi/ml	1.82E-7	7.20E-7	
3. Percent of applicable limit	% MPC	6.07E-3	2.40E-2	
4. Percent Effluent Concentration Limit	% ECL	1.82E-2	7.20E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	7.81E-5	1.40E-2	1.90E+1
2. Average diluted concentration during period	μCi/ml	1.05E-13	1.85E-11	
3. Percent of applicable limit	% MPC	5.27E-8	9.27E-6	
4. Percent Effluent Concentration Limit	% ECL	5.27E-8	9.27E-6	
D. Gross alpha radioactivity [1]				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)	liters	8.58E+7	1.06E+8	5.00E+0
F. Volume of dilution water used during period	liters	7.41E+11	7.57E+11	5.00E+0

(1) The sample for Unit 3 HUT released on 4/7/04 was discarded prior to use in the monthly composite for offsite analysis for alpha, Fe-55 and Sr-89/90. The April Unit 3 FFCPD composite was comprised of 11 other tank releases. The missing sample was a clean sump release (#5L-102-3) having gamma and tritium both <MDA. There was no dose impact to a member of the public from this event which is documented in AR 050500801.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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

TABLE 2A (Continued)

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Third Quarter	Fourth Quarter	Estimated Total Error, %
A. Fission and activation products [1]				
1. Total release (not including tritium, gases, alpha)	Ci	6.32E-3	7.20E-3	1.90E+1
2. Average diluted concentration during period	μCi/ml	8.23E-12	9.39E-12	
3. Percent of applicable limit	% MPC	1.38E-5	1.68E-5	
4. Percent Effluent Concentration Limit	% ECL	1.14E-4	1.71E-4	
B. Tritium				
1. Total release	Ci	7.22E+1	3.80E+2	1.90E+1
2. Average diluted concentration during period	μCi/ml	9.40E-8	4.95E-7	
3. Percent of applicable limit	% MPC	3.13E-3	1.65E-2	
4. Percent Effluent Concentration Limit	% ECL	9.40E-3	4.95E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	1.90E-4	6.36E-2	1.90E+1
2. Average diluted concentration during period	μCi/ml	2.47E-13	8.29E-11	
3. Percent of applicable limit	% MPC	1.24E-7	4.14E-5	
4. Percent Effluent Concentration Limit	% ECL	1.24E-7	4.14E-5	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	5.00E+1
E. Volume of waste released (batch & continuous, prior to dilution)	liters	7.35E+7	6.40E+7	5.00E+0
F. Volume of dilution water used during period	liters	7.68E+11	7.67E+11	5.00E+0

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TABLE 2B

LIQUID EFFLUENTS
CONTINUOUS MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation products					
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	<LLD	<LLD	<LLD	<LLD
cesium-137	Ci	<LLD	<LLD	<LLD	<LLD
chromium-51	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-58	Ci	<LLD	<LLD	<LLD	<LLD
cobalt-60	Ci	<LLD	<LLD	<LLD	<LLD
iodine-131	Ci	<LLD	<LLD	<LLD	<LLD
iron-55	Ci	<LLD	<LLD	<LLD	<LLD
iron-59	Ci	<LLD	<LLD	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	<LLD	<LLD	<LLD	<LLD
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	<LLD	<LLD	<LLD	<LLD
strontium-89	Ci	<LLD	<LLD	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
technetium-99m	Ci	<LLD	<LLD	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	<LLD	<LLD	<LLD	<LLD
2. Dissolved and entrained gases					
xenon-133	Ci	<LLD	<LLD	<LLD	<LLD
xenon-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	<LLD	<LLD	<LLD	<LLD

LLD Lower Limit of Detection; see Table 2C.

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TABLE 2B (Continued)

LIQUID EFFLUENTS
BATCH MODE

Radionuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Fission and activation products					
antimony-125	Ci	1.32E-4	1.15E-3	1.01E-4	6.86E-4
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	<LLD
cerium-144	Ci	<LLD	<LLD	<LLD	<LLD
cesium-134	Ci	3.96E-6	6.21E-5	<LLD	2.25E-5
cesium-137	Ci	6.64E-5	6.59E-4	<LLD	3.88E-4
chromium-51	Ci	3.30E-4	<LLD	<LLD	<LLD
cobalt-57	Ci	7.71E-7	<LLD	<LLD	<LLD
cobalt-58	Ci	1.58E-3	2.57E-3	1.57E-3	4.83E-4
cobalt-60	Ci	6.34E-4	1.61E-3	2.19E-3	2.26E-3
iodine-131	Ci	<LLD	<LLD	<LLD	<LLD
iron-55	Ci	1.67E-3	2.48E-3	1.62E-3	2.58E-3
iron-59	Ci	1.21E-4	8.83E-5	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD
manganese-54	Ci	1.63E-4	3.85E-4	2.37E-4	2.94E-4
molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD
niobium-95	Ci	4.60E-4	9.86E-4	2.94E-4	9.65E-5
niobium-97	Ci	8.85E-6	<LLD	1.05E-5	3.14E-5
silver-110m	Ci	5.09E-5	1.42E-4	1.41E-4	3.53E-4
strontium-89	Ci	<LLD	<LLD	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD	<LLD	<LLD
technetium-99m	Ci	<LLD	<LLD	<LLD	<LLD
tin-113	Ci	2.50E-5	1.94E-5	7.99E-6	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	2.44E-4	5.18E-4	1.47E-4	<LLD
zirconium-97	Ci	<LLD	<LLD	<LLD	1.16E-5
Total for period	Ci	5.49E-3	1.07E-2	6.32E-3	7.20E-3
2. Dissolved and entrained gases					
krypton-85	Ci	<LLD	1.25E-2	<LLD	1.36E-2
xenon-131m	Ci	<LLD	<LLD	<LLD	6.58E-4
xenon-133	Ci	7.81E-5	1.54E-3	1.90E-4	4.90E-2
xenon-133m	Ci	<LLD	<LLD	<LLD	2.77E-4
xenon-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	7.81E-5	1.40E-2	1.90E-4	6.36E-2

LLD Lower Limit of Detection; see Table 2C.

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TABLE 2C

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
CONTINUOUS MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation products	
barium-140	2.90E-7
cerium-141	4.30E-8
cerium-144	1.70E-7
cesium-134	7.50E-8
cesium-137	6.40E-8
chromium-51	3.30E-7
cobalt-58	6.80E-8
cobalt-60	1.00E-7
iodine-131	5.70E-8
iron-55	1.00E-6
iron-59	1.60E-7
lanthanum-140	5.60E-7
manganese-54	6.70E-8
molybdenum-99	5.60E-8
niobium-95	6.80E-8
strontium-89	5.00E-8
strontium-90	5.00E-8
technetium-99m	5.70E-8
zinc-65	1.70E-7
zirconium-95	1.20E-7
2. Dissolved and entrained gases	
xenon-133	1.90E-7
xenon-135	8.90E-8
3. gross alpha	1.00E-7

TABLE 2C (Continued)

LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION
BATCH MODE

Radionuclides	LLD (μCi/cc)
1. Fission and activation products	
barium-140	2.40E-7
cerium-141	4.00E-8
cerium-144	1.70E-7
cesium-134	7.50E-8
cesium-137	6.40E-8
chromium-51	3.00E-7
cobalt-57	2.20E-8
iodine-131	4.30E-8
iron-59	1.40E-7
lanthanum-140	1.80E-7
molybdenum-99	2.70E-8
niobium-97	1.50E-7
strontium-89	5.00E-8
strontium-90	5.00E-8
technetium-99m	2.70E-8
tin-113	5.30E-8
zinc-65	1.70E-7
zirconium-95	1.10E-7
zirconium-97	1.70E-7
2. Dissolved and entrained gases	
krypton-85	2.90E-5
xenon-131m	3.00E-6
xenon-133m	6.90E-7
xenon-135	8.90E-8
3. gross alpha	1.00E-7

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TABLE 2D

LIQUID EFFLUENTS-RADIATION DOSES AT THE LIQUID SITE BOUNDARY

	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A.					
1. Total body dose	mrem	3.92E-4	1.17E-3	2.66E-4	8.43E-4
2. Percent Applicable Limit	%	1.31E-2	3.91E-2	8.85E-3	2.81E-2
B.					
1. Limiting organ dose	mrem	1.38E-3	2.68E-3	1.37E-3	2.60E-3
2. Percent Applicable Limit	%	1.38E-2	2.68E-2	1.37E-2	2.60E-2
3. Limiting organ for period		GI-LLI	GI-LLI	GI-LLI	GI-LLI

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TABLE 2E

LIQUID EFFLUENTS-BATCH RELEASE SUMMARY

	12 month period
1. Number of batch releases:	122 releases
2. Total time period for batch releases:	18468 minutes
3. Maximum time period for a batch release:	550 minutes
4. Average time period for a batch release:	151 minutes
5. Minimum time period for a batch release:	1 minutes
6. Average saltwater flow during batch releases:	735350 gpm

SECTION D. PREVIOUS RADIOACTIVE EFFLUENT RELEASE REPORT ADDENDUM

None.

SECTION E. RADWASTE SHIPMENTS

TABLE 3

SOLID WASTE AND IRRADIATED FUEL SHIPMENT

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

1. Type of waste	Unit	12 month period	Estimated total error (%)
a. Spent resins, filter sludges	m^3	N/A	N/A
	Ci	N/A	
b. Dry active waste (DAW), compactable and non-compactable *	m^3	4.51E+1	3.00E+1
	Ci	3.16E-1	
c. Irradiated components	m^3	N/A	N/A
	Ci	N/A	
d. Other: Filters *	m^3	3.99E-2	3.00E+1
	Ci	1.04E+0	

Note: Total curie content estimated.

* Material packaged in strong tight containers (USA Type IP-1) of various sizes.

N/A No shipment made.

2. Estimate of major nuclide composition (by type of waste)		
a. not applicable	%	N/A
b. americium-241	%	3.00E-04
antimony-124	%	4.08E-01
antimony-125	%	8.60E-01
carbon-14	%	5.13E-01
cerium-144	%	3.04E-01
cesium-134	%	2.74E+00
cesium-137	%	1.34E+00
chromium-51	%	1.22E+01
cobalt-57	%	2.55E-01
cobalt-58	%	2.84E+01
cobalt-60	%	3.52E+00
curium-242	%	1.70E-03
curium-243/244	%	2.10E-03
iron-55	%	3.01E+01
iron-59	%	2.46E+00
manganese-54	%	1.32E+00
nickel-59	%	2.87E-01
nickel-63	%	6.33E+00
niobium-95	%	5.98E+00
plutonium-238	%	6.00E-04
plutonium-239/240	%	2.00E-04
plutonium-241	%	4.74E-02
strontium-89	%	2.73E-02
strontium-90	%	1.50E-03
zirconium-95	%	3.06E+00
c. not applicable	%	N/A

2. Estimate of major nuclide composition (by type of waste)		
d. americium-241	%	6.70E-03
antimony-125	%	1.09E+00
carbon-14	%	1.20E+01
cerium-144	%	2.16E-02
cesium-134	%	1.44E-01
cesium-137	%	1.04E+00
cobalt-57	%	2.95E-02
cobalt-58	%	1.80E-01
cobalt-60	%	1.74E+01
curium-242	%	2.00E-05
curium-243/244	%	1.23E-02
iodine-129	%	9.00E-04
iron-55	%	3.26E+01
iron-59	%	4.00E-04
manganese-54	%	3.93E-01
nickel-63	%	3.48E+01
niobium-95	%	6.00E-04
plutonium-238	%	3.30E-03
plutonium-239/240	%	3.50E-03
plutonium-241	%	1.62E-01
silver-110m	%	1.61E-02
strontium-90	%	1.54E-02
technetium-99	%	7.00E-03
tin-113	%	4.40E-03
tritium	%	1.32E-01
zirconium-95	%	3.80E-03

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

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

* SONGS maintains a contract with Duratek that provides volume reduction services. The processed volume was shipped from the Duratek facility to EnviroCare using 10 shipments. Those 10 shipments included waste from other generators. SCE's waste volume was a small fraction of the total waste volume of these shipments.

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

B. IRRADIATED FUEL SHIPMENTS (Disposition)

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

C. DEWATERING

Number of Containers	Solidification Agent
None	N/A

SECTION F. APPLICABLE LIMITS

Gaseous Effluents - Applicable Limits

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

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

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

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

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

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

n = total number of radionuclides identified

MPC_i = Maximum Permissible Concentration (MPC) of the ith radionuclide from 10 CFR 20 (20.1-20.602), Appendix B, Table II, Column 1.

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

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

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

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

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

n = total number of radionuclides identified

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

Liquid Effluents - Applicable Limits

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

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

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

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

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

n = total number of radionuclides identified

MPC_i = Maximum Permissible Concentration (MPC) of the ith radionuclide from 10 CFR 20 (20.1-20.602), Appendix B, Table II, Column 2.

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

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

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

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

n = total number of radionuclides identified

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

SECTION G. ESTIMATION OF ERROR

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

Sources of error for gaseous effluents - batch releases are:

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

Sources of error for gaseous effluents - continuous releases are:

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

Sources of error for liquid effluents - batch releases are:

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

Sources of error for liquid effluents - continuous releases are:

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

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

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

where: σ_i = Error associated with each component.

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS

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

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

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

For members of the public, per the ODCM, who may at times be within the site boundary[1], the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the site boundary. For members of the public who traverse the site boundary via highway I-5, the residency time shall be considered negligible and hence the dose "0".

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

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

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TABLE 1

SOURCE	Dose * (millirems)				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
LIQUID EFFLUENTS	1)	2)	3)	4)	5)
Whole Body	3.92E-4	1.17E-3	2.66E-4	8.43E-4	2.67E-3
	6)	7)	8)	9)	10)
Organ	1.38E-3	2.68E-3	1.37E-3	2.60E-3	8.03E-3
AIRBORNE EFFLUENTS	11)	12)	13)	14)	15)
Tritium, Iodines, and Particulates	1.11E-3	1.08E-3	1.24E-3	6.27E-4	3.93E-3
NOBLE GASES **	16)	17)	18)	19)	20)
Gamma	1.21E-2	1.62E-2	2.14E-2	1.99E-2	6.96E-2
	21)	22)	23)	24)	25)
Beta	2.24E-2	1.87E-2	1.67E-2	3.97E-2	9.75E-2
	26)	27)	28)	29)	30)
DIRECT RADIATION	1.65E-1	1.68E-1	1.49E-1	1.62E-1	6.12E-1

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

26. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the W sector.

27. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the WSW sector.

28. Measurements were made using TLD dosimeters; values are presented as site wide dose and are prorated to 300 hours per year; highest dose was measured at the Site Boundary in the S 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	1.31E-2	3.91E-2	8.85E-3	2.81E-2	4.45E-2
Organ	1.38E-2	2.68E-2	1.37E-2	2.60E-2	4.02E-2
AIRBORNE EFFLUENTS Tritium, Iodines, and Particulates	7.39E-3	7.18E-3	8.29E-3	4.18E-3	1.31E-2
NOBLE GASES Gamma	1.21E-1	1.62E-1	2.14E-1	1.99E-1	3.48E-1
Beta	1.12E-1	9.37E-2	8.35E-2	1.98E-1	2.44E-1

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

SECTION I. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

On February 25, 2005, Revision 40 to the Units 2/3 Offsite Dose Calculation Manual (ODCM) was adopted and published. This change incorporated 1) Removal of the requirements for a particulate activity radiation monitor from the South Yard Facility, 2) Updates related to the 2003-2004 Land Use Census (LUC), 3) A minor change to a REMP sampling location and 4) Various administrative changes.

An approved Effluent/ODCM Evaluation (EOE) was generated for item 1. Per NRC Generic Letter 89-01, no 50.59 or EOE reviews were required or performed for editorial changes made to reflect actual plant operation. The minor REMP sampling location change is administered by that program.

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, 10CFR50.35a and Appendix I to 10CFR50 will be maintained.

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

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

Page	Change	Reason
ii	Removed South Yard Facility from section 2.6.5	D
2-10	Defined flowpath admin factors with variables.	D,R
2-11	Revised definition PVS admin factor	R
2-13	Revised definition of CAE admin factor	R
2-15	Revised definition of CP admin factor	R
2-16	Revised definition of CP admin factor	R
2-17	Removed main purge flow rate which is N/A for RT-7865	D
2-19	Revised definition of waste gas admin factor	R
2-20	Removed South Yard Facility monitor setpoint determination from section 2.6.5	D
2-21	Removed South Yard Facility monitor setpoint determination from section 2.6.5	D
2-28	Replaced equation 2-26 that was mistakenly deleted last revision	F
2-31	Revised the Controlling Location Factor Table per LUC	R
2-32	Per LUC, updated selected Ri values.	R
2-33	Per LUC, updated selected Ri values.	R
2-34	Per LUC, updated selected Ri values.	R

2-35	Per LUC, updated selected Ri values.	R
2-36	Per LUC, updated selected Ri values.	R
2-38	Per LUC, updated selected Ri values.	R
2-40	Per LUC, updated selected Ri values.	R
2-41	Per LUC, updated selected Ri values.	R
2-42	Per LUC, updated all Ri values.	R
2-43	Per LUC, updated selected Ri values.	R
2-44	Per LUC, updated selected Ri values.	R
2-45	Per LUC, updated selected Ri values.	R
2-46	Per LUC, updated selected Ri values.	R
2-47	Per LUC, updated selected Ri values.	R
2-48	Per LUC, updated selected Ri values.	R
2-49	Per LUC, updated selected Ri values.	R
2-50	Per LUC, updated selected Ri values.	R
2-51	Per LUC, updated selected Ri values.	R
2-52	Per LUC, updated selected Ri values.	R
2-53	Per LUC, updated selected Ri values.	R
4-10	Assigned "a" or "b" to Action 36, specifying whether the action is related to process or sample flow.	F
4-11	Removed SYFRT-7904, SYFRT-7905 and SYF DAS datalink from Table 4-3.	D
4-13	Removed Action 43 because SYF monitors were removed.	D
4-15	Removed control room annunciation DAS as the datalink has been terminated.	D
4-16	Removed SYFRT-7904, SYFRT-7905 and SYF DAS from Table 4-3.	D
4-18	Removed notes 7 and 8 from Table 4-4	D
4-21	Modified Figure 4-6 to show P/I sampler only in SYF	R
5-20	Modified control location for non-migratory marine animals	R,A

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, 2005 to December 31, 2005.

SECTION K. MISCELLANEOUS

None

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 2005 - December 31, 2005

S.O.N.G.S. 2			
Monitor	Inoperability Period	Inoperability Cause	Explanation
2RT-7870 Condenser Air Ejector Process Flow Monitor	04/17/00 - present	Inoperable process flow measuring device whenever vacuum pump is running.	Design deficiency causes process flow instrument to be inoperable while the vacuum pump is running. Substitute flow value is automatically inserted whenever the vacuum pump is running as high flow values are not sensed. Flow monitor works properly during normal operations. This event is documented in ARs 000101252 and 000400960.
2RT-7865 Plant Vent Stack (Containment Purge) Particulate and Iodine Sampler	02/11/05 - 03/24/05	Intermittent Heat trace circuitry inoperability	Discovered that during times of heavy rainfall, water intrusion wets the circuitry and insulation preventing system from maintaining temperature. Initial repairs to circuitry made system operable. Permanent repairs planned. This event is documented in AR 050200818.
2APC-4077 Steam Generator E088 Blowdown Compositor	08/02/05 - 12/09/05	Failure of composite sampler	Degraded material conditions lead to failure. Also found inability to calibrate. A new composite sampler was installed. This event is documented in ARs 050800166 and 050900588.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2005)

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

EFFLUENT RADIATION MONITORS OUT OF SERVICE GREATER THAN 30 DAYS

January 1, 2005 - December 31, 2005

S.O.N.G.S. 3			
Monitor	Inoperability Period	Inoperability Cause	Explanation
3RT-7870 Condenser Air Ejector Process Flow Monitor	04/17/00 - present	Inoperable process flow measuring device whenever vacuum pump is running.	Design deficiency causes process flow instrument to be inoperable while the vacuum pump is running. Substitute flow value is automatically inserted whenever the vacuum pump is running as high flow values are not sensed. Flow monitor works properly during normal operations. This event is documented in ARs 000101252 and 000400960.
3RT-7865 Plant Vent Stack (Containment Purge) Particulate and Iodine Sampler	02/18/05 - 05/05/05	Intermittent heat trace circuitry inoperability	Investigation of the heat trace circuitry found water-damaged insulation at the roof penetration. Initial repairs to circuitry made system operable. Permanent repairs planned. This event is documented in ARs 050401453 and 050201162.
3APC-4076 Steam Generator E089 Blowdown Compositor	12/22/04 - 05/11/05	Faulty voltage regulator	Initial investigation resulted in the ordering of wrong part with long lead time. Further investigation found bad capacitor on voltage regulator. Release occurred only six days during this time period. This event is documented in AR 041201355.

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

- Gaseous releases totaled 1.79E+2 curies of which noble gases were 1.28E+2 curies, iodines were 2.87E-4 curies, particulates were 4.61E-4 curies, and tritium was 5.07E+1 curies.

- The radiation doses from gaseous releases were: (a) gamma air dose: 6.96E-2 mrad at the site boundary, (b) beta air dose: 9.75E-2 mrad at the site boundary, (c) organ dose: 3.93E-3 mrem at the nearest receptor.

- Liquid releases totaled 1.13E+3 curies of which particulates and iodines were 2.97E-2 curies, tritium was 1.13E+3 curies, and noble gases were 7.78E-2 curies.

- The radiation doses from liquid releases were: (a) total body: 2.67E-3 mrem, (b) limiting organ: 8.03E-3 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

COMMON

COMMON RADWASTE SHIPMENTS

TABLE 3

SOLID WASTE AND IRRADIATED FUEL SHIPMENT

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

1. Type of waste	Unit	12 month period	Estimated total error (%)
a. Spent resins, filter sludges, evaporator bottoms	m^3	N/A	N/A
	Ci	N/A	
b. Dry active waste (DAW), compactable and non-compactable *	m^3	3.26E+0	3.00E+1
	Ci	6.16E-4	
c. Irradiated components	m^3	N/A	N/A
	Ci	N/A	
d. Other (filters)	m^3	N/A	N/A
	Ci	N/A	

Note: Total curie content estimated.

* Material packaged in various General Design, IP-1, USA DOT 7A, and Type A packagings.

N/A No shipment made.

COMMON

2. Estimate of major nuclide composition (by type of waste)		
a. not applicable	%	N/A
b. americium-241	%	4.56E-04
antimony-124	%	3.00E-01
antimony-125	%	1.16E+00
carbon-14	%	2.03E+00
cerium-144	%	3.73E-01
cesium-134	%	3.65E+00
cesium-137	%	1.88E+00
chromium-51	%	4.22E+00
cobalt-57	%	3.10E-01
cobalt-58	%	2.32E+01
cobalt-60	%	4.85E+00
curium-242	%	1.85E-03
curium-243/244	%	3.04E-03
iron-55	%	4.06E+01
iron-59	%	1.44E+00
manganese-54	%	1.64E+00
nickel-59	%	4.03E-01
nickel-63	%	8.86E+00
niobium-95	%	2.78E+00
plutonium-238	%	7.73E-04
plutonium-239/240	%	2.89E-04
plutonium-241	%	6.61E-02
strontium-89	%	1.25E-02
strontium-90	%	2.16E-03
zirconium-95	%	2.34E+00
c. not applicable	%	N/A
d. not applicable	%	N/A

COMMON

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

3. Solid Waste Disposition (S.O.N.G.S. 1, 2, and 3)		
Number of Shipments	Mode of Transportation	Destination
1	TAG Transport Truck	EnviroCare, UT

B. IRRADIATED FUEL SHIPMENTS (Disposition)

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

C. DEWATERING

Number of Containers	Solidification Agent
None	N/A

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

None.

REFERENCES:

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

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

COMMON

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	6.71E-1
b. Percent ODCM Specification Limit	%	2.68E+0
2. Limiting Organ		
a. Organ Dose (GI-LLI)	mrem	8.63E-2
b. Percent ODCM Specification Limit	%	3.45E-1
3. Thyroid		
a. Thyroid Dose	mrem	1.22E-2
b. Percent ODCM Specification Limit	%	1.63E-2

COMMON CONCLUSIONS

- Gaseous releases from S.O.N.G.S. 1, 2 and 3 totaled 1.79E+2 curies of which noble gases were 1.28E+2 curies, iodines were 2.87E-4 curies, particulates were 4.61E-4 curies, and tritium was 5.07E+1 curies.

- Liquid releases from S.O.N.G.S. 1, 2 and 3 totaled 1.15E+3 curies of which particulates and iodines were 4.37E-2 curies, tritium was 1.15E+3 curies, and noble gases were 7.78E-2 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 245 radwaste shipments to Envirocare, UT and 5 shipments to Barnwell, SC. Total volume was 3.66E+3 cubic meters containing 3.71E+2 curies of radioactivity.

- Meteorological conditions during the year were typical for S.O.N.G.S. Meteorological dispersion was good 36% of the time, fair 38% of the time and poor 26% of the time.

- The net result from the analysis of these effluent releases indicates that the operation of S.O.N.G.S. 1, 2 and 3 has met all the requirements of the applicable regulations and therefore has not resulted in any detrimental effects to a member of the public.

APPENDIX A

GASEOUS EFFLUENTS - APPLICABLE LIMITS

A. Table 1A lists the total curies released and the release rate. The percent of applicable limit compares the released concentrations to the concentration limits of 10 CFR 20, Appendix B, Table II, Column 1.

B. Table 1E lists the air doses as calculated using the historical X/Q. The air dose due to noble gases released in gaseous effluents from S.O.N.G.S. (per reactor) to areas at and beyond the site boundary shall be limited to the following values:

1. During any calendar quarter: ≤ 5 mrad for gamma radiation and ≤ 10 mrad for beta radiation.

2. During any calendar year: ≤ 10 mrad for gamma radiation and ≤ 20 mrad for beta radiation.

C. The dose to a Member of the Public from iodines, tritium, and all radionuclides in particulate form with half-lives greater than eight days in gaseous effluents released from S.O.N.G.S. (per reactor) to areas at and beyond the site boundary shall be limited to the following values:

1. During any calendar quarter: ≤ 7.5 mrem to any organ.

2. During any calendar year: ≤ 15 mrem to any organ.

APPENDIX A (Continued)

LIQUID EFFLUENTS - APPLICABLE LIMITS

A. Table 2A lists the total curies released, the diluted concentration, and percent of the applicable limit. The percent of applicable limit compares the diluted concentration of radioactive material released to the concentrations specified in 10 CFR 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained gases. For dissolved or entrained noble gases, the concentration is limited to 2.00E-4 μCi/ml.

B. Table 2D lists doses due to liquid releases. The dose commitment to a Member of the Public from radioactive materials in liquid effluents released from S.O.N.G.S. (per reactor) to unrestricted areas shall be limited to the following values:

1. During any calendar quarter: $\leq$ 1.5 mrem to the total body and
   $\leq$ 5 mrem to any organ.

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

METEOROLOGY

METEOROLOGY

The meteorology of the San Onofre Nuclear Generating Station for each of the four quarters, 2005 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, 2005. 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.

METEOROLOGY

January - March
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05010100-05033123
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	1	0	1	0	0	0	0	2
NNE	0	0	0	1	0	1	1	2	0	0	0	0	5
NE	0	0	0	0	0	1	4	2	0	0	0	0	7
ENE	0	0	0	0	1	0	1	1	0	0	0	0	3
E	0	0	0	0	0	0	2	0	0	0	0	0	2
ESE	0	0	0	2	0	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	1	3	3	9	2	1	0	0	0	19
S	0	0	1	1	0	17	17	2	0	0	0	0	38
SSW	0	0	0	0	5	8	8	0	0	0	0	0	21
SW	0	0	0	1	6	8	3	0	0	0	0	0	18
WSW	0	0	0	2	8	40	36	0	0	0	0	0	86
W	0	0	0	1	6	63	57	3	0	0	0	0	130
WNW	0	0	0	1	3	21	29	11	1	0	0	0	66
NW	0	0	0	0	4	0	1	0	0	0	0	0	5
NNW	0	0	0	1	1	0	0	0	0	0	0	0	2
TOTALS	0	0	1	11	37	163	168	24	2	0	0	0	406

NUMBER OF VALID HOURS 406
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 406

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	1	0	0	0	0	0	1
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	1	0	0	0	0	1
ENE	0	0	0	0	0	0	0	2	0	0	0	0	2
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	1	0	1	0	0	0	2
SSE	0	0	0	1	0	1	2	0	1	0	0	0	5
S	0	0	0	0	0	1	0	4	0	0	0	0	5
SSW	0	0	0	1	2	2	3	0	0	0	0	0	8
SW	0	0	0	1	1	5	0	2	0	0	0	0	9
WSW	0	0	0	2	1	3	0	0	0	0	0	0	6
W	0	0	0	1	2	2	0	0	0	0	0	0	5
WNW	0	0	0	1	4	2	2	0	0	0	0	0	9
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
TOTALS	0	0	0	7	11	17	12	9	2	0	0	0	58

NUMBER OF VALID HOURS 58
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 58

METEOROLOGY

January - March
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05010100-05033123
WIND SPEED (M/S) AT 10 METER LEVEL

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

WIND DIR	.22 .50	.51 .75	.76 1.0	1.1 1.5	1.6 2.0	2.1 3.0	3.1 5.0	5.1 7.0	7.1 10.0	10.1 13.0	13.1 18.0	>18	TOTAL
N	0	0	0	0	1	0	0	0	0	0	0	0	1
NNE	0	0	0	0	0	1	0	0	0	0	0	0	1
NE	0	0	0	1	0	0	1	0	0	0	0	0	2
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	1	0	0	1	0	0	0	0	2
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	1	0	4	0	0	0	0	5
SSE	0	0	0	0	1	1	3	2	2	0	0	0	9
S	0	0	0	0	1	0	1	1	0	0	0	0	3
SSW	0	0	0	1	1	3	0	1	0	0	0	0	6
SW	0	0	0	1	2	2	0	0	0	0	0	0	5
WSW	0	0	0	1	2	2	1	0	0	0	0	0	6
W	0	0	0	1	1	3	0	0	0	0	0	0	5
WNW	0	0	0	1	3	7	3	1	0	0	0	0	15
NW	0	0	0	0	0	2	2	0	0	0	0	0	4
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	0	6	13	22	11	10	2	0	0	0	64

NUMBER OF VALID HOURS 64
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 64

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

WIND DIR	.22 .50	.51 .75	.76 1.0	1.1 1.5	1.6 2.0	2.1 3.0	3.1 5.0	5.1 7.0	7.1 10.0	10.1 13.0	13.1 18.0	>18	TOTAL
N	0	0	0	4	7	5	3	0	0	0	0	0	19
NNE	0	0	0	11	11	18	1	0	0	0	0	0	41
NE	0	0	0	2	6	5	1	1	0	0	0	0	15
ENE	0	0	1	0	2	2	2	1	0	0	0	0	8
E	0	0	1	1	2	0	6	4	0	0	0	0	14
ESE	0	0	0	1	2	6	9	17	7	0	0	0	42
SE	0	0	0	3	3	7	38	37	25	2	0	0	115
SSE	0	0	0	3	5	6	17	13	22	7	8	0	81
S	0	0	0	4	3	7	6	5	10	2	0	0	37
SSW	0	0	0	2	4	4	4	5	3	0	0	0	22
SW	1	0	0	5	2	4	9	2	2	0	0	0	25
WSW	0	0	2	2	1	4	8	2	1	0	0	0	20
W	0	1	0	1	2	6	5	7	2	0	0	0	24
WNW	0	1	0	3	3	15	12	7	2	0	0	0	43
NW	0	0	1	1	6	14	15	1	1	0	0	0	39
NNW	0	0	1	8	6	011	5	0	0	0	0	0	31
TOTALS	1	2	6	51	65	114	141	102	75	11	8	0	576

NUMBER OF VALID HOURS 576
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 576

METEOROLOGY

January - March
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05010100-05033123
WIND SPEED (M/S) AT 10 METER LEVEL

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

WIND DIR	.22 .50	.51 .75	.76 1.0	1.1 1.5	1.6 2.0	2.1 3.0	3.1 5.0	5.1 7.0	7.1 10.0	10.1 13.0	13.1 18.0	>18	TOTAL
N	0	0	0	7	12	11	1	0	0	0	0	0	31
NNE	0	0	2	16	14	20	7	0	0	0	0	0	59
NE	0	0	1	0	3	5	3	0	0	0	0	0	12
ENE	0	1	1	6	1	6	1	3	1	1	0	0	21
E	1	0	1	2	4	5	15	3	2	1	0	0	34
ESE	0	0	0	1	5	8	5	6	0	0	0	0	25
SE	0	0	0	2	3	2	7	12	8	0	0	0	34
SSE	0	0	0	0	1	5	2	9	8	0	0	0	25
S	0	0	0	1	1	4	1	0	3	3	0	0	13
SSW	0	0	0	1	1	2	1	0	1	0	0	0	6
SW	0	0	1	0	0	2	0	0	1	0	0	0	4
WSW	0	0	0	1	1	0	3	0	0	0	0	0	5
W	0	1	0	1	2	3	1	1	2	0	0	0	11
WNW	0	0	0	3	0	3	5	2	1	0	0	0	14
NW	0	0	0	0	1	5	5	2	1	0	0	0	14
NNW	0	0	1	2	4	8	3	0	0	0	0	0	18
TOTALS	1	2	7	43	53	89	60	38	28	5	0	0	326

NUMBER OF VALID HOURS 326
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 326

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

WIND DIR	.22 .50	.51 .75	.76 1.0	1.1 1.5	1.6 2.0	2.1 3.0	3.1 5.0	5.1 7.0	7.1 10.0	10.1 13.0	13.1 18.0	>18	TOTAL
N	0	0	0	5	5	5	3	0	0	0	0	0	18
NNE	0	0	0	15	38	71	17	1	0	0	0	0	142
NE	0	0	1	10	6	5	4	2	0	0	0	0	28
ENE	0	1	0	1	6	5	0	0	0	0	0	0	13
E	0	0	1	1	3	2	1	0	0	0	0	0	8
ESE	0	0	0	1	0	0	0	0	0	0	0	0	1
SE	0	0	0	0	1	2	0	0	0	0	0	0	3
SSE	0	0	1	0	0	1	2	0	0	0	0	0	4
S	0	0	0	2	0	2	0	0	0	0	0	0	4
SSW	0	0	1	2	0	0	0	0	0	0	0	0	3
SW	0	0	0	3	0	1	0	0	0	0	0	0	4
WSW	0	0	1	0	2	0	0	0	0	0	0	0	3
W	0	0	0	1	4	1	0	0	0	0	0	0	6
WNW	3	0	1	2	2	1	2	0	0	0	0	0	11
NW	0	0	0	1	0	1	2	0	0	0	0	0	4
NNW	0	0	0	2	2	3	2	0	0	0	0	0	9
TOTALS	3	1	6	46	69	100	33	3	0	0	0	0	261

NUMBER OF VALID HOURS 261
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 261

METEOROLOGY

January - March
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05010100-05033123
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	8	8	0	0	0	0	0	17
NNE	0	0	0	2	12	148	167	8	0	0	0	0	337
NE	0	0	0	1	10	17	15	4	0	0	0	0	47
ENE	0	0	0	0	5	6	2	0	0	0	0	0	13
E	0	0	0	1	3	2	1	0	0	0	0	0	7
ESE	0	0	0	3	1	0	0	0	0	0	0	0	4
SE	0	0	1	0	2	3	0	0	0	0	0	0	6
SSE	0	0	1	3	1	2	1	0	0	0	0	0	8
S	0	0	0	0	1	2	1	0	0	0	0	0	4
SSW	0	0	0	0	0	0	3	0	0	0	0	0	3
SW	0	0	0	2	0	2	0	0	0	0	0	0	4
WSW	0	0	0	3	2	0	0	0	0	0	0	0	5
W	0	0	0	1	1	0	0	0	0	0	0	0	2
WNW	1	0	2	1	0	2	0	0	0	0	0	0	6
NW	0	0	0	1	1	1	0	0	0	0	0	0	3
NNW	0	0	1	0	1	1	0	0	0	0	0	0	3
TOTALS	1	0	5	18	41	194	198	12	0	0	0	0	469

NUMBER OF VALID HOURS 469
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 469

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	0	16	26	30	16	1	0	0	0	0	89
NNE	0	0	2	45	75	259	193	11	0	0	0	0	585
NE	0	0	2	14	25	33	28	10	0	0	0	0	112
ENE	0	2	2	7	15	19	6	7	1	1	0	0	60
E	1	0	3	5	13	9	25	8	2	1	0	0	67
ESE	0	0	0	8	8	14	14	23	7	0	0	0	74
SE	0	0	1	5	9	15	46	53	34	2	0	0	165
SSE	0	0	2	8	11	19	36	26	34	7	8	0	151
S	0	0	1	8	6	33	26	12	13	5	0	0	104
SSW	0	0	1	7	13	19	19	6	4	0	0	0	69
SW	1	0	1	13	11	24	12	4	3	0	0	0	69
WSW	0	0	3	11	17	49	48	2	1	0	0	0	131
W	0	2	0	7	18	78	63	11	4	0	0	0	183
WNW	4	1	3	12	15	51	53	21	4	0	0	0	164
NW	0	0	1	3	13	24	28	3	2	0	0	0	74
NNW	0	0	3	13	14	23	10	0	0	0	0	0	63
TOTALS	6	5	25	182	289	699	623	198	109	16	8	0	2160

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

METEOROLOGY

April - June
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05040100-05063023
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	1	0	0	0	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	1	4	3	2	0	0	0	0	10
S	0	0	0	2	6	18	36	11	0	0	0	0	73
SSW	0	0	0	4	12	24	49	2	0	0	0	0	91
SW	0	0	0	3	18	57	51	1	0	0	0	0	130
WSW	0	0	0	1	19	66	81	3	0	0	0	0	170
W	0	0	0	0	11	68	124	0	0	0	0	0	203
WNW	0	0	0	1	7	31	68	12	0	0	0	0	119
NW	0	0	0	0	0	1	7	5	0	0	0	0	13
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	0	12	74	269	419	36	0	0	0	0	810

NUMBER OF VALID HOURS 810
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 810

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

WIND DIR	.22 .50	.51 .75	.76 1.0	1.1 1.5	1.6 2.0	2.1 3.0	3.1 5.0	5.1 7.0	7.1 10.0	10.1 13.0	13.1 18.0	>18	TOTAL
N	0	0	0	0	0	1	0	0	0	0	0	0	1
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	1	1	0	0	0	0	0	0	0	0	2
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	1	0	0	0	0	0	0	1
SSE	0	0	0	0	1	6	2	1	2	0	0	0	12
S	0	0	0	1	1	1	5	0	0	0	0	0	8
SSW	0	1	0	2	0	2	6	3	0	0	0	0	14
SW	0	0	0	0	2	6	1	0	0	0	0	0	9
WSW	0	0	0	1	4	4	4	0	0	0	0	0	13
W	0	0	0	0	2	2	1	0	0	0	0	0	5
WNW	0	0	0	0	1	6	1	1	0	0	0	0	9
NW	0	0	0	1	0	2	6	0	0	0	0	0	9
NNW	0	0	0	0	0	2	0	0	0	0	0	0	2
TOTALS	0	1	1	6	11	33	26	5	2	0	0	0	85

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

METEOROLOGY

April - June
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05040100-05063023
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	2	1	0	0	0	0	0	0	3
NNE	0	0	0	1	0	1	0	0	0	0	0	0	2
NE	0	0	0	0	2	1	0	0	0	0	0	0	3
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	1	0	0	0	0	0	0	0	0	1
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	1	1	0	3	0	0	0	0	0	5
SSE	0	0	0	1	2	4	8	3	0	0	0	0	18
S	0	0	0	2	2	5	6	3	0	0	0	0	18
SSW	0	0	0	0	2	6	16	2	0	0	0	0	26
SW	0	0	0	5	4	10	3	1	1	0	0	0	24
WSW	0	0	0	2	0	5	7	1	0	0	0	0	15
W	0	0	0	3	3	3	2	0	0	0	0	0	11
WNW	0	0	0	1	2	3	0	1	0	0	0	0	7
NW	0	0	0	0	0	5	4	1	0	0	0	0	10
NNW	0	0	0	1	0	2	0	0	0	0	0	0	3
TOTALS	0	0	0	18	20	46	49	12	1	0	0	0	146

NUMBER OF VALID HOURS 146
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 146

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

WIND DIR	.22 .50	.51 .75	.76 1.0	1.1 1.5	1.6 2.0	2.1 3.0	3.1 5.0	5.1 7.0	7.1 10.0	10.1 13.0	13.1 18.0	>18	TOTAL
N	0	0	1	10	3	5	0	0	0	0	0	0	19
NNE	0	0	1	8	9	9	4	0	0	0	0	0	31
NE	0	0	1	4	2	4	0	0	0	0	0	0	11
ENE	0	1	0	0	3	1	0	0	0	0	0	0	5
E	0	0	1	7	5	4	2	0	0	0	0	0	19
ESE	0	0	0	3	2	15	13	0	0	0	0	0	33
SE	1	0	4	4	7	27	29	9	1	0	0	0	82
SSE	0	0	0	4	15	24	26	7	0	0	0	0	76
S	0	0	0	6	5	19	23	5	0	0	0	0	58
SSW	0	0	1	10	9	12	14	6	0	0	0	0	52
SW	0	2	4	8	8	7	12	2	0	0	0	0	43
WSW	0	2	2	9	2	7	7	5	0	0	0	0	34
W	0	1	2	7	5	7	7	5	0	0	0	0	34
WNW	0	0	0	2	2	1	5	3	1	0	0	0	14
NW	0	0	2	5	2	14	5	1	1	2	0	0	32
NNW	0	0	4	4	5	4	2	0	0	0	0	0	19
TOTALS	1	6	23	91	84	160	149	43	3	2	0	0	562

NUMBER OF VALID HOURS 562
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 562

METEOROLOGY

April - June
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05040100-05063023
WIND SPEED (M/S) AT 10 METER LEVEL

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

WIND DIR	.22 .50	.51 .75	.76 1.0	1.1 1.5	1.6 2.0	2.1 3.0	3.1 5.0	5.1 7.0	7.1 10.0	10.1 13.0	13.1 18.0	>18	TOTAL
N	0	0	0	5	7	3	0	0	0	0	0	0	15
NNE	0	0	2	8	11	13	2	0	0	0	0	0	36
NE	0	0	0	8	2	1	0	0	0	0	0	0	11
ENE	0	0	0	4	2	5	0	0	0	0	0	0	11
E	0	0	0	2	3	5	1	0	0	0	0	0	11
ESE	0	0	3	3	2	3	1	0	0	0	0	0	12
SE	0	0	0	0	1	2	0	0	0	0	0	0	3
SSE	0	0	0	1	1	1	2	0	0	0	0	0	5
S	0	0	1	1	1	1	0	0	0	0	0	0	4
SSW	0	0	1	1	1	1	0	0	0	0	0	0	4
SW	0	0	2	2	1	0	0	0	0	0	0	0	5
WSW	0	0	0	1	1	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	3	3	0	4	0	0	0	0	0	10
NW	0	0	2	0	1	0	0	0	0	0	0	0	3
NNW	0	0	1	2	3	6	4	0	0	0	0	0	16
TOTALS	0	0	12	41	40	41	14	0	0	0	0	0	148

NUMBER OF VALID HOURS 148
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 148

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

WIND DIR	.22 .50	.51 .75	.76 1.0	1.1 1.5	1.6 2.0	2.1 3.0	3.1 5.0	5.1 7.0	7.1 10.0	10.1 13.0	13.1 18.0	>18	TOTAL
N	0	0	0	7	1	2	2	0	0	0	0	0	12
NNE	0	1	2	18	41	38	1	0	0	0	0	0	101
NE	0	0	3	16	5	2	1	2	0	0	0	0	29
ENE	0	0	1	1	4	2	0	1	0	0	0	0	9
E	0	0	1	3	0	0	0	0	0	0	0	0	4
ESE	0	0	0	1	0	0	0	0	0	0	0	0	1
SE	0	0	1	1	1	0	0	0	0	0	0	0	3
SSE	0	0	0	2	3	0	0	0	0	0	0	0	5
S	0	0	1	1	1	0	1	0	0	0	0	0	4
SSW	0	0	0	2	2	0	0	0	0	0	0	0	4
SW	0	0	0	1	0	2	0	0	0	0	0	0	3
WSW	0	0	0	2	0	0	0	0	0	0	0	0	2
W	0	0	1	2	1	1	0	0	0	0	0	0	5
WNW	0	0	0	0	2	2	0	0	0	0	0	0	4
NW	0	0	1	1	2	0	0	0	0	0	0	0	4
NNW	0	1	1	1	2	2	0	0	0	0	0	0	7
TOTALS	0	2	12	59	65	51	5	3	0	0	0	0	197

NUMBER OF VALID HOURS 197
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 197

METEOROLOGY

April - June
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05040100-05063023
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	3	2	0	0	0	0	0	6
NNE	0	0	0	2	14	120	63	3	0	0	0	0	202
NE	0	0	0	2	6	6	0	0	0	0	0	0	14
ENE	0	0	0	1	0	1	2	0	0	0	0	0	4
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	1	0	0	0	0	0	0	1
SE	0	0	0	0	1	0	0	0	0	0	0	0	1
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	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	1	0	0	0	0	0	1
WNW	0	0	0	0	0	0	2	1	0	0	0	0	3
NW	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	0	0	0	0	1	1	1	0	0	0	0	0	3
TOTALS	0	0	0	6	23	132	71	4	0	0	0	0	236

NUMBER OF VALID HOURS 236
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 236

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	1	22	14	15	4	0	0	0	0	0	56
NNE	0	1	5	37	75	181	70	3	0	0	0	0	372
NE	0	0	5	31	17	14	1	2	0	0	0	0	70
ENE	0	1	1	6	9	9	2	1	0	0	0	0	29
E	0	0	2	13	8	9	3	0	0	0	0	0	35
ESE	0	0	3	8	4	19	14	0	0	0	0	0	48
SE	1	0	5	6	11	30	32	9	1	0	0	0	95
SSE	0	0	0	8	23	39	41	13	2	0	0	0	126
S	0	0	2	14	16	44	71	19	0	0	0	0	166
SSW	0	1	2	19	26	45	85	13	0	0	0	0	191
SW	0	2	6	19	33	82	67	4	1	0	0	0	214
WSW	0	2	2	16	26	82	99	9	0	0	0	0	236
W	0	1	3	12	22	81	135	5	0	0	0	0	259
WNW	0	0	0	7	17	43	80	18	1	0	0	0	166
NW	0	0	5	7	5	22	22	7	1	2	0	0	71
NNW	0	1	6	8	11	17	7	0	0	0	0	0	50
TOTALS	1	9	48	233	317	732	733	103	6	2	0	0	2184

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

METEOROLOGY

July - September
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05070100-05093023
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	1	0	0	0	0	0	0	0	0	0	0	1
ESE	0	0	0	0	1	0	0	0	0	0	0	0	1
SE	0	0	0	1	2	0	0	0	0	0	0	0	3
SSE	0	0	0	0	0	7	1	3	0	0	0	0	11
S	0	0	0	2	3	10	23	4	0	0	0	0	42
SSW	0	0	0	3	8	24	38	3	0	0	0	0	76
SW	0	0	0	3	15	57	28	0	0	0	0	0	103
WSW	0	0	1	4	27	111	38	1	0	0	0	0	182
W	0	0	0	1	12	108	113	0	0	0	0	0	234
WNW	0	0	0	0	4	63	101	0	0	0	0	0	168
NW	0	0	0	1	0	5	3	1	0	0	0	0	10
NNW	0	0	0	2	1	0	0	0	0	0	0	0	3
TOTALS	0	1	1	17	73	385	345	12	0	0	0	0	834

NUMBER OF VALID HOURS 834
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 834

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	1	1	1	0	0	0	0	0	0	3
NNE	0	0	0	0	0	1	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	1	0	0	0	0	0	0	0	1
E	0	0	1	1	0	0	0	0	0	0	0	0	2
ESE	0	0	0	1	0	0	0	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	1	3	3	2	0	0	0	0	9
S	0	0	0	4	1	6	3	0	0	0	0	0	14
SSW	0	0	0	4	3	6	5	0	0	0	0	0	18
SW	0	0	1	2	6	4	0	0	0	0	0	0	13
WSW	0	0	0	0	3	3	0	0	0	0	0	0	6
W	0	0	0	2	3	2	0	0	0	0	0	0	7
WNW	0	0	0	3	3	10	0	1	0	0	0	0	17
NW	0	0	0	0	0	13	1	0	0	0	0	0	14
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	2	18	22	50	12	3	0	0	0	0	107

NUMBER OF VALID HOURS 107
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 107

METEOROLOGY

July - September
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05070100-05093023
WIND SPEED (M/S) AT 10 METER LEVEL

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

WIND DIR	.22 - .50	.51 - .75	.76 - 1.0	1.1 - 1.5	1.6 - 2.0	2.1 - 3.0	3.1 - 5.0	5.1 - 7.0	7.1 - 10.0	10.1 - 13.0	13.1 - 18.0	>18	TOTAL
N	0	0	0	1	2	1	0	0	0	0	0	0	4
NNE	0	0	0	5	2	4	2	0	0	0	0	0	13
NE	0	0	0	2	3	0	0	0	0	0	0	0	5
ENE	0	0	0	1	1	0	0	0	0	0	0	0	2
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	1	0	0	0	0	0	0	0	0	0	1
SE	0	0	1	3	0	2	0	0	0	0	0	0	6
SSE	0	0	0	0	2	13	11	3	1	0	0	0	30
S	0	0	0	2	6	14	3	1	0	0	0	0	26
SSW	0	0	0	2	6	9	4	0	0	0	0	0	21
SW	0	0	0	2	2	9	1	0	0	0	0	0	14
WSW	0	0	1	3	3	4	0	0	0	0	0	0	11
W	0	0	0	2	5	8	0	0	0	0	0	0	15
WNW	0	0	0	3	8	4	3	0	0	0	0	0	18
NW	0	0	1	2	3	8	4	0	0	0	0	0	18
NNW	0	0	0	1	2	1	0	0	0	0	0	0	4
TOTALS	0	0	4	29	45	77	28	4	1	0	0	0	188

NUMBER OF VALID HOURS 188
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 188

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	2	25	9	2	0	0	0	0	0	0	38
NNE	0	1	2	15	10	16	6	0	0	0	0	0	50
NE	0	0	2	13	8	6	1	0	0	0	0	0	30
ENE	0	0	1	3	2	3	0	0	0	0	0	0	9
E	0	0	1	1	2	5	0	0	0	0	0	0	9
ESE	0	0	1	9	5	15	4	0	0	0	0	0	34
SE	0	0	0	10	14	29	20	0	0	0	0	0	73
SSE	0	0	0	17	22	26	26	3	0	0	0	0	94
S	1	1	1	17	16	18	7	0	0	0	0	0	61
SSW	0	1	1	15	13	11	0	1	0	0	0	0	42
SW	0	1	6	12	2	4	1	0	0	0	0	0	26
WSW	0	1	1	4	4	1	0	0	0	0	0	0	11
W	0	0	6	6	6	5	7	0	0	0	0	0	30
WNW	0	0	6	19	11	6	1	0	0	0	0	0	43
NW	0	2	3	14	12	17	6	0	0	0	0	0	54
NNW	1	1	4	14	16	4	1	0	0	0	0	0	41
TOTALS	2	8	37	194	152	168	80	4	0	0	0	0	645

NUMBER OF VALID HOURS 645
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 645

METEOROLOGY

July - September
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05070100-05093023
WIND SPEED (M/S) AT 10 METER LEVEL

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

WIND DIR	.22 - .50	.51 - .75	.76 - 1.0	1.1 - 1.5	1.6 - 2.0	2.1 - 3.0	3.1 - 5.0	5.1 - 7.0	7.1 - 10.0	10.1 - 13.0	13.1 - 18.0	>18	TOTAL
N	0	0	1	11	7	2	0	0	0	0	0	0	21
NNE	0	0	6	19	19	11	8	0	0	0	0	0	63
NE	0	1	1	6	2	0	1	0	0	0	0	0	11
ENE	0	1	0	3	4	2	0	0	0	0	0	0	10
E	0	0	2	2	0	3	0	0	0	0	0	0	7
ESE	0	1	0	3	3	4	0	0	0	0	0	0	11
SE	0	0	0	2	2	6	3	0	0	0	0	0	13
SSE	0	0	0	0	3	5	1	0	0	0	0	0	9
S	0	0	0	0	0	1	0	0	0	0	0	0	1
SSW	0	0	0	1	1	1	0	0	0	0	0	0	3
SW	0	1	1	1	1	0	0	0	0	0	0	0	4
WSW	0	0	1	2	1	1	0	0	0	0	0	0	5
W	0	0	2	2	2	2	0	0	0	0	0	0	8
WNW	0	0	1	2	4	0	1	0	0	0	0	0	8
NW	0	0	1	2	3	2	1	0	0	0	0	0	9
NNW	0	1	3	3	1	3	0	0	0	0	0	0	11
TOTALS	0	5	19	59	53	43	15	0	0	0	0	0	194

NUMBER OF VALID HOURS 194
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 194

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

WIND DIR	.22 - .50	.51 - .75	.76 - 1.0	1.1 - 1.5	1.6 - 2.0	2.1 - 3.0	3.1 - 5.0	5.1 - 7.0	7.1 - 10.0	10.1 - 13.0	13.1 - 18.0	>18	TOTAL
N	0	0	0	3	2	5	0	0	0	0	0	0	10
NNE	0	0	2	11	18	23	0	0	0	0	0	0	54
NE	0	1	1	4	2	1	0	0	0	0	0	0	9
ENE	0	0	1	3	1	0	0	0	0	0	0	0	5
E	0	1	1	2	1	0	0	0	0	0	0	0	5
ESE	0	0	2	2	0	1	0	0	0	0	0	0	5
SE	0	0	0	0	0	1	0	2	0	0	0	0	3
SSE	0	0	0	0	2	3	0	0	0	0	0	0	5
S	0	0	0	0	0	1	0	0	0	0	0	0	1
SSW	0	1	1	1	0	0	0	0	0	0	0	0	3
SW	0	0	0	2	0	0	0	0	0	0	0	0	2
WSW	0	1	0	0	0	0	0	0	0	0	0	0	1
W	0	0	2	2	3	0	0	0	0	0	0	0	7
WNW	0	0	1	1	0	2	0	0	0	0	0	0	4
NW	0	0	0	0	2	0	0	0	0	0	0	0	2
NNW	0	0	0	1	0	1	1	0	0	0	0	0	3
TOTALS	0	4	11	32	31	38	1	2	0	0	0	0	119

NUMBER OF VALID HOURS 119
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 119

METEOROLOGY

July - September
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05070100-05093023
WIND SPEED (M/S) AT 10 METER LEVEL

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

WIND DIR	.22 - .50	.51 - .75	.76 - 1.0	1.1 - 1.5	1.6 - 2.0	2.1 - 3.0	3.1 - 5.0	5.1 - 7.0	7.1 - 10.0	10.1 - 13.0	13.1 - 18.0	>18	TOTAL
N	0	0	0	0	0	3	3	0	0	0	0	0	6
NNE	0	0	0	3	4	70	17	0	0	0	0	0	94
NE	0	0	1	2	0	2	1	0	0	0	0	0	6
ENE	0	0	0	0	0	1	0	0	0	0	0	0	1
E	0	0	0	0	1	2	0	0	0	0	0	0	3
ESE	0	0	0	0	2	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	1	1	3	0	0	0	0	0	0	5
S	0	0	0	0	0	1	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	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	0	0	0	0	0	0	0	1
WNW	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	0	1	0	0	0	0	0	0	0	0	0	0	1
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	1	1	7	9	82	21	0	0	0	0	0	121

NUMBER OF VALID HOURS 121
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 121

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	3	41	21	14	3	0	0	0	0	0	82
NNE	0	1	10	53	53	125	33	0	0	0	0	0	275
NE	0	2	5	27	15	10	3	0	0	0	0	0	62
ENE	0	1	2	10	9	6	0	0	0	0	0	0	28
E	0	2	5	6	4	10	0	0	0	0	0	0	27
ESE	0	1	4	15	11	20	4	0	0	0	0	0	55
SE	0	0	1	16	18	38	23	2	0	0	0	0	98
SSE	0	0	0	18	31	60	42	11	1	0	0	0	163
S	1	1	1	25	26	51	36	5	0	0	0	0	146
SSW	0	2	2	27	31	51	47	4	0	0	0	0	164
SW	0	2	8	22	26	74	30	0	0	0	0	0	162
WSW	0	2	4	13	38	120	38	1	0	0	0	0	216
W	0	0	10	15	32	125	120	0	0	0	0	0	302
WNW	0	0	8	28	30	85	106	1	0	0	0	0	258
NW	0	3	5	19	20	45	15	1	0	0	0	0	108
NNW	1	2	7	21	20	9	2	0	0	0	0	0	62
TOTALS	2	19	75	356	385	843	502	25	1	0	0	0	2208

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

METEOROLOGY

October - December
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05100100-05123123
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	1	0	0	0	0	1
ENE	0	0	0	0	0	1	0	0	0	0	0	0	1
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	1	0	0	0	0	0	0	0	0	1
SSE	0	0	0	3	0	3	5	0	0	0	0	0	11
S	0	0	0	0	8	23	21	6	0	0	0	0	58
SSW	0	0	0	1	10	18	11	0	0	0	0	0	40
SW	0	0	0	4	13	21	7	0	0	0	0	0	45
WSW	0	0	0	6	18	34	13	1	0	0	0	0	72
W	0	0	0	1	13	88	54	2	0	0	0	0	158
WNW	0	0	0	1	5	22	44	7	0	0	0	0	79
NW	0	0	0	2	0	1	4	0	0	0	0	0	7
NNW	0	0	0	0	1	0	1	0	0	0	0	0	2
TOTALS	0	0	0	19	68	211	160	17	0	0	0	0	475

NUMBER OF VALID HOURS 475
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 475

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	2	0	0	0	0	0	0	0	0	2
NE	0	0	0	0	2	0	0	1	0	0	0	0	3
ENE	0	0	0	0	0	0	1	0	0	0	0	0	1
E	0	1	0	0	0	0	0	0	0	0	0	0	1
ESE	0	0	0	0	0	1	0	0	0	0	0	0	1
SE	0	0	0	1	1	0	1	0	0	0	0	0	3
SSE	0	0	0	1	1	2	0	3	0	0	0	0	7
S	0	0	0	1	1	1	3	0	0	0	0	0	6
SSW	0	0	0	0	0	3	1	0	0	0	0	0	4
SW	0	0	0	1	4	2	1	0	0	0	0	0	8
WSW	0	0	0	2	3	2	1	0	0	0	0	0	8
W	0	0	0	3	0	6	2	0	0	0	0	0	11
WNW	0	0	0	1	1	2	1	0	0	0	0	0	5
NW	0	0	1	1	1	3	5	0	0	0	0	0	11
NNW	0	0	0	2	0	0	0	0	0	0	0	0	2
TOTALS	0	1	1	15	14	22	16	4	0	0	0	0	73

NUMBER OF VALID HOURS 73
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 73

METEOROLOGY

October - December
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05100100-05123123
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	2	4	0	0	0	0	0	0	0	6
NNE	0	0	0	7	1	0	0	0	0	0	0	0	8
NE	0	0	0	2	0	0	0	0	0	0	0	0	2
ENE	0	0	0	0	0	2	0	0	0	0	0	0	2
E	0	1	0	0	0	0	0	0	0	0	0	0	1
ESE	0	0	0	0	0	0	1	0	0	0	0	0	1
SE	0	0	0	1	2	1	2	0	0	0	0	0	6
SSE	0	0	0	0	0	1	2	4	0	0	0	0	7
S	0	0	0	1	0	3	0	0	0	0	0	0	4
SSW	0	0	0	1	1	1	0	0	1	0	0	0	4
SW	0	0	0	2	1	3	0	0	0	0	0	0	6
WSW	0	0	0	5	0	3	0	0	0	0	0	0	8
W	0	0	0	6	3	2	0	0	0	0	0	0	11
WNW	0	0	1	1	3	4	0	0	0	0	0	0	9
NW	0	0	1	1	2	3	2	0	0	0	0	0	9
NNW	0	0	0	1	0	0	0	0	0	0	0	0	1
TOTALS	0	1	2	30	17	23	7	4	1	0	0	0	85

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

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

WIND DIR	.22 - .50	.51 - .75	.76 - 1.0	1.1 - 1.5	1.6 - 2.0	2.1 - 3.0	3.1 - 5.0	5.1 - 7.0	7.1 - 10.0	10.1 - 13.0	13.1 - 18.0	>18	TOTAL
N	0	0	1	4	4	4	1	0	0	0	0	0	14
NNE	0	0	0	4	7	5	5	0	0	0	0	0	21
NE	0	1	0	3	0	2	0	2	0	0	0	0	8
ENE	0	0	0	1	0	4	0	0	0	0	0	0	5
E	0	0	0	4	2	6	0	1	0	0	0	0	13
ESE	0	0	0	1	0	9	11	5	1	0	0	0	27
SE	0	0	3	2	4	18	30	6	0	0	0	0	63
SSE	0	0	1	4	9	17	19	10	1	0	0	0	61
S	0	0	1	0	6	7	5	6	1	0	0	0	26
SSW	0	0	0	3	1	5	7	3	4	0	0	0	23
SW	0	0	5	1	6	2	1	0	0	0	0	0	15
WSW	0	0	0	8	6	0	1	0	0	0	0	0	15
W	0	0	3	4	5	5	2	0	0	0	0	0	19
WNW	0	0	1	5	6	7	3	0	0	0	0	0	22
NW	0	0	0	5	4	14	12	0	0	0	0	0	35
NNW	0	0	2	5	10	11	3	0	0	0	0	0	31
TOTALS	0	1	17	54	70	116	100	33	7	0	0	0	398

NUMBER OF VALID HOURS 398
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 398

METEOROLOGY

October - December
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05100100-05123123
WIND SPEED (M/S) AT 10 METER LEVEL

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

WIND DIR	.22 - .50	.51 - .75	.76 - 1.0	1.1 - 1.5	1.6 - 2.0	2.1 - 3.0	3.1 - 5.0	5.1 - 7.0	7.1 - 10.0	10.1 - 13.0	13.1 - 18.0	>18	TOTAL
N	0	0	0	6	12	11	1	0	0	0	0	0	30
NNE	0	1	0	8	8	17	10	2	0	0	0	0	46
NE	0	0	1	5	1	2	1	1	0	0	0	0	11
ENE	0	1	1	2	0	5	1	0	0	0	0	0	10
E	0	1	1	3	7	4	1	1	0	0	0	0	18
ESE	0	0	0	2	1	3	0	0	0	0	0	0	6
SE	0	0	2	1	1	5	5	0	0	0	0	0	14
SSE	0	0	0	2	2	6	1	0	0	0	0	0	11
S	0	0	0	4	2	3	0	0	0	0	0	0	9
SSW	0	0	0	3	2	2	0	0	0	0	0	0	7
SW	0	0	2	1	5	1	0	0	0	0	0	0	9
WSW	0	0	0	3	4	2	0	0	0	0	0	0	9
W	0	0	0	0	5	3	1	0	0	0	0	0	9
WNW	0	0	2	3	7	18	2	0	0	0	0	0	32
NW	0	0	1	5	3	11	1	0	0	0	0	0	21
NNW	0	1	1	1	5	6	1	0	0	0	0	0	15
TOTALS	0	4	11	49	65	99	25	4	0	0	0	0	257

NUMBER OF VALID HOURS 257
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 257

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

WIND DIR	.22 - .50	.51 - .75	.76 - 1.0	1.1 - 1.5	1.6 - 2.0	2.1 - 3.0	3.1 - 5.0	5.1 - 7.0	7.1 - 10.0	10.1 - 13.0	13.1 - 18.0	>18	TOTAL
N	0	0	1	7	5	6	2	0	0	0	0	0	21
NNE	0	0	0	18	24	64	13	1	0	0	0	0	120
NE	0	1	3	15	7	8	1	2	1	0	0	0	38
ENE	0	0	2	8	5	5	0	0	0	0	0	0	20
E	0	0	0	0	1	5	0	0	0	0	0	0	6
ESE	0	0	0	2	3	1	0	0	0	0	0	0	6
SE	0	0	0	0	0	1	0	0	0	0	0	0	1
SSE	0	1	1	1	1	1	0	0	0	0	0	0	5
S	0	0	0	2	5	1	0	0	0	0	0	0	8
SSW	0	0	1	1	1	2	1	0	0	0	0	0	6
SW	0	0	1	5	1	2	0	0	0	0	0	0	9
WSW	0	0	3	2	1	1	0	0	0	0	0	0	7
W	0	0	1	2	4	5	0	0	0	0	0	0	12
WNW	0	0	1	3	5	13	2	0	0	0	0	0	24
NW	0	0	0	2	3	4	1	0	0	0	0	0	10
NNW	0	1	1	5	2	2	3	0	0	0	0	0	14
TOTALS	0	3	15	73	68	121	23	3	1	0	0	0	307

NUMBER OF VALID HOURS 307
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 307

METEOROLOGY

October - December
TABLE 4A

SITE: SAN ONOFRE
PERIOD OF RECORD 05100100-05123123
WIND SPEED (M/S) AT 10 METER LEVEL

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

WIND DIR	.22 - .50	.51 - .75	.76 - 1.0	1.1 - 1.5	1.6 - 2.0	2.1 - 3.0	3.1 - 5.0	5.1 - 7.0	7.1 - 10.0	10.1 - 13.0	13.1 - 18.0	>18	TOTAL
N	0	0	0	2	10	9	7	0	0	0	0	0	28
NNE	0	0	1	7	35	175	182	1	0	0	0	0	401
NE	0	1	0	8	21	17	5	0	0	0	0	0	52
ENE	0	0	0	3	6	9	2	0	0	0	0	0	20
E	0	0	1	2	3	7	0	0	0	0	0	0	13
ESE	0	0	1	2	5	2	2	0	0	0	0	0	12
SE	0	0	1	4	1	1	3	0	0	0	0	0	10
SSE	0	0	3	3	5	4	1	0	0	0	0	0	16
S	0	1	3	0	2	1	0	0	0	0	0	0	7
SSW	0	0	0	4	0	2	1	0	0	0	0	0	7
SW	0	1	0	1	0	0	0	0	0	0	0	0	2
WSW	0	1	0	1	3	2	2	0	0	0	0	0	9
W	0	0	0	2	4	2	0	0	0	0	0	0	8
WNW	0	0	1	4	1	4	1	0	0	0	0	0	11
NW	0	0	0	1	2	5	1	0	0	0	0	0	9
NNW	0	0	0	0	3	2	3	0	0	0	0	0	8
TOTALS	0	4	11	44	101	242	210	1	0	0	0	0	613

NUMBER OF VALID HOURS 613
NUMBER OF INVALID HOURS 0
NUMBER OF CALMS 0
TOTAL HOURS FOR THE PERIOD 613

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	2	21	35	30	11	0	0	0	0	0	99
NNE	0	1	1	46	75	261	210	4	0	0	0	0	598
NE	0	3	4	33	31	29	7	7	1	0	0	0	115
ENE	0	1	3	14	11	26	4	0	0	0	0	0	59
E	0	3	2	9	13	22	1	2	0	0	0	0	52
ESE	0	0	1	7	9	16	14	5	1	0	0	0	53
SE	0	0	6	10	9	26	41	6	0	0	0	0	98
SSE	0	1	5	14	18	34	28	17	1	0	0	0	118
S	0	1	4	8	24	39	29	12	1	0	0	0	118
SSW	0	0	1	13	15	33	21	3	5	0	0	0	91
SW	0	1	8	15	30	31	9	0	0	0	0	0	94
WSW	0	1	3	27	35	44	17	1	0	0	0	0	128
W	0	0	4	18	34	111	59	2	0	0	0	0	228
WNW	0	0	6	18	28	70	53	7	0	0	0	0	182
NW	0	0	3	17	15	41	26	0	0	0	0	0	102
NNW	0	2	4	14	21	21	11	0	0	0	0	0	73
TOTALS	0	14	57	284	403	834	541	66	9	0	0	0	2208

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