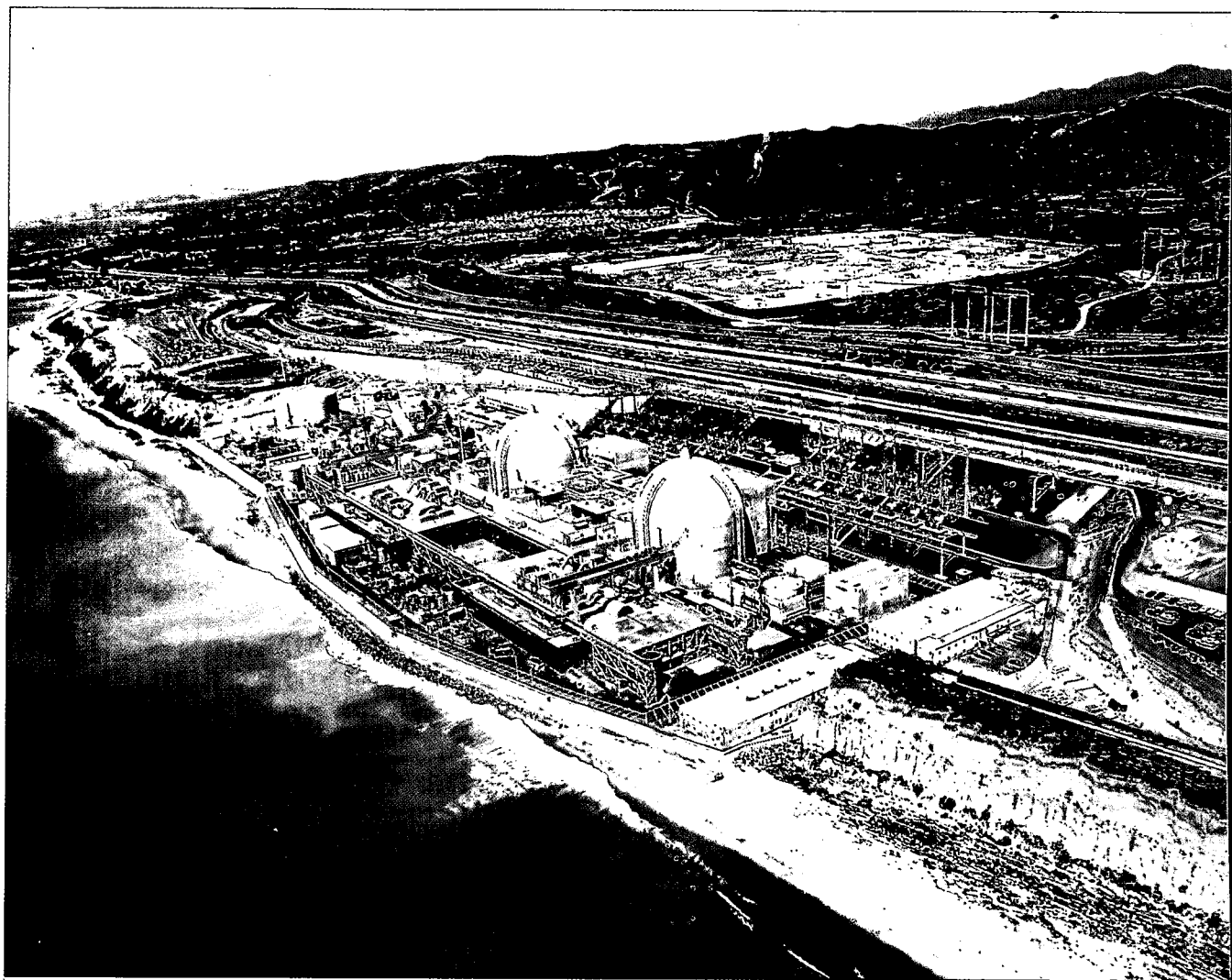


ENCLOSURE I

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (SARERR)

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SAN ONOFRE
NUCLEAR GENERATING STATION
SEMIANNUAL EFFLUENT REPORT
JANUARY - JUNE 1990



Southern California Edison Company

SAN ONOFRE NUCLEAR GENERATING STATION

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PREFACE

San Onofre Nuclear Generating Station is located next to San Onofre State Beach, adjoining Camp Pendleton Marine Corps Base, in San Diego County, 64 miles south of Los Angeles, California. There are three pressurized water Reactors with a total rated capacity of 2664 net megawatts electrical.

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

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

TABLE OF CONTENTS

PREFACE	i
SECTION A - INTRODUCTION	1
SECTION B - GASEOUS EFFLUENTS	2
SECTION C - LIQUID EFFLUENTS	8
SECTION D - PREVIOUS SEMIANNUAL REPORT ADDENDA.	14
SECTION E - RADWASTE SHIPMENTS	18
SECTION F - TECHNICAL SPECIFICATION LIMITS AND APPLICABLE LIMITS	20
SECTION G - ESTIMATION OF ERROR	22
SECTION H - 10 CFR 50 APPENDIX I REQUIREMENTS	23
SECTION I - CHANGES TO OFFSITE DOSE CALCULATION MANUAL	28
SECTION J - CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS	30
SECTION K - MISCELLANEOUS	30
SECTION L - S.O.N.G.S. 1 CONCLUSIONS	32
APPENDIX B - REVISION 5A TO UNIT 1 ODCM	33

SEMIANNUAL EFFLUENT REPORT

January - June (1990)

SECTION A. INTRODUCTION

This Semiannual 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 Technical Specification Limits
3. Percent of Applicable Limits
4. Estimated Total Percent Error
5. Lower Limit of Detection Concentrations
6. Batch Release Summaries
7. Previous Semiannual Report Addenda
8. Radwaste Shipments
9. 10 CFR 50 Appendix I Requirements
10. 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 Technical Specification Limit (TSL)
- (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 Technical Specification Limit is presented in Section F of this report. The methodology used in Table 1A to calculate the estimated total error is presented in Section G of this report.

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

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

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

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

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

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

TABLE 1A

S.O.N.G.S. 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	3.05E+2	7.06E+2	3.00E+1
2. Average release rate for period	$\mu\text{Ci/sec}$	3.92E+1	8.98E+1	
3. Percent of technical specification limit	%	1.76E-1	4.17E-1	
B. Iodines				
1. Total iodine-131	Ci	4.56E-4	7.36E-4	1.90E+1
2. Average release rate for period	$\mu\text{Ci/sec}$	5.86E-5	9.36E-5	
3. Percent of technical specification limit	%	7.62E-4	1.22E-3	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	1.02E-5	7.03E-6	1.60E+1
2. Average release rate for period	$\mu\text{Ci/sec}$	1.31E-6	8.94E-7	
3. Percent of technical specification limit	%	3.45E-6	2.40E-6	
4. Gross alpha radioactivity	Ci	*	*	5.00E+1
D. Tritium				
1. Total release	Ci	5.43E+0	5.77E+1	2.50E+1
2. Average release rate for period	$\mu\text{Ci/sec}$	6.98E-1	7.34E+0	
3. Percent of technical specification limit	%	4.54E-3	4.77E-2	

* First and second quarter analyses not available at report time; values will be included in the following Semiannual Report.

TABLE 1C

S.O.N.G.S. 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		First Quarter	Second Quarter	First Quarter	Second Quarter
1. Fission gases					
krypton-85	Ci	<LLD	<LLD	1.87E+0	1.94E+0
krypton-85m	Ci	<LLD	1.32E+1	4.28E-3	8.87E-5
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	2.06E-3	<LLD
xenon-131m	Ci	<LLD	6.12E+0	7.93E-1	5.85E-1
xenon-133	Ci	2.22E+2	6.26E+2	7.42E+1	4.19E+1
xenon-133m	Ci	8.70E-1	2.09E+0	3.63E-1	1.85E-1
xenon-135	Ci	5.12E+0	1.34E+1	1.10E-1	2.61E-2
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	2.28E+2	6.61E+2	7.73E+1	4.46E+1
2. Iodines					
iodine-131	Ci	4.56E-4	7.36E-4	NA	NA
iodine-132	Ci	2.95E-5	1.31E-4	NA	NA
iodine-133	Ci	7.48E-4	9.24E-4	NA	NA
iodine-135	Ci	6.59E-6	4.83E-5	NA	NA
Total for period	Ci	1.24E-3	1.84E-3	NA	NA
3. Particulates					
barium-140	Ci	<LLD	<LLD	NA	NA
cerium-143	Ci	<LLD	7.07E-8	NA	NA
cesium-134	Ci	3.89E-7	8.51E-7	NA	NA
cesium-137	Ci	9.84E-6	6.18E-6	NA	NA
cesium-138	Ci	1.46E-5	2.19E-4	NA	NA
lanthanum-140	Ci	<LLD	<LLD	NA	NA
rubidium-88	Ci	<LLD	1.46E-4	NA	NA
strontium-89	Ci	*	*	NA	NA
strontium-90	Ci	*	*	NA	NA

LLD Lower Limit of Detection; See Table 1D.

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

* First and second quarter analyses not available at report time; values will be included in the following Semiannual Report.

TABLE 1D

S.O.N.G.S. 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION

RADIONUCLIDES	CONTINUOUS MODE LLD ($\mu\text{Ci/cc}$)	BATCH MODE LLD ($\mu\text{Ci/cc}$)
1. <u>Fission and activation gases</u>		
krypton-85	1.00E-5	*
krypton-85m	5.30E-8	*
krypton-87	1.20E-7	8.20E-6
krypton-88	2.20E-7	1.30E-5
xenon-131m	2.10E-6	*
xenon-135m	4.60E-7	2.40E-5
xenon-138	1.70E-6	7.10E-5
2. <u>Iodines</u>		
None		
3. <u>Particulates</u>		
barium-140	9.00E-14	NA
cerium-143	2.10E-13	NA
lanthanum-140	1.60E-13	NA
rubidium-88	1.50E-8	NA

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

* Nuclide detected in Table 1C.

TABLE 1E

S.O.N.G.S. 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
 GASEOUS EFFLUENTS-RADIATION DOSES AT THE SITE BOUNDARY

	Unit	First Quarter*	Second Quarter*
A. Noble Gas			
1. Gamma air dose	mrads	4.75E-2	1.15E-1
2. Percent Technical Specification Limit	%	9.50E-1	2.13E+0
3. Beta air dose	mrads	1.36E-1	3.19E-1
4. Percent Technical Specification Limit	%	1.36E+0	3.19E+0
B. Tritium, Iodine, Particulate (at the nearest receptor)			
1. Organ dose	mrem	6.29E-4	2.70E-3
2. Percent Technical Specification Limit	%	8.39E-3	3.60E-2

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

* First and second quarter doses incomplete due to Sr-89, and Sr-90 analyses not available at report time; values will be reported in the following Semiannual Report.

TABLE 1F
S.O.N.G.S. 1
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
GASEOUS EFFLUENT-BATCH RELEASE SUMMARY

	6-MONTH PERIOD	
1. Number of batch releases:	13	releases
2. Total time period for batch releases:	3605	minutes
3. Maximum time period for a batch release:	400	minutes
4. Average time period for a batch release:	277	minutes
5. Minimum time period for a batch release:	204	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 Unit 1.

TABLE 2A

S.O.N.G.S. 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	9.53E-3	1.98E-1	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	6.53E-11	1.34E-9	
3. Percent of applicable limit	%	1.17E-3	6.90E-2	
B. Tritium				
1. Total release	Ci	3.30E+2	8.49E+2	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	2.26E-6	5.74E-6	
3. Percent of applicable limit	%	7.53E-2	1.91E-1	
C. Dissolved and entrained gases				
1. Total release	Ci	1.13E+0	2.46E+0	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	7.74E-9	1.66E-8	
3. Percent of applicable limit	%	3.87E-3	8.30E-3	
D. Gross alpha radioactivity				
1. Total release	Ci	*	*	5.00E+1
E. Volume of waste released (prior to dilution)				
	liters	4.26E+5	8.26E+5	5.00E+0
F. Volume of dilution water used during period				
	liters	1.46E+11	1.48E+11	5.00E+0

* First and second quarter analyses not available at report time; values will be included in the following Semiannual Report.

TABLE 2B

S.O.N.G.S. 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENTS

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		First Quarter	Second Quarter	First Quarter	Second Quarter
1. Fission and activation products					
antimony-124	Ci	<LLD	<LLD	<LLD	9.49E-6
antimony-125	Ci	<LLD	<LLD	<LLD	1.61E-4
barium-140	Ci	<LLD	<LLD	<LLD	7.79E-5
cerium-141	Ci	<LLD	<LLD	<LLD	7.94E-5
cesium-134	Ci	2.22E-3	4.11E-2	7.33E-4	1.95E-2
cesium-136	Ci	<LLD	1.26E-3	<LLD	7.83E-6
cesium-137	Ci	4.53E-3	6.48E-2	1.18E-3	3.28E-2
chromium-51	Ci	<LLD	<LLD	<LLD	5.57E-4
cobalt-57	Ci	<LLD	<LLD	<LLD	4.14E-5
cobalt-58	Ci	<LLD	<LLD	<LLD	1.06E-3
cobalt-60	Ci	3.57E-5	1.96E-4	1.87E-4	8.24E-3
iodine-131	Ci	1.80E-4	2.68E-2	6.95E-6	1.75E-4
iodine-133	Ci	4.59E-4	2.94E-4	<LLD	1.19E-5
iron-55	Ci	*	*	*	*
iron-59	Ci	<LLD	<LLD	<LLD	<LLD
lanthanum-140	Ci	<LLD	<LLD	<LLD	7.55E-5
manganese-54	Ci	<LLD	<LLD	<LLD	1.34E-4
molybdenum-99	Ci	<LLD	5.10E-6	<LLD	<LLD
niobium-95	Ci	<LLD	<LLD	<LLD	1.23E-4
ruthenium-103	Ci	<LLD	<LLD	<LLD	1.49E-4
strontium-89	Ci	*	*	*	*
strontium-90	Ci	*	*	*	*
technetium-99m	Ci	<LLD	5.19E-6	<LLD	<LLD
zinc-65	Ci	<LLD	<LLD	<LLD	<LLD
zirconium-95	Ci	<LLD	<LLD	<LLD	1.16E-4
Total for period	Ci	7.42E-3	1.34E-1	2.11E-3	6.33E-2
2. Dissolved and entrained gases					
krypton-85	Ci	<LLD	<LLD	2.19E-2	1.20E-1
xenon-131m	Ci	<LLD	<LLD	1.85E-2	7.36E-2
xenon-133	Ci	8.56E-4	4.85E-3	1.09E+0	2.26E+0
xenon-133m	Ci	<LLD	<LLD	2.40E-3	2.50E-3
xenon-135	Ci	<LLD	8.90E-5	<LLD	1.74E-5

LLD Lower Limit of Detection; see Table 2C.

* First and second quarter analyses not available at report time; values will be included in the following Semiannual Report.

TABLE 2C

S.O.N.G.S. 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION

RADIONUCLIDES	CONTINUOUS MODE LLD ($\mu\text{Ci/cc}$)	BATCH MODE LLD ($\mu\text{Ci/cc}$)
1. Fission and activation products		
antimony-124	1.50E-7	4.70E-8
antimony-125	1.90E-7	2.40E-7
barium-140	2.10E-7	3.00E-7
cerium-141	9.70E-8	1.10E-7
cesium-136	7.70E-8	9.30E-8
chromium-51	5.50E-7	6.60E-7
cobalt-57	5.20E-8	6.40E-8
cobalt-58	5.00E-8	8.30E-8
iodine-133	*	2.00E-7
iron-59	8.00E-8	1.40E-7
lanthanum-140	1.40E-7	5.10E-8
manganese-54	4.60E-8	6.90E-8
molybdenum-99	8.00E-8	7.60E-8
niobium-95	3.30E-8	8.60E-8
ruthenium-103	6.70E-8	1.00E-7
technetium-99m	8.10E-8	7.70E-8
zinc-65	1.20E-7	1.50E-7
zirconium-95	6.30E-8	1.40E-7
2. Dissolved and entrained gases		
krypton-85	1.20E-5	*
xenon-131m	2.10E-6	*
xenon-133m	4.30E-7	*
xenon-135	5.40E-8	1.10E-7

* Nuclide detected in Table 2B.

TABLE 2D

S.O.N.G.S. 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
 LIQUID EFFLUENTS-RADIATION DOSES AT THE LIQUID SITE BOUNDARY

	Unit	First Quarter*	Second Quarter*
A.			
1. Total body dose	mrem	2.61E-3	2.71E-2
2. Percent Technical Specification Limit	%	1.74E-1	1.81E+0
B.			
1. Limiting organ dose	mrem	3.09E-3	4.39E-2
2. Percent Technical Specification Limit	%	6.18E-2	8.78E-1

NOTE: The limiting organ for the first quarter is the Liver and for the second quarter is the Thyroid.

* First and second quarter doses incomplete due to Sr-89, Sr-90, and Fe-55 analyses not available at report time; values will be reported in the following Semiannual Report.

TABLE 2E

S.O.N.G.S. 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENT-BATCH RELEASE SUMMARY

		6-MONTH PERIOD
1.	Number of batch releases:	7 releases
2.	Total time period for batch releases:	11004 minutes
3.	Maximum time period for a batch release:	3123 minutes
4.	Average time period for a batch release:	1572 minutes
5.	Minimum time period for a batch release:	758 minutes
6.	Average saltwater flow during batch releases:	300000 gpm

SECTION D. PREVIOUS SEMIANNUAL REPORT ADDENDA

S.O.N.G.S. 1

1. The January - June 1989 Semiannual Report values for composite gross alpha, Sr-89, Sr-90, and Fe-55 (Tables 1A and 1C, Gaseous Effluents, Tables 2A and 2B, Liquid Effluents) were incomplete due to data not available at report time. The values not reported were for the second quarter of 1989. The values are as follows:

GASEOUS EFFLUENTS (2nd Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
strontium-89	Ci	<LLD	*
strontium-90	Ci	<LLD	*
Gross alpha	Ci	<LLD	*

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

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

Gross alpha LLD = $1.00\text{E-}14$ $\mu\text{Ci/cc}$

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

LIQUID EFFLUENTS (2nd Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
iron-55	Ci	<LLD	$3.85\text{E-}3$
strontium-89	Ci	<LLD	<LLD
strontium-90	Ci	$2.65\text{E-}5$	$1.90\text{E-}5$
Gross alpha	Ci	<LLD	<LLD

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

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

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

SECTION D. PREVIOUS SEMIANNUAL REPORT ADDENDA (Continued)

S.O.N.G.S. 1

1. The July - December 1989 Semiannual Report values for composite gross alpha, Sr-89, Sr-90, and Fe-55 (Tables 1A and 1C, Gaseous Effluents, Tables 2A and 2B, Liquid Effluents) were incomplete due to data not available at report time. The values not reported were for the third quarter of 1989. The values are as follows:

GASEOUS EFFLUENTS (3rd Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
strontium-89	Ci	<LLD	*
strontium-90	Ci	<LLD	*
Gross alpha	Ci	1.59E-7	*

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

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

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

LIQUID EFFLUENTS (3rd Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
iron-55	Ci	7.77E-3	3.73E-3
strontium-89	Ci	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD
Gross alpha	Ci	<LLD	<LLD

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

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

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

SECTION D. PREVIOUS SEMIANNUAL REPORT ADDENDA (Continued)

S.O.N.G.S. 1

1. The July-December 1989 Semiannual Report values for composite gross alpha, Sr-89, Sr-90, and Fe-55 (Tables 1A and 1C, Gaseous Effluents, Tables 2A and 2B, Liquid Effluents) were incomplete due to data not available at report time. The values not reported were for the fourth quarter of 1989. The values are as follows:

GASEOUS EFFLUENTS (4th Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
strontium-89	Ci	<LLD	*
strontium-90	Ci	<LLD	*
Gross alpha	Ci	5.47E-7	*

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

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

LIQUID EFFLUENTS (4th Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
iron-55	Ci	<LLD	6.35E-3
strontium-89	Ci	<LLD	<LLD
strontium-90	Ci	<LLD	1.14E-4
Gross alpha	Ci	<LLD	<LLD
Tritium	Ci	<LLD	1.36E-4*

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

- * In addition to previously reported values

SECTION D. PREVIOUS SEMIANNUAL REPORT ADDENDA (Continued)

S.O.N.G.S. 1

2. GASEOUS EFFLUENT-RADIATION DOSES AT THE SITE BOUNDARY

For the second, third, and fourth quarters of 1989 Semiannual Report, Sr-89, and Sr-90.

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

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

3. LIQUID EFFLUENT-RADIATION DOSES AT THE SITE BOUNDARY

For the second, third, and fourth quarters of 1989 Semiannual Report, Fe-55, Sr-89, and Sr-90.

	Unit	Second Quarter	Third Quarter	Fourth Quarter
A.				
1. Total body dose	mrem	3.43E-3	1.75E-3	8.18E-4
2. Percent Applicable Limit	%	2.29E-1	1.17E-1	5.45E-2
B.				
1. Limiting organ dose	mrem	1.40E-2	1.09E-2	4.98E-3
2. Percent Applicable Limit	%	2.80E-1	2.18E-1	9.96E-2

NOTE: The limiting organ is the bone.

SECTION E. RADWASTE SHIPMENTS

S.O.N.G.S. 1

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

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

1. Type of waste	Unit	6-month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³ Ci	NA NA	NA
b. Dry compressible waste, contaminated equip. etc.	m ³ Ci	7.45E+0 ** 1.97E-1	3.00E+1
c. Irradiated components, control rods, etc.	m ³ Ci	NA NA	NA
d. Other (filters)	m ³ Ci	NA NA	NA

NOTE: Total curie content estimated.

** Material packaged in 55-gallon DOT 7A drums (7.5 cu. ft. each), or strong, tight containers (steel boxes, 98 cu. ft. each).

SECTION E. RADWASTE SHIPMENTS (Continued)

S.O.N.G.S. 1

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
SOLID WASTE AND IRRADIATED FUEL SHIPMENT

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

2. Estimate of major nuclide composition (by type of waste)

a.

Not applicable	%	0.00E+0
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b.

carbon-14	%	1.48E-3
cesium-134	%	3.49E+0
cesium-137	%	9.58E+0
cobalt-58	%	9.07E-1
cobalt-60	%	4.42E+0
iodine-129	%	3.56E-1
iron-55	%	3.01E+0
nickel-63	%	2.48E+0
technetium-99	%	9.73E-2
tritium	%	7.57E+1

c.

Not applicable	%	0.00E+0
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d.

Not applicable	%	0.00E+0
----------------	---	---------

3. Solid Waste Disposition

See COMMON section of this report

B. IRRADIATED FUEL SHIPMENTS (Disposition)

See COMMON section of this report

SECTION F. TECHNICAL SPECIFICATION LIMITS AND APPLICABLE LIMITS

Gaseous Effluents - Technical Specification Limits

The percent of Technical Specification Limit, tabulated in Table 1A, was calculated using the following equation:

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

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

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

The MPC_{eff} is defined as:

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

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

n = total number of radionuclides identified

MPC_i = MPC of the i th radionuclide

The % TSL is placed in Parts A.3, B.3, C.3 and D.3 of Table 1A.

SECTION F. TECHNICAL SPECIFICATION LIMITS AND APPLICABLE LIMITS (Continued)

Liquid Effluents - Applicable Limits

The percent of applicable limit, tabulated in Table 2A, was calculated using the following equation:

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

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

The MPC_{eff} is defined as:

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

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

n = total number of radionuclides identified

MPC_i = MPC of the i th radionuclide

The % Applicable Limit is placed in Parts A.3, B.3 and C.3 of Table 2A.

SECTION G. ESTIMATION OF ERROR

S.O.N.G.S. 1

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

Sources of error for gaseous effluents - batch releases are:

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

Sources of error for gaseous effluents - continuous releases are:

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

Sources of error for liquid effluents - batch releases are:

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

Sources of error for liquid effluents - continuous releases are:

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

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

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

where: σ_i = Error associated with each component.

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS

S.O.N.G.S. 1

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

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

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

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

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS (Continued)

S.O.N.G.S. 1

TABLE 1

SOURCE	Dose* (millirems)	
	1st Quarter	2nd Quarter
LIQUID EFFLUENTS	1)	2)
Whole Body	2.61E-3	2.71E-2
Organ	3)	4)
	3.09E-3	4.39E-2
AIRBORNE EFFLUENTS	5)	6)
Tritium, Iodines, and Particulates	5.59E-3	3.33E-1
NOBLE GASES**	7)	8)
Gamma	3.33E-2	1.06E-1
Beta	9)	10)
	9.51E-2	2.90E-1
DIRECT RADIATION	11)	12)
	1.53E-1	6.98E-2

* 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 effluents are in units of mrad, reflecting the air dose.

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS (Continued)

S.O.N.G.S. 1

1. This data was calculated using the methodology of the ODCM.
2. This data was calculated using the methodology of the ODCM.
3. This data was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.
4. This data was calculated using the methodology of the ODCM; the thyroid received the maximum dose primarily by the saltwater fish pathway.
5. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the activity reported in the January - June 1990 Semiannual Report with the assumptions of USNRC Regulatory Guide 1.109.
6. The maximum organ dose was to a child's thyroid and was located in the NW sector. This was calculated using the activity reported in the January - June 1990 Semiannual Report with the assumptions of USNRC Regulatory Guide 1.109.
7. A maximum air dose of $2.52\text{E-}1$ mrad for gamma radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the NW sector, a landward sector, at the exclusion area boundary and calculated with the assumptions of the USNRC Regulatory Guide 1.109.
8. A maximum air dose of $2.71\text{E-}1$ mrad for gamma radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for gamma radiation was located in the NW sector, a landward sector, at the exclusion area boundary and calculated with the assumptions of the USNRC Regulatory Guide 1.109.
9. A maximum air dose of $7.18\text{E-}1$ mrad for beta radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for beta radiation was located in the NW sector, a landward sector, at the exclusion area boundary and calculated with the assumptions of the USNRC Regulatory Guide 1.109.
10. A maximum air dose of $7.53\text{E-}1$ mrad for beta radiation was located in the SSW sector, a seaward direction. The reported maximum air dose for beta radiation was located in the NW sector, a landward sector, at the exclusion area boundary and calculated with the assumptions of the USNRC Regulatory Guide 1.109.
11. 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 SW sector.

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS (Continued)

S.O.N.G.S. 1

12. 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 SW sector.

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS (Continued)

S.O.N.G.S. 1

TABLE 2

SOURCE	% Technical Specification Limit	
	1st Quarter	2nd Quarter
LIQUID EFFLUENTS		
Whole Body	1.74E-1	1.81E+0
Organ	6.18E-2	8.78E-1
AIRBORNE EFFLUENTS		
Tritium, Iodines, and Particulates	7.45E-2	4.44E+0
NOBLE GASES		
Gamma	6.66E-1	2.12E+0
Beta	9.51E-1	2.90E+0

NOTE: Direct Radiation is not specifically addressed in the Technical Specifications.

SECTION I. CHANGES TO OFFSITE DOSE CALCULATION MANUAL

S.O.N.G.S 1

SUBJECT: Revision 5A to the Offsite Dose Calculation Manual (ODCM)

On February 1, 1990, Revision 5A to the Offsite Dose Calculation Manual (ODCM) was adopted and published. This revision reflected changes required by the 1989 Land Use Census such as addition of a new pathway in receptor locations and land uses, addition of a new radiological environmental monitoring sample location, and included calibration constant updates. The following is a detailed explanation of the revision to support the changes incorporated without benefit of additional or supplemental information. A determination has been made that these changes do not reduce the accuracy or reliability of the dose calculations and setpoint determinations. Documentation of the fact that this change has been reviewed and found acceptable was indicated by his signature on a letter dated February 1, 1990.

Explanations of changes are listed below. Copies of the affected pages are contained in Appendix B of the report.

<u>Page</u>	
1-14	Liquid Effluent Radiation Monitor Calibration Constants updated for RT-1216 and RT-1218.
2-9	Gaseous Effluent Radiation Monitor Calibration Constants updated for RT-1212 and RT-1219.
2-22	Table 2-4, the controlling location factor for I-131 was corrected to 2.35E1.
2-28	Table 2-7, page 3 of 7, Enlisted Beach Check-In for Sector Q, X/Q changed to $8.6E-7 \text{ sec/m}^3$.
2-32	Table 2-7, page 7 of 7, SC Res. with Garden for Sector Q, distance changed to 3.9 miles, X/Q changed to $1.4E-7 \text{ sec/m}^3$, and D/Q changed to $4.9E-10 \text{ m}^2$.
2-37	Table 2-8, page 5 of 5, S. C. Ranch Pac. W Res for Sector R, D/Q changed to $9.5E-10 \text{ m}^2$, adult food and ground pathway for Sr-89 changed to 7.2E9.
2-39	Table 2-9, page 2 of 3, Deer Consumer for Sector A, D/Q changed to $1.0E-9 \text{ m}^2$.
2-42	Table 2-10, page 3 of 3, Deer Consumer for Sector B, distance changed to 1.6 miles and D/Q changed to $2.1E-9 \text{ m}^9$.
2-47	Table 2-11, page 4 of 5, Deer Consumer for Sector C, distance changed to 1.3 miles.

SECTION I. CHANGES TO OFFSITE DOSE CALCULATION MANUAL (Continued)

S.O.N.G.S 1

- 2-55 Table 2-14, page 1 of 5 (changed from page 1 of 4), Sheep (Meat) for Sector F, child food and ground pathway for Nb-95 changed to 2.4E5.
- 3-56 Table 2-14, page 2 of 5 (changed from page 2 of 4), Deer Consumer for Sector F, adult inhalation pathway for Co-57 changed to 8.6E2 and child food and ground pathway for UN-ID changed to 1.1E8.
- 3-57 Table 2-14, page 3 of 5, San Onofre State Park Guard Shack for Sector F, changed from page 3 of 4.
- 3-57A Table 2-14, page 4 of 5, addition of Beach Concession in Sector F.
- 3-58 Table 2-14, page 5 of 5, Border-Highway Patrol Weight Station for Sector F, changed from page 4 of 4.
- 5-6 Table 5-1, addition of San Clemente Resident with Garden to Local Crops as a new Radiological Environmental Monitoring Sample Location.

SECTION J. CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

S.O.N.G.S 1

- o There were no changes to the Unit 1 Radioactive Waste Treatment Systems during the reporting period, January 1, 1990 to June 30, 1990.

SECTION K. MISCELLANEOUS

S.O.N.G.S 1

- o Description of and Events leading to an Unplanned but Monitored Gaseous Release from Unit 1.

On March 14, 1990, Unit 1 containment was vented to maintain pressure within limits. Following the completion of the vent at 1517, radiation monitor readings on the Plant Vent Stack did not return to previous levels. Investigation showed the source of the increased activity to be gas originating from the Volume Control Tank and escaping through the packing on the Flash Tank pumps. The Flash Tank is maintained under nitrogen overpressure and typically has a resident low level of water. With time however, the water had seeped out, allowing gases to escape through the dry packing. Water was added to the tank, rehydrating the pump packing, and the Plant Vent Stack radiation monitor readings returned to normal. To prevent recurrence of this incident a minimum water level will be maintained in the Flash Tank.

The maximum additional gaseous activity discharged is estimated to be 8.9 Curies, predominantly Xe-133. This is an insignificant release for both site boundary concentration and dose considerations.

SECTION K. MISCELLANEOUS (Continued)

January 1, 1990 - June 30, 1990

EFFLUENT RADIATION MONITORS OUT OF SERVICE FOR GREATER THAN 30 DAYS

S.O.N.G.S. 1

Monitor	Inoperability Period	Inoperability Cause	Explanation
R-1214 Plant Vent noble gas	06/13/86-present	Removed from service	Maintained out-of-service pending evaluation of calibration deficiency
R-1254 Plant Vent Stack Fan Flow Indication	08/12/88-present	Process flow indication	Process Flow indication is deficient. Design change to improve/correct existing flow measurement under evaluation. Radiation monitor functions still operable.
R-1218 Liquid Radwaste Effluent	12/18/89-04/05/90	Failed surveillance acceptance criteria	Detector failed linearity criteria with calibration sources.

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

- o Gaseous effluent releases, excluding tritium, totaled $1.01\text{E}+3$ curies with 95% of the total being Xe-133.
- o The radiation doses from gaseous releases are: (a) gamma air dose: $1.63\text{E}-1$ mrad at the site boundary, (b) beta air dose: $4.55\text{E}-1$ mrad at the site boundary, (c) organ dose: $3.33\text{E}-3$ mrem at the nearest receptor.
- o Liquid releases totaled $1.18\text{E}+3$ curies of which tritium was $1.18\text{E}+3$ Ci, noble gases were $3.59\text{E}+0$ Ci, and particulates and iodines were $2.08\text{E}-1$ Ci.
- o The radiation doses from liquid releases are: (a) total body: $2.97\text{E}-2$ mrem, (b) limiting organ: $4.70\text{E}-2$ mrem.
- o The radioactive releases and resulting doses generated from Unit 1 were below the Technical Specification Limits for both gaseous and liquid effluents.

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

OFFSITE DOSE CALCULATION MANUAL

NUCLEAR GENERATION SITE

UNIT 1

APPROVED FEB 0 1 1990

ODCM1/
3075cc.man

Revision 5A
02-01-90

|R

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

Table 1-1(a)
Liquid Effluent Radiation Monitor
Calibration Constants
($\mu\text{Ci/cc/cpm}$)

MONITOR	Co-60	Ba-133	Cs-137
RT-1216	2.73E-8	3.02E-8	4.84E-8
RT-1218	5.82E-9	6.72E-9	9.77E-9
RT-2100	1.51E-9	2.17E-9	3.02E-9
RT-2101	1.51E-9	2.19E-9	3.05E-9

R

(a) This table provides typical ($\pm 20\%$) calibration constants for the liquid effluent radiation monitors.

APPROVED FFB 0 1 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

Table 2-1(a)
Gaseous Effluent Radiation Monitor
Calibration Constants
($\mu\text{Ci/cc/cpm}$)

MONITOR	Kr-85	Xe-133
RT-1212	2.17E-8	1.48E-7
RT-1219 ^(b)	1.47E-8	4.36E-8

R

(a) This table provides typical ($\pm 20\%$) calibration constants for the gaseous effluent radiation monitors.

(b) Calibration constants for Monitor RT-1219 include a 5.17% dilution factor (air in-leakage).

APPROVED FEB 01 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-4
CONTROLLING LOCATION FACTORS

Radionuclide	$\sum_k R_{ik} W_k$ mrem/yr per $\mu\text{Ci/sec}$
H -3	1.12E-3
Cr-51	1.80E-2
Mn-54	4.58E0
Co-57	1.13E0
Co-58	1.32E0
Co-60	6.99E1
Sr-89	5.58E1
Sr-90	2.34E3
Zr-95	1.98E0
Nb-95	4.92E0
Te-129m	4.14E0
Cs-134	4.32E1
Cs-136	6.55E-1
Cs-137	3.96E1
Ba-140	2.63E-1
Ce-141	7.38E-1
Ce-144	2.16E1
I -131	2.35E1
I -133	3.28E0
I -135	6.88E-1
UN-ID	4.50E0

Footnote: These values to be used in manual calculations are the maximum $\sum_k R_{ik} W_k$ for all locations based on the most restrictive age group.

APPROVED FEB 0 1 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-7

DOSE PARAMETER R_i FOR SECTOR Q

Page 3 of 7

Pathway = Enlisted Beach Check-In $X/Q = 8.6E-7 \text{ sec/m}^3$								
Distance = .1.2 miles $D/Q = 4.1E-9 \text{ m}^{-2}$								
Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	2.9E2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	7.6E2	1.1E6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	1.8E4	3.2E8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	7.2E3	7.8E7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	2.4E4	8.7E7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	6.5E4	4.9E9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	6.9E4	4.9E3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	2.3E7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	3.4E4	5.7E7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	2.4E4	3.1E7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	8.3E3	4.5E6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	1.9E5	1.6E9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	3.3E4	3.4E7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	1.4E5	2.3E9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	5.0E4	4.7E6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	2.7E4	3.1E6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	1.9E5	1.6E7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	2.7E6	3.9E6
I -133	-0-	-0-	-0-	-0-	-0-	-0-	4.9E5	5.6E5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.0E5	5.8E5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	2.4E4	1.7E8

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FEB 01 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-7

DOSE PARAMETER R_i FOR SECTOR Q

Page 7 of 7

Page 7 of 7

Pathway = SC Res. with Garden X/Q = 1.4E-7 sec/m ³					Distance = 3.9 miles D/Q = 4.9E-10 m ⁻²			
Radio- Nuclide	Infant		Child		Teen		Adult	
	Inhala- tion Pathway	Food & Ground Pathway	Inhala- tion Pathway	Food & Ground Pathway	Inhala- tion Pathway	Food & Ground Pathway	Inhala- tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	4.0E3	-0-	2.6E3	1.3E3	2.3E3
Cr-51	-0-	-0-	-0-	6.1E6	-0-	1.0E7	3.3E3	1.5E7
Mn-54	-0-	-0-	-0-	6.5E8	-0-	9.2E8	7.7E4	2.0E9
Co-57	-0-	-0-	-0-	2.4E8	-0-	3.2E8	3.1E4	5.6E8
Co-58	-0-	-0-	-0-	3.7E8	-0-	5.9E8	1.1E5	9.1E8
Co-60	-0-	-0-	-0-	2.1E9	-0-	3.2E9	2.8E5	2.0E10
Sr-89	-0-	-0-	-0-	3.5E10	-0-	1.5E10	3.0E5	9.8E9
Sr-90	-0-	-0-	-0-	1.4E12	-0-	8.3E11	9.9E7	6.7E11
Zr-95	-0-	-0-	-0-	8.8E8	-0-	1.2E9	1.5E5	1.4E9
Nb-95	-0-	-0-	-0-	2.9E8	-0-	4.5E8	1.0E5	5.8E8
Te-129m	-0-	-0-	-0-	2.9E9	-0-	1.8E9	3.7E4	1.2E9
Cs-134	-0-	-0-	-0-	2.6E10	-0-	1.6E10	8.5E5	1.6E10
Cs-136	-0-	-0-	-0-	2.2E8	-0-	1.7E8	1.5E5	2.9E8
Cs-137	-0-	-0-	-0-	2.4E10	-0-	1.4E10	6.2E5	1.7E10
Ba-140	-0-	-0-	-0-	2.8E8	-0-	2.1E8	2.2E5	2.8E8
Ce-141	-0-	-0-	-0-	4.0E8	-0-	5.3E8	1.2E5	5.1E8
Ce-144	-0-	-0-	-0-	1.0E10	-0-	1.3E10	8.2E5	1.1E10
I -131	-0-	-0-	-0-	4.8E10	-0-	3.1E10	1.2E7	3.8E10
I -133	-0-	-0-	-0-	8.1E8	-0-	4.6E8	2.2E6	5.3E8
I -135	-0-	-0-	-0-	9.8E6	-0-	5.7E6	4.5E5	8.6E6
UN-ID	-0-	-0-	-0-	2.7E9	-0-	1.9E9	1.0E5	1.9E9

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

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SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR R

Page 5 of 5

Pathway = S.C. Ranch Pac. W. Res. X/Q = 1.9E-7 sec/m³		Distance = 2.4 miles D/Q = 9.5E-10 m²						
Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H-3	-0-	-0-	-0-	3.8E3	-0-	2.4E3	1.2E3	1.9E3
Cr-51	-0-	-0-	-0-	4.8E6	-0-	7.4E6	3.0E3	1.0E7
Mn-54	-0-	-0-	-0-	6.1E8	-0-	8.3E8	7.1E4	1.9E9
Co-57	-0-	-0-	-0-	2.2E8	-0-	2.9E8	2.9E4	5.2E8
Co-58	-0-	-0-	-0-	3.3E8	-0-	5.1E8	9.8E4	7.8E8
Co-60	-0-	-0-	-0-	2.0E9	-0-	3.0E9	2.6E5	2.0E10
Sr-89	-0-	-0-	-0-	3.1E10	-0-	1.2E10	2.8E5	7.2E9
Sr-90	-0-	-0-	-0-	1.3E12	-0-	7.7E11	9.1E7	5.8E11
Zr-95	-0-	-0-	-0-	7.8E8	-0-	1.1E9	1.4E5	1.1E9
Nb-95	-0-	-0-	-0-	2.4E8	-0-	3.5E8	9.5E4	4.2E8
Te-129m	-0-	-0-	-0-	2.3E9	-0-	1.4E9	3.4E4	8.0E8
Cs-134	-0-	-0-	-0-	2.4E10	-0-	1.5E10	7.8E5	1.5E10
Cs-136	-0-	-0-	-0-	9.0E7	-0-	5.7E7	1.3E5	1.6E8
Cs-137	-0-	-0-	-0-	2.2E10	-0-	1.3E10	5.7E5	1.6E10
Ba-140	-0-	-0-	-0-	1.1E8	-0-	6.8E7	2.0E5	7.0E7
Ce-141	-0-	-0-	-0-	3.3E8	-0-	4.1E8	1.1E5	3.3E8
Ce-144	-0-	-0-	-0-	9.2E9	-0-	1.2E10	7.5E5	9.0E9
I-131	-0-	-0-	-0-	4.1E9	-0-	2.1E9	1.1E7	1.4E9
I-133	-0-	-0-	-0-	4.0E-11	-0-	1.7E-11	2.0E6	2.0E6
I-135	-0-	-0-	-0-	6.9E-35	-0-	3.0E-35	4.1E5	2.0E6
UN-ID	-0-	-0-	-0-	2.5E9	-0-	1.7E9	9.5E4	1.7E9

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FEB 01 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-9

DOSE PARAMETER R_i FOR SECTOR A

Page 2 of 3

Pathway = Deer Consumer X/Q = $2.8E-7$ sec/m ³		Distance = 1.6 miles D/Q = $1.0E-9$ m ⁻²						
Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E1	-0-	2.3E1	3.5E1	3.9E1
Cr-51	-0-	-0-	-0-	5.0E4	-0-	1.0E5	9.1E1	3.2E5
Mn-54	-0-	-0-	-0-	7.7E5	-0-	1.4E6	2.1E3	4.1E7
Co-57	-0-	-0-	-0-	4.6E6	-0-	8.0E6	8.6E2	2.3E7
Co-58	-0-	-0-	-0-	9.6E6	-0-	1.9E7	2.9E3	4.7E7
Co-60	-0-	-0-	-0-	3.6E7	-0-	7.2E7	7.8E3	7.2E8
Sr-89	-0-	-0-	-0-	4.9E7	-0-	2.6E7	8.3E3	3.1E7
Sr-90	-0-	-0-	-0-	1.0E9	-0-	8.0E8	2.7E6	1.2E9
Zr-95	-0-	-0-	-0-	6.2E7	-0-	1.1E8	4.1E3	2.0E8
Nb-95	-0-	-0-	-0-	2.3E8	-0-	4.5E8	2.8E3	8.2E8
Te-129m	-0-	-0-	-0-	5.9E8	-0-	4.5E8	1.0E3	5.3E8
Cs-134	-0-	-0-	-0-	1.4E8	-0-	1.2E8	2.3E4	3.4E8
Cs-136	-0-	-0-	-0-	5.1E6	-0-	4.2E6	4.0E3	9.5E6
Cs-137	-0-	-0-	-0-	1.2E8	-0-	9.3E7	1.7E4	4.0E8
Ba-140	-0-	-0-	-0-	5.0E6	-0-	4.2E6	6.0E3	7.4E6
Ce-141	-0-	-0-	-0-	1.5E6	-0-	2.4E6	3.3E3	4.2E6
Ce-144	-0-	-0-	-0-	1.8E7	-0-	2.9E7	2.2E4	4.9E7
I -131	-0-	-0-	-0-	6.5E8	-0-	4.3E8	3.3E5	5.9E8
I -133	-0-	-0-	-0-	1.6E1	-0-	8.6E0	5.9E4	6.7E4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E4	6.9E4
UN-ID	-0-	-0-	-0-	1.1E8	-0-	9.4E7	2.8E3	1.4E8

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FEB 0 1 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-10

DOSE PARAMETER R_1 FOR SECTOR B

Page 3 of 3

Pathway = Deer Consumer $X/Q = 2.2E-7 \text{ sec/m}^3$								
Distance = 1.6 miles $D/Q = 2.1E-9 \text{ m}^{-2}$								
Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E1	-0-	2.3E1	3.5E1	3.9E1
Cr-51	-0-	-0-	-0-	5.0E4	-0-	1.0E5	9.1E1	3.2E5
Mn-54	-0-	-0-	-0-	7.7E5	-0-	1.4E6	2.1E3	4.1E7
Co-57	-0-	-0-	-0-	4.6E6	-0-	8.0E6	8.6E2	2.3E7
Co-58	-0-	-0-	-0-	9.6E6	-0-	1.9E7	2.9E3	4.7E7
Co-60	-0-	-0-	-0-	3.6E7	-0-	7.2E7	7.8E3	7.2E8
Sr-89	-0-	-0-	-0-	4.9E7	-0-	2.6E7	8.3E3	3.1E7
Sr-90	-0-	-0-	-0-	1.0E9	-0-	8.0E8	2.7E6	1.2E9
Zr-95	-0-	-0-	-0-	6.2E7	-0-	1.1E8	4.1E3	2.0E8
Nb-95	-0-	-0-	-0-	2.3E8	-0-	4.5E8	2.8E3	8.2E8
Tc-129m	-0-	-0-	-0-	5.9E8	-0-	4.5E8	1.0E3	5.3E8
Cs-134	-0-	-0-	-0-	1.4E8	-0-	1.2E8	2.3E4	3.4E8
Cs-136	-0-	-0-	-0-	5.1E6	-0-	4.2E6	4.0E3	9.5E6
Cs-137	-0-	-0-	-0-	1.2E8	-0-	9.3E7	1.7E4	4.0E8
Ba-140	-0-	-0-	-0-	5.0E6	-0-	4.2E6	6.0E3	7.4E6
Ce-141	-0-	-0-	-0-	1.5E6	-0-	2.4E6	3.3E3	4.2E6
Ce-144	-0-	-0-	-0-	1.8E7	-0-	2.9E7	2.2E4	4.9E7
I -131	-0-	-0-	-0-	6.5E8	-0-	4.3E8	3.3E5	5.9E8
I -133	-0-	-0-	-0-	1.6E1	-0-	8.6E0	5.9E4	6.7E4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E4	6.9E4
UN-ID	-0-	-0-	-0-	1.1E8	-0-	9.4E7	2.8E3	1.4E8

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FFB 0 1 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-11

DOSE PARAMETER R_i FOR SECTOR C

Page 4 of 5

Pathway = Deer Consumer X/Q = $2.8E-7$ sec/m ³		Distance = 1.3 miles D/Q = $2.9E-9$ m ⁻²						
Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E1	-0-	2.3E1	3.5E1	3.9E1
Cr-51	-0-	-0-	-0-	5.0E4	-0-	1.0E5	9.1E1	3.2E5
Mn-54	-0-	-0-	-0-	7.7E5	-0-	1.4E6	2.1E3	4.1E7
Co-57	-0-	-0-	-0-	4.6E6	-0-	8.0E6	8.6E2	2.3E7
Co-58	-0-	-0-	-0-	9.6E6	-0-	1.9E7	2.9E3	4.7E7
Co-60	-0-	-0-	-0-	3.6E7	-0-	7.2E7	7.8E3	7.2E8
Sr-89	-0-	-0-	-0-	4.9E7	-0-	2.6E7	8.3E3	3.1E7
Sr-90	-0-	-0-	-0-	1.0E9	-0-	8.0E8	2.7E6	1.2E9
Zr-95	-0-	-0-	-0-	6.2E7	-0-	1.1E8	4.1E3	2.0E8
Nb-95	-0-	-0-	-0-	2.3E8	-0-	4.5E8	2.8E3	8.2E8
Te-129m	-0-	-0-	-0-	5.9E8	-0-	4.5E8	1.0E3	5.3E8
Cs-134	-0-	-0-	-0-	1.4E8	-0-	1.2E8	2.3E4	3.4E8
Cs-136	-0-	-0-	-0-	5.1E6	-0-	4.2E6	4.0E3	9.5E6
Cs-137	-0-	-0-	-0-	1.2E8	-0-	9.3E7	1.7E4	4.0E8
Ba-140	-0-	-0-	-0-	5.0E6	-0-	4.2E6	6.0E3	7.4E6
Ce-141	-0-	-0-	-0-	1.5E6	-0-	2.4E6	3.3E3	4.2E6
Ce-144	-0-	-0-	-0-	1.8E7	-0-	2.9E7	2.2E4	4.9E7
I -131	-0-	-0-	-0-	6.5E8	-0-	4.3E8	3.3E5	5.9E8
I -133	-0-	-0-	-0-	1.6E1	-0-	8.6E0	5.9E4	6.7E4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E4	6.9E4
UN-ID	-0-	-0-	-0-	1.1E8	-0-	9.4E7	2.8E3	1.4E8

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FEB 01 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-14

DOSE PARAMETER R_i FOR SECTOR F

Page 1 of 5

Pathway = Sheep (Meat) X/Q = 1.0E-6 sec/m ³		Distance = 0.7 miles D/Q = 8.8E-9 m ⁻²						
Radio- Nuclide	Infant		Child		Teen		Adult	
	Inhala- tion Pathway	Food & Ground Pathway	Inhala- tion Pathway	Food & Ground Pathway	Inhala- tion Pathway	Food & Ground Pathway	Inhala- tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E0	-0-	1.2E0	7.0E0	2.1E0
Cr-51	-0-	-0-	-0-	5.1E1	-0-	1.0E2	1.8E1	2.6E4
Mn-54	-0-	-0-	-0-	7.8E2	-0-	1.4E3	4.3E2	7.6E6
Co-57	-0-	-0-	-0-	4.7E3	-0-	8.1E3	1.7E2	1.9E6
Co-58	-0-	-0-	-0-	9.7E3	-0-	2.0E4	5.9E2	2.1E6
Co-60	-0-	-0-	-0-	3.7E4	-0-	7.3E4	1.6E3	1.2E8
Sr-89	-0-	-0-	-0-	5.0E4	-0-	2.6E4	1.7E3	3.1E4
Sr-90	-0-	-0-	-0-	1.0E6	-0-	8.1E5	5.5E5	1.3E6
Zr-95	-0-	-0-	-0-	6.3E4	-0-	1.1E5	8.3E2	1.6E6
Nb-95	-0-	-0-	-0-	2.4E5	-0-	4.5E5	5.7E2	1.6E6
Te-129m	-0-	-0-	-0-	6.0E5	-0-	4.5E5	2.0E2	6.5E5
Cs-134	-0-	-0-	-0-	1.4E5	-0-	1.2E5	4.7E3	3.8E7
Cs-136	-0-	-0-	-0-	5.1E3	-0-	4.3E3	8.1E2	8.3E5
Cs-137	-0-	-0-	-0-	1.3E5	-0-	9.5E4	3.4E3	5.7E7
Ba-140	-0-	-0-	-0-	5.1E3	-0-	4.3E3	1.2E3	1.2E5
Ce-141	-0-	-0-	-0-	1.5E3	-0-	2.4E3	6.6E2	7.9E4
Ce-144	-0-	-0-	-0-	1.8E4	-0-	3.0E4	4.5E3	4.3E5
I -131	-0-	-0-	-0-	6.6E5	-0-	4.4E5	6.6E4	7.0E5
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E4	1.3E4
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E3	1.4E4
UN-ID	-0-	-0-	-0-	1.1E5	-0-	9.5E4	5.7E2	4.2E6

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FEB 01 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-14

DOSE PARAMETER R_i FOR SECTOR F

Page 2 of 5

Pathway = Deer Consumer $X/Q = 7.8E-7 \text{ sec/m}^3$		Distance = 0.9 miles $D/Q = 2.0E-9 \text{ m}^{-2}$						
Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E1	-0-	2.3E1	3.5E1	3.9E1
Cr-51	-0-	-0-	-0-	5.0E4	-0-	1.0E5	9.1E1	3.2E5
Mn-54	-0-	-0-	-0-	7.7E5	-0-	1.4E6	2.1E3	4.1E7
Co-57	-0-	-0-	-0-	4.6E6	-0-	8.0E6	8.6E2	2.3E7
Co-58	-0-	-0-	-0-	9.6E6	-0-	1.9E7	2.9E3	4.7E7
Co-60	-0-	-0-	-0-	3.6E7	-0-	7.2E7	7.8E3	7.2E8
Sr-89	-0-	-0-	-0-	4.9E7	-0-	2.6E7	8.3E3	3.1E7
Sr-90	-0-	-0-	-0-	1.0E9	-0-	8.0E8	2.7E6	1.2E9
Zr-95	-0-	-0-	-0-	6.2E7	-0-	1.1E8	4.1E3	2.0E8
Nb-95	-0-	-0-	-0-	2.3E8	-0-	4.5E8	2.8E3	8.2E8
Te-129m	-0-	-0-	-0-	5.9E8	-0-	4.5E8	1.0E3	5.3E8
Cs-134	-0-	-0-	-0-	1.4E8	-0-	1.2E8	2.3E4	3.4E8
Cs-136	-0-	-0-	-0-	5.1E6	-0-	4.2E6	4.0E3	9.5E6
Cs-137	-0-	-0-	-0-	1.2E8	-0-	9.3E7	1.7E4	4.0E8
Ba-140	-0-	-0-	-0-	5.0E6	-0-	4.2E6	6.0E3	7.4E6
Ce-141	-0-	-0-	-0-	1.5E6	-0-	2.4E6	3.3E3	4.2E6
Ce-144	-0-	-0-	-0-	1.8E7	-0-	2.9E7	2.2E4	4.9E7
I -131	-0-	-0-	-0-	6.5E8	-0-	4.3E8	3.3E5	5.9E8
I -133	-0-	-0-	-0-	1.6E1	-0-	8.6E0	5.9E4	6.7E4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E4	6.9E4
UN-ID	-0-	-0-	-0-	1.1E8	-0-	9.4E7	2.8E3	1.4E8

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FEB 01 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-14

DOSE PARAMETER R_i FOR SECTOR F

Page 3 of 5

1R

Pathway = San Onofre State Park Guard Shack X/Q = 6.2E-7 sec/m ³								
Distance = 1.0 miles D/Q = 5.0E-9 m ⁻²								
Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	7.2E1	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	1.9E2	2.7E5
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	4.4E3	7.9E7
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	1.8E3	2.0E7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	6.1E3	2.2E7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	1.6E4	1.2E9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	1.7E4	1.2E3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	5.7E6	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	8.6E3	1.4E7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	5.9E3	7.8E6
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	2.1E3	1.1E6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	4.8E4	3.9E8
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	8.4E3	8.6E6
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	3.5E4	5.9E8
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	1.2E4	1.2E6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	6.9E3	7.8E5
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	4.7E4	4.0E6
I -131	-0-	-0-	-0-	-0-	-0-	-0-	6.8E5	9.8E5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	1.2E5	1.4E5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	2.6E4	1.4E5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	5.9E3	4.3E7

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FEB 01 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-14

DOSE PARAMETER R_i FOR SECTOR F

Page 4 of 5

Page 4 of 5

Pathway = Beach Concession X/Q = 5.3E-7 sec/m³					Distance = 1.1 miles D/Q = 4.3E-9 m⁻²			
Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	1.2E2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	3.1E2	4.4E5
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	7.2E3	1.3E9
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	2.9E3	3.2E7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	1.0E4	3.6E7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	2.7E4	2.0E9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	2.8E4	2.0E3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	9.3E6	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	1.4E4	2.4E7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	9.7E3	1.3E7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	3.4E3	1.8E6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	7.9E4	6.4E8
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	1.4E4	1.4E7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	5.8E4	9.6E8
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	2.0E4	1.9E6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	1.1E4	1.3E6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	7.6E4	6.5E6
I -131	-0-	-0-	-0-	-0-	-0-	-0-	1.1E6	1.6E6
I -133	-0-	-0-	-0-	-0-	-0-	-0-	2.0E5	2.3E5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	4.2E4	2.4E5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	9.7E3	7.0E7

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FFB 0 1 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

TABLE 2-14

DOSE PARAMETER R_1 FOR SECTOR F

Page 5 of 5

1R

Pathway = Border-Highway Patrol Weight Station $X/Q = 2.2E-7 \text{ sec/m}^3$								
Distance = 2.0 miles $D/Q = 1.6E-9 \text{ m}^{-2}$								
Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	3.6E2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	9.5E2	1.3E6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	2.2E4	3.9E8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	9.0E3	9.8E7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	3.0E4	1.1E8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	8.1E4	6.1E9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	8.7E4	6.2E3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	2.8E7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	4.3E4	7.2E7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	3.0E4	3.9E7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	1.0E4	5.6E6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	2.4E5	1.9E9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	4.2E4	4.3E7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	1.8E5	2.9E9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	6.2E4	5.9E6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	3.4E4	3.9E6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	2.3E5	2.0E7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	3.4E6	4.9E6
I -133	-0-	-0-	-0-	-0-	-0-	-0-	6.1E5	7.0E5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.3E5	7.2E5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	2.9E4	2.1E8

Inhalation Pathway, units = $\frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}$

Food & Ground Pathway, units = $\frac{(\text{m}^2)(\text{mrem/yr})}{\mu\text{Ci/sec}}$

APPROVED FEB 01 1990

SONGS Semiannual Effluent Report

January - June 1990

APPENDIX B

Page 5 of 6

TABLE 5-1

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

<u>TYPE OF SAMPLE AND SAMPLING LOCATION</u>	<u>DISTANCE*</u> (miles)	<u>DIRECTION*</u>
Drinking Water		
1 Tri-Cities Municipal Water District Reservoir	8.7	NW
2 San Clemente Golf Course Well	3.5	NNW
3 Huntington Beach	37.0	NW
Shoreline Sediment (Beach Sand)		
1 San Onofre State Beach (0.6 mile Southeast)	0.6	SE
2 San Onofre Surfing Beach	0.9	NW
3 San Onofre State Beach (3.1 miles Southeast)	3.1	SE
4 Newport Beach (North End)	30.0	NW
Local Crops		
1 San Mateo Canyon (San Clemente Canyon)	2.6	NW
2 Southeast of Oceanside	22.0	SE
3 San Clemente Resident with Garden	4.1	NW

1A

* Distance (miles) and Direction (sector) are measured relative to Units 2 and 3 midpoint. Direction is determined from degrees true north.

APPROVED FEB 01 1990

TABLE OF CONTENTS

SECTION A - INTRODUCTION	49
SECTION B - GASEOUS EFFLUENTS	50
SECTION C - LIQUID EFFLUENTS	57
SECTION D - PREVIOUS SEMIANNUAL REPORT ADDENDA	65
SECTION E - RADWASTE SHIPMENTS	69
SECTION F - APPLICABLE LIMITS	72
SECTION G - ESTIMATION OF ERROR	74
SECTION H - 10 CFR 50 APPENDIX I REQUIREMENTS	75
SECTION I - CHANGES TO OFFSITE DOSE CALCULATION MANUAL	79
SECTION J - MISCELLANEOUS	83
SECTION K - S.O.N.G.S. 2-3 CONCLUSIONS	85

SEMIANNUAL EFFLUENT REPORT

January - June (1990)

SECTION A. INTRODUCTION

This Semiannual 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 Semiannual Report Addenda
7. Radwaste Shipments
8. 10 CFR 50 Appendix I Requirements

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 and calibration releases are considered to be "batch" releases. Containment purges and plant stack releases are considered to be "continuous" releases.

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

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

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

TABLE 1A

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Estimated Total Error, %
A. Fission and activation gases				
1. Total release	Ci	2.89E+2	3.28E+2	2.50E+1
2. Average release rate for period	$\mu\text{Ci/sec}$	3.72E+1	4.17E+1	
3. Percent of applicable limit	%	6.43E-2	6.86E-2	
B. Iodines				
1. Total iodine-131	Ci	8.58E-4	2.49E-3	1.90E+1
2. Average release rate for period	$\mu\text{Ci/sec}$	1.10E-4	3.17E-4	
3. Percent of applicable limit	%	5.30E-4	1.52E-3	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	5.93E-5	4.60E-4	1.60E+1
2. Average release rate for period	$\mu\text{Ci/sec}$	7.63E-6	5.85E-5	
3. Percent of applicable limit	%	7.44E-6	1.93E-5	
4. Gross alpha radioactivity	Ci	*	*	5.00E+1
D. Tritium				
1. Total release	Ci	9.46E+0	1.09E+1	2.50E+1
2. Average release rate for period	$\mu\text{Ci/sec}$	1.22E+0	1.39E+0	
3. Percent of applicable limit	%	2.92E-3	3.33E-3	

* First and second quarter analyses not available at report time; values will be included in the following Semiannual Report.

TABLE 1C

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		First Quarter	Second Quarter	First Quarter	Second Quarter
1. <u>Fission gases</u>					
argon-41	Ci	2.60E+0	6.68E-1	<LLD	<LLD
krypton-85	Ci	<LLD	2.60E-1	1.62E+0	1.04E+0
krypton-85m	Ci	2.31E-3	4.30E-1	<LLD	<LLD
krypton-87	Ci	<LLD	<LLD	<LLD	<LLD
krypton-88	Ci	<LLD	<LLD	<LLD	<LLD
xenon-131m	Ci	1.15E-1	3.39E-1	<LLD	1.55E-1
xenon-133	Ci	2.80E+2	3.21E+2	5.50E-2	4.92E-1
xenon-133m	Ci	3.16E-2	1.12E-1	<LLD	<LLD
xenon-135	Ci	3.80E+0	2.73E+0	<LLD	<LLD
xenon-135m	Ci	<LLD	<LLD	<LLD	<LLD
xenon-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	2.87E+2	3.26E+2	1.68E+0	1.69E+0
2. <u>Iodines</u>					
iodine-131	Ci	8.58E-4	2.49E-3	NA	NA
iodine-132	Ci	4.65E-5	2.49E-4	NA	NA
iodine-133	Ci	1.21E-3	1.42E-3	NA	NA
iodine-135	Ci	1.10E-4	1.33E-4	NA	NA
Total for period	Ci	2.22E-3	4.29E-3	NA	NA
3. <u>Particulates</u>					
barium-139	Ci	1.09E-8	<LLD	NA	NA
barium-140	Ci	<LLD	<LLD	NA	NA
bromine-82	Ci	8.75E-5	1.42E-5	NA	NA
cerium-143	Ci	<LLD	1.24E-5	NA	NA
cesium-134	Ci	2.25E-7	<LLD	NA	NA
cesium-137	Ci	8.90E-6	1.38E-5	NA	NA
cesium-138	Ci	9.70E-5	2.72E-5	NA	NA
chromium-51	Ci	<LLD	1.39E-5	NA	NA
cobalt-57	Ci	4.67E-11	2.21E-8	NA	NA
cobalt-58	Ci	2.30E-5	4.06E-4	NA	NA
cobalt-60	Ci	2.72E-5	2.58E-5	NA	NA

LLD Lower Limit of Detection; See Table 1D.

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

TABLE 1C (Continued)

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		First Quarter	Second Quarter	First Quarter	Second Quarter
3. Particulates (Continued)					
lanthanum-140	Ci	<LLD	<LLD	NA	NA
molybdenum-99	Ci	7.45E-7	<LLD	NA	NA
rubidium-88	Ci	1.36E-4	4.60E-4	NA	NA
strontium-89	Ci	*	*	NA	NA
strontium-90	Ci	*	*	NA	NA
technetium-99m	Ci	7.64E-7	<LLD	NA	NA

LLD Lower Limit of Detection; See Table 1D.

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

* First and second quarter analyses not available at report time; values will be included in the following Semiannual Report.

TABLE 1D

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
GASEOUS EFFLUENTS-LOWER LIMIT OF DETECTION

RADIONUCLIDES	CONTINUOUS MODE LLD ($\mu\text{Ci/cc}$)	BATCH MODE LLD ($\mu\text{Ci/cc}$)
1. <u>Fission and activation gases</u>		
argon-41	*	6.60E-6
krypton-85	2.10E-5	*
krypton-85m	*	1.70E-6
krypton-87	3.70E-7	5.90E-6
krypton-88	4.50E-7	5.10E-6
xenon-131m	*	8.40E-5
xenon-133m	*	1.40E-5
xenon-135	*	1.80E-6
xenon-135m	1.20E-6	1.90E-5
xenon-138	2.30E-6	3.90E-5
2. <u>Iodines</u>		
None		
3. <u>Particulates</u>		
barium-139	1.30E-10	NA
barium-140	6.00E-13	NA
cerium-143	9.00E-13	NA
cesium-134	1.90E-13	NA
chromium-51	1.80E-12	NA
lanthanum-140	1.00E-12	NA
molybdenum-99	2.40E-13	NA
technetium-99m	2.40E-13	NA

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

* Nuclides were detected in Table 1C.

TABLE 1E

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
 GASEOUS EFFLUENTS-RADIATION DOSES AT THE SITE BOUNDARY

	Unit	First Quarter*	Second Quarter*
A. Noble Gas			
1. Gamma air dose	mrad	1.98E-2	1.91E-2
2. Percent Applicable Limit	%	1.99E-1	1.91E-1
3. Beta air dose	mrad	4.80E-2	5.32E-2
4. Percent Applicable Limit	%	2.40E-1	2.66E-1
B. Tritium, Iodine, Particulate (at the nearest receptor)			
1. Organ dose	mrem	1.01E-3	2.10E-3
2. Percent Applicable Limit	%	6.72E-3	1.40E-2

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

* First and second quarter doses incomplete due to Sr-89, and Sr-90 analyses not available at report time; values will be reported in the following Semiannual Report.

TABLE 1F

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
GASEOUS EFFLUENTS-BATCH RELEASE SUMMARY

	6-MONTH PERIOD
1. Number of batch releases:	8 releases
2. Total time period for batch releases:	2698 minutes
3. Maximum time period for a batch release:	630 minutes
4. Average time period for a batch release:	337 minutes
5. Minimum time period for a batch release:	225 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.

TABLE 2A

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
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	2.23E-2	7.58E-2	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	3.08E-11	1.56E-10	
3. Percent of applicable limit	%	1.47E-4	9.74E-4	
B. Tritium				
1. Total release	Ci	2.87E+2	9.88E+1	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	3.96E-7	2.03E-7	
3. Percent of applicable limit	%	1.32E-2	6.77E-3	
C. Dissolved and entrained gases				
1. Total release	Ci	4.84E-1	1.20E-2	1.90E+1
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	6.68E-10	2.46E-11	
3. Percent of applicable limit	%	3.34E-4	1.23E-5	
D. Gross alpha radioactivity				
1. Total release	Ci	*	*	5.00E+1
E. Volume of waste released (prior to dilution)				
	liters	5.72E+6	6.58E+6	5.00E+0
F. Volume of dilution water used during period				
	liters	7.25E+11	4.87E+11	5.00E+0

* First and second quarter analyses not available at report time; values will be included in the following Semiannual Report.

TABLE 2B

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENTS

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		First Quarter	Second Quarter	First Quarter	Second Quarter
1. Fission and activation products					
antimony-124	Ci	<LLD	<LLD	1.97E-4	6.27E-4
antimony-125	Ci	<LLD	<LLD	2.66E-3	4.69E-3
barium-140	Ci	<LLD	<LLD	<LLD	<LLD
cerium-141	Ci	<LLD	<LLD	<LLD	1.42E-5
cerium-144	Ci	<LLD	<LLD	4.29E-5	7.22E-5
cesium-134	Ci	3.44E-4	1.60E-4	2.82E-3	1.90E-2
cesium-137	Ci	1.09E-3	1.88E-3	4.37E-3	3.03E-2
chromium-51	Ci	<LLD	<LLD	1.35E-3	2.25E-3
cobalt-57	Ci	<LLD	<LLD	2.62E-5	2.09E-5
cobalt-58	Ci	<LLD	2.60E-3	3.77E-3	9.52E-3
cobalt-60	Ci	5.75E-4	<LLD	2.35E-3	1.32E-3
iodine-131	Ci	<LLD	<LLD	6.38E-5	2.02E-4
iodine-132	Ci	<LLD	<LLD	<LLD	6.29E-5
iodine-133	Ci	<LLD	<LLD	<LLD	9.35E-6
iron-55	Ci	*	*	*	*
iron-59	Ci	<LLD	<LLD	1.15E-4	2.55E-4
lanthanum-140	Ci	<LLD	<LLD	1.36E-4	8.29E-5
manganese-54	Ci	<LLD	<LLD	4.86E-4	3.19E-4
molybdenum-99	Ci	<LLD	<LLD	<LLD	1.29E-5
niobium-95	Ci	<LLD	<LLD	8.56E-4	9.92E-4
niobium-97	Ci	<LLD	<LLD	1.28E-5	1.43E-5
ruthenium-103	Ci	<LLD	<LLD	2.72E-5	6.16E-5
silver-110m	Ci	<LLD	<LLD	4.15E-4	3.08E-4
strontium-89	Ci	*	*	*	*
strontium-90	Ci	*	*	*	*
strontium-92	Ci	<LLD	<LLD	7.26E-6	<LLD
technetium-99m	Ci	<LLD	<LLD	<LLD	1.31E-5
tellurium-132	Ci	<LLD	<LLD	<LLD	6.70E-5
tin-113	Ci	<LLD	<LLD	2.04E-4	1.66E-4
yttrium-91m	Ci	<LLD	<LLD	<LLD	3.55E-4
zinc-65	Ci	<LLD	<LLD	<LLD	3.33E-6
zirconium-95	Ci	<LLD	<LLD	3.90E-4	5.40E-4
Total for period	Ci	2.01E-3	4.64E-3	2.03E-2	7.12E-2

LLD Lower Limit of Detection; see Table 2C.

* First and second quarter analyses not available at report time; values will be included in the following Semiannual Report.

TABLE 2B (Continued)

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENTS (Continued)

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	First Quarter	Second Quarter	First Quarter	Second Quarter
(2) Dissolved and entrained gases					
krypton-85m	Ci	<LLD	<LLD	<LLD	6.31E-6
xenon-131m	Ci	<LLD	<LLD	1.23E-2	5.42E-4
xenon-133	Ci	1.76E-4	<LLD	4.68E-1	1.09E-2
xenon-133m	Ci	<LLD	<LLD	1.76E-3	<LLD
xenon-135	Ci	<LLD	<LLD	1.33E-3	5.35E-4

LLD Lower Limit of Detection; see Table 2C.

TABLE 2C

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION

RADIONUCLIDES	CONTINUOUS MODE LLD ($\mu\text{Ci/cc}$)	BATCH MODE LLD ($\mu\text{Ci/cc}$)
1. Fission and activation products		
antimony-124	3.10E-7	*
antimony-125	1.80E-7	*
barium-140	3.00E-7	2.00E-7
cerium-141	8.90E-8	6.80E-8
cerium-144	3.90E-7	*
chromium-51	6.60E-7	*
cobalt-57	5.30E-8	*
cobalt-58	1.10E-7	*
cobalt-60	1.10E-7	*
iodine-131	8.00E-8	*
iodine-132	1.30E-4	5.80E-8
iodine-133	5.80E-7	6.70E-8
iron-59	1.80E-7	*
lanthanum-140	4.90E-7	*
manganese-54	7.20E-8	*
molybdenum-99	1.10E-7	3.90E-8
niobium-95	7.10E-8	*
niobium-97	8.50E-7	*
ruthenium-103	5.60E-8	*
silver-110m	1.10E-7	*
strontium-92	1.30E-4	5.90E-8
technetium-99m	1.10E-7	3.90E-8
tellurium-132	1.10E-7	3.80E-8
tin-113	6.40E-8	*
yttrium-91m	**	1.30E-7
zinc-65	1.90E-7	6.90E-8
zirconium-95	1.40E-7	*

* Nuclide detected in Table 2B.

** Weekly composite analysis will not detect this isotope.

TABLE 2C (Continued)

S.O.N.G.S 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENTS-LOWER LIMIT OF DETECTION

RADIONUCLIDES	CONTINUOUS MODE LLD ($\mu\text{Ci/cc}$)	BATCH MODE LLD ($\mu\text{Ci/cc}$)
2. <u>Dissolved and entrained gases</u>		
krypton-85m	1.30E-7	5.00E-8
xenon-131m	4.00E-6	*
xenon-133	3.80E-7	*
xenon-133m	9.30E-7	5.50E-7
xenon-135	2.30E-8	*

* Nuclide detected in Table 2B.

TABLE 2D

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENTS-RADIATION DOSES AT THE LIQUID SITE BOUNDARY

		Unit	First Quarter*	Second Quarter*
A.				
1.	Total body dose	mrem	1.21E-3	4.64E-3
2.	Percent Applicable Limit	%	4.03E-2	1.55E-1
B.				
1.	Limiting organ dose	mrem	4.01E-3	6.54E-3
2.	Percent Applicable Limit	%	4.01E-2	6.54E-2

NOTE: The limiting organ for the first quarter is the GI-LLI and second quarter is the Liver.

* First and second quarter doses incomplete due to Sr-89, Sr-90, and Fe-55 analyses not available at report time; values will be reported in the following Semiannual Report.

TABLE 2E

S.O.N.G.S. 2-3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
LIQUID EFFLUENTS-BATCH RELEASE SUMMARY

		6-MONTH PERIOD
1.	Number of batch releases:	86 releases
2.	Total time period for batch releases:	16853 minutes
3.	Maximum time period for a batch release:	1005 minutes
4.	Average time period for a batch release:	196 minutes
5.	Minimum time period for a batch release:	5 minutes.
6.	Average saltwater flow during batch releases:	712384 gpm

SECTION D. PREVIOUS SEMIANNUAL REPORT ADDENDA

S.O.N.G.S. 2-3

1. The July-December 1989 Semiannual Report values for composite gross alpha, Sr-89, Sr-90, and Fe-55 (Tables 1A and 1C, Gaseous Effluents, Tables 2A and 2B, Liquid Effluents) were incomplete due to data not available at report time. The values not reported were for the second quarter of 1989. The values are as follows:

GASEOUS EFFLUENTS (2nd Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
strontium-89	Ci	1.73E-6	*
strontium-90	Ci	<LLD	*
Gross alpha	Ci	<LLD	*

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

Gross alpha LLD = $1.00\text{E-}13 \mu\text{Ci/cc}$

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

LIQUID EFFLUENTS (2nd Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
iron-55	Ci	<LLD	3.47E-2
strontium-89	Ci	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD
Gross alpha	Ci	<LLD	<LLD

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

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

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

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

SECTION D. PREVIOUS SEMIANNUAL REPORT ADDENDA (Continued)

S.O.N.G.S. 2-3

1. The July-December 1989 Semiannual Report values for composite gross alpha, Sr-89, Sr-90, and Fe-55 (Tables 1A and 1C, Gaseous Effluents, Tables 2A and 2B, Liquid Effluents) were incomplete due to data not available at report time. The values not reported were for the third quarter of 1989. The values are as follows:

GASEOUS EFFLUENTS (3rd Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
strontium-89	Ci	5.79E-7	*
strontium-90	Ci	1.06E-6	*
Gross alpha	Ci	5.62E-7	*

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

LIQUID EFFLUENTS (3rd Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
iron-55	Ci	<LLD	4.19E-2
strontium-89	Ci	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD
Gross alpha	Ci	<LLD	<LLD

Fe-55 LLD = 1.00E-6 μ Ci/ml
Sr-89 LLD = 5.00E-8 μ Ci/ml
Sr-90 LLD = 1.00E-8 μ Ci/ml
Gross alpha LLD = 1.00E-7 μ Ci/ml

SECTION D. PREVIOUS SEMIANNUAL REPORT ADDENDA (Continued)

S.O.N.G.S. 2-3

1. The July-December 1989 Semiannual Report values for composite gross alpha, Sr-89, Sr-90, and Fe-55 (Tables 1A and 1C, Gaseous Effluents, Tables 2A and 2B, Liquid Effluents) were incomplete due to data not available at report time. The values not reported were for the fourth quarter of 1989. The values are as follows:

GASEOUS EFFLUENTS (4th Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
strontium-89	Ci	<LLD	*
strontium-90	Ci	2.54E-7	*
Gross alpha	Ci	5.85E-6	*

Sr-89 LLD = $1.00\text{E-}13 \mu\text{Ci/cc}$

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

LIQUID EFFLUENTS (4th Quarter 1989)

Nuclides Released	Unit	Continuous Mode	Batch Mode
iron-55	Ci	<LLD	4.91E-3
strontium-89	Ci	<LLD	<LLD
strontium-90	Ci	<LLD	<LLD
Gross alpha	Ci	<LLD	<LLD

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

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

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

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

SECTION D. PREVIOUS SEMIANNUAL REPORT ADDENDA (Continued)

S.O.N.G.S. 2-3

2. GASEOUS EFFLUENT-RADIATION DOSES AT THE SITE BOUNDARY

For the second, third, and fourth quarters of 1989 Semiannual Report, Sr-89, and Sr-90.

	Unit	Second Quarter	Third Quarter	Fourth Quarter
A. Tritium, Iodine, Particulate (at the nearest receptor)				
1. Organ dose	mrem	2.38E-6	9.48E-5	1.47E-5
2. Percent Applicable Limit	%	1.58E-5	6.32E-4	9.79E-5

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

3. LIQUID EFFLUENT-RADIATION DOSES AT THE SITE BOUNDARY

For the second, third, and fourth quarters of 1989 Semiannual Report, Fe-55, Sr-89, and Sr-90.

	Unit	Second Quarter	Third Quarter	Fourth Quarter
A.				
1. Total body dose	mrem	1.74E-3	2.06E-3	2.41E-4
2. Percent Applicable Limit	%	5.81E-2	6.85E-2	8.02E-3
B.				
1. Limiting organ dose	mrem	1.08E-2	1.28E-2	1.50E-3
2. Percent Applicable Limit	%	1.08E-1	1.28E-1	1.50E-2

NOTE: The limiting organ is the bone.

SECTION E. RADWASTE SHIPMENTS

S.O.N.G.S. 2-3

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

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

1. Type of waste	Unit	6-month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³ Ci	NA NA	NA
b. Dry compressible waste, contaminated equip. etc.	m ³ Ci	5.86E+1** 1.57E+0	3.00E+1
c. Irradiated components, control rods, etc.	m ³ Ci	NA NA	NA
d. Other (filters)	m ³ Ci	4.25E-1** 4.21E-1	3.00E+1

NOTE: Total curie content estimated.

** Material packaged in 55-gallon DOT 7A drums (7.5 cu. ft. each), or strong, tight containers (steel boxes, 98 cu. ft. each).

SECTION E. RADWASTE SHIPMENTS (Continued)

S.O.N.G.S. 2-3

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
SOLID WASTE AND IRRADIATED FUEL SHIPMENT

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

2. Estimate of major nuclide composition (by type of waste)

a.	Not applicable	%	0.00E+0
----	----------------	---	---------

b.	antimony-125	%	4.87E-1
	carbon-14	%	9.87E-3
	cesium-134	%	1.04E+1
	cesium-137	%	1.70E+1
	cobalt-58	%	1.02E+0
	cobalt-60	%	8.08E+0
	curium-242	%	3.52E-1
	iodine-129	%	3.29E-2
	iron-55	%	1.95E+1
	manganese-54	%	5.36E-1
	nickel-63	%	2.68E+0
	niobium-95	%	5.81E-1
	plutonium-241	%	4.81E-1
	technetium-99	%	7.42E-2
	tritium	%	3.84E+1
	zirconium	%	2.40E-1

c.	Not applicable	%	0.00E+0
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SECTION E. RADWASTE SHIPMENTS (Continued)

S.O.N.G.S. 2-3

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
SOLID WASTE AND IRRADIATED FUEL SHIPMENT

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

2. Estimate of major nuclide composition (by type of waste)

d.	antimony-124	%	9.35E-2
	antimony-125	%	3.20E-1
	carbon-14	%	7.05E-3
	cerium-144	%	1.56E-1
	cesium-134	%	1.51E+0
	cesium-137	%	4.16E+0
	chromium-51	%	9.28E-1
	cobalt-57	%	7.80E-2
	cobalt-58	%	1.52E+1
	cobalt-60	%	8.27E+0
	curium-242	%	5.20E-3
	iodine-129	%	5.51E-4
	iron-55	%	3.90E+1
	iron-59	%	1.46E-1
	manganese-54	%	1.28E+0
	nickel-63	%	5.64E+0
	niobium-95	%	1.29E+0
	plutonium-241	%	9.20E-2
	ruthenium-106	%	1.28E-1
	silver-110m	%	6.53E-2
	strontium-89	%	5.60E-3
	strontium-90	%	3.77E-3
	technetium-99	%	3.29E-4
	tritium	%	2.09E+1
	zirconium-95	%	6.97E-1

3. Solid Waste Disposition

See COMMON section of this report

B. IRRADIATED FUEL SHIPMENTS (Disposition)

See COMMON section of this report

SECTION F. APPLICABLE LIMITS

Gaseous Effluents - Applicable Limits

The percent of applicable limit, tabulated in Table 1A, was calculated using the following equation:

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

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

X/Q = $4.80\text{E-}6 \text{ sec/m}^3$; the annual average atmospheric dispersion defined in the ODCM, Rev. 17.

The MPC_{eff} is defined as:

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

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

n = total number of radionuclides identified

MPC_i = MPC of the i th radionuclide

The % Applicable Limit is placed in Parts A.3, B.3, C.3 and D.3 of Table 1A.

SECTION F. APPLICABLE LIMITS (Continued)

Liquid Effluents - Applicable Limits

The percent of applicable limit, tabulated in Table 2A, was calculated using the following equation:

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

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

The MPC_{eff} is defined as:

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

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

n = total number of radionuclides identified

MPC_i = MPC of the i th radionuclide

The % Applicable Limit is placed in Parts A.3, B.3 and C.3 of Table 2A.

SECTION G. ESTIMATION OF ERROR

S.O.N.G.S. 2-3

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

Sources of error for gaseous effluents - batch releases are:

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

Sources of error for gaseous effluents - continuous releases are:

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

Sources of error for liquid effluents - batch releases are:

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

Sources of error for liquid effluents - continuous releases are:

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

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

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

where: σ_i = Error associated with each component.

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS

S.O.N.G.S. 2-3

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

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

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

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

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS (Continued)

S.O.N.G.S. 2-3

TABLE 1

SOURCE	Dose* (millirems)	
	1st Quarter	2nd Quarter
LIQUID EFFLUENTS	1)	2)
Whole Body	1.21E-3	4.64E-3
Organ	3)	4)
	4.01E-3	6.54E-3
AIRBORNE EFFLUENTS	5)	6)
Tritium, Iodines, and Particulates	2.27E-3	5.94E-3
NOBLE GASES**	7)	8)
Gamma	9.90E-3	5.97E-3
Beta	9)	10)
	2.57E-2	1.70E-2
DIRECT RADIATION	11)	12)
	1.53E-1	6.98E-2

* 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 effluents are in units of mrad, reflecting the air dose.

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS (Continued)

S.O.N.G.S. 2-3

1. This data was calculated using the methodology of the ODCM.
2. This data was calculated using the methodology of the ODCM.
3. This data was calculated using the methodology of the ODCM; the GI-LLI received the maximum dose primarily by the saltwater fish pathway.
4. This data was calculated using the methodology of the ODCM; the liver received the maximum dose primarily by the saltwater fish pathway.
5. The maximum organ dose was to a child's thyroid and was located in the NNW sector. This was calculated using the activity reported in the January - June 1990 Semiannual Report with the assumptions of USNRC Regulatory Guide 1.109.
6. The maximum organ dose was to a child's thyroid and was located in the N sector. This was calculated using the activity reported in the January - June 1990 Semiannual Report with the assumptions of USNRC Regulatory Guide 1.109.
7. The maximum air dose for gamma radiation was located in the E sector, at the exclusion area boundary and calculated with the assumptions of the USNRC Regulatory Guide 1.109.
8. The maximum air dose for gamma radiation was located in the ENE sector, at the exclusion area boundary, and calculated with the assumptions of the USNRC Regulatory Guide 1.109.
9. The maximum air dose for beta radiation was located in the E sector, at the exclusion area boundary and calculated with the assumptions of the USNRC Regulatory Guide 1.109.
10. The maximum air dose for beta radiation was located in the ENE sector, at the exclusion area boundary, and calculated with the assumptions of the USNRC Regulatory Guide 1.109.
11. 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 SW sector.
12. 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 SW sector.

SECTION H. 10 CFR 50 APPENDIX I REQUIREMENTS (Continued)

S.O.N.G.S. 2-3

TABLE 2

SOURCE	% Applicable Limit	
	1st Quarter	2nd Quarter
LIQUID EFFLUENTS	1)	2)
Whole Body	4.03E-2	1.55E-1
Organ	3)	4)
	4.01E-2	6.54E-2
AIRBORNE EFFLUENTS	5)	6)
Tritium, Iodines, and Particulates	1.51E-2	3.96E-2
NOBLE GASES	7)	8)
Gamma	9.90E-2	5.97E-2
Beta	9)	10)
	1.29E-1	8.50E-2

NOTE: Direct Radiation is not specifically addressed in the ODCM Specifications.

SECTION I. CHANGES TO OFFSITE DOSE CALCULATION MANUAL

S.O.N.G.S. 2-3

During January - June 1990, two revisions to the Units 2/3 Offsite Dose Calculation Manual were issued: Revision 20A on February 1, 1990 and Revision 21 on February 15, 1990.

SUBJECT: Revision 20A to Units 2/3 Offsite Dose Calculation Manual

On February 1, 1990, Revision 20A to the Offsite Dose Calculation Manual (ODCM) was adopted and published. This revision was the result of the 1989 Land Use Census which contained several minor changes in land use and sampling location. A determination has been made that these changes do not reduce the accuracy or reliability of the dose calculations and setpoint determinations. Documentation of the fact that this revision has been reviewed and found acceptable by the Station Manager was indicated by his signature on a letter dated February 1, 1990.

Explanations of changes are listed below. These changes were incorporated into Revision 21 of the ODCM.

Page

- | | |
|------|--|
| 1-18 | Several monitor calibration constants revised due to annual isotopic calibrations. |
| 2-8 | Change in reference from Technical Specification 3.11.2.1 to ODCM Specification 2.1.1.* |
| 2-15 | Several monitor calibration constants revised due to annual isotopic calibrations. |
| 2-17 | Change in reference for beta and gamma dose factors from Table 2-2 to Table 2-4.* |
| 2-19 | Change in reference for gamma dose factors from Table 2-2 to Table 2-4.* |
| 2-22 | Change in reference for controlling dose factor from Table 2-4 to Table 2-6. Change in reference for dose parameters from Tables 2-5 through 2-14 to Tables 2-7 through 2-16.* |
| 2-27 | Controlling location factor revised for I-131 due to changes in Dose Parameter tables/updated Land Use Census. |

SECTION I. CHANGES TO OFFSITE DOSE CALCULATION MANUAL (Continued)

S.O.N.G.S 2-3

SUBJECT: Revision 20A to Units 2/3 Offsite Dose Calculation Manual (Continued)

- 2-35 Addition of a new vegetable garden in Land Use Census; X/Q, D/Q and distance updated.
- 2-60 New Dose Parameter table added for Sector F: Beach Concession,
through inserted page 60A. Remaining tables updated to include correct
2-63 placement and total number of pages
- 5-6 Radiological environmental monitoring sample location table updated to include new residential garden in San Clemente as a result of new Land Use Census.
- * The change was the reference to a table only and premature. At the time that Rev. 20A was being processed, Effluent was also processing Rev. 21, which transferred the RETS from the Technical Specifications to the ODCM. The actual tables were available in the ODCM. Anyone using the ODCM would have readily discovered the error(s), found the necessary table, and performed the calculations appropriately. The inaccurate references were in place from 2/1/90 to 2/15/90.

SUBJECT: Revision 21 to Units 2/3 Offsite Dose Calculation Manual

On February 15, 1990, Revision 21 to the Offsite Dose Calculation Manual (ODCM) was adopted and published. This revision moved the Radiological Effluent Technical Specifications (RETS) verbatim from the Technical Specifications to the ODCM per the NRC Generic Letter 89-01, Amendment 83 to the Unit 2 Technical Specifications, and Amendment 73 to the Unit 3 Technical Specifications. It has been determined that these changes do not reduce the accuracy or reliability of the dose calculations and setpoint determinations. Documentation of the fact that this revision has been reviewed and found acceptable by the Station Manager was indicated by his signature on a letter dated February 21, 1990.

Explanations of the changes are listed below. A complete copy of Revision 21 is being submitted to the NRC per Technical Specification 6.14.2.3 concurrent with this report.

SECTION I. CHANGES TO OFFSITE DOSE CALCULATION MANUAL (Continued)

S.O.N.G.S 2-3

SUBJECT: Revision 21 to Units 2/3 Offsite Dose Calculation Manual (Continued)

<u>ODCM Rev. 21</u>	<u>"Old" Requirement</u>
1.0 Liquid Effluents	T.S. 3/4.11.1.1
1.1 Concentration	T.S. 3/4.11.1.1
1.2 Dose	T.S. 3/4.11.1.2
1.3 Liquid Waste	T.S. 3/4.11.1.3
1.4 Liquid Effluent Monitor Setpoints	ODCM, Section 1.1, Rev. 20A
1.5 Dose Calculations for Liquid Effluents	ODCM, Section 1.2, Rev. 20A
1.6 Representative Sampling	ODCM, Section 1.3, Rev. 20A
2.0 Gaseous Effluents	T.S. 3/4.11.2.1
2.1 Dose Rate	T.S. 3/4.11.2.1
2.2 Dose-Noble Gas	T.S. 3/4.11.2.2
2.3 Dose-Radioiodines, Radioactive Materials in Particulate Form and Tritium	T.S. 3/4.11.2.3
2.4 Gaseous Radwaste Treatment	T.S. 3/4.11.2.4
2.5 Total Dose	T.S. 3/4.11.4
2.6 Gaseous Effluent Monitor Setpoints	ODCM, Section 2.1, Rev. 20A
2.7 Gaseous Effluent Dose Rate	ODCM, Section 2.2, Rev. 20A
2.8 Gaseous Effluent Dose Calculation	ODCM, Section 2.3, Rev. 20A
2.9 Total Dose Calculations	ODCM, Section 2.4, Rev. 20A
3.0 Projected Doses	ODCM, Section 3.0, Rev. 20A
4.0 Equipment	T.S. 3/4.3.3
4.1 Radioactive Liquid Effluent Monitoring Instrumentation	T.S. 3/4.3.3.8

SECTION I. CHANGES TO OFFSITE DOSE CALCULATION MANUAL (Continued)

S.O.N.G.S 2-3

SUBJECT: Revision 21 to Units 2/3 Offsite Dose Calculation Manual (Continued)

<u>ODCM Rev. 21</u>	<u>"Old" Requirements</u>
4.2 Radioactive Gaseous Effluent Monitoring Instrumentation	T.S. 3/4.3.3.9
4.3 Operability of Radioactive Waste Equipment	ODCM, Section 4.0, Rev. 20A
5.0 Radiological Environmental Monitoring	T.S. 3/4.12
5.1 Radiological Environmental Monitoring Program	T.S. 3/4.12.1
5.2 Land Use Census	T.S. 3/4.12.2
5.3 Interlaboratory Comparison Program	T.S. 3/4.12.3
5.4 Annual Radiological Environmental Operating Report	T.S. 6.9.1.7
5.5 Sample Locations	ODCM, Section 5.0, Rev. 20A
5.6 Bases	From appropriate T.S.
6.1 Definitions	T.S. 1.0
6.2 Administrative Controls	T.S. 6.9.1.9
6.3 Major Changes to Radioactive Waste Treatment Systems	T.S. 6.15
6.4 Bases	From appropriate T.S.
Table 6-1	T.S. Table 1.1
Table 6-2	T.S. Table 1.2

SECTION J. MISCELLANEOUS

- There were no unplanned releases of radioactive gases or liquids from Units 2 and 3 during the reporting period, January 1, 1990 to June 30, 1990.

EFFLUENT RADIATION MONITORS OUT OF SERVICE FOR GREATER THAN 30 DAYS

January 1, 1990 - June 30, 1990

S.O.N.G.S. 2

Monitor	Inoperability Period	Inoperability Cause	Explanation
2RT-7818 A/B Condenser Air Ejector	01/25/88 to present	Detector design deficiency	Design flaw in 2RI-7818 Channel B causes entire monitor to be inoperable.
2RT-7870 Condenser Air Ejector	02/18/89 to present	Process flow	Inconsistent flow indication. Design change to rework/replace existing circuitry and certain components is being initiated. Radiation monitor functions still operable.

S.O.N.G.S. 3

Monitor	Inoperability Period	Inoperability Cause	Explanation
3RT-7818 Condenser Air Ejector	01/25/88 to present	Detector design	Design flaw in 3RI-7818 channel B causes entire monitor to be inoperable. Blower removed and used as a replacement for a leaky blower on 3RI-7804.

SECTION J. MISCELLANEOUS (Continued)

EFFLUENT RADIATION MONITORS OUT OF SERVICE FOR GREATER THAN 30 DAYS (Continued)

January 1, 1990 - June 30, 1990

S.O.N.G.S. 3

Monitor	Inoperability Period	Inoperability Cause	Explanation
3RT-7870 Condenser Air Ejector	03/03/89 to present	Process Flow	Inconsistent flow indication. Design change to rework/replace existing circuitry and certain components is being initiated. Radiation monitor functions still operable.
	04/16/90 to 07/18/90	Removed from service	Performed Channel Functional Test and Corrective maintenance.
3RT-7865 Plant Vent Stack	04/17/90 to present	Process flow	Process flow is out of range during refueling outage when main purge is in operation. Radiation monitor functions still operable. Corrective maintenance being performed.
3RT-6753/ 3RT-6759 Steam Generator Blowdown	04/14/90 to 07/16/90	No Sample Flow	No steam generator pressure/steam flow due to Unit being in a refueling outage.
3RT-7828 Containment Purge	05/31/90 to 07/14/90	Flow indication falls outside range.	Simulated flow value flow value installed.

SECTION K. S.O.N.G.S. 2-3 CONCLUSIONS

- o Gaseous effluent releases, excluding tritium, totaled $6.15\text{E}+2$ curies with 98% of the total being Xe-133.
- o The radiation doses from gaseous releases are: (a) gamma air dose: $3.89\text{E}-2$ mrad at the site boundary, (b) beta air dose: $1.01\text{E}-1$ mrad at the site boundary, (c) organ dose: $3.11\text{E}-3$ mrem at the nearest receptor.
- o Liquid releases totaled $3.86\text{E}+2$ curies of which tritium was $3.86\text{E}+2$ Ci, noble gases were $4.96\text{E}-1$ Ci, and particulates and iodines were $9.81\text{E}-2$ Ci.
- o The radiation doses from liquid releases are: (a) total body: $5.85\text{E}-3$ mrem, (b) limiting organ: $1.06\text{E}-2$ mrem.
- o The radioactive releases and resulting doses generated from Units 2 and 3 were below the applicable limits for both gaseous and liquid effluents.

COMMON RADWASTE SHIPMENTS

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990) SOLID WASTE AND IRRADIATED FUEL SHIPMENT

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

1. Type of waste	Unit	6-month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporate bottoms, etc.	m ³ Ci	NA NA	NA
b. Dry compressible waste, contaminated equipment, etc.	m ³ Ci	NA NA	NA
c. Irradiated components, control rods, etc.	m ³ Ci	NA NA	NA
d. Other (filters, sludge, sand/rubble, wet trash)	m ³ Ci	NA NA	NA

2. Estimate of major nuclide composition (by type of waste)

a. Not Applicable	%	0.00E+0
b. Not Applicable	%	0.00E+0
c. Not Applicable	%	0.00E+0
d. Not Applicable	%	0.00E+0

COMMON RADWASTE SHIPMENTS (Continued)

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1990)
SOLID WASTE AND IRRADIATED FUEL SHIPMENT

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

2. Solid Waste Disposition (S.O.N.G.S. 1, 2, and 3)

<u>Number of Shipments*</u>	<u>Mode of Transportation</u>	<u>Destination</u>
3	Tri-State Motor Transit Truck/Trailer	Beatty, NV

* All waste packaged at SONGS is staged at one location. There are no independent shipments of Dry Active Waste (DAW) made for Unit 1 or Units 2/3 and are not reported separately.

B. IRRADIATED FUEL SHIPMENTS (Disposition)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
None	N/A	N/A

C. DEWATERING

<u>Number of Containers</u>	<u>Solidification Agent</u>
None	N/A

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

1. There were no revisions to the Process Control Program procedure, S0123-VII-8.5.1 was made during the reporting period, January 1, 1990 to June 30, 1990.

REFERENCES:

1. Unit 1 Technical Specifications, Section 3.19
2. Unit 2 & 3 Technical Specifications, Sections 6.5.2.9, 6.5.2.10, and 6.13.2

COMMON CONCLUSIONS

- Radioactive releases from S.O.N.G.S. 1, 2 and 3 totaled $1.63\text{E}+3$ curies for gaseous effluents, 96% of which was Xe-133. Curies discharged for liquid effluents were: tritium, $1.57\text{E}+3$ curies; noble gases, $4.09\text{E}+0$ curies; particulates and iodines, $3.06\text{E}-1$ curies.
- Radioactive releases and resulting doses generated from S.O.N.G.S. 1, 2 and 3 were below the Technical Specification and ODCM specification limits for both gaseous and liquid effluents.
- S.O.N.G.S. 1, 2 and 3 made three radwaste shipments to Beatty, Nevada. Total volume was $6.65\text{E}+1$ cubic meters containing $2.19\text{E}+0$ curies of radioactivity.
- Meteorological conditions during the year were typical for S.O.N.G.S. Meteorological dispersion was good 33% of the time, fair 44% of the time and poor 23% of the time.
- The net result from the analysis of these effluent releases indicates that the operation of S.O.N.G.S. 1, 2 and 3 has met all the requirements of the Technical Specifications and other applicable regulatory requirements and therefore has not produced any detrimental effect on the environment.

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

METEOROLOGY

The meteorology of the San Onofre Nuclear Generating Station for the first and second quarter, 1990 is described in this section. Meteorological measurements have been made according to the guidance provided in USNRC Regulatory Guide 1.23, "Onsite Meteorological Programs." A summary report of the meteorological measurements taken during each calendar quarter are presented in Table 4A as joint frequency distribution (JFD) of wind direction and wind speed by atmospheric stability class.

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

Table 4A lists the joint frequency distribution for the first and second quarter, 1990. 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- and 40-meter levels.

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

08/09/90 11:11

SITE: SAN ONOFRE

PERIOD OF RECORD 90010101-90033123
EXTREMELY UNSTABLE (DT/DZ LESS THAN -1.9 DEG.C/100 M)
PASQUILL A
WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	2	2	0	0	0	0	4
NE	0	0	0	0	0	0	1	0	0	0	0	0	1
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0	1	1	0	0	0	2
SSE	0	0	0	0	1	6	0	0	0	0	0	0	7
S	0	0	0	2	4	19	17	1	0	0	0	0	43
SSW	0	0	1	2	7	13	17	1	0	0	0	0	41
SW	0	0	0	7	12	26	15	2	0	0	0	0	62
WSW	0	0	0	6	11	36	32	1	1	0	0	0	87
W	0	0	0	4	8	64	62	6	3	0	0	0	147
WNW	0	0	0	0	3	13	27	14	12	1	0	0	70
NW	0	0	0	0	0	0	2	0	0	0	0	0	2
NNW	0	0	0	0	0	0	0	1	0	0	0	0	1
TOTALS	0	0	1	21	46	177	175	29	17	1	0	0	467
NUMBER OF CALMS	5												
NUMBER OF INVALID HOURS	35												
NUMBER OF VALID HOURS	467												
TOTAL HOURS FOR THE PERIOD	2159												

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:11

PERIOD OF RECORD 90010101-90033123
MODERATELY UNSTABLE (-1.9 < DT/DZ <= -1.7 DEG.C/100 M)

PASQUILL B

WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0	1	0	0	0	0	0	0	0	0	0	0	0
SSW	0	0	0	0	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	0	0	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	0	1	0	0	0	0	0	0	0	0	0	0	1

NUMBER OF CALMS 5
NUMBER OF INVALID HOURS 35
NUMBER OF VALID HOURS 1
TOTAL HOURS FOR THE PERIOD 2159

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:11

PERIOD OF RECORD 90010101-90033123
SLIGHTLY UNSTABLE (-1.7 < DT/TZ <= -1.5 DEG.C/100 M)

PASQUILL C

WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	0	0	0	0	0	2	0	0	0	0	0	2
NNE	0	0	0	1	0	1	0	0	0	0	0	0	2
NE	0	0	0	0	0	0	1	0	0	0	0	0	1
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	1	0	0	0	0	0	0	0	1
SE	0	0	0	0	0	3	4	1	1	0	0	0	9
SSE	0	0	0	1	1	8	7	1	0	0	0	0	18
S	0	0	0	3	3	7	4	2	0	0	0	0	19
SSW	0	0	1	0	1	2	3	0	0	0	0	0	7
SW	0	0	0	1	1	3	0	1	0	0	0	0	6
WSW	0	0	0	1	0	3	1	2	1	0	0	0	8
W	0	0	2	0	2	3	4	2	0	1	0	0	14
WNW	0	0	0	2	2	5	2	2	0	0	0	0	13
NW	0	0	0	0	1	1	4	1	0	0	0	0	7
NNW	0	0	0	0	0	1	1	1	0	0	0	0	3
TOTALS	0	0	3	9	12	37	33	13	2	1	0	0	110

NUMBER OF CALMS 5
NUMBER OF INVALID HOURS 35
NUMBER OF VALID HOURS 110
TOTAL HOURS FOR THE PERIOD 2159

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:12

PERIOD OF RECORD 90010101-90033123
NEUTRAL (-1.5 < DT/DZ <= -0.5 DEG.C/100 M)

PASQUILL D

WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	0	2	1	6	7	2	1	0	0	0	0	19
NNE	0	1	1	8	9	9	3	2	0	0	0	0	33
NE	0	0	0	5	2	1	5	0	0	0	0	0	13
ENE	0	1	1	2	1	1	1	2	0	0	0	0	9
E	0	0	1	5	1	4	5	0	0	0	0	0	16
ESE	0	0	0	3	3	3	1	2	0	0	0	0	12
SE	0	0	0	1	6	18	31	17	6	0	0	0	79
SSE	0	0	0	6	9	19	25	7	2	4	1	0	73
S	0	0	2	4	8	7	5	12	3	5	1	0	47
SSW	0	0	2	5	8	9	6	0	2	1	0	0	33
SW	0	1	1	1	7	6	9	4	0	0	0	0	29
WSW	0	1	0	2	6	4	8	7	1	0	0	0	29
W	0	2	2	7	8	7	7	10	6	1	0	0	50
WNW	1	1	1	5	4	11	10	11	8	1	0	0	53
NW	0	1	3	3	3	10	10	3	4	0	0	0	37
NNW	0	0	2	8	3	4	2	4	0	0	0	0	23
TOTALS	1	8	18	66	84	120	130	82	32	12	2	0	555

NUMBER OF CALMS 5
NUMBER OF INVALID HOURS 35
NUMBER OF VALID HOURS 555
TOTAL HOURS FOR THE PERIOD 2159

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:12

PERIOD OF RECORD 90010101-90033123
 SLIGHTLY STABLE ($-0.5 < DT/DZ \leq -1.5$ DEG.C/100 M)

PASQUILL E

WIND SPEED (M/S) AT 10 M 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	TOT.
N	1	3	3	5	9	7	8	1	0	0	0	0	37
NNE	0	2	6	20	24	18	3	1	1	0	0	0	75
NE	0	1	3	5	2	1	5	3	1	0	0	0	21
ENE	1	0	1	2	1	2	3	2	1	0	0	0	13
E	0	2	0	2	2	4	1	0	0	0	0	0	11
ESE	0	1	2	0	0	1	0	0	0	0	0	0	4
SE	0	2	1	1	4	5	4	2	0	0	0	0	19
SSE	0	1	0	0	0	4	2	0	1	0	0	0	8
S	0	1	0	2	0	0	0	1	0	0	0	0	4
SSW	0	1	2	2	0	2	0	0	0	0	0	0	7
SW	0	0	0	2	0	0	0	1	0	0	0	0	3
WSW	0	0	0	3	2	0	0	0	0	0	0	0	5
W	0	0	2	1	0	3	2	3	0	0	0	0	11
WNW	0	1	0	0	2	7	2	2	0	0	0	0	14
NW	0	0	0	0	0	2	2	0	0	0	0	0	4
NNW	0	1	2	3	6	5	4	2	0	0	0	0	23
TOTALS	2	16	22	48	52	61	36	18	4	0	0	0	259

NUMBER OF CALMS 5
 NUMBER OF INVALID HOURS 35
 NUMBER OF VALID HOURS 259
 TOTAL HOURS FOR THE PERIOD 2159

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:12

PERIOD OF RECORD 90010101-90033123
MODERATELY STABLE ($1.5 \leq DT/DZ \leq -0.5$ DEG.C/100 M)
PASQUILL F

WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	1	1	4	5	8	8	0	0	0	0	0	27
NNE	0	1	6	24	47	52	12	1	0	0	0	0	143
NE	0	1	6	8	3	5	3	1	0	0	0	0	27
ENE	1	1	3	1	1	1	1	0	0	0	0	0	9
E	0	1	2	3	1	2	0	0	0	0	0	0	9
ESE	0	0	0	0	1	0	1	0	0	0	0	0	2
SE	0	2	0	0	0	2	1	0	0	0	0	0	5
SSE	0	1	1	1	0	1	0	0	0	0	0	0	4
S	0	0	2	3	0	1	0	0	0	0	0	0	6
SSW	0	1	1	0	0	0	0	0	0	0	0	0	2
SW	0	1	0	0	0	0	0	0	0	0	0	0	1
WSW	0	1	0	0	1	1	0	0	0	0	0	0	3
W	0	1	0	2	1	6	0	0	0	0	0	0	10
WNW	0	0	0	0	1	2	0	0	0	0	0	0	3
NW	1	0	1	1	0	0	2	0	0	0	0	0	5
NNW	1	0	1	2	0	5	0	0	0	0	0	0	9
TOTALS	3	12	24	49	61	86	28	2	0	0	0	0	265
NUMBER OF CALMS	5												
NUMBER OF INVALID HOURS	35												
NUMBER OF VALID HOURS	265												
TOTAL HOURS FOR THE PERIOD	2159												

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

08/09/90 11:12

SITE: SAN ONOFRE

PERIOD OF RECORD 90010101-90033123
EXTREMELY STABLE(DT/DZ EXCEEDS 4.0 DEG.C/100 M)

PASQUILL G

WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	1	1	2	0	4	16	5	0	0	0	0	29
NNE	0	1	1	4	32	201	120	3	0	0	0	0	362
NE	0	0	1	11	6	5	8	0	0	0	0	0	31
ENE	0	0	2	4	3	0	0	0	0	0	0	0	9
E	0	0	1	0	0	0	0	0	0	0	0	0	1
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	1	0	1	0	0	0	0	0	0	2
SSE	0	1	2	0	2	1	0	0	0	0	0	0	6
S	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	0	0	0	3	0	0	0	0	0	0	0	0	3
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	1	0	0	1	1	0	0	0	0	0	0	3
W	0	0	1	2	0	2	3	0	0	0	0	0	8
WNW	0	0	1	0	1	3	2	0	0	0	0	0	7
NW	0	0	0	0	1	1	2	0	0	0	0	0	4
NNW	0	0	0	1	1	0	0	0	0	0	0	0	2
TOTALS	0	4	10	28	47	219	151	8	0	0	0	0	467

NUMBER OF CALMS 5
NUMBER OF INVALID HOURS 35
NUMBER OF VALID HOURS 467
TOTAL HOURS FOR THE PERIOD 2159

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:12

PERIOD OF RECORD 90010101-90033123

ALL STABILITY, ALL DT/DZ

WIND SPEED (M/S) AT 10 M 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 TOT.
N	1	5	7	12	20	26	36	7	0	0	0	114
NNE	0	5	14	57	112	281	140	9	1	0	0	619
NE	0	2	10	29	13	12	23	4	1	0	0	94
ENE	2	2	7	9	6	4	5	4	1	0	0	40
E	0	3	4	10	4	10	6	0	0	0	0	37
ESE	0	1	2	3	5	4	2	2	0	0	0	19
SE	0	4	1	3	10	29	40	21	8	0	0	116
SSE	0	3	3	8	13	39	34	8	3	4	1	116
S	0	2	4	14	15	34	26	16	3	5	1	120
SSW	0	2	7	12	16	26	26	1	2	1	0	93
SW	0	2	1	11	20	35	24	8	0	0	0	101
WSW	0	3	0	12	21	45	41	10	3	0	0	135
W	0	3	7	16	19	85	78	21	9	2	0	240
WNW	1	2	2	7	13	41	43	29	20	2	0	160
NW	1	1	4	4	5	14	22	4	4	0	0	59
NNW	1	1	5	14	10	15	7	8	0	0	0	61
TOTALS	6	41	78	221	302	700	553	152	55	14	2	0 2124

NUMBER OF CALMS 5
 NUMBER OF INVALID HOURS 35
 NUMBER OF VALID HOURS 2124
 TOTAL HOURS FOR THE PERIOD 2159

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

08/09/90 11:14

SITE: SAN ONOFRE

PERIOD OF RECORD 90040101-90063023
EXTREMELY UNSTABLE (DT/DZ LESS THAN -1.9 DEG.C/100 M)
PASQUILL A
WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	1	4	4	0	0	0	0	9
SSE	0	0	0	0	1	0	5	9	4	0	0	0	19
S	0	0	0	1	2	12	50	11	6	0	0	0	82
SSW	0	0	0	0	1	22	36	2	0	0	0	0	61
SW	0	0	0	3	8	30	76	4	0	0	0	0	121
WSW	0	0	0	4	7	38	92	4	0	0	0	0	145
W	0	0	0	1	5	53	137	8	0	0	0	0	204
WNW	0	0	0	0	1	10	41	10	0	0	0	0	62
NW	0	0	0	0	0	0	0	3	1	0	0	0	4
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0

TOTALS 0 0 0 9 25 166 441 55 11 0 0 0 0 707

NUMBER OF CALMS 18
NUMBER OF INVALID HOURS 3
NUMBER OF VALID HOURS 707
TOTAL HOURS FOR THE PERIOD 2183

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

08/09/90 11:14

SITE: SAN ONOFRE

PERIOD OF RECORD 90040101-90063023
MODERATELY UNSTABLE (-1.9 < DT/DZ <= -1.7 DEG.C/100 M)
PASQUILL B
WIND SPEED (M/S) AT 10 M LEVEL

WIND	.22-	.51-	.76-	1.1-	1.6-	2.1-	3.1-	5.1-	7.1-	10.1-	13.1-	>18	TOT.
DIR	.50	.75	1.0	1.5	2.0	3.0	5.0	7.0	10.0	13.0	18.0		
N	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0	0	0	0	0	0	0
WSW	0	0	0	0	1	0	0	0	0	0	0	0	1
W	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0

TOTALS	0	0	0	0	1	0	0	0	0	0	0	0	1
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NUMBER OF CALMS 18
NUMBER OF INVALID HOURS 3
NUMBER OF VALID HOURS 1
TOTAL HOURS FOR THE PERIOD 2183

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:14

PERIOD OF RECORD 90040101-90063023
 SLIGHTLY UNSTABLE (-1.7 < DT/TZ <= -1.5 DEG.C/100 M)

PASQUILL C

WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	1	3	4	2	0	0	0	10
SSE	0	0	0	0	1	2	6	17	7	0	0	0	33
S	0	0	0	0	3	5	5	3	0	0	0	0	16
SSW	0	0	0	1	1	3	5	4	2	0	0	0	16
SW	0	0	1	3	2	4	3	0	0	0	0	0	13
WSW	0	0	0	4	4	2	2	1	0	0	0	0	13
W	0	0	0	0	3	5	3	1	0	0	0	0	12
WNW	0	0	0	0	0	7	10	0	0	0	0	0	17
NW	0	0	0	0	0	3	2	1	0	0	0	0	6
NNW	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTALS	0	0	1	8	14	32	40	31	11	0	0	0	137

NUMBER OF CALMS 18
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 137
 TOTAL HOURS FOR THE PERIOD 2183

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:14

PERIOD OF RECORD 90040101-90063023
NEUTRAL(-1.5 < DT/DZ <= -0.5 DEG.C/100 M)
PASQUILL D

WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	1	5	7	15	2	1	0	0	0	0	0	31
NNE	0	1	1	15	7	9	0	0	0	0	0	0	33
NE	0	0	2	2	5	0	0	0	0	0	0	0	9
ENE	0	0	0	3	2	4	0	0	0	0	0	0	9
E	0	0	1	2	1	15	7	0	0	0	0	0	26
ESE	0	3	2	3	0	13	11	0	0	0	0	0	32
SE	0	0	1	4	9	42	53	19	2	1	0	0	131
SSE	0	1	2	7	14	28	57	19	17	1	0	0	146
S	0	0	0	8	10	21	21	10	2	0	0	0	72
SSW	1	2	3	3	13	22	16	6	3	0	0	0	69
SW	0	0	1	6	5	16	12	2	0	0	0	0	42
WSW	2	0	2	10	3	10	12	8	1	0	0	0	48
W	0	2	2	7	8	11	14	2	0	0	0	0	46
WNW	0	3	1	5	7	17	20	3	1	0	0	0	57
NW	0	0	3	12	4	24	20	2	0	0	0	0	65
NNW	1	0	4	8	3	7	0	0	0	0	0	0	23
TOTALS	4	13	30	102	106	241	244	71	26	2	0	0	839

NUMBER OF CALMS 18
NUMBER OF INVALID HOURS 3
NUMBER OF VALID HOURS 839
TOTAL HOURS FOR THE PERIOD 2183

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:14

PERIOD OF RECORD 90040101-90063023
SLIGHTLY STABLE (-0.5 < DT/DZ <= -1.5 DEG.C/100 M)
PASQUILL E
WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	0	5	12	8	7	1	0	0	0	0	0	33
NNE	0	1	5	10	15	18	3	0	0	0	0	0	52
NE	0	1	2	6	2	1	0	0	0	0	0	0	12
ENE	0	1	1	0	0	0	0	0	0	0	0	0	2
E	0	1	1	0	5	8	0	1	0	0	0	0	16
ESE	1	0	1	1	2	4	4	2	0	0	0	0	15
SE	1	1	2	5	8	13	22	1	0	0	0	0	53
SSE	0	0	0	4	4	3	4	1	1	0	0	0	17
S	0	0	1	4	0	2	0	1	0	0	0	0	8
SSW	0	1	0	0	0	2	0	0	0	0	0	0	3
SW	0	1	0	0	0	0	1	0	0	0	0	0	2
WSW	0	0	1	0	0	0	0	0	1	0	0	0	2
W	0	0	1	1	2	4	1	0	0	0	0	0	9
WNW	1	1	0	0	0	1	5	1	0	0	0	0	9
NW	0	0	3	2	0	2	3	0	0	0	0	0	10
NNW	1	0	1	2	2	2	1	0	0	0	0	0	9
TOTALS	4	8	24	47	48	67	45	7	2	0	0	0	252

NUMBER OF CALMS 18
NUMBER OF INVALID HOURS 3
NUMBER OF VALID HOURS 252
TOTAL HOURS FOR THE PERIOD 2183

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:14

PERIOD OF RECORD 90040101-90063023
MODERATELY STABLE ($1.5 \leq DT/DZ \leq -0.5$ DEG.C/100 M)
PASQUILL F
WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	1	2	8	3	4	3	0	0	0	0	0	21
NNE	1	2	3	19	17	22	0	0	0	0	0	0	64
NE	0	2	4	1	0	0	0	0	0	0	0	0	7
ENE	0	1	2	0	0	0	0	0	0	0	0	0	3
E	0	0	0	1	0	0	0	0	0	0	0	0	1
ESE	0	0	0	1	1	0	1	1	0	0	0	0	4
SE	0	0	1	0	0	1	3	0	0	0	0	0	5
SSE	0	0	0	0	0	1	1	0	0	0	0	0	2
S	0	0	0	0	0	0	0	0	0	0	0	0	0
SSW	0	0	0	3	0	0	0	0	0	0	0	0	3
SW	0	0	0	1	0	0	0	0	0	0	0	0	1
WSW	1	0	0	0	0	0	0	0	0	0	0	0	1
W	0	0	0	0	0	1	0	0	0	0	0	0	1
WNW	0	0	0	1	0	0	3	0	0	0	0	0	4
NW	0	0	0	0	1	0	0	0	0	0	0	0	1
NNW	0	1	1	2	0	0	0	0	0	0	0	0	4
TOTALS	2	7	13	37	22	29	11	1	0	0	0	0	122
NUMBER OF CALMS	18												
NUMBER OF INVALID HOURS	3												
NUMBER OF VALID HOURS	122												
TOTAL HOURS FOR THE PERIOD	2183												

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

08/09/90 11:14

SITE: SAN ONOFRE

PERIOD OF RECORD 90040101-90063023
EXTREMELY STABLE(DT/DZ EXCEEDS 4.0 DEG.C/100 M)
PASQUILL G
WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	0	1	0	2	3	4	0	0	0	0	0	10
NNE	0	0	0	4	22	46	13	0	0	0	0	0	85
NE	0	0	0	4	2	0	0	0	0	0	0	0	6
ENE	0	0	1	0	0	0	0	0	0	0	0	0	1
E	0	0	0	0	1	0	0	0	0	0	0	0	1
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	1	0	0	0	0	0	0	1
SSE	0	0	0	0	1	0	0	0	0	0	0	0	1
S	0	0	0	3	0	0	0	0	0	0	0	0	3
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	1	0	1	0	1	0	0	0	0	0	0	0	3
W	0	0	0	1	0	1	0	0	0	0	0	0	2
WNW	0	0	0	0	0	1	5	0	0	0	0	0	6
NW	0	0	0	0	0	0	1	0	0	0	0	0	1
NNW	0	0	0	0	0	1	1	0	0	0	0	0	2
TOTALS	1	0	3	12	29	53	24	0	0	0	0	0	122

NUMBER OF CALMS 18
NUMBER OF INVALID HOURS 3
NUMBER OF VALID HOURS 122
TOTAL HOURS FOR THE PERIOD 2183

SONGS Semiannual Effluent Report

January - June 1990

Table 4A

SITE: SAN ONOFRE

08/09/90 11:14

PERIOD OF RECORD 90040101-90063023

ALL STABILITY, ALL DT/DZ

WIND SPEED (M/S) AT 10 M 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	TOT.
N	0	2	13	27	28	16	9	0	0	0	0	0	95
NNE	1	4	9	48	61	95	16	0	0	0	0	0	234
NE	0	3	8	13	9	1	0	0	0	0	0	0	34
ENE	0	2	4	3	2	4	0	0	0	0	0	0	15
E	0	1	2	3	7	23	7	1	0	0	0	0	44
ESE	1	3	3	5	3	17	16	3	0	0	0	0	51
SE	1	1	4	9	17	59	85	28	4	1	0	0	209
SSE	0	1	2	11	21	34	73	46	29	1	0	0	218
S	0	0	1	16	15	40	76	25	8	0	0	0	181
SSW	1	3	3	7	15	49	57	12	5	0	0	0	152
SW	0	1	2	13	15	50	92	6	0	0	0	0	179
WSW	4	0	4	18	16	50	106	13	2	0	0	0	213
W	0	2	3	10	18	75	155	11	0	0	0	0	274
WNW	1	4	1	6	8	36	84	14	1	0	0	0	155
NW	0	0	6	14	5	29	26	6	1	0	0	0	87
NNW	2	1	6	12	5	10	3	0	0	0	0	0	39
TOTALS	11	28	71	215	245	588	805	165	50	2	0	0	2180

NUMBER OF CALMS 18
 NUMBER OF INVALID HOURS 3
 NUMBER OF VALID HOURS 2180
 TOTAL HOURS FOR THE PERIOD 2183