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A. Edward Scherer
Director
Nuclear Regulatory Affairs

May 13, 2008

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: **Docket Nos. 50-206, 50-361, 50-362 and 72-41**
2007 Annual Radiological Environmental Operating Report
San Onofre Nuclear Generating Station Units 1, 2 and 3 and
Independent Spent Fuel Storage Facility

Dear Sir or Madam:

As required by Technical Specification (TS) Section D6.9.1.3 of San Onofre Nuclear Generating Station (SONGS) Unit 1 Facility Operating License DPR-13, and TS Section 5.7.1.2 of Facility Operating Licenses NPF-10 and NPF-15 for SONGS Units 2 and 3, respectively, this letter transmits the 2007 Annual Radiological Environmental Operating Report (AREOR) for SONGS Unit 1 and SONGS Units 2 and 3.

The AREOR covers the operation of SONGS Unit 1 and SONGS Units 2 and 3 during the calendar year 2007 and includes summaries, interpretations, and analyses of trends of the results of the Radiological Environmental Monitoring Program.

In addition, the AREOR includes the results for direct radiation monitoring near the Independent Spent Fuel Storage Installation.

If you require any additional information, please contact Mr. Clay Williams at (949) 368-6707.

Sincerely,

Enclosure

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2007
Radiological Environmental Operating Report
San Onofre Nuclear Generating Station

Southern California Edison
An Edison International Company

Docket Nos. 50-206, 50-361, 50-362
License Nos. DPR-13, NPF-10, NPF-15

April 2008

SOUTHERN CALIFORNIA EDISON
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2007 ANNUAL

RADIOLOGICAL ENVIRONMENTAL

OPERATING REPORT

San Onofre Nuclear Generating Station

UNITS 1, 2, & 3

Southern California Edison
An Edison International Company

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APRIL 2008

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Executive Summary

The data from the San Onofre Nuclear Generating Station (SONGS) Radiological Environmental Monitoring Program (REMP) clearly indicate that SONGS had no measurable radiological environmental impact during 2007.

Preparation of the 2007 Annual Radiological Environmental Operating Report (AREOR) used the data reduction protocol described in NUREG/CR-4007. A meaningful analysis of data at, near, or below the detection limit must necessarily involve a consideration of the degrees of uncertainty associated with the data. Excluding naturally occurring radionuclides, approximately 5% of the 2007 SONGS REMP data set was above the critical level (1.64 sigma), which is characteristic of a database of values statistically equal to zero. The data have been summarized in the Statistical Summary of REMP Data found in Appendix B. The plant related radionuclides (Cs-137 in soil and sediment, as well as I-131 in kelp) detected above the *a posteriori* minimum detectable concentration (MDC) may be attributable to fallout from nuclear weapons testing (Cs-137) and medical administrations of radionuclides (I-131). These isotopes have been detected at indicator as well as control locations in past years. The naturally occurring radionuclides (Be-7, K-40, and Th-228) detected were observed in both control and indicator locations at substantially similar concentrations and are not related to the operation of SONGS. The balance of 2007 SONGS REMP database displays behavior statistically equal to a null set. Refer to Appendix B for a more detailed discussion.

INTRODUCTION

SONGS consists of two pressurized water nuclear reactors housed in separate containment buildings. Unit 1 attained initial criticality June 1967 and was permanently retired from service in November 1992. Units 2/3 attained initial criticality in July 1982 and August 1983, respectively, and have been in operation to date.

The purpose of the REMP is to quantify ambient radiation levels in the environs of SONGS, and to identify and quantify concentrations of radioactivity in various environmental media in the vicinity of SONGS which have a potential radiation exposure pathway to man. Thermoluminescent dosimeters (TLDs) were used to measure direct radiation levels. Sampled environmental media include soil, shoreline sediment (beach sand), air (particulate & iodine), local crops, non-migratory marine species, kelp, drinking water, ocean water, and ocean bottom sediments. Each of the samples was analyzed for both naturally-occurring and SONGS-related radionuclides.

The REMP is conducted in accordance with Section 5.0 of the SONGS Offsite Dose Calculation Manual (ODCM).

To conform with 10CFR Part 50, Appendix I, Section IV-B.2, measured radioactivity concentrations in the environmental samples have been compared against predicted (calculated) ones to evaluate the relationship between quantities of radioactive material released in effluents and resultant radiation doses to individuals from principal pathways of exposure.

Refer to Appendix B for a correlation of effluent to environmental concentrations.

A land use census was performed in 2007 to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the monitoring program are made if required by the results of this census. Appendix F of the report identifies changes to the census and the resultant dose increase, if any, to individuals from principal pathways of exposures in conformance with 10CFR Part 50, Appendix I, Section IV. B.3.

OBJECTIVES

1. To fulfill the radiological environmental monitoring requirements of the ODCM and the Technical Specifications.

2. To detect any significant increase in the concentration of radionuclides in critical pathways.

3. To detect any significant change in ambient gamma radiation levels.

4. To verify that the operation of SONGS Units 1, 2 and 3 have no measurable (detrimental) effects on the health and safety of the public or the environment.

SAMPLE COLLECTION

Samples of various environmental media were obtained to meet the stated objectives. The selection of sample types was based on established critical pathways for the transfer of radionuclides through the environment to individuals, and the evaluation of data during the operational phase. Sampling locations were determined with consideration given to site meteorology, local demography, and land uses. Refer to Appendix A for a complete list of REMP sample locations as described in Table 5-4 of the ODCM.

Sampling locations were divided into two classes, indicator and control. Control stations were at locations considered to be unaffected by SONGS operations. All others are considered indicator locations and may be potentially affected by SONGS operations.

SOURCES OF RADIOACTIVITY

Plant-specific radionuclides are produced in the normal operation of a nuclear power plant. Most of the fission products are retained within the fuel and its cladding. A small fraction of fission products such as cesium-137 (Cs-137) and iodine-131 (I-131), and activation products such as cobalt-60 (Co-60), are present in the primary reactor cooling system. Noble gases are also produced during the fission process.

Radioactive liquid and gaseous waste releases to the ocean and the atmosphere may contain very minute concentrations of plant-produced radionuclides. The airborne radioactive noble gases released are mostly xenon and krypton, which are inert (non-reactive). They do not concentrate in the body, but they may contribute to human radiation exposure as an immersion source for whole body exposure. Xenon-133 and argon-41 are the major radioactive noble gases released

to the atmosphere, and their calculated offsite beta and gamma air doses are no greater than 0.1 mrad per year.

The releases of iodines and particulates in the gaseous and liquid effluents are small. The major radionuclides of interest are I-131, Cs-134, Cs-137, Co-58, and Co-60. The total releases for these radionuclides were well below applicable regulatory limits.

Tritium (H-3), the radioactive isotope of hydrogen, is the predominant radionuclide in the liquid effluents and is also present in gaseous effluents. Tritium is produced in the reactor water (coolant) as a result of boron activation and other nuclear reactions.

EXPOSURE PATHWAY

Figure 1 illustrates various exposure pathways resulting in radiation dose to the surrounding population from operation of a nuclear facility. Only a few pathways will have real dose potential and require detailed calculations.

a. External Exposure

External exposure to people during normal operations will include radioactive gases in gaseous effluent plumes, radionuclides deposited on soil, and vegetation, or shoreline sediments. Direct exposure from radionuclides in water during recreation or commercial fishing activity is insignificant. Accumulation in sediments has the greater potential as a source of exposure. Gamma dosimeters (TLDs) are the usual means of measuring direct radiation exposure since significant dose contributors are gamma-emitters.

b. Internal Exposure

The release of radioactivity in liquid effluents involves pathways such as fish consumption and direct exposure from the ocean water by swimming and the shoreline activities. Consumption of fish or crops from the area receiving liquid effluents and breathing noble gases from the gaseous effluents releases are the most probable sources of internal exposure.

REGULATORY LIMITS, GUIDANCE, AND REQUIREMENTS

* 10CFR50

The Code of Federal Regulations Title 10, Part 50, Appendix I.

* 40CFR190

The Environmental Protection Agency (EPA) has established environmental radiation protection standards for nuclear power plants in 40CFR190. The standards for normal operation recommended that the dose from all discharges of radioactivity should not exceed 25 mrem/yr. These limits are applicable to the sum of both liquid and gaseous

effluents and direct radiation. The environmental doses calculated at SONGS are a small fraction of the dose limits established by the EPA.

* 10CFR20

10CFR20, Appendix B, Table II, "Effluent Concentrations" and Appendix C, "Concentration for Release to Sewerage"

Guidance:

* Regulatory Guide 4.1

Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants, 1975

* Regulatory Guide 4.2

Preparation of Environmental Reports for Nuclear Power Stations, 1976

* Regulatory Guide 4.8

Environmental Technical Specifications for Nuclear Power Plants, 1975

* Regulatory Guide 4.13

Performance, Testing, and Procedural Specification for Thermoluminescent Dosimetry: Environmental Applications, 1977

* NUREG-0133

Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants

* Regulatory Guide 1.109

Calculation of Annual Doses to Man from Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR Part 50, Appendix I, 1977

* NUREG-1301

Offsite Dose Calculations Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors, Generic Letter 89-01, Supplement No. 1, 1991

* ANSI N545 (TLD's)

American National Standard Performance, Testing, And Procedural Specifications for Thermoluminesence Dosimetry (Environmental Application), 1975

* Regulatory Guide 4.15

Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment, 1979

* NUREG/CR-4007 Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements, 1984

DATA MANAGEMENT

The tabulated means, ranges and standard deviations presented in Appendix B were calculated following the standard format specified in Regulatory Guide 4.8, the Radiological Assessment Branch Technical Position, Revision 1, 1979, and in accordance with the protocol outlined in NUREG/CR-4007. A custom data management software package was used to perform the statistical analysis and tabulation of the data.

The REMP data are reviewed for accuracy and comparison against NRC reporting levels, and then entered into the REMP database. One of the REMP menus flags measurements exceeding the administrative levels (10% of the NRC reporting levels) established by Southern California Edison (SCE). The *a posteriori* MDC is compared to the maximum value for the *a priori* Lower Limit of Detection (LLD) specified in the ODCM. This ensures that regulatory limits for the maximum LLD are met.

The impact of SONGS on the surrounding environment was assessed through a series of analyses. These analyses included: data reduction, comparisons of indicator to control locations, and summary (Appendix B); comparison of operational to preoperational environmental data (Appendix D); summary of deviations from sampling requirements and corrective actions taken (Appendix E); and the results of the 2007 Land Use Census (Appendix F).

All Radiological Environmental Monitoring activities for San Onofre are assessed in accordance with Quality Assurance requirements as defined in Regulatory Guide 4.15. The Contracted Environmental Analysis Laboratory (CEAL) participated in an interlaboratory comparison program in partial fulfillment of the quality assurance requirements for environmental monitoring. The CEAL participated in cross check programs which meet the intent of Reg. Guide 4.15. Refer to Appendix C.

DETECTION LIMIT TERMINOLOGY

This report utilizes three distinct terms to describe the concept of "lower limit of detection" at various detection confidence levels. The terms are briefly defined below. For a more thorough discussion, the reader should refer to NUREG/CR-4007.

Critical level - Defined as 1.64 sigma. For a sufficiently large database of [isotopically analyzed] sample results, with the "true" activity being equal to zero, approximately 5% of the results should be above the critical level.

Lower Limit of Detection (LLD) - The LLD is the *a priori* (before the fact) lower limit of detection. This value is calculated for each isotope and every matrix based on typical or expected values of decay time, sample size, counter efficiency, etc. These values are listed in the ODCM and represent the maximum permissible value for the "lower limit of detection" for specified sample media.

Minimum Detectable Concentration (MDC) - The MDC is the *a posteriori* (after the fact) lower limit of detection based on actual decay time, measured sample size, counter efficiency as determined by recent calibration, etc. The MDC is compared to the LLD to verify that the measurement met the ODCM requirements for the maximum value of the LLD for the listed analytes. Values above the MDC are presumed to represent "detected" activity at the 95% detection confidence level.

The 2007 SONGS REMP data required by the ODCM have been summarized in the Statistical Summary of REMP Data found in Appendix B.

CONCLUSION

Levels of radioactivity in environmental media are a function of several factors including: site release rates; meteorology; number, location, size and date of nuclear weapons tests; seasonal variability of fallout; soil conditions; local terrain and variability in the natural environment.

Radiological environmental data collected throughout 2007 have been evaluated to determine the impact, if any, of San Onofre operations on the surrounding environment. To accomplish this, several methods of evaluation were employed, namely:

1. Compilation and verification of all data, as well as a determination of those data considered to be significantly greater than background levels.

2. Correlation of effluent concentrations to concentrations in the environment. Refer to Appendix B.

3. Examination of time-dependent variations of pertinent radioisotopes in selected environmental media throughout the year at both indicator and control locations.

4. Comparison of radioactivity in various media in 2007 against the levels observed in pre-operational years.

5. Historical trending of radionuclides in various media during operational years.

In comparing these findings to the conservatively-defined limits of the facility operating licenses, it is concluded that the radiological environmental impact of the operation of SONGS through 2007 has been negligible, and the resulting dose to man is negligible.

REFERENCES

1. 10CFR20, 10CFR50

2. Land Use Census for SONGS Units l, 2 and 3 Radiological Environmental Monitoring Program, October 2007.

3. ODCM (Offsite Dose Calculation Manual) for SONGS Unit 1 and Units 2/3, Section 5.0, 2007.

4. SONGS Radiological Monitoring (RM) Procedures: SO123-RM-1 (SO123-IX-1.10).

5. L. Currie. 1968 "Limits for the Qualitative Detection and Quantitative Determination - Application to Radiochemistry," Analytical Chemistry, vol. 40 pp. 586-593

APPENDIX A

SAMPLE TYPE AND SAMPLING LOCATION

TABLE A-1

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

TYPE OF SAMPLE AND SAMPLING LOCATION (Out of sequence sample numbers are due to program modifications)		DISTANCE* (miles)	DIRECTION* (Sector)
Direct Radiation			
1	City of San Clemente (Former SDG&E Offices)	5.7	NW
2	Camp San Mateo – MCB	3.5	N
3	Camp San Onofre – MCB	2.6	NE
4	Camp Horno – MCB	4.5	E
6	Old Route 101 (East-Southeast)	3.0	ESE
8	Noncommissioned Officers' Beach Club	1.4	NW
10	Bluff (Adjacent to PIC #1)	0.7	WNW
11	Former Visitors' Center	0.4 **	NW
12	South Edge of Switchyard	0.2 **	E
13	Southeast Site Boundary (Bluff)	0.4 **	ESE
15	Southeast Site Boundary (Office Building)	0.1 **	SSE
16	East Southeast Site Boundary	0.4 **	ESE
19	San Clemente Highlands	5.0	NNW
22	Former US Coast Guard Station - San Mateo Point	2.7	WNW
23	SDG&E Service Center Yard	8.1	NW
31	Aurora Park - Mission Viejo (Control)	18.6	NNW
33	Camp Talega – MCB	5.7	N
34	San Onofre School – MCB	1.9	NW
35	Range 312 – MCB	4.7	NNE
36	Range 208C – MCB	4.2	NE
38	San Onofre State Beach Park	3.3	SE
40	SCE Training Center - Mesa (Adjacent to PIC #3)	0.7	NNW
41	Old Route 101 – East	0.3 **	E
44	Fallbrook Fire Station	17.7	E

* Distance (miles) and Direction (sector) are measured relative to Units 2/3 midpoint. Direction determined from degrees true north.
** Distances are within the Units 2/3 CAB/EAB (Controlled Area Boundary/Exclusion Area Boundary)
*** Soil samples are not required by Technical Specifications.
**** Kelp samples are not required by Technical Specifications.
MCB Marine Corp Base Camp Pendleton
PIC Pressurized Ion Chamber

TABLE A-1

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

TYPE OF SAMPLE AND SAMPLING LOCATION (Out of sequence sample numbers are due to program modifications)		DISTANCE* (miles)	DIRECTION* (Sector)
Direct Radiation (Continued)			
46	San Onofre State Beach Park	0.9	SE
47	Camp Las Flores – MCB	8.6	SE
49	Camp Chappo – MCB	12.8	ESE
50	Oceanside Fire Station (Control)	15.6	SE
53	San Diego County Operations Center	44.3	SE
54	Escondido Fire Station	31.8	ESE
55	San Onofre State Beach (U1 West)	0.2 **	W
56	San Onofre State Beach (U1 West)	0.2 **	W
57	San Onofre State Beach (Unit 2)	0.1 **	WSW
58	San Onofre State Beach (Unit 3)	0.1 **	S
59	SONGS Meteorological Tower	0.3 **	WNW
61	Mesa - East Boundary (Adjacent to PIC #4)	0.7	N
62	MCB - Camp Pendleton (Adjacent to PIC #5)	0.6	NNE
63	MCB - Camp Pendleton (Adjacent to PIC #6)	0.6	NE
64	MCB - Camp Pendleton (Adjacent to PIC #7)	0.6	ENE
65	MCB - Camp Pendleton (Adjacent to PIC #8)	0.7	E
66	San Onofre State Beach (Adjacent to PIC #9)	0.6	ESE
67	Former SONGS Evaporation Pond (Adjacent to PIC #2)	0.6	NW
68	Range 210C – MCB	4.3	ENE
73	South Yard Facility	0.4 **	ESE
74	Oceanside City Hall (Backup Control)	15.6	SE
75	Gate 25 MCB	4.6	SE
76	El Camino Real Mobil Station	4.6	NW
77	Area 62 Heavy Lift Pad	4.3	N
78	Sheep Valley	4.4	ESE

* Distance (miles) and Direction (sector) are measured relative to Units 2/3 midpoint. Direction determined from degrees true north.
** Distances are within the Units 2/3 CAB/EAB (Controlled Area Boundary/Exclusion Area Boundary)
*** Soil samples are not required by Technical Specifications.
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TYPE OF SAMPLE AND SAMPLING LOCATION (Out of sequence sample numbers are due to program modifications)		DISTANCE* (miles)	DIRECTION* (Sector)
Airborne			
1	City of San Clemente (City Hall)	5.1	NW
7	AWS Roof	0.18 **	NW
9	State Beach Park	0.6	ESE
10	Bluff	0.7	WNW
11	Mesa EOF	0.7	NNW
12	Former SONGS Evaporation Pond	0.6	NW
13	Marine Corp Base (Camp Pendleton East)	0.7	E
14	Mesa Medical Facility	0.7	NNW
15	Oceanside City Hall (Control)	15.6	SE
Soil Samples ***			
1	Camp San Onofre	2.6	NE
2	Old Route 101 - East Southeast	3.0	ESE
3	Basilone Road / I-5 Freeway Off ramp	2.0	NW
5	Former Visitor's Center	0.4 **	NW
6	Oceanside (Control)	16.0	SE

* Distance (miles) and Direction (sector) are measured relative to Units 2/3 midpoint. Direction determined from degrees true north.
** Distances are within the Units 2/3 CAB/EAB (Controlled Area Boundary/Exclusion Area Boundary)
*** Soil samples are not required by Technical Specifications.
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MCB Marine Corp Base Camp Pendleton
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TABLE A-1

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

TYPE OF SAMPLE AND SAMPLING LOCATION (Out of sequence sample numbers are due to program modifications)		DISTANCE* (miles)	DIRECTION* (Sector)
Ocean Water			
A	Station Discharge Outfall - Unit 1	0.6	SW
B	Outfall - Unit 2	1.5	SW
C	Outfall - Unit 3	1.2	SSW
D	Newport Beach (Control)	30.0	NW
51	Unit 2 Conduit	0.1	SW
52	Unit 3 Conduit	0.1	SSW
Drinking Water			
4	Camp Pendleton Drinking Water Reservoir	2.2	NNW
5	Oceanside City Hall (Control)	15.6	SE
Shoreline Sediment (Beach Sand)			
1	San Onofre State Beach (SE)	0.6	SE
2	San Onofre Surfing Beach	0.8	WNW
3	San Onofre State Beach (SE)	3.5	SE
4	Newport Beach North End (Control)	29.2	NW
Local Crops			
1	San Clemente Ranch (San Mateo Canyon)	2.6	NW
2	Oceanside (Control)	15-25	SE to ESE
4	San Clemente Residence (Ola Vista) with Garden	4.4	NW
6	SONGS Garden	0.4	NNW
Non-Migratory Marine Animals			
A	Unit 1 Outfall	0.9	WSW
B	Units 2/3 Outfall	1.5	SSW
C	Laguna Beach (Control)	18.2	NW

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

*** Soil samples are not required by Technical Specifications.

**** Kelp samples are not required by Technical Specifications.

MCB Marine Corp Base Camp Pendleton

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TABLE A-1

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

TYPE OF SAMPLE AND SAMPLING LOCATION (Out of sequence sample numbers are due to program modifications)		DISTANCE* (miles)	DIRECTION* (Sector)
Kelp ****			
A	San Onofre Kelp Bed	1.5	S
B	San Mateo Kelp Bed	3.8	WNW
C	Barn Kelp Bed	6.3	SSE
E	Salt Creek (Control)	11 to 13	WNW to NW
Ocean Bottom Sediments			
B	Unit 1 Outfall (0.6 mile West)	0.8	SSW
C	Unit 2 Outfall	1.6	SW
D	Unit 3 Outfall	1.2	SSW
E	Laguna Beach (Control)	18.2	NW
F	SONGS Upcoast	0.9	WSW
51	Unit 2 Conduit	0.1	SW
52	Unit 3 Conduit	0.1	SSW

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

*** Soil samples are not required by Technical Specifications.

**** Kelp samples are not required by Technical Specifications.

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TABLE A-2

SECTOR AND DIRECTION DESIGNATION FOR REMP SAMPLE LOCATION MAP

DEGREES TRUE NORTH FROM SONGS 2 AND 3 MIDPOINT			NOMENCLATURE	
Sector Limit	Center Line	Sector Limit	22.5^0 Sector	Direction
348.75	0 & 360	11.25	A	N
11.25	22.5	33.75	B	NNE
33.75	45.0	56.25	C	NE
56.25	67.5	78.75	D	ENE
78.75	90.0	101.25	E	E
101.25	112.0	123.75	F	ESE
123.75	135.0	146.25	G	SE
146.25	157.0	168.75	H	SSE
168.75	180.0	191.25	J	S
191.25	202.5	213.75	K	SSW
213.75	225.0	236.25	L	SW
236.25	247.5	258.75	M	WSW
258.75	270.0	281.25	N	W
281.25	292.5	303.75	P	WNW
303.75	315.0	326.25	Q	NW
326.25	337.5	348.75	R	NNW

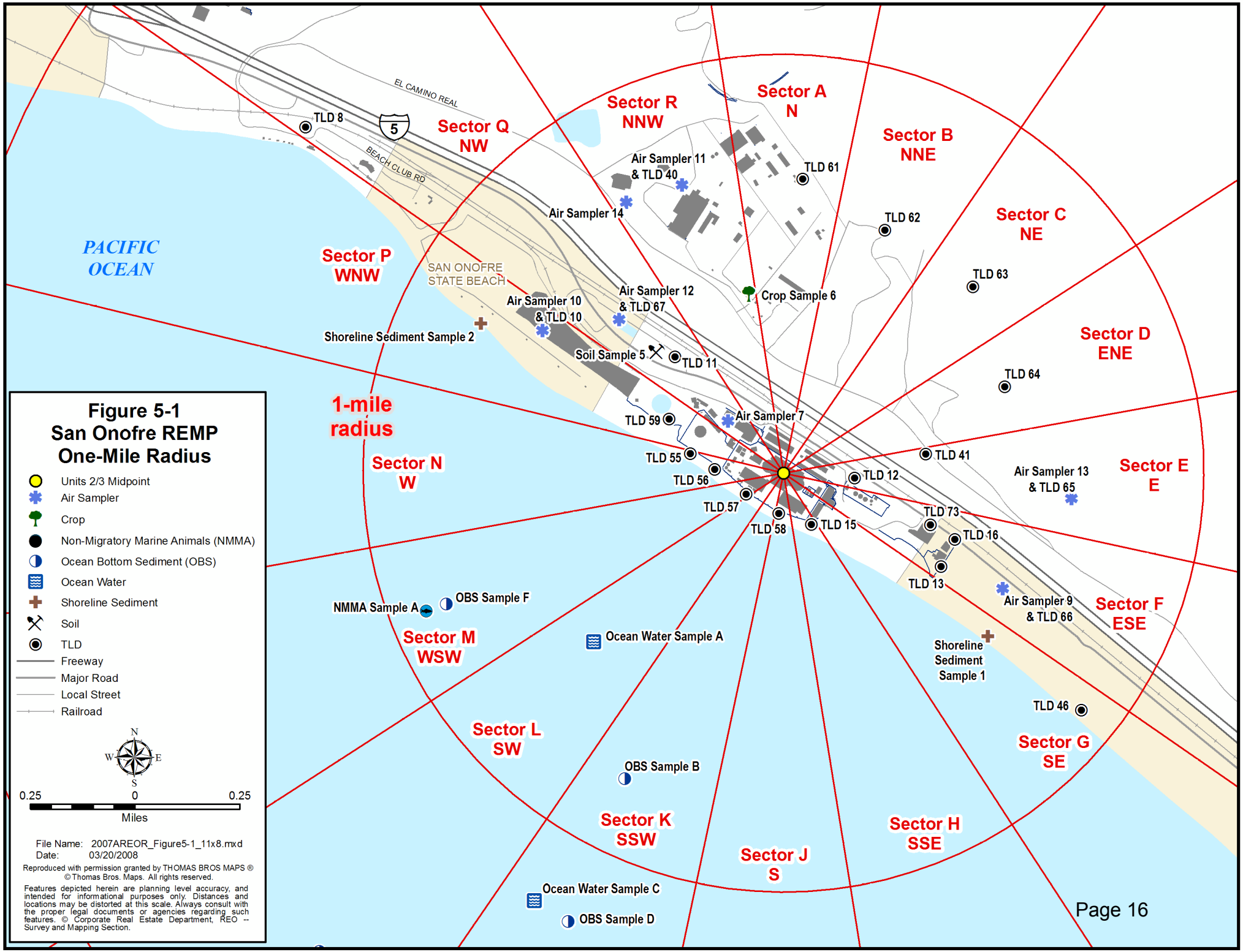
Figure 5-1
San Onofre REMP
One-Mile Radius
Units 2/3 Midpoint
Air Sampler
Crop
Non-Migratory Marine Animals (NMMA)
Ocean Bottom Sediment (OBS)
Ocean Water
Shoreline Sediment
Soil
TLD
Freeway
Major Road
Local Street
Railroad
N
W
E
S
0.25
0
0.25
Miles
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Date: 03/20/2008
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PACIFIC OCEAN
EL CAMINO REAL
BEACH CLUB RD
5
SAN ONOFRE STATE BEACH
1-mile radius
Sector A N
Sector B NNE
Sector C NE
Sector D ENE
Sector E E
Sector F ESE
Sector G SE
Sector H SSE
Sector J S
Sector K SSW
Sector L SW
Sector M WSW
Sector N W
Sector P WNW
Sector Q NW
Sector R NNW
TLD 8
TLD 61
TLD 62
TLD 63
TLD 64
TLD 41
TLD 12
TLD 73
TLD 16
TLD 13
TLD 15
TLD 58
TLD 57
TLD 56
TLD 55
TLD 59
TLD 11
TLD 46
Air Sampler 11 & TLD 40
Air Sampler 14
Air Sampler 12 & TLD 67
Air Sampler 10 & TLD 10
Air Sampler 7
Air Sampler 13 & TLD 65
Air Sampler 9 & TLD 66
Crop Sample 6
Soil Sample 5
Shoreline Sediment Sample 2
Shoreline Sediment Sample 1
NMMA Sample A
OBS Sample F
Ocean Water Sample A
OBS Sample B
Ocean Water Sample C
OBS Sample D

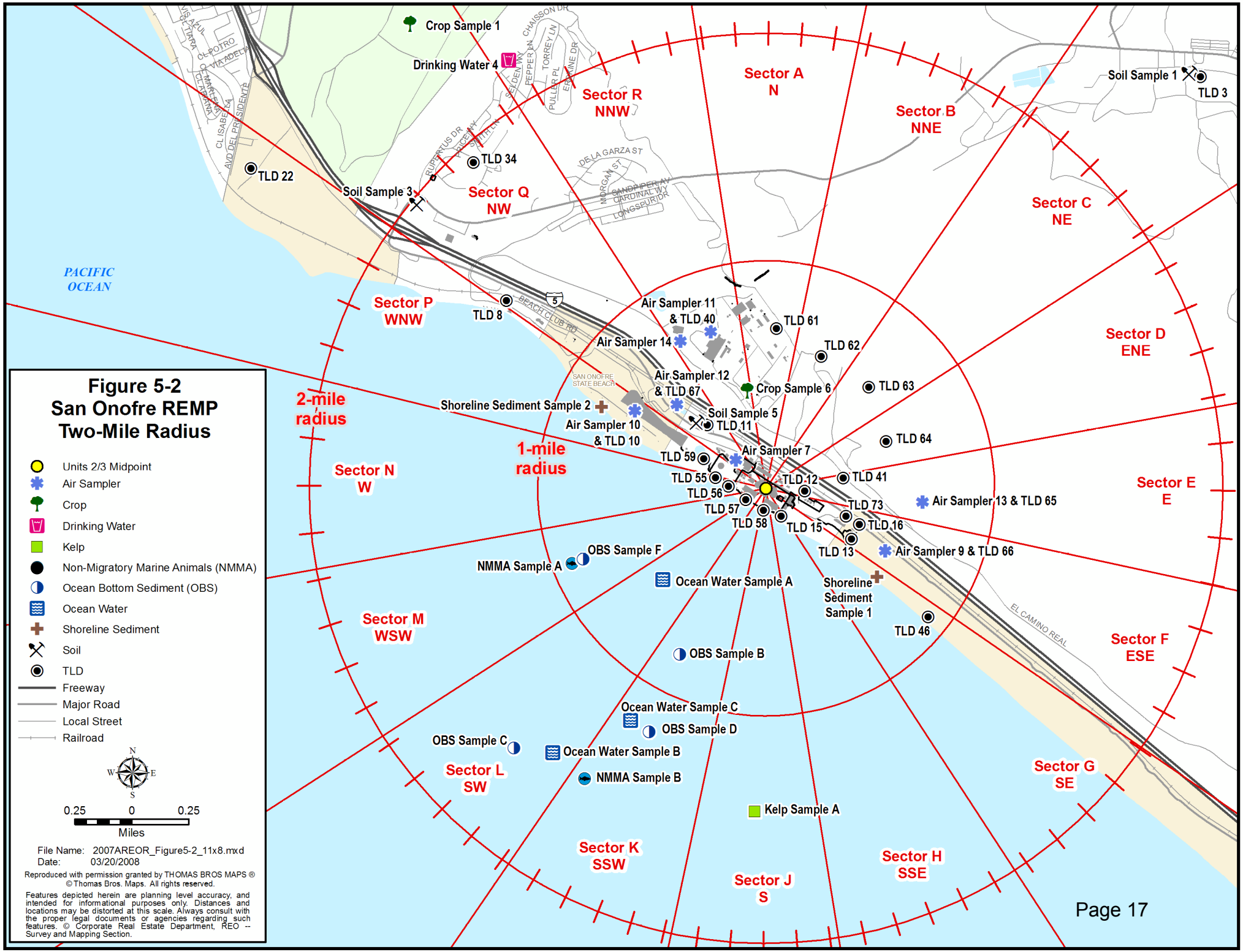
Figure 5-2
San Onofre REMP
Two-Mile Radius
Units 2/3 Midpoint
Air Sampler
Crop
Drinking Water
Kelp
Non-Migratory Marine Animals (NMMA)
Ocean Bottom Sediment (OBS)
Ocean Water
Shoreline Sediment
Soil
TLD
Freeway
Major Road
Local Street
Railroad
N
W
E
S
0.25
0
0.25
Miles
File Name: 2007AREOR_Figure5-2_11x8.mxd
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PACIFIC OCEAN
2-mile radius
1-mile radius
Sector A N
Sector B NNE
Sector C NE
Sector D ENE
Sector E E
Sector F ESE
Sector G SE
Sector H SSE
Sector J S
Sector K SSW
Sector L SW
Sector M WSW
Sector N W
Sector P WNW
Sector Q NW
Sector R NNW
Crop Sample 1
Drinking Water 4
Soil Sample 1
TLD 3
TLD 22
Soil Sample 3
TLD 34
TLD 8
Air Sampler 11 & TLD 40
TLD 61
Air Sampler 14
TLD 62
Air Sampler 12 & TLD 67
Crop Sample 6
TLD 63
Shoreline Sediment Sample 2
Soil Sample 5
Air Sampler 10 & TLD 10
TLD 11
TLD 64
TLD 59
Air Sampler 7
TLD 55
TLD 12
TLD 41
TLD 56
TLD 73
Air Sampler 13 & TLD 65
TLD 57
TLD 58
TLD 15
TLD 16
TLD 13
Air Sampler 9 & TLD 66
OBS Sample F
NMMA Sample A
Ocean Water Sample A
Shoreline Sediment Sample 1
TLD 46
OBS Sample B
Ocean Water Sample C
OBS Sample D
OBS Sample C
Ocean Water Sample B
NMMA Sample B
Kelp Sample A
SAN ONOFRE STATE BEACH
BEACH CLUB RD
EL CAMINO REAL
DE LA GARZA ST
MORGAN ST
SANDPIPER AV
CARDINAL WY
LONGSPUR DR
RUPERTUS DR
PRICE AV
SMITH LN
SALDEN WY
PEPPER LN
TORREY LN
PULLER PL
ERMINE DR
CHAISSON DR
CL POTRO
CL MARCELINA
CL CLARIANA
CL ISABELLA
AVD DEL PRESIDENTE
5

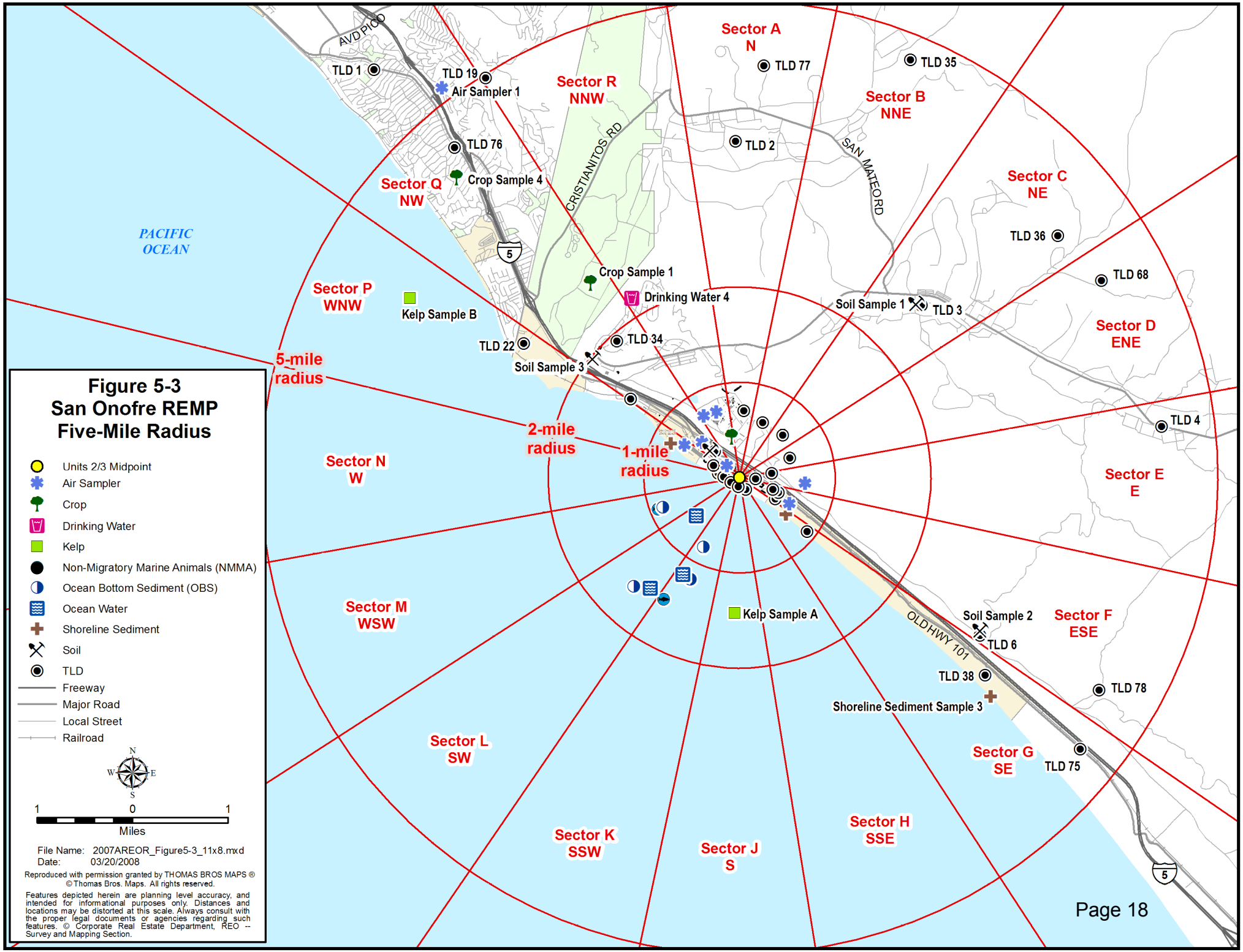
Figure 5-3
San Onofre REMP
Five-Mile Radius
Units 2/3 Midpoint
Air Sampler
Crop
Drinking Water
Kelp
Non-Migratory Marine Animals (NMMA)
Ocean Bottom Sediment (OBS)
Ocean Water
Shoreline Sediment
Soil
TLD
Freeway
Major Road
Local Street
Railroad
N
W
E
S
1
0
1
Miles
File Name: 2007AREOR_Figure5-3_11x8.mxd
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PACIFIC OCEAN
AVD PICO
CRISTIANITOS RD
SAN MATEO RD
OLD HWY 101
5
Sector A
N
Sector B
NNE
Sector C
NE
Sector D
ENE
Sector E
E
Sector F
ESE
Sector G
SE
Sector H
SSE
Sector J
S
Sector K
SSW
Sector L
SW
Sector M
WSW
Sector N
W
Sector P
WNW
Sector Q
NW
Sector R
NNW
5-mile radius
2-mile radius
1-mile radius
TLD 1
TLD 19
Air Sampler 1
TLD 76
Crop Sample 4
Crop Sample 1
Drinking Water 4
Kelp Sample B
TLD 22
TLD 34
Soil Sample 3
TLD 77
TLD 35
TLD 2
TLD 36
TLD 68
Soil Sample 1
TLD 3
TLD 4
Kelp Sample A
Soil Sample 2
TLD 6
TLD 38
Shoreline Sediment Sample 3
TLD 78
TLD 75

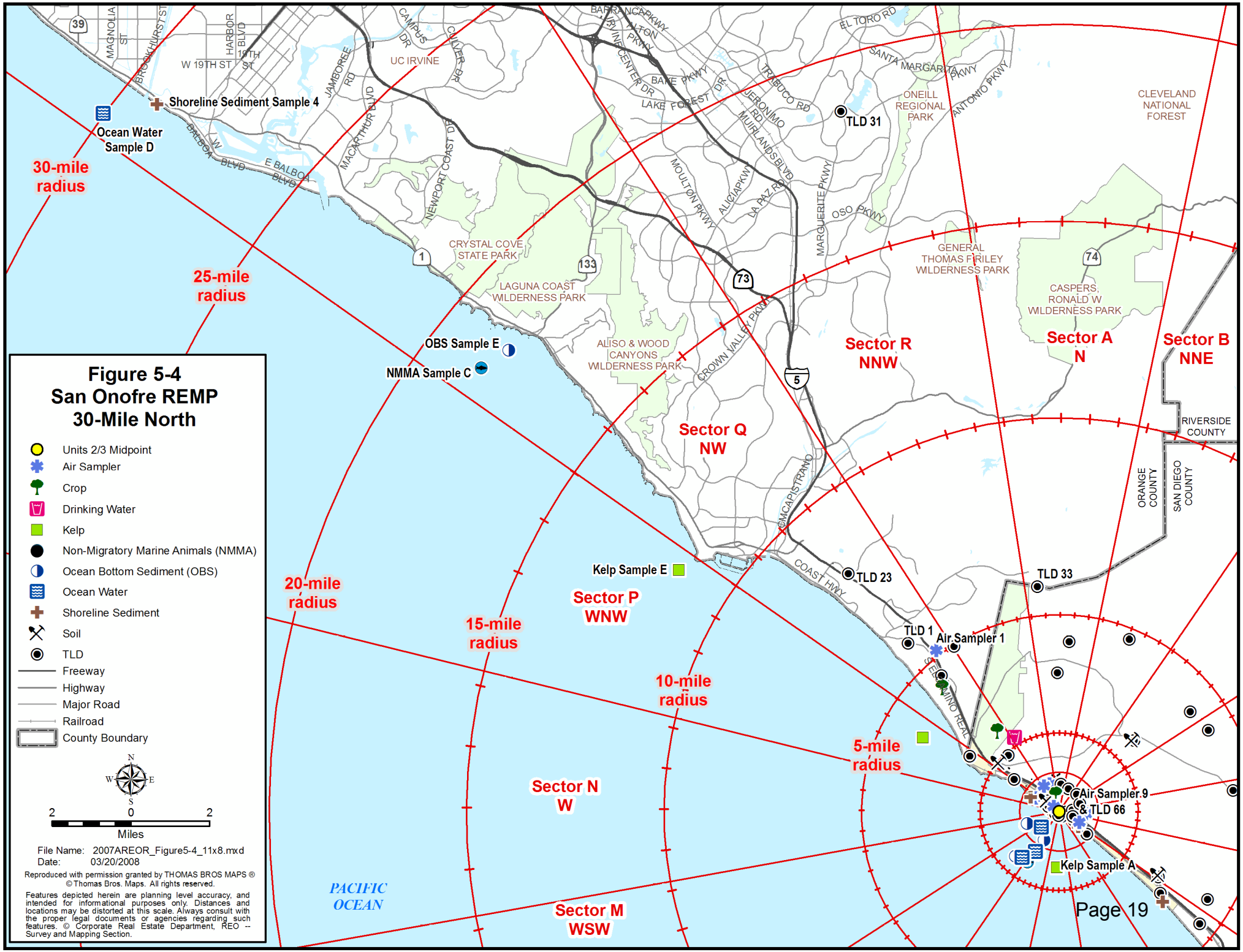
Figure 5-4
San Onofre REMP
30-Mile North
Units 2/3 Midpoint
Air Sampler
Crop
Drinking Water
Kelp
Non-Migratory Marine Animals (NMMA)
Ocean Bottom Sediment (OBS)
Ocean Water
Shoreline Sediment
Soil
TLD
Freeway
Highway
Major Road
Railroad
County Boundary
N
W
E
S
2
0
2
Miles
File Name: 2007AREOR_Figure5-4_11x8.mxd
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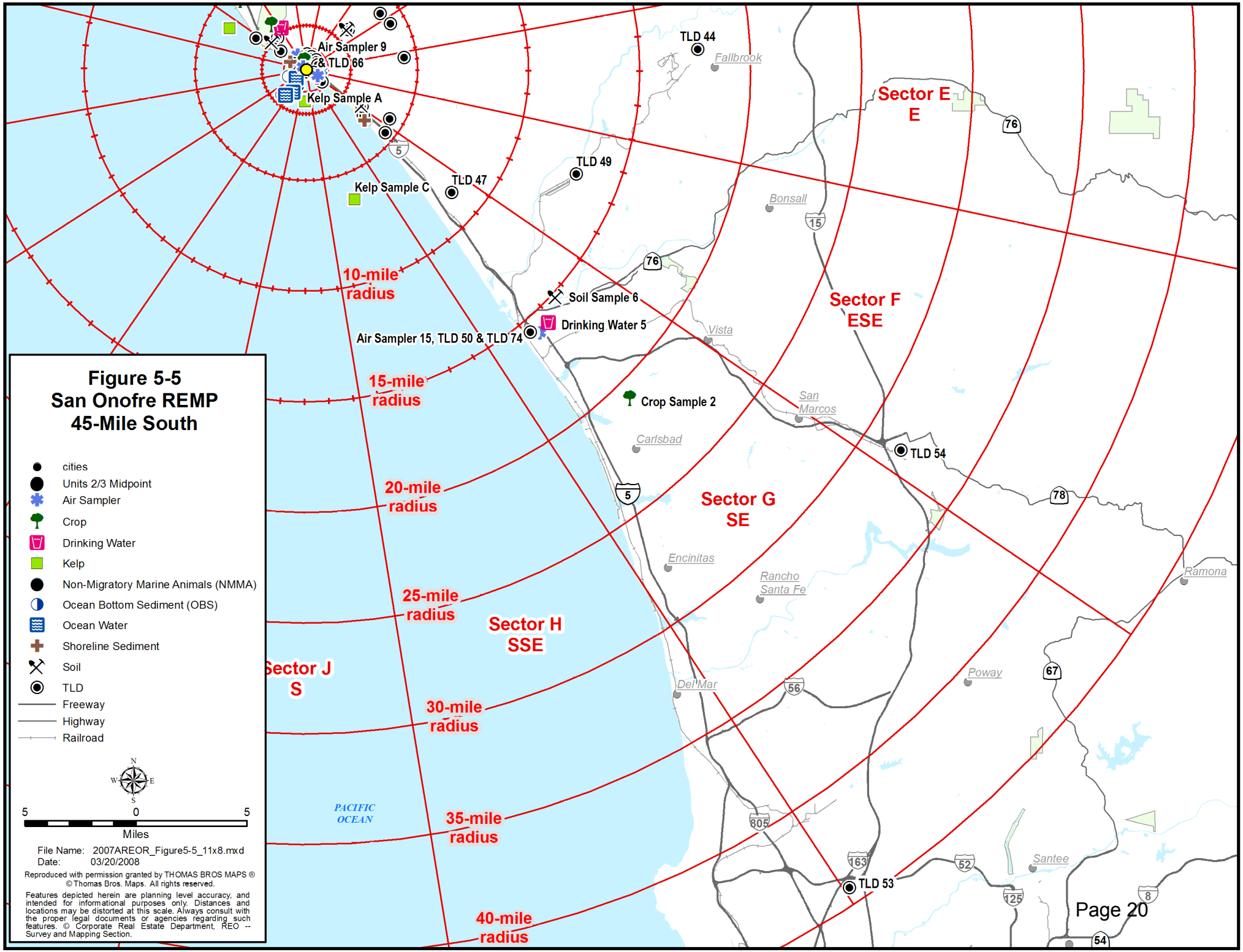
30-mile radius
25-mile radius
20-mile radius
15-mile radius
10-mile radius
5-mile radius
Sector N
W
Sector M
WSW
Sector P
WNW
Sector Q
NW
Sector R
NNW
Sector A
N
Sector B
NNE
PACIFIC OCEAN
Shoreline Sediment Sample 4
Ocean Water Sample D
OBS Sample E
NMMA Sample C
Kelp Sample E
Kelp Sample A
TLD 31
TLD 23
TLD 33
TLD 1
Air Sampler 1
Air Sampler 9
& TLD 66
UC IRVINE
CRYSTAL COVE STATE PARK
LAGUNA COAST WILDERNESS PARK
ALISO & WOOD CANYONS WILDERNESS PARK
ONEILL REGIONAL PARK
GENERAL THOMAS FRILEY WILDERNESS PARK
CASPERS, RONALD W WILDERNESS PARK
CLEVELAND NATIONAL FOREST
RIVERSIDE COUNTY
ORANGE COUNTY
SAN DIEGO COUNTY
COAST HWY
EL TORO RD
SANTA MARGARITA PKWY
ANTONIO PKWY
BAKE PKWY
LAKE FOREST DR
JERONIMO RD
MUIRLANDS BLVD
MARGUERITE PKWY
OSO PKWY
MOULTON PKWY
ALICIA PKWY
LA PAZ RD
CROWN VALLEY PKWY
CAPISTRANO
EL CAMINO REAL
NEWPORT COAST DR
MACARTHUR BLVD
JAMBOREE RD
CAMPUS DR
CULVER DR
W 19TH ST
19TH ST
HARBOR BLVD
MAGNOLIA ST
BROOKHURST ST
W BALBOA BLVD
E BALBOA BLVD
BALTICA
ALTON PKWY
BARRANCA PKWY
TRABUCO RD
39
1
133
73
5
74


Air Sampler 9
& TLD 66
Kelp Sample A
Kelp Sample C
TLD 47
TLD 49
TLD 44
Fallbrook
Bonsall
Soil Sample 6
Drinking Water 5
Air Sampler 15, TLD 50 & TLD 74
Vista
Crop Sample 2
San Marcos
Carlsbad
TLD 54
Encinitas
Rancho Santa Fe
Ramona
Del Mar
Poway
Santee
TLD 53
PACIFIC OCEAN
10-mile radius
15-mile radius
20-mile radius
25-mile radius
30-mile radius
35-mile radius
40-mile radius
Sector E
E
Sector F
ESE
Sector G
SE
Sector H
SSE
Sector J
S
Figure 5-5
San Onofre REMP
45-Mile South
cities
Units 2/3 Midpoint
Air Sampler
Crop
Drinking Water
Kelp
Non-Migratory Marine Animals (NMMA)
Ocean Bottom Sediment (OBS)
Ocean Water
Shoreline Sediment
Soil
TLD
Freeway
Highway
Railroad
N
W
E
S
5
0
5
Miles
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APPENDIX B

SUMMARY, RESULTS, AND DISCUSSIONS

OF 2007 ENVIRONMENTAL DATA

SUMMARY

To assess the changes or trends in the radioactivity level in the environment over the past year, the data from January 2007 to December 2007 were evaluated. The 2007 REMP data were evaluated according to the criteria described in NUREG/CR-4007 and with the methodology described by Currie (1968).* The REMP data above the critical level (1.64 times one sigma) for selected radionuclides, were reduced and tabulated in the Statistical Summary of REMP Data in accordance with the format specified in Reg. Guide 4.8. It should be noted that in an ideal database with the "true" value of each data point equal to zero, five (5)% of the values should be expected to be above the critical level. Excluding natural radionuclides (Be-7, K-40 and Th-228), approximately 5% of the data listed in the Statistical Summary of REMP Data are above the critical level. Thus the 2007 SONGS REMP database, when examined in accordance with the Currie data reduction protocol, leads to the conclusion that SONGS had no statistically significant radiological environmental impact. A summary of the type and number of REMP samples obtained in 2007 appears in Table B-2.

As noted above, the SONGS REMP data base behaves substantially similar to a data base with values statistically indistinguishable from zero for station related isotopes. The exceptions, summarized in Table B-1, include seven (7) isotopically analyzed samples with station related activity reported above the *a posteriori* MDC. All sample values were significantly less than the NRC reporting levels. I-131 was detected in kelp and Cs-137 was detected in soil. These radionuclides have been detected in control as well as indicator locations in previous years. Cs-137 is commonly detected in environmental sediment samples because of fallout from weapons testing. Cs-137 has been intermittently detected in the indicator and in the control soil samples in past years and no correlation between Cs-137 level in soil and proximity to the plant has been observed. The data strongly suggest that the low level Cs-137 in certain soil samples is due to fallout from nuclear weapons testing and from Chernobyl. We conclude that the low level Cs-137 in soil is not due to the operation of SONGS. I-131 is a medically administered radionuclide which is often detected in sewage plant outfalls, including those routed to the Pacific Ocean. I-131 has been detected in control and indicator kelp samples, suggesting that the source of the I-131 is external to SONGS. See Table B-1 for data. We conclude that SONGS had a negligible radiological environmental impact during 2007.

Historical trending of data near and below the detection limits is necessarily limited. The concentration of radionuclides in the environs of SONGS has trended downward since the early to mid 1980s. In the past decade only a few REMP analysis results have been above the detection limit. These isotopes are detected in control as well as indicator locations and there are known sources for these radionuclides external to SONGS. The overall trend of the REMP data at SONGS is *de minimis* levels of anthropogenic radioactivity with occasional samples showing radioactivity above the *a posteriori* MDC.

* L. Currie. 1968 "Limits for the Qualitative Detection and Quantitative Determination - Application to Radiochemistry," Analytical Chemistry, vol. 40 pp. 586-593

RESULTS AND DISCUSSIONS OF 2007 ENVIRONMENTAL DATA

A. Direct Radiation

The purpose of this program element was to measure the quarterly environmental gamma radiation in the vicinity of SONGS. To accomplish this task, calcium sulfate ($CaSO_4$) thermoluminescent dosimeters (TLDs) were placed at 38 indicator and 11 control locations. They were collected and analyzed quarterly in accordance with ANSI-N545 standards. TLDs within five miles of SONGS were considered indicator locations. TLDs located greater than five miles from SONGS were considered control locations. The indicator locations are selected as inner and outer rings as required by the SONGS Offsite Dose Calculation Manual (ODCMs). Additional TLDs are placed at locations of interest such as schools and hospitals.

Six laboratory control TLDs were analyzed quarterly. TLD numbers 17, 18, and 60 are used for background dose normalization. TLDs #A and #B are used to compensate for transit dose. A fader TLD is used to evaluate for the time and temperature dependent "fade" that may affect dosimeter data.

After the samples were analyzed, the measured doses were corrected for pre and post field exposure times. The average indicator location dose was 16.90 mR with a range of 10.37 to 32.85 mR. The average control location dose was 15.80 mR with a range of 12.62 to 21.17 mR. The routine 2007 REMP TLD data has been grouped into four categories based on distance from SONGS for the purposes of trending any correlation between distance from SONGS and total annual dose.

2007 REMP TLD data (Average Dose vs. Distance from SONGS)

	Average Quarterly Dose in mR
TLDs ≤ 0.5 miles from SONGS	19.28
TLDs > 0.5 miles AND ≤ 1.0 mile from SONGS	14.70
TLDs > 1.0 mile AND ≤ 5.0 miles from SONGS	16.48
TLDs > 5 miles from SONGS (Control TLDs)	15.80

These data indicate no correlation between total dose and distance from SONGS. The variations in the average dose is approximately equal to the median two sigma variation of measurement (1.7 mR per quarter). Statistically, the control and indicator doses are the same value. The routine indicator location at the South Yard Facility (0.4 miles ESE from the Units 2/3 midpoint) had the highest TLD average in 2007. The operation of SONGS had no impact on the environment as measured by this sample medium.

Figure 2A compares environmental radiation levels of indicator and control locations for the operational year 2007 and for previous years. This figure shows the close correlation between the control and indicator location TLD dose data.

Quality Control Duplicate Direct Radiation Samples
Duplicate QC TLDs were installed adjacent to TLD #66 and TLD #67. Refer to Appendix C for results. These TLDs were not required by the ODCM and are not included in the Statistical Summary of REMP Data.

ISFSI Direct Radiation Samples
ISFSI (Independent Spent Fuel Storage Installation) TLDs were deployed in the vicinity of the ISFSI. Data from these TLDs have not been included in the statistical summary of REMP data since these TLDs are not required by the ODCM. The ISFSI data are listed and discussed in Appendix J.

B. Airborne Particulate, Iodine, and Composite Isotopic Analyses

Air particulate samples were collected on a weekly basis from eight indicator locations and from one control location. The samples were analyzed for gross beta activity, I-131, and composited quarterly for gamma isotopic analysis. Sample locations were selected according to the requirements of the Unit 1 and Units 2/3 Offsite Dose Calculation Manuals.

Gross beta analysis is a measure of total radioactivity of beta-emitting radionuclides in a sample. Beta radiation is emitted by many radionuclides, but beta decay gives a continuous energy spectrum rather than the discrete lines or peaks associated with gamma radiation. Gross beta measurements only indicate whether the sample contains normal or abnormal concentrations of beta-emitting radionuclides and does not identify specific radionuclides. Gross beta measurement data serves as a screening tool to determine if further analysis is required.

Nearly all gross beta activity analysis results were above the *a posteriori* MDC. The concentration of gross beta activity in the samples collected from the indicator locations ranged from 0.0084-0.0631 pCi/m^3, averaging 0.0264 pCi/m^3 of air. The concentrations of gross beta activity in the samples from the control location ranged from 0.0109 to 0.0592 pCi/m^3, averaging 0.0263 pCi/m^3 of air. Figure 3D shows the variation in gross beta activity level in 2007 at different locations. This graph show a close correlation between the indicator and control location data.

Per the requirements of the SONGS ODCM, Section 5, Table 5.1, an assessment was performed to determine whether the gross beta activity of the indicators exceeded 10 times the background (control location #15). The results showed that indicator locations maximum gross beta activity in air in 2007 was 0.0517 pCi/m^3 and the 2006 control location average was 0.0235 pCi/m^3. No action was taken since no indicator location value exceeded ten times the annual average gross beta activity of the control location data from the previous year.

All samples analyzed for I-131 were less than the *a posteriori* MDC and all I-131 samples were less than the *a priori* lower limit of detection (LLD). The airborne indicator and control I-131 REMP samples taken in 2007 at SONGS were statistically indistinguishable from zero.

No samples yielded station related isotopic results confirmed above the *a posteriori* MDC. Quarterly composite gamma spectral analysis analyses yielded only naturally occurring beryllium-7 (Be-7) above the *a posteriori* MDC.

We conclude that the operation of SONGS had no impact on the environment as measured by this sample medium.

C. Ocean Water

Monthly ocean water samples were collected from indicator locations in the vicinity of each station discharge and from the control location at Newport Beach. The samples were analyzed for naturally-occurring and SONGS-related gamma-emitting radionuclides. Quarterly composite ocean water samples were analyzed for tritium according to ODCM requirements.

Four non-ODCM ocean water samples were obtained from two locations, Unit 2 outfall conduit and Unit 3 outfall conduit. The conduit samples were collected to measure the radiological environmental effect potentially resulting from the minor conduit leakage. The conduit sample results are included in the statistical summary.

Throughout 2007, only naturally occurring K-40 was detected in the monthly gamma spectral analyses of ocean water. No station related radionuclides were detected above the *a posteriori* MDC in this sample type during 2007.

Naturally occurring potassium-40 (K-40) was detected in all ocean water samples obtained in 2007. No SONGS related radionuclides were detected in this sample medium during 2007. Excluding K-40, the ocean water gamma isotopic database is statistically indistinguishable from a database with zero activity.

The data indicate that the operation of SONGS had no impact on the environment as measured by this sample medium.

D. Drinking Water

In 2007, drinking water samples were collected on a monthly basis from one indicator location and from the Oceanside control location. Samples were analyzed for tritium, gross beta, and 26 naturally-occurring and SONGS-related gamma emitting radionuclides. There is no drinking water pathway for liquid effluent at SONGS.

No station related radionuclides were detected in drinking water during 2007. The gross beta activity is due to naturally occurring radionuclides. The drinking water gamma isotopic database is statistically indistinguishable from a database with zero activity. The operation of SONGS had no impact on this sample medium.

E. Shoreline Sediment (Beach Sand)

Beach sand was collected semiannually in 2007 from three indicator locations and from a control location situated in Newport Beach. After collection, the samples were analyzed for 26 different plant-related and naturally-occurring radionuclides. Only naturally occurring K-40 and thorium-228 (Th-228) were detected. No plant related radionuclides were reported above the *a posteriori* MDC. The operation of SONGS had no impact on the environment as measured by this sample medium.

F. Ocean Bottom Sediments

Ocean bottom sediments were collected in the vicinity of each of the three SONGS discharge locations and at the Newport Beach control location. The samples were analyzed by gamma-spectral analysis for 26 naturally-occurring and station-related radionuclides. K-40 and Th-228 were detected in all ocean bottom sediment samples collected during 2007.

Four non-ODCM ocean bottom sediment samples were obtained from two locations, Unit 2 outfall conduit and Unit 3 outfall conduit. The conduit samples were collected to measure the radiological environmental effect potentially resulting from the minor conduit leakage. During 2007, all the conduit sample analysis results were below the MDC for station related radionuclides.

We conclude that the operation of SONGS had no significant impact on the environment as measured by this sample medium.

G. Non-Migratory Marine Species (Flesh)

Species of adult fish, crustacea and mollusks, were collected on a semi annual basis at the SONGS Unit l outfall, the SONGS Units 2/3 outfall and from Laguna Beach control location. The flesh portion of each sample type was analyzed for 26 gamma-emitting station-related and naturally occurring radionuclides. The results were subsequently reported to Edison in terms of wet sample weights. Because results based on a wet sample weight are most useful for calculating doses, the results of sample analyses are summarized in terms of "as received" wet weights.

No plant related radionuclides were confirmed above the *a posteriori* MDC.

Naturally-occurring K-40 was detected in most marine species samples collected during 2007. No plant related isotopes were reported above the *a posteriori* MDC. The operation of SONGS had no impact on the environment as measured by this sample medium. The potential dose to members of the public from consumption of marine species near SONGS is negligible.

H. Local Crops

Fleshy and leafy crops were collected semiannually in 2007 from the SONGS garden and from the control location 21 miles from SONGS Units 2/3 midpoint in sector F. The crop samples were analyzed quantitatively for 26 gamma-emitting radionuclides, both natural and plant related. Only naturally occurring radionuclides were detected. SONGS had no measurable impact on this sample medium.

I. Soil

To determine if there is evidence of a build-up of radionuclides in the land near SONGS, indicator soil samples were collected from the East Site Boundary (Former Visitor's center), Old Route 101, Basilone Road, and Camp San Onofre. A control sample was obtained from Oceanside. Surface soil was collected from all indicator and control locations at the depth of

3 inches. The sampling protocol is consistent with the procedure described in HASL-300. Soil sampling is not required by ODCMs.

Soil samples were analyzed for 26 naturally-occurring and SONGS-related gamma-emitting radionuclides using gamma spectral analysis. All 2007 soil samples yielded naturally occurring K-40 and Th-228. Cs-137, above the *a posteriori* MDC, was detected in three indicator samples, as well as the control sample. Cs-137 is often detected in environmental sediment samples and the presence of Cs-137 is most likely related to nuclear weapons testing fallout.

Cs-137 and strontium-90 (Sr-90) were detected in soil profile analyses conducted in previous years. These radionuclides are mostly due to the nuclear weapons testing fallout depositing on soil and retention of these radionuclides due to their long half lives. The presence of Cs-137 in the indicator and the control locations in previous years supports the conclusion that the major source of this radionuclide is fallout deposition. The Cs-137 activity can be attributed to atmospheric nuclear weapons tests and not SONGS operations. During 2007, the operation of SONGS had no impact on the environment as measured by this sample medium.

J. Kelp Sampling

Kelp was collected during April and October 2007 from the San Onofre kelp beds, San Mateo kelp beds, Barn kelp beds, and from the Salt Creek control location. Upon collection, the samples were analyzed by gamma-spectral analysis for 26 different naturally-occurring and Station-related radionuclides. The radionuclides detected in 2007 were, K-40 and I-131. K-40 is naturally occurring and not related to the operation of SONGS. I-131 was detected in one control sample and two indicator samples. I-131 is often detected in Sewage Plant outfalls, including those routed to the Pacific Ocean.

I-131 has been detected at indicator and control locations in previous years. The northern control location is too far away and in the predominantly upstream current direction for the I-131 activity to be attributable to SONGS. The presence of low levels of I-131 in both the indicator and the control locations suggest a source which is external to SONGS. The I-131 activity in kelp data, graphically presented in Figure 4, shows a relatively close correlation between indicator and control locations over a 25 year period - further supporting the assessment that the likely source for this radionuclide is external to SONGS.

K. Correlation of Effluent Concentrations to Concentrations in the Environment

In accordance with 10 CFR 50 Appendix I, a correlation study was generated to estimate the environmental concentration of selected radionuclides using the methodology outlines in Reg. Guide 1.109 and basing the projected environmental concentrations on actual SONGS effluent data. The predicted environmental concentrations of the radionuclides listed in the ODCM Table 5-3 for all ODCM identified environmental media are much less than the associated environmental *a priori* LLD and the lower, count specific, *a posteriori* MDC. With two exceptions, the measured concentrations of these radionuclides are also less than the *a posteriori* MDC. The exceptions are Cs-137 in soil and I-131 in Kelp.

The REMP soil Cs-137 levels in the control and indicator samples are about equal which leads to the conclusion that Cs-137 in soil is attributable to residual fallout from external anthropogenic factors such as nuclear weapons testing and Chernobyl. The predicted concentration for Cs-137 in soil (based on effluent data) is about 2 to 3 orders of magnitude lower than the measured concentration of Cs-137 in soil. The effluent based correlation calculation indicates that even if there were no Cs-137 in soil from sources external to SONGS, the Cs-137 concentration in soil attributable to the operation of SONGS would be undetectable.

The SONGS REMP indicator and control kelp samples have historically contained equal concentrations of I-131. The I-131 concentration in the control kelp sample location, approximately twelve (12) miles from SONGS in the predominantly upstream direction, has historically been slightly higher than the indicator locations. Kelp has a very large biomagnification factor and can concentrate very low concentrations of I-131 in ocean water to detectable I-131 levels in kelp. The SONGS I-131 liquid effluent release data are too low to account for the I-131 in Kelp at the indicator and control locations. We conclude that the I-131 in Kelp is probably attributable to sewage treatment plant discharges in the predominantly upstream direction, near the kelp control location.

TABLE B-1

Summary of SONGS related Gamma Isotopic Analyses confirmed above MDC

Sample Media & location	Radionuclide	Sample Value	MDC (*a posteriori*)
Aquatic Kelp San Onofre Kelp Bed Station A 17APR07	I-131	(83 ± 24) E-3 pCi/g	30 E-3 pCi/g
Aquatic Kelp Barn Kelp Bed Station C 17APR07	I-131	(38 ± 19) E-3 pCi/g	26 E-3 pCi/g
Aquatic Kelp Salt Creek (Control) Station E 17APR07	I-131	(35 ± 20) E-3 pCi/g	29 E-3 pCi/g
Soil Camp San Onofre Location # 1 17SEP07	Cs-137	(133 ± 28) E-3 pCi/g	35 E-3 pCi/g
Soil Old El Camino Real Location #2 17SEP07	Cs-137	(67 ± 16) E-3 pCi/g	20 E-3 pCi/g
Soil Basilone Road Location # 3 17SEP07	Cs-137	(19 ± 11) E-3 pCi/g	17 E-3 pCi/g
Soil Oceanside Control Location #6 17SEP07	Cs-137	(132 ± 17) E-3 pCi/g	14 E-3 pCi/g

TABLE B-2

REMP SAMPLE ANALYSIS SUMMARY FOR 2007

Medium	Analysis Type	Sampling Frequency	# of Locations	Total # of Analyses in 2007
[1] Direct Radiation	Dosimetry	Quarterly	49	194
[2, 3] Airborne Particulates	Gross Beta	Weekly	10	475
[2, 3] Charcoal Cartridge	I-131	Weekly	10	470
Airborne Particulates	Ge (Li) Scan	Quarterly	10	37
Ocean Water	Ge (Li) Scan	Monthly	4	48
Ocean Water	H-3	Quarterly	4	16
Ocean Water Conduit	Ge (Li) Scan	Semi-Annually	2	4
[4] Drinking Water, Unfiltered	Ge (Li) Scan H-3 Gross Beta	Monthly	3 3 3	36 36 36
Shoreline Sediment	Ge (Li) Scan	Semi-Annually	4	8
Ocean Bottom Sediment	Ge (Li) Scan	Semi-Annually	7	14
Marine Species, Flesh	Ge (Li) Scan	Semi-Annually	3	30
Crops	Ge (Li) Scan	Semi-Annually	2	8
Kelp	Ge (Li) Scan	Semi-Annually	4	5
Soil	Ge (Li) Scan	Annually	5	5

1. Two (2) TLDs were missing in 2007. See Appendix E for details.
2. Includes location # 30 compensatory air sampler for fire damaged # 13
3. As per SONGS REMP air sampling procedure additional particulate samples were collected during the October wildfires. No additional I-131 samples were collected. See Appendix E for discussion.
4. The total number of analyses include data from drinking water well #6, San Clemente.

STATISTICAL SUMMARY OF REMP DATA FOR 2007

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Quarterly Gamma Exposure – Table 1A (mR/std quarter)							
	Gamma 194	5	16.90 (151/151) (10.37 – 32.85)	South Yard Facility, 0-4, ESE	28.96 (4/4) (24.77 – 32.85)	15.80 (43/43) (12.62 – 21.17)	

(1) Indicator location TLDs include all REMP TLDs 5.0 miles or closer to SONGS 2/3 midpoint.
(2) Control location TLDs include all REMP TLDs more than 5.0 miles from SONGS 2/3 midpoint.
(3) TLD data excludes QC TLDs, transit dose TLDs, and ISFSI TLDs.

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Weekly Airborne Particulates Gross Beta Activity – Table 2 (pCi/cu.m)							
	Gross Beta 475	0.01	0.0264 (423/423) (0.0084 – 0.0631)	AP-30 (AP13 backup) 0.2 Mi. E	0.0384 (10/10) (0.0181 – 0.0583)	0.0263 (52/52) (0.0109 – 0.0592)	0

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Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)	Control Locations Mean (Range)	Number of Nonroutine Reported Measurements
Weekly Radioiodine I-131 Activity – Table 3 (pCi/cu.m)							
	I-131 470	0.07	0.0215 (24/418) (0.0110 – 0.0350)	Bluff 0.7 Mi. WNW	0.0300 (1/52) (0.0300 – 0.0300)	0.0163 (4/52) (0.0140 – 0.0190)	0

This table summarizes the weekly air iodine 131 cartridge data above the critical level (1.64 x One Sigma). Note that in an ideal gamma isotopic database, consisting entirely of sample values with no detectable radioactivity, approximately 5% of the data will be greater than the critical level. In 2007, all weekly iodine 131 cartridge analysis results were less than the *a posteriori* MDC (Minimum Detectable Concentration).

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Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)	Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)	Control Locations Mean (Range)	Number of Nonroutine Reported Measurements
Quarterly Comp. Airborne Particulates Gamma – Table 4A (pCi/cu.m)								
	Be-7	37	0.04	0.13 (33/33) (0.0530 – 0.023)	Substitute (AP13 backup) 0.2 Mi. E	0.15 (1/1) (0.15 – 0.15)	0.12 (4/4) (0.0860 – 0.17)	0
	Cs-134	37	0.05	6.00E-4 (1/33) (6.00E-4 – 6.00E-4)	AWS Roof parking 0.18 Mi. NW	6.00E-4 (1/4) (6.00E-4 – 6.00E-4)	< LLD (0/4) (-)	0
	Cs-137	37	0.06	4.85E-4 (4/33) (3.10E-4 – 8.20E-4)	AWS Roof parking 0.18 Mi. NW	8.20E-4 (1/4) (8.20E-4 – 8.20E-4)	<LLD (0/4) (-)	0

Be-7 (Beryllium 7) is a naturally occurring radioactive isotope produced by cosmic radiation. Be-7 was confirmed above the detection limit in all the SONGS air particulate quarterly composite samples analyzed in 2007. All other air particulate quarterly composite analysis results were less than the detection limit.

The term "< LLD," as used above, means that all results were less than the critical level (1.64 x One Sigma). The critical level is used to determine if a bias exists in the database and is not used to determine if a particular sample result should be considered other than background. The numerical values for Cs-134 (Cesium-134) and Cs-137 (Cesium-137) listed in this table are those values above the critical level and do not indicate that these radionuclides were detected in any samples.

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Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Monthly Ocean Water Gamma Spectral Analysis – Table 5 (pCi/l)											
	Ba-140	52	15	4.10 (3.90 – 4.30)	(2/40)	(B) Outfall – Unit 2 1.5 Mi SW	4.30 (4.30 – 4.30)	(1/12)	< LLD (-)	(0/12)	0
	Co-58	52	15	2.50 (2.50-2.50)	(1/40)	(C) Outfall -Unit 3 1.2 Mi. SSW	2.50 (2.50 – 2.50)	(1/12)	< LLD (-)	(0/12)	0
	Co-60	52	15	4.40 (4.40 – 4.40)	(1/40)	(B) Outfall – Unit 2 1.5 Mi. SW	4.40 (4.40 – 4.40)	(1/12)	< LLD (-)	(0/12)	0
	Cs-134	52	15	3.60 (2.70 – 4.50)	(2/40)	(C) Outfall - Unit 3 1.2 Mi. SSW	3.60 (2.70 – 4.50)	(2/12)	2.90 (2.90 – 2.90)	(1/12)	0
	Cs-137	52	18	3.05 (2.50 – 3.60)	(2/40)	(A) Station discharge Outfall – Unit 1 0.6 Mi. SW	3.05 (2.50 – 3.60)	(2/2)	< LLD (-)	(0/12)	0
	Fe-59	52	30	6.75 (5.40-8.10)	(2/40)	(A) Station discharge Outfall – Unit 1 0.6 Mi. SW	6.75 (5.40-8.10)	(2/12)	4.60 (4.60-4.60)	(1/12)	0
	I-131	52	15	7.96 (5.50 – 11.90)	(5/40)	(B) Outfall – Unit 2 1.5 Mi. SW	10.00 (8.10 – 11.90)	(2/12)	7.30 (7.30 – 7.30)	(1/12)	0
	K-40	52	150	326.35 (262.00 – 415.00)	(40/40)	Unit 3 Conduit 0.1 Mi. SSW	354.50 (316.00 - 393.00)	(2/2)	313.08 (240.00 – 351.00)	(12/12)	0

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Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Monthly Ocean Water Gamma Spectral Analysis – Table 5 (pCi/l)											
	La-140	52	15	4.75 (4.50 – 5.00)	(2/40)	(B) Outfall - Unit 2 1.5 Mi. SW	5.00 (5.00 – 5.00)	(1/12)	< LLD (-)	(0/12)	0
	Mn-54	52	15	3.58 (2.80 – 4.40)	(4/40)	(B) Outfall – Unit 2 1.5 Mi. SW	3.83 (3.20 – 4.40)	(3/12)	1.50 (1.50 – 1.50)	(1/12)	0
	Nb-95	52	15	< LLD (-)	(0/40)		---- (-)	(0/2)	< LLD (-)	(0/12)	0
	Zn-65	52	30	< LLD (-)	(0/40)		---- (-)	(0/2)	< LLD (-)	(0/12)	0
	Zr-95	52	15	5.13 (4.90 – 5.40)	(3/40)	(B) Outfall - Unit 2 1.5 Mi SW	5.40 (5.40 – 5.40)	(1/12)	3.10 (3.10-3.10)	(1/12)	0

The naturally occurring radioactive isotope K-40 (Potassium 40) was detected in all SONGS Ocean water samples analyzed in 2007. The analysis results for all other radionuclides were less than the detection limit.

The term "< LLD," as used above, means that all results were less than the critical level (1.64 x One Sigma). The critical level is used to determine if a bias exists in the database and is not used to determine if a particular sample result should be considered other than background. The numerical values listed in this table are those values above the critical level and do not indicate that these radionuclides were detected in any samples.

This table is a statistical summary of the radionuclides detected in 2007 (K-40) and the radionuclides listed in the ODCM (Offsite Dose Calculation Manual).

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Quarterly Composite Ocean Water Tritium Activity – Table 7 (pCi/l)									
	H-3	16	2000	< LLD (-)	(0/12)	---- (-)	(0/4)	< LLD (-)	(0/4)	0

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Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Monthly Drinking Water Analysis – Table 9A (pCi/l)											
	Ba-140	36	15	< LLD (-)	(0/24)		---- (-)	(0/12)	< LLD (-)	(0/12)	0
	Co-58	36	15	< LLD (-)	(0/24)		---- (-)	(0/12)	< LLD (-)	(0/12)	0
	Co-60	36	15	3.20 (3.20 – 3.20)	(1/24)	San Clemente Golf Course Well 3.3 Mi. NW	3.20 (3.20 – 3.20)	(1/12)	3.00 (3.00 – 3.00)	(1/12)	0
	Cs-134	36	15	< LLD (-)	(0/24)	Oceanside (Control) 15.6 Mi. SE	3.17 (2.70 – 3.80)	(3/12)	3.17 (2.70 – 3.80)	(3/12)	0
	Cs-137	36	18	< LLD (-)	(0/24)		---- (–)	(0/12)	< LLD (-)	(0/12)	0
	Fe-59	36	30	< LLD (-)	(0/24)	Oceanside (Control) 15.6 Mi. SE	6.90 (6.90 – 6.90)	(1/12)	6.90 (6.90 – 6.90)	(1/12)	0
	Gross Beta	36	4	5.66 (2.00 – 8.90)	(24/24)	Oceanside (Control) 15.6 Mi SE	7.05 (2.70 – 9.40)	(12/12)	7.05 (2.70 – 9.40)	(12/12)	0
	H-3	36	2000	< LLD (-)	(0/24)		---- (–)	(0/12)	< LLD (–)	(0/12)	0
	I-131	36	15	4.80 (4.80 – 4.80)	(1/24)	Oceanside (Control) 15.6 Mi SE	8.50 (8.50 – 8.50)	(1/12)	8.50 (8.50 – 8.50)	(1/12)	0

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Monthly Drinking Water Analysis – Table 9A (pCi/l)											
	La-140	36	15	< LLD (-)	(0/24)		---- (-)	(0/12)	< LLD (-)	(0/12)	0
	Mn-54	36	15	3.60 (3.60 – 3.60)	(1/24)	San Clemente Golf Course Well 3.3 Mi. NW	3.60 (3.60 – 3.60)	(1/12)	< LLD (-)	(0/12)	0
	Nb-95	36	15	2.10 (2.10 – 2.10)	(1/24)	Oceanside (Control) 15.6 Mi. SE	3.90 (3.90 – 3.90)	(1/12)	3.90 (3.90 – 3.90)	(1/12)	0
	Zn-65	36	30	18.00 (18.00 – 18.00)	(1/24)	Camp Pendleton 2.2 Mi. NNW	18.00 (18.00 – 18.00)	(1/12)	< LLD (-)	(0/12)	0

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Monthly Drinking Water Analysis – Table 9A (pCi/l)											
	Zr-95	36	15	5.20 (5.20 – 5.20)	(1/24)	Oceanside (Control) 15.6 Mi. SE	6.80 (6.80 – 6.80)	(1/12)	6.80 (6.80 – 6.80)	(1/12)	0

During 2007 gross beta was confirmed above the *a posteriori* MDC in most drinking water samples. Gross beta is attributable to naturally occurring radionuclides. All the other analysis results were less than detectable.

The term "< LLD," as used above, means that all results were less than the critical level (1.64 x One Sigma). The critical level is used to determine if a bias exists in the database and is not used to determine if a particular sample result should be considered other than background. The numerical values listed in this table are those values above the critical level and do not indicate that these radionuclides were detected in any samples.

This table is a statistical summary of the analysis results confirmed above the *a posteriori* MDC in 2007 (Gross Beta) as well as those radionuclides listed in the ODCM (Offsite Dose Calculation Manual).

Starting in October 2006 San Clemente Well # 6 was sampled and analyzed as a courtesy to the City of San Clemente. This table includes the City of San Clemente drinking water analysis results.

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Semi-annual Shoreline Sediment Gamma Spectral Analysis – Table 10 (pCi/g)											
	Cs-134	8	0.15	<LLD (-)	(0/6)		--- (-)	(0/2)	<LLD (-)	(0/2)	0
	Cs-137	8	0.18	< LLD (–)	(0/6)		---- (–)	(0/2)	<LLD (-)	(0/2)	0
	K-40	8	1.5	12.63 (9.12 - 15.70)	(6/6)	Newport Beach North End 29.2 Mi. NW	16.62 (16.19 – 17.05)	(2/2)	16.62 (16.19 – 17.05)	(2/2)	0
	Th-228	8	0.4	0.34 (0.16 – 0.49)	(6/6)	Newport Beach North End 29.2 Mi. NW	1.11 (0.78 – 1.44)	(2/2)	1.11 (0.78 – 1.44)	(2/2)	0

During 2007 naturally occurring Th-228 (thorium 228) and K-40 (potassium 40) were confirmed above the *a posteriori* MDC in most shoreline sediment samples.

The term "< LLD," used above, indicates that all analysis results were less than the critical level (1.64 x One Sigma). The critical level is used to determine if a bias exists in the database and is not used to determine if a particular sample result should be considered other than background. The numerical values listed in this table for Cs-137 are those values above the critical level and do not indicate that Cs-137 was detected in any samples.

This table is a statistical summary of the analysis results confirmed above the *a posteriori* MDC in 2007 (K-40 and Th-228) as well as those radionuclides listed in the ODCM (Offsite Dose Calculation Manual).

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Semi-Annual Ocean Bottom Sediment Gamma Spectral Analysis – Table 11 (pCi/g)										
	Cs-134	14	0.15	< LLD (-)	(0/12)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
	Cs-137	14	0.18	0.0153 (0.0120 – 0.0220))	(3/12)	Unit 3 Conduit 0.1 Mi SW	0.0170 (0.0120 – 0.0220)	(2/2)	< LLD (-)	(0/2)	0
	K-40	14	1.5	16.16 (13.02 – 20.17)	(12/12)	(B) Unit 1 Outfall 0.8 Mi SSW	19.92 (19.66 – 20.17)	(2/2)	5.22 (4.76 – 5.68)	(2/2)	0
	Th-228	14	0.4	0.43 (0.0710 – 0.87)	(12/12)	(C) Unit 2 Outfall 1.6 Mi. SW	0.79 (0.78 – 0.81)	(2/2)	0.0925 (0.0590 – 0.13)	(2/2)	0

During 2007, naturally occurring Th-228 (thorium 228) and K-40 (potassium 40) were confirmed above the *a posteriori* MDC in most ocean bottom sediment samples.

The term "< LLD," used above, indicates that all analysis results were less than the critical level (1.64 x One Sigma). The critical level is used to determine if a bias exists in the database and is not used to determine if a particular sample result should be considered other than background. The numerical values listed in this table for Cs-137 are those values above the critical level and do not indicate that Cs-137 was detected in any samples.

This table is a statistical summary of the analysis results confirmed above the *a posteriori* MDC in 2007 (K-40 and Th-228) as well as those radionuclides listed in the ODCM (Offsite Dose Calculation Manual).

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Semi-Annual Non-Migratory Marine Animals (Flesh) Analysis – Table 12A (pCi/g)											
Blacksmith	Co-58	3	0.13	< LLD (-)	(0/1)		---- (-)	(0/1)	< LLD (-)	(0/2)	0
Blacksmith	Co-60	3	0.13	< LLD (-)	(0/1)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Blacksmith	Cs-134	3	0.13	< LLD (-)	(0/1)		---- (-)	(0/1)	< LLD (-)	(0/2)	0
Blacksmith	Cs-137	3	0.15	< LLD (–)	(0/1)	(C) Laguna Beach 18.2 Mi. NW	0.0390 (0.0390 – 0.0390)	(1/2)	0.0390 (0.0390 – 0.0390)	(1/2)	0
Blacksmith	Fe-59	3	0.26	< LLD (-)	(0/1)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Blacksmith	K-40	3	1.4	2.97 (2.97 – 2.97)	(1/1)	(B) Units 2 and 3 Outfall 1.5 Mi. SSW	2.97 (2.97 – 2.97)	(1/1)	2.96 (2.25 – 3.66)	(2/2)	0
Blacksmith	Mn-54	3	0.13	< LLD (-)	(0/1)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Blacksmith	Zn-65	3	0.26	< LLD (-)	(0/1)		---- (-)	(0/2)	< LLD (-)	(0/2)	0

<LLD results are less than the critical level 1.64 sigma.

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Semi-Annual Non-Migratory Marine Animals (Flesh) Analysis – Table 12A (pCi/g)											
California Mussel	Co-58	6	0.13	< LLD (-)	(0/4)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
California Mussel	Co-60	6	0.13	< LLD (-)	(0/4)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
California Mussel	Cs-134	6	0.13	< LLD (-)	(0/4)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
California Mussel	Cs-137	6	0.15	< LLD (-)	(0/4)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
California Mussel	Fe-59	6	0.26	< LLD (-)	(0/4)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
California Mussel	K-40	6	1.4	1.82 (1.60 – 2.24)	(4/4)	(B) Units 2 and 3 Outfall 1.5 Mi. SSW	1.99 (1.74 – 2.24)	(2/2)	1.73 (1.44 – 2.01)	(2/2)	0
California Mussel	Mn-54	6	0.13	< LLD (-)	(0/4)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
California Mussel	Zn-65	6	0.26	< LLD (-)	(0/4)		---- (-)	(0/2)	< LLD (-)	(0/2)	0

<LLD results are less than the critical level 1.64 sigma.

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Semi-Annual Non-Migratory Marine Animals (Flesh) Analysis – Table 12A (pCi/g)											
Black Perch	Co-58	2	0.13	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Black Perch	Co-60	2	0.13	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Black Perch	Cs-134	2	0.13	< LLD (–)	(0/2)		---- (–)	(0/2)	< LLD (-)	(0/0)	0
Black Perch	Cs-137	2	0.15	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Black Perch	Fe-59	2	0.26	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Black Perch	K-40	2	1.4	3.70 (3.70 – 3.70)	(2/2)	(A) Unit 1 Outfall 0.9 Mi WSW	3.70 (3.70 – 3.70)	(2/2)	< LLD (-)	(0/0)	0
Black Perch	Mn-54	2	0.13	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Black Perch	Zn-65	2	0.26	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0

<LLD results are less than the critical level 1.64 sigma.

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Semi-Annual Non-Migratory Marine Animals (Flesh) Analysis – Table 12A (pCi/g)											
Kelp Bass	Co-58	2	0.13	< LLD (-)	(0/2)		---- (-)	(0/2)	---- (-)	(0/0	0
Kelp Bass	Co-60	2	0.13	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Kelp Bass	Cs-134	2	0.13	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Kelp Bass	Cs-137	2	0.15	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Kelp Bass	Fe-59	2	0.26	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Kelp Bass	K-40	2	1.4	3.62 (3.39 – 3.84)	(2/2)	(B) Units 2 & 3 Outfall 1.5 MI. SSW	3.62 (3.39 – 3.84)	(2/2)	< LLD (-)	(0/0)	0
Kelp Bass	Mn-54	2	0.13	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Kelp Bass	Zn-65	2	0.26	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0

<LLD results are less than the critical level 1.64 sigma.

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Semi-Annual Non-Migratory Marine Animals (Flesh) Analysis – Table 12A (pCi/g)											
Sheephead	Co-58	5	0.13	< LLD (-)	(0/3)	(C) Laguna Beach 18.2 Mi. NW	0.0190 (0.0190 – 0.0190)	(1/2)	0.0190 (0.0190 – 0.0190)	(1/2)	0
Sheephead	Co-60	5	0.13	< LLD (-)	(0/3)		---- (-)	(0/1)	< LLD (-)	(0/2)	0
Sheephead	Cs-134	5	0.13	< LLD (-)	(0/3)	(C) Laguna Beach 18.2 Mi. NW	0.0220 (0.0220 – 0.0220)	(1/2)	0.0220 (0.0220 – 0.0220)	(1/2)	0
Sheephead	Cs-137	5	0.15	< LLD (–)	(0/3)		---- (–)	(0/2)	< LLD (-)	(0/2)	0
Sheephead	Fe-59	5	0.26	< LLD (-)	(0/3)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Sheephead	K-40	5	1.4	3.35 (3.19 – 3.60)	(3/3)	(B) Units 2 and 3 Outfall 1.5 Mi. SSW	3.60 (3.60 – 3.60)	(1/1)	3.27 (2.82 – 3.71)	(2/2)	0
Sheephead	Mn-54	5	0.13	< LLD (-)	(0/3)	(C) Laguna Beach 18.2 Mi. NW	0.0200 (0.0200 – 0.0200)	(1/2)	0.0200 (0.0200 – 0.0200)	(1/2)	0
Sheephead	Zn-65	5	0.26	< LLD (-)	(0/3)		---- (-)	(0/2)	< LLD (-)	(0/2)	0

<LLD results are less than the critical level 1.64 sigma.

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Semi-Annual Non-Migratory Marine Animals (Flesh) Analysis – Table 12A (pCi/g)											
Spiny Lobster	Co-58	6	0.13	0.0180 (0.0180 – 0.0180)	(1/4)	(A) Unit 1 Outfall 0.9 Mi. WSW	0.0180 (0.0180 – 0.0180)	(1/2)	< LLD (-)	(0/2)	0
Spiny Lobster	Co-60	6	0.13	0.0350 (0.0350 – 0.0350)	(1/4)	(A) Unit 1 Outfall 0.9 Mi. WSW	0.0350 (0.0350 – 0.0350)	(1/2)	< LLD (-)	(0/2)	0
Spiny Lobster	Cs-134	6	0.13	0.0360 (0.0360 – 0.0360)	(1/4)	(B) Units 2 and 3 Outfall 1.5 Mi. SSW	0.0360 (0.0360 – 0.0360)	(1/2)	< LLD (–)	(0/2)	0
Spiny Lobster	Cs-137	6	0.15	< LLD (-)	(0/4)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Spiny Lobster	Fe-59	6	0.26	< LLD (-)	(0/4)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Spiny Lobster	K-40	6	1.4	3.44 (3.02 – 3.90)	(4/4)	(B) Units 2 & 3 Outfall 1.5 Mi SSW	3.66 (3.41 – 3.90)	(2/2)	3.46 (2.81-4.10)	(2/2)	0
Spiny Lobster	Mn-54	6	0.13	< LLD (–)	(0/4)		---- (–)	(0/2)	< LLD (-)	(0/2)	0
Spiny Lobster	Zn-65	6	0.26	0.0660 (0.0660 – 0.0660)	(1/4)	(A) Unit 1 Outfall 0.9 Mi. WSW	0.0660 (0.0660 – 0.0660)	(1/4)	< LLD (-)	(0/2)	0

<LLD results are less than the critical level 1.64 sigma.

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Semi-Annual Local Crops Gamma Spectral Analysis – Table 13A (pCi/g)											
Lettuce	Be-7	2	0.3	< LLD (-)	(0/0)	Southeast of Oceanside 22 Mi SE	0.25 (0.25 – 0.25)	(1/2)	0.25 (0.25 – 0.25)	(1/2)	0
Lettuce	Cs-134	2	0.06	< LLD (-)	(0/0)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Lettuce	Cs-137	2	0.08	< LLD (-)	(0/0)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Lettuce	I-131	2	0.06	< LLD (-)	(0/0)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Lettuce	K-40	2	1	< LLD (-)	(0/0)	Southeast of Oceanside 22 Mi SE	1.78 (1.49 – 2.06)	(2/2)	1.78 (1.49 – 2.06)	(2/2)	0
Sorrel	Be-7	2	0.3	0.0660 (0.0660 – 0.660)	(1/2)	SONGS Garden 0.4 Mi. NNW	0.0660 (0.0660 – 0.0660)	(1/2)	< LLD (-)	(0/0)	0
Sorrel	Cs-134	2	0.06	0.0250 (0.0250 – 0.0250)	(1/2)	SONGS Garden 0.4 Mi. NNW	0.0250 (0.0250 – 0.0250)	(1/2)	< LLD (-)	(0/0)	0
Sorrel	Cs-137	2	0.08	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Semi-Annual Local Crops Gamma Spectral Analysis – Table 13A (pCi/g)											
Sorrel	I-131	2	0.06	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/0)	0
Sorrel	K-40	2	1	3.44 (3.12 – 3.75)	(2/2)	SONGS Garden 0.4 Mi NNW	3.44 (3.12 – 3.75)	(2/2)	< LLD (-)	(0/0)	0
Tomato	Be-7	4	0.3	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/2)	0

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Semi-Annual Local Crops Gamma Spectral Analysis – Table 13A (pCi/g)											
Tomato	Cs-134	4	0.06	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Tomato	Cs-137	4	0.08	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Tomato	I-131	4	0.06	< LLD (-)	(0/2)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Tomato	K-40	4	1	2.14 (1.56 – 2.71)	(2/2)	SONGS Garden 0.4 Mi. NNW	2.14 (1.56 – 2.71)	(2/2)	2.03 (1.61 – 2.44)	(2/2)	0

During 2007, naturally occurring K-40 (potassium 40) and Be-7 (Beryllium 7) were confirmed above the *a posteriori* MDC in local crop samples.

The term "< LLD," used above, indicates that all analysis results were less than the critical level (1.64 x One Sigma). The critical level is used to determine if a bias exists in the database and is not used to determine if a particular analysis result should be considered as other than background. The numerical values listed in this table for Cs-137 are those values above the critical level and do not indicate that Cs-137 was detected in any samples.

This table is a statistical summary of the analysis results confirmed above the *a posteriori* MDC in 2007 (K-40 & Be-7) as well as those radionuclides listed in the ODCM (Offsite Dose Calculation Manual).

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Annual Soil Analysis – Depth 3 ” – Table 14 (pCi/g)											
	Cs-134	5	0.15	< LLD (-)	(0/4)		---- (-)	(0/1)	< LLD (-)	(0/1)	0
	Cs-137	5	0.18	0.0730 (0.0190 – 0.13)	(3/4)	Camp San Onofre 2.6 Mi. NE	0.13 (0.13 – 0.13)	(1/1)	0.13 (0.13 – 0.13)	(1/1)	0
	K-40	5	1.5	13.97 (7.11 – 18.48)	(4/4)	Basilone Road/I-5 Freeway Offramp 2 Mi NW	18.48 (18.48 – 18.48)	(1/1)	2.52 (2.52 – 2.52)	(1/1)	0
	Th-228	5	0.4	0.56 (0.34 – 0.80)	(4/4)	Basilone Road/I-5 Freeway Offramp 2 Mi NW	0.80 (0.80 – 0.80)	(1/1)	0.16 (0.16 – 0.16)	(1/1)	0

During 2007, naturally occurring Th-228 (thorium 228) and K-40 (potassium 40) were confirmed above the *a posteriori* MDC in all soil samples. Cs-137 (Cesium 137) was detected in four samples and is attributable to fallout from nuclear weapons testing and from Chernobyl.

The term "< LLD," used above, indicates that all analysis results were less than the critical level (1.64 x One Sigma). The critical level is used to determine if a bias exists in the database and is not used to determine if a particular sample result should be considered other than background.

This table is a statistical summary of the analysis results confirmed above the *a posteriori* MDC in 2007 (K-40, Cs 137, and Th-228) as well as those radionuclides listed in the ODCM (Offsite Dose Calculation Manual) for sediment samples.

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION

DOCKET NOS. 50-206, 50-361, 50-362
SAN DIEGO COUNTY, CALIFORNIA

Reporting Period: 1/1/2007 to 12/31/2007

Medium or Pathway sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Range)		Location with Highest Annual Mean: Name, Distance and Direction	Location with Highest Annual Mean: Mean (Range)		Control Locations Mean (Range)		Number of Nonroutine Reported Measurements
Semi-Annual Kelp Analysis – Table 15 (pCi/g)											
Macrocystis p.	Cs-134	8	0.06	< LLD (-)	(0/6)		---- (-)	(0/2)	< LLD (-)	(0/2)	0
Macrocystis p.	Cs-137	8	0.08	< LLD (–)	(0/6)		---- (–)	(0/2)	< LLD (-)	(0/2)	0
Macrocystis p.	I-131	8	0.06	0.0422 (0.0260 – 0.0830)	(5/6)	(A) San Onofre Kelp Bed 1.5 Mi. S	0.0545 (0.0260 – 0.0830)	(2/2)	0.0280 (0.0210 – 0.0350)	(2/2)	0
Macrocystis p.	K-40	8	1	8.59 (7.66 – 10.55)	(5/6)	(E) Salt Creek (Control) 11 Mi NNW	10.14 (9.57 – 10.70)	(2/2)	10.14 (9.57 – 10.70)	(2/2)	0

During 2007, naturally occurring K-40 (potassium 40) were confirmed above the *a posteriori* MDC in all kelp samples. I-131 (iodine 131) was also confirmed above the *a posteriori* MDC in three samples. I-131 is known to be a constituent of sewage plant discharges due to medically administered I-131. Since the concentration of I-131 in the control sample (Salt Creek - about 11 miles up coast from SONGS) has is historically been higher than the I-131 concentration in kelp closer to SONGS, we conclude that the I-131 in kelp is most likely attributable to sewage plant effluents.

The term "< LLD," used above, indicates that all analysis results were less than the critical level (1.64 x One Sigma). The critical level is used to determine if a bias exists in the database and is not used to determine if a particular sample result should be considered other than background. The numerical values listed in this table for Cs-137 are those values above the critical level and do not indicate that Cs-137 was detected in any samples.

APPENDIX C

SUMMARY OF 2007 QUALITY CONTROL PROGRAMS

All REMP samples are collected, shipped, and analyzed in accordance with NRC Regulatory Guide 4.15. Marine radiological environmental samples are collected by a vendor, MBC Environmental, per the vendor's Quality Assurance manual. REMP sample analysis is performed by the Contracted Environmental Analysis Laboratory (CEAL) in accordance with the Laboratory Quality Assurance Plan. During 2007 the CEAL was Areva NP Environmental Laboratory.

INTERLABORATORY CROSS-CHECK PROGRAM:

The CEAL participates in a number of independent cross check programs, including the National Institute of Standards and Technology (NIST) and Analytics cross-check programs. A summary of the Analytics cross check data is included in Table C-1. The CEAL's performance meets the criteria described in Reg. Guide 4.15. Discrepancies and non-agreement results are resolved through a formal Condition Report evaluation process.

QUARTERLY DUPLICATE TLDs

SONGS deployed a duplicate TLD package in the same location and canister as TLD 66. The quarterly dose measured by these separate TLD packages is statistically equal.

DUPLICATE TLD DATA COMPARISON

	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
TLD 66	14.93 ± 0.64	13.39 ± 0.61	15.66 ± 0.66	12.56 ± 1.1
TLD 200	14.61 ± 0.92	13.67 ± 0.66	15.21 ± 0.61	12.75 ± 0.85

* Data is reported as mR per standard quarter ± 1 sigma

ANNUAL DUPLICATE TLDs

An annual duplicate TLD package is collocated with TLD 67.

TLD 67 average dose in mR per standard quarter (July 2006 to July 2007)	TLD 201 (annual duplicate) dose in mR per standard quarter (July 2006 to July 2007)
16.55	16.06

CALIBRATION OF AIR SAMPLER VOLUME METERS

The Shop Services and Instrumentation Division of SCE performs an annual calibration procedure using standards referenced to NIST on all REMP air sampler gas meters. When the gas meters are removed from service, the meter is calibrated and the calibration reports are reviewed for bias. This is an *a posteriori* review of the gas meter performance to evaluate method bias and to identify possible outlier analysis results. In 2007, two (2) gas meters failed to meet this criterion at all calibrated flow rates and one gas meter was inoperable. A review of the affected gross beta data has revealed no meaningful anomalies. Thus no discernable impact to the REMP database or conclusions resulted from use of the out of tolerance gas meters. Replacement of the gas meters was completed in 2007.

TABLE C-1

ANALYTICS CROSS-CHECK PROGRAM SUMMARY

Sample Number	Quarter / Year	Sample Media	Analyte / Nuclide	Units	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E5222-162	4th / 2006	Water	H-3	pCi/L	14570	14800	0.99	Agreement
E5223-162	4th / 2006	Water	Sr-89	pCi/L	68.8	72.6	0.95	Agreement
E5223-162	4th / 2006	Water	Sr-90	pCi/L	5.56	5.9	0.94	Agreement
E5224-162	4th / 2006	Filter	Gross Alpha	pCi	63.3	67.2	0.94	Agreement
E5224-162	4th / 2006	Filter	Gross Beta	pCi	209.6	203	1.03	Agreement
E5225-162	4th / 2006	Filter	Ce-141	pCi	179.0	185	0.97	Agreement
E5225-162	4th / 2006	Filter	Cr-51	pCi	277.9	273	1.02	Agreement
E5225-162	4th / 2006	Filter	Cs-134	pCi	89.1	92.7	0.96	Agreement
E5225-162	4th / 2006	Filter	Cs-137	pCi	158.8	149	1.06	Agreement
E5225-162	4th / 2006	Filter	Co-58	pCi	54.0	52.8	1.02	Agreement
E5225-162	4th / 2006	Filter	Mn-54	pCi	71.2	69.8	1.02	Agreement
E5225-162	4th / 2006	Filter	Fe-59	pCi	51.0	50.2	1.02	Agreement
E5225-162	4th / 2006	Filter	Zn-65	pCi	104.3	103	1.01	Agreement
E5225-162	4th / 2006	Filter	Co-60	pCi	166.7	177	0.94	Agreement
E5226-162	4th / 2006	Filter	Sr-89	pCi	69.5	74.2	0.94	Agreement
E5226-162	4th / 2006	Filter	Sr-90	pCi	6.46	6.06	1.07	Agreement
E5227-162	4th / 2006	Milk	I-131LL	pCi/L	71.0	70.8	1.00	Agreement
E5227-162	4th / 2006	Milk	I-131	pCi/L	64.8	70.8	0.91	Agreement
E5227-162	4th / 2006	Milk	Ce-141	pCi/L	277.7	294	0.94	Agreement
E5227-162	4th / 2006	Milk	Cr-51	pCi/L	430.7	433	0.99	Agreement
E5227-162	4th / 2006	Milk	Cs-134	pCi/L	141.4	147	0.96	Agreement
E5227-162	4th / 2006	Milk	Cs-137	pCi/L	233.9	237	0.99	Agreement
E5227-162	4th / 2006	Milk	Co-58	pCi/L	83.1	83.8	0.99	Agreement
E5227-162	4th / 2006	Milk	Mn-54	pCi/L	110.6	111	1.00	Agreement
E5227-162	4th / 2006	Milk	Fe-59	pCi/L	82.3	79.7	1.03	Agreement
E5227-162	4th / 2006	Milk	Zn-65	pCi/L	171.4	164	1.05	Agreement

TABLE C-1

ANALYTICS CROSS-CHECK PROGRAM SUMMARY

Sample Number	Quarter / Year	Sample Media	Analyte / Nuclide	Units	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E5227-162	4th / 2006	Milk	Co-60	pCi/L	273.1	281	0.97	Agreement
E5228-162	4th / 2006	Charcoal	I-131	pCi	84.2	87.1	0.97	Agreement
E5238-162	1st / 2007	Water	Gross Alpha	pCi/L	117	112	1.05	Agreement
E5238-162	1st/2007	Water	Gross Beta	pCi/L	104	100	1.04	Agreement
E5239-162	1st/2007	Water	I-131LL	pCi/L	88.3	89.8	0.98	Agreement
E5239-162	1st/2007	Water	I-131	pCi/L	74.3	89.8	0.83	Agreement
E5239-162	1st/2007	Water	Ce-141	pCi/L	257	258	1.00	Agreement
E5239-162	1st/2007	Water	Cr-51	pCi/L	218	213	1.02	Agreement
E5239-162	1st/2007	Water	Cs-134	pCi/L	93.6	97.1	0.96	Agreement
E5239-162	1st/2007	Water	Cs-137	pCi/L	197	204	0.97	Agreement
E5239-162	1st/2007	Water	Co-58	pCi/L	86.2	85.8	1.00	Agreement
E5239-162	1st/2007	Water	Mn-54	pCi/L	155	158	0.98	Agreement
E5239-162	1st/2007	Water	Fe-59	pCi/L	87.1	91.7	0.95	Agreement
E5239-162	1st/2007	Water	Zn-65	pCi/L	886	869	1.02	Agreement
E5239-162	1st/2007	Water	Co-60	pCi/L	131	132	0.99	Agreement
E5240-162	1st/2007	Water	Sr-89	pCi/L	127	137	0.92	Agreement
E5240-162	1st/2007	Water	Sr-90	pCi/L	9.39	9.99	0.94	Agreement
E5241-162	1st/2007	Charcoal	I-131	pCi	67.6	70.2	0.96	Agreement
E5242-162	1st/2007	Filter	Gross Alpha	pCi	67.2	69.1	0.97	Agreement
E5242-162	1st/2007	Filter	Gross Beta	pCi	69.4	61.9	1.12	Agreement
E5243-162	1st/2007	Milk	I-131LL	pCi/L	85.1	85.2	1.00	Agreement
E5243-162	1st/2007	Milk	I-131	pCi/L	75.4	85.2	0.88	Agreement
E5243-162	1st/2007	Milk	Ce-141	pCi/L	294	297	0.99	Agreement
E5243-162	1st/2007	Milk	Cr-51	pCi/L	226	245	0.92	Agreement
E5243-162	1st/2007	Milk	Cs-134	pCi/L	104	112	0.93	Agreement
E5243-162	1st/2007	Milk	Cs-137	pCi/L	228	234	0.97	Agreement

TABLE C-1

ANALYTICS CROSS-CHECK PROGRAM SUMMARY

Sample Number	Quarter / Year	Sample Media	Analyte / Nuclide	Units	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E5243-162	1st/2007	Milk	Co-58	pCi/L	98.1	98.8	0.99	Agreement
E5243-162	1st/2007	Milk	Mn-54	pCi/L	184	182	1.01	Agreement
E5243-162	1st/2007	Milk	Fe-59	pCi/L	109	106	1.03	Agreement
E5243-162	1st/2007	Milk	Zn-65	pCi/L	1041	1000	1.04	Agreement
E5243-162	1st/2007	Milk	Co-60	pCi/L	148	152	0.98	Agreement
E5244-162	1st/2007	Milk	Sr-89	pCi/L	126	137	0.92	Agreement
E5244-162	1st/2007	Milk	Sr-90	pCi/L	8.85	10	0.88	Agreement
E5334-162	2nd/2007	Water	H-3	pCi/L	8520	9040	0.94	Agreement
E5335-162	2nd/2007	Filter	Gross Alpha	pCi	122.7	125	0.98	Agreement
E5335-162	2nd/2007	Filter	Gross Beta	pCi	127	112	1.13	Agreement
E5335-162	2nd/2007	Filter	Ce-141	pCi	94.1	107	0.88	Agreement
E5335-162	2nd/2007	Filter	Cr-51	pCi	230	273	0.84	Non-Agreement(1)
E5335-162	2nd/2007	Filter	Cs-134	pCi	114.3	129	0.89	Agreement
E5335-162	2nd/2007	Filter	Cs-137	pCi	86.3	90.1	0.96	Agreement
E5335-162	2nd/2007	Filter	Co-58	pCi	98.4	106	0.93	Agreement
E5335-162	2nd/2007	Filter	Mn-54	pCi	83.3	88.5	0.94	Agreement
E5335-162	2nd/2007	Filter	Fe-59	pCi	79	89.0	0.89	Agreement
E5335-162	2nd/2007	Filter	Zn-65	pCi	167	178	0.94	Agreement
E5335-162	2nd/2007	Filter	Co-60	pCi	112	127	0.89	Agreement
E5337-162	2nd/2007	Filter	Sr-89	pCi	71.4	91.2	0.78	Agreement
E5337-162	2nd/2007	Filter	Sr-90	pCi	10.1	12.4	0.82	Agreement
E5338-162	2nd/2007	Milk	I-131LL	pCi/L	73.5	70.1	1.05	Agreement
E5338-162	2nd/2007	Milk	I-131	pCi/L	75	70.1	1.07	Agreement
E5338-162	2nd/2007	Milk	Ce-141	pCi/L	168	200	0.84	Non-Agreement(2)
E5338-162	2nd/2007	Milk	Cr-51	pCi/L	447	512	0.87	Agreement

TABLE C-1

ANALYTICS CROSS-CHECK PROGRAM SUMMARY

Sample Number	Quarter / Year	Sample Media	Analyte / Nuclide	Units	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E5338-162	2nd/2007	Milk	Cs-134	pCi/L	223	242	0.92	Agreement
E5338-162	2nd/2007	Milk	Cs-137	pCi/L	165	169	0.98	Agreement
E5338-162	2nd/2007	Milk	Co-58	pCi/L	203	198	1.02	Agreement
E5338-162	2nd/2007	Milk	Mn-54	pCi/L	178	166	1.07	Agreement
E5338-162	2nd/2007	Milk	Fe-59	pCi/L	170	167	1.02	Agreement
E5338-162	2nd/2007	Milk	Zn-65	pCi/L	343	334	1.03	Agreement
E5338-162	2nd/2007	Milk	Co-60	pCi/L	238	238	1.00	Agreement
E5430-162	3rd/2007	Water	Gross Alpha	pCi/L	112	109	1.03	Agreement
E5430-162	3rd/2007	Water	Gross Beta	pCi/L	218	214	1.02	Agreement
E5431-162	3rd/2007	Water	I-131LL	pCi/L	83.4	80.1	1.04	Agreement
E5431-162	3rd/2007	Water	I-131	pCi/L	80.2	80.1	1.00	Agreement
E5431-162	3rd/2007	Water	Ce-141	pCi/L	176	182	0.97	Agreement
E5431-162	3rd/2007	Water	Cr-51	pCi/L	228	249	0.92	Agreement
E5431-162	3rd/2007	Water	Cs-134	pCi/L	111	127	0.87	Agreement
E5431-162	3rd/2007	Water	Cs-137	pCi/L	112	112	1.00	Agreement
E5431-162	3rd/2007	Water	Co-58	pCi/L	94.3	98.1	0.96	Agreement
E5431-162	3rd/2007	Water	Mn-54	pCi/L	141	144	0.98	Agreement
E5431-162	3rd/2007	Water	Fe-59	pCi/L	94.8	95.1	1.00	Agreement
E5431-162	3rd/2007	Water	Zn-65	pCi/L	186	174	1.07	Agreement
E5431-162	3rd/2007	Water	Co-60	pCi/L	120	127	0.94	Agreement
E5432-162	3rd/2007	Charcoal	I-131	pCi	66.5	69.6	0.96	Agreement
E5433-162	3rd/2007	Filter	Gross Alpha	pCi	86.4	105	0.82	Non-Agreement(3)
E5433-162	3rd/2007	Filter	Gross Beta	pCi	190	196	0.97	Agreement
E5434-162	3rd/2007	Milk	I-131LL	pCi/L	87.2	85.2	1.02	Agreement
E5434-162	3rd/2007	Milk	I-131	pCi/L	82.9	85.2	0.97	Agreement
E5434-162	3rd/2007	Milk	Ce-141	pCi/L	196	211	0.93	Agreement

TABLE C-1

ANALYTICS CROSS-CHECK PROGRAM SUMMARY

Sample Number	Quarter / Year	Sample Media	Analyte / Nuclide	Units	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E5434-162	3rd/2007	Milk	Cr-51	pCi/L	282	289	0.97	Agreement
E5434-162	3rd/2007	Milk	Cs-134	pCi/L	141	147	0.96	Agreement
E5434-162	3rd/2007	Milk	Cs-137	pCi/L	126	131	0.96	Agreement
E5434-162	3rd/2007	Milk	Co-58	pCi/L	111	114	0.97	Agreement
E5434-162	3rd/2007	Milk	Mn-54	pCi/L	171	168	1.02	Agreement
E5434-162	3rd/2007	Milk	Fe-59	pCi/L	112	111	1.01	Agreement
E5434-162	3rd/2007	Milk	Zn-65	pCi/L	212	202	1.05	Agreement
E5434-162	3rd/2007	Milk	Co-60	pCi/L	154	148	0.98	Agreement
E5435-162	3rd/2007	Milk	Sr-89	pCi/L	89.2	94.9	0.94	Agreement
E5435-162	3rd/2007	Milk	Sr-90	pCi/L	12.9	13.1	0.98	Agreement

(1) (2) (3) The non agreement conditions were identified in the CEAL's Corrective Action Program. As of April 2008 a resolution was not available. On January 3, 2008 the REMP lab was changed from Areva to GEL.

APPENDIX D

COMPARISON OF OPERATIONAL TO PREOPERATIONAL DATA AND ANALYSIS OF TRENDS

Comparison of Operational to Preoperational Data and Analysis of Trends

Unit 1 achieved criticality on June 14, 1967 and was permanently retired from service on November 30, 1992. Unit 2 attained initial criticality on July 26, 1982 and Unit 3 on August 29, 1983.

A variety of environmental samples were analyzed and the analytical results (January 1, 1979 to July 31, 1982) were compared with the 2007 operational data obtained for SONGS Units 2/3, which is the subject post-operational period for SONGS Unit 1.

The following media were evaluated and compared with the operational data of SONGS Units 1, 2 and 3:

A.	External Radiation	F.	Ocean Bottom Sediments
B.	Air Particulates	G.	Marine Species
C.	Radioiodine	H.	Local Crops
D.	Ocean Water	I.	Soil
E.	Shoreline Sediment (sand)	J.	Kelp
		K.	Drinking Water

All of the measurements obtained from the SONGS Unit 1 operational Radiological Environmental Monitoring Program (REMP) during the period from January 1979 to July 1982 are used as the preoperational baseline for SONGS Units 2/3. This is in accordance with San Onofre Units 2/3, Environmental Report, Operating License Stage, Appendix 6A, Pre-operational Radiological Environmental Monitoring, May 31, 1978. Comparisons of preoperational data to 2007 operational data are possible for each of the exposure pathways to man, namely: (1) direct radiation, (2) air particulates (inhalation), and (3) ocean water (waterborne). Comparisons can also be made between preoperational and operational data for ocean bottom sediment data to ascertain if there has been any significant increase in radioactivity in ocean bottom sediments in the vicinity of the SONGS Units 2/3 outfalls.

Overall, the preoperational data are much higher than the operational data. The decrease in radioactivity is due primarily to the cessation of nuclear weapons testing and to the decay of fallout radionuclides. There is a close correlation between indicator and control data over several decades. See Figures 2A, 2B, 3A, 3B, 3C and 4. There are no adverse trends.

A. Direct Radiation

SONGS Unit 1:

No direct radiation data were obtained in the preoperational period of 1964 to 1967 to compare with the operational data.

SONGS Units 2/3:

Direct radiation measurements for the SONGS REMP were made quarterly at 38 indicator locations and 11 control locations in 2007. (See Appendix I for ISFSI TLD data). Direct radiation samples (TLDs) were collected at a number of inner and outer ring locations as

specified by the ODCM. During the preoperational period from January 1979 to July 31, 1982, the indicator stations ranged from 16.1 to 46.6 millirem. The preoperational indicator average was 25.3. The preoperational control range was 19.3 to 30.1 and the control mean was 23.1. During the 2007 operational year for Units 2/3, the routine indicator TLD locations ranged from 10.37 to 32.85 millirem, averaging 16.90 millirem while the control locations ranged from 12.62 to 21.17 millirem with an average of 15.80 millirem.

Factors such as meteorology, geographic location, the fallout from atmospheric nuclear weapons testing, and seasonal fluctuations account for the variability in the data seen during the preoperational period for each location. The decrease in radiation levels at all TLD sample locations is attributable to the curtailment of the atmospheric nuclear weapons testing, and the continued decay of fission products from previous nuclear weapons tests.

The average direct radiation doses were larger at both indicator and control locations during the preoperational period than during the 2007 operational period for SONGS Units 2/3. The larger average observed during the preoperational time span may be attributable to Chinese atmospheric nuclear weapons tests on March 14, 1978 and on October 15, 1980. The large average of annual direct radiation levels seen at most TLD sample locations during 1986 and 1987 is attributable to the Chernobyl Nuclear Power Plant accident that occurred April 26, 1986.

Figure 2A and 2B compares the environmental radiation levels of selected indicator and control locations. Simultaneous variation in the radiation levels at both the control and indicator locations show that the variations are due to factors external to SONGS. The operation of SONGS had no impact on the environment as measured by this sample medium.

B. Air Particulates

SONGS Unit l:

Before SONGS Unit 1 attained initial criticality, samples of air particulate gross beta activity were collected from indicator and control locations. During the preoperational period of 1964-1967, detectable gross beta activity at the indicator locations ranged from 0.030 to 3.810 pCi/m^3, averaging 0.253 pCi/m^3. The control location of Huntington Beach (HBGS) had an average gross beta activity of 0.306 ranging from 0.04 to 2.77 pCi/m^3. During 2007, the gross beta activity at the indicator locations ranged from 0.0084 to 0.0631 pCi/m^3, and averaging 0.0264 pCi/m^3. The Oceanside control location gross beta activity ranged from 0.0109 to 0.0592 pCi/m^3 with an average of 0.0263 pCi/m^3. The decrease in activity levels between 1965 and 2007 is ascribed to the curtailment of atmospheric nuclear weapons testing and the resultant decrease in fallout. Refer to figures 3A, 3B and 3C. There was a close correlation between indicator and control locations in 2007. The operation of SONGS had no impact on the environment as measured by this sample medium.

Valid comparisons of preoperational data to the 2007 postoperational data are difficult to make because the preoperational background levels are elevated by a factor of about ten due to the atmospheric nuclear weapons testing fallout.

SONGS Units 2/3:

From January 1979 through July 1982 (considered to be the preoperational period for SONGS Units 2/3), there is a period of noticeably higher gross beta activity in air at all sample locations. This period extends from the fourth quarter of 1980 through the fourth quarter of 1981. These higher activity levels are attributable to the Chinese atmospheric nuclear weapons test conducted on October 15, 1980.

Figures 3A, 3B, and 3C compare the monthly average gross beta particulate in air activity levels of selected indicator locations with the control location over a period of 31 years (January 1976 to December 2007). The data clearly show a close correlation between the indicator and control locations for the entire time period covered. The various spike increases in gross beta activity at all sample locations are closely grouped and timed to coincide with known events external to SONGS with worldwide radiological impact. These events include: Chinese atmospheric nuclear weapons testing on September 17, 1977; March 14, 1978; October 15, 1980; and the April 1986 Chernobyl accident. The graphs (Figures 3A, 3B and 3C) show that the environmental levels of gross beta remained substantially similar at both the indicator and the control locations over an extended period of time, with both control and indicator locations showing simultaneous variations of equal magnitude. The fluctuations in gross beta activity are not attributable to SONGS and are the result of other environmental phenomena and seasonal variations.

C. Radioiodine

SONGS Unit 1:

No preoperational data are available. All 2007 data were below both the *a priori* LLD (0.07 pCi/m^3) and the lower, count specific, *a posteriori* MDC.

SONGS Units 2/3:

Most of the preoperational and all of the 2007 operational data for I-131 level were below the detection limit.

D. Ocean Water

SONGS Unit 1:

No samples were obtained for the preoperational period of SONGS Unit 1.

SONGS Units 2/3:

Ocean water samples were collected on a monthly basis in the vicinity of each of the Station discharge outfalls, which served as indicator locations, and from the Newport Beach control location. The ocean water samples are analyzed for naturally-occurring and station-related gamma-emitting radionuclides. They are composited quarterly and analyzed for tritium.

During the preoperational period, naturally-occurring potassium-40 was detected in each of the samples collected from both indicator and control locations. Other gamma-emitting radionuclides were detected in only one ocean water sample. In May 1980, Co-58, Co-60,

Cs-l34, and Cs-137 were detected in an ocean water sample collected from the SONGS Unit l outfall. Concentrations of the radionuclides in this sample were 11, 6, 380, and 430 pCi/l, respectively. Tritium was also detected in two of the ocean water samples collected in May 1980 from the SONGS Unit 2 outfall and from the Newport Beach control location. Reduction in effluent activity through programmatic changes at Unit 1 may have reduced activity levels in ocean water.

For tritium and all SONGS related radionuclides, the data collected at all locations during the 2007 operational period were below both the *a priori* LLD and the lower *a posteriori* MDC. We conclude that the operation of SONGS had no impact on the environment as measured by this sample medium.

E. Shoreline Sediments (Sand)

SONGS Unit l:

Shoreline sediment samples were not collected during the preoperational period for SONGS 1.

SONGS Units 2/3:

Beach sand is collected semiannually from three indicator locations and from a control location situated at Newport Beach. The samples are analyzed for 26 naturally-occurring and plant-related radionuclides.

To assess the impact of SONGS operations on this environmental medium, preoperational data were compared to 2007 operational data. The radionuclide detected in shoreline sediment in the preoperational time frame was Cs-137 with a range of 0.012 to 0.022 pCi/g, averaging 0.019 in 5 sediment samples. One control sample with a Cs-137 activity of 0.032 pCi/g was observed in July 1979. The presence of Cs-137 in both control and indicator locations during the preoperational period leads to the conclusion that the root cause is external to SONGS and is most likely attributable to atmospheric nuclear weapons testing. No SONGS-related radionuclides were detected in shoreline sediment during the 2007 operational period. Thus the impact of SONGS on the environment as measured by the sample medium is considered to be negligible.

F. Ocean Bottom Sediments

SONGS Unit 1:

Ocean bottom sediment samples were not collected during the preoperational phase of Unit 1, and, therefore, no comparison can be made. However, operational data for SONGS 1 did not reveal the presence of any significant radioactivity in the sediment samples.

SONGS Units 2/3:

During the preoperational and operational periods, representative samples of ocean bottom sediments were collected semiannually from each of the Station discharge outfalls and from a control station in Laguna Beach. The samples were analyzed for naturally occurring and SONGS related radionuclides. The results of the analyses are listed in Table D-1B.

SONGS-related radionuclides were also detected in samples collected during preoperational period. Manganese-54 (Mn-54) was detected in 5 of the 28 samples. The concentrations of Mn-54 in these samples ranged from 0.015 to 0.49 pCi/g, averaging 0.13 pCi/g. Cobalt-58 (Co-58) was detected in nine samples. The concentration of Co-58 in the samples ranged from 0.013 to 1.16 pCi/g, averaging 0.20 pCi/g. Cobalt-60 (Co-60) was measured in 15 of the 28 samples. The concentration of Co-60 in the sample ranged from 0.014 to 8.l pCi/g, averaging 0.79 pCi/g. Cs-137 was also detected in 16 of the 28 samples. The concentrations of Cs-137 in the samples ranged from 0.014 to 0.090 pCi/g, averaging 0.039 pCi/g. Cerium-144 (Ce-144) was found in two samples. The concentration of Ce-144 in the samples was 0.06 and 0.26 pCi/g, respectively.

The results indicate that there has not been a build-up of radionuclides with time in ocean bottom sediments near SONGS. The results also indicate notable decrease in the concentrations of plant-related radionuclides in the ocean bottom sediment. Although Co-58, Co-60, and Cs-137 are normally associated with nuclear power operations, preoperational study reveals no accumulation trend for these radionuclides, and no increase in levels for these radionuclides was detected during the operational period.

The concentration of station-related radionuclides in all ocean bottom sediment samples analyzed in 2007 was below the *a posteriori* MDC. We conclude that operation of SONGS Units 2/3 has had a negligible impact upon this environmental medium.

TABLE D-1A

SHORELINE SEDIMENTS CONCENTRATION (pCi/g, wet weight)
PREOPERATIONAL AND OPERATIONAL DATA*
SONGS UNITS 2/3

		INDICATOR		CONTROL	
Radionuclide**	**Period**	**Range**	**Average**	**Range**	**Average**
Cs-137	PreOp	0.012-0.022	0.019	<LLD-0.032	<LLD
All other measured SONGS related radionuclides	PreOp	< LLD	< LLD	< LLD	< LLD
	Operational	< LLD	< LLD	< LLD	< LLD

TABLE D-1B

OCEAN BOTTOM SEDIMENTS CONCENTRATION (pCi/g, wet weight)
PREOPERATIONAL AND OPERATIONAL DATA*
SONGS UNITS 2/3

		INDICATOR		CONTROL	
Radionuclide	**Period**	**Range**	**Average**	**Range**	**Average**
Mn-54	PreOp	0.0150-0.49	0.129	<LLD	<LLD
Co-58	PreOp	0.013-1.160	0.199	<LLD	<LLD
Co-60	PreOp	0.014-8.100	0.788	<LLD	<LLD
Ag-110m	PreOp	<LLD-0.020	<LLD	<LLD	<LLD
Cs-137	PreOp	0.014-0.090	0.039	<LLD-0.043	<LLD
Cs-137	Operational	<LLD	<LLD	<LLD	<LLD
Ce-144	PreOp	0.060-0.260	0.160	<LLD	<LLD
All other measured SONGS related radionuclides	PreOp	< LLD	< LLD	< LLD	< LLD
	Operational	< LLD	< LLD	< LLD	< LLD

***** **PreOp = January 1979 to July 1982; Operational - January to December 2007**
****** **During January to December 2007 all station related Radionuclides from all sample locations were < LLD**
LLD **Lower limits of detection for operational data are listed in Appendix B.**

G. Marine Species (Flesh)

SONGS Unit l:

Marine species were not collected during the preoperational period for SONGS Unit l. No comparison with operational data is possible.

SONGS Units 2/3:

Non-migratory marine species were collected semi-annually near SONGS to determine the amount of radioactivity that could be consumed by man or that was present in the food chain to man. Marine species caught by the SONGS outfalls and from Laguna Beach include two species of adult fish, crustacea and mollusks. Upon collection, the flesh portion is analyzed for gamma-emitting, radionuclides as specified in the ODCM. The results are subsequently reported as pCi/gram wet weight.

Results for several marine species for both the preoperational and 2007 operational periods for Units 2/3 are summarized in Table D-2. The marine species used for purposes of comparison include: sheephead (a fish), Blacksmith, black perch (a fish), bay mussel (a mollusk), spiny lobster (a crustacea), and keyhole limpet (a mollusk). Radionuclides analyzed but not included in Table D-2 were below the lower limits of detection for both the preoperational and operational periods.

During the 2007 operational period, no SONGS related radionuclides were detected at either the *a priori* LLD or the lower *a posteriori* MDC. The data indicate no accumulation trends. The operation of SONGS Units 2/3 in 2007 had no impact on the environment as measured by this sample medium.

TABLE D-2

MARINE SPECIES CONCENTRATIONS (pCi/g, wet weight) PREOPERATIONAL AND 2007 OPERATIONAL DATA (SONGS UNITS 2/3)*

Sheephead Flesh**

		INDICATOR		CONTROL	
Radionuclide	**Period**	**Range**	**Average**	**Range**	**Average**
Co-58	PreOp	0.016-0.030	0.023	<LLD	<LLD
Co-60	PreOp	0.005-0.044	0.017	<LLD	<LLD
Ag-110m	PreOp	<LLD-0.004	<LLD	<LLD	<LLD
Cs-137	PreOp	0.004-0.018	0.007	0.005-0.012	0.007
All other measured	PreOp	< LLD	< LLD	< LLD	< LLD
SONGS related radionuclides	Operational	< LLD	< LLD	< LLD	< LLD

Black Perch Flesh**

		INDICATOR		CONTROL	
Radionuclide	**Period**	**Range**	**Average**	**Range**	**Average**
Co-58	PreOp	0.009-0.011	0.010	<LLD	<LLD
Co-60	PreOp	0.004-0.045	0.017	<LLD	<LLD
Ag-110m	PreOp	0.002-0.009	0.006	<LLD	<LLD
Cs-137	PreOp	0.003-0.015	0.008	0.004-0.014	0.009
All other measured	PreOp	< LLD	< LLD	< LLD	< LLD
SONGS related radionuclides	Operational	< LLD	< LLD	< LLD	< LLD

* **PreOp = January 1979 to July 1982; Operational = January to December 2007. The nonmigratory marine species samples collected in 2007 were Blacksmith, California Mussel, Black Perch, Kelp Bass, Sheep head, and Spiny Lobster**

** **During January to December 2007 all station related Radionuclides from all sample locations were < LLD**

LLD **Lower limits of detection for operational data are listed in Appendix B.**

TABLE D-2

MARINE SPECIES CONCENTRATIONS (pCi/g, wet weight) PREOPERATIONAL AND 2007 OPERATIONAL DATA (SONGS UNITS 2/3)*

Bay Mussel Flesh**

		INDICATOR		CONTROL	
Radionuclide	**Period**	**Range**	**Average**	**Range**	**Average**
Mn-54	PreOp	0.009-0.025	0.017	<LLD	<LLD
Co-58	PreOp	0.008-0.080	0.028	--	--
Co-60	PreOp	0.005-0.40	0.077	<LLD	<LLD
Cs-137	PreOp	0.003-0.006	0.004	<LLD	<LLD
Ru-103	PreOp	<LLD-0.045	<LLD	<LLD	<LLD
All other measured SONGS related radionuclides	PreOp	< LLD	< LLD	< LLD	< LLD
	Operational	---	---	---	---

Spiny Lobster Flesh**

		INDICATOR		CONTROL	
Radionuclide	**Period**	**Range**	**Average**	**Range**	**Average**
Co-58	PreOp	0.007-0.270	0.086	<LLD	<LLD
Co-60	PreOp	0.014-0.210	0.060	<LLD	<LLD
Cs-137	PreOp	0.005-0.011	0.008	0.040-0.015	0.008
All other measured SONGS related radionuclides	PreOp	< LLD	< LLD	< LLD	< LLD
	Operational	< LLD	< LLD	< LLD	< LLD

* **PreOp = January 1979 to July 1982; Operational = January to December 2007. The nonmigratory marine species samples collected in 2007 were Blacksmith, California Mussel, Black Perch, Kelp Bass, Sheep head, and Spiny Lobster**

** **During January to December 2007 all station related Radionuclides from all sample locations were < LLD**

LLD **Lower limits of detection for operational data are listed in Appendix B.**

TABLE D-2

MARINE SPECIES CONCENTRATIONS (pCi/g, wet weight) PREOPERATIONAL AND 2007 OPERATIONAL DATA (SONGS UNITS 2/3)*

Sea Hare Flesh**

		INDICATOR		CONTROL	
Radionuclide	**Period**	**Range**	**Average**	**Range**	**Average**
Co-57	PreOp	0.006-0.017	0.009	<LLD	<LLD
Co-58	PreOp	0.006-12.4	1.233	<LLD	<LLD
Co-60	PreOp	0.016-2.000	0.448	0.003-0.027	0.013
Zn-65	PreOp	<LLD-0.10	<LLD	<LLD	<LLD
Ag-110m	PreOp	0.018-0.50	0.138	0.020-0.039	0.030
Cs-137	PreOp	<LLD-0.004	<LLD	<LLD-0.005	<LLD
All other measured	PreOp	< LLD	< LLD	< LLD	< LLD
SONGS related radionuclides	Operational	---	---	---	---

Keyhole Limpet (Flesh)**

		INDICATOR		CONTROL	
Radionuclide	**Period**	**Range**	**Average**	**Range**	**Average**
Co-58	PreOp	0.007-0.101	0.054	<LLD-0.190	<LLD
Co-60	PreOp	0.021-0.040	0.033	<LLD-0.022	0.022
Ag-110m	PreOp	0.033-0.101	0.054	0.005-0.042	0.022
Cs-137	PreOp	<LLD	<LLD	<LLD-0.005	<LLD
All other measured	PreOp	< LLD	< LLD	< LLD	< LLD
SONGS related Radionuclides	Operational	---	---	---	---

* **PreOp = January 1979 to July 1982; Operational = January to December 2007**
** **Sea Hare and Keyhole Limpet samples were not collected in 2007**
LLD **Lower limits of detection for operational data are listed in Appendix B.**

H. Local Crops

SONGS Unit 1:

During the preoperational phase of Unit 1, local crops were collected semiannually from both indicator and control locations, and subsequently analyzed for Sr-90. The range was 0.008 to 0.030 pCi/g wet weight. The average Sr-90 value was 0.022 pCi/g wet weight. Sr-90 is a common fission product likely due to atmospheric weapons tests.

During 2007, only naturally occurring radionuclides were detected in the crop samples.

SONGS Units 2/3:

In the preoperational period of January 1979 through July 1982, Sr-90 was detected in the control samples of kale, parsley, and squash. Naturally occurring K-40 was detected in cucumber, kale, and tomato samples from the indicator and control locations. Ce-144 and Zr-95 were detected in one sample of parsley at the control location at concentrations of 0.12 and 0.09 pCi/g, wet weight respectively.

In the 2007 operational period, only naturally occurring radionuclides were detected in the crop samples. The data indicate that the concentration of SONGS related radionuclides have decreased over time in this sample medium. This decrease is attributable to the termination of atmospheric nuclear weapons testing. The operation of SONGS had no impact on the environment as measured by this sample medium.

I. Soil

SONGS Unit 1:

No soil data were available for Unit 1 preoperational phase so a comparison cannot be made. However, gamma isotopic analysis of soil does not show any significant level of radioactivity. No accumulation pattern of plant-related radionuclides in the soil has been observed in the last 20 years.

SONGS Units 2/3:

A comparison of operational and preoperational data does not reveal any accumulation pattern of SONGS related isotopes in soil. The intermittent detection of Cs-137 in both indicator and control locations is due to residual fallout from atmospheric nuclear weapons testing.

J. Kelp

SONGS Unit 1:

Samples of kelp were not collected and analyzed during the preoperational period for SONGS Unit l. No comparison with operational data is possible.

SONGS Units 2/3:

Kelp is collected semiannually from three indicator locations and from a control location situated in Laguna Beach. After collection, the samples are analyzed by gamma-spectral analysis for naturally-occurring and SONGS-related radionuclides.

To assess the impact of SONGS operations on kelp, preoperational data were compared to 2007 operational data in Table D-4. Radionuclides detected during the preoperational period for SONGS Units 2/3 include Mn-54, Co-60, Zr-95, I-131, and Cs-137.

During the 2007 operational period, I-131 was detected in two (2) indicator samples and one control sample. No other station related isotopes were detected in kelp samples during the 2007 operational period. Figure 4 (I-131 in Kelp) shows a close correlation between indicator and control sample locations over an extended period of time.

Although I-131 activity has been randomly detected in kelp since 1977, there is no evidence that the concentration of I-131 or other station related radionuclides in kelp is increasing near SONGS. I-131 in kelp is most likely due to the sewer release of medical administrations, since it has been detected consistently in control as well as indicator locations. Since 1988 the concentration of I-131, when detected, has typically been highest at the control location. These data support the conclusion that during the Units 2/3 operational period, the detection of I-131 in kelp is primarily due to factors external to SONGS.

K. Drinking Water

No plant related radionuclides were detected during the 2007 operational period. Gross beta activity was detected during both the operational and preoperational periods at both the indicator and the control locations. No trends have been noted. There is no drinking water pathway for SONGS. The operation of SONGS had no impact on the environment as measured by this sample medium.

TABLE D-3
SOIL PREOPERATIONAL AND OPERATIONAL DATA* (pCi/g, dry weight)
SONGS UNITS 2/3

		INDICATOR		CONTROL	
Radionuclide	**Period**	**Range**	**Average**	**Range**	**Average**
Sr-90	PreOp	0.02-0.08	0.044	<LLD-0.03	<LLD
Cs-137	PreOp	0.02-0.20	0.096	<LLD-0.06	<LLD
Cs-137	Operational	< LLD-0.329	0.23	0.245	0.245
All other measured	PreOp	< LLD	< LLD	< LLD	< LLD
SONGS related radionuclides	Operational	< LLD	< LLD	< LLD	< LLD

TABLE D-4
KELP PREOPERATIONAL AND OPERATIONAL DATA* (pCi/g, wet weight)
SONGS UNITS 2/3

		INDICATOR		CONTROL	
Radionuclide	**Period**	**Range**	**Average**	**Range**	**Average**
Mn-54	PreOp	<LLD-0.005	<LLD	<LLD	<LLD
Co-60	PreOp	0.006-0.009	0.008	<LLD	<LLD
Zr(Nb)-95	PreOp	0.014-0.090	0.046	0.018-0.053	0.036
I-131	PreOp	0.006-0.024	0.013	0.008-0.030	0.014
I-131	Operational	<LLD-0.083	0.037	<LLD-0.035	<LLD
Cs-137	PreOp	0.004-0.009	0.006	<LLD	<LLD
All other measured	PreOp	< LLD	< LLD	< LLD	< LLD
SONGS related radionuclides	Operational	< LLD	< LLD	< LLD	< LLD

* **PreOp = January 1979 to July 1982; Operational = January to December 2007**
LLD Lower Limit of Detection for operational data are listed in Appendix B.
During 2007, kelp was not available for Autumn sampling due to the El Nino weather system. Only one control kelp sample was collected in 2007.

APPENDIX E

DEVIATIONS FROM ODCM SAMPLING REQUIREMENTS

IN 2007

DEVIATIONS FROM THE ODCM SAMPLING REQUIREMENTS

Deviations from the Offsite Dose Calculation Manual (ODCM) sampling requirements are identified below in accordance with section 5.0 of the ODCM. The performance standard for environmental data collection of 95% was met for most sample types. During 2007, the ODCM specified *a priori* LLD was achieved for most REMP samples. Exceptions are described below for each sample type. Deviations from the ODCM were associated with external factors not within the control of REMP personnel such as wildfires and limited availability of marine samples at the locations specified in the ODCM. The 2007 ODCM deviations had no meaningful impact on the REMP database and did not compromise the validity of the reported conclusions.

PART I TERRESTRIAL SAMPLING

A. WEEKLY AIR SAMPLING

Downtime for each air sampler in 2007 due to weekly sample collection, annual preventive maintenance (PM), and the annual gas meter change out was approximately 46 minutes for each sampler.

Weekly Change out:	Approximately 0.5 minutes x 52 = 26 minutes
Annual PM:	Approximately 15 minutes
Annual Gas Meter change out:	Approximately 5 minutes

Down times in excess of 1 hour are described below for each air sample. Smoke from the October 2007 wildfires damaged Air Sampler # 13 and dust loaded all REMP air samplers. These effects are described for each sampler.

Air Sampler 1 (City of San Clemente): Sampler # 1 had no down time during 2007. Sampler # 1 was dust loaded during the sample collection periods ending 23 October 2007 and 30 October 2007. Sample volumes and flow rates were reduced but there were no flow interruptions during the wildfires. The ODCM maximum values for the LLD were not exceeded for the particulate gross beta, I-131, and quarterly composite gamma analyses during 2007.

Air Sampler 7 (AWS Roof): Sampler # 7 had 82.6 hours of down time during 2007 due to external power interruptions. During the sample collection period ending 23 October 2007 sampler # 7 was dust loaded. A special air particulate collection was completed on 25 October 2007. During the sample collection period ending 30 October 2007 sampler # 7 flow was completely blocked by accumulated smoke and particulate material. The ODCM maximum value for the LLD was exceeded for the particulate gross beta during the collection period ending 30 October 2007. The ODCM maximum values for the LLD were not exceeded for I-131 and quarterly composite gamma analyses during 2007.

Air Sampler 9 (State Beach Park): Sampler # 9 had no down time during 2007. Sampler # 9 was dust loaded during the sample collection periods ending 23 October 2007 and 30 October 2007. Sample volumes and flow rates were reduced but there were no flow interruptions during the wildfires. The ODCM maximum values for the LLD were not exceeded for the particulate gross beta, I-131, and quarterly composite gamma analyses during 2007.

Air Sampler 10 (Bluff): Sampler # 10 had 18.4 hours of down time during 2007 due to external power interruptions. Sampler # 10 was dust loaded during the sample collection periods ending 23 October 2007 and 30 October 2007. A special air particulate collection was completed on 25 October 2007. The ODCM maximum values for the LLD were not exceeded for the particulate gross beta, I-131, and quarterly composite gamma analyses during 2007.

Air Sampler 11 (EOF): Sampler # 11 had 3.5 hours of down time during 2007 due to external power interruptions. Sampler # 11 was dust loaded during the sample collection periods ending 23 October 2007 and 30 October 2007. A special air particulate collection was completed on 25 October 2007. The ODCM maximum value for the LLD was exceeded for the particulate gross beta during the collection period ending 30 October 2007. The ODCM maximum values for the LLD were not exceeded for I-131 and quarterly composite gamma analyses during 2007.

Air Sampler 12 (Former SONGS Evaporation Pond): Sampler # 12 had 3.5 hours of down time during 2007 due to external power interruptions. Sampler # 12 was dust loaded during the sample collection periods ending 23 October 2007 and 30 October 2007. A special air particulate collection was completed on 25 October 2007. The ODCM maximum value for the LLD was exceeded for the particulate gross beta during the collection period ending 30 October 2007. The ODCM maximum values for the LLD were not exceeded for I-131 and quarterly composite gamma analyses during 2007.

Air Sampler 13 (Camp Pendleton East): Sampler # 13 had 6.6 hours of down time during 2007 due to external power interruptions. Sampler # 13 (0.7 miles E) was inoperable for 1510.5 hours in 2007 due to the wildfires. The wildfire outage started at 1030 on 24 October 2007. As a compensatory measure air sampler # 30 (~ 0.2 miles E) was placed in service at 1053 on 25 October 2007. Air sampler # 30 was out of service for 141 hours during November 2007 due to an external power interruption. The total time that both air samplers were out of service was 165.4 hours during 2007. Air sampler # 13 was returned to service at 0900 on 26 December 2007. Sampler # 13 was dust loaded during the sample collection periods ending 23 October 2007 and 30 October 2007. The sampler # 13 ODCM maximum value for the LLD was exceeded for the particulate gross beta during the collection period ending 30 October 2007 due to inadequate sample volume (The wildfires rendered # 13 inoperable on 24 October 2007). Sampler # 30 ODCM maximum value for the LLD was exceeded for articulate gross beta during the collection period ending 7 November 2007 due low volume attributed to the external power interruption. The ODCM maximum values for the LLD were not exceeded for I-131 and quarterly composite gamma analyses during 2007 for all samples collected at # 13 and at # 30.

Air Sampler 14 (Mesa Medical Facility): Sampler # 14 was dust loaded during the sample collection periods ending 23 October 2007 and 30 October 2007. A special air particulate

collection was completed on 25 October 2007. The ODCM maximum value for the LLD was exceeded for the particulate gross beta during the collection period ending 30 October 2007. The ODCM maximum values for the LLD were not exceeded for I-131 and quarterly composite gamma analyses during 2007.

Air Sampler 15 (Oceanside Control): No deviations were observed.

Summary of Air Sampler Corrective Actions

The useful life of the vacuum pump motor assemblies is estimated to be five years based on the recommendation of the manufacturer and upon experience. If the internal components (motor and control valve) are replaced the useful life may be extended. During 2007 the REMP air samplers experienced no down time attributable to motor or vacuum pump assembly failure. Thus there were no avoidable air sampler deviations from the ODCM during 2007.

B. DIRECT RADIATION

TLD # 54 (Escondido) was lost due to construction activity at the Escondido Fire Station in the 2nd quarter of 2007.

TLD # 4 was destroyed by the October 2007 wildfires. During the 4th quarter 2007 TLDs were installed at selected locations on Camp Pendleton where the potential for thermal fade was suspected. At all locations where both original and duplicate TLD data was available the reported exposure values in mR overlapped by less than 2 sigma. During the 4th quarter 2007 only the compensatory duplicate data was available for TLD # 35. AR (Action Request) 080400287 was generated to resolve the TLD # 35, 4th quarter 2007 TLD data issue. All of the available TLD data from locations affected by the wildfires during the 4th quarter 2007 was consistent with the historical data.

A verification of all terrestrial REMP sample location data was conducted in conjunction with the preparation for the 2007 AREOR. The latitude and longitude of all TLD sample locations in the REMP database is maintained by SCE Corporate Real Properties. The REMP database location data was compared with the USGS (US Geological Survey) satellite photo database. New GPS (Global Positioning System) survey data was obtained for those locations with an observed variance from the USGS data. Several TLD stations were not at the ODCM locations. These deviations will be captured in the next revision of the ODCM.

TLD #	ODCM location Distance (miles)/Direction	Measured TLD location Distance (miles)/Direction
TLD 19	5.0 NNW	4.9 NNW
TLD 38	3.3 SE	3.4 SE
TLD 46	0.9 SE	1.0 SE
TLD 49	12.8 ESE	12.9 ESE
TLD 53	44.3 SE	44.2 SE
TLD 55	0.2 W	0.2 WNW

TLD	2	3.5 N	3.6 N
TLD	3	2.6 NE	2.8 NE
TLD	4	4.5 E	4.4 E
TLD	33	5.7 N	5.9 N
TLD	35	4.7 NNE	4.8 NNE
TLD	57	0.1 WSW	0.1 SW
TLD	62	0.6 NNE	0.7 NNE
TLD	36	4.2 NE	4.1 NE
TLD	68	4.3 ENE	4.4 ENE
TLD	77	4.3 N	4.2 N

C. LOCAL CROPS

No deviations were observed. The active REMP sample locations were verified with GPS and USGS survey data.

D. SHORELINE SEDIMENTS

No deviations were observed. The REMP Shoreline sediment sample locations were verified with GPS and USGS survey data.

E. DRINKING WATER

In conjunction with the preparation of the 2007 AREOR, a verification of the REMP drinking water sample locations was performed using a GPS (Global Positioning System) receiver. The GPS data was then overlaid onto the USGS (US Geological Survey) satellite photo database. The location for drinking water sample #4, Camp Pendleton, was thus determined to be 2.1 miles from the SONGS Units 2/3 midpoint in sector Q. The ODCM location for drinking water sample # 4 is 2.2 miles in Sector R. Drinking water at location # 4 (Camp Pendleton Lincoln Properties Housing Office) is fed from the Area 52 reservoir, which collects drinking water from several Camp Pendleton wells. The ODCM location will be updated to reflect the revised location during the next ODCM revision.

F. SOIL

The ODCM listed location for the control soil sample is 16.0 miles SE. Due to recent development, an undisturbed sample was not available at that location. A control sample location in an undisturbed area was located approximately 15 miles SE from SONGS at the Prince of Peace Abbey in Oceanside.

In conjunction with the preparation of the 2007 AREOR a verification of the REMP soil sample locations performed using a GPS (Global Positioning System) receiver. The GPS data was then overlaid onto the USGS (US Geological Survey) satellite photo database. The location for soil sample # 1, Camp San Onofre, is adjacent to TLD # 3, Camp San Onofre. The GPS surveyed location for soil sample # 1 is 2.8 miles NE from SONGS

Units 2/3 midpoint. The ODCM location for soil sample # 1 is 2.6 miles NE from SONGS. The ODCM location will be updated during the next ODCM revision.

PART II MARINE SAMPLING

A. NON-MIGRATORY MARINE ANIMALS

Samples were collected from the specified ODCM sample location when samples were available at that location. When the specified sample type was not available at the ODCM listed location, alternate locations were selected based on sample availability and proximity to the specified sample location. All indicator samples were obtained within two miles of the associated outfall. In some cases the indicator species is not the same as the control species due to limited availability at the indicator location. Most non-migratory marine species samples were not available at the locations specified in the ODCM. All indicator marine animal samples were collected within 2 miles of the Units 2 & 3 discharge diffusers.

B. OCEAN WATER SAMPLING

The April 2007 LLD for I-131 was not achieved due to a lab counting delay. No satisfactory explanation was provided. The corrective action taken by SCE was that effective 3rd January 2008 the REMP lab was changed from AREVA to GEL.

C. OCEAN BOTTOM SEDIMENTS

No deviations were observed. The October 2007 control sediment sample was collected 18.1 miles NW from SONGS Units 2/3. The ODCM location is 18.2 miles. Sediment samples are collected at the location closest to the ODCM location where sediment is available.

D. KELP

Kelp is intermittently available at the various local kelp forests. Sea urchin population, El Nino and La Nina weather phenomena and other macro-environmental factors determine kelp sample availability. Samples were obtained from the kelp canopy closest to the ODCM specified location.

APPENDIX F

LAND USE CENSUS

INTRODUCTION

Southern California Edison conducted the annual 2007 Land Use Census (LUC) in accordance with section 5.2 of the Offsite Dose Calculation Manual (ODCM). The purpose of the LUC is to identify important radiological exposure pathways to humans. The LUC identifies the nearest residences, milk animals, meat animals, gardens of at least 500 square feet that produce fleshy or leafy vegetables, and other specified uses (campgrounds, employment, etc.) in each of the meteorological landward sectors within five miles of SONGS. Results are summarized in Table F-1 and F-2 at the end of this appendix.

THE STUDY AREA

The study area includes half of the city of San Clemente (population estimated at 67,373 as of January 1, 2007), the San Clemente State Park, U.S. Marine Corps Base Camp Pendleton (MCB), San Onofre State Beach and Park, the San Clemente Ranch (now known as Seaview Farm), the former U. S. Coast Guard Station at San Mateo Point, and SONGS.

METHODOLOGY

A review of the 2006 LUC and documentation notebook was conducted. Verification and revision of the 2006 data was accomplished by inquiry to the cognizant agency, organization, or individual possessing direct knowledge of the item being verified.

The garden census was performed by examining aerial photographs taken. The photographic image areas which appeared to correspond to likely garden locations were converted to street addresses. The corresponding residences were observed from the nearest public road to determine if a garden was present. If the entire property was not visible from the street then a garden was assumed to be present.

The closest residence was established in each sector by correspondence with cognizant authorities (City of San Clemente Planning Department and USMC Camp Pendleton). The meat and milk animal survey was performed by contacting the natural resources office on Camp Pendleton, the Orange County Agricultural Commissioner, and the County of San Diego Department of Agriculture. Information on other uses was obtained by contacting the appropriate organizations.

DEFINITIONS

Residence is defined as any structure (single-family house, apartment, mobile home, barracks or similar unit) occupied by individual(s) for three months (2,000 hours) or longer per year.
Other Specified Use is defined as a location occupied by members of the general population as other than their primary residence. The use is divided into two categories: employment and non-employment related.

Employment use is defined as a location occupied by members of the general population engaged in normal work activities regardless of the length of time spent at the location, and regardless of its permanence, including concession stands, restaurants, markets and guard shacks.

Non-employment-related use is defined as a location occupied by members of the general population who are not engaged in normal work activities, including campgrounds, temporary housing, time-share condominiums, motels, hotels, schools and beaches.

Milk animals include, but are not limited to cows, goats and sheep, whose milk is used in dairy products for human consumption.

Meat animals include, but are not limited to deer, other game animals, cattle, goats and sheep, whose meat is used for human consumption.

Leafy vegetables include, but are not limited to lettuce, cabbage, collard greens, Bok choi, sorrel, and spinach.

Fleshy vegetables include, but are not limited to tomatoes, cucumbers, cauliflower, squash, beans, zucchini, and sweet corn.

SUMMARY OF CHANGES

1. LUC #'s R-A2 & R-R2 - Camp Mesa - Camp Mesa was not occupied for a portion of 2007. The estimated maximum occupancy was 6624 hours during 2007.

2. LUC # R-R3 – Camp Mesa Dry Camping was not occupied for the period 1-1-2007 to 10-1-2007 (the LUC data collection and study period per SO123-IX-1.20). Outage workers occupied Camp Mesa during 2007 for the period 11-2-2007 to 12-31-2007. Table 1 reflects data as of the end of the study period as per SO123-IX-1.20.

3. LUC # O-2A San Onofre Surf Camp and campground host – the occupancy for this location increased due to the addition of a campground host in space 100 of the San Onofre State Beach Campground.

4. LUC # O-2B YMCA Surf Camp at camping space # 18 in the San Onofre State Beach Campground. This is a new location.

5. LUC # O-2C SurfCamp.com surf camp occupied camping spaces 35 to 37 in the San Onofre State Beach Campground. This is a new location.

6. LUC # 19 - San Mateo Waste Water Treatment Plant - The occupancy has changed per Camp Pendleton.

7. LUC # O-5 Camp Horno Motor Pool and LUC # O-8 Camp San Mateo Motor Pool - The occupancy for these locations changed per Camp Pendleton.

8. LUC # O-9 Sanitary Land Fill - the occupancy was increased per Camp Pendleton.

9. LUC # O-10 - San Onofre Waste Water Treatment Plant - The occupancy has changed per Camp Pendleton.

10. LUC # 8 USMC Exchange & Commissary - The occupancy has changed per Camp Pendleton.

11. LUC # 23 Christianitos USMC Gas Station - The occupancy has changed per Camp Pendleton.

12. During the 2006 LUC investigation the base game warden and the base terrestrial biologist were interviewed. It is not possible to fix a specific location for the grazing of free ranging wild animals such as deer. The possible grazing range includes areas where coastal sage brush exists. The closest areas in each sector where this vegetation grows is the closest that the deer could graze. These distances are: 0.1 miles Sectors R, A, B, C, D, E and G; 0.2 miles in Sector Q; and 0.3 miles Sectors F and P. Exactly where deer are taken will not definitively determine where the subject deer grazed. Accordingly, specific locations regarding the location of deer are not provided and are not available. The meat animal map (Figure 3) was deleted in 2006. Plans are being developed to add meat animals (deer) to the SONGS REMP sampling plan. A scientific take permit has been approved by the California Fish and Game in December 2007. The deer meat pathway will be monitored by sampling in 2008. The Camp Pendleton hunting take for the period July 1, 2006 to June 30, 2007 is listed in Table 2. Per the base wildlife biologist, the exact location of a particular kill is not known. The reported take area should be interpreted as an estimate of approximate location. Thus a deer reported as taken in hunting area Alpha 2 may actually have been taken in an adjacent hunting area (such as Romeo 3 or Bravo 3). There are no changes to these estimates for 2007.

Distances to nearest vegetation typically consumed by deer.

Sector 2/3	Distance Units 2/3	Sector 1	Distance Unit 1
P	0.3	P	0.1
Q	0.3	Q	0.2
R	0.2	R	0.1
A	0.1	A	0.1
B	0.1	B	0.1
C	0.1	C	0.1
D	0.1	D	0.1
E	0.2	E	0.2
F	0.3	F	0.4
G	0.1	G	0.4

13 Residences map and Table 1 updates - LUC #s R-Q4, R-Q5, R-P4 and R-P3 are individual SPORB employee or campground host trailers. LUC # 33 is a duplicate of LUC # R-P4. The LUC data has been amended to include only the closest residence in the SORB facility. Therefore LUC #'s 33, R-P4, and R-Q4 were deleted from Table 1 and from the LUC maps.

14. LUC # 27 (Ammunition Storage Facility) - This facility has not been occupied for several years per Camp Pendleton. It was marked NA during the 2006 LUC. LUC # 27 has been removed from the Table 1 and the map.

15. LUC # 1B (mini exchange trailer) no longer exists. It was marked NA in the 2006 LUC. LUC # 1B has been removed from 2007 LUC.

16. LUC # 2 (SORB guard shack) is no longer used and was marked NA during the 2006 LUC. LUC # 2 has been removed from the 2007 LUC.

17. LUC # 31A and LUC # 31B occupancy was reduced to 1960 hours per year.

TABLE F-1
2007 SONGS Units 2/3 LUC Five-Mile Radius Summary Sheet

Units 2/3 Sector	LUC #	**Residence**	Miles From Unit 1	Unit 1 Sector	Miles From U2/3	Estimated Hours of Maximum Occupancy
A	R-A1	Camp San Mateo	3.5	A	3.6	FTR
	R-A2	SONGS Camp Mesa	0.3	B	0.4	**6624**
B						
C	R-C2	Camp San Onofre Fire Station	2.4	C	2.4	3,744
	R-C1	Camp San Onofre Barracks 524101	2.9	C	2.8	FTR
D	R-D1	Camp San Onofre Barracks	3.0	D	3.0	FTR
E	R-E1	Camp Horno Barracks	4.2	E	4.1	FTR
F						
G						
H						
J						
K						
L						
M						
N						
P	R-P3	San Onofre Rec Beach (SORB)	0.8	Q	1.0	FTR
	R-P2	San Mateo Point Housing	2.5	P	2.7	FTR
	R-P1	Cotton Point Estates	2.5	P	2.7	FTR
Q	R-Q5	SORB Resident Employee	0.9	Q	1.1	FTR
	R-Q2	San Onofre Mobile Homes	1.2	Q	1.4	FTR
	R-Q3	San Mateo Point Housing	2.5	Q	2.7	FTR
	11	State park Main Offices	3.3	Q	3.5	FTR
R	R-R2	SONGS Camp Mesa	0.3	A	0.4	**6624**
	R-R3	SONGS Dry Camping PL12	0.6	Q/R	0.7	2920
	R-R1	San Onofre Mobile Homes	1.2	R	1.3	FTR
	20	Sea Ridge Estates	4.4	R	4.5	FTR

FTR – Full Time Residence **Bolt Text** indicates changes from 2006 LUC

TABLE F-2
2007 SONGS Units 2/3 LUC Five-Mile Radius Summary Sheet

Units 2/3 Sector	LUC #	Gardens	Miles From Unit 1	Unit 1 Sector	Miles From U2/3
A					
B					
C					
D					
E					
F					
G					
H					
J					
K					
L					
M					
N					
P	G-3	Cotton Point Estate	2.6	P	2.8
Q	G-8	2240 Ave. Salvador	3.9	Q	4.1
	G-5	1706 S Ola Vista	4.2	Q	4.4
	G-6	1315 S Ola Vista	4.4	Q	4.6
	14	Inactive -	4.1	Q	4.3
		3 W Ave San Antonio			
	16	Inactive -	3.9	Q	4.1
		147 W Junipero			
R	G-10	SONGS Garden	0.3	B	0.4

FTR – Full Time Residence **Bolt Text** indicates changes from 2006 LUC

TABLE F-3
2007 SONGS Units 2/3 LUC Five-Mile Radius Summary Sheet

Units 2/3 Sector	LUC #	**Other Specified Uses**	Miles From Unit 1	Unit 1 Sector	Miles From U2/3	Estimated Hours of Maximum Occupancy
A	O-8	Camp San Mateo Motor Pool	3.5	A	3.6	**1,950**
	24	Cristianitos Fire Station	4.8	A	5.0	3,744
	22	SCE Land Uses	0.3	B	0.4	---
B	O-9	USMC CP Sanitary Land Fill	2.1	B	2.1	**600**
C	O-10	Camp San Onofre (STP #11)	2.3	C	2.2	**2,000**
D						
E	O-5	Camp Horno Motor Pool	4.2	E	4.0	1,920
	29	Camp Horno Truck Company			4.7	NA
F	O-1	San Onofre State Beach Guard Shack	1.0	F	0.8	1,500
	31A	Border Patrol Checkpoint (NB)	2.2	F	1.9	2,256
	31B	Hwy Patrol Weigh Sta (NB)	2.3	F	2.1	**1,960**
G	O-2	San Onofre Beach Campground	2.0	G	1.8	720
	32	Hwy Patrol Weigh Sta (SB)	2.3	G	2.1	**1,960**
	O-2A	**Surf Camp (2448 hours) / Campground Host**	3.0	G	2.8	**4,380**
	O-2B	**YMCA Surf Camp**	**2.1**	**F**	**1.9**	**288**
	O-2C	**SurfCamp.com State Beach Surf Camp**	**2.5**	**G**	**2.3**	**2,280**
H						
J						
K						
L						
M						
N						
P	O-6	Surf Beach (Lifeguard)	0.3	P	0.5	800
	3	Trestles Beach Lookout Tower	1.6	P	1.8	500
Q	O-3	State Park Office Trailer	0.4	Q	0.6	2,000
	5	Surf Beach Guard Shack	0.5	Q	0.7	1,500
	7	SORB Clubhouse	1.0	Q	1.2	30
	18	SORB Lifeguard Tower	1.0	Q	1.2	2,000
	8	USMC Exchange & Commissary	1.5	Q	1.7	**1,950**
	9	Basilone Road USMC Entry Gate	1.8	Q	2.0	1,248
	12	San Mateo Campground	2.7	Q	2.9	4,380
	13	Beach Concession	3.7	Q	3.9	2,000
	17	Beach Concession	4.7	Q	4.5	500
	1A	SORB Campground Checkin	1.1	Q	1.3	2000
R	19	Camp San Mateo (STP #12)	3.5	A	3.7	**2,000**
	21	Cristainitos USMC Entry Gate	4.0	A	4.1	1,248
	23	Cristianitos USMC Gas Station	4.0	A	4.1	**1,984**

FTR – Full Time Residence **Bolt Text** indicates changes from 2006 LUC

APPENDIX G

FIGURES FOR 2007

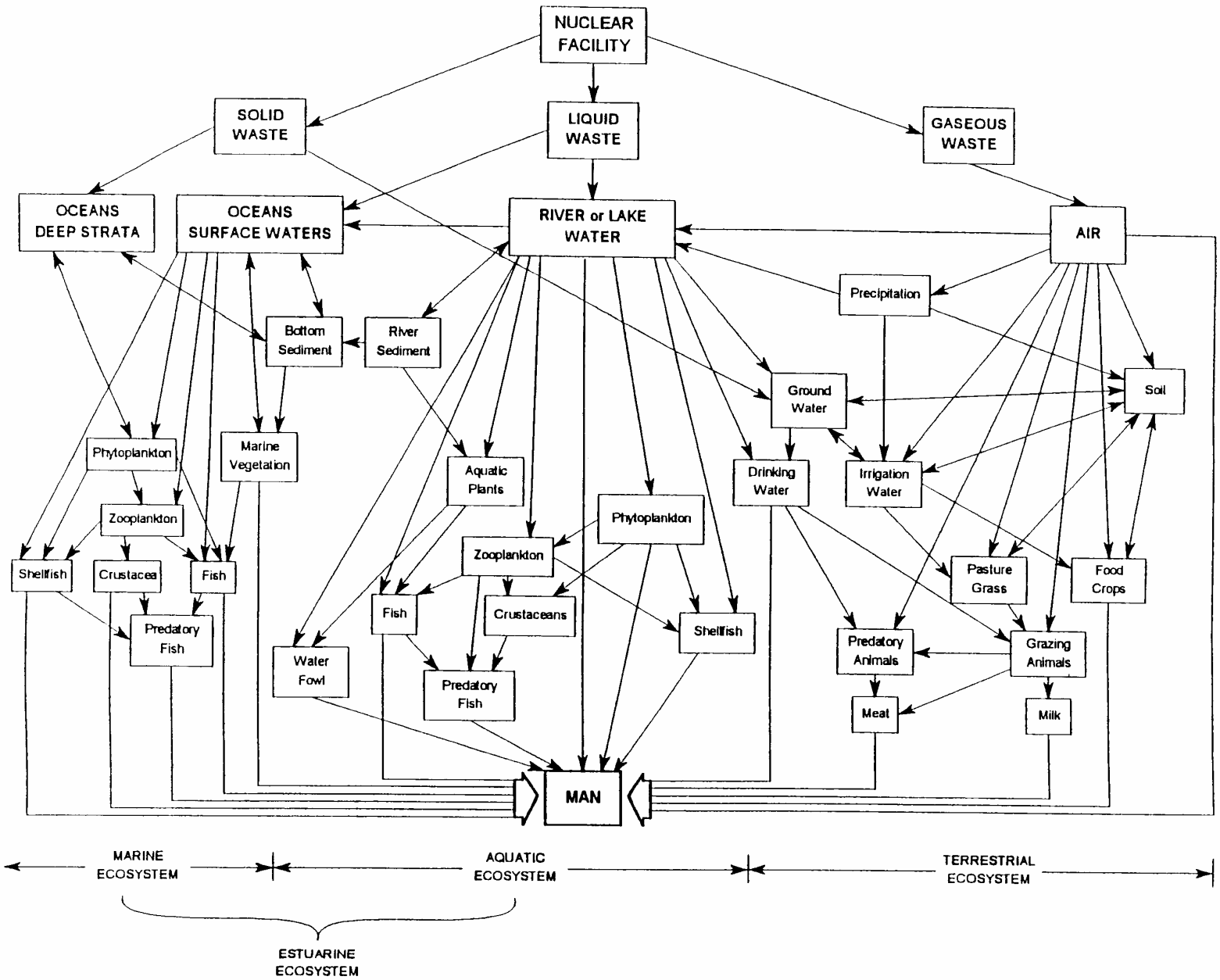


Figure 1. Potential Radiation Exposure Pathways Leading to Man

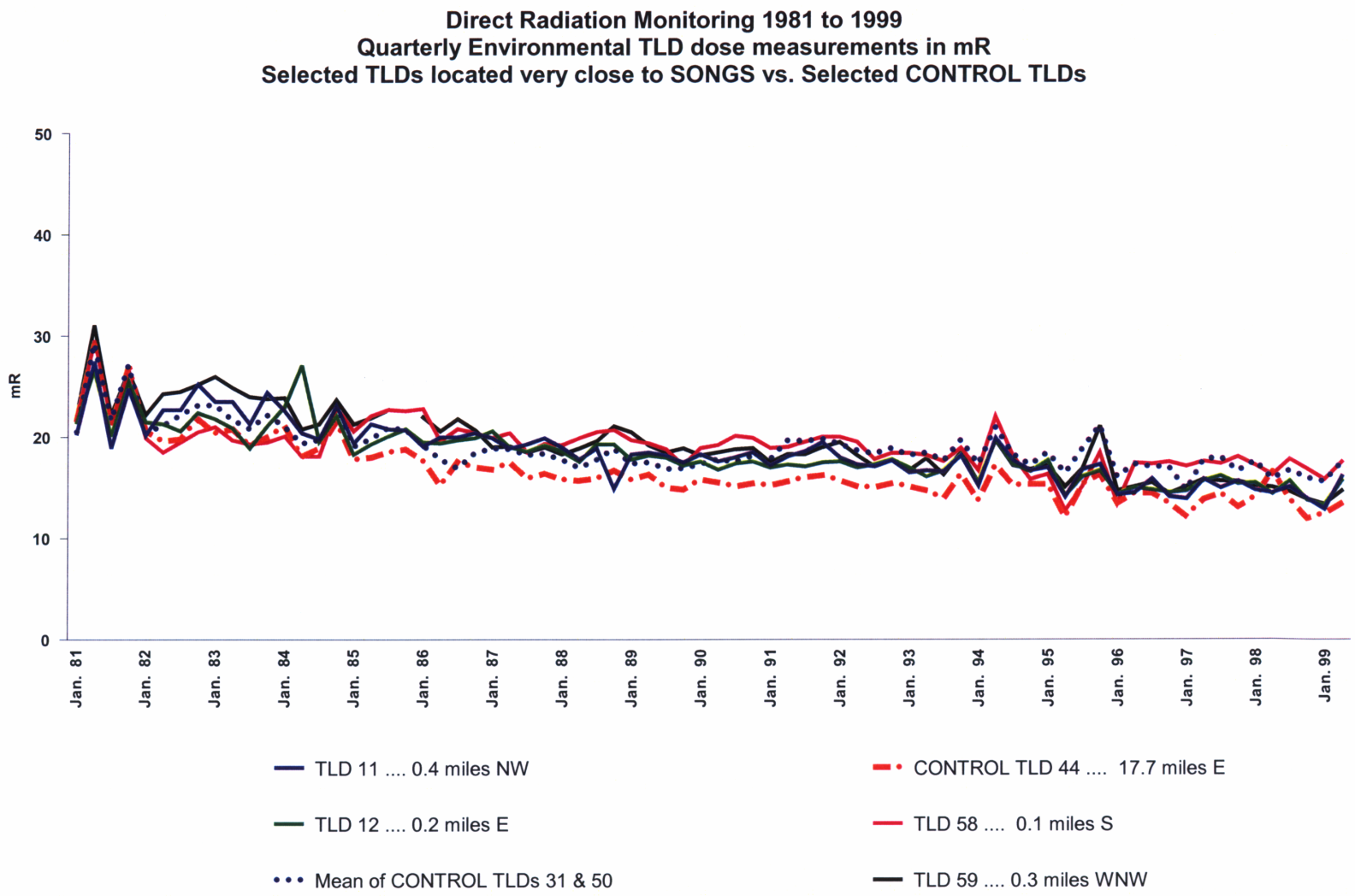

Direct Radiation Monitoring 1981 to 1999
Quarterly Environmental TLD dose measurements in mR
Selected TLDs located very close to SONGS vs. Selected CONTROL TLDs
mR
50
40
30
20
10
0
Jan. 81
Jan. 82
Jan. 83
Jan. 84
Jan. 85
Jan. 86
Jan. 87
Jan. 88
Jan. 89
Jan. 90
Jan. 91
Jan. 92
Jan. 93
Jan. 94
Jan. 95
Jan. 96
Jan. 97
Jan. 98
Jan. 99
TLD 11 .... 0.4 miles NW
TLD 12 .... 0.2 miles E
Mean of CONTROL TLDs 31 & 50
CONTROL TLD 44 .... 17.7 miles E
TLD 58 .... 0.1 miles S
TLD 59 .... 0.3 miles WNW

Figure 2A

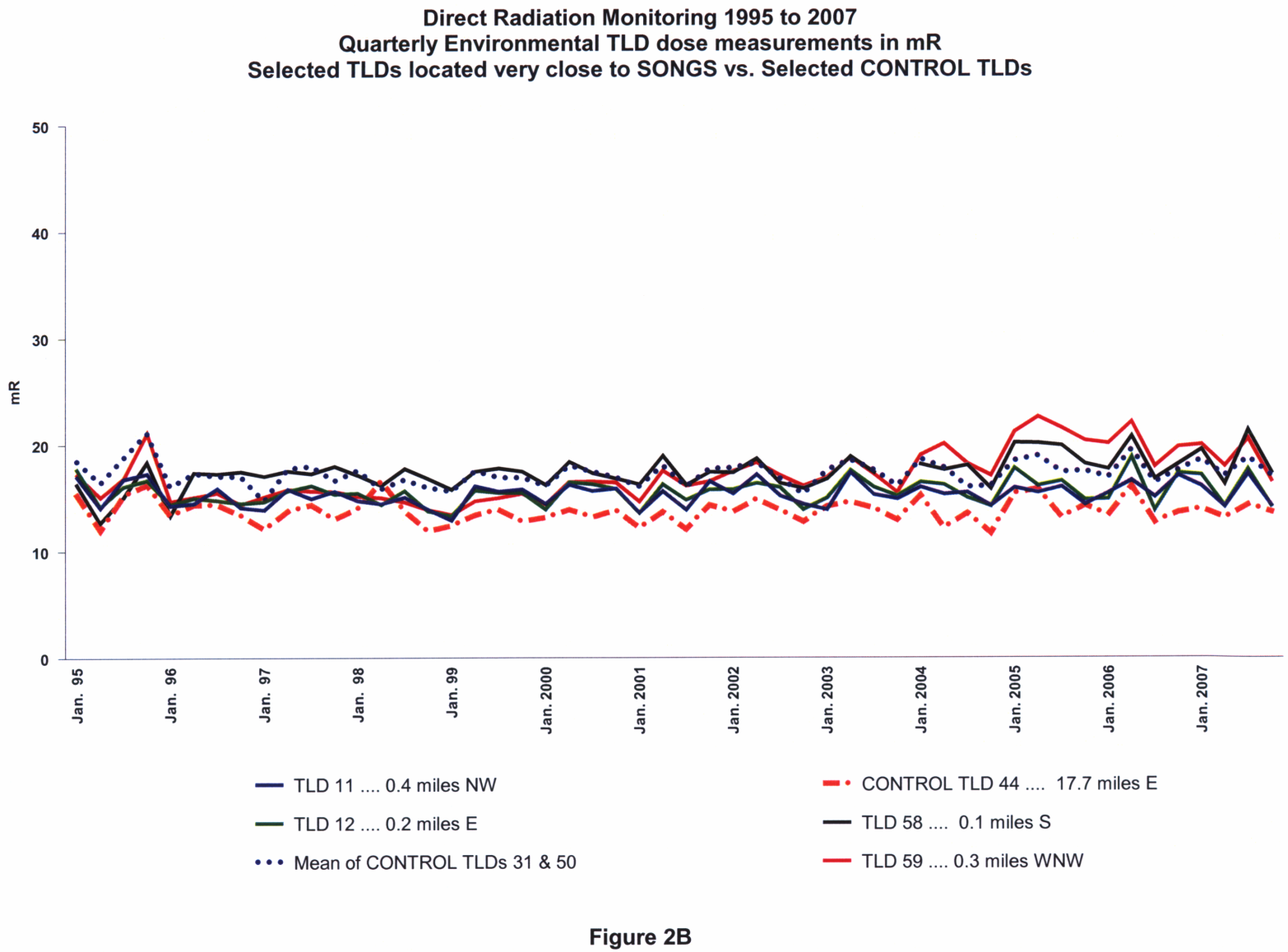

Direct Radiation Monitoring 1995 to 2007
Quarterly Environmental TLD dose measurements in mR
Selected TLDs located very close to SONGS vs. Selected CONTROL TLDs
mR
50
40
30
20
10
0
Jan. 95
Jan. 96
Jan. 97
Jan. 98
Jan. 99
Jan. 2000
Jan. 2001
Jan. 2002
Jan. 2003
Jan. 2004
Jan. 2005
Jan. 2006
Jan. 2007
TLD 11 .... 0.4 miles NW
TLD 12 .... 0.2 miles E
Mean of CONTROL TLDs 31 & 50
CONTROL TLD 44 .... 17.7 miles E
TLD 58 .... 0.1 miles S
TLD 59 .... 0.3 miles WNW

Figure 2B

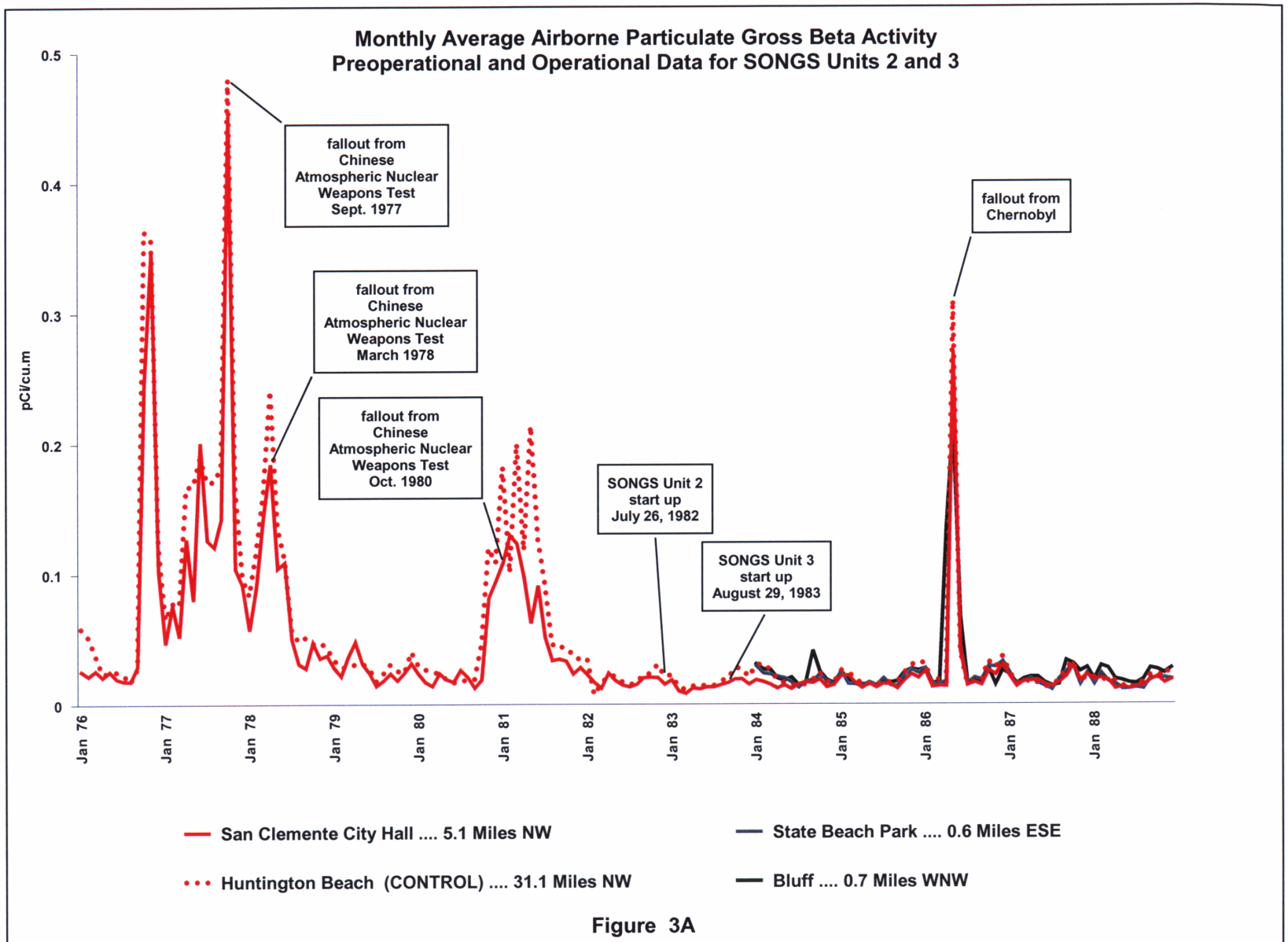

Monthly Average Airborne Particulate Gross Beta Activity
Preoperational and Operational Data for SONGS Units 2 and 3
pCi/cu.m
0.5
0.4
0.3
0.2
0.1
0
fallout from Chinese Atmospheric Nuclear Weapons Test Sept. 1977
fallout from Chinese Atmospheric Nuclear Weapons Test March 1978
fallout from Chinese Atmospheric Nuclear Weapons Test Oct. 1980
SONGS Unit 2 start up July 26, 1982
SONGS Unit 3 start up August 29, 1983
fallout from Chernobyl
Jan 76
Jan 77
Jan 78
Jan 79
Jan 80
Jan 81
Jan 82
Jan 83
Jan 84
Jan 85
Jan 86
Jan 87
Jan 88
San Clemente City Hall .... 5.1 Miles NW
Huntington Beach (CONTROL) .... 31.1 Miles NW
State Beach Park .... 0.6 Miles ESE
Bluff .... 0.7 Miles WNW

Figure 3A

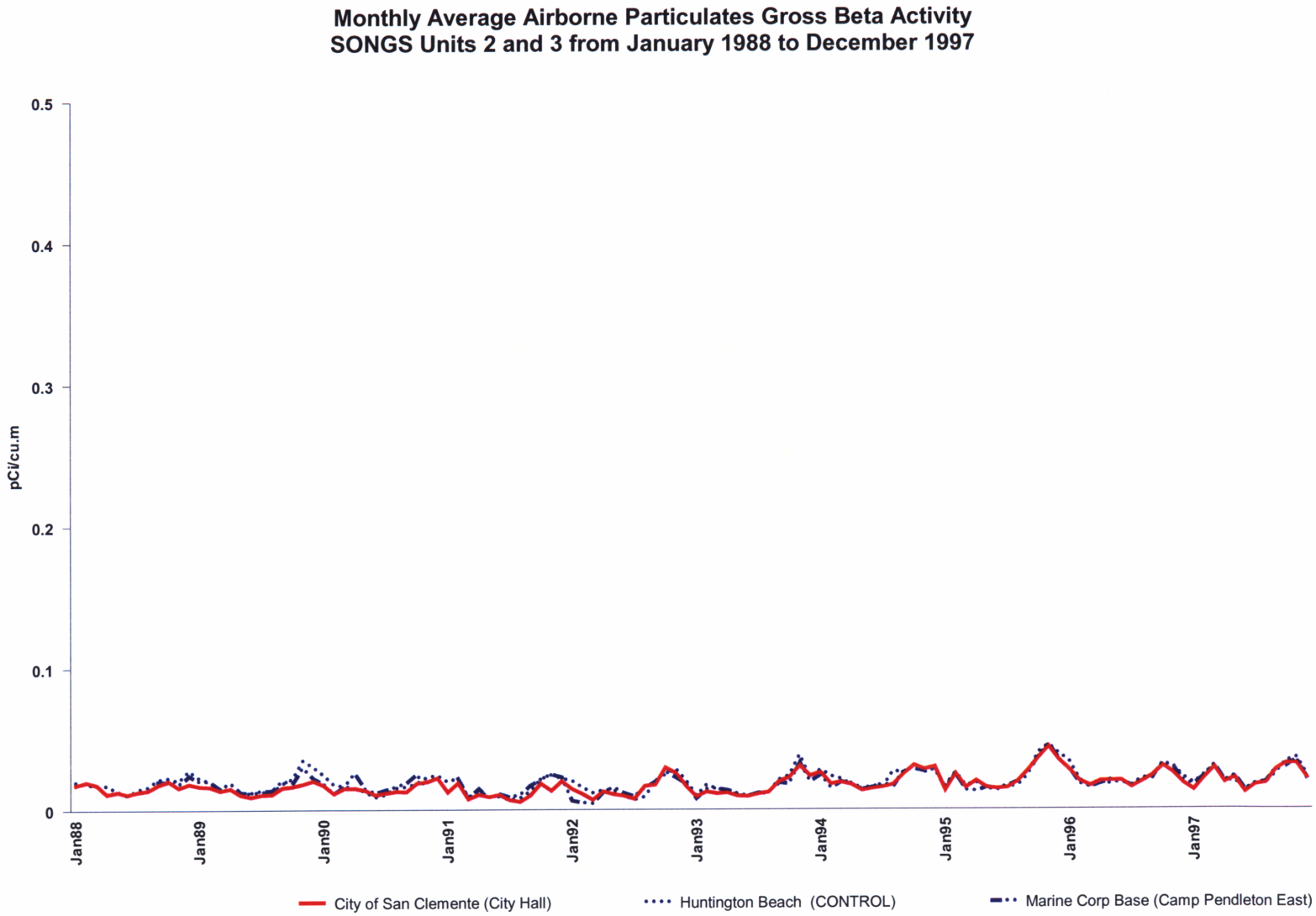

Monthly Average Airborne Particulates Gross Beta Activity
SONGS Units 2 and 3 from January 1988 to December 1997
pCi/cu.m
0.5
0.4
0.3
0.2
0.1
0
Jan88
Jan89
Jan90
Jan91
Jan92
Jan93
Jan94
Jan95
Jan96
Jan97
City of San Clemente (City Hall)
Huntington Beach (CONTROL)
Marine Corp Base (Camp Pendleton East)

Figure 3B

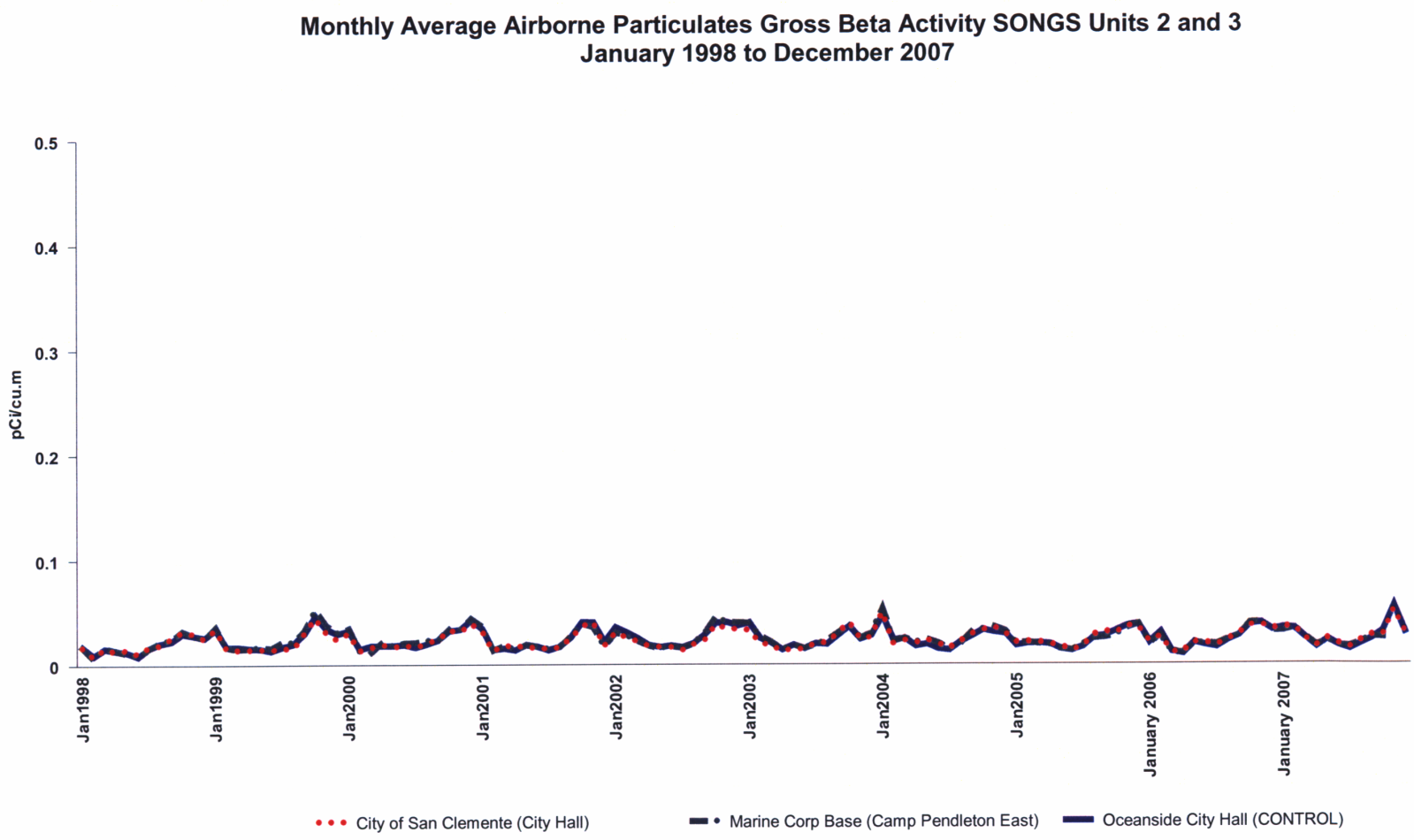

Monthly Average Airborne Particulates Gross Beta Activity SONGS Units 2 and 3
January 1998 to December 2007
pCi/cu.m
0.5
0.4
0.3
0.2
0.1
0
Jan1998
Jan1999
Jan2000
Jan2001
Jan2002
Jan2003
Jan2004
Jan2005
January 2006
January 2007
City of San Clemente (City Hall)
Marine Corp Base (Camp Pendleton East)
Oceanside City Hall (CONTROL)

Figure 3C

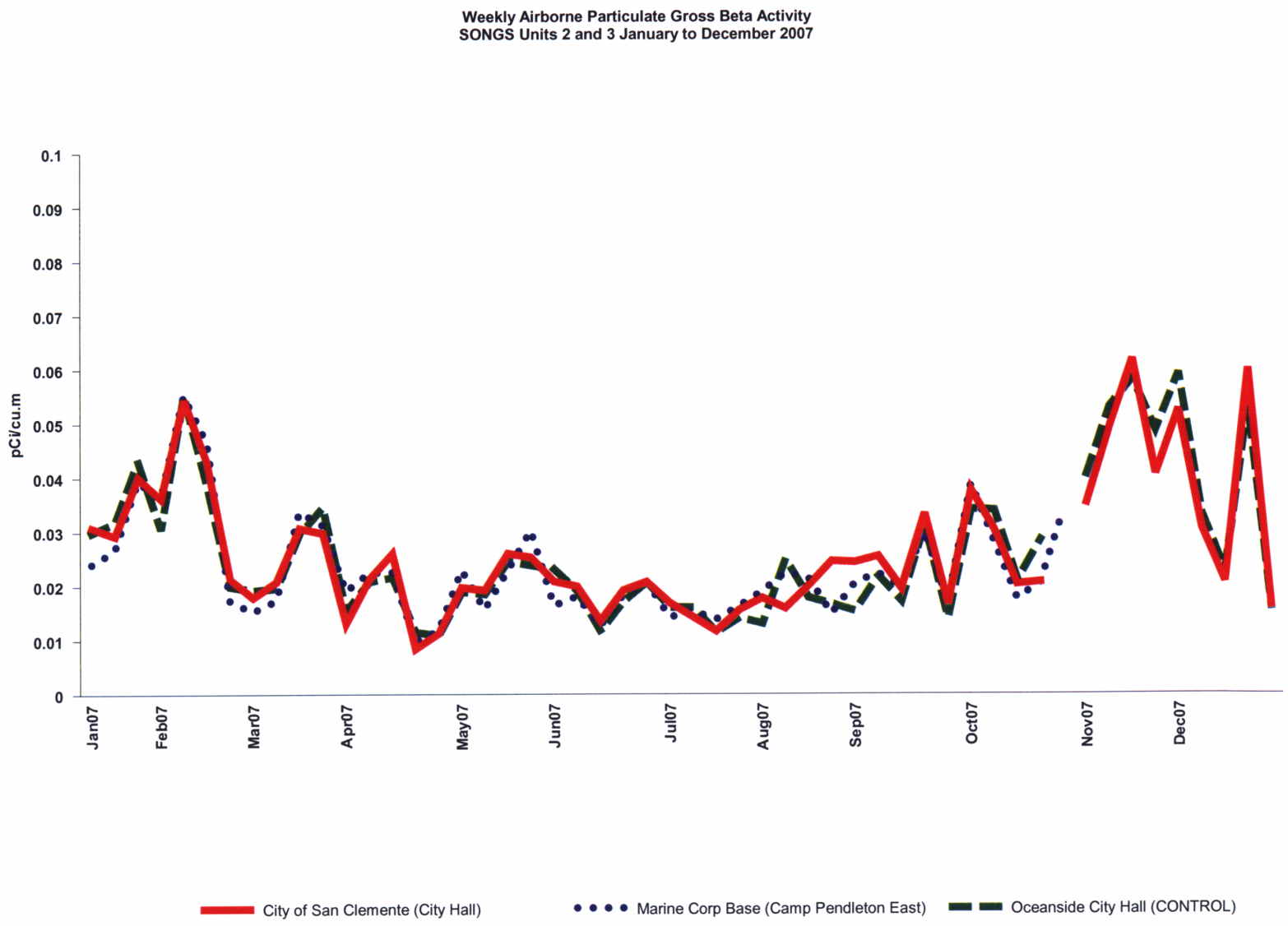

Weekly Airborne Particulate Gross Beta Activity
SONGS Units 2 and 3 January to December 2007
pCi/cu.m
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Jan07
Feb07
Mar07
Apr07
May07
Jun07
Jul07
Aug07
Sep07
Oct07
Nov07
Dec07
City of San Clemente (City Hall)
Marine Corp Base (Camp Pendleton East)
Oceanside City Hall (CONTROL)

Figure 3D

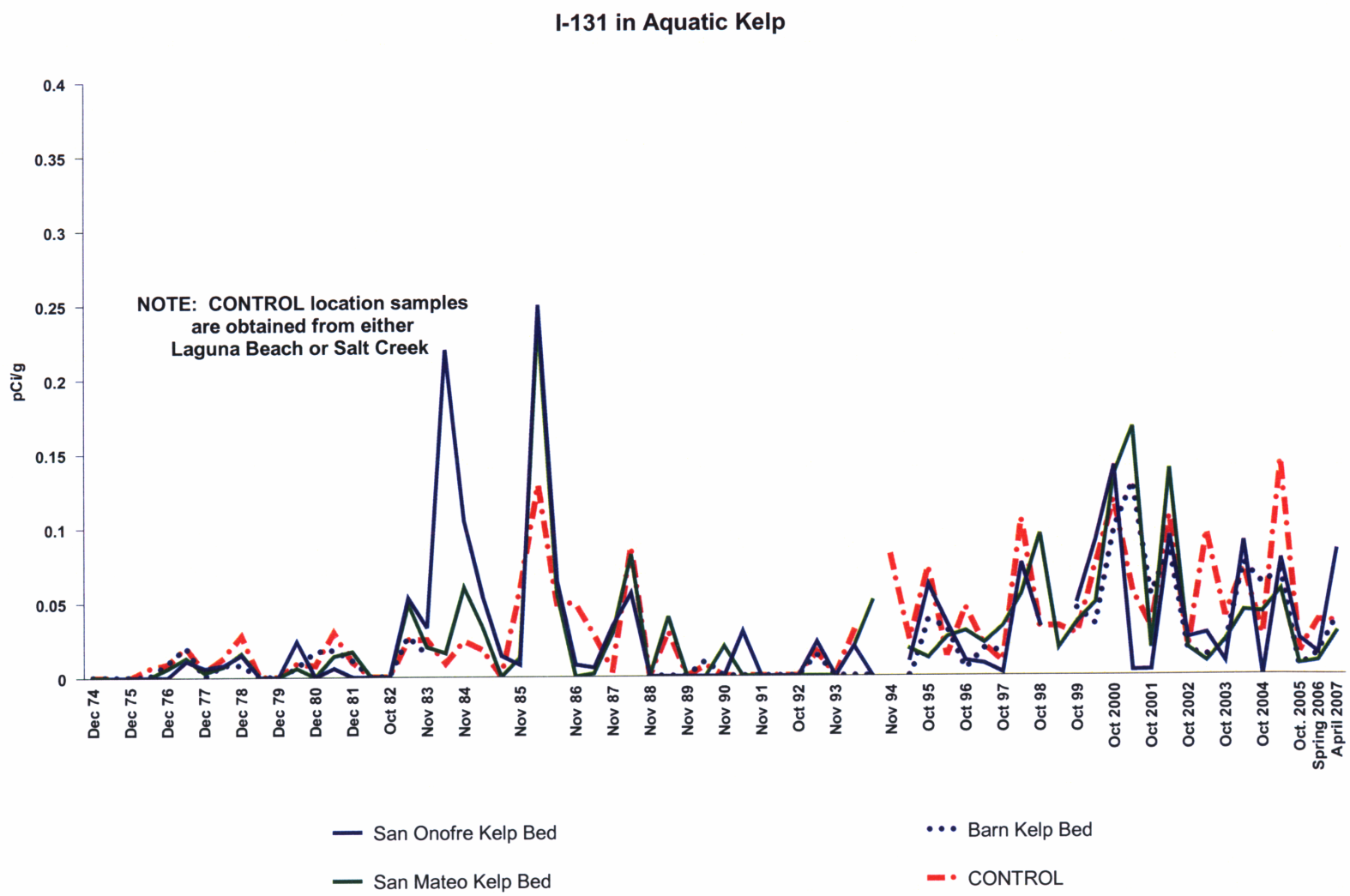

I-131 in Aquatic Kelp
pCi/g
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
NOTE: CONTROL location samples are obtained from either Laguna Beach or Salt Creek
Dec 74
Dec 75
Dec 76
Dec 77
Dec 78
Dec 79
Dec 80
Dec 81
Oct 82
Nov 83
Nov 84
Nov 85
Nov 86
Nov 87
Nov 88
Nov 89
Nov 90
Nov 91
Oct 92
Nov 93
Nov 94
Oct 95
Oct 96
Oct 97
Oct 98
Oct 99
Oct 2000
Oct 2001
Oct 2002
Oct 2003
Oct 2004
Oct. 2005
Spring 2006
April 2007
San Onofre Kelp Bed
San Mateo Kelp Bed
Barn Kelp Bed
CONTROL

Figure 4

APPENDIX H

ERRATA TO THE 2006 AREOR

All data required by the ODCM in 2006 was reported in the 2006 AREOR. There are no errata to be appended to the 2006 AREOR.

APPENDIX I

REMP TLDs CO-LOCATED WITH DHS TLDs DURING 2007

APPENDIX I

REMP TLDs CO-LOCATED WITH DHS TLDs DURING 2007

Requirements in the standard Technical Specifications adopted under the Technical Specifications Improvement Program include reporting results of those thermoluminescent dosimeters (TLDs) that are co-located with NRC dosimeters. The NRC no longer deploys TLDs in the environs of SONGS. Some SCE TLDs are located adjacent to the former NRC TLD locations and these SCE TLDs are listed below.

The DHS (Department of Health Services) also maintains a TLD program in the environs of SONGS. The DHS direct radiation monitoring program uses Landauer TLDs.

The below listed quarterly TLD data is from the SCE & DHS TLD programs. The NRC location numbers refer to the locations in the old NRC program.

2007 Data from SCE TLDs

Location Number	Location Name	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
SCE -1 , NRC -7, DHS #2	San Clemente	19.38	16.67	18.26	17.15
SCE -2, NRC -23, DHS #8	Camp San Mateo	19.49	18.18	20.66	18.04
SCE -3, NRC -19, DHS #9	Camp San Onofre	17.16	15.55	18.29	15.81
SCE -6, DHS #10	Old Route 101 (East-Southeast)	11.83	11.25	13.11	11.12
SCE 10, NRC -12, DHS #6	San Onofre Surfing Beach	17.14	16.16	17.63	14.66
SCE 16, DHS #7*	ESE Site boundary	22.69	18.43	19.25	17.58
SCE 22, NRC 11, DHS #4	Coast Guard Station	19.23	16.56	19.1	16.46
SCE -34, NRC -14, DHS #5	San Onofre Elementary School	17.68	14.87	17.16	14.31
SCE 41, NRC 25, DHS #11**	Old Route 101 (Unit 3)	16.12	14.82	17.12	14.98
SCE 50, NRC 32, DHS #13	Oceanside Fire Station	17.08	15.85	16.39	16.83

* SCE 16 is approximately 15 meters from DHS 7. DHS 7 is across Basilone Rd.
** SCE 41 is approximately 120 meters from DHS 11. Results included per DHS request.

Appendix J

ISFSI (Independent Spent Fuel Storage Installation) TLD Data

ISFSI (Independent Spent Fuel Storage Installation) TLD Data

Per 10 CFR 72.126, SONGS implemented an environmental TLD program in the vicinity of the ISFSI. In the fourth quarter of 2001, 21 pre-operational TLDs were deployed in the area around the ISFSI foundation then under construction. The pre-operational TLDs data are compared to the data obtained after the commencement of spent fuel storage in the ISFSI for the purposes of estimating the additional dose potentially attributable to the operation of the ISFSI.

Environmental dose rates are variable. The REMP TLD data show a seasonal variability that does not appear to be related to any activities at SONGS. Data from the REMP indicator and control TLDs increase and decrease in a synchronous manner. The data support the conclusion that macro-environmental factors are the causative agents for the variations. Refer to Figure 2a and 2b. The ISFSI TLD data gathered to date appears to follow a similar seasonal variability. Refer to Figures 6-1, 6-2, and 7a. In addition to environmental factors some non-ISFSI work activities at Unit 1 have elevated the pre-operational measured ISFSI TLD dose. The storage and transport of radioactive materials and waste near the location of the ISFSI foundation area in 2001 and 2002 appears to have elevated the dose rates of TLDs 306 to 315. In addition, the removal of the Unit 1 reactor vessel in October 2002 caused a noticeable increase in the measured dose for TLDs 301 to 315. Refer to Tables J-1 and J-2 which list all the REMP and ISFSI TLD data within the 10 CFR 72 Controlled Area Boundary and the 10 CFR 50 EAB (Exclusion Area Boundary).

The TLDs close to the ISFSI foundation (TLDs 306 to 315) all showed a decrease in measured dose after the commencement of spent fuel storage in the ISFSI. Refer to Table J-1. This decrease in measured dose may be attributable to the aforementioned seasonal variability of environmental dose rates or it may be attributable to the decrease in non-ISFSI radioactive material work activity in the Unit 1 area.

In the first quarter 2004, 3 TLDs were placed on the perimeter fence 15 meters SW of the ISFSI module. These TLDs (336, 337, and 338) showed the highest measured dose in 2007. The closest publicly accessible location SW of the ISFSI is the San Onofre Beach access road. The TLDs located along the access road measured a dose indistinguishable from background in 2007.

The measured ISFSI TLD dose rate was compared to the calculated ISFSI dose rates (calculation SCE-23.0508). The measured dose rates correlate well with the calculated dose rates.

We conclude that dose attributable to the storage of spent fuel in the ISFSI is not measurable beyond the immediate area of the ISFSI and is well below regulatory limits. We further conclude that dose to a member of the general public attributable to all SONGS related radiological activities at the EAB is below 10 CFR 72.104 limits.

TABLE J-1
ISFSI TLD DATA

ISFSI TLD Number Location	2001	2002				2003				2004			
	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr (1)	1st Qtr	2nd Qtr	3rd Qtr (2)	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
TLD 301 (3)	17.3	18.42	17.91	18.51	24.56	17.23	18.47	17.09	17.39	18.86	18.0	17.7	15.49
TLD 302 (3)	20.28	20.67	19.59	19.46	125.78	20.32	20.77	19.3	21.97	23.57	26.37	20.02	19.11
TLD 303 (3)	18.96	18.82	18.26	18.11	156.89	20.45	25.74	26.56	27.06	28.54	29.98	24.59	24.72
TLD 304 (3)	18.06	19.1	18.28	17.95	64.53	19.57	28.34	33.25	31.8	34.72	33.22	29.74	28.44
TLD 305 (3)	18.99	20.49	19.68	19.82	147.33								
TLD 306 (3)	17.23	18.56	16.91	17.07	29.6	19.03	19.75	17.3	17.27	18.85	17.31	15.7	16.08
TLD 307 (3)	17.34	19.61	17.68	17.36	23.35	24.07	20.3	16.24	16.82	18.07	17.62	15.53	15.11
TLD 308 (3)	18.75	20.11	18.9	18.68	27.22	21.82	21.31	18.35	18.73	20.55	21.72	18.11	15.82
TLD 309 (3)	18.74	23.09	23.43	24.43	30.53	21.78	20.49	18.44	16.85	20.15	21.44	18.72	17.34
TLD 310 (3)	19.79	25.82	23.47	21.49	25.8	20.74	19.05	18.96	17.59	21.17	21.28	18.19	17.15
TLD 311 (3)	21.29	29.93	25.33	26.43	26.61	25.24	23.59	21.8	19.99	19.06	20.43	18.04	17.52
TLD 312 (3)	21.86	34.08	28.45	30.07	26.45	28.46	27.71	19.88	16.15	15.5	13.87	15.23	13.35
TLD 313 (3)	24.95	36.84	28.78	26.49	25.44	25.78	26.34	25.6	23.4	22.87	21.14	20.68	20.0
TLD 314 (3)	20.67	22.28	20.15	19.58	18.8	19.74	20.23	19.3	19.85	18.84	19.06	17.68	15.83
TLD 315 (3)	23.37	25.7	22.77	22.58	20.82	24.06	23.18	22.77	21.49	20.89	21.36	19.26	18.13
TLD 316 (4)	16.96	18.81	17.83	16.29	18.01	16.72	17.76	16.01	14.97	16.68	19.06	15.15	14.45
TLD 317 (4)	18.07	19.87	20.62	17.95	18.43	16.86	18.82	17.12	16.02	17.41	17.51	16.96	14.94
TLD 318 (4)	17.86	18.91	19.59	18.4	18.3	17.62	19.01	17.72	16.95	18.15	18.31	16.34	16.37
TLD 319 (4)	17.78	19.76	20.01	19.02	18.35	19.14	19.54	18.57	15.88	17.22	19.19	16.48	16.54
TLD 320 (4)	17.83	19.39	19.11	18.34	18.25	17.78	19.41	17.8	16.94	16.36	19.18	16.34	15.93
TLD 321 (4)	18.52	19.84	20.45	18.67	19.41	19.83	21.1	18.46	17.82	18.89	20.8	16.92	15.5
TLD 336										39.12	31.35	30.77	24.63
TLD 337										36.03	49.65	65.77	47.51
TLD 338										45.83	38.84	36.06	30.27

(1) Large Component Removal and start of the long term storage of the Unit 1 Reactor Vessel.
(2) Fuel loaded into the ISFSI pad September 2003.
(3) These TLDs are in an area where radiological materials have been stored or transported.
(4) These TLDs are not in the proximity of radiological activities.

TABLE J-1
ISFSI TLD DATA

ISFSI TLD Number Location	2005				2006				2007			
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr (1)	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
TLD 301 (3)	22.05	33.23	31.2	27.44	31.54	26.99	20.41	18.96	18.11	15.62	19.39	15.76
TLD 302 (3)	31.04	45.99	41	40.43	40.3	35.93	28.72	20.75	19.98	17.1	20.76	16.98
TLD 303 (3)	33.14	49.45	41.54	38.53	39.16	34.51	29.14	25.08	24.93	21.13	20.21	18.09
TLD 304 (3)	34.63	42.62	41.1	37.05	36.66	37.95	29.07	29.71	27.48	25.27	21.85	16.89
TLD 306 (3)	19.92	20.4	20.44	19.24	19.68	24.01	17.65	18.5	19.04	15.95	19.56	17.00
TLD 307 (3)	20.26	24.94	22.08	20.98	21.48	23.22	16.98	16.66	16.93	14.97	19.26	19.07
TLD 308 (3)	21.81	25.3	23.88	23.1	23.42	23.89	18.01	17.82	18.00	14.94	20.56	20.41
TLD 309 (3)	22.1	20.61	19.53	18.14	18.95	22.54	17.08	19.25	17.83	16.86	19.76	19.09
TLD 310 (3)	20.66	20.91	21.08	20.26	20.27	24.21	17.92	19.01	19.21	17.36	20.63	19.22
TLD 311 (3)	21.85	20.94	20.61	19.35	19.48	23.91	17.82	19.49	19.51	16.88	19.27	18.08
TLD 312 (3)	16.88	15.67	15.57	13.81	14.99	19.36	16.18	16.08	15.29	13.47	15.84	14.24
TLD 313 (3)	26.97	26.36	26.45	25.93	26.33	33.12	36.28	25.34	22.97	20.26	20.33	
TLD 314 (3)	21.79	20.26	20.83	20.05	20.67	28.09	45.96	24.18	18.31	15.54	17.7	17.12
TLD 315 (3)	22.84	20.28	20.61	19.65	20.61	28.62	36.53	22.32	18.54	16.36	18.67	18.36
TLD 316 (4)	19.02	18.62	19.7	19.5	19.34	21.3	14.77	16.59	17.15	13.08	16.18	15.76
TLD 317 (4)	20.04	21.48	21.19	19.89	21.21	23.92	17.57	16.77	17.54	14.28	17.21	15.88
TLD 318 (4)	21.56	19.82	19.23	18.44	19.22	23.38	16.96	17.93	20.25	15.77	20.37	17.59
TLD 319 (4)	20.94	19.42	19.02	18.13	18.23	21.76	15.88	16.45	19.86	15.11	18.31	17.52
TLD 320 (4)	21.89	19.91	20.42	19.54	20.39	23.05	17.29	17.1	19.68	15.64	18.66	16.89
TLD 321 (4)	21.34	20.15	20.83	20.12	20.75	23.67	17.9	18.03	20.48	16.71	18.91	17.94
TLD 336	39.5	63.71	67.54	73.3	78.47	51.74	61.25	34.02	60.62	61.1	64.19	
TLD 337	54.46	64.07	59.43	68.36	62.62	92.87	116.8	44.67	54.8	39.09	43.46	
TLD 338	40.18	44.51	42.75	46.49	42.78	45.02	51.58	36.63	34.45	26.48	29.42	

(1) Large Component Removal and start of the long term storage of the Unit 1 Reactor Vessel.
(2) Fuel loaded into the ISFSI pad September 2003.
(3) These TLDs are in an area where radiological materials have been stored or transported.
(4) These TLDs are not in the proximity of radiological activities.

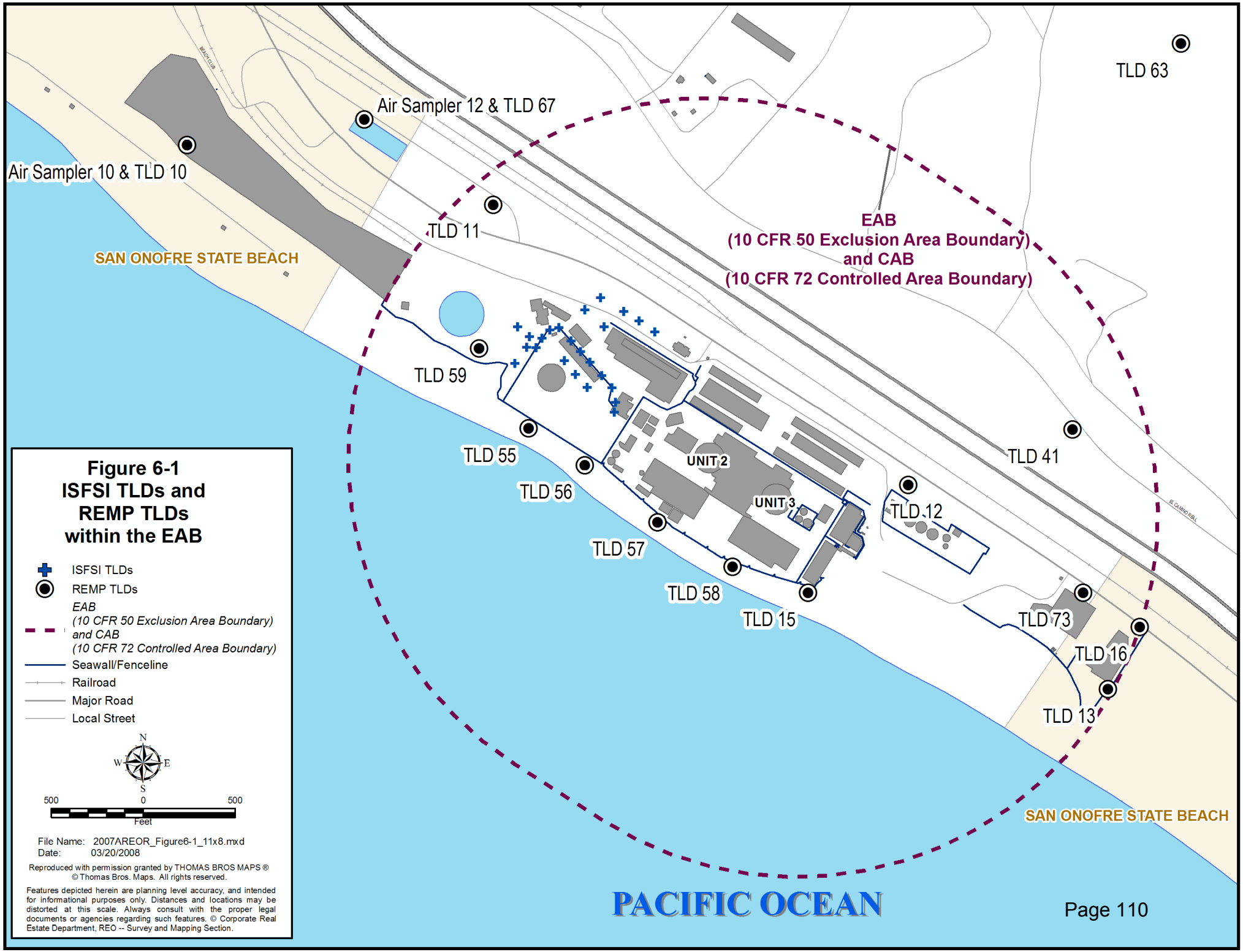
TABLE J-2
REMP TLDs WITHIN THE EAB

REMP TLD Number Location	2001				2002				2003				2004			
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr (1)	1st Qtr	2nd Qtr	3rd Qtr (2)	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
11	13.61	15.63	13.89	16.57	15.39	17.2	15.17	14.38	13.89	17.43	15.29	14.93	16.02	15.35	15.52	14.26
12	13.59	16.28	14.81	15.79	15.75	16.4	16.01	13.93	14.96	17.64	16.04	15.19	16.49	16.25	15.01	14.22
13	28.13	33.16	38.84	31.06	31.03	37.64	38.2	22.62	27.26	28.38	33.11	21.08	21.67	20.34	22.45	22.84
15	15.63	18.37	16.07	17.76	17.32	20.82	16.79	15.63	16.52	19.11	15.44	16.36	17.37	16.23	19.52	16.95
16	17.46	18.16	19.61	17.66	17.14	18.25	17.91	13.61	15.04	18.48	17.77	15.53	19.27	17.62	16.31	15.37
41	13.51	16.47	14.3	14.63	15.24	17.41	15.13	13.32	15.98	16.41	14.32	15.03	16.26	14.45	14.85	13.85
55	17.11	19.37	15.93	18.98	20.11	19.89	17.67	17.84	18.08	19.86	18.04	18.2	20.06	16.67	18.67	16.72
56	16.39	19.17	15.57	18.77	18.11	20.12	17.31	17.05	17.84	19.71	17.11	17.26	19.12	17.63	17.63	16.69
57	15.88	18.51	16.29	19.19	17.96	19.09	16.03	15.8	16.18	17.44	16.69	15.85	17.8	16.64	15.56	16.69
58	16.29	18.97	16.22	17.45	17.4	18.65	16.39	15.88	16.75	18.94	17.39	(3)	18.17	17.66	18.08	15.88
59	14.65	17.56	16.14	16.54	17.45	18.31	17.12	16.11	16.88	18.79	17.23	15.51	19.0	20.07	18.18	17.08
73	22.97	25.29	22.41	22.71	22.94	23.48	24.9	21.47	22.1	23.91	22.53	22.47	23.02	22.02	23.64	20.67

(1) Large Component Removal and the start of the long term storage of the Unit 1 Reactor Vessel.
(2) Spent Fuel Storage started at the ISFSI
(3) TLD damaged; no data available.

TABLE J-2
REMP TLDs WITHIN THE EAB

REMP TLD Number Location	2005				2006				2007			
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
11	15.96	15.49	16.04	14.38	15.44	16.62	15.06	17.08	16.07	14.14	17.28	14.29
12	17.79	16.14	16.59	14.81	14.87	18.82	13.82	17.3	17.12	14.21	17.7	14.75
13	24.28	29.32	25.68	17.95	23.52	31.94	34.84	28.16	32.85	24.77	27.52	30.7
15	20.94	19.06	19.29	17.7	18.84	20.97	18.69	20.14	21.28	18.98	21.51	18.99
16	22.12	18.18	17.2	16.16	15.78	20.39	19.88	20.84	22.69	18.43	19.25	17.58
41	16.66	17.04	15.45	14.47	14.76	17.71	14.95	15.84	16.12	14.82	17.12	14.98
55	21.64	21.73	19.07	20.51	20.95	21.69	18.44	16.78	19.99	16.64	20.34	15.34
56	20.66	21.39	19.59	18.75	20.7	22.99	18.84	17.76	19.5	16.73	19.76	15.79
57	21.4	21.79	19.86	19.1	18.73	21.63	17.7	18.41	20.02	16.89	21.00	16.84
58	20.19	20.15	19.93	18.2	17.71	20.78	16.78	18.16	19.53	16.32	21.4	17.44
59	21.18	22.58	21.52	20.35	20.07	22.08	17.89	19.74	19.94	17.93	20.53	16.59
73	26.83	24.81	23.35	22.34	21.12	23.52	24.27	25.2	26.60	22.96	24.05	20.37


Air Sampler 12 & TLD 67
Air Sampler 10 & TLD 10
TLD 63
TLD 11
SAN ONOFRE STATE BEACH
EAB
(10 CFR 50 Exclusion Area Boundary)
and CAB
(10 CFR 72 Controlled Area Boundary)
TLD 59
TLD 55
TLD 56
UNIT 2
UNIT 3
TLD 41
TLD 12
TLD 57
TLD 58
TLD 15
TLD 73
TLD 16
TLD 13
SAN ONOFRE STATE BEACH
PACIFIC OCEAN
Figure 6-1
ISFSI TLDs and
REMP TLDs
within the EAB
ISFSI TLDs
REMP TLDs
EAB
(10 CFR 50 Exclusion Area Boundary)
and CAB
(10 CFR 72 Controlled Area Boundary)
Seawall/Fenceline
Railroad
Major Road
Local Street
N
W
E
S
500
0
500
Feet
File Name: 2007AREOR_Figure6-1_11x8.mxd
Date: 03/20/2008
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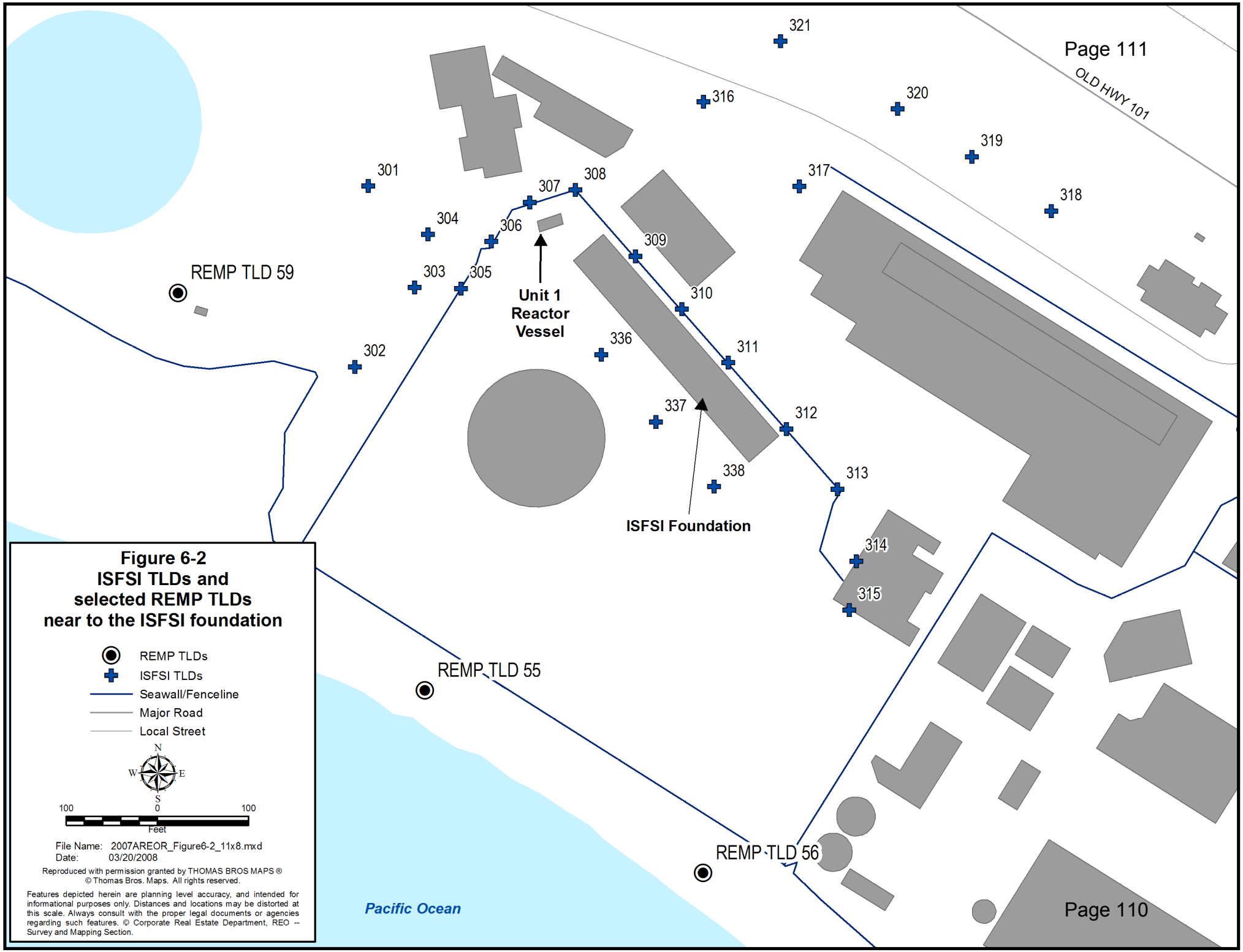


Figure 6-2
ISFSI TLDs and selected REMP TLDs near to the ISFSI foundation

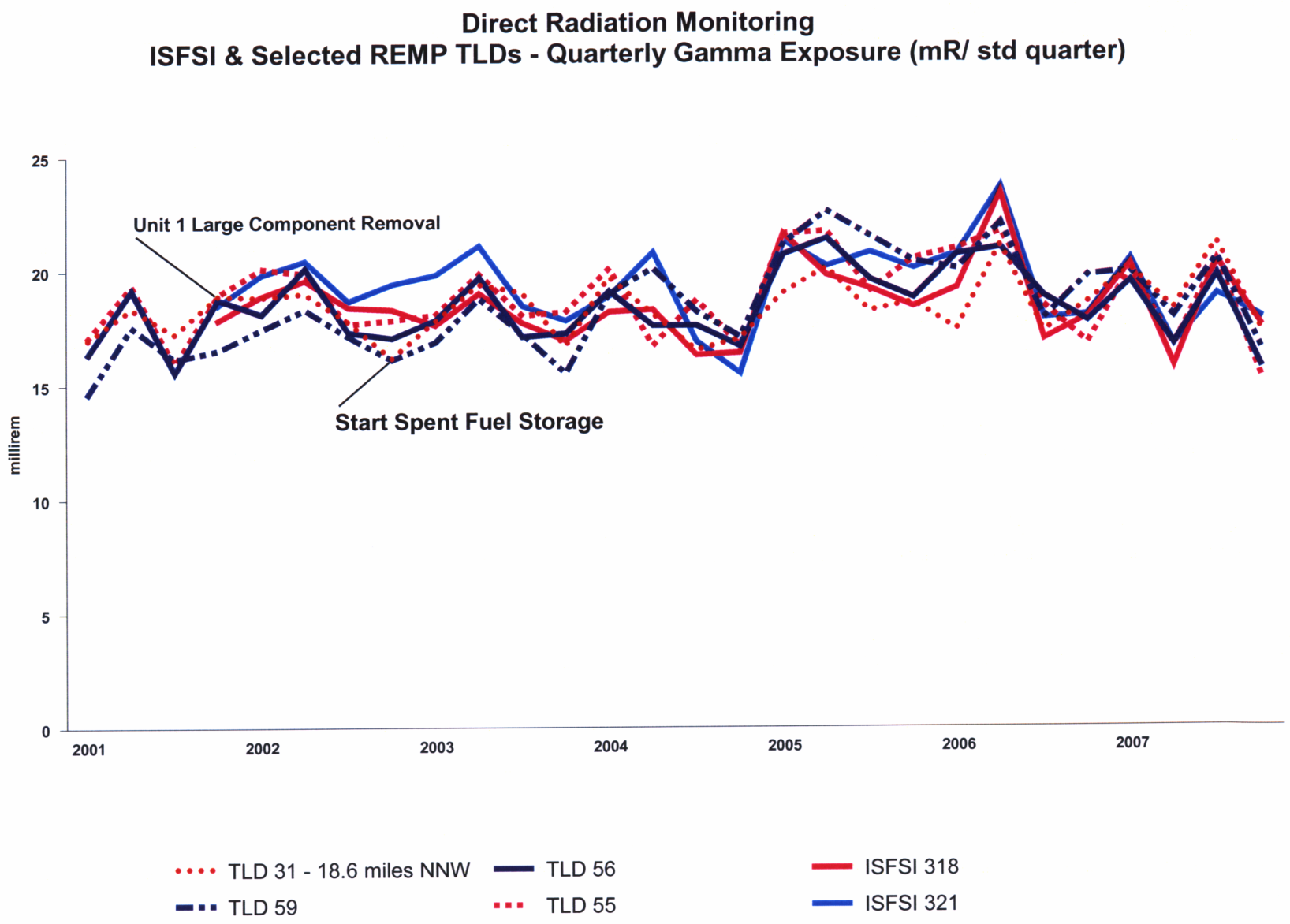

Direct Radiation Monitoring
ISFSI & Selected REMP TLDs - Quarterly Gamma Exposure (mR/ std quarter)
millirem
25
20
15
10
5
0
2001
2002
2003
2004
2005
2006
2007
Unit 1 Large Component Removal
Start Spent Fuel Storage
TLD 31 - 18.6 miles NNW
TLD 56
ISFSI 318
TLD 59
TLD 55
ISFSI 321

Figure 6A

Appendix K

Local Drinking Water Wells

Local Drinking Water Well Data

Samples collected from the drinking water wells closest to SONGS were analyzed in October 2006. See figure 7-1 for the well locations and the groundwater directional flow.

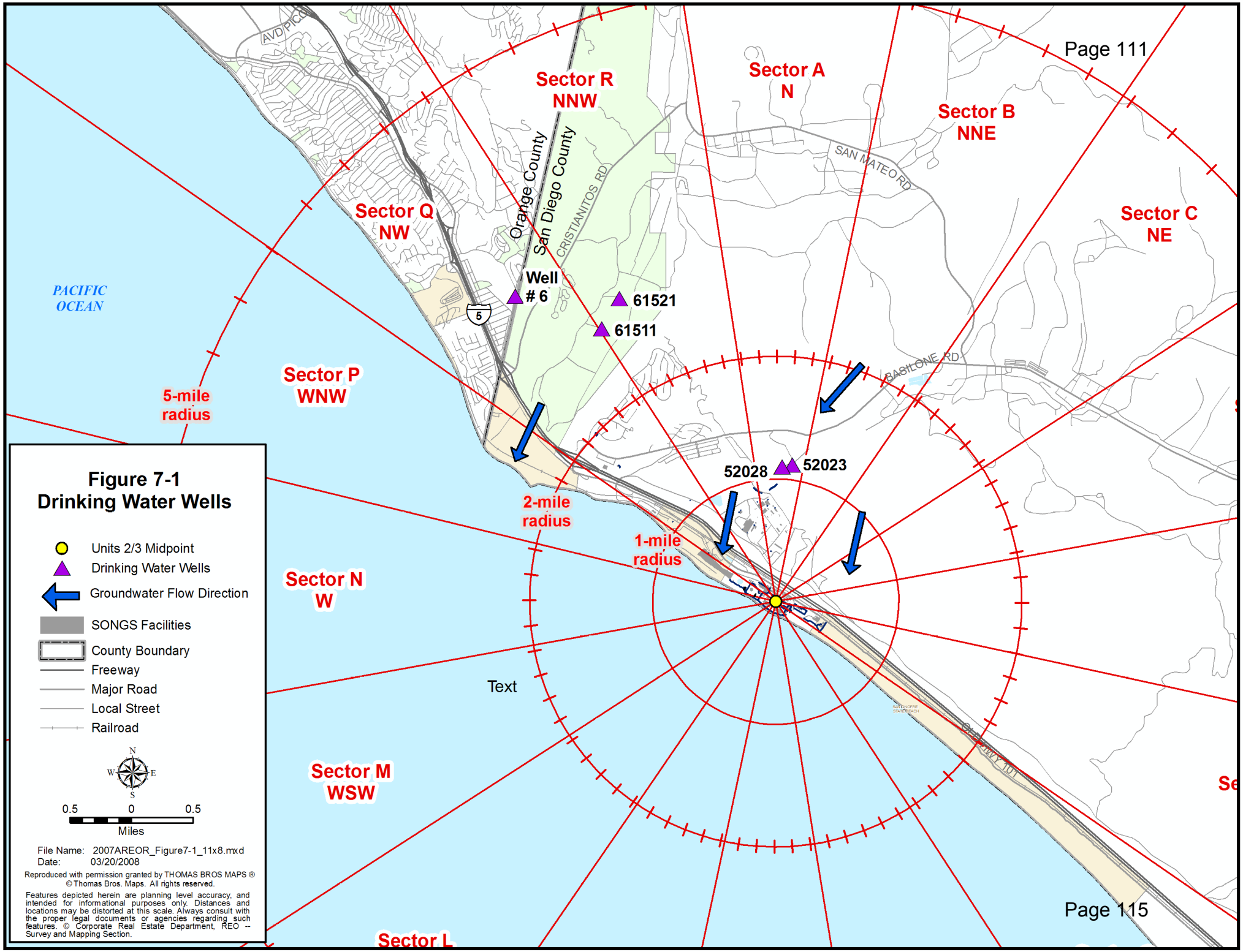
The analysis results are summarized below. The 2007 data for San Clemente well # 6 is included in the data summary contained in Appendix B.

Summary of local drinking water well analyses

Camp Pendleton Well # 530028	< LLD tritium	< LLD gamma isotopic
Camp Pendleton Well # 530028	< LLD tritium	< LLD gamma isotopic
Camp Pendleton Well # 530028	< LLD tritium	< LLD gamma isotopic
Camp Pendleton Well # 530028	< LLD tritium	< LLD gamma isotopic
San Clemente Well # 6	< LLD tritium	< LLD gamma isotopic

Local drinking water well *a priori* LLDs

Tritium	2000 pCi/ℓ
Mn54	15 pCi/ℓ
Fe59	30 pCi/ℓ
Co58	15 pCi/ℓ
Co60	15 pCi/ℓ
Zr95	15 pCi/ℓ
Nb95	15 pCi/ℓ
I-131	15 pCi/ℓ
Cs134	15 pCi/ℓ
Cs137	18 pCi/ℓ
Ba140	15 pCi/ℓ
La140	15 pCi/ℓ


Sector R
NNW
Sector A
N
Sector B
NNE
Sector C
NE
Sector Q
NW
Sector P
WNW
Sector N
W
Sector M
WSW
Sector L
Orange County
San Diego County
CRISTIANITOS RD
SAN MATEO RD
BASILONE RD
AVD PICO
PACIFIC
OCEAN
Well
6
61521
61511
52028
52023
5-mile
radius
2-mile
radius
1-mile
radius
Text
Page 115
Figure 7-1
Drinking Water Wells
Units 2/3 Midpoint
Drinking Water Wells
Groundwater Flow Direction
SONGS Facilities
County Boundary
Freeway
Major Road
Local Street
Railroad
N
W
E
S
0.5
0
0.5
Miles
File Name: 2007AREOR_Figure7-1_11x8.mxd
Date: 03/20/2008
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