Enclosure 1

# ANNUAL OPERATING REPORT

# OF

# SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1

# FOR 1980

## MAINTENANCE, DESIGN CHANGES, AND RADIOLOGICAL

## ENVIRONMENTAL MONITORING

SOUTHERN CALIFORNIA EDISON COMPANY
SAN DIEGO GAS AND ELECTRIC COMPANY

DOCKET NO. 50-206

LICENSE NO. DPR-13

SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

CORRECTIVE MAINTENANCE OF COMPONENTS DESIGNED TO MINIMIZE THE RELEASE OF TOXIC OR RADIOACTIVE MATERIALS TO THE ENVIRONMENT

Docket No. 50-206
San Diego County, California

Reporting Period January - December, 1980

| COMPONENT | MALFUNCTION | | EFFECT ON PLANT OPERATION | CORRECTIVE ACTION | PRECAUTION TAKEN TO PROVIDE FOR ENVIRONMENT'S PROTECTION |
|---|---|---|---|---|---|
| | CAUSE | EFFECT | | | |
| North Waste Gas Compressor | Motor Burned Up | Compressor Inoperative | None | Replaced Motor | Alternate Processing |
| North Waste Gas Compressor | Faulty Valves and Motor | No Discharge Pressure | None | Overhaul Compressor Replace Motor | Alternate Processing |
| 3 Air Samplers | Misc. Malfunctions | Samplers Inoperative | None | Overhaul Air Samplers | Spare Air Samplers Used |
| Radwaste Discharge Filter | Filter Plugged | Low Flow | None | Replace Filter Elements | None Required |
| ORMS Detector 1218 | Contaminated | High Background | None | Decontaminate Detector | None Required |
| | | | | | |
| | | | | | |

SAN ONOFRE NUCLEAR GENERATING STATION

## DESIGN CHANGES APPROVED DURING THE YEAR 1980

The following design changes were approved for implementation by the On-Site Review Committee in 1980. Except as noted, the design changes were fully implemented as of the end of the calendar year 1980. This list fulfills the reporting requirements of Section 5.6.1b of the Environmental Technical Specifications. With respect to this requirement, none of the 1980 changes resulted in a condition which significantly altered the impact of the Station on the environment as described in the NRC Final Environmental Statement and did not involve a change in the Environmental Technical Specifications incorporated in the San Onofre Unit 1 Provisional Operating License DPR-13.

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1. DESIGN CHANGE 80-02: MODIFICATION TO VENT VALVE ACTUATORS TO LIMIT OPENING TO 50°

   This plant modification will provide stops to limit the opening of vent valves CV-10 and CV-116 to 50° from the fully closed position as required by the NRC letter of October 23, 1979. This modification was committed to for the January outage in SCE letter of January 15, 1980, to D. L. Ziemann of the NRC from K. P. Baskin. (See Page 3 of letter.)

   The reason for this change is to satisfy NRC requirements as stated in NRC letter of October 23, 1979, to "limit the valves to be no more than 30° to 50° open."

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2. DESIGN CHANGE 80-04: THE INSTALLATION OF CONTAINMENT HYDROGEN RECOMBINERS (TMI) (IN PROGRESS)

   This plant modification consists of the addition of necessary supports for redundant safety related quality class hydrogen recombiners inside the containment sphere to deal with the long-term post LOCA generation of hydrogen.

   The recombiners scheduled to be installed during a projected January 1981 outage will be mounted on steel platforms extended from the A&C steam generator enclosure structures at elevation 53'-6". Access ladders will be provided from the operation deck (el. 42'-0") to the platform for required normal maintenance.

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3. DESIGN CHANGE 80-07: ADDITION OF MECHANICAL PENETRATIONS (In Progress)

This plant modification consists of the addition of containment penetrations only, for sampling lines for obtaining samples of the reactor coolant and of the containment atmosphere. The sampling lines and associated systems will be incorporated by a future design change to be prepared later in 1981.

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4. DESIGN CHANGE 80-28: (Revision 2): POST-ACCIDENT SAMPLING STATION (In Progress)

The purpose of this design change is to provide a shielded underground sample station which will be constructed to house the Post-Accident Sample System. The underground arrangement will minimize personnel exposure and preserve space for normal station activities.

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5. DESIGN CHANGE 80-30: INCREASED RANGE OF NOBLE GAS EFFLUENT RADIATION MONITOR (In Progress)

This design change consists of an extended range plant stack effluent radiation monitor that will be capable of measuring post-accident noble gas activity, as Xe-133, from concentrations of ALARA ($1 \times 10^{-7}$ µCi/cc) to $1 \times 10^{5}$ µCi/cc. The system will also provide grab samples for determining the I-131 release.

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6. DESIGN CHANGE 80-31: STEAM DUMP AND SAFETY VALVE HEADER RADIATION MONITORS (In Progress)

This design change adds a radiation monitoring system for the two atmospheric steam dump valve and steam safety valve headers. The monitors will be installed at the headers to indirectly monitor the noble gas level by measuring the radiation level of the contained steam to $10^{4}$ rads per hour with an accuracy of ± 20 percent. Readout will be provided in the main Control Room and in the Technical Support Center.

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7. DESIGN CHANGE 80-32: ONSITE TECHNICAL SUPPORT CENTER (TMI) (In Progress)

This plant modification consists of the addition of an Onsite Technical Support Center (TSC) located adjacent to the main Control Room in the existing visitors viewing area and a mechanical equipment room on the southeast corner of the administration and control building. The TSC will contain equipment capable of monitoring plant critical functions, and files containing current plant drawings and documents. Operations data will be stored in a moving head disc system.

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8. DESIGN CHANGE 80-33: CONTAINMENT PRESSURE INDICATION (In Progress)

Provided by this design change will be new, separate, and redundant containment pressure indicators. The new transducers will tap from the same line as the existing pressure transducers.

Each system will consist of the following components:

- Pressure transmitter
- Signal converter (I/V)
- Control Room panel indicating instrument
- Instrument tubing and valves

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9. DESIGN CHANGE 80-36: REACTOR COOLANT SYSTEM VENTING (In Progress)

This design change consists of a remotely operated system for venting the reactor coolant system during post-accident situations when large quantities of non-condensable gases may collect in reactor coolant system high points. The venting system will utilize existing maintenance vent line stubs.

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10. DESIGN CHANGE 80-44: METEOROLOGICAL TOWER MODIFICATIONS (In Progress)

This modification consists of moving the majority of the signal conditioning and recording equipment associated with the meteorological monitoring system from its present location in a room adjacent to the SONGS 1 Control Room to a climate-controlled instrument shelter to be located near the Bluff Meteorological Tower.

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11. DESIGN CHANGE 80-52: FUEL OIL TRANSFER PUMP DRAINAGE (In Progress)

This design change provides a drainage system (see Figure 1) for the fuel oil transfer pump vaults adequate for the removal of water resulting from any storm, up to and including the PMF, sufficiently rapid to limit the maximum depth of water in the vault to below the fuel oil transfer pump-motor coupling. Check valves will be provided in the drain lines to prevent backflow. Curbing at grade will be improved to prevent flood runoff from entering the vaults.

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ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period January - December, 1980

| Medium | # of Sampling Locations | Total No. of Samples | # of Locations Above Local Background | SAMPLING LOCATION WITH HIGHEST MEAN | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| AIR SAMPLING Weekly | 5 (1)* | $^{131}$I-257 | Ø | (All samples were below detection limits) | | | | | pCi/m$^3$ |
| | 5 (1) | Gross Beta-257 | Ø | Visitor Center | 0.1mi. 15°mag. | 0.006 | 0.049 | 0.204 | pCi/m$^3$ |
| Quarterly Composite | 5 (1) | Gross Alpha-20 | Ø | Huntington Beach | 37mi. 300°mag. | 0.0006 | 0.0020 | 0.0036 | pCi/m$^3$ |
| | 5 (1) | $^{137}$Cs-20 | Ø | (All samples were below detection limits) | | | | | pCi/m$^3$ |
| | 5 (1) | $^{90}$Sr-20 | Ø | San Clemente | 5.0mi. 320°mag. | Ø | 0.0001 | 0.0002 | pCi/m$^3$ |
| | 5 (1) | $^{7}$Be-20 | Ø | Huntington Beach | 37mi. 300°mag. | 0.06 | 0.08 | 0.14 | pCi/m$^3$ |
| | 4 (1) | $^{141}$Ce-4 | Ø | San Clemente | 5.0mi. 320°mag. | -- | 0.006 | -- | pCi/m$^3$ |
| | 5 (1) | $^{95}$Zr-5 | Ø | San Clemente | 5.0mi. 320°mag. | -- | 0.011 | -- | pCi/m$^3$ |
| | 5 (1) | $^{95}$Nb-5 | Ø | San Clemente | 5.0mi. 320°mag. | -- | 0.014 | -- | pCi/m$^3$ |

*Number in ( ) indicates number of locations sampled in addition to E.T.S. specified locations

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| DIRECT RADIATION Quarterly | 16 (2)* | Accumulated Dose - 48 | Ø | Huntington Beach | 37mi. 300°mag. | 25.1 | 31.1 | 38.2 | mR/Qtr. |
| Annual | 16 (2) | Accumulated Dose - 16 | Ø | Huntington Beach | 37mi. 300°mag. | 61.0 | 76.0 | 92.0 | mR/Year |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| DRINKING WATER FILTRATE Monthly | 3 | Gross Alpha-35 | Ø | (All | samples were | below | detection | limits) | pCi/ℓ |
| | 3 | Gross Beta-35 | Ø | Tri-Cities Water Dist. | 8.7mi. 320°mag. | 7 | 11.8 | 19 | pCi/ℓ |
| Quarterly Composite | 3 | Gross Alpha-12 | Ø | Tri-Cities Water Dist. | 8.7mi. 320°mag. | Ø | 1 | 3 | pCi/ℓ |
| | 3 | Gross Beta-12 | Ø | Tri-Cities Water Dist. | 8.7mi. 320°mag. | 9 | 13 | 16 | pCi/ℓ |
| | 3 | $^{3}H$-12 | Ø | Tri-Cities Water Dist. | 8.7mi. 320°mag. | Ø | 150 | 600 | pCi/ℓ |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| DRINKING WATER SOLIDS | | | | | | | | | |
| Monthly | 3 | Gross Alpha-35 | Ø | Huntington Beach | 37mi. 300° mag. | Ø | 0.05 | 0.6 | pCi/ℓ |
| | 3 | Gross Beta-35 | Ø | Tri-Cities Water Dist. | 8.7mi. 320°mag. | 0.8 | 1.5 | 2.7 | pCi/ℓ |
| Quarterly Composite | 3 | Gross Alpha-12 | Ø | Huntington Beach | 37mi. 300°mag. | Ø | 0.1 | 0.4 | pCi/ℓ |
| | 3 | Gross Beta-12 | Ø | San Clemente | 3.5mi. 320°mag. | 0.9 | 1.7 | 2.3 | pCi/ℓ |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| OCEAN WATER BiMonthly | 4 (2)* | Gross Beta-24 | Ø | SONGS I-Outfall | 0.5mi. 215°mag. | 670 | 903 | 1340 | pCi/ℓ |
| | 4 (2) | Ge(Li)Scan $^{137}$Cs-24 | 1 | SONGS I-Outfall | 0.5mi. 215°mag. | Ø | 72 | 430 | pCi/ℓ |
| Semi-Annual Composite | 4 (2) | $^{3}$H-8 | 2 | SONGS I-Outfall | 0.5mi. 215°mag. | -- | 950 | -- | pCi/ℓ |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| BEACH SAND | | | | | | | | | |
| | 4 | $^{137}Cs$-8 | 2 | Surfing Beach | 1.4mi. 305°mag. | Ø | 0.06 | 0.12 | pCi/g-Dr Wt |
| | 4 | $^{226}Ra$-8 Decay Chain | Ø | 0.5mi.South of Unit 1 | 0.5mi. 125°mag. | 0.22 | 0.46 | 0.70 | pCi/g-Dr Wt |
| | 4 | $^{232}Th$-8 Decay Chain | Ø | Surfing Beach | 1.4mi. 305°mag. | 0.26 | 0.43 | 0.60 | pCi/g-Dr Wt |
| LOCAL CROPS | | | | | | | | | |
| | 2 | Ge(Li)Scan $^{131}I$-2 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 2 | $^{137}Cs$-2 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 2 | Radiochemical $^{90}Sr$-2 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 2 | $^{3}H$-2 | Ø | Oceanside | 23mi. 135°mag. | 110 | 205 | 300 | nCi/Kg |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| NON-MIGRATORY MARINE ANIMALS | | | | | | | | | Dry Wt. |
| | 3 (1) | Ge(Li)Scan $^{137}Cs$-48 | Ø | SONGS II & III | 0.7mi. 215°mag. | Ø | 0.02 | 0.06 | nCi/Kg |
| | 3 (1) | $^{58}Co$-48 | 2 | SONGS II & III | 0.7mi. 215°mag. | Ø | 0.10 | 0.54 | nCi/Kg |
| | 3 (1) | $^{60}Co$-48 | 2 | SONGS II & III | 0.7mi. 215°mag. | Ø | 0.11 | 0.91 | nCi/Kg |
| | 3 (1) | $^{110m}Ag$-48 | 2 | SONGS I | 0.6mi. 215°mag. | Ø | 0.169 | 1.3 | nCi/Kg |
| | 3 (1) | Radiochemical $^{3}H$-48 | Ø | SONGS I | 0.6mi. 215°mag. | Ø | 113 | 450 | nCi/Kg |
| | 3 (1) | $^{90}Sr$-45 | 1 | SONGS II & III | 0.7mi. 215°mag. | Ø | 0.004 | 0.07 | nCi/Kg |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| NON-MIGRATORY MARINE ANIMALS | | Ge(Li)Scan | | | | | | | Wet Wt. |
| | 3 (1)* | $^{137}Cs$-48 | Ø | Newport Beach | 30mi. 305° mag. | Ø | 0.006 | 0.015 | nCi/Kg |
| | 3 (1) | $^{58}Co$-48 | 2 | SONGS II & III | 0.7mi. 215° mag. | Ø | 0.022 | 0.101 | nCi/Kg |
| | 3 (1) | $^{60}Co$-48 | 2 | SONGS I | 0.6mi. 215° mag. | Ø | 0.045 | 0.266 | nCi/Kg |
| | 3 (1) | $^{110m}Ag$-48 | 2 | SONGS II & III | 0.7mi. 215° mag. | Ø | 0.003 | 0.020 | nCi/Kg |
| | 3 (1) | Radiochemical $^{3}H$-48 | Ø | Newport Beach | 30mi. 305° mag. | Ø | 27.8 | 150 | nCi/Kg |
| | 3 (1) | $^{90}Sr$-45 | 1 | SONGS II & III | 0.7mi. 215° mag. | Ø | 0.001 | 0.03 | nCi/Kg |
| | 1 | $^{238}U$-1 | Ø | SONGS II & III | 0.7mi. 215° mag. | -- | 0.111 | -- | nCi/Kg |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| KELP | | | | | | | | | Dry Wt. |
| | 4 | Ge(Li)Scan $^{131}I$-8 | Ø | Barn Kelp<br>San Onofre | 6.6mi. 160°mag.<br>1.6mi. 195°mag. | 0.05<br>Ø | 0.09<br>0.09 | 0.13<br>0.18 | nCi/Kg |
| | 4 | $^{137}Cs$-8 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 4 | $^{58}Co$-8 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 4 | $^{60}Co$-8 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 4 | $^{110m}Ag$-8 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 4 | $^{95}Zr$-$^{95}Nb$-4 | Ø | San Mateo | 2.9mi. 295°mag. | -- | 0.15 | -- | nCi/Kg |
| | 4 | Radiochemical $^{3}H$-8 | 1 | San Mateo | 2.9mi. 295°mag. | Ø | 6 | 12 | nCi/Kg |
| | 4 | $^{95}Zr$-$^{95}Nb$-4 | Ø | Newport | 30mi. 300°mag. | -- | 0.16 | -- | nCi/Kg |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| KELP | 4 | Ge(Li)Scan $^{131}I$-8 | Ø | San Onofre | 1.6mi. 195°mag. | Ø | 0.012 | 0.024 | Wet Wt. nCi/Kg |
| | 4 | $^{137}Cs$-8 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 4 | $^{58}Co$-8 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 4 | $^{60}Co$-8 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 4 | $^{110m}Ag$-8 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 4 | $^{95}Zr$-$^{95}Nb$-4 | Ø | San Onofre | 1.6mi. 195°mag. | -- | 0.023 | -- | nCi/Kg |
| | 4 | Radiochemical $^{3}H$-8 | 1 | San Mateo | 2.9mi. 295°mag. | -- | 1.6 | -- | nCi/Kg |
| | 4 | $^{95}Zr$-$^{95}Nb$-4 | Ø | Newport | 30mi. 300°mag. | -- | 0.021 | -- | nCi/Kg |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| OCEAN BOTTOM SEDIMENT | 5 | Ge(Li)Scan $^{137}Cs$-10 | Ø | SONGS I | 0.5mi. 215°mag. | 0.02 | 0.05 | 0.07 | Dry Wt. nCi/Kg |
| | 5 | $^{58}Co$-10 | 1 | SONGS I | 0.5mi. 215°mag. | 0.02 | 0.77 | 1.51 | nCi/Kg |
| | 5 | $^{60}Co$-10 | 1 | SONGS I | 0.5mi. 215°mag. | 0.02 | 5.26 | 10.5 | nCi/Kg |
| | 5 | $^{110m}Ag$-10 | Ø | (All samples were | | below | detection | limits) | nCi/Kg |
| | 2 | $^{54}Mn$-2 | Ø | SONGS II | 0.8mi. 245°mag. | -- | 0.64 | -- | nCi/Kg |
| | 1 | $^{65}Zn$-1 | Ø | SONGS I | 0.5mi. 215°mag. | -- | 0.34 | -- | nCi/Kg |
| | 1 | $^{144}Ce$-1 | Ø | SONGS I | 0.5mi. 215°mag. | -- | 0.34 | -- | nCi/Kg |
| | 5 | $^{226}Ra$-10 Decay Chain | Ø | SONGS I | 0.5mi. 215°mag. | 0.23 | 0.56 | 0.89 | nCi/Kg |
| | 5 | $^{232}Th$-10 Decay Chain | Ø | SONGS I | 0.5mi. 215°mag. | 0.28 | 0.61 | 0.94 | nCi/Kg |

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|---|---|---|---|---|---|---|---|---|---|
| OCEAN BOTTOM SEDIMENT | | Ge(Li)Scan | | | | | | | Wet Wt. |
| | 5 | $^{137}$Cs-10 | Ø | SONGS I | 0.5mi. 215° mag. | 0.014 | 0.04 | 0.06 | nCi/Kg |
| | 5 | $^{58}$Co-10 | 1 | SONGS I | 0.5mi. 215° mag. | 0.014 | 0.59 | 1.16 | nCi/Kg |
| | 5 | $^{60}$Co-10 | 1 | SONGS I | 0.5mi. 215° mag. | 0.014 | 4.06 | 8.1 | nCi/Kg |
| | 5 | $^{110m}$Ag-10 | Ø | (All samples were below detection limits) | | | | | nCi/Kg |
| | 2 | $^{54}$Mn-2 | Ø | SONGS I | 0.5mi. 215° mag. | -- | 0.49 | -- | nCi/Kg |
| | 1 | $^{65}$Zn-1 | Ø | SONGS I | 0.5mi. 215° mag. | -- | 0.26 | -- | nCi/Kg |
| | 1 | $^{144}$Ce-1 | Ø | SONGS I | 0.5mi. 215° mag. | -- | 0.26 | -- | nCi/Kg |
| | 5 | $^{226}$Ra-10 Decay Chain | Ø | SONGS II | 0.8mi. 245° mag. | 0.19 | 0.47 | 0.74 | nCi/Kg |
| | 5 | $^{232}$Th-10 Decay Chain | Ø | SONGS I | 0.5mi. 215° mag. | 0.20 | 0.46 | 0.72 | nCi/Kg |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| SOIL | | Ge(Li)Scan | | | | | | | Dry Wt. |
| | 5 | $^{137}Cs$-5 | Ø | Huntington Beach | 37mi. 300°mag. | -- | 0.06 | -- | nCi/Kg |
| | | | | Camp San Onofre | 3.0mi. 45°mag. | | | | |
| | | Decay Chain | | | | | | | |
| | 5 | $^{226}Ra$-5 | Ø | Camp San Onofre | 3.0mi. 45°mag. | -- | 0.69 | -- | nCi/Kg |
| | | Decay Chain | | | | | | | |
| | 5 | $^{232}Th$-5 | Ø | Huntington Beach | 37mi. 300°mag. | -- | 0.96 | -- | nCi/Kg |
| | 5 | $^{90}Sr$-5 | Ø | Camp San Onofre | 3.0mi. 45°mag. | -- | 0.05 | -- | nCi/Kg |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Location | Low | Mean | High | Units |
| JACK RABBIT Femur | 1 | $^{89}Sr$-3 | Ø | East of Station | 2.0mi. 45°mag. | Ø | 1 | 4 | pCi/gCa |
| | 1 | $^{90}Sr$-3 | Ø | East of Station | 2.0mi. 45°mag. | 4 | 5 | 6 | pCi/gCa |
| Thyroid | 1 | $^{131}I$-3 | Ø | (All samples were below detection limits) | | | | | pCi/g |
| Flesh | 1 | $^{137}Cs$-3 | Ø | (All samples were below detection limits) | | | | | Dry Wt. pCi/g |
| | 1 | $^{131}I$-3 | Ø | (All samples were below detection limits) | | | | | pCi/g |

SAMPLES FOR WHICH RADIONUCLIDE CONTENT
WAS GREATER THAN TWICE BACKGROUND
LEVEL OF CONTROL LOCATION, JANUARY - DECEMBER, 1980

| SAMPLE TYPE | LOCATION | COLLECTION DATE |
|---|---|---|
| Air Filter - Gross Beta | Visitor Center | April 7, 1980 |
| Air Filter - Gross Beta | Visitor Center | July 28, 1980 |
| Air Filter - Gross Beta | San Clemente | July 28, 1980 |
| Drinking Water - Gross Beta | San Clemente | January, 1980 |
| Drinking Water - Gross Beta | San Clemente | February, 1980 |
| Drinking Water - Gross Beta | San Clemente | March, 1980 |
| Drinking Water - Gross Beta | San Clemente | January-March, 1980 |
| Drinking Water (Solids)-Gross Beta | San Clemente | January-March, 1980 |
| Beach Sand - $^{232}Th$ | Surfing Beach | January, 1980 |
| Beach Sand - $^{226}Ra$ | Unit 1 - South | July, 1980 |
| Beach Sand - $^{226}Ra$ | So. San Onofre State Beach | July, 1980 |
| Non-Migratory Marine Animals-$^{58}Co$ | SONGS I | April, June, Dec., 1980 |
| Non-Migratory Marine Animals-$^{58}Co$ | SONGS II & III | April, June, Dec., 1980 |
| Non-Migratory Marine Animals-$^{60}Co$ | SONGS I | April, June, Dec., 1980 |
| Non-Migratory Marine Animals-$^{60}Co$ | SONGS II & III | April, June, Dec., 1980 |
| Non-Migratory Marine Animals-$^{110m}Ag$ | SONGS I | April, June, Dec., 1980 |
| Non-Migratory Marine Animals-$^{110}Ag$ | SONGS II & III | April, June, Dec., 1980 |
| *Ocean Bottom Sediment-$^{58}Co$ | SONGS I | December, 1980 |
| *Ocean Bottom Sediment-$^{60}Co$ | SONGS I | December, 1980 |

*Possible Correlation with Liquid Releases:

| | $^{58}Co$ | $^{60}Co$ |
|---|---|---|
| Annual Total | 3.92 Curies | 1.67 Curies |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period January - March, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| AIR FILTERS ($pCi/m^3$) | | | | | | | |
| Weekly | Gross Beta-65 | 0.001 | 0.023 (65/65) (0.004-0.048) | Huntington Beach 37mi. 300°mag. | 0.027 (13/13) (0.010-0.046) | 0.027 (13/13) (0.010-0.046) | Ø |
| | $^{131}I$-65 | 0.04 | <LLD (0/65) | -- | -- | <LLD (0/13) | Ø |
| Quarterly Composite | Gross Alpha-5 | 0.0001 | 0.0018 (5/5) (0.0008-0.0031) | Huntington Beach 37mi. 300°mag. | 0.0031 (1/1) | 0.0031 (1/1) | Ø |
| | $^{90}Sr$-5 | 0.001 | <LLD (0/5) | -- | -- | <LLD (0/13) | Ø |
| | $^{7}Be$-5 | 0.007 | 0.103 (5/5) (0.08-0.14) | Huntington Beach 37mi. 300°mag. | 0.14 (1/1) | 0.14 (1/1) | Ø |
| | $^{137}Cs$-5 | 0.0006 | 0.0006 (2/5) (0-0.0021) | Visitor Center 0.1mi. 15°mag. | 0.0021 (1/1) | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period January - March, 1980

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|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DIRECT RADIATION (mR) Quarterly | Accumulated Dose - 16 | 10mR | 30.0 (16/16) (24.4-38.2) | Huntington Beach 37mi. 300°mag. | 38.2 (1/1) | 38.2 (1/1) | Ø |
| DRINKING WATER FILTRATE (pCi/ℓ) Monthly | | | | | | | |
| | Gross Alpha 9 | 1 | 1.6 (4/9) (0-5) | Huntington Beach 37mi. 300°mag. | 2.3 (2/3) (0-4) | 2.3 (2/3) (0-4) | Ø |
| | Gross Beta 9 | 0.4 | 8.0 (9/9) (3.7-14) | San Clemente 8.7mi. 320° mag. | 12.3 (3/3) (11-14) | 4.2 (3/3) (3.7-5) | Ø |
| Quarterly Composite | Gross Alpha 3 | 1 | 0.7 (1/3) (0-2) | Huntington Beach 37mi. 300° mag. | 2 (1/1) | 2 (1/1) | Ø |
| | Gross Beta 3 | 1 | 9.7 (3/3) (6-14) | San Clemente 3.5mi. 320° mag. | 14 (1/1) | 6 (1/1) | Ø |
| | $^{3}H$ - 3 | 200 | <LLD (0/3) | <LLD (0/1) | -- | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period January - March, 1980

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|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DRINKING WATER SOLIDS (pCi/ℓ) | | | | | | | |
| Monthly | Gross Alpha 9 | 0.1 | 0.1 (2/9) (0-0.6) | Huntington Beach 37mi. 300°mag. | 0.2 (1/3) (0-0.6) | 0.2 (1/3) (0-0.6) | ø |
| | Gross Beta 9 | 0.1 | 1.5 (9/9) (0.9-2.2) | San Clemente 3.5mi. 320°mag. | 1.9 (3/3) | 1.1 (3/3) (0.9-1.5) | ø |
| Quarterly Composite | Gross Alpha 3 | 0.1 | 0.2 (2/3) (0.0-0.4) | Huntington Beach 37mi. 300°mag. | 0.4 (1/1) | 0.4 (1/1) | ø |
| | Gross Beta 3 | 0.1 | 1.4 (3/3) (1.0-2.3) | San Clemente 3.5mi. 300°mag. | 2.3 (1/1) | 1.0 (1/1) | ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period January - March

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| OCEAN WATER (pCi/ℓ) BiMonthly | Gross Beta-8 | 70 | 926 (8/8) (830-1000) | SONGS III Downcoast 0.7mi. 215°mag. | 965 (2/2) (930-1000) | 905 (2/2) (830-980) | Ø |
| | Ge(Li)Scan | | | | | | |
| | $^{137}Cs$-8 | 5 | <LLD (0/8) | <LLD (0/2) | -- | <LLD (0/2) | Ø |
| BEACH SAND (pCi/g-Dry Wt.) | $^{137}Cs$-4 | 0.004 | 0.03 (1/4) (0-0.12) | Surfing Beach 1.4mi. 305°mag. | 0.12 (1/1) | <LLD (0/1) | Ø |
| | $^{226}Ra$ Decay Chain 4 | 0.01 | 0.23 (4/4) (0.22-0.24) | Surfing Beach 1.4mi. 305°mag. | | | Ø |
| | | | | Newport Beach 30mi. 305°mag. | 0.24 (1/1) | 0.24 (1/1) | |
| | $^{232}Th$ Decay Chain 4 | 0.02 | 0.26 (4/4) (0.16-0.42) | So. San Onofre State Beach 1.4mi. 305° mag. | 0.42 (1/1) | 0.16 (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April -June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| AIR FILTERS ($pCi/m^3$) Weekly | $^{131}I$-65 | 0.04 | <LLD (0/65) | <LLD (0/26) | -- | <LLD (0/13) | Ø |
| | Gross Beta-65 | 0.001 | 0.021 (65/65) (0.006-0.062) | Visitor Center 0.1mi. 15°mag. | 0.026(26/26) (0.006-0.062) | 0.019 (13/13) (0.006-0.030) | Ø |
| Quarterly Composite | Gross Alpha-5 | 0.0001 | 0.0011 (5/5) (0.0006-0.0015) | Huntington Beach 37mi. 300°mag. | 0.0020(2/2) (0.0008-0.0020) | 0.0008 (1/1) | Ø |
| | $^{90}Sr$-5 | 0.001 | <LLD (0/5) | <LLD (0/10) | -- | <LLD (0/1) | Ø |
| | $^{7}Be$-5 | 0.01 | 0.06 (5/5) (0.05-0.08) | Visitor Center 0.1mi. 15°mag. | 0.08 (2/2) (0.08-0.08) | 0.06 (1/1) | Ø |
| | $^{137}Cs$-5 | 0.001 | <LLD (0/5) | Units 2&3 Switchyard 0.6mi. 110°mag. | 0.0006 (1/2) (0-0.0011) | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DIRECT RADIATION (mR) Quarterly | Accumulated Dose - 16 | 10 | 24.8 (16/16) (20.2-32.2) | Camp San Mateo 3.8mi. 355°mag. | 34.2 (2/2) (32.2-36.1) | 28.2 (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DRINKING WATER FILTRATE (pCi/ℓ) Monthly | Gross Alpha-9 | 1 | 0.8 (3/9) (0-3) | Huntington Beach 37mi. 300°mag. | 2.0 (4/6) (0-4) | 1.7 (2/3) (0-3) | ø |
| | Gross Beta-9 | 1 | 11.1 (9/9) (7-19) | San Clemente 3.5mi. 320°mag. | 11.3 (6/6) (8-14) | 8.7 (3/3) (7-11) | ø |
| Quarterly Composite | Gross Alpha-3 | 1 | <LLD (0/3) | Huntington Beach 37mi. 300°mag. | 1.0 (1/2) (0-2) | <LLD (0/1) | ø |
| | Gross Beta-3 | 1 | 10.3 (3/3) (9-13) | San Clemente 3.5mi. 320°mag. | 12 (2/2) (9-14) | 9 (1/1) | ø |
| | $^{3}H$-3 | 200 | 467 (3/3) (300-600) | Tri-Cities Water District 8.7mi. 320°mag. | 300 (1/2) (0-600) | 500 (1/1) | ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DRINKING WATER SOLIDS (pCi/ℓ) Monthly | Gross Alpha-9 | 1 | <LLD (0/9) | Huntington Beach 37mi. 300°mag. | 0.1 (1/6) (0-0.6) | <LLD (0/3) | Ø |
| | Gross Beta-9 | 1 | 0.9 (9/9) (0.8-1.1) | San Clemente 3.5mi. 320°mag. | 1.4 (6/6) (0.8-2.2) | 1.1 (3/3) (0.8-1.1) | Ø |
| Quarterly Composite | Gross Alpha-3 | 0.1 | <LLD (0/3) | Huntington Beach 37mi. 300°mag. | 0.2 (1/2) (0-0.4) | <LLD (0/1) | Ø |
| | Gross Beta-3 | 0.1 | 1.8 (3/3) (1.7-2.0) | San Clemente 3.5mi. 320°mag. | 2.2 (2/2) (2.0-2.3) | 1.8 (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean: Name, Distance and Direction | Location with Highest Annual Mean: Mean(f) Range | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| OCEAN WATER (pCi/ℓ) BiMonthly | Gross Beta-4 | 40 | 1047 (4/4) (800-1340) | SONGS I Outfall 0.5mi. 215°mag. | 1043 (3/3) (890-1340) | 1250 (1/1) | Ø |
| | Ge(Li)Scan | | | | | | |
| | $^{137}$Cs-4 | 5 | 408 (1/4) (0-430) | SONGS I Outfall 0.5mi. 215°mag. | 144 (1/3) (0-430) | <LLD (0/1) | Ø |
| | $^{60}$Co-1 | 2 | 6 (1/1) | SONGS I Outfall 0.5mi. 215°mag. | 6 (1/1) | Not Analyzed | 1 |
| | $^{58}$Co-1 | 5 | 11 (1/1) | SONGS I Outfall 0.5mi. 215°mag. | 11 (1/1) | Not Analyzed | 1 |
| | $^{134}$Cs-1 | 20 | 380 (1/1) | SONGS I Outfall 0.5mi. 215°mag. | 380 (1/1) | Not Analyzed | 1 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| OCEAN WATER (pCi/ℓ) Semi-Annual Composite | $^{3}H$-4 | 200 | 1150 (2/4) (0-1900) | SONGS I Outfall 0.5mi. 215°mag. | 1900 (1/1) | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| NON-MIGRATORY MARINE ANIMALS (nCi/Kg-Dry Wt.) | Ge(Li)Scan | | | | | | |
| | $^{137}Cs$-24 | 0.007 | 0.055 (15/28) (0-0.06) | SONGS II & III 0.7mi. 215° mag. | 0.12 (4/8) (0-0.05) | 0.03 (7/8) (0-0.06) | Ø |
| | $^{58}Co$-24 | 0.01 | 0.107 (8/24) (0-0.54) | SONGS II & III 0.7mi. 215° mag. | 0.16 (4/8) (0-0.54) | LLD (0/8) | Ø |
| | $^{60}Co$-24 | 0.01 | 0.05 (8/24) (0-0.23) | SONGS II & III 0.7mi. 215° mag. | 0.08 (4/8) (0-0.23) | LLD (0/8) | Ø |
| | $^{110m}Ag$-24 | 0.01 | 0.12 (8/24) (0-0.98) | SONGS II & III 0.7mi. 215° mag. | 0.23 (4/8) (0-0.98) | 0.03 (2/8) (0-0.15) | Ø |
| | Radiochemical | | | | | | |
| | $^{3}H$-24 | 3 | 154 (14/24) (0-450) | SONGS I 0.6mi. 215° mag. | 213 (6/8) (0-450) | 161 (6/8) (0-400) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| NON-MIGRATORY MARINE ANIMALS (nCi/Kg-Dry Wt.) (Continued) | Radiochemical | | | | | | |
| | $^{90}Sr$-24 | 0.02 | <LLD (0/24) | <LLD (0/8) | -- | <LLD (0/8) | 24 |
| | $^{238}U$-1 | 0.03 | 0.71 (1/1) | SONGS II & III 0.7mi. 215°mag. | 0.71 (1/1) | Not Analyzed | 1 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

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|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| NON-MIGRATORY MARINE ANIMALS (nCi/Kg-Wet. Wt.) | Ge(Li)Scan | | | | | | |
| | $^{137}Cs$-24 | 0.001 | 0.005 (14/24) (0-0.015) | Newport Beach 30mi. 305° mag. | 0.007 (6/8) (0-0.015) | 0.007 (6/8) (0-0.015) | Ø |
| | $^{58}Co$-24 | 0.002 | 0.018 (8/24) (0-0.101) | SONGS II & III 0.7mi. 215° mag. | 0.040 (4/8) (0-0.101) | <LLD (0/8) | Ø |
| | $^{60}Co$-24 | 0.002 | 0.028 (8/24) (0-0.266) | SONGS I 0.6mi. 215° mag. | 0.066 (4/8) (0-0.266) | <LLD (0/8) | Ø |
| | $^{110m}Ag$-24 | 0.002 | 0.040 (8/24) (0-0.14) | SONGS II & III 0.7mi. 215° mag. | 0.090 (4/8) (0-0.33) | 0.005 (2/8) (0-0.020) | Ø |
| | Radiochemical | | | | | | |
| | $^{3}H$-24 | 0.5 | 34.8 (16/24) (0-109) | SONGS I 0.6mi. 215° mag. | 49.0 (6/8) (0-109) | 34.9 (6/8) (0-94) | Ø |
| | $^{90}Sr$-24 | 0.001 | <LLD (0/24) | <LLD (0/8) | -- | <LLD (0/8) | Ø |
| | $^{238}U$-1 | 0.006 | 0.111 (1/1) | SONGS II & III 0.7mi. 215° mag. | 0.111 (1/1) | Not Analyzed | 1 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| KELP (nCi/Kg-Dry Wt.) | Ge(Li)Scan $^{131}I$-4 | 0.02 | 0.10 (4/4) (0.05-0.18) | San Onofre 1.6mi. 195°mag. | 0.18 (1/1) | 0.11 (1/1) | Ø |
| | $^{137}Cs$-4 | 0.02 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |
| | $^{58}Co$-4 | 0.02 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |
| | $^{60}Co$-4 | 0.02 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |
| | $^{110m}Ag$-4 | 0.02 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |
| | Radiochemical $^{3}H$-4 | 5 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| KELP (nCi/Kg-Wet. Wt.) | Ge(Li)Scan $^{131}I$-4 | 0.002 | 0.011 (4/4) (0.006-0.024) | San Onofre 1.6mi. 195°mag. | 0.024 (1/1) | 0.009 (1/1) | Ø |
| | $^{137}Cs$-4 | 0.002 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |
| | $^{58}Co$-4 | 0.002 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |
| | $^{60}Co$-4 | 0.003 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |
| | $^{110m}Ag$-4 | 0.002 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |
| | Radiochemical $^{3}H$-4 | 0.5 | <LLD (0/4) | <LLD (0/1) | -- | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June,1980

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|---|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | | |
| OCEAN BOTTOM SEDIMENT (nCi/Kg-Dry Wt.) | Ge(Li)Scan $^{137}Cs$-5 | 0.01 | 0.02 (3/5) (0-0.07) | SONGS III-Downcoast 0.9mi. 180°mag. | 0.07 (1/1) | <LLD | (0/1) | Ø |
| | $^{58}Co$-5 | 0.01 | 0.01 (2/5) (0-0.02) | SONGS III-Downcoast 0.9mi. 180°mag. | 0.02 (1/1) | <LLD | (0/1) | Ø |
| | | | | SONGS I-Upcoast 0.5mi. 215°mag. | | | | |
| | $^{60}Co$-5 | 0.01 | 0.01 (2/5) (0-0.03) | SONGS III-Downcoast 0.9mi. 180°mag. | 0.03 (1/1) | <LLD | (0/1) | Ø |
| | $^{110m}Ag$-5 | 0.01 | <LLD (0/5) | <LLD (0/1) | -- | <LLD | (0/1) | Ø |
| | $^{226}Ra$-5 Decay Chain | 0.005 | 0.22 (5/5) (0.05-0.32) | SONGS I-Downcoast 0.5mi. 215°mag. | 0.32 (1/1) | 0.050 | (1/1) | Ø |
| | $^{232}Th$-5 Decay Chain | 0.01 | 0.23 (5/5) (0.06-0.31) | SONGS I-Downcoast 0.5mi. 215°mag. | 0.31 (1/1) | 0.06 | (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| OCEAN BOTTOM SEDIMENT (nCi/Kg-Wet Wt.) | Ge(Li)Scan $^{137}Cs$-5 | 0.006 | 0.015 (3/5) (0-0.044) | SONGS III-Downcoast 0.9mi. 180°mag. | 0.044 (1/1) | <LLD (0/1) | Ø |
| | $^{58}Co$-5 | 0.007 | 0.005 (2/5) (0-0.014) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.014 (1/1) | <LLD (0/1) | Ø |
| | $^{60}Co$-5 | 0.007 | 0.007 (2/5) (0-0.020) | SONGS III-Downcoast 0.9mi. 180°mag. | 0.020 (1/1) | <LLD (0/1) | Ø |
| | $^{110m}Ag$-5 | 0.006 | <LLD (0/5) | <LLD (0/1) | -- | <LLD (0/1) | Ø |
| | $^{226}Ra$-5 Decay Chain | 0.004 | 0.165 (5/5) (0.038-0.24) | SONGS I-Downcoast 0.5mi. 215°mag. | 0.24 (1/1) | 0.038 (1/1) | Ø |
| | $^{232}Th$-5 Decay Chain | 0.008 | 0.175 (5/5) (0.045-0.24) | SONGS I-Downcoast 0.5mi. 215°mag. | 0.24 (1/1) | 0.045 (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period April - June, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean: Name, Distance and Direction | Location with Highest Annual Mean: Mean(f) Range | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| JACK RABBIT Femur (pCi/gCa)* | $^{89}Sr$-1 | 3 | 4 (1/1) | 2mi. East 45°mag. | 4 (1/1) | None | Ø |
| | $^{90}Sr$-1 | 1 | 6 (1/1) | 2mi. East 45°mag. | 6 (1/1) | None | Ø |
| Thyroid (pCi/g) | $^{131}I$-1 | 10 | LLD (0/1) | <LLD (0/1) | -- | None | Ø |
| Flesh (pCi/g-Dry Wt.) | $^{137}Cs$-1 | 0.04 | LLD (0/1) | <LLD (0/1) | -- | None | Ø |
| | $^{131}I$-1 | 0.03 | LLD (0/1) | <LLD (0/1) | -- | None | Ø |

*Note: 0.28±0.02 gCa/g Ash

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period July - September, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| AIR FILTERS ($pCi/m^3$) | | | | | | | |
| Weekly | $^{131}I$-63 | 0.04 | <LLD (0/63) | <LLD (0/193) | -- | <LLD (0/11) | Ø |
| | Gross Beta-63 | 0.001 | 0.019 (63/63) (0.007-0.066) | Visitor Center 0.1mi. 15°mag. | 0.031 (39/39) (0.006-0.062) | 0.016 (11/11) (0.010-0.033) | Ø |
| Quarterly Composite | Gross Alpha-5 | 0.0003 | 0.0003 (3/5) (0-0.0006) | Huntington Beach 37mi. 300°mag. | 0.0015 (3/3) (0.0006-0.0031) | 0.0006 (1/1) | Ø |
| | $^{90}Sr$-5 | 0.001 | <LLD (0/5) | <LLD (0/15) | -- | <LLD (0/1) | Ø |
| | $^{7}Be$-5 | 0.01 | 0.05 (5/5) (0.03-0.07) | Huntington Beach 37mi. 300°mag. | 0.09 (3/3) (0.06-0.14) | 0.06 (1/1) | Ø |
| | $^{137}Cs$-5 | 0.001 | <LLD (0/5) | Visitor Center 0.1mi. 15°mag. | 0.0007 (1/3) (0-0.0021) | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period July - September, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DIRECT RADIATION (mR) Quarterly | Accumulated Dose 16 | 10 mR | 25.2 (16/16) (20.7-32.8) | Huntington Beach 37mi. 300°mag. | 33.0 (3/3) (28.2-38.2) | 32.8 (1/1) | Ø |
| DRINKING WATER FILTRATE (pCi/ℓ) Monthly | Gross Alpha-9 | 1 | <LLD (0/9) | Huntington Beach 37mi. 300°mag. | 11.1 (9/9) (7-19) | <LLD (0/3) | Ø |
| | Gross Beta-9 | 1 | 9.8 (9/9) (6-14) | Tri-Cities Water District 8.7mi. 300°mag. | 1.3 (4/9) (0-4) | 9.7 (3/3) (6-13) | Ø |
| Quarterly Composite | Gross Alpha-3 | 2 | <LLD (0/3) | | | | Ø |
| | Gross Beta-3 | 1 | 11 (3/3) (9-13) | Tri-Cities Water District 8.7mi. 300°mag. | 12 (3/3) (9-13) | 9 (1/1) | Ø |
| | $^{3}$H-3 | 200 | <LLD (0/3) | Huntington Beach 37mi. 300°mag. | 0 7 (1/3) (0-2.0) | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period July - September, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DRINKING WATER SOLIDS (pCi/ℓ) Monthly | Gross Alpha-9 | 0.1 | 0.04 (1/9) (0-0.4) | Huntington Beach 37mi. 300°mag. | 0.07 (1/9) (0-0.6) | <LLD (0/3) | Ø |
| | Gross Beta-9 | 0.1 | 1.6 (9/9) (1.0-2.7) | Tri-Cities Water District 8.7mi. 320°mag. | 1.5 (9/9) (0.8-2.7) | 1.4 (3/3) (1.2-1.6) | Ø |
| Quarterly Composite | Gross Alpha-3 | 0.1 | <LLD (0/3) | Huntington Beach 37mi. 300°mag. | 0.1 (1/3) (0-0.4) | <LLD (0/1) | Ø |
| | Gross Beta-3 | 0.1 | 1.1 (3/3) (0.9-1.6) | San Clemente Well No. 6 3.5mi. 320°mag. | 1.7 (3/3) (0.9-2.3) | 0.9 (1/1) | Ø |
| OCEAN WATER (pCi/ℓ) Bi Monthly | Gross Beta-8 | 40 | 720 (8/8) (640-820) | SONGS III Downcoast 0.7mi. 215°mag. | 775 (5/5) (730-1000) | 645 (2/2) (640-650) | Ø |
| | Ge(Li)Scan $^{137}Cs$-8 | 5 | <LLD (0/8) | SONGS I-Outfall 0.5mi. 215°mag. | 86 (1/5) (0-430) | <LLD (0/2) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period July - September, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| BEACH SAND (pCi/g-DRY WT.) | $^{137}Cs$-4 | 0.01 | 0.005 (1/4) (0-0.02) | Surfing Beach 1.4mi. 305°mag. | 0.06 (1/2) (0-0.12) | <LLD (0/1) | Ø |
| | $^{226}Ra$ Decay Chain 4 | 0.01 | 0.40 (4/4) (0.14-0.70 | 0.5mi. South of Unit 1 0.5mi. 125°mag. | 0.46 (2/2) (0.22-0.70) | 0.25 (1/1) | Ø |
| | $^{232}Th$ Decay Chain 4 | 0.02 | 0.46 (4/4) (0.14-0.62) | Surfing Beach 1.4mi. 305°mag. | 0.43 (2/2) (0.26-0.60) | 0.47 (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period July - September, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| LOCAL CROPS (nCi/Kg) | | | | | | | |
| | Ge(Li)Scan $^{131}I$ - 4 | 0.02 | <LLD (0/4) | -- | -- | <LLD (0/2) | Ø |
| | Ge(Li)Scan $^{137}Cs$ - 4 | 0.01 | <LLD (0/4) | -- | -- | <LLD (0/2) | Ø |
| | Radiochemical $^{90}Sr$-4 | 0.04 | <LLD (0/4) | -- | -- | <LLD (0/2) | Ø |
| | Radiochemical $^{3}H$-4 | 4 | 303 (4/4) (86-300) | Oceanside 23mi. 135°mag. | 205 (2/2) (110-300) | 205 (2/2) (110-300) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| AIR FILTERS ($pCi/m^3$) Weekly | $^{131}I$-64 | 0.04 | <LLD (0/64) | <LLD (0/52) | -- | <LLD (0/13) | Ø |
| | Gross Beta-64 | 0.001 | 0.090 (64/64) (0.013-0.204) | Visitor Center 0.1mi 15°mag. | 0.049 (52/52) (0.006-0.204) | 0.091 (12/12) (0.029-0.194) | Ø |
| Quarterly Composite | Gross Alpha-5 | 0.0001 | 0.0008 (2/5) (0-0.0036) | Huntington Beach 37mi. 300°mag. | 0.0020 (4/4) (0.0006-0.0036) | 0.0036 (1/1) | Ø |
| | $^{90}Sr$-5 | 0.001 | 0.00004 (1/5) (0-0.0002) | San Clemente 5.0mi. 320°mag. | 0.0001 (1/4) (0-0.0002) | <LLD (0/1) | Ø |
| | $^{7}Be$-5 | 0.01 | 0.039 (5/5) (0.03-0.061) | Huntington Beach 37mi. 300°mag. | 0.075 (4/4) (0.06-0.14) | 0.038 (1/1) | Ø |
| | $^{137}Cs$-5 | 0.001 | <LLD (0/5) | <LLD (0/4) | -- | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| AIR FILTERS ($pCi/m^3$) Quarterly Composite | $^{141}Ce$-4 | 0.001 | 0.003 (4/4) (0.002-0.006) | San Clemente 5.0mi. 320°mag. | 0.006 (1/1) | 0.002 (1/1) | 4 |
| | $^{95}Zr$-5 | 0.001 | 0.005 (5/5) (0.002-0.011) | San Clemente 5.0mi. 320°mag. | 0.011 (1/1) | 0.004 (1/1) | 5 |
| | $^{95}Nb$-5 | 0.001 | 0.006 (5/5) (0.002-0.014) | San Clemente 5.0mi. 320°mag. | 0.014 (1/1) | 0.004 (1/1) | 5 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DIRECT RADIATION (mR) Quarterly | Accumulated Dose - 16 | 10 | 22.5 (16/16) (18.3-27.4) | Huntington Beach 37mi. 300°mag. | 31.1 (4/4) (25.1-38.2) | 25.1 (1/1) | Ø |
| Annual | Accumulated Dose | 3 | 76.0 (16/16) (61-92) | Huntington Beach 37mi. 300°mag. | 92 (1/1) | 92 (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DRINKING WATER FILTRATE (pCi/ℓ) Monthly | Gross Alpha-8 | 1 | 0.6 (1/8) | <LLD (0/2) | -- | <LLD (0/2) | Ø |
| | Gross Beta-8 | 1 | 12.5 (8/8) | Tri-Cities Water District 8.7mi. 320°mag. | 11.8 (12/12) (7-19) | 13.7 (3/3) (10-17) | Ø |
| Quarterly Composite | Gross Alpha-3 | 1 | 1.0 (1/3) (0-3) | Tri-Cities Water District 8.7mi. 320°mag. | 1 (1/4) (0-3) | <LLD (0/1) | Ø |
| | Gross Beta-3 | 1 | 13 (3/3) (9-16) | Tri-Cities Water District 8.7mi. 320°mag. | 13 (4/4) (9-16) | 9 (1/1) | Ø |
| | $^{3}$H-3 | 200 | <LLD (0/3) | Tri-Cities Water District 8.7mi. 320°mag. | 150 (1/4) (0-600) | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| DRINKING WATER SOLIDS (pCi/ℓ) | | | | | | | |
| Monthly | Gross Alpha-8 | 1 | <LLD (0/8) | Huntington Beach 37mi. 300°mag. | 0.05 (1/11) (0-0.6) | <LLD (0/2) | Ø |
| | Gross Beta-8 | 1 | 1.1 (8/8) (0.6-2.0) | Tri-Cities Water District 8.7mi. 320°mag. | 1.5 (12/12) (0.8-2.7) | 1.2 (3/3) (0.6-1.1) | Ø |
| Quarterly Composite | Gross Alpha-3 | 0.1 | <LLD (0/3) | Huntington Beach 37mi. 300°mag. | 0.1 (1/4) (0-0.4) | <LLD (0/1) | Ø |
| | Gross Beta-3 | 0.1 | 1.4 (3/3) (1.2-1.7) | San Clemente 3.5mi. 320°mag. | 1.7 (4/4) (0.9-2.3) | 1.2 (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| OCEAN WATER (pCi/ℓ) BiMonthly | Gross Beta-4 | 40 | 893 (4/4) (700-1040) | SONGS I Outfall 0.5mi. 215°mag. | 903 (6/6) (670-1340) | 700 (1/1) | Ø |
| | Ge(Li)Scan | | | | | | |
| | $^{137}Cs$-4 | 5 | <LLD (0/4) | SONGS I Outfall 0.5mi. 215°mag. | 72 (1/6) (0-430) | <LLD (0/1) | Ø |
| Semiannual Composite | $^{3}H$-4 | 200 | <LLD (0/4) | SONGS I Outfall 0.5mi. 215°mag. | 950 (1/2) | <LLD (0/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| NON-MIGRATORY MARINE ANIMALS (nCi/Kg-Dry Wt.) | Ge(Li)Scan | | | | | | |
| | $^{137}Cs$-24 | 0.007 | 0.015 (12/24) (0-0.06) | SONGS II & III 0.7mi. 215°mag. | 0.02 (8/16) (0-0.06) | 0.01 (4/8) (0-0.046) | Ø |
| | $^{58}Co$-24 | 0.01 | 0.03 (4/24) (0-0.31) | SONGS II & III 0.7mi. 215°mag. | 0.10 (6/16) (0-0.54) | <LLD (0/8) | Ø |
| | $^{60}Co$-24 | 0.01 | 0.11 (9/24) (0-0.99) | SONGS II & III 0.7mi. 215°mag. | 0.11 (8/16) (0-0.91) | 0.03 (2/8) | Ø |
| | $^{110m}Ag$-24 | 0.01 | 0.11 (6/24) (0-1.3) | SONGS I 0.6mi. 215°mag. | 0.169 (5/16) (0-1.3) | <LLD (0/8) | Ø |
| | Radiochemical $^{3}H$-24 | 3 | 35.5 (13/24) (0-450) | SONGS I 0.6mi. 215°mag. | 113 (10/16) (0-450) | 64.5 (3/8) (0-450) | Ø |
| | $^{90}Sr$-21 | 0.02 | 0.003 (1/21) (0-0.07) | SONGS II & III 0.7mi. 215°mag. | 0.004 (1/16) (0-0.07) | <LLD (0/8) | 21 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| NON-MIGRATORY MARINE ANIMALS (nCi/Kg-Wet Wt.) | Ge(Li)Scan | | | | | | |
| | $^{137}Cs$-24 | 0.001 | 0.005 (12/24) (0-0.014) | SONGS II & III 0.7mi. 215°mag. | 0.006 (4/8) (0-0.014) | 0.005 (4/8) (0-0.014) | Ø |
| | $^{58}Co$-24 | 0.002 | 0.004 (4/24) (0-0.043) | SONGS I 0.6mi. 215°mag. | 0.008 (2/8) (0-0.043) | <LLD (0/8) | Ø |
| | $^{60}Co$-24 | 0.002 | 0.016 (9/24) (0-0.138) | SONGS I 0.6mi. 215°mag. | 0.024 (3/8) (0-0.138) | 0.004 (2/8) (0-0.016) | Ø |
| | $^{110m}Ag$-24 | 0.002 | 0.021 (6/24) (0-0.17) | SONGS I 0.6mi. 215°mag. | 0.043 (3/8) (0-0.17) | <LLD (0/8) | Ø |
| | Radiochemical | | | | | | |
| | $^{3}H$-24 | 0.04 | 10.7 (13/24) (0-150) | Newport Beach 30mi. 305°mag. | 20.7 (3/8) (0-150) | 20.7 (3/8) (0-150) | Ø |
| | $^{90}Sr$-21 | 0.001 | 0.001 (1/21) (0-0.03) | SONGS II & III 0.7mi. 215°mag. | 0.003 (1/8) (0-0.03) | <LLD (0/8) | 21 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| KELP (nCi/Kg-Dry Wt.) | Ge(Li)Scan | | | | | | |
| | $^{131}I$-4 | 0.02 | 0.07 (2/4) (0-0.13) | Barn Kelp 6.6mi. 160°mag. | 0.09 (2/2) (0.05-0.13) | 0.06 (1/1) | Ø |
| | | | | San Onofre Kelp 1.6mi. 195°mag. | 0.09 (1/2) (0-0.18) | | |
| | $^{137}Cs$-4 | 0.02 | <LLD (0/4) | <LLD (0/2) | -- | <LLD (0/1) | Ø |
| | $^{58}Co$-4 | 0.02 | <LLD (0/4) | <LLD (0/2) | -- | <LLD (0/1) | Ø |
| | $^{60}Co$-4 | 0.02 | <LLD (0/4) | <LLD (0/2) | -- | <LLD (0/1) | Ø |
| | $^{110m}Ag$-4 | 0.02 | <LLD (0/4) | <LLD (0/2) | -- | <LLD (0/1) | Ø |
| | $^{95}Zr$-$^{95}Nb$-4 | 0.02 | 0.14 (4/4) | San Mateo Kelp 2.9mi. 295 °mag. | 0.15 (1/1) | 0.14 (1/1) | 4 |
| | Radiochemical $^{3}H$-4 | 5 | 3 (1/4) (0-12) | San Mateo Kelp 2.9mi. 295 °mag. | 6 (1/2) (0-12) | <LLD (0/1) | Ø |
| | $^{95}Zr$-$^{95}Nb$-4 | 0.01 | 0.12 (4/4) (0.06-0.16) | Newport Kelp 30mi. 300 °mag. | 0.16 (1/1) | 0.16 (1/1) | 4 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| KELP (nCi/Kg-Wet Wt.) | Ge(Li)Scan | | | | | | |
| | $^{131}I$-4 | 0.002 | 0.06 (2/4) (0-0.017) | San Onofre Kelp 1.6mi. 195°mag. | 0.012 (1/2) (0-0.024) | 0.008 (1/1) | Ø |
| | $^{137}Cs$-4 | 0.002 | <LLD (0/4) | <LLD (0/2) | -- | <LLD (0/1) | Ø |
| | $^{58}Co$-4 | 0.002 | <LLD (0/4) | <LLD (0/2) | -- | <LLD (0/1) | Ø |
| | $^{60}Co$-4 | 0.003 | <LLD (0/4) | <LLD (0/2) | -- | <LLD (0/1) | Ø |
| | $^{110m}Ag$-4 | 0.002 | <LLD (0/4) | <LLD (0/2) | -- | <LLD (0/1) | Ø |
| | $^{95}Zr$-$^{95}Nb$-4 | 0.002 | 0.19 (4/4) (0.14-0.23) | San Onofre Kelp 1.6mi. 195°mag. | 0.023 (1/1) | 0.018 (1/1) | 4 |
| | Radiochemical $^{3}H$-4 | 0.5 | 0.4 (1/4) (0-1.6) | San Mateo Kelp 2.9mi. 295°mag. | 1.6 (1/1) | <LLD (0/1) | Ø |
| | $^{95}Zr$-$^{95}Nb$-4 | 0.01 | 0.016 (4/4) (0.008-0.021) | Newport Kelp 30mi. 300°mag. | 0.021 (1/1) | 0.021 (1/1) | 4 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | | |
| OCEAN BOTTOM SEDIMENT (nCi/Kg-Dry Wt.) | Ge(Li)Scan | | | | | | | |
| | $^{137}Cs$-5 | 0.01 | 0.04 (4/5) (0-0.07) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.05 (2/2) (0.02-0.07) | 0.06 | (1/1) | Ø |
| | $^{58}Co$-5 | 0.01 | 0.31 (2/5) (0-1.51) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.77 (2/2) (0.02-1.51) | <LLD | (0/1) | Ø |
| | $^{60}Co$-5 | 0.01 | 2.15 (2/5) (0-10.5) | SONGS I-Upcoast 0.5mi. 215°mag. | 5.26 (2/2) (0.02-10.5) | <LLD | (0/1) | Ø |
| | $^{110m}Ag$-5 | 0.01 | <LLD (0/5) | <LLD (0/2) | -- | <LLD | (0/1) | Ø |
| | $^{226}Ra$-5 Decay Chain | 0.005 | 0.58 (5/5) (0.42-0.89) | SONGS II-Upcoast 0.8mi. 245°mag. | 0.56 (2/2) (0.23-0.89) | 0.42 | (1/1) | Ø |
| | $^{232}Th$-5 Decay Chain | 0.01 | 0.61 (5/5) (0.28-0.94) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.61 (0.28-0.94) | 0.51 | (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

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|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| OCEAN BOTTOM SEDIMENT (nCi/Kg-Dry Wt.) | | | | | | | |
| | $^{54}Mn$-2 | 0.006 | 0.33 (2/2) (0.02-0.64) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.64 (1/1) | Not Analyzed | 2 |
| | $^{65}Zn$-1 | 0.06 | 0.34 (1/1) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.34 (1/1) | Not Analyzed | 1 |
| | $^{144}Ce$-1 | 0.07 | 0.34 (1/1) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.34 (1/1) | Not Analyzed | 1 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

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|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| OCEAN BOTTOM SEDIMENT (nCi/Kg-Dry Wt.) | | | | | | | |
| | $^{54}Mn$-2 | 0.006 | 0.33 (2/2) (0.02-0.64) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.64 (1/1) | Not Analyzed | 2 |
| | $^{65}Zn$-1 | 0.06 | 0.34 (1/1) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.34 (1/1) | Not Analyzed | 1 |
| | $^{144}Ce$-1 | 0.07 | 0.34 (1/1) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.34 (1/1) | Not Analyzed | 1 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| OCEAN BOTTOM SEDIMENT (nCi/Kg-Wet Wt.) | Ge(Li)Scan | | | | | | |
| | $^{137}Cs$-5 | 0.005 | 0.033 (4/5) (0-0.06) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.04 (2/2) (0.014-0.06) | 0.043 (1/1) | Ø |
| | $^{58}Co$-5 | 0.006 | 0.238 (2/5) (0-1.16) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.59 (2/2) (0.014-1.16) | <LLD (0/1) | Ø |
| | $^{60}Co$-5 | 0.01 | 1.66 (2/5) (0-8.1) | SONGS I-Upcoast 0.5mi. 215°mag. | 4.06 (2/2) (0.014-8.1) | <LLD (0/1) | Ø |
| | $^{110m}Ag$-5 | 0.009 | <LLD (0/5) | <LLD (0/2) | -- | <LLD (0/1) | Ø |
| | Decay Chain: $^{226}Ra$-5 | 0.01 | 0.45 (5/5) (0.25-0.74) | SONGSII-Upcoast 0.8mi. 245°mag. | 0.47 (2/2) (0.19-0.74) | 0.30 (1/1) | Ø |
| | Decay Chain: $^{232}Th$-5 | 0.02 | 0.48 (5/5) (0.23-0.72) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.46 (1/1) (0.20-0.72) | 0.36 (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

| Medium or Pathway Sampled (Unit of Measurement) | Type and Total Number of Analyses Performed | Lower Limit of Detection (LLD) | All Indicator Locations Mean(f) Range | Location with Highest Annual Mean | | Control Locations Mean(f) Range | Number of Nonroutine Reported Measurements |
|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| OCEAN BOTTOM SEDIMENT (nCi/Kg-Wet Wt.) | Ge(Li)Scan | | | | | | |
| | $^{54}$Mn-2 | 0.005 | 0.253 (2/2) (0.015-0.49) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.49 (1/1) | Not Analyzed | 2 |
| | $^{65}$Zn-1 | 0.05 | 0.26 (1/1) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.26 (1/1) | Not Analyzed | 1 |
| | $^{144}$Ce-1 | 0.06 | 0.26 (1/1) | SONGS I-Upcoast 0.5mi. 215°mag. | 0.26 (1/1) | Not Analyzed | 1 |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

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|---|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | | |
| SOIL (nCi/Kg-Dry Wt.) | Ge(Li)Scan | | | | | | | |
| | $^{137}Cs$-5 | 0.01 | 0.03 (3/5) (0-0.06) | Huntington Beach 37mi. 300°mag. Camp San Onofre 3.0mi. 45°mag. | 0.06 (1/1) | 0.06 | (1/1) | Ø |
| | $^{226}Ra$-5 Decay Chain | 0.02 | 0.55 (5/5) (0.38-0.69 | Camp San Onofre 3.0mi. 45°mag. | 0.69 (1/1) | 0.67 | (1/1) | Ø |
| | $^{232}Th$-5 Decay Chain | 0.03 | 0.64 (5/5) (0.43-0.96) | Huntington Beach 37mi. 300°mag. | 0.96 (1/1) | 0.96 | (1/1) | Ø |
| | $^{90}Sr$-5 | 0.01 | 0.02 (3/5) (0-0.05) | Camp San Onofre 3.0mi. 45°mag. | 0.05 (1/1) | 0.03 | (1/1) | Ø |

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION - UNIT 1

Docket No. 50-206
San Diego County, California

Reporting Period October - December, 1980

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|---|---|---|---|---|---|---|---|
| | | | | Name, Distance and Direction | Mean(f) Range | | |
| JACK RABBIT | | | | | | | |
| Femur (pCi/gCa)* | $^{89}Sr$-2 | 1 | <LLD (0/2) | 2 mi. East 45°mag. | 1 (1/3) | None | 1 |
| | $^{90}Sr$-2 | 1 | 5 (0/2) | 2 mi. East 45°mag. | 5 (3/3) | None | 1 |
| Thyroid (pCi/g) | $^{131}I$-2 | 2 | <LLD (0/2) | <LLD (0/3) | -- | None | 1 |
| Flesh (pCi/g-Dry Wt.) | $^{137}Cs$-2 | 0.06 | <LLD (0/2) | <LLD (0/3) | -- | None | 1 |
| | $^{131}I$-2 | 0.03 | <LLD (0/2) | <LLD (0/3) | -- | None | 1 |

*0.37 ± 0.02 gCa/g ash