RECEIVED CDM
DEC 2 0 1993
SITE FILE COPY

December 20, 1993

SUBJECT: Units 2/3 OFFSITE DOSE CALCULATION MANUAL Revision 26

Enclosed is Revision 26 to the Units 2/3 Offsite Dose Calculation Manual (ODCM). This revision changed all references from a Semiannual Report to a Annual Radioactive Effluent Release Report in accordance with approved PCN-419 and incorporated updates in tables used in the gaseous dose calculations that resulted specifically from the 1992 Land Use Census. Further, major changes were made as a result of an evaluation of the Radiological Environmental Monitoring Program. None of the above changes have any impact on the accuracy or reliability of methods for determining dose or setpoint values.

Removed from several monitors was the guide to set the setpoint as close to background as possible when not conducting a release. The goal for the radiation monitors and the effluent program as stated in the basis section of the ODCM for liquids is "to ensure that the concentration of radioactive materials released in liquid waste effluents from the site will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II, Column 2", and for gases, "ensure that the dose at any time at the site boundary from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20, for unrestricted areas". The purpose of these bases is accomplished by the effluent program in its present format. Since this particular change does not affect the intent of the program, lessen its regulatory adherence, or affect the methodology used in calculating setpoints, no safety evaluation was required.

DCP 2&3 6191.00BJ installed (among other unrelated components) a flow meter for the liquid radwaste monitor, RE-7813. This flow meter is required for monitor operability. It is included on the same signal loop as the radiation monitor, and therefore, will receive all required maintenance as dictated by the existing maintenance schedule. FISL-7813 is being included on individual maintenance procedures. When the radiation monitor "loop" receives its maintenance, the new flow indicating switch is included. Operations procedures ensure the operablility of FISL-7813 prior to and during release of liquid radioactive waste. If inoperable, and unable to measure minimum flow requirements, radiation monitor RT-7813 is deemed inoperable, and the appropriate action step is followed. Because of this method of capturing the essence of the requirement, calling out FISL-7813 individually in Table 4-1 was not warranted. FISL-7813 is now considered to be part of RT-7813 and thereby does not need individual mention.

To be more consistent within the ODCM itself, two references to 2RT-7865 were removed. Section 2.6.4 allows only 3RT-7865 or 2/3RT-7808 to be used to monitor a waste gas decay tank (WGDT) release. Due to uneven mixing, 2RT-7865 can not be used. 3RT-7865 will see the greater percent of released gas because of the physical layout of the system. This revision deletes reference to 2RT-7865 in Table 4-3 and Table 4-4. Chemistry procedures already require either 2RT-7865 or 2/3RT-7808 for releasing the WGDTs. No procedural changes are occurring as a result of this particular change.

9405040080 931231
PDR ADOCK 05000206
R PDR

No safety evaluations were performed for updating radiation monitor calibration constants or implementing changes from the 1992 Land Use Census. These changes reflect results from routine surveillances and as such do not constitute a modification in methodology for determining activity released from the site and subsequent dose to a member of the public.

Per NRC Generic Letter 89-01, no safety review was required or performed for the correction of typographical errors.

The following is a complete list of the changes:

a Indicates typographical, sequential sectional and page numbering, and format changes.

b Removed guidance calling for the setting of setpoints as close to background as possible when the monitor is not being used for a release. The bases for the radiation monitors and the effluent program as stated in the basis section of the ODCM for liquids is "to ensure that the concentration of radioactive materials released in liquid waste effluents from the site will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II, Column 2", and for gases, "ensure that the dose at any time at the site boundary from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20, for unrestricted areas". The purpose of these bases is accomplished by the effluent program in its present format.

* The 1992 Land Use Census revealed increased occupancy factors in two locations, Enlisted Beach Campground (Sector Q, 0.9 mile) and San Clemente Ranch Administration Offices (Sector Q, 2.3 miles). Correspondingly, the dose parameters for all affected age groups were increased in those locations. The occupancy factors increased from 0.1014 to 0.1233 and from 0.2283 to 0.3425, respectively. Further, an evaluation of the Radiological Environmental Monitoring Program showed 21 TLD locations could be deleted. One air sampler location was also deleted, while a new one was added. This information was formally transmitted in two letters: 1) E.M. Goldin to J.R. Clark dated 9/28/92 "Submittal of 1992 Dose Parameters for SONGS Unit 1 and Units 2/3 ODCMs" and 2) E.M. Goldin to J.R. Clark dated 12/2/92 "Revision of Radiological Environmental Monitoring Sample Location, ODCM Table 5-4, SONGS Units 1,2, and 3".

ii[a] Revised page numbers.

iv[a] Added Figures 5-2 and 5-3 to this page. The figures have always been in the ODCM.

1-3 Deleted statement describing the calculation of LLD regarding interference from other nuclides in accordance with NUREG 0472, Rev 3.

1-4 Clarified note on blowdown processing sump as a continuous release pathway. Specified that the first sump is to be treated as a batch release.

1-6[a] Added a missing "comma" punctuation mark.

1-10[a] Corrected typographical error and moved definitions from p. 1-11 to this page.

1-11[a] Moved definitions to p. 1-10.

1-12 Rearranged equation 1-5 for clarification and accuracy.

1-14[b] Deleted statement providing guidance on establishing setpoint as close to background as possible whenever no release is in progress.

1-15 Revised FFCPD holdup flow rate to more reflect actual conditions and reformatted waste flow rate section of definitions.

1-16[b] Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.

1-20[b] Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.

1-23[b] Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress and added statement describing typical waste release flow rates.

1-25[b] Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.

1-26 Revised calibration constants.

1-27 Added parenthetical terminology to the definition of F_j.

1-28 Added ICRP-30 as a reference and corrected reference "0472" to "0172".

1-29 Added ICRP-30 as a reference and corrected reference "0472" to "0172".

2-3 Deleted statement describing the calculation of LLD regarding interference from other nuclides in accordance with NUREG 0472, Rev 3.

2-8[a] Added a missing comma.

2-10 Corrected title box on Figure 2-2.

2-11 Added statement describing administrative values to be ≤1 for the site.

2-14[b] Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.

2-15[b] Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.

2-16[a] Added reference paragraph to definitions.

2-17[b] Deleted statements specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.

2-19[a] Corrected typographical error.

2-20[b] Deleted statement specifying guidance on establishing setpoint as close to background as possible whenever no release is in progress.

2-22[a] Condensed the page by formatting the information and deleting blank spots.

2-23[a] Condensed the page by formatting the information and deleting blank spots. No information was added or deleted.

2-24[a] Because of reformatting the previous two pages, this page is left blank. No information was deleted.

2-25 Revised calibration constants.

2-26[a] Corrected typographical error on equation 2-12.

2-29[a] ↓ 2-32[a] Reformatted these four pages by condensing sections so they are grouped properly. By so doing, p. 2-31 is left blank. No information was deleted.

2-32 Changed reference used in definition for R_{ik}.

2-33 Added X/Q for H-3 for completeness. Also added the word "individual" to definition of D_θ in equation 2-19.

2-38 Clarified the pathway name.

2-43 Clarified the pathway name.

2-44* Revised dose parameters based on Land Use Census.

2-46 Clarified the pathway name.

2-49* Revised dose parameters based on Land Use Census.

2-53 Clarified the pathway name.

2-54 Clarified the pathway name.

2-56 Clarified the pathway name.

2-57 Clarified the pathway name.

2-58 Clarified the pathway name.

2-59 Clarified the pathway name.

2-64 Clarified the pathway name.

2-65 Clarified the pathway name.

2-67 Clarified the pathway name.

2-68 Clarified the pathway name.

2-70 Clarified the pathway name.

2-71 Clarified the pathway name.

2-72[a] Added "/" in pathway name.

2-74 Clarified the pathway name.

2-75 Clarified the pathway name.

2-78 Clarified the pathway name.

2-79 Clarified the pathway name.

2-80[a] Corrected typographical error in equation 2-21 by adding a missing "Σ" and removing subscript "l".

2-81 Provide proper references for terms in equations 2-21 and 2-22.

2-82 Revised the number of TLD locations around site per Land Use Census Report. Included additional examples of occupancy factors. Clarified the method to calculate direct radiation from the site.

4-1 Replaced Semiannual with Annual.

4-5[a] Added a missing "period" punctuation mark.

4-6 Replaced Semiannual with Annual.

4-7 Deleted WRGM 2RT-7865 under WGDT in order to be consistent with section 2.6.4.

4-8[a] Corrected typographical error.

4-9 Deleted Action 39. It is not referenced in Table 4-3 and had no noted action steps.

4-10 Deleted WRGM 2RT-7865 under WGDT in order to be consistent with section 2.6.4.

4-11[a] Corrected typographical error in title of Table 4-4.

4-12 Revised the name of NBS to NIST, National Institute of Standards and Technology.

4-14 Added FFCPD holdup tank to Figure 4-5.

4-15[a] Figure 4-6 was redrawn with extraneous wording deleted.

4-16 Revised Figure 4-7 to reflect current solid waste handling methodology.

5-9[a] Corrected a typographical error.

5-15* Deleted the following TLD locations per REMP:
5. Camp Las Pulgas (MCB, Camp Pendleton)
7. Old Route 101 (East - Northeast)
9. Basilone Road/I-5 Freeway Offramp
20. San Clemente Pier
21. Concordia Elementary School - San Clemente
24. San Clemente High School

5-16* Deleted the following TLD locations per REMP:
25. Convalescent Home - San Clemente
26. Dana Hills High School
27. US Post Office - Dana Point
28. Doheny Fire Station - Capistrano Beach
29. San Juan Capistrano Fire Station
30. Laguna Beach Fire Station
32. Santa Ana Police Department
37. Laguna Niguel Fire Station
39. Basilone Road Trailer Park (MCB, Camp Pendleton)
42. Horno Canyon (MCB, Camp Pendleton)
43. Edison Range (MCB, Camp Pendleton)
45. Interstate 5 Weigh Station
48. Mainside (MCB, Camp Pendleton)

5-17* Deleted two TLD locations per REMP.
51. Carlsbad Fire Station
52. Vista Fire Station

5-18* Deleted one airborne sampling location, added one airborne sample location and labeled three locations as Control locations.

3. Huntington Beach Generating Station	Control
6. SONGS Meteorological Tower	DELETED
7. AWS Roof	ADDED
4. Huntington Beach Generating Station	Control
D. Newport Beach	Control

5-19* Labeled three samples a Control Locations
3. Huntington Beach
4. Newport Beach (North end)
2. Southeast of Oceanside

5-20* Changed the name of three sampling locations from Newport Beach to Laguna Beach (Control). The physical location of the samples remain the same.

5-23* Revised drawings to reflect revised TLD and sample locations.

5-24* Revised drawings to reflect revised TLD and sample locations. Also added title to page.

5-25* Revised drawings to reflect revised TLD and sample locations. Also added title to page.

6-7 Revised all references from Semiannual reporting period for the Radioactive Effluent Release Report to Annual. This is in accordance with PCN-419. Also deleted a statement requiring the first such report upon initial criticality. Also added a note which was removed from page 6-8 to coincide with the reference.

6-8 Revised all references form Semiannual reporting period for the Radioactive Effluent Release Report to Annual. This is in accordance with PCN-419.And also deleted a note which was transferred to page 6-7.

6-9 Added note regarding reporting major changes to the radioactive waste treatment system.

OFFSITE DOSE CALCULATION MANUAL

NUCLEAR ORGANIZATION

UNITS 2 AND 3

S023-ODCM
Revision 26
12-20-93

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

R

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

A

LIST OF TABLES

LIST OF TABLES (Continued)

INTRODUCTION

The OFFSITE DOSE CALCULATION MANUAL (ODCM) is a supporting document of the RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS (NUREG 0472). The ODCM enumerates dose and concentration specifications, instrument requirements, as well as describes the methodology and parameters to be used in the calculation of offsite doses from radioactive liquid and airborne effluents. In order to meet release limits, it additionally provides calculations for liquid and gaseous effluent monitoring instrumentation alarm/trip setpoints. The environmental section contains a list of the sample locations for the radiological environmental monitoring program.

The ODCM will be maintained at the Site for use as a document of Specifications and acceptable methodologies and calculations to be used in implementing the Specifications. Changes in the calculational methods or parameters will be incorporated into the ODCM in order to assure that the ODCM represents current methodology.

1.0 LIQUID EFFLUENTS

1.1 CONCENTRATION

SPECIFICATION

1.1.1 The concentration of radioactive material released from the site (see Figure 1-2) shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2×10^{-4} microcuries/ml total activity.

APPLICABILITY: At all times

ACTION:

a. With the concentration of radioactive material released from the site exceeding the above limits, immediately restore the concentration to within the above limits.

SURVEILLANCE REQUIREMENTS

.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analysis program of Table 1-1.

.2 The results of the radioactivity analyses shall be used in accordance with the methodology and parameters in Section 1.4 to assure that the concentrations at the point of release are maintained within the limits of Specification 1.1.1.

TABLE 1-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) (μCi/ml)[a]
A. Batch Waste Release[d]	P Each Batch	P Each Batch	Principal Gamma Emitters[f]	$5x10^{-7}$
			I-131	$1x10^{-6}$
	P One Batch/M	M	Dissolved and Entrained Gases (Gamma emitters)	$1x10^{-5}$
	P Each Batch	M Composite[b]	H-3	$1x10^{-5}$
			Gross Alpha	$1x10^{-7}$
	P Each Batch	Q Composite[b]	Sr-89, Sr-90	$5x10^{-8}$
			Fe-55	$1x10^{-6}$

NOTE BATCH RELEASE POINTS: Primary Plant Makeup Storage Tanks, Radwaste Primary Tanks, Radwaste Secondary Tanks, Miscellaneous Waste Condensate Monitor Tanks, Blowdown Processing Sump, FFCPD sumps (high conductivity, low conductivity) and holdup tank, Component Cooling Water Sump, Storage Tank Area Sump, S/G Blowdown.

B. Continuous Releases[e],	D Grab Sample	W Composite[c]	Principal Gamma Emitters[f]	$5x10^{-7}$
			I-131	$1x10^{-6}$
	M Grab Sample	M	Dissolved and Entrained Gases (Gamma emitters)	$1x10^{-5}$
	D Grab Sample	M Composite[c]	H-3	$1x10^{-5}$
			Gross Alpha	$1x10^{-7}$
	D Grab Sample	Q Composite[c]	Sr-89, Sr-90	$5x10^{-8}$
			Fe-55	$1x10^{-6}$

NOTE CONTINUOUS RELEASE POINTS: Turbine Plant Sump*, Blowdown Processing Sump**, S/G Blowdown Bypass Line***, S/G Blowdown, Salt Water Discharge from CCW Heat Exchanger, Auxiliary Building Sump.*

TABLE NOTATION

a. The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\ s_b}{E \bullet V \bullet 2.22 \times 10^6 \bullet Y \bullet \exp(-\lambda \Delta t)}$$

where:

LLD is the "a priori" lower limit of detection as defined above (as microcurie per unit mass or volume),

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute),

E is the counting efficiency (as counts per transformation),

V is the sample size (in units of mass or volume),

2.22×10^6 is the number of transformations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

λ is the radioactive decay constant for the particular radionuclide, and

Δt is the elapsed time between midpoint of sample collection and time of counting (for plant effluents, not environmental samples).

The value of s_b used in the calculation of the LLD for a particular measurement system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance.

Typical values of E, V, Y and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an <u>a priori</u> (before the fact) limit representing the capability of the measurement system and not as <u>a posteriori</u> (after the fact) limit for a particular measurement.#

#For a more complete discussion of the LLD, and other detection limits, see the following:
(1) HASL Procedures Manual, <u>HASL-300</u> (revised annually).
(2) Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry" <u>Anal. Chem. 40</u>, 586-93 (1968).
(3) Hartwell, J. K., "Detection Limits for Radioisotopic Counting Techniques," Atlantic Richfield Hanford Company Report <u>ARH-2537</u> (June 22, 1972).

TABLE NOTATION

b. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.

c. To be representative of the quantities and concentrations of radioactive materials in liquid effluents, samples shall be collected continuously in proportion to the rate of flow of the effluent stream. Prior to analysis, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.

d. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed, by a method described in the ODCM, to assure representative sampling.

e. A continuous release is the discharge of liquid wastes of a nondiscrete volume; e.g., from a volume of system that has an input flow during the continuous release.

f. The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported.

* Administrative controls shall ensure that only one continuous release point is discharging through a discharge path at any given time. The normal continuous release point via 2(3)RT-7821 is the turbine plant sump.

** The first sump when transferring outlying sumps shall be treated as a batch release. R

*** Sampling of this flow is not required if at least once per 31 days blowdown bypass isolation valve (S21301MU618 for Steam Generator 2E088, S21301MU619 for Steam Generator 2E089, S31301MU618 for Steam Generator 3E088 and S31301MU619 for Steam Generator 3E089) is verified locked shut.

1.2 DOSE

SPECIFICATION

1.2.1 The dose or dose commitment to an individual from radioactive materials in liquid effluents released, from each reactor unit, from the site (see Figure 1-2) shall be limited:

a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ, and

b. During any calendar year to less than or equal to 3 mrem to the total body and to less than or equal to 10 mrem to any organ.

APPLICABILITY: At all times

ACTION:

a. With calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, in lieu of any other report required by Technical Specification 6.9.1, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report which identifies the cause(s) for exceeding the limit(s) and defines the corrective actions taken to reduce the releases and the proposed actions to be taken to assure that subsequent releases will be in compliance with Specification 1.2.1.

SURVEILLANCE REQUIREMENTS

.1 Dose Calculation. Cumulative dose contributions from liquid effluents shall be determined in accordance with Section 1.5 at least once per 31 days.

1.0 **LIQUID EFFLUENTS** (Continued)

1.3 LIQUID WASTE TREATMENT

SPECIFICATION

1.3.1 The liquid radwaste treatment system shall be OPERABLE. The appropriate portions of the system shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the projected doses due to the liquid effluent from the site (see Figure 1-2) when averaged over 31 days, would exceed 0.06 mrem to the total body or 0.2 mrem to any organ.*

APPLICABILITY: At all times

ACTION:

a. With radioactive liquid waste being discharged without treatment and in excess of the above limits, in lieu of any other report required by Technical Specification 6.9.1, prepare and submit to the Commission within 30 days pursuant to Technical Specification 6.9.2 a Special Report which includes the following information:

1. Explanation of why liquid radwaste was being discharged without treatment, identification of the inoperable equipment or subsystems and the reason for inoperability,

2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and

3. Summary description of action(s) taken to prevent a recurrence.

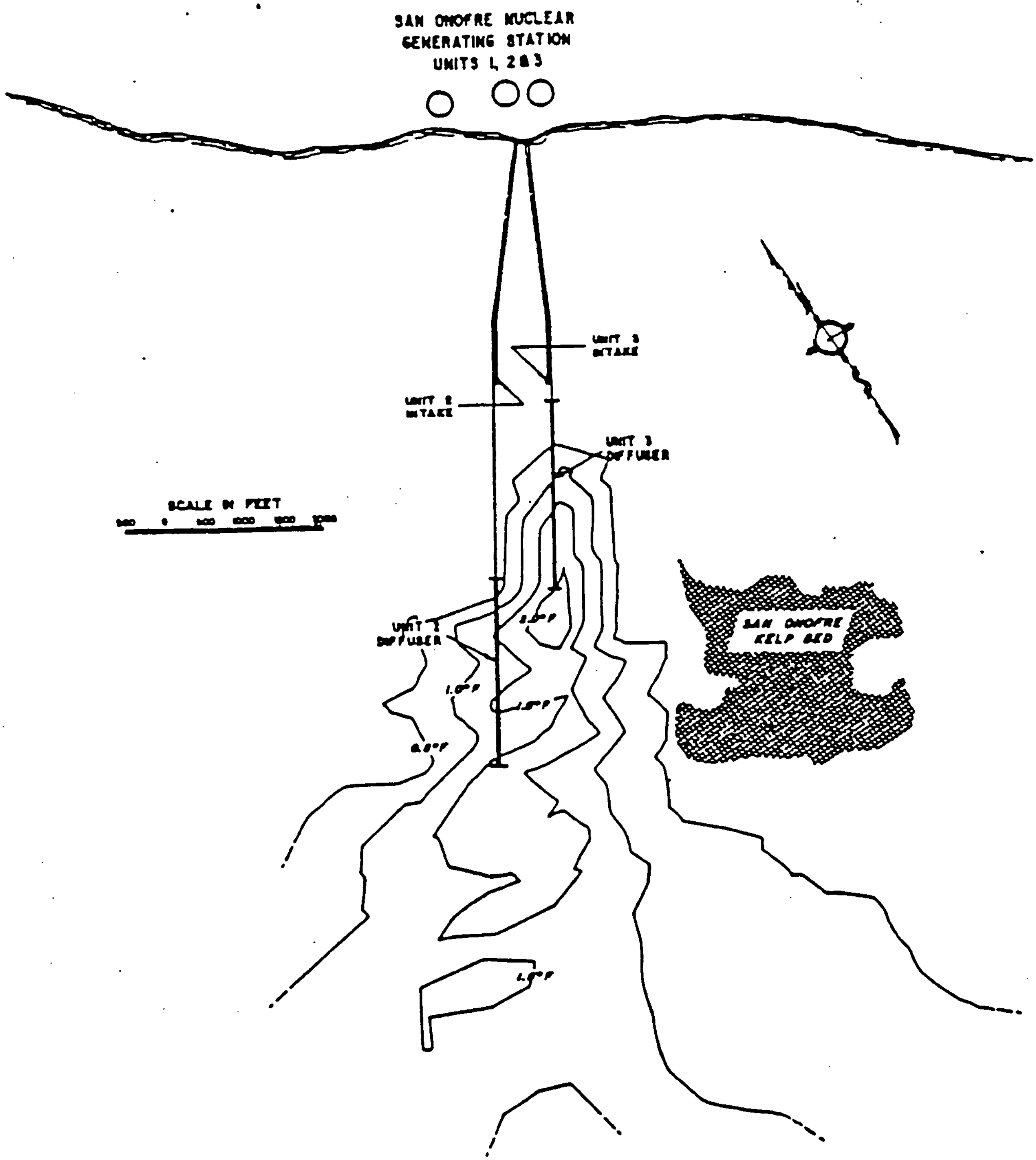
SURVEILLANCE REQUIREMENTS

.1 Doses due to liquid releases shall be projected at least once per 31 days, in accordance with Section 3.1.

.2 During plant operation (Mode 1-4), the appropriate portions of the liquid radwaste treatment system shall be demonstrated OPERABLE by operating the liquid radwaste treatment system equipment for at least 15-minutes at least once per 92 days unless the liquid radwaste system has been utilized to process radioactive liquid effluents during the previous 92 days.

.3 In plant shut-down (Mode 5, 6), the appropriate portions of the liquid radwaste treatment system shall be demonstrated OPERABLE by operating the liquid radwaste treatment system equipment for at least 15-minutes prior to processing liquids unless the appropriate liquid radwaste system has been utilized to process radioactive liquid effluents during the previous 92 days. | R

*Per reactor unit



SITE BOUNDARY FOR LIQUID EFFLUENTS

FIGURE 1-2

REFERENCE: TECHNICAL SPECIFICATIONS, FIGURE 5.1-4

1.0 **LIQUID EFFLUENTS** (Continued)

1.4 Liquid Effluent Monitor Methods of Setpoint Calculation

Liquid Radwaste Effluent Line Monitors provide alarm and automatic termination of release prior to exceeding the concentration limits specified in 10CFR20, Appendix B, Table II, Column 2 at the release point to the unrestricted area. To meet this specification and for the purpose of implementation of Specification 1.1.1, the alarm/trip setpoints for liquid effluent monitors and flow measurement devices are set to assure that the following equation is satisfied:

$$\frac{C_m R}{F+R} \leq MPC_{eff} \qquad (1\text{-}1)$$

where:

MPC_{eff} = effective effluent maximum concentration permissible limit (µCi/ml) at the release point to the unrestricted area for the radionuclide mixture being released,

$$= \frac{1}{\sum_{i=1}^{N} \left(\frac{F_i}{MPC_i} \right)} \qquad (1\text{-}2)$$

1.4 Liquid Effluent Monitor Methods of Setpoint Calculation (Continued)

where:

F_i = fractional concentration of the i^{th} radionuclide as obtained by sample analysis.

N = number of radionuclides identified in sample analysis.

MPC_i = MPC of the i^{th} radionuclide (10CFR20, App B, Table II, Column 2).

C_m = setpoint, representative of a radionuclide concentration for the radiation monitor measuring the radioactivity in the waste effluent line prior to dilution and subsequent release, µCi/ml.

R = permissible waste effluent flow rate at the radiation monitor location, in volume per unit time in the same units as for F.

F = dilution water flow in volume per unit time. The dilution water flow (F) is 185,000 gpm per circ pump (4 total) and 17,000 gpm per saltwater pump (2 total).

The design flowrate of each circulating water pump is 205,000 gpm. The value used in the determination of F takes into account factors such as frictional losses, pump inefficiency, and tidal flow, and provides reasonable assurance that the radioactive release concentration is not underestimated.

1.4 **Liquid Effluent Monitor Methods of Setpoint Calculation** (Continued)

Administrative values are used to reduce each setpoint to account for the potential activity in other releases. These administrative values shall be periodically reviewed based on actual release data (including, for example, any saltwater discharge of the component cooling water heat exchanger) and revised as necessary.

1.4.1 **Batch Release Setpoint Determination**

The waste flow (R) and monitor setpoint (c) are set to meet the condition of equation (1-1) for the effective MPC (MPC_{eff}) limit. The method by which this is accomplished is as follows:

STEP 1: The isotopic concentration for each batch tank (or sump) to be released is obtained from the sum of the measured concentrations in the tank (or sump) as determined by analysis.

$$C = \Sigma_i C_{\gamma_i} + C_\alpha + C_s + C_t + C_{Fe} \qquad (1\text{-}3)$$

where:

C = total concentration in each batch tank, μCi/ml

$\Sigma_i C_{\gamma i}$ = sum of the measured concentrations for each radionuclide, i, in the gamma spectrum, μCi/ml | R

C_{Fe} = Fe-55 concentration as determined in the previous quarterly composite sample, μCi/ml

C_α = gross alpha concentration determined in the previous monthly composite sample, μCi/ml

C_s = Sr-89 and Sr-90 concentrations as determined in the previous quarterly composite sample, μCi/ml | A

C_t = H-3 concentration as determined in the previous monthly composite sample, μCi/ml

1.4.1 **Batch Release Setpoint Determination** (Continued)

IC

STEP 2: The effective MPC (MPC_{eff}) for each batch tank (or sump) is determined using:

$$MPC_{eff} = \frac{1}{\Sigma_i \left(\frac{C_{\gamma i}/C}{MPC_{\gamma i}}\right) + \left(\frac{C_s/C}{MPC_s}\right) + \left(\frac{C_t/C}{MPC_t}\right) + \left(\frac{C_\alpha/C}{MPC_\alpha}\right) + \left(\frac{C_{Fe}/C}{MPC_{Fe}}\right)} \quad (1\text{-}4)$$

$MPC_{\gamma i}$, MPC_s, MPC_t, MPC_{Fe}, MPC_α = the limiting concentrations of the appropriate radionuclide from 10CFR20, Appendix B, Table II, Column 2.

NOTE: For dissolved or entrained noble gases, the concentration shall be limited to 2.0E-4 µCi/ml total activity.

STEP 3: The radioactivity monitor setpoint C_m, µCi/ml, may now be specified based on the values of C, $\Sigma_i C_{\gamma i}$, F, MPC_{eff} and R to provide compliance with the limits of 10CFR20, Appendix B, Table II, Column 2. The monitor setpoint, cpm, is taken from the applicable calibration constants given in Table 1-3 to correspond to the calculated monitor concentration limit C_m, µCi/ml.

1.0 **LIQUID EFFLUENTS** (Continued)

1.4.1 **Batch Release Setpoint Determination** (Continued)

1.4.1.1 RADWASTE DISCHARGE LINE MONITOR (2/3-7813)

The value for C_m, the concentration limit at the detector, is determined by using:

$$C_m \leq \frac{(RW) \quad (F) \quad (C_{eff})}{\left(R_1 + .. + R_n\right) \left(\frac{C_1}{MPC_{eff1}} + .. + \frac{C_n}{MPC_{effn}}\right)} \tag{1-5}$$

R

where:

n = number of tanks to be released.

C_{eff} = effective gamma isotopic concentration at the monitor for the tank combination to be released (equal to $\Sigma_i C_{\gamma i}$ for single tank releases).

$$= \frac{R_1 \left(\Sigma_i C_{\gamma i}\right)_1 + R_2 \left(\Sigma_i C_{\gamma i}\right)_2 + \ldots + R_n \left(\Sigma_i C_{\gamma i}\right)_n}{R_1 + R_2 + \ldots + R_n} \tag{1-6}$$

$(\Sigma_i C_{\gamma i})_1$, $(\Sigma_i C_{\gamma i})_2$, etc. = total gamma isotopic concentration of first tank, second tank, etc. (µCi/ml).

R_1, R_2, etc. = typical effluent flow rate from first tank, second tank, etc. Values of R for each tank are as follows:

Radwaste Primary Tanks R = 140 gpm/pump (x no. of pumps to be run)

Radwaste Secondary Tanks R = 140 gpm/pump (x no. of pumps to be run)

Primary Plant Makeup Tank R = 160 gpm/pump (x no. of pumps to be run)

Condensate Monitor Tanks R = 100 gpm/pump (x no. of pumps to be run)

1.4.1.1 <u>RADWASTE DISCHARGE LINE MONITOR (2/3-7813)</u> (Continued)

NOTE: Since the values of R are much smaller than F, the term (F + R) in equation (1-1) may be replaced by F.

MPC_{eff1}, MPC_{eff2}, etc.	=	values of MPC_{eff} from equation (1-4) for first tank, second tank, etc.
C_1, C_2, etc.	=	values of C, total concentration, from equation (1-3) for the first tank, second tank, etc., in µCi/ml.

RW_{7813} and SG_{88-2}, SG_{89-2}, SG_{88-3}, SG_{89-3}, B_2, B_3, T_2, T_3 are administrative values used for simultaneous releases from the Radwaste Effluent discharge and any or all of the four Steam Generators as well as continuous discharges from the two Blowdown Processing Systems and the two Turbine Plant Sumps. The fractions RW_{7813} and SG_{88-2}, SG_{89-2}, SG_{88-3}, SG_{89-3}, B_2, B_3, T_2, T_3 will be assigned such that $\{RW_{7813} + SG_{88-2} + SG_{89-2} + SG_{88-3} + SG_{89-3} + B_2 + B_3 + T_2 + T_3\} \leq 1.0$.

1.4.1.1 <u>RADWASTE DISCHARGE LINE MONITOR (2/3-7813)</u> (Continued)

The 1.0 is an administrative value used to account for the potential activity released simultaneously from other release points. This assures that the total concentration from all release points to the plant discharge will not result in a release of concentrations exceeding the limits of 10 CFR 20, Appendix B, Table II, Column 2 from the Site.

NOTE: If $C_m \leq C_{eff}$, then no release is possible. To increase C_m, increase dilution flow F (by running more circulating water pumps in the applicable discharge structure), and/or decrease the effluent flow rates R_1, R_2, etc., (by throttling the combined flow as measured on 2/3FI-7643, 2FIC-4055, 2FIC-4056, 3FIC-4055 or 3FIC-4056 as appropriate) and recalculate C_m using the new F, R and equation (1-5).

D

1.0 **LIQUID EFFLUENTS** (Continued)

1.4.1.2 NEUTRALIZATION SUMP/FULL FLOW CONDENSATE POLISHER DEMINERALIZER (FFCPD) SUMP DISCHARGE LINE MONITOR (batch) (2RT-7817, 3RT-7817)

The value for C_2 or C_3, the concentration limit at the Unit 2 or Unit 3 detector, is determined by using:

$$C_2 \le \frac{(B_2)(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \quad (1\text{-}7)$$

$$C_3 \le \frac{(B_3)(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \quad (1\text{-}8)$$

where:

C, $\Sigma_i C_{\gamma i}$, MPC_{eff} = values of C, $\Sigma_i C_{\gamma i}$ and MPC_{eff} as defined in STEPS 1) and 2) for the Neutralization Sump/FFCPD Sumps.

R = Typical release flow rates

500 gpm	Neutralization Sump
500 gpm	FFCPD High Conductivity Sump
600 gpm	FFCPD Low Conductivity Sump
700 gpm	FFCPD Holdup Tank

R

C_2 = instantaneous concentration at the detector (2RT-7817) in µCi/cc

C_3 = instantaneous concentration at the detector (3RT-7817) in µCi/cc

B_2 and B_3 are administrative values used to account for simultaneous releases from both SONGS 2 and SONGS 3 neutralization sumps. The fractions B_2 and B_3 (each normally set to 0.05) will be assigned such that $\{RW_{7813} + SG_{88\text{-}2} + SG_{89\text{-}2} + SG_{88\text{-}3} + SG_{89\text{-}3} + B_2 + B_3 + T_2 + T_3\} \le 1.0$.

1.4.1.2 <u>NEUTRALIZATION SUMP/FULL FLOW CONDENSATE POLISHER DEMINERALIZER (FFCPD) SUMP DISCHARGE LINE MONITOR (batch) (2RT-7817, 3RT-7817)</u> (Continued)

NOTE: If C_2 or $C_3 \leq \Sigma_i C_{\gamma i}$, then no release is possible. To increase C_2 or C_3, increase dilution flow F (by running more pumps), and/or decrease the effluent flow rate R, (by throttling the flow as measured on 2FI-3722 and 3FI-3772), and recalculate C_2 or C_3 using the new F, R and equation (1-7) or (1-8).

1.4.2 Continuous Release Setpoint Determination

The waste flow (R) and monitor setpoint (C_m) are set to meet the condition of equation (1-1) for the effective MPC (MPC_{eff}) limit. The method by which this is accomplished is as follows:

<u>STEP 1</u>: The isotopic concentration for the continuous releases are obtained for each release stream (steam generator blowdown, steam generator blowdown bypass, blowdown neutralization sump and turbine plant sump) from the sum of the respective measured concentrations as determined by analysis:

$$C = \Sigma_i C_{\gamma i} + C_\alpha + C_t + C_s + C_{Fe} \qquad (1\text{-}9)$$

1.4.2 Continuous Release Setpoint Determination (Continued)

where:

C = total concentration (µCi/ml)

$\Sigma_i C_{\gamma i}$ = total gamma activity associated with each radionuclide, i, in the weekly composite analysis for the release stream, µCi/ml

C_α = total measured gross alpha concentration determined from the previous monthly composite analysis for the release stream, µCi/ml

C_{Fe} = total Fe-55 concentration as determined in the previous quarterly composite sample for the release stream, µCi/ml

C_t = total measured H-3 concentration determined from the previous monthly composite analysis for the release stream, µCi/ml

C_s = total measured concentration of Sr-89 and Sr-90 as determined from the previous quarterly composite analysis for the release stream, µCi/ml

<u>STEP 2</u>: The effective MPC (MPC_{eff}) for each release stream (steam generator blowdown, blowdown neutralization sump, or turbine plant sump) is determined using:

$$MPC_{eff} = \frac{1}{\Sigma_i\left(\frac{C_{\gamma i}/C}{MPC_i}\right) + \left(\frac{C_s/C}{MPC_s}\right) + \left(\frac{C_\alpha/C}{MPC_\alpha}\right) + \left(\frac{C_{Fe}/C}{MPC_{Fe}}\right) + \left(\frac{C_t/C}{MPC_t}\right)} \quad (1\text{-}10)$$

1.0 **LIQUID EFFLUENTS** (Continued)

1.4.2 **Continuous Release Setpoint Determination** (Continued)

STEP 3: The setpoint, C_m (μCi/ml), for each continuous release radioactivity monitor may now be specified based on the respective values of C, $\Sigma_i C_{\gamma i}$, F, MPC_{eff}, and R to provide compliance with the limits of 10CFR20, Appendix B, Table II, Column 2. The monitor setpoint, cpm, is taken from the applicable calibration constants given in Table 1-3 to correspond to the calculated monitor limit C_m, μCi/ml.

1.4.2.1 NEUTRALIZATION SUMP DISCHARGE LINE MONITORS (2RT-7817, 3RT-7817)

The value for C_2 or C_3, the concentration limit at the Unit 2 or Unit 3 detector is determined by using:

$$C_2 \le \frac{(B_2)(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \quad (1\text{-}11)$$

$$C_3 \le \frac{(B_3)(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \quad (1\text{-}12)$$

where:

C, $\Sigma_i C_{\gamma i}$, MPC_{eff}	=	values of C, $\Sigma_i C_{\gamma i}$ and MPC_{eff} as defined in STEPS 1 and 2 for the Steam Generator blowdown/BPS neutralization sump.
R	=	effluent flow rate at the radiation monitor as defined in STEP 2 (maximum of 500 gpm).
C_2	=	instantaneous concentration at the Unit 2 detector (2RT-7817) in µCi/cc
C_3	=	instantaneous concentration at the Unit 3 detector (3RT-7817) in µCi/cc

B_2 and B_3 are administrative values used to account for simultaneous releases from both SONGS 2 and SONGS 3 neutralization sumps. The fractions B_2 and B_3 will be assigned such that $\{RW_{7813} + SG_{88\text{-}2} + SG_{89\text{-}2} + SG_{88\text{-}3} + SG_{89\text{-}3} + B_2 + B_3 + T_2 + T_3\} \le 1.0$

1.4.2.1 NEUTRALIZATION SUMP DISCHARGE LINE MONITOR (2RT-7817, 3RT-7817) (Continued)

NOTE: If C_2 or $C_3 \leq \Sigma_i C_{\gamma i}$, then no release is possible. To increase C_2 or C_3, increase dilution flow F (by running more circulating water pumps), and/or decrease the effluent flow rate R, (by throttling the flow as measured on 2FI-3722 and 3FI-3772), and recalculate C_2 or C_3 using the new F, R and equation (1-11) or (1-12).

D

1.0 **LIQUID EFFLUENTS** (Continued)

1.4.2.2 STEAM GENERATOR BLOWDOWN BYPASS DISCHARGE LINE MONITORS (2RT-6753, 2RT-6759, 3RT-6753, 3RT-6759)

The value for C_{59-2}, C_{53-2}, C_{59-3} or C_{53-3}, the concentration limit at the Unit 2 or Unit 3 detectors, is determined by using:

$$C_{59-2} \leq \frac{(SG_{88-2})(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \qquad (1\text{-}13)$$

$$C_{53-2} \leq \frac{(SG_{89-2})(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \qquad (1\text{-}14)$$

$$C_{59-3} \leq \frac{(SG_{88-3})(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \qquad (1\text{-}15)$$

$$C_{53-3} \leq \frac{(SG_{89-3})(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \qquad (1\text{-}16)$$

where:

C, $\Sigma_i C_{\gamma i}$, MPC_{eff} = values of C, $\Sigma_i C_{\gamma i}$ and MPC_{eff} (as defined in STEPS 1 and 2 above) for the steam generator blowdown bypass.

R = maximum blowdown bypass effluent flowrate per steam generator, 200 gpm.

C_{59-2} = instantaneous concentration at the Unit 2 detector (2RT-6759) in μCi/ml

C_{53-2} = instantaneous concentration at the Unit 2 detector (2RT-6753) in μCi/ml

C_{59-3} = instantaneous concentration at the Unit 3 detector (3RT-6759) in μCi/ml

C_{53-3} = instantaneous concentration at the Unit 3 detector (3RT-6753) in μCi/ml

1.4.2.2 STEAM GENERATOR BLOWDOWN BYPASS DISCHARGE LINE MONITORS (2RT-6753, 2RT-6759, 3RT-6753, 3RT-6759) (Continued)

RW_{7813} and SG_{88-2}, SG_{89-2}, SG_{88-3}, SG_{89-3}, B_2, B_3, T_2, T_3 are administrative values used for simultaneous releases from the Radwaste Effluent discharge and any or all of the four Steam Generators as well as continuous discharges from the two Blowdown Processing Systems and the two Turbine Plant Sumps. The fractions RW_{7813} and SG_{88-2}, SG_{89-2}, SG_{88-3}, SG_{89-3}, B_2, B_3, T_2, T_3 will be assigned such that $\{RW_{7813} + SG_{88-2} + SG_{89-2} + SG_{88-3} + SG_{89-3}\ B_2 + B_3 + T_2 + T_3\} \leq 1.0$.

The 1.0 is an administrative value used to account for the potential activity released simultaneously from other release points. This assures that the total concentration from all release points to the plant discharge will not result in a release of concentrations exceeding the limits of 10 CFR 20, Appendix B, Table II, Column 2 from the site.

NOTE: If C_{59-2}, C_{53-2}, C_{59-3}, or $C_{53-3} \leq \Sigma_i C_{\gamma i}$ (for the respective steam generator), then no release is possible. To increase C_{59-2}, C_{53-2}, C_{59-3} or C_{53-3}, increase dilution flow F (by running more circulating water pumps), and/or decrease the effluent flow rate R (by throttling the flow as measured on 2FIC-4055, 2FIC-4056, 3FIC-4055, 3FIC-4056 or 2/3FI-7643, as appropriate) and recalculate C_{59-2}, C_{53-2}, C_{59-3} or C_{53-3} using the new values of F, R and equation (1-13), (1-14), (1-15) or (1-16).

1.4.2.3 <u>TURBINE PLANT SUMP MONITORS (2RT-7821, 3RT-7821)</u>

The value for C_2 or C_3 (the concentration limit at the Unit 2 or Unit 3 detector) is determined by using:

$$C_2 \leq \frac{(T_2)(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \qquad (1\text{-}17)$$

$$C_3 \leq \frac{(T_3)(F)\Sigma_i C_{\gamma i}}{(R)(C/MPC_{eff})} \qquad (1\text{-}18)$$

where:

C, $\Sigma_i C_{\gamma i}$, MPC_{eff} = values of C, $\Sigma_i C_{\gamma i}$ and MPC_{eff} (as defined in STEPS 1 and 2 above) for the turbine plant sump

R = Typical waste stream release flow rates:
100 gpm/pump (x no. sump pumps to be run) Unit 2
50 gpm/pump (x no. sump pumps to be run) Unit 3

C_2 = instantaneous concentration at the Unit 2 detector (2RT-7821), µCi/ml.

C_3 = instantaneous concentration at the Unit 3 detector (3RT-7821), µCi/ml.

T_2 and T_3 are administrative values used to account for simultaneous releases from both SONGS 2 and SONGS 3 turbine plant sumps. The fractions T_2 and T_3 will be assigned such that $\{RW_{7813} + SG_{88-2} + SG_{89-2} + SG_{88-3} + SG_{89-3}\ B_2 + B_3 + T_2 + T_3\} \leq 1.0$.

NOTE: If C_2 or $C_3 \leq \Sigma_i C_{\gamma i}$ (for the respective sump), then no release is possible. To increase C_2 or C_3, increase the dilution flow F (by running more circulating water pumps) and recalculate C_2 or C_3 using the new value of F and equation (1-17) or (1-18).

Use of a temporary discharge path from the Turbine Plant Sump is allowed providing the radiation monitor, 7821, in service and the normal discharge path is used concurrently. Temporary pumps facilitate faster discharge when draining the condenser to the outfall via this pathway. The following conditions shall be met:

a. The release permit shall account for the entire volume of water discharged from the Turbine Plant Sump.
b. The alarm setpoint for the monitor shall be adjusted to take into account the entire discharge flow through both the normal and temporary paths.
c. Procedures shall require the immediate termination of the discharge via the temporary path if the monitor on the normal path alarms.

D

This page intentionally left blank.

Table 1-3

Liquid Effluent Radiation Monitor
Calibration Constants
(μCi/cc/cpm)

MONITOR	Co-60	Ba-133	Cs-137
2RT-6753		1.88E-8	1.94E-8
2RT-6759		2.03E-8	2.05E-8
3RT-6753		1.97E-8	1.94E-8
3RT-6759		1.91E-8	1.94E-8
2/3RT-7813	2.36E-9	3.23E-9	5.40E-9
2RT-7817	2.42E-9	3.35E-9	4.97E-9
2RT-7821	2.35E-9	3.23E-9	4.77E-9
3RT-7817	2.30E-9	3.16E-9	4.97E-9
3RT-7821	2.06E-9	3.61E-9	5.50E-9

R

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

1.5 Dose Calculation for Liquid Effluents

The liquid releases considered in the following dose calculations are described in Section 1.4. The dose commitment to an individual from radioactive materials in liquid effluents released to unrestricted areas are calculated for the purpose of implementing Specification 1.2.1 using the following expression.

$$D_\tau = \Sigma_i\left[A_{i\tau}\ \Sigma_j\left(\Delta t_j\ C_{ij}\ F_j\right)\right] \qquad (1\text{-}19)$$

where:

$A_{i\tau}$ = Site-related adult ingestion dose commitment factor to the total body or an organ, τ, for each identified principal gamma and beta emitter, i, from Table 1-4 in mrem/hr per µCi/ml.

C_{ij} = average concentration of radionuclide, i, in the undiluted liquid effluent during time period, Δt_j, in µCi/ml.

D_τ = dose commitment to the total body or an organ, τ, from the liquid effluent for the time period, Δt_j, in mrem.

F_j = near field average dilution factor (actually mixing ratio) for C_{ij} during the time period, Δt_j. This factor is the ratio of the maximum undiluted liquid waste flow during time period, Δt_j, to the average flow from the site discharge structure to unrestricted receiving waters,

or $\dfrac{\text{maximum liquid radioactive waste flow}}{\text{discharge structure exit flow}}$

Δt_j = length of the j^{th} time period over which C_{ij} and F_j are averaged for all liquid releases, in hours.

TABLE 1-4

DOSE COMMITMENT FACTORS*, $A_{i\tau}$
(mrem/hr per µCi/ml)

Radio-Nuclide	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
H-3		2.82E-1	2.82E-1	2.82E-1	2.82E-1	2.82E-1	2.82E-1
Na-24	4.57E-1	4.57E-1	4.57E-1	4.57E-1	4.57E-1	4.57E-1	4.57E-1
Cr-51			5.58E+0	3.34E+0	1.23E+0	7.40E+0	1.40E+3
Mn-54		7.06E+3	1.35E+3		2.10E+3		2.16E+4
Mn-56		1.78E+2	3.15E+1		2.26E+2		5.67E+3
Fe-55	5.11E+4	3.53E+4	8.23E+3			1.97E+4	2.03E+4
Fe-59	8.06E+4	1.90E+5	7.27E+4			5.30E+4	6.32E+5
Co-57		1.42E+2	2.36E+2				3.59E+3
Co-58		6.03E+2	1.35E+3				1.22E+4
Co-60		1.73E+3	3.82E+3				3.25E+4
Cu-64		2.14E+2	1.01E+2		5.40E+2		1.83E+4
Zn-65	1.61E+5	5.13E+5	2.32E+5		3.43E+5		3.23E+5
Br-84			9.39E-2				7.37E-7
Rb-88		1.79E+0	9.49E-1				2.47E-11
Sr-89	4.99E+3		1.43E+2				8.00E+2
Sr-90	1.23E+5		3.01E+4				3.55E+3
Sr-91	9.18E+1		3.71E+0				4.37E+2
Sr-92	3.48E+1		1.51E+0				6.90E+2
Y-90	6.06E+0		1.63E-1				6.42E+4
Y-91m	5.73E-2		2.22E-3				1.68E-1
Y-92	5.32E-1		1.56E-2				9.32E+3
Zr-95	1.59E+1	5.11E+0	3.46E+0		8.02E+0		1.62E+4
Zr-97	8.81E-1	1.78E-1	8.13E-2		2.68E-1		5.51E+4
Nb-95	1.84E+0	1.03E+0	5.51E-1		1.01E+0		6.22E+3
Nb-95m	1.84E+0	1.03E+0	5.51E-1		1.01E+0		6.22E+3
Nb-97	1.55E-2	3.91E-3	1.43E-3		4.56E-3		1.44E+1
Mo-99		1.28E+2	2.43E+1		2.89E+2		2.96E+2
Tc-99m	1.30E-2	3.66E-2	4.66E-1		5.56E-1	1.79E-2	2.17E+1
Ru-103	1.07E+2		4.60E+1		4.07E+2		1.25E+4
Ru-106	1.59E+3		2.01E+2		3.06E+3		1.03E+5
Ag-110m	1.42E+3	1.32E+3	7.82E+2		2.59E+3		5.37E+5
Sn-113							2.26E+5
Sn-117m							2.26E+5
Sb-124	2.76E+2	5.22E+0	1.09E+2	6.70E-1		2.15E+2	7.84E+3
Sb-125	1.77E+2	1.97E+0	4.20E+1	1.79E-1		1.36E+2	1.94E+3
Te-129m	9.31E+2	3.47E+2	1.47E+2	3.20E+2	3.89E+3		4.69E+3
Te-132	2.04E+2	1.32E+2	1.24E+2	1.46E+2	1.27E+3		6.24E+3
I-131	2.18E+2	3.12E+2	1.79E+2	1.02E+5	5.35E+2		8.23E+1
I-132	1.06E+1	2.85E+1	9.96E+0	9.96E+2	4.54E+1		5.35E+0
I-133	7.45E+1	1.30E+2	3.95E+1	1.90E+4	2.26E+2		1.16E+2
I-134	5.56E+0	1.51E+1	5.40E+0	2.62E+2	2.40E+1		1.32E-2
I-135	2.32E+1	6.08E+1	2.24E+1	4.01E+3	9.75E+1		6.87E+1

NOTE: where no value is given, no data are available.

*Source: Reg. Guide 1.109, Table E-11, Table A-1
USNRC NUREG-0172, Table 4
ICRP-30, Part 3, Supplement A

Methodology: USNRC NUREG-0133, Section 4.3.1

|R
|A

TABLE 1-4

DOSE COMMITMENT FACTORS*, $A_{i\tau}$
(mrem/hr per µCi/ml)

Radio-Nuclide	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Cs-134	6.84E+3	1.63E+4	1.33E+4		5.27E+3	1.75E+3	2.85E+2
Cs-136	7.16E+2	2.83E+3	2.04E+3		1.57E+3	2.16E+2	3.21E+2
Cs-137	8.77E+3	1.20E+4	7.85E+3		4.07E+3	1.35E+3	2.32E+2
Cs-138	6.07E+0	1.20E+1	5.94E+0		8.81E+0	8.70E-1	5.12E-5
Ba-139	7.85E+0	5.59E-3	2.30E-1		5.23E-3	3.17E-3	1.39E+1
Ba-140	1.64E+3	2.06E+0	1.08E+2		7.02E-1	1.18E+0	3.38E+3
La-140	1.57E+0	7.94E-1	2.10E-1				5.83E+4
Ce-141	3.43E+0	2.32E+0	2.63E-1		1.08E+0		8.86E+3
Ce-143	6.04E-1	4.46E+2	4.94E-2		1.97E-1		1.67E+4
Ce-144	1.79E+2	7.47E+1	9.59E+0		4.43E+1		6.04E+4
Nd-147	3.96E+0	4.58E+0	2.74E-1		2.68E+0		2.20E+4
W -187	9.16E+0	7.66E+0	2.68E+0				2.51E+3
Np-239	3.53E-2	3.47E-3	1.91E-3		1.08E-2		7.11E+2

NOTE: where no value is given, no data are available.

*Source: Reg. Guide 1.109, Table E-11, Table A-1
USNRC NUREG-0172, Table 4 | R
ICRP-30, Part 3, Supplement A | A

Methodology: USNRC NUREG-0133, Section 4.3.1

1.6 Representative Sampling

Prior to sampling of a batch release, each batch shall be thoroughly mixed to assure representative sampling in accordance with the requirements of Regulatory Guide 1.21 and NUREG-0800, Section 11.5. The methodology for mixing and sampling is described in SO123-III-5.11.23, "Units 2/3 Liquid Effluent Release Permit" and SO123-III-5.2.23, "Units 2/3 Liquid Effluent Sample Collection".

2.0 GASEOUS EFFLUENTS

2.1 DOSE RATE

SPECIFICATION

2.1.1 The dose rate in unrestricted areas due to radioactive materials released in gaseous effluents from the site (see Figure 2-2) shall be limited to the following:

a. For noble gases: Less than or equal to 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin, and

b. For all radioiodines, tritium and for all radioactive materials in particulate form with half lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.

APPLICABILITY: At all times

ACTION:

a. With dose rate(s) exceeding the above limits, immediately decrease the release rate to within the above limit(s).

SURVEILLANCE REQUIREMENTS

.1 The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with Section 2.7.

.2 The dose rate due to radioiodines, tritium and radioactive materials in particulate form with half lives greater than 8 days in gaseous effluents shall be determined to be within the above limits in accordance with Section 2.7 by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 2-1.

TABLE 2-1

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (μCi/ml)[a]
Batch Waste Gas Decay Tank	P Each Tank Grab Sample	P Each Tank	Principal Gamma Emitters[g]	$1x10^{-4}$
Incinerated Oil[h]	Each Batch[i] Grab Sample	Each Batch[i]	Principal Gamma Emitters[g]	$5x10^{-7}$
Continuous	*	*	Principal Gamma Emitters[g]	$1x10^{-4}$
	*	*	Tritium	$1x10^{-6}$
	Continuous[f] Sampler	W[d] Charcoal Sample	I-131	$1x10^{-12}$
			I-133	$1x10^{-10}$
	Continuous[f] Sampler	W[d] Particulate Sample	Principal Gamma Emitters[g] (I-131 and Others)	$1x10^{-11}$
	Continuous[f] Sampler	M Composite Particulate Sample	Gross Alpha	$1x10^{-11}$
	Continuous[f] Sampler	Q Composite Particulate Sample	Sr-89 and Sr-90	$1x10^{-11}$
	Continuous[f] Monitor	Noble Gas Monitor	Noble Gases Gross Beta or Gamma	$1x10^{-6}$

*Sampling frequencies for noble gases and tritium are:

CONTINUOUS PATHWAYS:		
	Containment Purge - 42"	: Each Purge[b,c]
	Containment Purge - 8"	: Monthly Grab[b]
	Condenser Air Ejector	: Monthly Grab[b]
	Plant Vent Stack	: Weekly Grab[b,e]

TABLE NOTATION

a. The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\ s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(-\lambda\Delta t)}$$

where:

LLD is the "a priori" lower limit of detection as defined above (as microcurie per unit mass or volume),

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute),

E is the counting efficiency (as counts per transformation),

V is the sample size (in units of mass or volume),

2.22×10^6 is the number of transformations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

λ is the radioactive decay constant for the particular radionuclide, and

Δt is the elapsed time between midpoint of sample collection and time of counting (for plant effluents, not environmental samples).

The value of s_b used in the calculation of the LLD for a particular measurement system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance.

Typical values of E, V, Y and Δt should be used in the calculation. | D

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of the measurement system and not as a posteriori (after the fact) limit for a particular measurement.*

*For a more complete discussion of the LLD, and other detection limits, see the following:
(1) HASL Procedures Manual, HASL-300 (revised annually).
(2) Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry" Anal. Chem. 40, 586-93 (1968).
(3) Hartwell, J. K., "Detection Limits for Radioisotopic Counting Techniques," Atlantic Richfield Hanford Company Report ARH-2537 (June 22, 1972).

TABLE NOTATION

b. Analyses shall also be performed following shutdown, startup, or a THERMAL POWER change exceeding 15 percent of the RATED THERMAL POWER within a 1-hour period. This requirement does not apply if: (1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the reactor coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

c. Tritium grab samples shall be taken at least once per 24 hours when the refueling canal is flooded.

d. Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing (or after removal from sampler). Sampling shall also be performed at least once per 24 hours for at least 7 days following each shutdown, startup, or a THERMAL POWER change exceeding 15 percent of RATED THERMAL POWER in 1 hour and analyses shall be completed within 48 hours of changing. This requirement does not apply if: (1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the reactor coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3. When samples collected for 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10.

e. Tritium grab samples shall be taken at least one per 7 days from the ventilation exhaust from the spent fuel pool area, whenever spent fuel is in the spent fuel pool.

f. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specifications 2.1, 2.2, 2.3.

g. The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Ce-141 and Ce-144 for particulate emissions. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported.

h. Incinerated oil may be discharged at points other than the plant vent stack. Release shall be accounted for based on pre-release grab sample data.

i. Samples for incinerated oil releases shall be collected from representative samples of filtered oil in liquid form.

2.0 **GASEOUS EFFLUENTS** (Continued)

2.2 DOSE - NOBLE GASES

SPECIFICATION

2.2.1 The air dose due to noble gases released in gaseous effluents, from each reactor unit, from the site (see Figure 2-2) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation and,

b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

APPLICABILITY: At all times

ACTION:

a. With calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, in lieu of any other report required by Technical Specification 6.9.1, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report which identifies the cause(s) for exceeding the limit(s) and defines the corrective actions taken to reduce releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with Specification 2.2.1.

SURVEILLANCE REQUIREMENTS

.1 Dose Calculations Cumulative dose contributions for the current calendar quarter and current calendar year shall be determined in accordance with Section 2.8 at least once per 31 days.

2.3 DOSE - RADIOIODINES, RADIOACTIVE MATERIALS IN PARTICULATE FORM AND TRITIUM

SPECIFICATION

2.3.1 The dose to an individual from tritium, radioiodines and radioactive materials in particulate form with half-lives greater than 8 days in gaseous effluents released, from each reactor unit, from the Site (see Figure 2-2) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ and,

b. During any calendar year: Less than or equal to 15 mrem to any organ.

c. Less than 0.1% of the limits of 2.3.1 (a) and (b) as a result of burning contaminated oil.

APPLICABILITY: At all times

ACTION:

a. With the calculated dose from the release of tritium, radioiodines, and radioactive materials in particulate form, with half lives greater than 8 days, in gaseous effluents exceeding any of the above limits, in lieu of any other report required by Technical Specification 6.9.1, prepare and submit to the Commission within 30 days pursuant to Technical Specification 6.9.2 a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions taken to reduce releases and the proposed actions to be taken to assure that subsequent releases will be in compliance with Specification 2.3.1.

SURVEILLANCE REQUIREMENTS

.1 Dose Calculations Cumulative dose contributions for the current calendar quarter and current calendar year shall be determined in accordance with Section 2.8 at least once per 31 days.

2.4 GASEOUS RADWASTE TREATMENT

SPECIFICATION

2.4.1 The GASEOUS RADWASTE TREATMENT SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM shall be operable. The appropriate portions of the GASEOUS RADWASTE TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected gaseous effluent air doses due to gaseous effluent releases from the site (see Figure 2-2), when averaged over 31 days, would exceed 0.2 mrad for gamma radiation and 0.4 mrad for beta radiation. The appropriate portions of the VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected doses due to gaseous effluent releases from the site (see Figure 2-2) when averaged over 31 days would exceed 0.3 mrem to any organ.*

APPLICABILITY: At all times

ACTION:

a. With gaseous waste being discharged without treatment and in excess of the above limits, in lieu of any other report required by Technical Specification 6.9.1, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report which includes the following information:

1. Explanation of why gaseous radwaste was being discharged without treatment, identification of the inoperable equipment or subsystems and the reason for inoperability,

2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and

3. Summary description of action(s) taken to prevent a recurrence.

SURVEILLANCE REQUIREMENTS

.1 Doses due to gaseous releases from the site shall be projected at least once per 31 days, in accordance with Section 3.2.

*These doses are per reactor unit.

2.0 **GASEOUS EFFLUENTS** (Continued)

2.4 GASEOUS RADWASTE TREATMENT (Continued)

SURVEILLANCE REQUIREMENTS (Continued)

2.4.1.2 During plant operation (Modes 1-4), the applicable portions of the GASEOUS RADWASTE TREATMENT SYSTEM and VENTILATION EXHAUST TREATMENT SYSTEM shall be demonstrated OPERABLE by operating the GASEOUS RADWASTE TREATMENT SYSTEM equipment and VENTILATION EXHAUST TREATMENT SYSTEM equipment for at least 15 minutes, at least once per 92 days unless the appropriate system has been utilized to process radioactive gaseous effluents during the previous 92 days.

.3 In plant shut-down (Mode 5, 6), the applicable portions of the GASEOUS RADWASTE TREATMENT SYSTEM and VENTILATION EXHAUST TREATMENT SYSTEM shall be demonstrated OPERABLE by operating the GASEOUS RADWASTE TREATMENT SYSTEM equipment and VENTILATION EXHAUST TREATMENT SYSTEM equipment for at least 15-minutes prior to processing gases unless the appropriate gaseous radwaste system has been utilized to process radioactive gaseous effluents during the previous 92 days. | R

2.0 **GASEOUS EFFLUENTS** (Continued)

2.5 TOTAL DOSE

SPECIFICATION

2.5.1 The dose or dose commitment to any member of the public, due to releases of radioactivity and radiation, from uranium fuel cycle sources shall be limited to less than or equal to 25 mrem to the total body or any organ (except the thyroid, which shall be limited to less than or equal to 75 mrem) over 12 consecutive months.

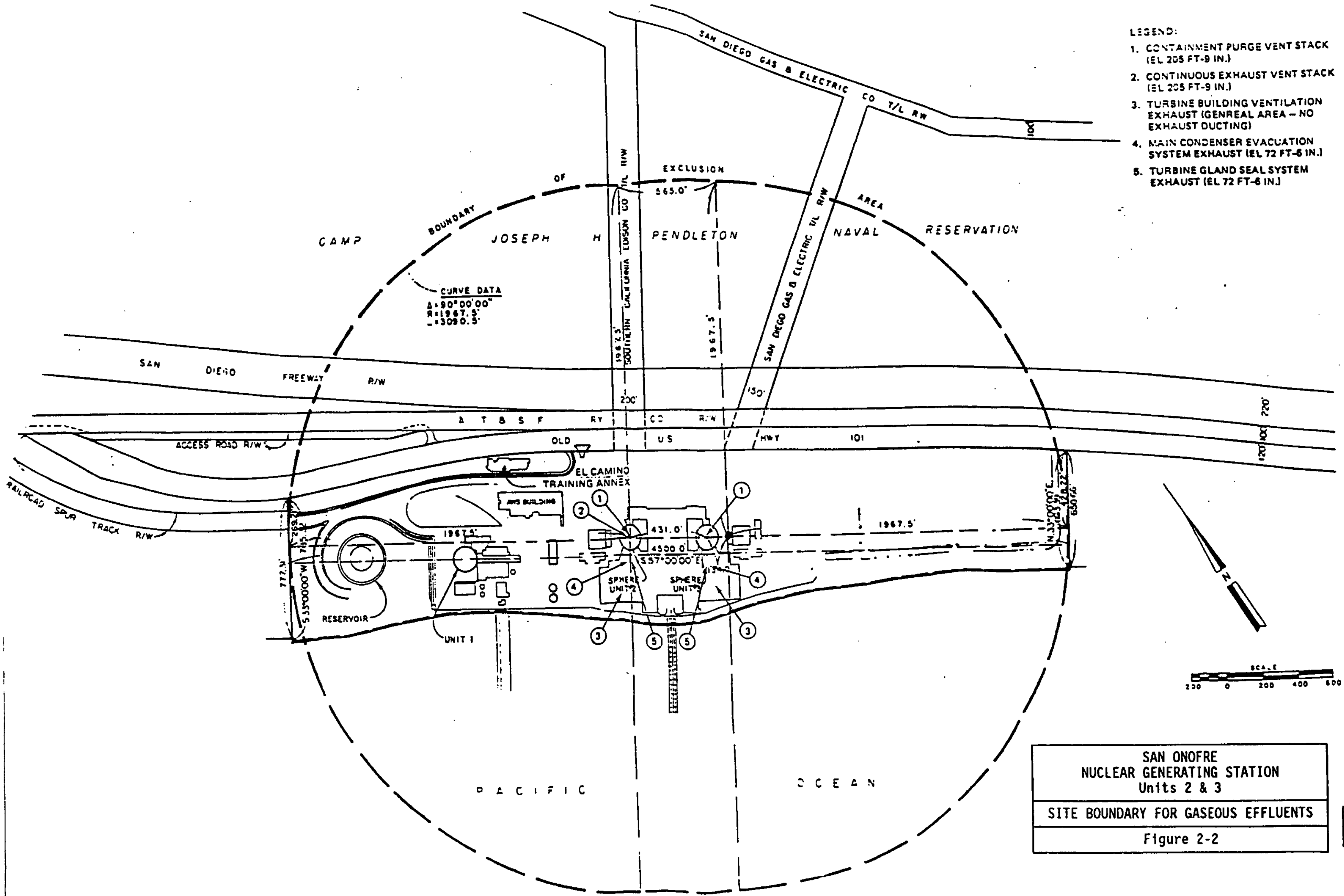
APPLICABILITY: At all times

ACTION:

a. With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Specifications 1.2.1.a, 1.2.1.b, 2.2.1.a, 2.2.1.b, 2.3.1.a, or 2.3.1.b in lieu of any other report required by Specification 6.9.1, prepare and submit a Special Report to the Director, Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, within 30 days, which defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the limits of Specification 2.5.1. This Special Report shall include an analysis which estimates the radiation exposure (dose) to a member of the public from uranium fuel cycle sources (including all effluent pathways and direct radiation) for a 12 consecutive month period that includes the release(s) covered by this report. If the estimated dose(s) exceeds the limits of Specification 2.5.1, and if the release condition resulting in violation of 40 CFR 190 has not already been corrected, the Special Report shall include a request for a variance in accordance with the provisions of 40 CFR 190 and including the specified information of paragraph 190.11(b). Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete. The variance only relates to the limits of 40 CFR 190, and does not apply in any way to the requirements for dose limitation of 10 CFR Part 20, as addressed elsewhere in this ODCM.

SURVEILLANCE REQUIREMENTS

.1 Dose Calculations Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with surveillance 1.2.1.1, 2.2.1.1, and 2.3.1.1.



SAN ONOFRE
NUCLEAR GENERATING STATION
Units 2 & 3

SITE BOUNDARY FOR GASEOUS EFFLUENTS

Figure 2-2

R

2.6 Methods of Calculation for Gaseous Effluent Monitor Setpoints

Administrative values are used to reduce each setpoint to account for the potential activity in other releases. These administrative values shall be periodically reviewed based on actual release data and revised as required. The sum total of all these administrative values for the site shall be less than or equal to 1.0.

2.6.1 PLANT VENT STACK - 2/3RT-7808, 2RT-7865-1, 3RT-7865-1

2.6.1.1 2/3RT-7808 - Plant Vent Stack Monitor

For the purpose of implementation of Specification 2.1.1, the alarm setpoint level for noble gas monitors is based on the gaseous effluent flow rate and the meteorological dispersion factor.

Total Body

The concentration at the detector corresponding to a 500 mrem/yr total body dose rate at the exclusion area boundary is determined by: (2-1)

$$C_{det} = \frac{(0.38)\left(2120\ \frac{\text{cfm}}{\text{m}^3/\text{sec}}\right)(500\ \text{mrem/yr})\left(10^{-6}\ \text{m}^3/\text{cc}\right)}{(\text{Flow rate, cfm})\left(\text{X/Q, sec/m}^3\right)\left[\Sigma_i \left(K_i, \frac{\text{mrem/yr}}{\mu\text{Ci/m}^3}\right)\left(\frac{C_i}{C_{tot}}\right)\right]}$$

where:

C_{det} = the instantaneous concentration at the detector, µCi/cc

0.38 = an administrative value used to account for potential activity from other gaseous release pathways

2.6.1 PLANT VENT STACK - 2/3RT-7808, 2RT-7865-1, 3RT-7865-1 (Continued)

K_i = total body dose conversion factor from Table 2-4 for the i^{th} gamma emitting noble gas, mrem/yr per $\mu Ci/m^3$

C_i = concentration of the i^{th} noble gas as determined by sample analysis, µCi/cc

C_{tot} = total concentration of noble gases as determined by sample analysis, µCi/cc = $\Sigma_i C_i$

Flow Rate = plant vent flow rate, cfm
= 82,000 cfm/fan (x no. of fans to be run)

2120 = conversion constant, cfm per m^3/sec

500 mrem/yr = total body dose rate limit, as specified by Specification 2.1.1.a

X/Q = historical annual average dispersion factor, sec/m^3
= 4.8E-6 sec/m^3

Skin

The concentration at the detector corresponding to a 3000 mrem/yr skin dose rate at the exclusion area boundary is determined by:

(2-2)

$$C_{det} = \frac{(0.38)\left(2120\ \frac{cfm}{m^3/sec}\right)(3000\ mrem/yr)\left(10^{-6}\ m^3/cc\right)}{(\text{Flow rate, cfm})\left(X/Q,\ sec/m^3\right)\left[\Sigma_i\left(L_i + 1.1M_i,\ \frac{mrem/yr}{\mu Ci/m^3}\right)\left(\frac{C_i}{C_{tot}}\right)\right]}$$

2.6.1 PLANT VENT STACK - 2/3RT-7808, 2RT-7865-1, 3RT-7865-1 (Continued)

where:

L_i = skin Dose Conversion Factor from Table 2-4 for the i^{th} noble gas, mrem/yr per $\mu Ci/m^3$

M_i = air Dose Conversion Factor from Table 2-4 for the i^{th} noble gas, mrem/yr per $\mu Ci/m^3$

1.1 = conversion factor to convert gamma air dose to skin dose

3000 mrem/yr = skin dose rate limit as specified by Specification 2.1.1.a

Other values in equation (2-2) are defined in equation (2-1).

The smaller of the values of C_{det} from equations (2-1) or (2-2) is to be used in the determination of the maximum permissible monitor alarm setpoint (cpm), as follows:

The maximum permissible alarm setpoint (cpm) is determined using the calibration constant for 2/3RT-7808 given in Table 2-3. The maximum permissible alarm setpoint is the value "cpm" corresponding to the concentration, C_{det} (the smaller value from equation (2-1) or (2-2)). The calibration constant used is based on Kr-85 or on Xe-133, whichever yields a lower detection efficiency (the largest value in terms of μCi/cc/cpm).

The alarm setpoint will be maintained at a value not greater than the maximum permissible alarm setpoint.

D

2.6.1.2 2RT-7865-1 and 3RT-7865-1 Wide Range Gas Monitors

The maximum release rate (µCi/sec) for Wide Range Gas Monitors is determined by converting the concentration at the detector, C_{det} (µCi/cc) to an equivalent release rate in µCi/sec, as follows:

$$A_{max} = \frac{(C_{det}, \mu Ci/cc)(flowrate, cc/sec)}{2} \qquad (2\text{-}3)$$

where:

A_{max}	=	maximum permissible release rate, µCi/sec
C_{det}	=	smaller of the values of C_{det} obtained from equations (2-1) or (2-2).
Flow Rate	=	flow rate, cc/sec
	=	(3.87×10^7 cc/sec per fan) (number of fans)
2	=	a factor to compensate for the split flow between Unit 2 and Unit 3 plant vent stacks

The release rate setpoint will not be set greater than the maximum release rate determined above, when this monitor is being used to meet the requirements of Specification 2.1.1.

2.6.2 CONDENSER EVACUATION SYSTEM - 2RT-7818, 2RT-7870-1, 3RT-7818 or 3RT-7870-1

2.6.2.1 2RT-7818 and 3RT-7818 Condenser Air Ejector Monitors

For the purpose of implementation of Specification 2.1.1, the alarm setpoint level for noble gas monitors is based on the gaseous effluent flow rate and the meteorological dispersion factor.

The concentration at the detector corresponding to a total body dose rate of 500 mrem/yr at the exclusion area boundary is determined by using:

Total Body (2-4)

$$C_{det} = \frac{(0.1)(0.5)\left(2120\ \frac{cfm}{m^3/sec}\right)(500\ mrem/yr)\left(10^{-6}\ m^3/cc\right)}{(Flow\ rate,\ cfm)\left(X/Q,\ sec/m^3\right)\left[\Sigma_i\left(K_i,\ \frac{mrem/yr}{\mu Ci/m^3}\right)\left(\frac{C_i}{C_{tot}}\right)\right]} \tag{2-4}$$

The concentration at the detector corresponding to a 3000 mrem/yr skin dose rate at the exclusion area boundary is determined by using:

Skin (2-4a)

$$C_{det} = \frac{(0.1)(0.5)\left(2120\ \frac{cfm}{m^3/sec}\right)(3000\ mrem/yr)\left(10^{-6}\ m^3/cc\right)}{(Flow\ rate,\ cfm)\left(X/Q,\ sec/m^3\right)\left[\Sigma_i\left(L_i + 1.1M_i,\ \frac{mrem/yr}{\mu Ci/m^3}\right)\left(\frac{C_i}{C_{tot}}\right)\right]} \tag{2-4a}$$

2.6.2 CONDENSER EVACUATION SYSTEM - 2RT-7818, 2RT-7870-1, 3RT-7818 or 3RT-7870-1 (Continued)

where:

0.1 is an administrative value used to account for potential activity from other gaseous release pathways. 0.5 is an administrative value used to account for releases from both SONGS 2 and SONGS 3 condenser air ejectors simultaneously. Other parameters are specified in 2.6.1.1, and 2.6.2.2. | R

The smaller of the values C_{det} from equations (2-4) or (2-4a) is to be used in determining the maximum permissible monitor alarm setpoint (cpm), as follows:

The maximum permissible alarm setting (cpm) is determined by using the calibration constant for the corresponding Condenser Evacuation System Monitor given in Table 2-3. The maximum permissible alarm setpoint is the cpm value corresponding to the concentration, C_{det}, [smaller value from equation (2-4) or (2-4a)].

The calibration constant used is based on Kr-85 or on Xe-133, whichever yields a lower detection efficiency (higher value in terms of μCi/cc/cpm). The alarm setpoint will not be set greater than the maximum permissible alarm setting determined above.

D

2.6.2.2 2RT-7870-1 and 3RT-7870-1 Wide Range Gas Monitors

The maximum release rate (µCi/sec) for Wide Range Gas Monitor is determined by converting the concentration at the detector, C_{det} (µCi/cc), to an equivalent release rate in µCi/sec.

$$A_{max} = (C_{det}, \mu Ci/cc)\ (\text{flow rate, cc/sec})$$

where:

A_{max} = maximum permissible release rate, µCi/sec

C_{det} = smaller value of C_{det}, as obtained from equations (2-4) and (2-4a)

flow rate = flow rate of the condenser air ejector, cc/sec
= 4.719E5 cc/sec (conservatively assumed as design flow rate)

D

2.0 **GASEOUS EFFLUENTS** (Continued)

2.6.3 CONTAINMENT PURGE - 2RT-7828, 3RT-7828, 2RT-7865, 3RT-7865 For The purpose of implementation of Specification 2.1.1, the alarm setpoint level for noble gas monitors is based on the gaseous effluent flow rate and the meteorological dispersion factor. The concentration at the detector corresponding to a total body dose rate of 500 mrem/yr at the exclusion boundary is determined by using:

Total Body

$$C_{det2} = \frac{(0.38)(P_2)\left(2120 \frac{cfm}{m^3/sec}\right)(500\ mrem/yr)\left(10^{-6}\ m^3/cc\right)}{(Flow\ rate,\ cfm)\left(X/Q,\ sec/m^3\right)\left[\Sigma_i \left(K_i,\ \frac{mrem/yr}{\mu Ci/m^3}\right)\left(\frac{C_i}{C_{tot}}\right)\right]} \qquad (2\text{-}6)$$

$$C_{det3} = \frac{(0.38)(P_3)\left(2120 \frac{cfm}{m^3/sec}\right)(500\ mrem/yr)\left(10^{-6}\ m^3/cc\right)}{(Flow\ rate,\ cfm)\left(X/Q,\ sec/m^3\right)\left[\Sigma_i \left(K_i,\ \frac{mrem/yr}{\mu Ci/m^3}\right)\left(\frac{C_i}{C_{tot}}\right)\right]} \qquad (2\text{-}7)$$

The concentration at the detector corresponding to a 3000 mrem/yr skin dose rate at the exclusion area boundary is determined by using:

Skin

$$C_{det2} = \frac{(0.38)(P_2)\left(2120 \frac{cfm}{m^3/sec}\right)(3000\ mrem/yr)\left(10^{-6}\ m^3/cc\right)}{(Flow\ rate,\ cfm)\left(X/Q,\ sec/m^3\right)\left[\Sigma_i \left(L_i + 1.1M_i,\ \frac{mrem/yr}{\mu Ci/m^3}\right)\left(\frac{C_i}{C_{tot}}\right)\right]} \qquad (2\text{-}6a)$$

(2-
7a)

$$C_{det3} = \frac{(0.38)(P_3)\left(2120 \frac{cfm}{m^3/sec}\right)(3000\ mrem/yr)\left(10^{-6}\ m^3/cc\right)}{(Flow\ rate,\ cfm)\left(X/Q,\ sec/m^3\right)\left[\Sigma_i \left(L_i + 1.1M_i,\ \frac{mrem/yr}{\mu Ci/m^3}\right)\left(\frac{C_i}{C_{tot}}\right)\right]}$$

2.6.3 CONTAINMENT PURGE - 2RT-7828, 3RT-7828, 2RT-7865, 3RT-7865 (Continued)

where:

C_{det2} = instantaneous concentration of the Unit 2 detector, μCi/cc.

C_{det3} = instantaneous concentration of the Unit 3 detector, μCi/cc.

0.38 is an administrative value used to account for potential activity from other gaseous release pathways. | R

P_2 and P_3 are administrative values used to account for simultaneous purges of both SONGS 2 and SONGS 3. The fractions P_2 and P_3 will be assigned such that $P_2 + P_3 \leq 1.0$.

Flow rate = observed maximum flowrate in cfm from the unit specific monitor 7828. Default values will be the following conservative measured flows:

= 50,000 cfm full purge

= 3,000 cfm mini-purge

(The above values replace the smaller design flowrates.)

Other parameters are as specified in 2.6.1.1 above. The smaller of the values of maximum permissible C_{det2} from equation (2-6) or (2-6a) and C_{det3} from equations (2-7) or (2-7a) is to be used in determining the maximum permissible monitor alarm setpoints.

2.6.3 CONTAINMENT PURGE - 2RT-7828, 3RT-7828, 2RT-7865, 3RT-7865 (Continued)

2.6.3.1 Maximum Permissible Alarm Setting (RT-7865)

The maximum permissible alarm setting for the Wide Range Gas Monitor expressed as a maximum release rate (μCi/sec) is determined by converting the concentration at the detector, C_{det} (μCi/cc),to an equivalent release rate in μCi/sec.

$$A_{max} = (C_{det}, \mu Ci/cc)\ (\text{flow rate, cc/sec})$$

where:

A_{max} = maximum permissible release rate, μCi/cc

C_{det} = smaller value of C_{det}, as obtained from equation (2-6, 2-6a) for Unit 2 or (2-7, 2-7a) for Unit 3.

flow rate = flow rate, cc/sec
= 1.416E6 cc/sec for mini-purge.
= 2.360E7 cc/sec for main purge.

.2 Maximum Permissible Alarm Setting (RT-7828)

The maximum permissible alarm setting for RT-7828 is in μCi/cc and is the smaller of the values of C_{det2} (μCi/cc) from equations (2-6) and (2-6a).

D

2.6.4 WASTE GAS HEADER - 3RT-7865, 2/3RT-7808

For the purpose of Specification 2.1.1, the alarm setpoint level for noble gas monitors is based on the gaseous effluent flow rate and the meteorological dispersion factor. Since the waste gas header discharges to the plant vent stack, either 3RT-7865 or 2/3RT-7808 may be used to monitor waste gas header releases.

The concentration at the detector corresponding to a total body dose rate of 500 mrem/yr or a skin dose rate of 3000 mrem/yr at the exclusion area boundary is determined by using equations (2-1) or (2-2) with sample concentration (C_i) and (C_{tot}) being obtained from the waste gas decay tank to be released.

The smaller of the values of maximum permissible concentration (C_{det}) from equation (2-1) or (2-2) is to be used in determining the maximum permissible monitor alarm setpoint.

2/3RT-7808

The maximum permissible alarm setting (cpm) is determined by using the calibration constant for plant vent stack monitor 7808 given in Table 2-3. The maximum permissible setpoint is the cpm value corresponding to the concentration C_{det}, (smaller value from equation (2-1) or (2-2)).

2.0 **GASEOUS EFFLUENTS** (Continued)

2.6.4 WASTE GAS HEADER - 3RT-7865, 2/3RT-7808 (Continued)

3RT-7865

The maximum permissible alarm setting is expressed as a maximum release rate (μCi/sec) and is determined by converting the concentration at the detector, C_{det}, to an equivalent release rate in μCi/sec by equation (2-8).

$$A_{max} = \frac{(C_{det}, \mu Ci/cc)\ (flowrate,\ cc/sec)}{2} \qquad (2\text{-}8)$$

where:

A_{det} = the maximum permissible release rate, μCi/sec

C_{det} = the smaller value of C_{det}, as obtained from equation (2-1) or (2-2).

flowrate = flowrate, cc/sec
= 7.74E7 cc/sec for 2 fan operation or
= 3.87E7 cc/sec for 1 fan operation

2 = correction for 3-7865 viewing only 1/2 the total Plant Vent Stack Flow.

.1 A release from the waste gas header is not possible if:

$$\left(\Sigma_i C_i\right)\left(\frac{f}{F}\right) > C_{det} \qquad (2\text{-}9)$$

where:

$\Sigma_i C_i$ = total concentration in waste gas holdup tank to be released

f = waste gas header effluent flow rate, cfm

F = plant vent stack flowrate in cfm (166,000 cfm for 2 fan operation; 82,000 for 1 fan operation)

C_{det} = smaller of the values of C_{det} from equation (2-1) or (2-2) with C_i being obtained from the waste gas holdup tank to be released

2.6.4 WASTE GAS HEADER - 3RT-7865, 2/3RT-7808 (Continued)

2.6.4.1 (Continued) D

If a release is not possible, adjust the waste gas header flow by determining the maximum permissible waste gas header effluent flow rate corresponding to the Vent Stack Monitor setpoint in accordance with the following:

$$f < \frac{(0.9)(C_{det})(F)}{\Sigma_i \ C_i} \qquad (2\text{-}10)$$

where:

f = waste gas header effluent flow rate (cfm)

F = plant vent stack flow rate (cfm) used in equation (2-1) or (2-2)

C_{det} = smaller of the value of C_{det} from equation (2-1) or (2-2)

$\Sigma_i C_i$ = total gamma activity (μCi/cc) of the waste gas holdup tank to be released, as determined from the pre-release sample analysis. f

The 0.9 is an administrative value to account for the potential activity from other releases in the same release pathway.

THIS PAGE INTENTIONALLY LEFT BLANK

Table 2-3[a]

Gaseous Effluent Radiation Monitor
Calibration Constants
(μCi/cc/cpm)

MONITOR	Kr-85	Xe-133
2/3RT-7808C	4.43E-8	4.81E-8
2RT-7818A	4.27E-8	6.86E-8
2RT-7818B	7.31E-5	2.14E-5
3RT-7818A	3.73E-8	5.12E-8
3RT-7818B	9.31E-5	2.26E-5

R

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

2.7 Gaseous Effluent Dose Rate

The methodology used for the purpose of implementation of Specification 2.1.1 for the dose rate above background to an individual in an unrestricted area is calculated by using the following expressions:

2.7.1 FOR NOBLE GASES:

$$\dot{D}_{TB} = \Sigma_i \left[K_i (\overline{X/Q}) \dot{Q}_i \right] \quad (2\text{-}11)$$

$$\dot{D}_s = \Sigma_i \left[(L_i + 1.1M_i) (\overline{X/Q}) \dot{Q}_i \right] \quad (2\text{-}12)$$

R

where:

$\dot{D}_{TB}$ = total body dose rate in unrestricted areas due to radioactive materials released in gaseous effluents, mrem/yr

$\dot{D}_s$ = skin dose rate in unrestricted areas due to radioactive materials released in gaseous effluents, mrem/yr

K_i = the total body dose factor due to gamma emissions from Table 2-4 for each identified noble gas radionuclide, i, in mrem/yr per $\mu Ci/m^3$

2.7.1 FOR NOBLE GASES: (Continued)

L_i = skin dose factor due to the beta emissions from Table 2-4 for each identified noble gas radionuclide, i, in mrem/yr per $\mu Ci/m^3$

M_i = air dose factor due to gamma emissions from Table 2-4 for each identified noble gas radionuclide, i, in mrad/yr per $\mu Ci/m^3$

(conversion constant of 1.1 mrem/mrad converts air dose to skin dose.)

$\dot{Q}_i$ = measured or calculated release rate of radionuclide, i, for either continuous or batch gaseous effluents, in µCi/sec

$(\overline{X/Q})$ = Maximum annual average atmospheric dispersion factor for any sector or distance at or beyond the unrestricted area boundary.
= 4.8E-6 sec/m³.

2.7.2 FOR ALL RADIOIODINES, TRITIUM AND FOR ALL RADIOACTIVE MATERIALS IN PARTICULATE FORM WITH HALF LIVES GREATER THAN EIGHT DAYS:

$$\dot{D}_o = \Sigma_i \left[\Sigma_k (P_{ik}\, W_k)\, \dot{Q}_i\right] \qquad (2\text{-}13)$$

where:

$\dot{D}_o$ = organ dose rate in unrestricted areas due to radioactive materials released in gaseous effluents, mrem/yr

2.7.2 FOR ALL RADIOIODINES, TRITIUM AND FOR ALL RADIOACTIVE MATERIALS IN PARTICULATE FORM WITH HALF LIVES GREATER THAN EIGHT DAYS: (Continued)

$\dot{Q}_i$ = measured or calculated release rate of radionuclide, i, for either continuous or batch gaseous effluents, µCi/sec

P_{ik} = dose parameter for radionuclide, i, for pathway, k, from Table 2-5 for the inhalation pathway in mrem/yr per µCi/m^3. The dose factors are based on the critical individual organ and the child age group.

$\overline{W}_k$ = highest calculated annual average dispersion parameter for estimating the dose to an individual at or beyond the unrestricted area boundary for pathway k.

= $(\overline{X/Q})$, 4.8E-6 sec/m^3 for the inhalation pathway. The location is the unrestricted area in the NW sector.

= $(\overline{D/Q})$, 4.3E-8 m^{-2} for the food and ground plane pathways. The location is the unrestricted area in the E sector.

2.0 **GASEOUS EFFLUENTS** (Continued)

2.8 Gaseous Effluent Dose Calculation

2.8.1 DOSE FROM NOBLE GASES IN GASEOUS EFFLUENTS

The gaseous releases considered in the following dose calculations are described in Section 2.6. The air dose in unrestricted areas due to noble gases released in gaseous effluents is calculated using the following expressions:

2.8.1.1 For historical meteorology:

$$D_\gamma = 3.17\times10^{-8}\ \Sigma_i\ M_i \left[(\overline{X/Q})Q_i\right] \tag{2-14}$$

$$D_\beta = 3.17\times10^{-8}\ \Sigma_i\ N_i \left[(\overline{X/Q})Q_i\right] \tag{2-15}$$

where:

D_γ = total gamma air dose from gaseous effluents, mrad

D_β = total beta air dose from gaseous effluents, mrad

3.17×10^{-8} = inverse seconds per year

M_i = air dose factor due to gamma emissions from Table 2-4 for each identified noble gas radionuclide, i, in mrad/yr per $\mu Ci/m^3$

N_i = air dose due to beta emissions from Table 2-4 for each identified noble gas radionuclide, i, in mrad/yr per $\mu Ci/m^3$

$(\overline{X/Q})$ = 4.8E-6 sec/m^3. The maximum annual average atmospheric dispersion factor for any sector or distance at or beyond the unrestricted area boundary. A

Q_i = amount of noble gas radionuclide, i, released in gaseous effluents, μCi.

2.8.1.2 For meteorology concurrent with release:

NOTE: Consistent with the methodology provided in Regulatory Guide 1.109 and the following equations, RRRGS (Radioactive Release Report Generating System) software is used to perform the actual calculations.

$$D_{\gamma\theta} = 1.14\times10^{-4} \Sigma_i M_i \left[\Sigma_j (\Delta t_j (X/Q)_{j\theta} \dot{Q}_{ij}\right] \quad (2\text{-}16)$$

$$D_{\beta\theta} = 1.14\times10^{-4} \Sigma_i N_i \left[\Sigma_j (\Delta t_j (X/Q)_{j\theta} \dot{Q}_{ij}\right] \quad (2\text{-}17)$$

where:

$D_{\gamma\theta}$ = total gamma air dose from gaseous effluents in sector θ, mrad

$D_{\beta\theta}$ = total beta air dose from gaseous effluents in sector θ, mrad

1.14×10^{-4} = inverse hours/year

M_i = air dose factor due to gamma emissions from Table 2-4 for each identified noble gas radionuclide, i, in mrad/yr per $\mu Ci/m^3$

N_i = air dose factor due to beta emissions from Table 2-4 for each identified noble gas radionuclide, i, in mrad/yr per $\mu Ci/m^3$

Δt_j = length of the j^{th} time period over which $(X/Q)_{j\theta}$ and $\dot{Q}_{ij}$ are averaged for gaseous releases in hours

$(X/Q)_{j\theta}$ = atmospheric dispersion factor for time period Δt_j at exclusion boundary location in sector θ determined by concurrent meteorology, sec/m^3

$\dot{Q}_{ij}$ = average release rate of radionuclide, i, in gaseous effluents during time period, Δt_j, $\mu Ci/sec$

THIS PAGE INTENTIONALLY LEFT BLANK

2.8.2 DOSE FROM TRITIUM, RADIOIODINES AND RADIOACTIVE MATERIALS IN PARTICULATE FORM WITH HALF LIVES GREATER THAN 8 DAYS IN GASEOUS EFFLUENTS

The dose to an individual from tritium, radioiodines and radioactive materials in particulate form with half lives greater than eight days in gaseous effluents released to unrestricted areas is calculated using the following expressions: A

2.8.2.1 For historical meteorology:

$$D_o = 3.17 \times 10^{-8} \Sigma_i \left[\left(\Sigma_k R_{ik} W_k \right) Q_i \right] \quad (2\text{-}18)$$

where:

D_o = total projected dose from gaseous effluents to an individual, mrem

3.17×10^{-8} = year/second A

Q_i = amount of each radionuclide, i, (tritium, radioiodine, radioactive material in particulate form with half lives greater than eight days), released in gaseous effluents, μCi

$\Sigma_k R_{ik} W_k$ = sum of all pathways, k, for radionuclide, i, of the $R_i W$ product, in mrem/yr per μCi/sec. The $\Sigma_k R_{ik} W_k$ value for each radionuclide, i, is given in Table 2-6. The value given is the maximum $\Sigma_k R_{ik} W_k$ for all locations and is based on the most restrictive age groups.

R_{ik} = dose factor for each identified radionuclide, i, for pathway k, (for the inhalation pathway in mrem/yr per μCi/m^3 and for the food and ground plane pathways in m^2-mrem/yr per μCi/sec), at the controlling location. The R_{ik}'s for each controlling location for each age group are given in Tables 2-7 thru 2-16. Data in these tables are derived using the NRC code, PARTS. (See "Submittal of 1992 Dose Parameters for SONGS Unit 1 and Units 2/3 ODCMs" from E. M. Goldin to J.R. Clark, dated 9/28/92) R

2.8.2.1 For historical meteorology: (Continued)

W_k = annual average dispersion parameter for estimating the dose to an individual at the controlling location for pathway k.

= $(\overline{X/Q})$ for the inhalation pathway in sec/m^3. The $(\overline{X/Q})$ for each controlling location is given in Tables 2-7 thru 2-16.

= $(\overline{D/Q})$ for the food and ground plane pathways in m^{-2}. The $(\overline{D/Q})$ for each controlling location are given in Tables 2-7 thru 2-16.

= $(\overline{X/Q})$ for any H-3 pathway for each controlling location is given in Tables 2-7 through 2-16. | A

2.8.2.2 For meteorology concurrent with releases:

NOTE: Consistent with the methodology provided in Regulatory Guide 1.109 and the following equations, RRRGS (Radioactive Release Report Generating System) software is used to perform the actual calculations.

$$D_\theta = 1.14 \times 10^{-4} \sum_{i}^{l} \sum_{j}^{m} \sum_{k}^{n} \left[(\Delta t_j)(R_{ik\theta})(W_{jk\theta}) \left(\dot{Q}_{ij} \right) \right] \quad (2\text{-}19)$$

where:

D_θ = total annual dose from gaseous effluents to an individual in sector θ, mrem. | R

Δt_j = length of the j^{th} period over which $W_{jk\theta}$ and $\dot{Q}_{ij}$ are averaged for gaseous released, hours

$\dot{Q}_{ij}$ = average release rate of radionuclide, i, in gaseous effluents during time period Δt_j, µCi/sec

2.8.2.2 For meteorology concurrent with releases: (Continued)

$R_{ik\theta}$ = dose factor for each identified radionuclide i, for pathway k for sector θ (for the inhalation pathway in mrem/yr per $\mu Ci/m^3$ and for the food and ground plane pathways in m^2 mrem/yr per $\mu Ci/sec$) at the controlling location. A listing of R_{ik} for the controlling locations in each landward sector for each group is given in Tables 2-7 thru 2-16. The θ is determined by the concurrent meteorology.

$W_{jk\theta}$ = dispersion parameter for the time period Δt_j for each pathway k for calculating the dose to an individual at the controlling location in sector θ using concurrent meteorological conditions.

= $(\overline{X/Q})$ for the inhalation pathway, sec/m^3

= $(\overline{D/Q})$ for the food and ground plane pathways, m^{-2}

TABLE 2-4

DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS**

Radio-Nuclide	Total Body Dose Factor K_i (mrem/yr per μCi/m^3)	Skin Dose Factor L_i (mrem/yr per μCi/m^3)	Gamma Air Dose Factor M_i (mrad/yr per μCi/m^3)	Beta Air Dose Factor N_i (mrad/yr per μCi/m^3)
Kr-85m	1.17E+3	1.46E+3	1.23E+3	1.97E+3
Kr-85	1.61E+1	1.34E+3	1.72E+1	1.95E+3
Kr-87	5.92E+3	9.73E+3	6.17E+3	1.03E+4
Kr-88	1.47E+4	2.37E+3	1.52E+4	2.93E+3
Xe-131m	9.15E+1	4.76E+2	1.56E+2	1.11E+3
Xe-133m	2.51E+2	9.94E+2	3.27E+2	1.48E+3
Xe-133	2.94E+2	3.06E+2	3.53E+2	1.05E+3
Xe-135m	3.12E+3	7.11E+2	3.36E+3	7.39E+2
Xe-135	1.81E+3	1.86E+3	1.92E+3	2.46E+3
Xe-138	8.83E+3	4.13E+3	9.21E+3	4.75E+3
Ar-41	8.84E+3	2.69E+3	9.30E+3	3.28E+3

**Source: USNRC Reg. Guide 1.109, Table B-1

TABLE 2-5

DOSE PARAMETER P_{ik}*

CHILD AGE GROUP
CRITICAL ORGAN

Radionuclide	Inhalation Pathway (mrem/yr per µCi/m^3)	Radionuclide	Inhalation Pathway (mrem/yr per µCi/m^3)
H - 3	1.1E+3	I -131	1.6E+7
Cr-51	1.7E+4	I -132	1.9E+5
Mn-54	1.6E+6	I -133	3.8E+6
Co-57	5.1E+5	I -134	5.1E+4
Co-58	1.1E+6	I -135	7.9E+5
Co-60	7.1E+6	Cs-134	1.0E+6
Sr-89	2.2E+6	Cs-136	1.7E+5
Sr-90	1.0E+8	Cs-137	9.1E+5
Zr-95	2.2E+6	Ba-140	1.7E+6
Nb-95	6.1E+5	Ce-141	5.4E+5
Ru-103	6.6E+5	Ce-144	1.2E+7
Te-129m	1.8E+6		

*Source: USNRC NUREG-0133, Section 5.2.1.1

TABLE 2-6

CONTROLLING LOCATION FACTORS

Radionuclide	$\Sigma_k R_{ik} W_k$ mrem/yr per µCi/sec	Use:
H -3	9.62E-4	Q: San Onofre Mobil.Homes
Cr-51	3.25E-2	Q: San Onofre Mobil.Homes
Mn-54	6.52E+0	Q: San Onofre Mobil.Homes
Co-57	1.66E+0	Q: San Onofre Mobil.Homes
Co-58	2.33E+0	Q: San Onofre Mobil.Homes
Co-60	8.56E+1	Q: San Onofre Mobil.Homes
Sr-89	4.34E+1	Q: SC Ranch (No. Res.)
Sr-90	1.82E+3	Q: SC Ranch (No. Res.)
Zr-95	2.90E+0	Q: San Onofre Mobil.Homes
Nb-95	6.81E+0	E: Deer Consumer
Ru-103	1.08E+1	E: Deer Consumer
Te-129m	5.32E+0	E: Deer Consumer
Cs-134	3.36E+1	Q: SC Ranch (No. Res.)
Cs-136	6.81E-1	Q: San Onofre Mobil.Homes
Cs-137	3.67E+1	Q: San Onofre Mobil.Homes
Ba-140	1.56E+0	Q: San Onofre Mobil.Homes
Ce-141	5.74E-1	Q: SC Ranch (No. Res.)
Ce-144	1.68E+1	Q: SC Ranch (No. Res.)
I -131	1.19E+1	Q: San Onofre Mobil.Homes
I -132	1.45E-1	Q: San Onofre Mobil.Homes
I -133	2.82E+0	Q: San Onofre Mobil.Homes
I -134	3.94E-2	Q: San Onofre Mobil.Homes
I -135	5.94E-1	Q: San Onofre Mobil.Homes
UN-ID	3.59E+0	Q: San Onofre Mobil.Homes

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

TABLE 2-7

DOSE PARAMETER R_i FOR SECTOR P

Pathway = Surf Beach/Life Guard   Distance = 0.4 miles
X/Q = 1.8E-6 sec/m^3 D/Q = 8.2E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	1.2E+1	-0-	5.1E+1	-0-	9.6E+1	-0-
Cr-51	-0-	-0-	1.8E+2	3.2E+4	8.4E+2	1.5E+5	1.1E+3	3.5E+5
Mn-54	-0-	-0-	1.6E+4	9.5E+6	8.0E+4	4.5E+7	1.1E+5	1.1E+8
Co-57	-0-	-0-	5.3E+3	2.4E+6	2.4E+4	1.1E+7	2.8E+4	2.6E+7
Co-58	-0-	-0-	1.2E+4	2.6E+6	5.4E+4	1.2E+7	7.1E+4	2.9E+7
Co-60	-0-	-0-	7.3E+4	1.5E+8	3.5E+5	7.0E+8	4.5E+5	1.6E+9
Sr-89	-0-	-0-	2.2E+4	1.5E+2	9.7E+4	7.1E+2	1.1E+5	1.6E+3
Sr-90	-0-	-0-	1.1E+6	-0-	4.4E+6	-0-	7.5E+6	-0-
Zr-95	-0-	-0-	2.3E+4	1.7E+6	1.1E+5	8.2E+6	1.3E+5	1.9E+7
Nb-95	-0-	-0-	6.4E+3	9.4E+5	3.0E+4	4.5E+6	3.8E+4	1.0E+7
Ru-103	-0-	-0-	6.9E+3	7.5E+5	3.2E+4	3.6E+6	3.8E+4	8.3E+6
Te-129m	-0-	-0-	1.8E+4	1.4E+5	8.0E+4	6.4E+5	8.8E+4	1.5E+6
Cs-134	-0-	-0-	1.1E+4	4.7E+7	4.5E+4	2.2E+8	6.5E+4	5.2E+8
Cs-136	-0-	-0-	1.8E+3	1.0E+6	7.8E+3	4.9E+6	1.1E+4	1.1E+7
Cs-137	-0-	-0-	9.4E+3	7.1E+7	3.4E+4	3.4E+8	4.7E+4	7.8E+8
Ba-140	-0-	-0-	1.8E+4	1.4E+5	8.2E+4	6.7E+5	9.7E+4	1.6E+6
Ce-141	-0-	-0-	5.7E+3	9.4E+4	2.5E+4	4.5E+5	2.8E+4	1.0E+6
Ce-144	-0-	-0-	1.2E+5	4.8E+5	5.4E+5	2.3E+6	5.9E+5	5.3E+6
I -131	-0-	-0-	1.7E+5	1.2E+5	5.9E+5	5.6E+5	9.1E+5	1.3E+6
I -132	-0-	-0-	2.0E+3	8.5E+3	6.1E+3	4.1E+4	8.7E+3	9.4E+4
I -133	-0-	-0-	4.0E+4	1.7E+4	1.2E+5	8.0E+4	1.6E+5	1.9E+5
I -134	-0-	-0-	5.3E+2	3.1E+3	1.6E+3	1.5E+4	2.3E+3	3.4E+4
I -135	-0-	-0-	8.2E+3	1.7E+4	2.5E+4	8.2E+4	3.4E+4	1.9E+5
UN-ID	-0-	-0-	1.0E+4	5.1E+6	5.0E+4	2.4E+7	6.6E+4	5.7E+7

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

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

TABLE 2-7

DOSE PARAMETER R_i FOR SECTOR P

Pathway = Former Nixon Estate (no garden) Distance = 2.8 miles
X/Q = 1.2E-7 sec/m^3 D/Q = 3.4E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	6.5E+2	-0-	1.1E+3	-0-	1.3E+3	-0-	1.3E+3	-0-
Cr-51	1.3E+4	4.7E+6	1.7E+4	4.7E+6	2.1E+4	4.7E+6	1.4E+4	4.7E+6
Mn-54	1.0E+6	1.4E+9	1.6E+6	1.4E+9	2.0E+6	1.4E+9	1.4E+6	1.4E+9
Co-57	3.8E+5	3.4E+8	5.1E+5	3.4E+8	5.9E+5	3.4E+8	3.7E+5	3.4E+8
Co-58	7.8E+5	3.8E+8	1.1E+6	3.8E+8	1.3E+6	3.8E+8	9.3E+5	3.8E+8
Co-60	4.5E+6	2.2E+10	7.1E+6	2.2E+10	8.7E+6	2.2E+10	6.0E+6	2.2E+10
Sr-89	2.0E+6	2.2E+4	2.2E+6	2.2E+4	2.4E+6	2.2E+4	1.4E+6	2.2E+4
Sr-90	4.1E+7	-0-	1.0E+8	-0-	1.1E+8	-0-	9.9E+7	-0-
Zr-95	1.8E+6	2.5E+8	2.2E+6	2.5E+8	2.7E+6	2.5E+8	1.8E+6	2.5E+8
Nb-95	4.8E+5	1.4E+8	6.1E+5	1.4E+8	7.5E+5	1.4E+8	5.0E+5	1.4E+8
Ru-103	5.5E+5	1.1E+8	6.6E+5	1.1E+8	7.8E+5	1.1E+8	5.0E+5	1.1E+8
Te-129m	1.7E+6	2.0E+7	1.8E+6	2.0E+7	2.0E+6	2.0E+7	1.2E+6	2.0E+7
Cs-134	7.0E+5	6.8E+9	1.0E+6	6.8E+9	1.1E+6	6.8E+9	8.5E+5	6.8E+9
Cs-136	1.3E+5	1.5E+8	1.7E+5	1.5E+8	1.9E+5	1.5E+8	1.5E+5	1.5E+8
Cs-137	6.1E+5	1.0E+10	9.1E+5	1.0E+10	8.5E+5	1.0E+10	6.2E+5	1.0E+10
Ba-140	1.6E+6	2.1E+7	1.7E+6	2.1E+7	2.0E+6	2.1E+7	1.3E+6	2.1E+7
Ce-141	5.2E+5	1.4E+7	5.4E+5	1.4E+7	6.1E+5	1.4E+7	3.6E+5	1.4E+7
Ce-144	9.8E+6	7.0E+7	1.2E+7	7.0E+7	1.3E+7	7.0E+7	7.8E+6	7.0E+7
I -131	1.5E+7	1.7E+7	1.6E+7	1.7E+7	1.5E+7	1.7E+7	1.2E+7	1.7E+7
I -132	1.7E+5	1.2E+6	1.9E+5	1.2E+6	1.5E+5	1.2E+6	1.1E+5	1.2E+6
I -133	3.6E+6	2.4E+6	3.8E+6	2.4E+6	2.9E+6	2.4E+6	2.2E+6	2.4E+6
I -134	4.5E+4	4.5E+5	5.1E+4	4.5E+5	4.0E+4	4.5E+5	3.0E+4	4.5E+5
I -135	7.0E+5	2.5E+6	7.9E+5	2.5E+6	6.2E+5	2.5E+6	4.5E+5	2.5E+6
UN-ID	6.5E+5	7.5E+8	1.0E+6	7.5E+8	1.2E+6	7.5E+8	8.6E+5	7.5E+8

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

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

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = Enlisted Bch Trailers   Distance = 1.1 miles
X/Q = 9.3E-7 sec/m^3 D/Q = 4.6E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	7.2E+3	2.3E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	7.0E+5	6.9E+8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+5	1.7E+8
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	4.6E+5	1.9E+8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	3.0E+6	1.1E+10
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	7.0E+5	1.1E+4
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	8.8E+5	1.3E+8
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	2.5E+5	6.8E+7
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	2.5E+5	5.4E+7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	5.8E+5	9.8E+6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	4.2E+5	3.4E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	7.3E+4	7.5E+7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	3.1E+5	5.1E+9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	6.4E+5	1.0E+7
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+5	6.8E+6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	3.9E+6	3.5E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	6.0E+6	8.6E+6
I -132	-0-	-0-	-0-	-0-	-0-	-0-	5.7E+4	6.2E+5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	1.1E+6	1.2E+6
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+4	2.2E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	2.2E+5	1.3E+6
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	4.3E+5	3.7E+8

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

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

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = San Onofre Mobil Homes
X/Q = 7.4E-7 sec/m³

Distance = 1.3 miles
D/Q = 3.6E-9 m⁻²

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	6.5E+2	-0-	1.1E+3	-0-	1.3E+3	-0-	1.3E+3	-0-
Cr-51	1.3E+4	4.7E+6	1.7E+4	4.7E+6	2.1E+4	4.7E+6	1.4E+4	4.7E+6
Mn-54	1.0E+6	1.4E+9	1.6E+6	1.4E+9	2.0E+6	1.4E+9	1.4E+6	1.4E+9
Co-57	3.8E+5	3.4E+8	5.1E+5	3.4E+8	5.9E+5	3.4E+8	3.7E+5	3.4E+8
Co-58	7.8E+5	3.8E+8	1.1E+6	3.8E+8	1.3E+6	3.8E+8	9.3E+5	3.8E+8
Co-60	4.5E+6	2.2E+10	7.1E+6	2.2E+10	8.7E+6	2.2E+10	6.0E+6	2.2E+10
Sr-89	2.0E+6	2.2E+4	2.2E+6	2.2E+4	2.4E+6	2.2E+4	1.4E+6	2.2E+4
Sr-90	4.1E+7	-0-	1.0E+8	-0-	1.1E+8	-0-	9.9E+7	-0-
Zr-95	1.8E+6	2.5E+8	2.2E+6	2.5E+8	2.7E+6	2.5E+8	1.8E+6	2.5E+8
Nb-95	4.8E+5	1.4E+8	6.1E+5	1.4E+8	7.5E+5	1.4E+8	5.0E+5	1.4E+8
Ru-103	5.5E+5	1.1E+8	6.6E+5	1.1E+8	7.8E+5	1.1E+8	5.0E+5	1.1E+8
Te-129m	1.7E+6	2.0E+7	1.8E+6	2.0E+7	2.0E+6	2.0E+7	1.2E+6	2.0E+7
Cs-134	7.0E+5	6.8E+9	1.0E+6	6.8E+9	1.1E+6	6.8E+9	8.5E+5	6.8E+9
Cs-136	1.3E+5	1.5E+8	1.7E+5	1.5E+8	1.9E+5	1.5E+8	1.5E+5	1.5E+8
Cs-137	6.1E+5	1.0E+10	9.1E+5	1.0E+10	8.5E+5	1.0E+10	6.2E+5	1.0E+10
Ba-140	1.6E+6	2.1E+7	1.7E+6	2.1E+7	2.0E+6	2.1E+7	1.3E+6	2.1E+7
Ce-141	5.2E+5	1.4E+7	5.4E+5	1.4E+7	6.1E+5	1.4E+7	3.6E+5	1.4E+7
Ce-144	9.8E+6	7.0E+7	1.2E+7	7.0E+7	1.3E+7	7.0E+7	7.8E+6	7.0E+7
I -131	1.5E+7	1.7E+7	1.6E+7	1.7E+7	1.5E+7	1.7E+7	1.2E+7	1.7E+7
I -132	1.7E+5	1.2E+6	1.9E+5	1.2E+6	1.5E+5	1.2E+6	1.1E+5	1.2E+6
I -133	3.6E+6	2.4E+6	3.8E+6	2.4E+6	2.9E+6	2.4E+6	2.2E+6	2.4E+6
I -134	4.5E+4	4.5E+5	5.1E+4	4.5E+5	4.0E+4	4.5E+5	3.0E+4	4.5E+5
I -135	7.0E+5	2.5E+6	7.9E+5	2.5E+6	6.2E+5	2.5E+6	4.5E+5	2.5E+6
UN-ID	6.5E+5	7.5E+8	1.0E+6	7.5E+8	1.2E+6	7.5E+8	8.6E+5	7.5E+8

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

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

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = State Park Office Trailer Distance = 0.6 miles
X/Q = 2.2E-6 sec/m^3 D/Q = 1.2E-8 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	5.8E+1	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	6.6E+2	2.1E+5
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	6.4E+4	6.3E+7
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	1.7E+4	1.6E+7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	4.2E+4	1.7E+7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	2.7E+5	9.8E+8
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	6.4E+4	9.9E+2
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	4.5E+6	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	8.1E+4	1.1E+7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	2.3E+4	6.2E+6
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	2.3E+4	5.0E+6
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	5.3E+4	9.0E+5
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	3.9E+4	3.1E+8
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	6.7E+3	6.9E+6
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	2.8E+4	4.7E+8
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	5.8E+4	9.4E+5
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	1.7E+4	6.2E+5
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	3.6E+5	3.2E+6
I -131	-0-	-0-	-0-	-0-	-0-	-0-	5.4E+5	7.9E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	5.2E+3	5.7E+4
I -133	-0-	-0-	-0-	-0-	-0-	-0-	9.8E+4	1.1E+5
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+3	2.1E+4
I -135	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+4	1.2E+5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	3.9E+4	3.4E+7

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

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

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = Surf. Beach/Guard Shack   Distance = 0.7 miles
X/Q = 1.8E-06 sec/m^3 D/Q = 9.9E-09 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	1.2E+1	-0-	5.1E+1	-0-	2.2E+2	-0-
Cr-51	-0-	-0-	1.8E+2	3.2E+4	8.4E+2	1.5E+5	2.5E+3	8.0E+5
Mn-54	-0-	-0-	1.6E+4	9.5E+6	8.0E+4	4.5E+7	2.4E+5	2.4E+8
Co-57	-0-	-0-	5.3E+3	2.4E+6	2.4E+4	1.1E+7	6.3E+4	5.9E+7
Co-58	-0-	-0-	1.2E+4	2.6E+6	5.4E+4	1.2E+7	1.6E+5	6.5E+7
Co-60	-0-	-0-	7.3E+4	1.5E+8	3.5E+5	7.0E+8	1.0E+6	3.7E+9
Sr-89	-0-	-0-	2.2E+4	1.5E+2	9.7E+4	7.1E+2	2.4E+5	3.7E+3
Sr-90	-0-	-0-	1.1E+6	-0-	4.4E+6	-0-	1.7E+7	-0-
Zr-95	-0-	-0-	2.3E+4	1.7E+6	1.1E+5	8.2E+6	3.0E+5	4.3E+7
Nb-95	-0-	-0-	6.4E+3	9.4E+5	3.0E+4	4.5E+6	8.6E+4	2.3E+7
Ru-103	-0-	-0-	6.9E+3	7.5E+5	3.2E+4	3.6E+6	8.6E+4	1.9E+7
Te-129m	-0-	-0-	1.8E+4	1.4E+5	8.0E+4	6.4E+5	2.0E+5	3.4E+6
Cs-134	-0-	-0-	1.1E+4	4.7E+7	4.5E+4	2.2E+8	1.5E+5	1.2E+9
Cs-136	-0-	-0-	1.8E+3	1.0E+6	7.8E+3	4.9E+6	2.5E+4	2.6E+7
Cs-137	-0-	-0-	9.4E+3	7.1E+7	3.4E+4	3.4E+8	1.1E+5	1.8E+9
Ba-140	-0-	-0-	1.8E+4	1.4E+5	8.2E+4	6.7E+5	2.2E+5	3.5E+6
Ce-141	-0-	-0-	5.7E+3	9.4E+4	2.5E+4	4.5E+5	6.2E+4	2.3E+6
Ce-144	-0-	-0-	1.2E+5	4.8E+5	5.4E+5	2.3E+6	1.3E+6	1.2E+7
I -131	-0-	-0-	1.7E+5	1.2E+5	5.9E+5	5.6E+5	2.0E+6	2.9E+6
I -132	-0-	-0-	2.0E+3	8.5E+3	6.1E+3	4.1E+4	2.0E+4	2.1E+5
I -133	-0-	-0-	4.0E+4	1.7E+4	1.2E+5	8.0E+4	3.7E+5	4.2E+5
I -134	-0-	-0-	5.3E+2	3.1E+3	1.6E+3	1.5E+4	5.1E+3	7.7E+4
I -135	-0-	-0-	8.2E+3	1.7E+4	2.5E+4	8.2E+4	7.7E+4	4.3E+5
UN-ID	-0-	-0-	1.0E+4	5.1E+6	5.0E+4	2.4E+7	1.5E+5	1.3E+8

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

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

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = Enlisted Beach/Campground   Distance = 1.1 miles
X/Q = 9.3E-07 sec/m^3 D/Q = 4.6E-09 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	8.0E+01	-0-	1.4E+02	-0-	1.6E+02	-0-	1.6E+02	-0-
Cr-51	1.6E+03	5.7E+05	2.1E+03	5.7E+05	2.6E+03	5.7E+05	1.8E+03	5.7E+05
Mn-54	1.2E+05	1.7E+08	1.9E+05	1.7E+08	2.4E+05	1.7E+08	1.7E+05	1.7E+08
Co-57	4.7E+04	4.2E+07	6.3E+04	4.2E+07	7.2E+04	4.2E+07	4.6E+04	4.2E+07
Co-58	9.6E+04	4.7E+07	1.4E+05	4.7E+07	1.7E+05	4.7E+07	1.1E+05	4.7E+07
Co-60	5.6E+05	2.7E+09	8.7E+05	2.7E+09	1.1E+06	2.7E+09	7.4E+05	2.7E+09
Sr-89	2.5E+05	2.7E+03	2.7E+05	2.7E+03	3.0E+05	2.7E+03	1.7E+05	2.7E+03
Sr-90	5.0E+06	-0-	1.2E+07	-0-	1.3E+07	-0-	1.2E+07	-0-
Zr-95	2.2E+05	3.1E+07	2.8E+05	3.1E+07	3.3E+05	3.1E+07	2.2E+05	3.1E+07
Nb-95	5.9E+04	1.7E+07	7.6E+04	1.7E+07	9.3E+04	1.7E+07	6.2E+04	1.7E+07
Ru-103	6.8E+04	1.3E+07	8.2E+04	1.3E+07	9.7E+04	1.3E+07	6.2E+04	1.3E+07
Te-129m	2.1E+05	2.4E+06	2.2E+05	2.4E+06	2.4E+05	2.4E+06	1.4E+05	2.4E+06
Cs-134	8.7E+04	8.4E+08	1.3E+05	8.4E+08	1.4E+05	8.4E+08	1.0E+05	8.4E+08
Cs-136	1.7E+04	1.9E+07	2.1E+04	1.9E+07	2.4E+04	1.9E+07	1.8E+04	1.9E+07
Cs-137	7.5E+04	1.3E+09	1.1E+05	1.3E+09	1.0E+05	1.3E+09	7.7E+04	1.3E+09
Ba-140	2.0E+05	2.5E+06	2.1E+05	2.5E+06	2.5E+05	2.5E+06	1.6E+05	2.5E+06
Ce-141	6.4E+04	1.7E+06	6.7E+04	1.7E+06	7.6E+04	1.7E+06	4.5E+04	1.7E+06
Ce-144	1.2E+06	8.6E+06	1.5E+06	8.6E+06	1.6E+06	8.6E+06	9.6E+05	8.6E+06
I -131	1.8E+06	2.1E+06	2.0E+06	2.1E+06	1.8E+06	2.1E+06	1.5E+06	2.1E+06
I -132	2.1E+04	1.5E+05	2.4E+04	1.5E+05	1.9E+04	1.5E+05	1.4E+04	1.5E+05
I -133	4.4E+05	3.0E+05	4.7E+05	3.0E+05	3.6E+05	3.0E+05	2.7E+05	3.0E+05
I -134	5.5E+03	5.5E+04	6.3E+03	5.5E+04	4.9E+03	5.5E+04	3.7E+03	5.5E+04
I -135	8.6E+04	3.1E+05	9.8E+04	3.1E+05	7.7E+04	3.1E+05	5.5E+04	3.1E+05
UN-ID	8.0E+04	9.2E+07	1.2E+05	9.2E+07	1.5E+05	9.2E+07	1.1E+05	9.2E+07

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

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

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = Enlisted Beach Check-In   Distance = 1.4 miles
X/Q = 6.8E-7 sec/m^3 D/Q = 3.2E-9 m^{-2}

Radio-Nuclide	Infant Inhala-tion Pathway	Infant Food & Ground Pathway	Child Inhala-tion Pathway	Child Food & Ground Pathway	Teen Inhala-tion Pathway	Teen Food & Ground Pathway	Adult Inhala-tion Pathway	Adult Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+3	1.1E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+5	3.2E+8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	8.4E+4	7.8E+7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	2.1E+5	8.7E+7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	4.9E+9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+5	4.9E+3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	2.3E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	4.0E+5	5.7E+7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+5	3.1E+7
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+5	2.5E+7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+5	4.5E+6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	1.9E+5	1.6E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+4	3.4E+7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+5	2.3E+9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+5	4.7E+6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	8.3E+4	3.1E+6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+6	1.6E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	2.7E+6	3.9E+6
I -132	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+4	2.8E+5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	4.9E+5	5.6E+5
I -134	-0-	-0-	-0-	-0-	-0-	-0-	6.8E+3	1.0E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.0E+5	5.8E+5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+5	1.7E+8

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

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

DOSE PARAMETER R_i FOR SECTOR Q

IR

Pathway = Sheep (Meat)/Shepherd   Distance = 1.6 miles
X/Q = 5.6E-7 sec/m^3 D/Q = 2.6E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E+0	-0-	1.2E+0	7.0E+0	2.1E+0
Cr-51	-0-	-0-	-0-	5.1E+1	-0-	1.0E+2	7.9E+1	2.6E+4
Mn-54	-0-	-0-	-0-	7.8E+2	-0-	1.4E+3	7.7E+3	7.6E+6
Co-57	-0-	-0-	-0-	4.7E+3	-0-	8.1E+3	2.0E+3	1.9E+6
Co-58	-0-	-0-	-0-	9.7E+3	-0-	2.0E+4	5.1E+3	2.1E+6
Co-60	-0-	-0-	-0-	3.7E+4	-0-	7.3E+4	3.3E+4	1.2E+8
Sr-89	-0-	-0-	-0-	5.0E+4	-0-	2.6E+4	7.7E+3	3.1E+4
Sr-90	-0-	-0-	-0-	1.0E+6	-0-	8.1E+5	5.5E+5	1.3E+6
Zr-95	-0-	-0-	-0-	6.3E+4	-0-	1.1E+5	9.7E+3	1.6E+6
Nb-95	-0-	-0-	-0-	2.4E+5	-0-	4.5E+5	2.8E+3	1.6E+6
Ru-103	-0-	-0-	-0-	4.2E+5	-0-	7.6E+5	2.8E+3	1.9E+6
Te-129m	-0-	-0-	-0-	6.0E+5	-0-	4.5E+5	6.4E+3	7.6E+5
Cs-134	-0-	-0-	-0-	1.4E+5	-0-	1.2E+5	4.7E+3	3.8E+7
Cs-136	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	8.1E+2	8.3E+5
Cs-137	-0-	-0-	-0-	1.3E+5	-0-	9.5E+4	3.4E+3	5.7E+7
Ba-140	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	7.0E+3	1.2E+5
Ce-141	-0-	-0-	-0-	1.5E+3	-0-	2.4E+3	2.0E+3	7.9E+4
Ce-144	-0-	-0-	-0-	1.8E+4	-0-	3.0E+4	4.3E+4	4.3E+5
I -131	-0-	-0-	-0-	6.6E+5	-0-	4.4E+5	6.6E+4	7.0E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	6.8E+3
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E+4	1.3E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+2	2.5E+3
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E+3	1.4E+4
UN-ID	-0-	-0-	-0-	1.1E+5	-0-	9.5E+4	4.8E+3	4.2E+6

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

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

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = S. C. Res W Garden
X/Q = 1.2E-07 sec/m^3

Distance = 4.1 miles
D/Q = 4.1E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	6.5E+2	-0-	1.1E+3	3.8E+3	1.3E+3	2.4E+3	1.3E+3	1.9E+3
Cr-51	1.3E+4	4.7E+6	1.7E+4	9.4E+6	2.1E+4	1.2E+7	1.4E+4	1.1E+7
Mn-54	1.0E+6	1.4E+9	1.6E+6	2.0E+9	2.0E+6	2.2E+9	1.4E+6	2.2E+9
Co-57	3.8E+5	3.4E+8	5.1E+5	5.6E+8	5.9E+5	6.3E+8	3.7E+5	5.8E+8
Co-58	7.8E+5	3.8E+8	1.1E+6	7.1E+8	1.3E+6	8.9E+8	9.3E+5	8.5E+8
Co-60	4.5E+6	2.2E+10	7.1E+6	2.3E+10	8.7E+6	2.4E+10	6.0E+6	2.4E+10
Sr-89	2.0E+6	2.2E+4	2.2E+6	3.1E+10	2.4E+6	1.2E+10	1.4E+6	7.2E+9
Sr-90	4.1E+7	-0-	1.0E+8	1.3E+12	1.1E+8	7.7E+11	9.9E+7	5.8E+11
Zr-95	1.8E+6	2.5E+8	2.2E+6	1.0E+9	2.7E+6	1.3E+9	1.8E+6	1.2E+9
Nb-95	4.8E+5	1.4E+8	6.1E+5	3.8E+8	7.5E+5	4.9E+8	5.0E+5	4.5E+8
Ru-103	5.5E+5	1.1E+8	6.6E+5	4.4E+8	7.8E+5	5.6E+8	5.0E+5	4.9E+8
Te-129m	1.7E+6	2.0E+7	1.8E+6	2.4E+9	2.0E+6	1.4E+9	1.2E+6	9.7E+8
Cs-134	7.0E+5	6.8E+9	1.0E+6	3.1E+10	1.1E+6	2.2E+10	8.5E+5	1.6E+10
Cs-136	1.3E+5	1.5E+8	1.7E+5	2.4E+8	1.9E+5	2.1E+8	1.5E+5	1.9E+8
Cs-137	6.1E+5	1.0E+10	9.1E+5	3.4E+10	8.5E+5	2.3E+10	6.2E+5	1.8E+10
Ba-140	1.6E+6	2.1E+7	1.7E+6	1.3E+8	2.0E+6	8.8E+7	1.3E+6	7.4E+7
Ce-141	5.2E+5	1.4E+7	5.4E+5	3.4E+8	6.1E+5	4.2E+8	3.6E+5	3.3E+8
Ce-144	9.8E+6	7.0E+7	1.2E+7	9.3E+9	1.3E+7	1.2E+10	7.8E+6	9.0E+9
I -131	1.5E+7	1.7E+7	1.6E+7	4.1E+9	1.5E+7	2.1E+9	1.2E+7	1.4E+9
I -132	1.7E+5	1.2E+6	1.9E+5	1.2E+6	1.5E+5	1.2E+6	1.1E+5	1.2E+6
I -133	3.6E+6	2.4E+6	3.8E+6	2.4E+6	2.9E+6	2.4E+6	2.2E+6	2.4E+6
I -134	4.5E+4	4.5E+5	5.1E+4	4.5E+5	4.0E+4	4.5E+5	3.0E+4	4.5E+5
I -135	7.0E+5	2.5E+6	7.9E+5	2.5E+6	6.2E+5	2.5E+6	4.5E+5	2.5E+6
UN-ID	6.5E+5	7.5E+8	1.0E+6	3.3E+9	1.2E+6	2.4E+9	8.6E+5	1.8E+9

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

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

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = San Clemente Ranch (No Residents) Distance = 2.2 miles
X/Q = 3.3E-7 sec/m^3 D/Q = 1.4E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	3.8E+3	-0-	2.4E+3	-0-	1.9E+3
Cr-51	-0-	-0-	-0-	4.8E+6	-0-	7.4E+6	-0-	6.7E+6
Mn-54	-0-	-0-	-0-	6.1E+8	-0-	8.3E+8	-0-	8.0E+8
Co-57	-0-	-0-	-0-	2.2E+8	-0-	2.9E+8	-0-	2.4E+8
Co-58	-0-	-0-	-0-	3.3E+8	-0-	5.1E+8	-0-	4.7E+8
Co-60	-0-	-0-	-0-	2.0E+9	-0-	3.0E+9	-0-	2.7E+9
Sr-89	-0-	-0-	-0-	3.1E+10	-0-	1.2E+10	-0-	7.2E+9
Sr-90	-0-	-0-	-0-	1.3E+12	-0-	7.7E+11	-0-	5.8E+11
Zr-95	-0-	-0-	-0-	7.8E+8	-0-	1.1E+9	-0-	9.1E+8
Nb-95	-0-	-0-	-0-	2.4E+8	-0-	3.5E+8	-0-	3.1E+8
Ru-103	-0-	-0-	-0-	3.3E+8	-0-	4.5E+8	-0-	3.8E+8
Te-129m	-0-	-0-	-0-	2.3E+9	-0-	1.4E+9	-0-	9.5E+8
Cs-134	-0-	-0-	-0-	2.4E+10	-0-	1.5E+10	-0-	9.2E+9
Cs-136	-0-	-0-	-0-	9.0E+7	-0-	5.7E+7	-0-	3.6E+7
Cs-137	-0-	-0-	-0-	2.3E+10	-0-	1.3E+10	-0-	7.8E+9
Ba-140	-0-	-0-	-0-	1.1E+8	-0-	6.8E+7	-0-	5.3E+7
Ce-141	-0-	-0-	-0-	3.3E+8	-0-	4.1E+8	-0-	3.2E+8
Ce-144	-0-	-0-	-0-	9.2E+9	-0-	1.2E+10	-0-	9.0E+9
I -131	-0-	-0-	-0-	4.1E+9	-0-	2.1E+9	-0-	1.4E+9
I -132	-0-	-0-	-0-	6.0E-36	-0-	2.6E-36	-0-	1.7E-36
I -133	-0-	-0-	-0-	4.0E-11	-0-	1.7E-11	-0-	1.1E-11
I -134	-0-	-0-	-0-	6.1E-37	-0-	2.7E-37	-0-	1.7E-37
I -135	-0-	-0-	-0-	7.0E-35	-0-	3.1E-35	-0-	1.9E-35
UN-ID	-0-	-0-	-0-	2.5E+9	-0-	1.7E+9	-0-	1.1E+9

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

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

TABLE 2-8

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = San Clemente Ranch Adm. Offices   Distance = 2.5 miles
X/Q = 2.7E-7 sec/m^3 D/Q = 1.1E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	4.3E+02	1.9E+03
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	4.9E+03	8.3E+06
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	4.8E+05	1.3E+09
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+05	3.6E+08
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+05	6.0E+08
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+06	1.0E+10
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	4.8E+05	7.2E+09
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	3.4E+07	5.8E+11
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	6.1E+05	9.9E+08
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	1.7E+05	3.6E+08
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	1.7E+05	4.2E+08
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	4.0E+05	9.6E+08
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+05	1.2E+10
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+04	8.7E+07
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	2.1E+05	1.1E+10
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	4.4E+05	6.0E+07
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+05	3.2E+08
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	2.7E+06	9.0E+09
I -131	-0-	-0-	-0-	-0-	-0-	-0-	4.1E+06	1.4E+09
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.9E+04	4.2E+05
I -133	-0-	-0-	-0-	-0-	-0-	-0-	7.4E+05	8.4E+05
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.0E+04	1.5E+05
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+05	8.6E+05
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	3.0E+05	1.3E+09

R

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

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

TABLE 2-9

DOSE PARAMETER R_i FOR SECTOR R

Pathway = San Onofre Mobile Homes   Distance = 1.2 miles
X/Q = 5.3E-7 sec/m^3 D/Q = 3.2E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	6.5E+2	-0-	1.1E+3	-0-	1.3E+3	-0-	1.3E+3	-0-
Cr-51	1.3E+4	4.7E+6	1.7E+4	4.7E+6	2.1E+4	4.7E+6	1.4E+4	4.7E+6
Mn-54	1.0E+6	1.4E+9	1.6E+6	1.4E+9	2.0E+6	1.4E+9	1.4E+6	1.4E+9
Co-57	3.8E+5	3.4E+8	5.1E+5	3.4E+8	5.9E+5	3.4E+8	3.7E+5	3.4E+8
Co-58	7.8E+5	3.8E+8	1.1E+6	3.8E+8	1.3E+6	3.8E+8	9.3E+5	3.8E+8
Co-60	4.5E+6	2.2E+10	7.1E+6	2.2E+10	8.7E+6	2.2E+10	6.0E+6	2.2E+10
Sr-89	2.0E+6	2.2E+4	2.2E+6	2.2E+4	2.4E+6	2.2E+4	1.4E+6	2.2E+4
Sr-90	4.1E+7	-0-	1.0E+8	-0-	1.1E+8	-0-	9.9E+7	-0-
Zr-95	1.8E+6	2.5E+8	2.2E+6	2.5E+8	2.7E+6	2.5E+8	1.8E+6	2.5E+8
Nb-95	4.8E+5	1.4E+8	6.1E+5	1.4E+8	7.5E+5	1.4E+8	5.0E+5	1.4E+8
Ru-103	5.5E+5	1.1E+8	6.6E+5	1.1E+8	7.8E+5	1.1E+8	5.0E+5	1.1E+8
Te-129m	1.7E+6	2.0E+7	1.8E+6	2.0E+7	2.0E+6	2.0E+7	1.2E+6	2.0E+7
Cs-134	7.0E+5	6.8E+9	1.0E+6	6.8E+9	1.1E+6	6.8E+9	8.5E+5	6.8E+9
Cs-136	1.3E+5	1.5E+8	1.7E+5	1.5E+8	1.9E+5	1.5E+8	1.5E+5	1.5E+8
Cs-137	6.1E+5	1.0E+10	9.1E+5	1.0E+10	8.5E+5	1.0E+10	6.2E+5	1.0E+10
Ba-140	1.6E+6	2.1E+7	1.7E+6	2.1E+7	2.0E+6	2.1E+7	1.3E+6	2.1E+7
Ce-141	5.2E+5	1.4E+7	5.4E+5	1.4E+7	6.1E+5	1.4E+7	3.6E+5	1.4E+7
Ce-144	9.8E+6	7.0E+7	1.2E+7	7.0E+7	1.3E+7	7.0E+7	7.8E+6	7.0E+7
I -131	1.5E+7	1.7E+7	1.6E+7	1.7E+7	1.5E+7	1.7E+7	1.2E+7	1.7E+7
I -132	1.7E+5	1.2E+6	1.9E+5	1.2E+6	1.5E+5	1.2E+6	1.1E+5	1.2E+6
I -133	3.6E+6	2.4E+6	3.8E+6	2.4E+6	2.9E+6	2.4E+6	2.2E+6	2.4E+6
I -134	4.5E+4	4.5E+5	5.1E+4	4.5E+5	4.0E+4	4.5E+5	3.0E+4	4.5E+5
I -135	7.0E+5	2.5E+6	7.9E+5	2.5E+6	6.2E+5	2.5E+6	4.5E+5	2.5E+6
UN-ID	6.5E+5	7.5E+8	1.0E+6	7.5E+8	1.2E+6	7.5E+8	8.6E+5	7.5E+8

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

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

TABLE 2-9

DOSE PARAMETER R_i FOR SECTOR R

Pathway = San Clemente Ranch (No Residents) Distance = 2.3 miles
X/Q = 2.0E-7 sec/m^3 D/Q = 1.0E-9 m^{-2}

Radio-Nuclide	Infant Inhalation Pathway	Infant Food & Ground Pathway	Child Inhalation Pathway	Child Food & Ground Pathway	Teen Inhalation Pathway	Teen Food & Ground Pathway	Adult Inhalation Pathway	Adult Food & Ground Pathway
H -3	-0-	-0-	-0-	3.8E+3	-0-	2.4E+3	-0-	1.9E+3
Cr-51	-0-	-0-	-0-	4.8E+6	-0-	7.4E+6	-0-	6.7E+6
Mn-54	-0-	-0-	-0-	6.1E+8	-0-	8.3E+8	-0-	8.0E+8
Co-57	-0-	-0-	-0-	2.2E+8	-0-	2.9E+8	-0-	2.4E+8
Co-58	-0-	-0-	-0-	3.3E+8	-0-	5.1E+8	-0-	4.7E+8
Co-60	-0-	-0-	-0-	2.0E+9	-0-	3.0E+9	-0-	2.7E+9
Sr-89	-0-	-0-	-0-	3.1E+10	-0-	1.2E+10	-0-	7.2E+9
Sr-90	-0-	-0-	-0-	1.3E+12	-0-	7.7E+11	-0-	5.8E+11
Zr-95	-0-	-0-	-0-	7.8E+8	-0-	1.1E+9	-0-	9.1E+8
Nb-95	-0-	-0-	-0-	2.4E+8	-0-	3.5E+8	-0-	3.1E+8
Ru-103	-0-	-0-	-0-	3.3E+8	-0-	4.5E+8	-0-	3.8E+8
Te-129m	-0-	-0-	-0-	2.3E+9	-0-	1.4E+9	-0-	9.5E+8
Cs-134	-0-	-0-	-0-	2.4E+10	-0-	1.5E+10	-0-	9.2E+9
Cs-136	-0-	-0-	-0-	9.0E+7	-0-	5.7E+7	-0-	3.6E+7
Cs-137	-0-	-0-	-0-	2.3E+10	-0-	1.3E+10	-0-	7.8E+9
Ba-140	-0-	-0-	-0-	1.1E+8	-0-	6.8E+7	-0-	5.3E+7
Ce-141	-0-	-0-	-0-	3.3E+8	-0-	4.1E+8	-0-	3.2E+8
Ce-144	-0-	-0-	-0-	9.2E+9	-0-	1.2E+10	-0-	9.0E+9
I -131	-0-	-0-	-0-	4.1E+9	-0-	2.1E+9	-0-	1.4E+9
I -132	-0-	-0-	-0-	6.0E-36	-0-	2.6E-36	-0-	1.7E-36
I -133	-0-	-0-	-0-	4.0E-11	-0-	1.7E-11	-0-	1.1E-11
I -134	-0-	-0-	-0-	6.1E-37	-0-	2.7E-37	-0-	1.7E-37
I -135	-0-	-0-	-0-	7.0E-35	-0-	3.1E-35	-0-	1.9E-35
UN-ID	-0-	-0-	-0-	2.5E+9	-0-	1.7E+9	-0-	1.1E+9

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

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

TABLE 2-9

DOSE PARAMETER R_i FOR SECTOR R

Pathway = SC Ranch Packing
X/Q = 1.7E-07 sec/m^3

Distance = 2.6 miles
D/Q = 8.2E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	4.3E+2	1.9E+3
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	4.9E+3	8.3E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	4.8E+5	1.3E+9
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+5	3.6E+8
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+5	6.0E+8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+6	1.0E+10
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	4.8E+5	7.2E+9
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	3.4E+7	5.8E+11
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	6.1E+5	9.9E+8
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	1.7E+5	3.6E+8
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	1.7E+5	4.2E+8
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	4.0E+5	9.6E+8
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+5	1.2E+10
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+4	8.7E+7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	2.1E+5	1.1E+10
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	4.4E+5	6.0E+7
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+5	3.2E+8
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	2.7E+6	9.0E+9
I -131	-0-	-0-	-0-	-0-	-0-	-0-	4.1E+6	1.4E+9
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.9E+4	4.2E+5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	7.4E+5	8.4E+5
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.0E+4	1.5E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+5	8.6E+5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	3.0E+5	1.3E+9

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

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

TABLE 2-9

DOSE PARAMETER R_i FOR SECTOR R

R

Pathway = Sheep Meat/Shepherd Distance = 0.9 miles
X/Q = 8.3E-7 sec/m^3 D/Q = 5.2E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E+0	-0-	1.2E+0	7.0E+0	2.1E+0
Cr-51	-0-	-0-	-0-	5.1E+1	-0-	1.0E+2	7.9E+1	2.6E+4
Mn-54	-0-	-0-	-0-	7.8E+2	-0-	1.4E+3	7.7E+3	7.6E+6
Co-57	-0-	-0-	-0-	4.7E+3	-0-	8.1E+3	2.0E+3	1.9E+6
Co-58	-0-	-0-	-0-	9.7E+3	-0-	2.0E+4	5.1E+3	2.1E+6
Co-60	-0-	-0-	-0-	3.7E+4	-0-	7.3E+4	3.3E+4	1.2E+8
Sr-89	-0-	-0-	-0-	5.0E+4	-0-	2.6E+4	7.7E+3	3.1E+4
Sr-90	-0-	-0-	-0-	1.0E+6	-0-	8.1E+5	5.5E+5	1.3E+6
Zr-95	-0-	-0-	-0-	6.3E+4	-0-	1.1E+5	9.7E+3	1.6E+6
Nb-95	-0-	-0-	-0-	2.4E+5	-0-	4.5E+5	2.8E+3	1.6E+6
Ru-103	-0-	-0-	-0-	4.2E+5	-0-	7.6E+5	2.8E+3	1.9E+6
Te-129m	-0-	-0-	-0-	6.0E+5	-0-	4.5E+5	6.4E+3	7.6E+5
Cs-134	-0-	-0-	-0-	1.4E+5	-0-	1.2E+5	4.7E+3	3.8E+7
Cs-136	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	8.1E+2	8.3E+5
Cs-137	-0-	-0-	-0-	1.3E+5	-0-	9.5E+4	3.4E+3	5.7E+7
Ba-140	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	7.0E+3	1.2E+5
Ce-141	-0-	-0-	-0-	1.5E+3	-0-	2.4E+3	2.0E+3	7.9E+4
Ce-144	-0-	-0-	-0-	1.8E+4	-0-	3.0E+4	4.3E+4	4.3E+5
I -131	-0-	-0-	-0-	6.6E+5	-0-	4.4E+5	6.6E+4	7.0E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	6.8E+3
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E+4	1.3E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+2	2.5E+3
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E+3	1.4E+4
UN-ID	-0-	-0-	-0-	1.1E+5	-0-	9.5E+4	4.8E+3	4.2E+6

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

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

TABLE 2-9

DOSE PARAMETER R_i FOR SECTOR R

R

Pathway = Deer Consumer/Hunter
X/Q = 1.8E-7 sec/m^3

Distance = 2.2 miles
D/Q = 8.8E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E+1	-0-	2.3E+1	3.5E+1	3.9E+1
Cr-51	-0-	-0-	-0-	5.0E+4	-0-	1.0E+5	3.9E+2	3.2E+5
Mn-54	-0-	-0-	-0-	7.7E+5	-0-	1.4E+6	3.8E+4	4.1E+7
Co-57	-0-	-0-	-0-	4.6E+6	-0-	8.0E+6	1.0E+4	2.3E+7
Co-58	-0-	-0-	-0-	9.6E+6	-0-	1.9E+7	2.5E+4	4.7E+7
Co-60	-0-	-0-	-0-	3.6E+7	-0-	7.2E+7	1.6E+5	7.2E+8
Sr-89	-0-	-0-	-0-	4.9E+7	-0-	2.6E+7	3.8E+4	3.1E+7
Sr-90	-0-	-0-	-0-	1.0E+9	-0-	8.0E+8	2.7E+6	1.2E+9
Zr-95	-0-	-0-	-0-	6.2E+7	-0-	1.1E+8	4.8E+4	2.0E+8
Nb-95	-0-	-0-	-0-	2.3E+8	-0-	4.5E+8	1.4E+4	8.2E+8
Ru-103	-0-	-0-	-0-	4.2E+8	-0-	7.5E+8	1.4E+4	1.3E+9
Te-129m	-0-	-0-	-0-	5.9E+8	-0-	4.5E+8	3.2E+4	6.4E+8
Cs-134	-0-	-0-	-0-	1.4E+8	-0-	1.2E+8	2.3E+4	3.4E+8
Cs-136	-0-	-0-	-0-	5.1E+6	-0-	4.2E+6	4.0E+3	9.5E+6
Cs-137	-0-	-0-	-0-	1.3E+8	-0-	9.3E+7	1.7E+4	4.0E+8
Ba-140	-0-	-0-	-0-	5.0E+6	-0-	4.2E+6	3.5E+4	7.4E+6
Ce-141	-0-	-0-	-0-	1.5E+6	-0-	2.4E+6	9.9E+3	4.2E+6
Ce-144	-0-	-0-	-0-	1.8E+7	-0-	2.9E+7	2.1E+5	4.9E+7
I -131	-0-	-0-	-0-	6.5E+8	-0-	4.3E+8	3.3E+5	5.9E+8
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.1E+3	3.4E+4
I -133	-0-	-0-	-0-	1.6E+1	-0-	8.6E+0	5.9E+4	6.7E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	8.2E+2	1.2E+4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E+4	6.9E+4
UN-ID	-0-	-0-	-0-	1.1E+8	-0-	9.4E+7	2.4E+4	1.4E+8

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

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

TABLE 2-10

DOSE PARAMETER R_i FOR SECTOR A

Pathway = Camp San Mateo Distance = 3.6 miles
X/Q = 7.1E-8 sec/m^3 D/Q = 4.1E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+3	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+4	4.7E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	1.4E+9
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	3.7E+5	3.4E+8
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	9.3E+5	3.8E+8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	6.0E+6	2.2E+10
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	2.2E+4
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	9.9E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+6	2.5E+8
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+5	1.4E+8
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+5	1.1E+8
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+6	2.0E+7
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	8.5E+5	6.8E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+5	1.5E+8
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	6.2E+5	1.0E+10
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+6	2.1E+7
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	3.6E+5	1.4E+7
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	7.8E+6	7.0E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+7	1.7E+7
I -132	-0-	-0-	-0-	-0-	-0-	-0-	1.1E+5	1.2E+6
I -133	-0-	-0-	-0-	-0-	-0-	-0-	2.2E+6	2.4E+6
I -134	-0-	-0-	-0-	-0-	-0-	-0-	3.0E+4	4.5E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	4.5E+5	2.5E+6
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	8.6E+5	7.5E+8

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

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

TABLE 2-10

DOSE PARAMETER R_i FOR SECTOR A

|R

Pathway = Sheep (Meat)/Shepherd   Distance = 0.2 miles
X/Q = 6.7E-6 sec/m^3 D/Q = 5.2E-8 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E+0	-0-	1.2E+0	7.0E+0	2.1E+0
Cr-51	-0-	-0-	-0-	5.1E+1	-0-	1.0E+2	7.9E+1	2.6E+4
Mn-54	-0-	-0-	-0-	7.8E+2	-0-	1.4E+3	7.7E+3	7.6E+6
Co-57	-0-	-0-	-0-	4.7E+3	-0-	8.1E+3	2.0E+3	1.9E+6
Co-58	-0-	-0-	-0-	9.7E+3	-0-	2.0E+4	5.1E+3	2.1E+6
Co-60	-0-	-0-	-0-	3.7E+4	-0-	7.3E+4	3.3E+4	1.2E+8
Sr-89	-0-	-0-	-0-	5.0E+4	-0-	2.6E+4	7.7E+3	3.1E+4
Sr-90	-0-	-0-	-0-	1.0E+6	-0-	8.1E+5	5.5E+5	1.3E+6
Zr-95	-0-	-0-	-0-	6.3E+4	-0-	1.1E+5	9.7E+3	1.6E+6
Nb-95	-0-	-0-	-0-	2.4E+5	-0-	4.5E+5	2.8E+3	1.6E+6
Ru-103	-0-	-0-	-0-	4.2E+5	-0-	7.6E+5	2.8E+3	1.9E+6
Te-129m	-0-	-0-	-0-	6.0E+5	-0-	4.5E+5	6.4E+3	7.6E+5
Cs-134	-0-	-0-	-0-	1.4E+5	-0-	1.2E+5	4.7E+3	3.8E+7
Cs-136	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	8.1E+2	8.3E+5
Cs-137	-0-	-0-	-0-	1.3E+5	-0-	9.5E+4	3.4E+3	5.7E+7
Ba-140	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	7.0E+3	1.2E+5
Ce-141	-0-	-0-	-0-	1.5E+3	-0-	2.4E+3	2.0E+3	7.9E+4
Ce-144	-0-	-0-	-0-	1.8E+4	-0-	3.0E+4	4.3E+4	4.3E+5
I -131	-0-	-0-	-0-	6.6E+5	-0-	4.4E+5	6.6E+4	7.0E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	6.8E+3
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E+4	1.3E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+2	2.5E+3
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E+3	1.4E+4
UN-ID	-0-	-0-	-0-	1.1E+5	-0-	9.5E+4	4.8E+3	4.2E+6

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

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

TABLE 2-10

DOSE PARAMETER R_i FOR SECTOR A

Pathway = Deer Consumer/Hunter   Distance = 2.2 miles
$X/Q = 1.9E\text{-}7\ sec/m^3$ $D/Q = 1.4E\text{-}9\ m^{-2}$

|R

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E+1	-0-	2.3E+1	3.5E+1	3.9E+1
Cr-51	-0-	-0-	-0-	5.0E+4	-0-	1.0E+5	3.9E+2	3.2E+5
Mn-54	-0-	-0-	-0-	7.7E+5	-0-	1.4E+6	3.8E+4	4.1E+7
Co-57	-0-	-0-	-0-	4.6E+6	-0-	8.0E+6	1.0E+4	2.3E+7
Co-58	-0-	-0-	-0-	9.6E+6	-0-	1.9E+7	2.5E+4	4.7E+7
Co-60	-0-	-0-	-0-	3.6E+7	-0-	7.2E+7	1.6E+5	7.2E+8
Sr-89	-0-	-0-	-0-	4.9E+7	-0-	2.6E+7	3.8E+4	3.1E+7
Sr-90	-0-	-0-	-0-	1.0E+9	-0-	8.0E+8	2.7E+6	1.2E+9
Zr-95	-0-	-0-	-0-	6.2E+7	-0-	1.1E+8	4.8E+4	2.0E+8
Nb-95	-0-	-0-	-0-	2.3E+8	-0-	4.5E+8	1.4E+4	8.2E+8
Ru-103	-0-	-0-	-0-	4.2E+8	-0-	7.5E+8	1.4E+4	1.3E+9
Te-129m	-0-	-0-	-0-	5.9E+8	-0-	4.5E+8	3.2E+4	6.4E+8
Cs-134	-0-	-0-	-0-	1.4E+8	-0-	1.2E+8	2.3E+4	3.4E+8
Cs-136	-0-	-0-	-0-	5.1E+6	-0-	4.2E+6	4.0E+3	9.5E+6
Cs-137	-0-	-0-	-0-	1.3E+8	-0-	9.3E+7	1.7E+4	4.0E+8
Ba-140	-0-	-0-	-0-	5.0E+6	-0-	4.2E+6	3.5E+4	7.4E+6
Ce-141	-0-	-0-	-0-	1.5E+6	-0-	2.4E+6	9.9E+3	4.2E+6
Ce-144	-0-	-0-	-0-	1.8E+7	-0-	2.9E+7	2.1E+5	4.9E+7
I -131	-0-	-0-	-0-	6.5E+8	-0-	4.3E+8	3.3E+5	5.9E+8
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.1E+3	3.4E+4
I -133	-0-	-0-	-0-	1.6E+1	-0-	8.6E+0	5.9E+4	6.7E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	8.2E+2	1.2E+4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E+4	6.9E+4
UN-ID	-0-	-0-	-0-	1.1E+8	-0-	9.4E+7	2.4E+4	1.4E+8

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

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

TABLE 2-11

DOSE PARAMETER R_i FOR SECTOR B

Pathway = Sheep (Meat)/Shepherd   Distance = 0.2 miles
X/Q = 6.1E-6 sec/m^3 D/Q = 5.3E-8 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E+0	-0-	1.2E+0	7.0E+0	2.1E+0
Cr-51	-0-	-0-	-0-	5.1E+1	-0-	1.0E+2	7.9E+1	2.6E+4
Mn-54	-0-	-0-	-0-	7.8E+2	-0-	1.4E+3	7.7E+3	7.6E+6
Co-57	-0-	-0-	-0-	4.7E+3	-0-	8.1E+3	2.0E+3	1.9E+6
Co-58	-0-	-0-	-0-	9.7E+3	-0-	2.0E+4	5.1E+3	2.1E+6
Co-60	-0-	-0-	-0-	3.7E+4	-0-	7.3E+4	3.3E+4	1.2E+8
Sr-89	-0-	-0-	-0-	5.0E+4	-0-	2.6E+4	7.7E+3	3.1E+4
Sr-90	-0-	-0-	-0-	1.0E+6	-0-	8.1E+5	5.5E+5	1.3E+6
Zr-95	-0-	-0-	-0-	6.3E+4	-0-	1.1E+5	9.7E+3	1.6E+6
Nb-95	-0-	-0-	-0-	2.4E+5	-0-	4.5E+5	2.8E+3	1.6E+6
Ru-103	-0-	-0-	-0-	4.2E+5	-0-	7.6E+5	2.8E+3	1.9E+6
Te-129m	-0-	-0-	-0-	6.0E+5	-0-	4.5E+5	6.4E+3	7.6E+5
Cs-134	-0-	-0-	-0-	1.4E+5	-0-	1.2E+5	4.7E+3	3.8E+7
Cs-136	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	8.1E+2	8.3E+5
Cs-137	-0-	-0-	-0-	1.3E+5	-0-	9.5E+4	3.4E+3	5.7E+7
Ba-140	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	7.0E+3	1.2E+5
Ce-141	-0-	-0-	-0-	1.5E+3	-0-	2.4E+3	2.0E+3	7.9E+4
Ce-144	-0-	-0-	-0-	1.8E+4	-0-	3.0E+4	4.3E+4	4.3E+5
I -131	-0-	-0-	-0-	6.6E+5	-0-	4.4E+5	6.6E+4	7.0E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	6.8E+3
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E+4	1.3E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+2	2.5E+3
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E+3	1.4E+4
UN-ID	-0-	-0-	-0-	1.1E+5	-0-	9.5E+4	4.8E+3	4.2E+6

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

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

TABLE 2-11

DOSE PARAMETER R_i FOR SECTOR B

Pathway = Deer Consumer/Hunter   Distance = 1.1 miles
X/Q = 3.4E-7 sec/m^3 D/Q = 2.4E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E+1	-0-	2.3E+1	3.5E+1	3.9E+1
Cr-51	-0-	-0-	-0-	5.0E+4	-0-	1.0E+5	3.9E+2	3.2E+5
Mn-54	-0-	-0-	-0-	7.7E+5	-0-	1.4E+6	3.8E+4	4.1E+7
Co-57	-0-	-0-	-0-	4.6E+6	-0-	8.0E+6	1.0E+4	2.3E+7
Co-58	-0-	-0-	-0-	9.6E+6	-0-	1.9E+7	2.5E+4	4.7E+7
Co-60	-0-	-0-	-0-	3.6E+7	-0-	7.2E+7	1.6E+5	7.2E+8
Sr-89	-0-	-0-	-0-	4.9E+7	-0-	2.6E+7	3.8E+4	3.1E+7
Sr-90	-0-	-0-	-0-	1.0E+9	-0-	8.0E+8	2.7E+6	1.2E+9
Zr-95	-0-	-0-	-0-	6.2E+7	-0-	1.1E+8	4.8E+4	2.0E+8
Nb-95	-0-	-0-	-0-	2.3E+8	-0-	4.5E+8	1.4E+4	8.2E+8
Ru-103	-0-	-0-	-0-	4.2E+8	-0-	7.5E+8	1.4E+4	1.3E+9
Te-129m	-0-	-0-	-0-	5.9E+8	-0-	4.5E+8	3.2E+4	6.4E+8
Cs-134	-0-	-0-	-0-	1.4E+8	-0-	1.2E+8	2.3E+4	3.4E+8
Cs-136	-0-	-0-	-0-	5.1E+6	-0-	4.2E+6	4.0E+3	9.5E+6
Cs-137	-0-	-0-	-0-	1.3E+8	-0-	9.3E+7	1.7E+4	4.0E+8
Ba-140	-0-	-0-	-0-	5.0E+6	-0-	4.2E+6	3.5E+4	7.4E+6
Ce-141	-0-	-0-	-0-	1.5E+6	-0-	2.4E+6	9.9E+3	4.2E+6
Ce-144	-0-	-0-	-0-	1.8E+7	-0-	2.9E+7	2.1E+5	4.9E+7
I -131	-0-	-0-	-0-	6.5E+8	-0-	4.3E+8	3.3E+5	5.9E+8
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.1E+3	3.4E+4
I -133	-0-	-0-	-0-	1.6E+1	-0-	8.6E+0	5.9E+4	6.7E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	8.2E+2	1.2E+4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E+4	6.9E+4
UN-ID	-0-	-0-	-0-	1.1E+8	-0-	9.4E+7	2.4E+4	1.4E+8

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

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

<u>TABLE 2-11</u>

DOSE PARAMETER R_i FOR SECTOR B

Pathway = Sanitary Landfill
X/Q = 1.4E-7 sec/m^3

Distance = 2.1 miles
D/Q = 1.2E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+3	1.1E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+5	3.2E+8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	8.4E+4	7.8E+7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	2.1E+5	8.7E+7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	4.9E+9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+5	4.9E+3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	2.3E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	4.0E+5	5.7E+7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+5	3.1E+7
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+5	2.5E+7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+5	4.5E+6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	1.9E+5	1.6E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+4	3.4E+7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+5	2.3E+9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+5	4.7E+6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	8.3E+4	3.1E+6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+6	1.6E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	2.7E+6	3.9E+6
I -132	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+4	2.8E+5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	4.9E+5	5.6E+5
I -134	-0-	-0-	-0-	-0-	-0-	-0-	6.8E+3	1.0E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.0E+5	5.8E+5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+5	1.7E+8

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

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

TABLE 2-12

DOSE PARAMETER R_i FOR SECTOR C

Pathway = Camp San Onofre Distance = 2.6 miles
X/Q = 9.2E-8 sec/m^3 D/Q = 8.4E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+3	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+4	4.7E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	1.4E+9
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	3.7E+5	3.4E+8
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	9.3E+5	3.8E+8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	6.0E+6	2.2E+10
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	2.2E+4
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	9.9E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+6	2.5E+8
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+5	1.4E+8
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+5	1.1E+8
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+6	2.0E+7
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	8.5E+5	6.8E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+5	1.5E+8
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	6.2E+5	1.0E+10
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+6	2.1E+7
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	3.6E+5	1.4E+7
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	7.8E+6	7.0E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+7	1.7E+7
I -132	-0-	-0-	-0-	-0-	-0-	-0-	1.1E+5	1.2E+6
I -133	-0-	-0-	-0-	-0-	-0-	-0-	2.2E+6	2.4E+6
I -134	-0-	-0-	-0-	-0-	-0-	-0-	3.0E+4	4.5E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	4.5E+5	2.5E+6
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	8.6E+5	7.5E+8

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

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

TABLE 2-12

DOSE PARAMETER R_i FOR SECTOR C

Pathway = Camp San Onofre Fr. Stn Distance = 2.3 miles
X/Q = 1.1E-7 sec/m^3 D/Q = 1.1E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	5.2E+2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	5.9E+3	1.9E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	5.8E+5	5.7E+8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+5	1.4E+8
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	3.8E+5	1.6E+8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	2.5E+6	8.8E+9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	5.8E+5	8.9E+3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	4.1E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	7.3E+5	1.0E+8
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	2.1E+5	5.6E+7
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	2.1E+5	4.5E+7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	4.8E+5	8.1E+6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	3.5E+5	2.8E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	6.0E+4	6.2E+7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+5	4.2E+9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	5.2E+5	8.4E+6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+5	5.6E+6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+6	2.9E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	4.9E+6	7.1E+6
I -132	-0-	-0-	-0-	-0-	-0-	-0-	4.7E+4	5.1E+5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	8.8E+5	1.0E+6
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+4	1.8E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+5	1.0E+6
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	3.6E+5	3.1E+8

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

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

DOSE PARAMETER R_i FOR SECTOR C

Pathway = Sewage Facility
X/Q = 1.2E-7 sec/m^3

Distance = 2.2 miles
D/Q = 1.2E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+3	1.1E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+5	3.2E+8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	8.4E+4	7.8E+7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	2.1E+5	8.7E+7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	4.9E+9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+5	4.9E+3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	2.3E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	4.0E+5	5.7E+7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+5	3.1E+7
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+5	2.5E+7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+5	4.5E+6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	1.9E+5	1.6E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+4	3.4E+7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+5	2.3E+9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+5	4.7E+6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	8.3E+4	3.1E+6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+6	1.6E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	2.7E+6	3.9E+6
I -132	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+4	2.8E+5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	4.9E+5	5.6E+5
I -134	-0-	-0-	-0-	-0-	-0-	-0-	6.8E+3	1.0E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.0E+5	5.8E+5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+5	1.7E+8

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

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

TABLE 2-12

DOSE PARAMETER R_i FOR SECTOR C

Pathway = Sheep (Meat)/Shepherd   Distance = 0.2 miles
X/Q = 6.5E-6 sec/m^3 D/Q = 6.1E-8 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E+0	-0-	1.2E+0	7.0E+0	2.1E+0
Cr-51	-0-	-0-	-0-	5.1E+1	-0-	1.0E+2	7.9E+1	2.6E+4
Mn-54	-0-	-0-	-0-	7.8E+2	-0-	1.4E+3	7.7E+3	7.6E+6
Co-57	-0-	-0-	-0-	4.7E+3	-0-	8.1E+3	2.0E+3	1.9E+6
Co-58	-0-	-0-	-0-	9.7E+3	-0-	2.0E+4	5.1E+3	2.1E+6
Co-60	-0-	-0-	-0-	3.7E+4	-0-	7.3E+4	3.3E+4	1.2E+8
Sr-89	-0-	-0-	-0-	5.0E+4	-0-	2.6E+4	7.7E+3	3.1E+4
Sr-90	-0-	-0-	-0-	1.0E+6	-0-	8.1E+5	5.5E+5	1.3E+6
Zr-95	-0-	-0-	-0-	6.3E+4	-0-	1.1E+5	9.7E+3	1.6E+6
Nb-95	-0-	-0-	-0-	2.4E+5	-0-	4.5E+5	2.8E+3	1.6E+6
Ru-103	-0-	-0-	-0-	4.2E+5	-0-	7.6E+5	2.8E+3	1.9E+6
Te-129m	-0-	-0-	-0-	6.0E+5	-0-	4.5E+5	6.4E+3	7.6E+5
Cs-134	-0-	-0-	-0-	1.4E+5	-0-	1.2E+5	4.7E+3	3.8E+7
Cs-136	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	8.1E+2	8.3E+5
Cs-137	-0-	-0-	-0-	1.3E+5	-0-	9.5E+4	3.4E+3	5.7E+7
Ba-140	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	7.0E+3	1.2E+5
Ce-141	-0-	-0-	-0-	1.5E+3	-0-	2.4E+3	2.0E+3	7.9E+4
Ce-144	-0-	-0-	-0-	1.8E+4	-0-	3.0E+4	4.3E+4	4.3E+5
I -131	-0-	-0-	-0-	6.6E+5	-0-	4.4E+5	6.6E+4	7.0E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	6.8E+3
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E+4	1.3E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+2	2.5E+3
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E+3	1.4E+4
UN-ID	-0-	-0-	-0-	1.1E+5	-0-	9.5E+4	4.8E+3	4.2E+6

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

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

DOSE PARAMETER R_i FOR SECTOR C

1R

Pathway = Deer Consumer/Hunter
X/Q = 3.4E-7 sec/m^3

Distance = 1.0 miles
D/Q = 5.1E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E+1	-0-	2.3E+1	3.5E+1	3.9E+1
Cr-51	-0-	-0-	-0-	5.0E+4	-0-	1.0E+5	3.9E+2	3.2E+5
Mn-54	-0-	-0-	-0-	7.7E+5	-0-	1.4E+6	3.8E+4	4.1E+7
Co-57	-0-	-0-	-0-	4.6E+6	-0-	8.0E+6	1.0E+4	2.3E+7
Co-58	-0-	-0-	-0-	9.6E+6	-0-	1.9E+7	2.5E+4	4.7E+7
Co-60	-0-	-0-	-0-	3.6E+7	-0-	7.2E+7	1.6E+5	7.2E+8
Sr-89	-0-	-0-	-0-	4.9E+7	-0-	2.6E+7	3.8E+4	3.1E+7
Sr-90	-0-	-0-	-0-	1.0E+9	-0-	8.0E+8	2.7E+6	1.2E+9
Zr-95	-0-	-0-	-0-	6.2E+7	-0-	1.1E+8	4.8E+4	2.0E+8
Nb-95	-0-	-0-	-0-	2.3E+8	-0-	4.5E+8	1.4E+4	8.2E+8
Ru-103	-0-	-0-	-0-	4.2E+8	-0-	7.5E+8	1.4E+4	1.3E+9
Te-129m	-0-	-0-	-0-	5.9E+8	-0-	4.5E+8	3.2E+4	6.4E+8
Cs-134	-0-	-0-	-0-	1.4E+8	-0-	1.2E+8	2.3E+4	3.4E+8
Cs-136	-0-	-0-	-0-	5.1E+6	-0-	4.2E+6	4.0E+3	9.5E+6
Cs-137	-0-	-0-	-0-	1.3E+8	-0-	9.3E+7	1.7E+4	4.0E+8
Ba-140	-0-	-0-	-0-	5.0E+6	-0-	4.2E+6	3.5E+4	7.4E+6
Ce-141	-0-	-0-	-0-	1.5E+6	-0-	2.4E+6	9.9E+3	4.2E+6
Ce-144	-0-	-0-	-0-	1.8E+7	-0-	2.9E+7	2.1E+5	4.9E+7
I -131	-0-	-0-	-0-	6.5E+8	-0-	4.3E+8	3.3E+5	5.9E+8
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.1E+3	3.4E+4
I -133	-0-	-0-	-0-	1.6E+1	-0-	8.6E+0	5.9E+4	6.7E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	8.2E+2	1.2E+4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E+4	6.9E+4
UN-ID	-0-	-0-	-0-	1.1E+8	-0-	9.4E+7	2.4E+4	1.4E+8

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

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

TABLE 2-13

DOSE PARAMETER R_i FOR SECTOR D

Pathway = Camp San Onofre
X/Q = 6.6E-8 sec/m^3

Distance = 2.8 miles
D/Q = 6.4E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+3	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+4	4.7E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	1.4E+9
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	3.7E+5	3.4E+8
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	9.3E+5	3.8E+8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	6.0E+6	2.2E+10
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	2.2E+4
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	9.9E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+6	2.5E+8
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+5	1.4E+8
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+5	1.1E+8
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+6	2.0E+7
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	8.5E+5	6.8E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+5	1.5E+8
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	6.2E+5	1.0E+10
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+6	2.1E+7
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	3.6E+5	1.4E+7
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	7.8E+6	7.0E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+7	1.7E+7
I -132	-0-	-0-	-0-	-0-	-0-	-0-	1.1E+5	1.2E+6
I -133	-0-	-0-	-0-	-0-	-0-	-0-	2.2E+6	2.4E+6
I -134	-0-	-0-	-0-	-0-	-0-	-0-	3.0E+4	4.5E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	4.5E+5	2.5E+6
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	8.6E+5	7.5E+8

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

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

TABLE 2-13

DOSE PARAMETER R_i FOR SECTOR D

Pathway = Sheep (Meat)/Shepherd — Distance = 0.2 miles

X/Q = 6.3E-6 sec/m^3 — D/Q = 6.6E-8 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E+0	-0-	1.2E+0	7.0E+0	2.1E+0
Cr-51	-0-	-0-	-0-	5.1E+1	-0-	1.0E+2	7.9E+1	2.6E+4
Mn-54	-0-	-0-	-0-	7.8E+2	-0-	1.4E+3	7.7E+3	7.6E+6
Co-57	-0-	-0-	-0-	4.7E+3	-0-	8.1E+3	2.0E+3	1.9E+6
Co-58	-0-	-0-	-0-	9.7E+3	-0-	2.0E+4	5.1E+3	2.1E+6
Co-60	-0-	-0-	-0-	3.7E+4	-0-	7.3E+4	3.3E+4	1.2E+8
Sr-89	-0-	-0-	-0-	5.0E+4	-0-	2.6E+4	7.7E+3	3.1E+4
Sr-90	-0-	-0-	-0-	1.0E+6	-0-	8.1E+5	5.5E+5	1.3E+6
Zr-95	-0-	-0-	-0-	6.3E+4	-0-	1.1E+5	9.7E+3	1.6E+6
Nb-95	-0-	-0-	-0-	2.4E+5	-0-	4.5E+5	2.8E+3	1.6E+6
Ru-103	-0-	-0-	-0-	4.2E+5	-0-	7.6E+5	2.8E+3	1.9E+6
Te-129m	-0-	-0-	-0-	6.0E+5	-0-	4.5E+5	6.4E+3	7.6E+5
Cs-134	-0-	-0-	-0-	1.4E+5	-0-	1.2E+5	4.7E+3	3.8E+7
Cs-136	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	8.1E+2	8.3E+5
Cs-137	-0-	-0-	-0-	1.3E+5	-0-	9.5E+4	3.4E+3	5.7E+7
Ba-140	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	7.0E+3	1.2E+5
Ce-141	-0-	-0-	-0-	1.5E+3	-0-	2.4E+3	2.0E+3	7.9E+4
Ce-144	-0-	-0-	-0-	1.8E+4	-0-	3.0E+4	4.3E+4	4.3E+5
I -131	-0-	-0-	-0-	6.6E+5	-0-	4.4E+5	6.6E+4	7.0E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	6.8E+3
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E+4	1.3E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+2	2.5E+3
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E+3	1.4E+4
UN-ID	-0-	-0-	-0-	1.1E+5	-0-	9.5E+4	4.8E+3	4.2E+6

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

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

DOSE PARAMETER R_i FOR SECTOR D

IR

Pathway = Deer Consumer/Hunter
X/Q = 3.3E-7 sec/m^3

Distance = 1.0 miles
D/Q = 3.3E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E+1	-0-	2.3E+1	3.5E+1	3.9E+1
Cr-51	-0-	-0-	-0-	5.0E+4	-0-	1.0E+5	3.9E+2	3.2E+5
Mn-54	-0-	-0-	-0-	7.7E+5	-0-	1.4E+6	3.8E+4	4.1E+7
Co-57	-0-	-0-	-0-	4.6E+6	-0-	8.0E+6	1.0E+4	2.3E+7
Co-58	-0-	-0-	-0-	9.6E+6	-0-	1.9E+7	2.5E+4	4.7E+7
Co-60	-0-	-0-	-0-	3.6E+7	-0-	7.2E+7	1.6E+5	7.2E+8
Sr-89	-0-	-0-	-0-	4.9E+7	-0-	2.6E+7	3.8E+4	3.1E+7
Sr-90	-0-	-0-	-0-	1.0E+9	-0-	8.0E+8	2.7E+6	1.2E+9
Zr-95	-0-	-0-	-0-	6.2E+7	-0-	1.1E+8	4.8E+4	2.0E+8
Nb-95	-0-	-0-	-0-	2.3E+8	-0-	4.5E+8	1.4E+4	8.2E+8
Ru-103	-0-	-0-	-0-	4.2E+8	-0-	7.5E+8	1.4E+4	1.3E+9
Te-129m	-0-	-0-	-0-	5.9E+8	-0-	4.5E+8	3.2E+4	6.4E+8
Cs-134	-0-	-0-	-0-	1.4E+8	-0-	1.2E+8	2.3E+4	3.4E+8
Cs-136	-0-	-0-	-0-	5.1E+6	-0-	4.2E+6	4.0E+3	9.5E+6
Cs-137	-0-	-0-	-0-	1.3E+8	-0-	9.3E+7	1.7E+4	4.0E+8
Ba-140	-0-	-0-	-0-	5.0E+6	-0-	4.2E+6	3.5E+4	7.4E+6
Ce-141	-0-	-0-	-0-	1.5E+6	-0-	2.4E+6	9.9E+3	4.2E+6
Ce-144	-0-	-0-	-0-	1.8E+7	-0-	2.9E+7	2.1E+5	4.9E+7
I -131	-0-	-0-	-0-	6.5E+8	-0-	4.3E+8	3.3E+5	5.9E+8
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.1E+3	3.4E+4
I -133	-0-	-0-	-0-	1.6E+1	-0-	8.6E+0	5.9E+4	6.7E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	8.2E+2	1.2E+4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E+4	6.9E+4
UN-ID	-0-	-0-	-0-	1.1E+8	-0-	9.4E+7	2.4E+4	1.4E+8

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

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

TABLE 2-14

DOSE PARAMETER R_i FOR SECTOR E

Pathway = Camp Horno
X/Q = 6.6E-8 sec/m^3
Distance = 4.0 miles
D/Q = 6.4E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+3	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+4	4.7E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	1.4E+9
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	3.7E+5	3.4E+8
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	9.3E+5	3.8E+8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	6.0E+6	2.2E+10
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	2.2E+4
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	9.9E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+6	2.5E+8
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+5	1.4E+8
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+5	1.1E+8
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+6	2.0E+7
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	8.5E+5	6.8E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+5	1.5E+8
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	6.2E+5	1.0E+10
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+6	2.1E+7
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	3.6E+5	1.4E+7
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	7.8E+6	7.0E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+7	1.7E+7
I -132	-0-	-0-	-0-	-0-	-0-	-0-	1.1E+5	1.2E+6
I -133	-0-	-0-	-0-	-0-	-0-	-0-	2.2E+6	2.4E+6
I -134	-0-	-0-	-0-	-0-	-0-	-0-	3.0E+4	4.5E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	4.5E+5	2.5E+6
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	8.6E+5	7.5E+8

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

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

TABLE 2-14

DOSE PARAMETER R_i FOR SECTOR E

Pathway = Sheep (Meat)/Shepherd
X/Q = 4.5E-6 sec/m^3

Distance = 0.3 miles
D/Q = 5.9E-8 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E+0	-0-	1.2E+0	7.0E+0	2.1E+0
Cr-51	-0-	-0-	-0-	5.1E+1	-0-	1.0E+2	7.9E+1	2.6E+4
Mn-54	-0-	-0-	-0-	7.8E+2	-0-	1.4E+3	7.7E+3	7.6E+6
Co-57	-0-	-0-	-0-	4.7E+3	-0-	8.1E+3	2.0E+3	1.9E+6
Co-58	-0-	-0-	-0-	9.7E+3	-0-	2.0E+4	5.1E+3	2.1E+6
Co-60	-0-	-0-	-0-	3.7E+4	-0-	7.3E+4	3.3E+4	1.2E+8
Sr-89	-0-	-0-	-0-	5.0E+4	-0-	2.6E+4	7.7E+3	3.1E+4
Sr-90	-0-	-0-	-0-	1.0E+6	-0-	8.1E+5	5.5E+5	1.3E+6
Zr-95	-0-	-0-	-0-	6.3E+4	-0-	1.1E+5	9.7E+3	1.6E+6
Nb-95	-0-	-0-	-0-	2.4E+5	-0-	4.5E+5	2.8E+3	1.6E+6
Ru-103	-0-	-0-	-0-	4.2E+5	-0-	7.6E+5	2.8E+3	1.9E+6
Te-129m	-0-	-0-	-0-	6.0E+5	-0-	4.5E+5	6.4E+3	7.6E+5
Cs-134	-0-	-0-	-0-	1.4E+5	-0-	1.2E+5	4.7E+3	3.8E+7
Cs-136	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	8.1E+2	8.3E+5
Cs-137	-0-	-0-	-0-	1.3E+5	-0-	9.5E+4	3.4E+3	5.7E+7
Ba-140	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	7.0E+3	1.2E+5
Ce-141	-0-	-0-	-0-	1.5E+3	-0-	2.4E+3	2.0E+3	7.9E+4
Ce-144	-0-	-0-	-0-	1.8E+4	-0-	3.0E+4	4.3E+4	4.3E+5
I -131	-0-	-0-	-0-	6.6E+5	-0-	4.4E+5	6.6E+4	7.0E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	6.8E+3
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E+4	1.3E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+2	2.5E+3
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E+3	1.4E+4
UN-ID	-0-	-0-	-0-	1.1E+5	-0-	9.5E+4	4.8E+3	4.2E+6

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

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

TABLE 2-14

DOSE PARAMETER R_i FOR SECTOR E

1R

Pathway = Deer Consumer/Hunter
X/Q = 3.7E-7 sec/m^3

Distance = 1.2 miles
D/Q = 8.3E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E+1	-0-	2.3E+1	3.5E+1	3.9E+1
Cr-51	-0-	-0-	-0-	5.0E+4	-0-	1.0E+5	3.9E+2	3.2E+5
Mn-54	-0-	-0-	-0-	7.7E+5	-0-	1.4E+6	3.8E+4	4.1E+7
Co-57	-0-	-0-	-0-	4.6E+6	-0-	8.0E+6	1.0E+4	2.3E+7
Co-58	-0-	-0-	-0-	9.6E+6	-0-	1.9E+7	2.5E+4	4.7E+7
Co-60	-0-	-0-	-0-	3.6E+7	-0-	7.2E+7	1.6E+5	7.2E+8
Sr-89	-0-	-0-	-0-	4.9E+7	-0-	2.6E+7	3.8E+4	3.1E+7
Sr-90	-0-	-0-	-0-	1.0E+9	-0-	8.0E+8	2.7E+6	1.2E+9
Zr-95	-0-	-0-	-0-	6.2E+7	-0-	1.1E+8	4.8E+4	2.0E+8
Nb-95	-0-	-0-	-0-	2.3E+8	-0-	4.5E+8	1.4E+4	8.2E+8
Ru-103	-0-	-0-	-0-	4.2E+8	-0-	7.5E+8	1.4E+4	1.3E+9
Te-129m	-0-	-0-	-0-	5.9E+8	-0-	4.5E+8	3.2E+4	6.4E+8
Cs-134	-0-	-0-	-0-	1.4E+8	-0-	1.2E+8	2.3E+4	3.4E+8
Cs-136	-0-	-0-	-0-	5.1E+6	-0-	4.2E+6	4.0E+3	9.5E+6
Cs-137	-0-	-0-	-0-	1.3E+8	-0-	9.3E+7	1.7E+4	4.0E+8
Ba-140	-0-	-0-	-0-	5.0E+6	-0-	4.2E+6	3.5E+4	7.4E+6
Ce-141	-0-	-0-	-0-	1.5E+6	-0-	2.4E+6	9.9E+3	4.2E+6
Ce-144	-0-	-0-	-0-	1.8E+7	-0-	2.9E+7	2.1E+5	4.9E+7
I -131	-0-	-0-	-0-	6.5E+8	-0-	4.3E+8	3.3E+5	5.9E+8
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.1E+3	3.4E+4
I -133	-0-	-0-	-0-	1.6E+1	-0-	8.6E+0	5.9E+4	6.7E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	8.2E+2	1.2E+4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E+4	6.9E+4
UN-ID	-0-	-0-	-0-	1.1E+8	-0-	9.4E+7	2.4E+4	1.4E+8

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

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

TABLE 2-15

DOSE PARAMETER R_i FOR SECTOR F

Pathway = San Onofre State Park/Guard Shack Distance = 0.8 miles
X/Q = 8.6E-7 sec/m^3 D/Q = 7.5E-9 m^{-2}

Radio-Nuclide	Infant Inhalation Pathway	Infant Food & Ground Pathway	Child Inhalation Pathway	Child Food & Ground Pathway	Teen Inhalation Pathway	Teen Food & Ground Pathway	Adult Inhalation Pathway	Adult Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	2.2E+2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	2.5E+3	8.0E+5
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	2.4E+5	2.4E+8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+4	5.9E+7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+5	6.5E+7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	1.0E+6	3.7E+9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	2.4E+5	3.7E+3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	1.7E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	3.0E+5	4.3E+7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	8.6E+4	2.3E+7
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	8.6E+4	1.9E+7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+5	3.4E+6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+5	1.2E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	2.5E+4	2.6E+7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	1.1E+5	1.8E+9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	2.2E+5	3.5E+6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	6.2E+4	2.3E+6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+6	1.2E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+6	2.9E+6
I -132	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+4	2.1E+5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	3.7E+5	4.2E+5
I -134	-0-	-0-	-0-	-0-	-0-	-0-	5.1E+3	7.7E+4
I -135	-0-	-0-	-0-	-0-	-0-	-0-	7.7E+4	4.3E+5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	1.5E+5	1.3E+8

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

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

TABLE 2-15

DOSE PARAMETER R_i FOR SECTOR F

Pathway = Border Patrol Checkpt.   Distance = 1.8 miles
X/Q = 2.4E-7 sec/m^3 D/Q = 1.8E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway	Inhala-tion Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	3.6E+2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	4.1E+3	1.3E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	4.0E+5	3.9E+8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	1.1E+5	9.8E+7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+5	1.1E+8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	1.7E+6	6.1E+9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	4.0E+5	6.2E+3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	2.8E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	5.0E+5	7.2E+7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+5	3.9E+7
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+5	3.1E+7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+5	5.6E+6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	2.4E+5	1.9E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	4.2E+4	4.3E+7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+5	2.9E+9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	3.6E+5	5.9E+6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	1.0E+5	3.9E+6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	2.2E+6	2.0E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	3.4E+6	4.9E+6
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+4	3.5E+5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	6.1E+5	7.0E+5
I -134	-0-	-0-	-0-	-0-	-0-	-0-	8.5E+3	1.3E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.3E+5	7.2E+5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	2.5E+5	2.1E+8

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

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

DOSE PARAMETER R_i FOR SECTOR F

IR

Pathway = Sheep (Meat)/Shepherd Distance = 0.5 miles
X/Q = 1.9E-6 sec/m^3 D/Q = 1.7E-8 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E+0	-0-	1.2E+0	7.0E+0	2.1E+0
Cr-51	-0-	-0-	-0-	5.1E+1	-0-	1.0E+2	7.9E+1	2.6E+4
Mn-54	-0-	-0-	-0-	7.8E+2	-0-	1.4E+3	7.7E+3	7.6E+6
Co-57	-0-	-0-	-0-	4.7E+3	-0-	8.1E+3	2.0E+3	1.9E+6
Co-58	-0-	-0-	-0-	9.7E+3	-0-	2.0E+4	5.1E+3	2.1E+6
Co-60	-0-	-0-	-0-	3.7E+4	-0-	7.3E+4	3.3E+4	1.2E+8
Sr-89	-0-	-0-	-0-	5.0E+4	-0-	2.6E+4	7.7E+3	3.1E+4
Sr-90	-0-	-0-	-0-	1.0E+6	-0-	8.1E+5	5.5E+5	1.3E+6
Zr-95	-0-	-0-	-0-	6.3E+4	-0-	1.1E+5	9.7E+3	1.6E+6
Nb-95	-0-	-0-	-0-	2.4E+5	-0-	4.5E+5	2.8E+3	1.6E+6
Ru-103	-0-	-0-	-0-	4.2E+5	-0-	7.6E+5	2.8E+3	1.9E+6
Te-129m	-0-	-0-	-0-	6.0E+5	-0-	4.5E+5	6.4E+3	7.6E+5
Cs-134	-0-	-0-	-0-	1.4E+5	-0-	1.2E+5	4.7E+3	3.8E+7
Cs-136	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	8.1E+2	8.3E+5
Cs-137	-0-	-0-	-0-	1.3E+5	-0-	9.5E+4	3.4E+3	5.7E+7
Ba-140	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	7.0E+3	1.2E+5
Ce-141	-0-	-0-	-0-	1.5E+3	-0-	2.4E+3	2.0E+3	7.9E+4
Ce-144	-0-	-0-	-0-	1.8E+4	-0-	3.0E+4	4.3E+4	4.3E+5
I -131	-0-	-0-	-0-	6.6E+5	-0-	4.4E+5	6.6E+4	7.0E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	6.8E+3
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E+4	1.3E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+2	2.5E+3
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E+3	1.4E+4
UN-ID	-0-	-0-	-0-	1.1E+5	-0-	9.5E+4	4.8E+3	4.2E+6

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

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

TABLE 2-15

DOSE PARAMETER R_i FOR SECTOR F

Pathway = Deer Consumer/Hunter — Distance = 1.4 miles
X/Q = 3.0E-7 sec/m^3 — D/Q = 2.3E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E+1	-0-	2.3E+1	3.5E+1	3.9E+1
Cr-51	-0-	-0-	-0-	5.0E+4	-0-	1.0E+5	3.9E+2	3.2E+5
Mn-54	-0-	-0-	-0-	7.7E+5	-0-	1.4E+6	3.8E+4	4.1E+7
Co-57	-0-	-0-	-0-	4.6E+6	-0-	8.0E+6	1.0E+4	2.3E+7
Co-58	-0-	-0-	-0-	9.6E+6	-0-	1.9E+7	2.5E+4	4.7E+7
Co-60	-0-	-0-	-0-	3.6E+7	-0-	7.2E+7	1.6E+5	7.2E+8
Sr-89	-0-	-0-	-0-	4.9E+7	-0-	2.6E+7	3.8E+4	3.1E+7
Sr-90	-0-	-0-	-0-	1.0E+9	-0-	8.0E+8	2.7E+6	1.2E+9
Zr-95	-0-	-0-	-0-	6.2E+7	-0-	1.1E+8	4.8E+4	2.0E+8
Nb-95	-0-	-0-	-0-	2.3E+8	-0-	4.5E+8	1.4E+4	8.2E+8
Ru-103	-0-	-0-	-0-	4.2E+8	-0-	7.5E+8	1.4E+4	1.3E+9
Te-129m	-0-	-0-	-0-	5.9E+8	-0-	4.5E+8	3.2E+4	6.4E+8
Cs-134	-0-	-0-	-0-	1.4E+8	-0-	1.2E+8	2.3E+4	3.4E+8
Cs-136	-0-	-0-	-0-	5.1E+6	-0-	4.2E+6	4.0E+3	9.5E+6
Cs-137	-0-	-0-	-0-	1.3E+8	-0-	9.3E+7	1.7E+4	4.0E+8
Ba-140	-0-	-0-	-0-	5.0E+6	-0-	4.2E+6	3.5E+4	7.4E+6
Ce-141	-0-	-0-	-0-	1.5E+6	-0-	2.4E+6	9.9E+3	4.2E+6
Ce-144	-0-	-0-	-0-	1.8E+7	-0-	2.9E+7	2.1E+5	4.9E+7
I -131	-0-	-0-	-0-	6.5E+8	-0-	4.3E+8	3.3E+5	5.9E+8
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.1E+3	3.4E+4
I -133	-0-	-0-	-0-	1.6E+1	-0-	8.6E+0	5.9E+4	6.7E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	8.2E+2	1.2E+4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E+4	6.9E+4
UN-ID	-0-	-0-	-0-	1.1E+8	-0-	9.4E+7	2.4E+4	1.4E+8

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

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

TABLE 2-16

DOSE PARAMETER R_i FOR SECTOR G

Pathway = San Onofre State Beach Campground Distance = 0.8 miles
X/Q = 7.7E-7 sec/m^3 D/Q = 3.9E-9 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	8.0E+1	-0-	1.4E+2	-0-	1.6E+2	-0-	2.9E+2	-0-
Cr-51	1.6E+3	5.7E+5	2.1E+3	5.7E+5	2.6E+3	5.7E+5	3.3E+3	1.1E+6
Mn-54	1.2E+5	1.7E+8	1.9E+5	1.7E+8	2.4E+5	1.7E+8	3.2E+5	3.2E+8
Co-57	4.7E+4	4.2E+7	6.3E+4	4.2E+7	7.2E+4	4.2E+7	8.4E+4	7.8E+7
Co-58	9.6E+4	4.7E+7	1.4E+5	4.7E+7	1.7E+5	4.7E+7	2.1E+5	8.7E+7
Co-60	5.6E+5	2.7E+9	8.7E+5	2.7E+9	1.1E+6	2.7E+9	1.4E+6	4.9E+9
Sr-89	2.5E+5	2.7E+3	2.7E+5	2.7E+3	3.0E+5	2.7E+3	3.2E+5	4.9E+3
Sr-90	5.0E+6	-0-	1.2E+7	-0-	1.3E+7	-0-	2.3E+7	-0-
Zr-95	2.2E+5	3.1E+7	2.8E+5	3.1E+7	3.3E+5	3.1E+7	4.0E+5	5.7E+7
Nb-95	5.9E+4	1.7E+7	7.6E+4	1.7E+7	9.3E+4	1.7E+7	1.2E+5	3.1E+7
Ru-103	6.8E+4	1.3E+7	8.2E+4	1.3E+7	9.7E+4	1.3E+7	1.2E+5	2.5E+7
Te-129m	2.1E+5	2.4E+6	2.2E+5	2.4E+6	2.4E+5	2.4E+6	2.6E+5	4.5E+6
Cs-134	8.7E+4	8.4E+8	1.3E+5	8.4E+8	1.4E+5	8.4E+8	1.9E+5	1.6E+9
Cs-136	1.7E+4	1.9E+7	2.1E+4	1.9E+7	2.4E+4	1.9E+7	3.3E+4	3.4E+7
Cs-137	7.5E+4	1.3E+9	1.1E+5	1.3E+9	1.0E+5	1.3E+9	1.4E+5	2.3E+9
Ba-140	2.0E+5	2.5E+6	2.1E+5	2.5E+6	2.5E+5	2.5E+6	2.9E+5	4.7E+6
Ce-141	6.4E+4	1.7E+6	6.7E+4	1.7E+6	7.6E+4	1.7E+6	8.3E+4	3.1E+6
Ce-144	1.2E+6	8.6E+6	1.5E+6	8.6E+6	1.6E+6	8.6E+6	1.8E+6	1.6E+7
I -131	1.8E+6	2.1E+6	2.0E+6	2.1E+6	1.8E+6	2.1E+6	2.7E+6	3.9E+6
I -132	2.1E+4	1.5E+5	2.4E+4	1.5E+5	1.9E+4	1.5E+5	2.6E+4	2.8E+5
I -133	4.4E+5	3.0E+5	4.7E+5	3.0E+5	3.6E+5	3.0E+5	4.9E+5	5.6E+5
I -134	5.5E+3	5.5E+4	6.3E+3	5.5E+4	4.9E+3	5.5E+4	6.8E+3	1.0E+5
I -135	8.6E+4	3.1E+5	9.8E+4	3.1E+5	7.7E+4	3.1E+5	1.0E+5	5.8E+5
UN-ID	8.0E+4	9.2E+7	1.2E+5	9.2E+7	1.5E+5	9.2E+7	2.0E+5	1.7E+8

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

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

TABLE 2-16

DOSE PARAMETER R_1 FOR SECTOR G

Pathway = Hwy Patrol Weigh Station   Distance = 2.0 miles
X/Q = 2.0E-7 sec/m^3 D/Q = 8.5E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+3	1.1E+6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+5	3.2E+8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	8.4E+4	7.8E+7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	2.1E+5	8.7E+7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+6	4.9E+9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	3.2E+5	4.9E+3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	2.3E+7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	4.0E+5	5.7E+7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+5	3.1E+7
Ru-103	-0-	-0-	-0-	-0-	-0-	-0-	1.2E+5	2.5E+7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+5	4.5E+6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	1.9E+5	1.6E+9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	3.3E+4	3.4E+7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	1.4E+5	2.3E+9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	2.9E+5	4.7E+6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	8.3E+4	3.1E+6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	1.8E+6	1.6E+7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	2.7E+6	3.9E+6
I -132	-0-	-0-	-0-	-0-	-0-	-0-	2.6E+4	2.8E+5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	4.9E+5	5.6E+5
I -134	-0-	-0-	-0-	-0-	-0-	-0-	6.8E+3	1.0E+5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.0E+5	5.8E+5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	2.0E+5	1.7E+8

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

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

TABLE 2-16

DOSE PARAMETER R_i FOR SECTOR G

IR

Pathway = Sheep (Meat)/Shepherd   Distance = 2.7 miles
X/Q = 1.2E-7 sec/m^3 D/Q = 4.8E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	1.5E+0	-0-	1.2E+0	7.0E+0	2.1E+0
Cr-51	-0-	-0-	-0-	5.1E+1	-0-	1.0E+2	7.9E+1	2.6E+4
Mn-54	-0-	-0-	-0-	7.8E+2	-0-	1.4E+3	7.7E+3	7.6E+6
Co-57	-0-	-0-	-0-	4.7E+3	-0-	8.1E+3	2.0E+3	1.9E+6
Co-58	-0-	-0-	-0-	9.7E+3	-0-	2.0E+4	5.1E+3	2.1E+6
Co-60	-0-	-0-	-0-	3.7E+4	-0-	7.3E+4	3.3E+4	1.2E+8
Sr-89	-0-	-0-	-0-	5.0E+4	-0-	2.6E+4	7.7E+3	3.1E+4
Sr-90	-0-	-0-	-0-	1.0E+6	-0-	8.1E+5	5.5E+5	1.3E+6
Zr-95	-0-	-0-	-0-	6.3E+4	-0-	1.1E+5	9.7E+3	1.6E+6
Nb-95	-0-	-0-	-0-	2.4E+5	-0-	4.5E+5	2.8E+3	1.6E+6
Ru-103	-0-	-0-	-0-	4.2E+5	-0-	7.6E+5	2.8E+3	1.9E+6
Te-129m	-0-	-0-	-0-	6.0E+5	-0-	4.5E+5	6.4E+3	7.6E+5
Cs-134	-0-	-0-	-0-	1.4E+5	-0-	1.2E+5	4.7E+3	3.8E+7
Cs-136	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	8.1E+2	8.3E+5
Cs-137	-0-	-0-	-0-	1.3E+5	-0-	9.5E+4	3.4E+3	5.7E+7
Ba-140	-0-	-0-	-0-	5.1E+3	-0-	4.3E+3	7.0E+3	1.2E+5
Ce-141	-0-	-0-	-0-	1.5E+3	-0-	2.4E+3	2.0E+3	7.9E+4
Ce-144	-0-	-0-	-0-	1.8E+4	-0-	3.0E+4	4.3E+4	4.3E+5
I -131	-0-	-0-	-0-	6.6E+5	-0-	4.4E+5	6.6E+4	7.0E+5
I -132	-0-	-0-	-0-	-0-	-0-	-0-	6.3E+2	6.8E+3
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E+4	1.3E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	1.6E+2	2.5E+3
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E+3	1.4E+4
UN-ID	-0-	-0-	-0-	1.1E+5	-0-	9.5E+4	4.8E+3	4.2E+6

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

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

TABLE 2-16

DOSE PARAMETER R_i FOR SECTOR G

1R

Pathway = Deer Consumer/Hunter   Distance = 3.3 miles
X/Q = 8.8E-8 sec/m^3 D/Q = 3.2E-10 m^{-2}

Radio-Nuclide	Infant		Child		Teen		Adult	
	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H -3	-0-	-0-	-0-	2.8E+1	-0-	2.3E+1	3.5E+1	3.9E+1
Cr-51	-0-	-0-	-0-	5.0E+4	-0-	1.0E+5	3.9E+2	3.2E+5
Mn-54	-0-	-0-	-0-	7.7E+5	-0-	1.4E+6	3.8E+4	4.1E+7
Co-57	-0-	-0-	-0-	4.6E+6	-0-	8.0E+6	1.0E+4	2.3E+7
Co-58	-0-	-0-	-0-	9.6E+6	-0-	1.9E+7	2.5E+4	4.7E+7
Co-60	-0-	-0-	-0-	3.6E+7	-0-	7.2E+7	1.6E+5	7.2E+8
Sr-89	-0-	-0-	-0-	4.9E+7	-0-	2.6E+7	3.8E+4	3.1E+7
Sr-90	-0-	-0-	-0-	1.0E+9	-0-	8.0E+8	2.7E+6	1.2E+9
Zr-95	-0-	-0-	-0-	6.2E+7	-0-	1.1E+8	4.8E+4	2.0E+8
Nb-95	-0-	-0-	-0-	2.3E+8	-0-	4.5E+8	1.4E+4	8.2E+8
Ru-103	-0-	-0-	-0-	4.2E+8	-0-	7.5E+8	1.4E+4	1.3E+9
Te-129m	-0-	-0-	-0-	5.9E+8	-0-	4.5E+8	3.2E+4	6.4E+8
Cs-134	-0-	-0-	-0-	1.4E+8	-0-	1.2E+8	2.3E+4	3.4E+8
Cs-136	-0-	-0-	-0-	5.1E+6	-0-	4.2E+6	4.0E+3	9.5E+6
Cs-137	-0-	-0-	-0-	1.3E+8	-0-	9.3E+7	1.7E+4	4.0E+8
Ba-140	-0-	-0-	-0-	5.0E+6	-0-	4.2E+6	3.5E+4	7.4E+6
Ce-141	-0-	-0-	-0-	1.5E+6	-0-	2.4E+6	9.9E+3	4.2E+6
Ce-144	-0-	-0-	-0-	1.8E+7	-0-	2.9E+7	2.1E+5	4.9E+7
I -131	-0-	-0-	-0-	6.5E+8	-0-	4.3E+8	3.3E+5	5.9E+8
I -132	-0-	-0-	-0-	-0-	-0-	-0-	3.1E+3	3.4E+4
I -133	-0-	-0-	-0-	1.6E+1	-0-	8.6E+0	5.9E+4	6.7E+4
I -134	-0-	-0-	-0-	-0-	-0-	-0-	8.2E+2	1.2E+4
I -135	-0-	-0-	-0-	1.1E-15	-0-	6.3E-16	1.2E+4	6.9E+4
UN-ID	-0-	-0-	-0-	1.1E+8	-0-	9.4E+7	2.4E+4	1.4E+8

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

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

2.9 TOTAL DOSE CALCULATIONS

2.9.1 Total Dose to Most Likely Member of the Public

The total annual dose or total dose commitment to any member of the public, due to releases of radioactivity and to radiation, from uranium fuel cycle sources within 5 miles of the Site is calculated using the following expressions. This methodology is used to meet the dose limitations of 40 CFR 190 per twelve consecutive months. The transportation of radioactive material is excluded from the dose calculations.

The Annual Total Dose is determined monthly for maximum organ (gas & liquid), whole body (gas & liquid) and thyroid (gas & liquid) to verify that the Site total (Units 1, 2 and 3) is less than or equal to 25 mrem, 25 mrem, and 75 mrem respectively.

.1 Annual Total Organ Dose (D_{TOT} (O))

$$D_{TOT}\ (O) = \sum_{l=1}^{12} \sum_{j=1}^{2/3} \left[D_{jl}(OG) + D_{jl}(OL) + D_{jl}^{*H^3}(OG) \right] \quad (2\text{-}20)$$

where:

*NOTE: $D_{jl}^{H^3}(OG)$ = 0 for bone

**All to be summed over the most recent 12 months.

$$D_{jl}\ (OG) = K \sum_{i=1}^{n} C_i \sum\nolimits_k R_{ik}\, W_k \quad (2\text{-}21)$$ | R

i = each isotope in specific organ category

j = Units 1, 2 and 3

l = months 1 - 12**

$K = 3.1688E\text{-}2\ \frac{\text{year-}\mu\text{Ci}}{\text{sec-Ci}}$

2.9.1 **Total Dose to Most Likely Member of the Public** (Continued)

n = number of isotopes in the specified organ category

C_{il} = total particulate gas curies released for the month

$\sum_k R_{ik} W_k$ = controlling location factors from ODCM Table 2-5, Unit 1 and Table 2-6, Units 2/3, for all pathways k. R

$D_{jl}(OL)$ = liquid organ dose for the specified organ in mrem for the month. [Reference ODCM Units 2/3 (1-19), Unit 1 (1-13)]

$D_{jl}^{H^3}(OG)$* = gas organ dose form tritium in mrem for the month. [Reference ODCM Unit 1 (2-14), ODCM Units 2/3 (2-18)] R

.2 <u>Annual Total Whole Body Dose $D_{TOT}(WB)$</u>

(2-22)

$$D_{TOT}(WB) = \sum_{l=1}^{12} \sum_{j=1}^{2/3} \left[D_{jl}(WBL) + D_{jl}^{H^3}(OG) + 0.9\, D_{jl}(\gamma) \right] + D(DIRECT)$$

where:

j = Units 1, 2 and 3

l = months 1 - 12, to be summed over the most recent 12 months

$D_{jl}(WBL)$ = liquid whole body organ dose in mrem for the whole month. [Reference ODCM Units 2/3 (1-19), ODCM Unit 1 (1-13)]

$D_{jl}^{H^3}(OG)$ = gas organ dose from tritium in mrem for the month. [Refer ODCM Units 2/3 (2-18), ODCM Unit 1 (2-14)] R

$D_{jl}(\gamma)$ = gamma air dose in mrad for the month. 0.9 converts mrad to mrem. [Reference ODCM Units 2/3 (2-14), ODCM Unit 1 (2-10)]

(2-23)

$$D\ (Direct) = \sum_{q=1}^{4} \left[\max[D(beach)_i] - \frac{\sum_{p=1}^{n} D(bkgd)_i}{n} \right] .0342$$

p = for all TLDs per quarter

q = for Quarters 1-4

2.9.1.2 Annual Total Whole Body Dose $D_{TOT}(WB)$ (Continued)

*Direct Radiation

The direct radiation levels are evaluated most recently using cadmium covered TLDs. The TLDs are placed at 47 locations around the site. The average dose measured by TLDs 5 to 50 miles from the site is used as background. These sites are subject to change. R

The background is subtracted from the highest reading plant surrounding area TLD. This value is the direct dose but must be prorated by the occupancy factor.

Example: Beach time (west boundary, seawall) of 300 hrs/yr, east and north boundaries of 20 hrs/yr, or 8 hrs/yr for the south boundary and west fence of parking lot 1 (top of bluff). A

Reference: E. M. Goldin Memorandum for File, "Occupancy Factors at San Onofre Owner Controlled Area Boundaries," dated October 1, 1991.

.3 Annual Total Thyroid Dose $D_{TOT}(T)$

$$D_{TOT}(T) = \sum_{l=1}^{12} \sum_{j=1}^{2/3} \left[D_{jl}(OG) + D_{jl}(OL) \right] \qquad (2\text{-}24)$$

where:

j = Units 1, 2 and 3

l = months 1 - 12, to be summed over the most recent 12 months

$D_{jl}(OG)$ = thyroid organ dose from gaseous iodine for the month in mrem. (from 2-21)

$D_{jl}(OL)$ = liquid thyroid organ dose for the month in mrem. [Reference ODCM Units 2/3 (1-19), Unit 1 ODCM (1-13)]

3.0 PROJECTED DOSES

3.1 Liquid Dose Projection

The methodology used for projecting a liquid dose over 31 days for Specification 1.3.1 is as follows:

1. Determine the monthly total body and organ doses resulting from releases during the previous twelve months.

2. Projected dose = Previous 12 months' dose divided by 12 for the total body and each organ.

3.2 Gaseous Dose Projection

The methodology used for projecting a gaseous dose over 31 days for Specification 2.4.1 is as follows:

1. Determine the monthly gamma, beta and organ dose resulting from releases during the previous twelve months.

2. Projected dose = Previous 12 months' dose divided by 12 for the gamma, beta and organ doses.

4.0 EQUIPMENT

4.1 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

SPECIFICATION

4.1.1 The radioactive liquid effluent monitoring instrumentation channels shown in Table 4-1 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 1.1.1 are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with Section 1.4.

APPLICABILITY: At all times

ACTION:

a. With a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above specification, immediately suspend the release of radioactive liquid effluents monitored by the affected channel or declare the channel inoperable.

b. With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 4-1. Exert best efforts to return the instrument to OPERABLE status within 30 days and, additionally, if the inoperable instrument(s) remain inoperable for greater than 30 days, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner.

c. With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE and either the appropriate ACTION items in Table 4-1 not taken or the necessary surveillances not performed at the specified frequency prescribed in Table 4-2, an INVESTIGATIVE REPORT shall be prepared which identifies the cause(s) for the event and defines the corrective actions to be taken to preclude recurrence of the event.

SURVEILLANCE REQUIREMENTS

.1 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations at the frequencies shown in Table 4-2.

.2 At least once per 4 hours, all pumps required to be providing dilution to meet the site radioactive effluent concentration limits of Specification 1.1.1 shall be determined to be operating and providing dilution to the discharge structure.

TABLE 4-1

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT*	MINIMUM CHANNELS OPERABLE	ACTION
1. GROSS RADIOACTIVITY MONITORS PROVIDING ALARM TERMINATION OF RELEASE		
a. Liquid Radwaste Effluent Line - 2/3 RT-7813	1	28
b. Steam Generator Blowdown (Neutralization Sump), Full Flow Condensate Polisher Effluent Line - 2(3)RT-7817	1	29
c. Turbine Plant Sumps, Auxiliary Building Sump, Component Cooling Water Sumps, Storage Tank Area Sumps Effluent Line- 2(3)RT-7821	1	30
d. Steam Generator (E088) Blowdown Effluent Line - 2(3)RT6759	1	29
e. Steam Generator (E089) Blowdown Effluent Line - 2(3)RT6753	1	29
2. FLOW RATE MEASUREMENT DEVICES		
a. Liquid Radwaste Effluent Line	1	31
b. Steam Generator Blowdown (Neutralization Sump), Full Flow Condensate Polisher Effluent Line	1	31
c. Steam Generator (E088) Blowdown Bypass Effluent Line	1	31
d. Steam Generator (E089) Blowdown Bypass Effluent Line	1	31

TABLE NOTATION

* Monitor Recorders are not required for the Operability of the monitor, providing the inoperable recorder does not cause the monitor to become inoperable (i.e., feedback signal). As long as the monitor has indication, alarm capability (if applicable), proper response (based upon surveillance requirements) and isolation function (if applicable), the loss of the recorder does not render the monitor inoperable.

ACTION 28 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirements, effluent releases may continue provided that prior to initiating a release:

a. At least two independent samples are analyzed in accordance with Specification 1.1.1 and

b. At least two technically qualified members of the Facility Staff independently verify the release rate calculation and discharge line valving;

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 29 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are analyzed for gross radioactivity (beta or gamma) at a limit of detection of at least 10^{-7} microcuries/gram:

a. At least once per 8 hours when the specific activity of the secondary coolant is greater than 0.01 microcuries/gram DOSE EQUIVALENT I-131;

b. At least once per 24 hours when the specific activity of the secondary coolant is less than or equal to 0.01 microcuries/gram DOSE EQUIVALENT I-131; or

c. Lock closed valve HV-3773 and divert flow to T-064 for processing as liquid radwaste.

ACTION 30 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided that, at least once per 12 hours, grab samples are collected and analyzed within 4 hours of collection time for gross radioactivity (beta or gamma) at a limit of detection of at least 10^{-7} microcuries/ml or lock closed valve S2(3)2419MU077 or S2(3)2419MU078 and divert flow to the radwaste sump for processing as liquid radwaste.

ACTION 31 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours during actual releases. Pump curves may be used to estimate flow.

TABLE 4-2

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT**	CHANNEL CHECK	SOURCE CHECK	CHANNELS CALIBRATION	CHANNEL FUNCTIONAL TEST
1. GROSS BETA OR GAMMA RADIOACTIVITY MONITORS PROVIDING ALARM AND AUTOMATIC TERMINATION OF RELEASE				
a. Liquid Radwaste Effluents Line - 2/3 RT-7813	D	P	R(2)	Q(1)
b. Steam Generator Blowdown (Neutralization Sump), Full Flow Condensate Polisher Effluent Line - 2(3)RT-7817	D	M	R(2)	Q(1)
c. Turbine Plant Sump, Auxiliary Building Sump, Component Cooling Water Sumps, Storage Tank Area Sumps Effluent Line - 2(3)RT-7821	D	M	R(2)	Q(1)
d. Steam Generator (E088) Blowdown Bypass Effluent Line - 2(3)RT-6759	D	M	R(2)	Q(1)
e. Steam Generator (E089) Blowdown Bypass Line - 2(3)RT6753	D	M	R(2)	Q(1)
2. FLOW RATE MEASUREMENT DEVICES				
a. Liquid Radwaste Effluent Line	D(3)	N.A	R	Q
b. Steam Generator Blowdown (Neutralization Sump), Full Flow Condensate Polisher Effluent Line	D(3)	N.A	R	Q
c. Steam Generator (E088) Blowdown Bypass Effluent Line	D(3)	N.A	R	Q
d. Steam Generator (E089) Blowdown Bypass Effluent Line	D(3)	N.A	R	Q

TABLE 4-2 (Continued)

TABLE NOTATION

** Monitor Recorders are not required for the Operability of the monitor, providing the inoperable recorder does not cause the monitor to become inoperable (i.e., feedback signal). As long as the monitor has indication, alarm capability (if applicable), proper response (based upon surveillance requirements) and isolation function (if applicable), the loss of the recorder does not render the monitor inoperable.

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate verification of effluent path isolation closure and Control Room alarm annunciation if any of the following conditions exist:*

1. Instrument indicates measured levels above the alarm/trip setpoint.

2. Circuit failure.

3. Instrument indicates a downscale failure.

(2) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.

(3) CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK shall be made at least once per 24 hours on days on which continuous, periodic, or batch releases are made.

*If the instrument controls are not in the operate mode, procedures shall require that the channel be declared inoperable.

4.0 EQUIPMENT

4.2 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

SPECIFICATION

4.2.1 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 4-3 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 2.1.1 are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with ODCM.

APPLICABILITY: At all times

ACTION:

a. With a radioactive gaseous effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above specification, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel or declare the channel inoperable.

b. With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 4-3. Exert best efforts to return the instrument to OPERABLE status within 30 days and, additionally, if the inoperable instrument(s) remain inoperable for greater than 30 days, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner. | R

c. With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels OPERABLE and either the appropriate ACTION items in Table 4-3 not taken or the necessary surveillances not performed at the specified frequency prescribed in Table 4-4, an INVESTIGATIVE REPORT shall be prepared which identifies the cause(s) for the event and defines the corrective actions to be taken to preclude recurrence of the event.

SURVEILLANCE REQUIREMENTS

.1 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations at the frequencies shown in Table 4-4.

BLE 4-3

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT***	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION
1. WASTE GAS HOLDUP SYSTEM			
a. Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release - 2/3 RT-7808, or 3 RT-7865-1	1	*	35
b. Process Flow Rate Monitoring Device	1	*	36
2. CONDENSER EVACUATION SYSTEM			
a. Noble Gas Activity Monitor - 2(3)RT-7818 or 2(3)RT-7870-1	1	**	37
b. Iodine Sampler	1	**	40
c. Particulate Sampler	1	**	40
d. Associated Sample Flow Measuring Device	1	**	36
e. Process Flow Rate Monitoring Device	1(1)	**	36
3. PLANT VENT STACK			
a. Noble Gas Activity Monitor - 2/3 RT-7808, or 2RT-7865-1 and 3RT-7865-1	1(3)	*	37
b. Iodine Sampler	1(3)	*	40
c. Particulate Sampler	1(3)	*	40
d. Associated Sample Flow Measuring Device	1(3)	*	36
e. Process Flow Rate Monitoring Device	2(2)	*	36
4. CONTAINMENT PURGE SYSTEM			
a. Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release - 2(3)RT-7828, or 2(3)RT-7865-1	1	*	38
b. Iodine Sampler	1	*	40
c. Particulate Sampler	1	*	40
d. Process Flow Rate Monitoring Device	1	*	36
e. Associated Sample Flow Measuring Device	1	*	36

R

TABLE NOTATION

* At all times.

** MODES 1-4 with any main steam isolation valve and/or any main steam isolating bypass valve not fully closed.

*** Monitor Recorders are not required for the Operability of the monitor, providing the inoperable recorder does not cause the monitor to become inoperable (i.e., feedback signal). As long as the monitor has indication, alarm capability (if applicable), proper response (based upon surveillance requirements) and isolation function (if applicable), the loss of the recorder does not render the monitor inoperable.

(1) 2(3)RT-7818 is not equipped to monitor process flow. If another means of continuously monitoring process flow is not available, then comply with ACTION 36.

(2) 2/3RT-7808 is not equipped to monitor process flow. If 2RT-7865 and 3RT-7865 are not available to continuously monitor plant vent stack flow, then comply with ACTION 36.

(3) Due to unequal mixing in the Plant Vent Stack, both 2RT-7865 and 3RT-7865 are required to be operable when 2/3RT-7808 is inoperable.

ACTION 35 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank(s) may be released to the environment provided that prior to initiating the release:

a. At least two independent samples of the tank's contents are analyzed, and

b. At least two technically qualified members of the Facility Staff independently verify the release rate calculations and discharge valve lineup;

Otherwise, suspend releases of radioactive effluents via this pathway.

ACTION 36 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 8 hours. System design characteristics may be used to estimate flow.

ACTION 37 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for gross activity within 24 hours.

ACTION 38 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, immediately suspend PURGING of radioactive effluents via this pathway.

TABLE 4-3 (Continued)

TABLE NOTATION

D

ACTION 40 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the effected pathway may continue provided samples are continuously collected with auxiliary sampling equipment as required in Table 2-1.

TABLE 4-4

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT***	CHANNEL CHECK	SOURCE CHECK	CHANNELS CALIBRATION	CHANNEL FUNCTIONAL TEST	MODE FOR WHICH SURVEILLANCE IS REQUIRED
1. WASTE GAS HOLDUP SYSTEM					
a. Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release - 2/3 RT-7808, 3RT-7865-1	P	P	R(3)	Q(1)	*
b. Process Flow Rate Monitoring Device	P	N.A	R	Q	*
2. CONDENSER EVACUATION SYSTEM					
a. Noble Gas Activity Monitor - 2(3)RT-7818, 2(3)RT-7870-1	D	M	R(3)	Q(2)	**
b. Iodine Sampler	W	N.A	N.A	N.A	**
c. Particulate Sampler	W	N.A	N.A	N.A	**
d. Associated Sample Flow Measuring Device	D	N.A	R	Q	**
e. Process Flow Rate Monitoring Device (2(3)RT-7870-1)	D	N.A	R	Q	**

TABLE 4-4 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS |R

INSTRUMENT***	CHANNEL CHECK	SOURCE CHECK	CHANNELS CALIBRATION	CHANNEL FUNCTIONAL TEST	MODE FOR WHICH SURVEILLANCE IS REQUIRED
3. PLANT VENT STACK					
a. Noble Gas Activity Monitor - 2/3 RT-7808, 2RT-7865-1, 3RT-7865-1	D	M	R(3)	Q(2)	*
b. Iodine Sampler	W	N.A	N.A	N.A	*
c. Particulate Sampler	W	N.A	N.A	N.A	*
d. Associated Sample Flow Measuring Device	D	N.A	R	Q	*
e. Process Flow Rate Monitoring Device	D	N.A	R	Q	*
4. CONTAINMENT PURGE SYSTEM					
a. Noble Gas Activity Monitor - Providing Alarm and Automatic Termination of Release - 2(3)RT-7828, 2(3)RT-7865-1	D	P(4)	R(3)	Q(1)	*
b. Iodine Sampler	W	N.A	N.A	N.A	*
c. Particulate Sampler	W	N.A	N.A	N.A	*
d. Process Flow Rate Monitoring Device	D	N.A	R	Q	*
e. Associated Sample Flow Measuring Device	D	N.A	R	Q	*

TABLE NOTATION

* At all times.

** Modes 1-4 with any main steam isolation valve and/or any main steam isolating bypass valve not fully closed.

*** Monitor Recorders are not required for the Operability of the monitor, providing the inoperable recorder does not cause the monitor to become inoperable (i.e., feedback signal). As long as the monitor has indication, alarm capability (if applicable), proper response (based upon surveillance requirements) and isolation function (if applicable), the loss of the recorder does not render the monitor inoperable.

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate verification of effluent path isolation closure and control room alarm annunciation if any of the following conditions exist:#

1. Instrument indicates measured levels above the alarm/trip setpoint.
2. Circuit failure.
3. Instrument indicates a downscale failure.

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exist:#

1. Instrument indicates measured levels above the alarm setpoint.
2. Circuit failure.
3. Instrument indicates a downscale failure.

(3) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used. R

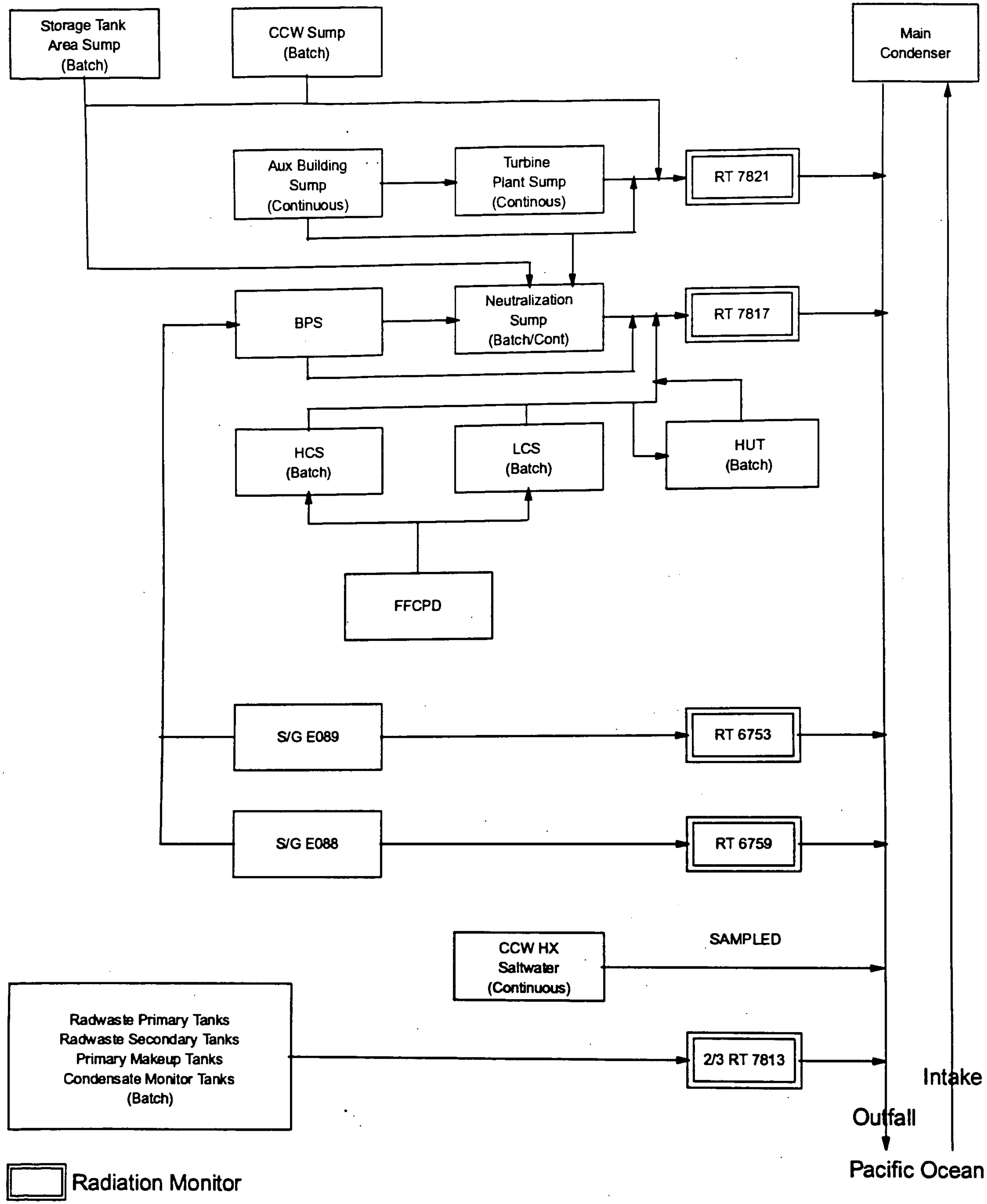
(4) Prior to each release and at least once per month.

#If the instrument controls are not set in the operate mode, procedures shall call for declaring the channel inoperable.

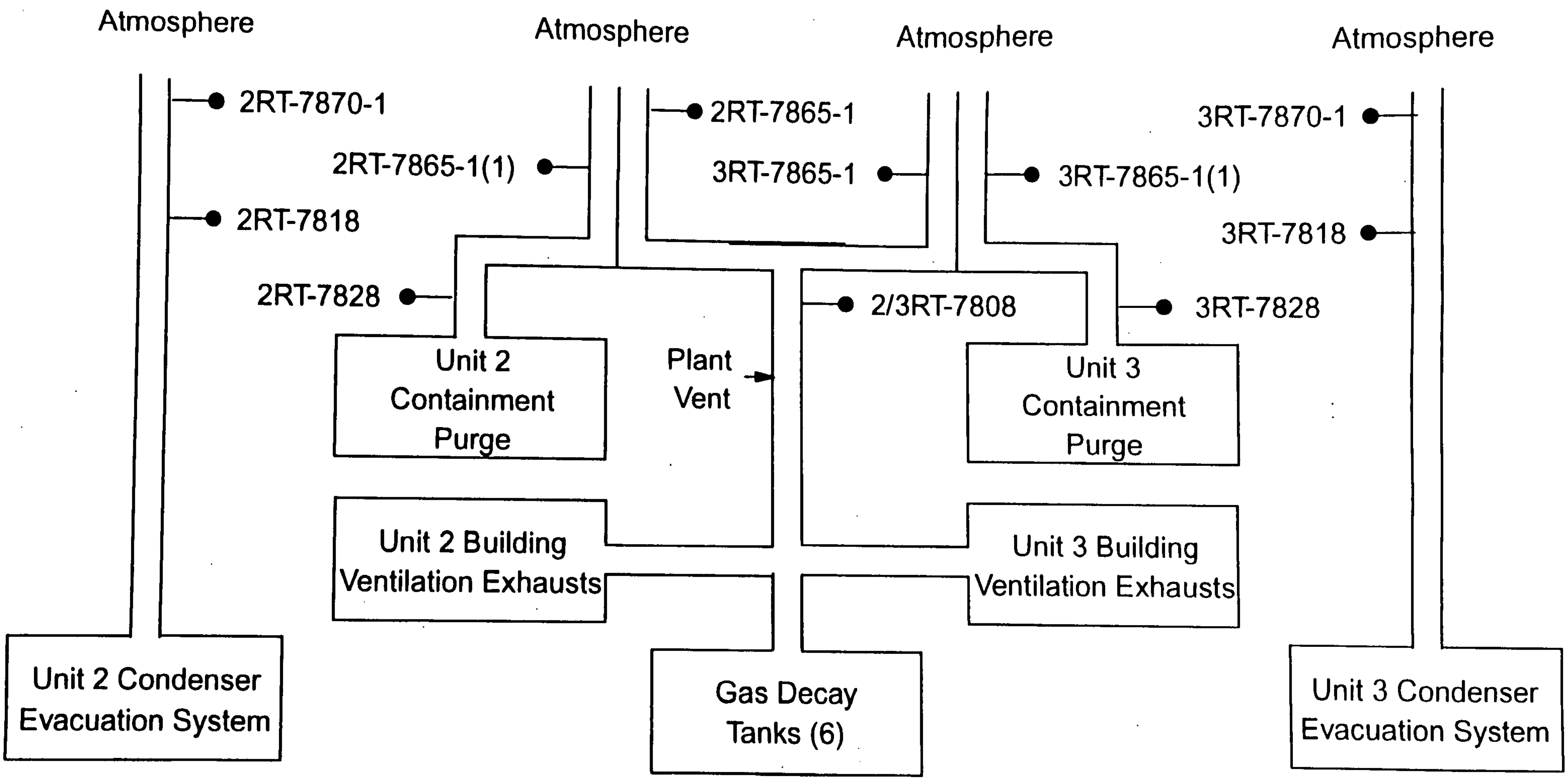
4.3 OPERABILITY OF RADIOACTIVE WASTE EQUIPMENT

The flow diagrams defining the treatment paths and the components of the radioactive liquid, gaseous and solid waste management systems are shown in Figures 4-5 thru 4-7.

FIGURE 4-5 SONGS 2 & 3 RADIOACTIVE LIQUID WASTE TREATMENT SYSTEMS



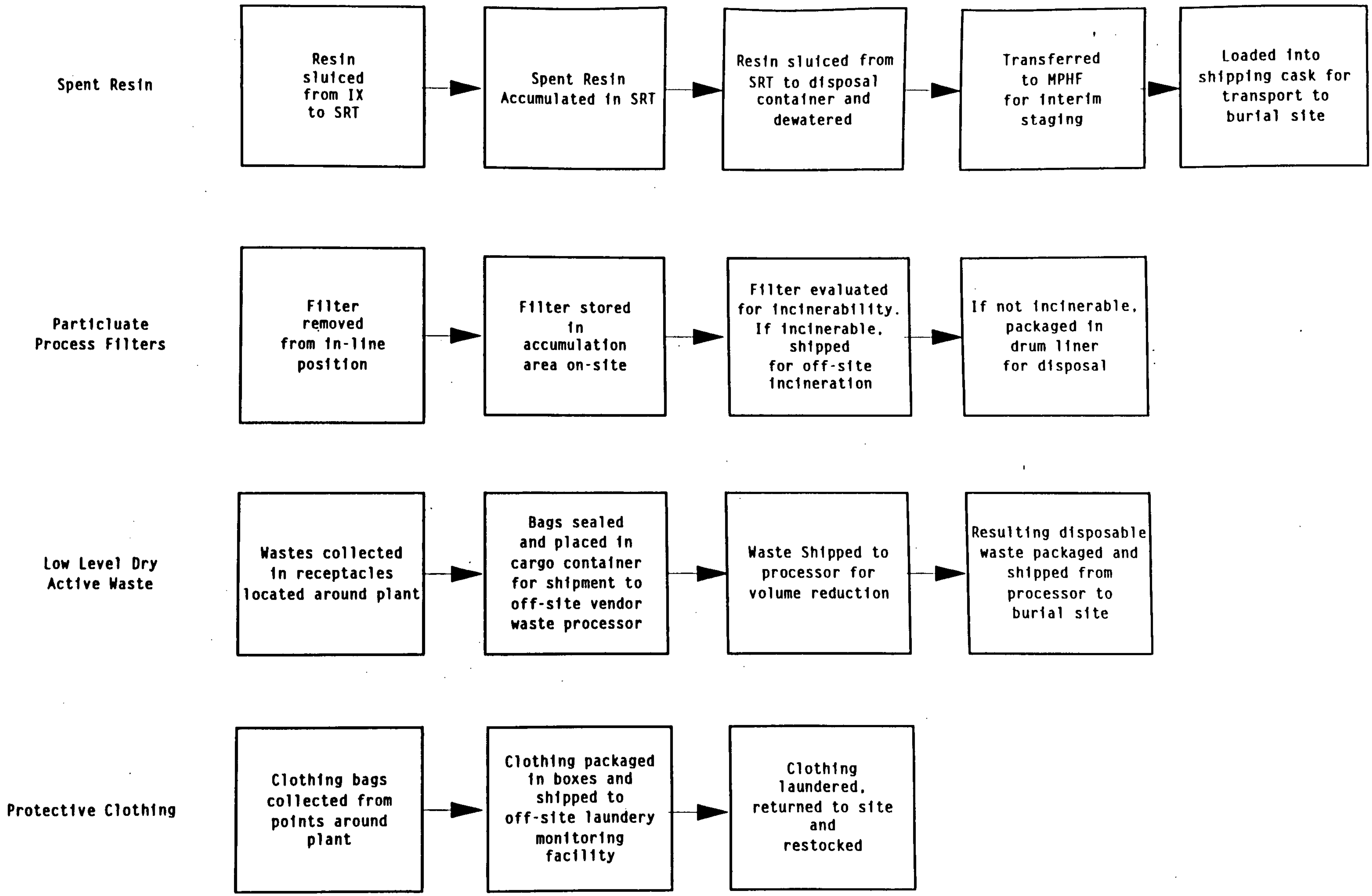
NOTE: Monitor pathways are unit specific unless indicated to be common to Units 2 and 3.



—● Radioactivity Monitor

(1) RT-7865 can be aligned to either containment purge or the plant vent stack

FIGURE 4-6 SONGS 2 & 3 RADIOACTIVE GASEOUS WASTE TREATMENT SYSTEMS



Legend
SRT: Spent Resin Tank
MPHF: Multi Purpose Handling Facility
IX: Ion Exchanger

SONGS 2/3 Solid Waste Handling
Figure 4-7

5.0 RADIOLOGICAL ENVIRONMENTAL MONITORING

5.1 Monitoring Program

SPECIFICATION

5.1.1 The radiological environmental monitoring program shall be conducted as specified in Table 5-1. The requirements are applicable at all times.

APPLICABILITY: At all times

ACTION:

a. Should the radiological environmental monitoring program not be conducted as specified in Table 5-1, in lieu of any other report required by Technical Specification(s) 6.9.1, prepare and submit to the Commission, in the Annual Radiological Operating Report (see Section 5.4), a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.

b. Should the level of radioactivity in an environmental sampling medium exceed the reporting levels of Table 5-2 when averaged over any calendar quarter, in lieu of any other report required by Technical Specification(s) 6.9.1, prepare and submit to the Commission, within 30 days from the end of the affected calendar quarter a Report pursuant to Technical Specification(s) 6.9.1.13. When more than one of the radionuclides in Table 5-2 are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{concentration (1)}}{\text{limit level (1)}} + \frac{\text{concentration (2)}}{\text{limit level (2)}} + \ldots \geq 1.0$$

c. When radionuclides other than those in Table 5-2 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose to an individual is equal to or greater than the calendar year limits of Specification(s) 1.2.1, 2.2.1 or 2.3.1, as appropriate. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report (see Section 5.4).

d. With fresh leafy vegetable samples or fleshy vegetable samples unavailable from one or more of the sample locations required by Table 5-1, in lieu of any other report required by Technical Specification 6.9.1, prepare and submit to the commission within 30 days, pursuant to Technical Specifications 6.9.2, a Special Report which identifies the cause of the unavailability of samples and identifies locations for obtaining replacement samples. The locations from which samples were unavailable may then be deleted from those required by Table 5-1, provided the locations from which the replacement samples were obtained are added to the environmental monitoring program as replacement locations.

5.0 **RADIOLOGICAL ENVIRONMENTAL MONITORING** (Continued)

SURVEILLANCE REQUIREMENTS

.1 The radiological environmental monitoring samples shall be collected pursuant to Table 5-1 from the locations given in Tables 5-4 and 5-5 and Figure 5-1 and shall be analyzed pursuant to the requirements of Tables 5-1 and 5-3.

TABLE 5-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Samples and Sample Locations[a]	Sampling and Collection Frequency[a]	Type and Frequency of Analyses
1. AIRBORNE Radioiodine and Particulates	Samples from at least 5 locations 3 samples from offsite locations (in different sectors) of the highest calculated annual average ground level D/Q. 1 sample from the vicinity of a community having the the highest calculated annual average ground-level D/Q. 1 sample from a control location 15-30 km (10-20 miles) distant and in the least prevalent wind direction[c]	Continuous operation of sampler with sample collection as required by dust loading, but at least once per 7 days.[d]	Radioiodine cartridge. Analyze at least once per 7 days for I-131. Particulate sampler. Analyze for gross beta radioactivity ≥ 24 hours following filter change. Perform gamma isotopic[b] analysis on each sample when gross beta activity is > 10 times the yearly mean of control samples. Perform gamma isotopic analysis on composite (by location) sample at least once per 92 days.
2. DIRECT RADIATION[e]	At least 30 locations including an inner ring of stations in the general area of the site boundary and an outer ring approximately in the 4 to 5 mile range from the site with a station in each sector of each ring. The balance of the stations is in special interest areas such as population centers, nearby residences, schools, and in 2 or 3 areas to serve as control stations.	At least once per 92 days.	Gamma dose. At least once per 92 days.

TABLE 5-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Samples and Sample Locations[a]	Sampling and Collection Frequency[a]	Type and Frequency of Analyses
3. WATERBORNE			
a. Ocean	4 locations	At least once per month and composited[f] quarterly	Gamma isotopic analysis of each monthly sample. Tritium analysis of composite sample at least once per 92 days.
b. Drinking	2 locations	Monthly at each location.	Gamma isotopic and tritium analyses of each sample.
c. Sediment	4 locations from Shoreline	At least once per 184 days.	Gamma isotopic analysis of each sample.
d. Ocean	5 locations Bottom Sediments	At least once per 184 days.	Gamma isotopic analysis of each sample.

TABLE 5-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Samples and Sample Locations[a]	Sampling and Collection Frequency[a]	Type and Frequency of Analyses
4. INGESTION			
a. Nonmigratory Marine Animals	3 locations	One sample in season, or at least once per 184 days if not seasonal. One sample of each of the following species: 1. Fish-2 adult species such as perch or sheephead. 2. Crustaceae-such as crab or lobster. 3. Mollusks-such as limpets, seahares or clams.	Gamma isotopic analysis on edible portions.
b. Local Crops	2 locations	Representative vegetables, normally 1 leafy and 1 fleshy collected at harvest time. At least 2 vegetables collected semiannually from each location.	Gamma isotopic analysis on edible portions semiannually and I-131 analysis for leafy crops.

TABLE 5-1 (Continued)

TABLE NOTATION

a. Sample locations are indicated on Figure 5-1.

b. Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

c. The purpose of this sample is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites which provide valid background data may be substituted.

d. Canisters for the collection of radioiodine in air are subject to channeling. These devices should be carefully checked before operation in the field or several should be mounted in series to prevent loss of iodine.

e. Regulatory Guide 4.13 provides minimum acceptable performance criteria for thermoluminescence dosimetry (TLD) systems used for environmental monitoring. One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purpose of this table, a thermoluminescent dosimeter may be considered to be one phosphor and two or more phosphors in a packet may be considered as two or more dosimeters. Film badges should not be used for measuring direct radiation.

f. Composite samples should be collected with equipment (or equivalent) which is capable of collecting an aliquot at time intervals which are very short (e.g., hourly) relative to the compositing period (e.g., monthly).

TABLE 5-2

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Reporting Levels

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m^3)	Marine Animals (pCi/Kg, wet)	Local Crops (pCi/Kg, wet)
H-3	2×10^4 (a)			
Mn-54	1×10^3		3×10^4	
Fe-59	4×10^2		1×10^4	
Co-58	1×10^3		3×10^4	
Co-60	3×10^2		1×10^4	
Zn-65	3×10^2		2×10^4	
Zr Nb-95	4×10^2			
I-131	2	0.9		1×10^2
Cs-134	30	10	1×10^3	1×10^3
Cs-137	50	20	2×10^3	2×10^3
Ba La-140	2×10^2			

(a) For drinking water samples. This is 40 CFR Part 141 value.

TABLE 5-3

MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION (LLD)[a,c]

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m^3)	Marine Animals (pCi/Kg, wet)	Local Crops (pCi/Kg, wet)	Sediment (pCi/Kg, dry)
gross beta	4	1×10^{-2}			
H-3	2000				
Mn-54	15		130		
Fe-59	30		260		
Co-58, 60	15		130		
Zn-65	30		260		
Zr-95	30				
Nb-95	15				
I-131	1[b]	7×10^{-2}		60	
Cs-134	15	5×10^{-2}	130	60	150
Cs-137	18	6×10^{-2}	150	80	180
Ba-140	60				
La-140	15				

TABLE NOTATION

a. The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\ s_b}{E \bullet V \bullet 2.22 \times 10^6 \bullet Y \bullet \exp(-\lambda\Delta t)}$$

where:

LLD is the "a priori" lower limit of detection as defined above (as microcurie per unit mass or volume),

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute),

E is the counting efficiency (as counts per transformation),

V is the sample size (in units of mass or volume),

2.22×10^6 is the number of transformations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

λ is the radioactive decay constant for the particular radionuclide, and

Δt is the elapsed time between midpoint of sample collection or end of the collection period and time of counting (for environmental samples, not plant effluents).

The value of s_b used in the calculation of the LLD for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background shall include the typical contributions of other radionuclides normally present in the samples (e.g., potassium-40 in milk samples). Typical values of E,V,Y and Δt shall be used in the calculations. | R

TABLE NOTATION

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of the measurement system and not as a posteriori (after the fact) limit for a particular measurement.*

b. LLD for drinking water.

c. Other peaks which are measurable and identifiable, together with the radionuclides in Table 5-3, shall be identified and reported.

---

*For a more complete discussion of the LLD, and other detection limits, see the following:

(1) HASL Procedures Manual, HASL-300 (revised annually).
(2) Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry" Anal. Chem. 40, 586-93 (1968).
(3) Hartwell, J. K., "Detection Limits for Radioisotopic Counting Techniques," Atlantic Richfield Hanford Company Report ARH-2537 (June 22, 1972).

5.0 **RADIOLOGICAL ENVIRONMENTAL MONITORING** (Continued)

5.2 LAND USE CENSUS

SPECIFICATION

5.2.1 A land use census shall be conducted and shall identify the location of the nearest milk animal, the nearest residence and the nearest garden* of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of five miles. For elevated releases as defined in Regulatory Guide 1.111, Revision 1, July 1977, the land use census shall also identify the locations of all milk animals and all gardens of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of three miles.

APPLICABILITY: At all times

ACTION:

a. With a land use census identifying a location(s) which yields a calculated dose or dose commitment greater than the values currently being calculated in Specification 2.3.1, in lieu of any other report required by Technical Specification 6.9.1, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report which identifies the new location(s).

b. With a land use census identifying a location(s) which yields a calculated dose or dose commitment via the same exposure pathway 20 percent greater than at a location from which samples are currently being obtained in accordance with Section 5.1, in lieu of any other report required by Technical Specification 6.9.1, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report which identifies the new location. The new location shall be added to the radiological environmental monitoring program within 30 days. The sampling location, excluding the control station location, having the lowest calculated does or dose commitment via the same exposure pathway may be deleted from this monitoring program after October 31 of the year in which this land use census was conducted.

SURVEILLANCE REQUIREMENTS

.1 The land use census shall be conducted at least once per 12 months between the dates of June 1 and October 1 using that information which will provide the best results, such as by a door-to-door survey, aerial survey, or by consulting local agriculture authorities.

*Broad leaf vegetation sampling may be performed at the site boundary in the direction sector with the highest D/Q in lieu of the garden census.

5.3 INTERLABORATORY COMPARISON PROGRAM

SPECIFICATION

5.3.1 Analyses shall be performed on radioactive materials supplied as part of an Interlaboratory Comparison Program which has been approved by the Commission.

APPLICABILITY: At all times

ACTION:

a. With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report.

SURVEILLANCE REQUIREMENTS

.1 A summary of the results obtained as part of the above required Interlaboratory Comparison Program and in accordance with Section 5.4.1 of this document shall be included in the Annual Radiological Environmental Operating Report (see Section 5.4).

5.4 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT*

5.4.1 The annual radiological environmental operating reports shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous environmental surveillance reports and an assessment of the observed impacts of the plant operation on the environment. The reports shall also include the results of land use censuses required by Section 5.2. If harmful effects or evidence of irreversible damage are detected by the monitoring, the report shall provide an analysis of the problem and a planned course of action to alleviate the problem.

The annual radiological environmental operating reports shall include summarized and tabulated results in the format of Regulatory Guide 4.8, December 1975 of all radiological environmental samples taken during the report period. In the event that some results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The reports shall also include the following: a summary description of the radiological environmental monitoring program; a map of all sampling locations keyed to a table giving distances and directions from the mid-point of reactor Units 2 and 3; and the results of licensee participation in the Interlaboratory Comparison Program, required by Section 5.3.

* A single submittal may be made for a multiple unit station, combining those sections that are common to all units at the station.

5.5 SAMPLE LOCATIONS

The Radiological Environmental Monitoring Sample Locations are identified in Figure 5-1. These sample locations are described in Tables 5-4 and 5-5 and indicate the distance in miles and the direction, determined from degrees true north, from the center of the Units 2 and 3 building complex. Table 5-6 gives the sector and direction designation for the Radiological Environmental Monitoring Sample Location on Map, Figure 5-1.

TABLE 5-4

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

	TYPE OF SAMPLE AND SAMPLING LOCATION***	DISTANCE* (miles)	DIRECTION*
Direct Radiation			
1	City of San Clemente (Former SDG&E Offices)	5.6	NW
2	Camp San Mateo (MCB, Camp Pendleton)	3.5	N
3	Camp San Onofre (MCB, Camp Pendleton)	2.6	NE
4	Camp Horno (MCB, Camp Pendleton)	4.5	E
5	**DELETED**		
6	Old Route 101 (East-Southeast)	3.0	ESE
7	**DELETED**		
8	Noncommissioned Officers' Beach Club	1.5	NW
9	**DELETED**		
10	Bluff (Adjacent to PIC #1)	0.7	WNW
11	Former Visitors' Center	0.3**	NW
12	South Edge of Switchyard	0.2**	E
13	Southeast Site boundary (Bluff)	0.4**	SE
14	Huntington Beach Generating Station	37.0	NW
15	Southeast Site Boundary (Office Building)	0.2**	SE
16	East Southeast Site Boundary	0.4**	ESE
17	Transit Dose	-	-
18	Transit Dose	-	-
19	San Clemente Highlands	5.0	NNW
20	**DELETED**		
21	**DELETED**		
22	Former U.S. Coast Guard Station - San Mateo Point	2.7	WNW
23	San Clemente General Hospital	8.2	NW
24	**DELETED**		

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

** Distances are within the Units 2 and 3 Site Boundary (0.4 mile in all sectors) and not required by Technical Specification.

*** MCB - Marine Corps Base   PIC - Pressurized Ion Chamber

TABLE 5-4

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

TYPE OF SAMPLE AND SAMPLING LOCATION***		DISTANCE* (miles)	DIRECTION*
Direct Radiation (Continued)			
25	**DELETED**		
26	**DELETED**		
27	**DELETED**		
28	**DELETED**		
29	**DELETED**		
30	**DELETED**		
31	Aurora Park-Mission Viejo	18.7	NNW
32	**DELETED**		
33	Camp Talega (MCB, Camp Pendleton)	5.7	N
34	San Onofre School (MCB, Camp Pendleton)	1.9	NW
35	Range 312 (MCB, Camp Pendleton)	4.7	NNE
36	Range 208C (MCB, Camp Pendleton)	4.2	NE
37	**DELETED**		
38	San Onofre State Beach Park	3.3	SE
39	**DELETED**		
40	SCE Training Center - Mesa (Adjacent to PIC #3)	0.7	NNW
41	Old Route 101 - East	0.4	E
42	**DELETED**		
43	**DELETED**		
44	Fallbrook Fire Station	18.0	E
45	**DELETED**		
46	San Onofre State Beach Park	1.0	SE
47	Camp Las Flores (MCB, Camp Pendleton)	8.6	SE
48	**DELETED**		

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

** Distances are within the Units 2 and 3 Site Boundary (0.4 mile in all sectors) and not required by Technical Specification.

*** MCB - Marine Corps Base PIC - Pressurized Ion Chamber

TABLE 5-4

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

TYPE OF SAMPLE AND SAMPLING LOCATION***		DISTANCE* (miles)	DIRECTION*
Direct Radiation (Continued)			
49	Camp Chappo (MCB, Camp Pendleton)	12.8	ESE
50	Oceanside Fire Station (CONTROL)	15.5	SE
51	**DELETED**		
52	**DELETED**		
53	San Diego County Operations Center	45.0	SE
54	Escondido Fire Station	32.0	ESE
55	San Onofre State Beach (Unit 1, West Southwest)	0.2**	WSW
56	San Onofre State Beach (Unit 1, Southwest)	0.1**	SW
57	San Onofre State Beach (Unit 2)	0.1**	SSW
58	San Onofre State Beach (Unit 3)	0.1**	S
59	SONGS Meteorological Tower	0.3**	WNW
60	Transit Control Storage Area	-	-
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)	0.5	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, Camp Pendleton)	4.3	ENE

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

** Distances are within the Units 2 and 3 Site Boundary (0.4 mile in all sectors) and not required by Technical Specification.

*** MCB - Marine Corps Base   PIC - Pressurized Ion Chamber

TABLE 5-4

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

TYPE OF SAMPLE AND SAMPLING LOCATION		DISTANCE* (miles)	DIRECTION*	
Airborne				
1	City of San Clemente (City Hall)	5.5	NW	
2	Camp San Onofre (Camp Pendleton)	1.8	NE	
3	Huntington Beach Generating Station (CONTROL)	37.0	NW	R
5	Units 2 and 3 Switchyard	0.13**	NNE	
6	**DELETED**			D
7	AWS Roof	0.18**	NW	A
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 Corps Base (Camp Pendleton East)	0.7	E	
Soil Samples				
1	Camp San Onofre	2.5	NE	
2	Old Route 101 - East Southeast	3.0	ESE	
3	Basilone Road/I-5 Freeway Offramp	2.0	NW	
4	Huntington Beach Generating Station (CONTROL)	37.0	NW	R
5	Former Visitor's Center	0.2**	NNW	
Ocean Water				
A	Station Discharge Outfall - Unit 1	0.5	SSW	
B	Outfall - Unit 2	0.7	SW	
C	Outfall - Unit 3	0.7	SW	
D	Newport Beach (CONTROL)	30.0	NW	R

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

** Distances are within the Units 2 and 3 Site boundary (0.4 mile in all sectors) and not required by Technical Specification.

TABLE 5-4

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

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

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

TABLE 5-4

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

TYPE OF SAMPLE AND SAMPLING LOCATION		DISTANCE* (miles)	DIRECTION*	
Non-Migratory Marine Animals				
A	Unit 1 Outfall	0.9	WSW	
B	Units 2 and 3 Outfall	1.7	SSW	
C	Laguna Beach (CONTROL)	18.2	NW	|R
Kelp				
A	San Onofre Kelp Bed	1.5	S	
B	San Mateo Kelp Bed	3.8	WNW	
C	Barn Kelp Bed	6.3	SSE	
D	Laguna Beach (CONTROL)	15.6	NW	|R
Ocean Bottom Sediments				
A	Unit 1 Outfall (0.5 mile West)	0.6	W	
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	|R

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

TABLE 5-5

PIC - RADIOLOGICAL ENVIRONMENTAL MONITORING LOCATIONS

PRESSURIZED ION CHAMBERS		Theta (Degrees)*	DISTANCE* Meters	DISTANCE* miles	DIRECTION/SECTOR*	
S1	San Onofre Beach	298°	1070	0.7	WNW	P
S2	SONGS Former Evap. Pnd	313°	890	0.6	NW	Q
S3	Japanese Mesa	340°	1150	0.7	NNW	R
S4	MCB - Camp Pendleton	3°	1120	0.7	N	A
S5	MCB - Camp Pendleton	19°	1050	0.6	NNE	B
S6	MCB - Camp Pendleton	46°	940	0.6	NE	C
S7	MCB - Camp Pendleton	70°	870	0.5	ENE	D
S8	MCB - Camp Pendleton	98°	1120	0.7	E	E
S9	San Onofre State Beach	121°	940	0.6	ESE	F

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

TABLE 5-6

SECTOR AND DIRECTION DESIGNATION FOR RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATION MAP

DEGREES TRUE NORTH FROM SONGS 2 AND 3 MID-POINT			NOMENCLATURE	
Sector Limit	Center Line	Sector Limit	22.5° 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	281.15	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

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