OFFSITE DOSE CALCULATION MANUAL

SAN ONOFRE NUCLEAR GENERATING STATION

UNITS 2&3

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ODCM

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INTRODUCTION

The OFFSITE DOSE CALCULATION MANUAL (ODCM) is a supporting document of the RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS (NUREG 0472). The ODCM describes the methodology and parameters to be used in the calculation of offsite doses due to radioactive liquid and gaseous effluents. It also calculates the liquid and gaseous effluent monitoring instrumentation alarm/trip setpoints. The ODCM contains a list of the sample locations for the radiological environmental monitoring program.

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

1.0 LIQUID EFFLUENTS

1.1 Liquid Effluent Monitor Setpoints (3.11.1.1)

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 3.11.1.1, the alarm/trip setpoints for liquid effluent monitors and flow measurement devices are set to assure that the following equation is satisfied:

$$\frac{cR}{F+R} \leq C \qquad (1\text{-}1)$$

where:

C = the effluent concentration limit implementing 10CFR20 for the site, in μCi/ml.

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

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

F = the dilution water flow in volume per unit time. The available dilution water flow (F) is constant.

= 207,500 gpm/pump (x number of circ pumps to be run)

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 in accordance with the Unit Technical Specifications.

1.1.1 Batch Release Setpoint Determination

The waste flow (R) and monitor setpoint (c) are set to meet the condition of equation (1-1) for a given effluent concentration, C. 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.

$$C = \Sigma_i C_{\gamma i} + C_\alpha + C_s + C_t + C_{Fe} \qquad (1\text{-}2)$$

Where:

C = The total concentration

$\Sigma_i C_{\gamma i}$ = The concentration for each radionuclide, i, in the gamma spectrum.

C_{Fe} = The Fe-55 concentration as determined in the previous quarterly composite sample.

C_α = The gross alpha concentration determined in the previous monthly composite sample.

C_s = The Sr-89 and Sr-90 concentrations as determined in the previous quarterly composite sample.

C_t = The H-3 concentration as determined in the previous monthly composite sample.

Step 2) The adjustment factor, A, for each batch tank (or sump) is determined using:

$$A = \sum_i \frac{C_{\gamma i}}{MPC_{\gamma i}} + \frac{C_s}{MPC_s} + \frac{C_t}{MPC_t} + \frac{C_\alpha}{MPC_\alpha} + \frac{C_{Fe}}{MPC_{Fe}} \quad (1\text{-}3)$$

$MPC_{\gamma i}$, MPC_s, MPC_t, MPC_{Fe}, $MPC\ \alpha$ = the limiting concentrations of the appropriate radionuclide from 10CFR20, Appendix B, Table II, Column 2. For dissolved or entrained noble gases, the concentration shall be limited to 2.0 E-4μCi/mℓ total activity.

Step 3) The radioactivity monitor setpoint may now be specified based on the values of $\sum_i C_{\gamma i}$, F, A 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 1-1 to correspond to the calculated monitor limit C_m.

2/3 RT - 7813

$$C_m \leq \frac{0.8\ F\ C_{eff}}{R_1\ A_1 + R_2\ A_2 + \ldots + R_n\ A_n} \quad (1\text{-}4)$$

Where:

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

$$= \frac{R_1 (\Sigma C_{\gamma i})_1 + R_2 (\Sigma C_{\gamma i})_2 + \ldots + R_n (\Sigma C_{\gamma i})_n}{R_1 + R_2 + \ldots + R_n} \quad (1\text{-}5)$$

$(\Sigma C_{\gamma i})_1$, $(\Sigma C_{\gamma i})_2$, etc. = The total gamma isotopic concentration of first tank, second tank, etc.

R_1, R_2, etc. = The 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 tanks 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)

A_1, A_2, etc. = Value of A from equation (1-3) for first tank, second tank, etc.

The 0.8 is an administrative value used to account for the potential activity for other releases. 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 10CFR20, 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 2/3 FI-7643), and recalculate C_m using the new F, R and equation (1-4).

If there is no release associated with this monitor, the monitor setpoint should be established as close to background as practical to prevent spurious alarms and yet assure an alarm should an inadvertant release occur.

2RT - 7817, 3RT - 7817

$$C_m < \frac{(0.5)\ (0.1)\ F \sum_i C_{\gamma i}}{RA} \qquad (1\text{-}6)$$

Where:

$\sum_i C_{\gamma i}$, A = The values of $\sum_i C_i$ and A (as defined in Steps 1) and 2) above) for the neutralization sump. R = 400 gpm/pump (x number of sump pumps to be run).

The 0.1 is an administrative value used to account for the potential activity from other releases. 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 10CFR20, Appendix B, Table II, Column 2 from the site. 0.5 is an administrative value used to account for simultaneous releases from both SONGS 2 and SONGS 3.

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NOTE: If $C_m < \sum_1 C_{\gamma i}$ then no release is possible. To increase C_m, 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 3772 and 3FI 3772), and recalculate C_m using the new F, R and equation (1-6). 19

If there is no release associated with this monitor, the monitor setpoint should be established as close to background as practical to prevent spurious alarms and yet assure an alarm should an inadvertant release occur.

1.1.2 Continuous Release Setpoint Determination

Step 1) The isotopic concentration for the continuous releases are obtained for each release stream (steam generator blowdown or turbine building sump) from the sum of the respective measured concentrations as determined by analysis:

$$C = \sum_1 C_{\gamma i} + C_\alpha + C_t + C_s + C_{Fe} \qquad (1\text{-}7)$$

where:

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

C_{α} = The total measured gross alpha concentration (μCi/cc) determined from the previous monthly composite analysis for the release stream.

C_{Fe} = The total Fe-55 concentration as determined in the previous quarterly composite sample for the release stream.

C_{t} = the total measured H-3 concentration (μCi/cc) determined from the previous monthly composite analysis for the release stream.

C_{s} = the total measured concentration (μCi/cc) of Sr-89 and Sr-90 as determined from the previous quarterly composite analysis for the release stream.

Step 2) The adjustment factor, B, for each release stream (steam generator blowdown or turbine building sump) is determined using:

$$B = \sum_i \frac{C_{\gamma i}}{MPC_i} + \frac{C_s}{MPC_s} + \frac{C_t}{MPC_t}\,\frac{C_\alpha}{MPC_\alpha} + \frac{C_{Fe}}{MPC_{Fe}} \qquad (1\text{-}8)$$

Step 3) The setpoint for each continuous release radioactivity monitor may now be specified based on the respective values of $\sum_i C_i$, F, B and R to provide compliance with the limits of 10CFR50, Appendix B, Table II, Column 2. The monitor setpoint (cpm) is taken from the applicable calibration constants given in Table 1-1 to correspond to the calculated monitor limit, C_m.

2RT - 7817, 3RT - 7817

$$C_m \leq \frac{(0.5)\,(0.1)\,F\sum_i C_{\gamma i}}{R\,B} \qquad (1\text{-}9)$$

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Where:

$\sum_i C_{\gamma i}$, B = values of $\sum_i C_{\gamma i}$ and B (as defined in Steps 1 and 2 above) for the steam generator blowdown.

R = 400 gpm

where R is the effluent flow rate at the radiation monitor as defined in Step 2.

The 0.1 is an administrative value to account for the potential activity in other release pathways. 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 10CFR20, Appendix B, Table II, Column 2 from the site. 0.5 is an administrative value used to account for simultaneous releases from both SONGS 2 and SONGS 3. 9

NOTE: $C_m < \sum_i C_i$ then no release is possible. To increase C_m, increase the 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-3772), and recalculate C_m using the new values of F, R and equation (1-9).

2RT - 7821, 3RT - 7821

$$C_m < \frac{(0.5)\ (0.1)\ F \sum_i C_{\gamma_i}}{RB} \qquad (1\text{-}10)$$

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Where:

$\sum_i C_{\gamma i}$, B = values of $\sum_i C_{\gamma i}$ and B (as defined in steps 1) and 2) above) for the turbine building sump

R = 50 gpm/pump (x no. sump pumps to be run)

The 0.1 is an administrative value to account for the potential activity in other release pathways. 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 10CFR20, Appendix B, Table II, Column 2 from the site. 0.5 is an administrative value used to account for simultaneous releases from both SONGS 2 and SONGS 3. 9

NOTE: If $C_m \leq \sum_i C_{\gamma i}$ then no release is possible. To increase C_m, increase the dilution flow F (by running more circulating water pumps) and recalculate C_m using the new value of F and equation (1-10).

Table 1-1

Liquid Effluent Radiation Monitor
Calibration Constants

Monitor	Co-60*	Ba-133*	Cs-137*
2/3RT-7813	2.08 E-9	3.14 E-9	4.59 E-9
2RT-7817	2.11 E-9	3.20 E-9	4.71 E-9
2RT-7821	2.08 E-9	3.17 E-9	4.61 E-9
3RT-7817	2.24 E-9	2.99 E-9	4.63 E-9
3RT-7821	2.15 E-9	3.30 E-9	4.72 E-9

*μCi/cc/cpm

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1.2 Dose Calculation for Liquid Effluents (3.11.1.2)

The dose commitment to an individual from radioactive materials in liquid effluents released to unrestricted areas are calculated for the purpose of implementing Specification 3.11.1.2 using the following expression.

$$D_\tau = \sum_i \left[A_{i\tau} \sum_l (\Delta t_l \, C_{il} \, F_l) \right] \qquad (1\text{-}9)$$

where:

$A_{i\tau}$ = the site related adult ingestion dose committment factor to the total body or an organ, τ, for each identified principal gamma and beta emitter, i, from Table 1-2 in mrem/hr per μCi/ml.

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

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

F_1 = the near field average dilution factor for C_{i1} during the time period, Δt_1. This factor is the ratio of the maximum undiluted liquid waste flow during time period, Δt_1, to the average flow from the site discharge structure to unrestricted receiving waters or

$$= \frac{\text{maximum liquid radioactive waste flow}}{\text{discharge structure exit flow}}$$

Δt_1 = the length of the 1^{th} time period over which C_{i1} and F_1 are averaged for all liquid releases, in hours.

TABLE 1-2

DOSE COMMITMENT FACTORS, A_{it}
(mrem/hr per μCi/ml)

Radio-Nuclid	Total Body	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI
H - 3	2.80 E-1		2.80 E-1	2.80 E-1	2.80 E-1	2.80 E-1	2.80 E-1
P - 32	6.46 E+5	1.67 E+7	1.04 E+6				1.88 E+6
Cr - 51	5.60			3.30	1.20	7.40	1.40 E+3
Mn - 54	1.35 E+3		7.08 E+3		2.11 E+3		2.17 E+4
Fe - 55	8.24 E+3	5.12 E+4	3.53 E+4			1.97 E+4	2.03 E+4
Fe - 59	7.27 E+4	8.07 E+4	1.90 E+5			5.30 E+4	6.23 E+5
Co - 58	1.35 E+3		6.04 E+2				1.22 E+4
Co - 60	3.83 E+3		1.74 E+3				3.26 E+4
Zn - 65	2.32 E+5	1.61 E+5	5.13 E+5		3.43 E+5		3.23 E+5
Rb - 86	3.02 E+2		6.48 E+2				1.28 E+2
Sr - 89	1.43 E+2	4.99 E+3					8.00 E+2
Sr - 90	3.01 E+4	1.23 E+5					3.55 E+3
Y - 91	2.38	8.90 E+1					4.90 E+4
Zr - 95	3.47	1.60 E+1	5.12		8.03		1.62 E+4
Zr - 97	8.14 E-2	8.80 E-1	1.80 E+1		2.70 E-1		5.51 E+4
Nb - 95	1.34 E+2	4.48 E+2	2.49 E+2		2.46 E+2		1.51 E+6
Mo - 99	2.44 E+1		1.28 E+2		2.90 E+2		2.97 E+2
Ru - 103	4.61 E+1	1.07 E+2			4.08 E+2		1.25 E+4
Ru - 106	2.01 E+2	1.59 E+3			3.07 E+3		1.03 E+5
Ag - 110m	8.61 E+2	1.57 E+3	1.45 E+3		2.85 E+3		5.91 E+5
Sb - 124	1.10 E+2	2.77 E+2	5.23	6.70 E-1			7.85 E+3
Sb - 125	4.42 E+1	2.20 E+2	2.37	2.00 E-1		2.30 E+4	1.94 E+3
Te - 125m	2.91 E+1	2.17 E+2	7.87 E+1	6.54 E+1	8.84 E+2		8.68 E+2
Te - 127m	6.69 E+1	5.49 E+2	1.96 E+2	1.40 E+2	2.23 E+3		1.84 E+3
Te - 129m	1.48 E+2	9.33 E+2	3.48 E+2	3.20 E+2	3.89 E+3		4.67 E+3
Te - 131m	5.72 E+1	1.40 E+2	6.88 E+1	1.09 E+2	6.95 E+2		6.81 E+3
Te - 132	1.24 E+2	2.40 E+2	1.32 E+2	1.46 E+2	1.27 E+3		6.25 E+3
I - 131	1.79 E+2	2.18 E+2	3.12 E+2	1.02 E+5	5.36 E+2		8.24 E+1
I - 133	3.95 E+1	7.46 E+1	1.30 E+2	1.91 E+4	2.26 E+2		1.17 E+2
Cs - 134	1.33 E+4	6.84 E+3	1.63 E+4		5.27 E+3	1.75 E+3	2.85 E+2
Cs - 136	2.04 E+3	7.16 E+2	2.83 E+3		1.57 E+3	2.16 E+2	3.21 E+2
Cs - 137	7.85 E+3	8.77 E+3	1.20 E+4		4.07 E+3	1.35 E+3	2.32 E+2
Ba - 140	1.08 E+2	1.65 E+3	2.07		7.00 E-1	1.18	3.39 E+3
La - 140	2.10 E-1	1.58	8.00 E-1				5.84 E+4
Ce - 141	2.60 E-1	3.43	2.32		1.08		8.86 E+3
Ce - 143	4.94 E-2	6.00 E-1	4.47 E-2		2.00 E-1		1.67 E+4
Ce - 144	9.59	1.99 E+2	7.47 E+1		4.43 E+1		6.04 E+4
Np - 239	1.92 E-3	3.53 E-2	3.47 E-3		1.08 E-2		7.13 E+2

1.3 Representative Sampling

Prior to sampling of a batch release, each batch shall be thoroughly mixed to assure representative sampling. The methodology for mixing and sampling is described in SO23 III - 5.4.23 Liquid Radwaste Sampling.

2.0 GASEOUS EFFLUENTS

2.1 Gaseous Effluent Monitor Setpoints (3.11.2.1)

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 in accordance with the Unit Technical Specifications.

2.1.1 Plant Stack - 2/3RT - 7808, 2RT-7865-1, 3RT-7865-1

For the purpose of implementation of Specification 3.11.2.1, the alarm setpoint level for noble gas monitors is based on the gaseous effluent flow rate and meteorological dispersion factor.

The concentration at the detector is determined by using:

$$C \leq (0.45)\ (2120)\ \frac{(MPC)}{(X/Q)\ (\text{flow rate})} \qquad (2\text{-}1)$$

where:

C = the instantaneous concentration at the detector in μCi/cc

MPC = the 10CFR Part 20 concentration for the limiting radionuclide present in sample analysis in μCi/cc (i.e., smallest MPC)

flow rate = the plant vent flow rate in cfm

= 83,000 cfm/fan (x no. of fans to be run)

(X/Q) = 2.4 E-5 sec/m^3 the annual average atmosphere dispersion

2120 = conversion of cfm to m^3/sec

0.45 is an administrative value used to account for potential activity from other gaseous release pathways

The alarm setting is determined by using the calibration constant for the applicable Plant Stack Airborne Monitor given in Table 2-1. The alarm setpoint is the cpm value corresponding to the concentration, C, which is conservatively assumed to be the isotope of greatest sensitivity for the monitor.

If there is no release associated with this monitor, the monitor setpoint should be established as close as practical to background to prevent spurious alarms and yet assure an alarm should inadvertant release occur.

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2.1.2 Condenser Evacuation System - 2RT - 7818, 2RT - 7870-1 9
3RT - 7818 or 3RT - 7870-1

For the purpose of implementation of Specification 3.11.2.1, the alarm setpoint level for noble gas monitors is based on the gaseous effluent flow rate and meteorological dispersion factor.

The concentration at the detector is determined by using:

$$C < (0.1)\ (0.5)\ (2120)\ \frac{MPC}{(X/Q)\ \ (\text{flow rate})} \qquad (2\text{-}2)$$ 9

where:

C = the instantaneous concentration at the detector in μCi/cc

MPC = the 10CFR Part 20 concentration for the limiting radionuclide present in sample analysis in μCi/cc (i.e., smallest MPC)

flow rate = the condenser evacuation system flow rate in cfm
= 1,000 cfm

(X/Q) = 2.4 E-5 sec/m^3 the annual average atmosphere dispersion

2120 = conversion of cfm to m^3/sec

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 simultaneous. 9

The alarm setting is determined by using the calibration constant for the corresponding Condenser Evacuation System Monitor given in Table 2-1. The alarm setpoint is the cpm value corresponding to the concentration, C, which is conservatively assumed to be the isotope of greatest sensitivity for the monitor.

If there is no release associated with this monitor, the monitor setpoint should be established as close as practical to background to prevent spurious alarms yet assure an alarm should an inadvertent release occur. 9

2.1.3 Containment Purge - 2RT - 7804-1, 3RT - 7804-1 9

For the purpose of implementation of Specification 3.11.2.1, the alarm setpoint level for noble gas monitors is based on the gaseous effluent flow rate and meteorological dispersion factor.

The concentration at the detector is determined by using:

$$C < (1.45)\,(0.5)\,(2120)\,\frac{(MPC)}{(X/Q)\,(\text{flow rate})} \qquad (2\text{-}3$$ 9

where:

C = the instantaneous concentration at the detector in μCi/cc

MPC = the 10CFR Part 20 concentration for the limiting radionuclide present in sample analysis in μCi/cc. (i.e., smallest MPC)

flow rate = the containment purge flow rate in cfm
= 40,000 cfm full purge
= 2,000 cfm mini purge

(X/Q) = 2.4 E-5 sec/m^3 the annual average atmosphere dispersion

2120 = conversion of cfm to m^3/sec

0.45 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 simultaneous releases from both SONGS 2 and SONGS 3. 9

The alarm setting is determined by using the calibration constant for the Containment Airborne Monitor given in Table 2-1. The alarm setpoint is the cpm value corresponding to the concentration, C, which is conservatively assumed to be the isotope of greatest sensitivity for the monitor.

If there is no release associated with this monitor, the monitor setpoint should be established as close as practical to background to prevent spurious alarms yet assure an alarm should an inadvertent release occur. 4

2.1.4 Waste Gas Header - 2/3 RT-7814, 2/3 RT-7808

For the purpose of Specification 3.11.2.1, the alarm setpoint level for noble gas monitors is based on the gaseous effluent flow rate and meteorological dispersion factor. Since the waste gas header discharges to the plant vent stack, either 2/3 RT-7814 or 2/3 RT-7808 may be used to monitor waste gas header releases.

2/3 RT-7808

When plant vent stack monitor 2/3 RT-7808 is being used to monitor waste gas header releases, the setpoint determined by equation (2-1) will provide automatic termination of release from the waste gas header.

Determine the maximum permissible waste gas header effluent flow rate corresponding to the vent stack monitor setpoint in accordance with the following:

$$f < \frac{(0.9)\ C\ F}{\sum_i C_{\gamma i}} \qquad (2\text{-}4)$$

Where:

f = waste gas header effluent flow rate

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

$\sum_{i} C_{\gamma i}$ = total gamma activity (µCi/cc) of the waste gas holdup tank to be released, as determined from the pre-release sample analysis.

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

2/3 RT-7814

$$C \leq (0.9)\ (0.45)\ (2120)\ \frac{MPC}{(\chi/Q)\ (\text{flow rate})} \qquad (2\text{-}5)$$

Where:

C = the instantaneous concentration at the detector in µCi/cc

MPC = the 10CFR20 concentration for the limiting radionuclide present in the sample analysis in µCi/cc (i.e., smallest MPC)

flow rate = the waste gas header flow rate in cfm

= 50 cfm

(X/Q) 2.4 E-5 sec/m^3, the annual average atmosphere dispersion

2120 = conversion of cfm to m^3/sec

The 0.45 is an administrative value to account for potential activity from other release pathways.

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

The alarm setting is determined by using the calibration constant for the Waste Gas Header Monitor given in Table 2-1. The alarm setpoint is the cpm value corresponding to the concentration, C, which is conservatively assumed to be the isotope of greatest sensitivity for the monitor.

NOTE: If $C < \sum_i C_i$ for the waste gas decay tank, then no release is possible. To increase C, decrease the waste gas effluent flow rate in accordance with:

$$(\text{flow rate}) < \frac{(0.9)\ (0.45)\ (2120)\ MPC}{\sum_i C_{\gamma i}\ (X/Q)} \qquad (2\text{-}6)$$

Where:

flow rate = the maximum permissible waste gas effluent flow rate in cfm

0.9, 0.45, 2120, MPC, X/Q are defined in equation (2-5)

$\sum C_{0i}$ = total gamma activity (μCi/cc) of the waste gas holdup tank to be released, as determined from the pre-released sample analysis.

Recalculate the monitor setpoint using the new flow rate and equation (2-5).

If there is no release associated with this monitor, the monitor setpoint should be established as close as practical to background to prevent spurious alarms and yet assure an alarm should an inadvertant release occur.

Table 2-1

Gaseous Effluent Radiation Monitor
Calibration Constants

Monitor	Kr-85*	Xe-133*	
2RT-7804-1C	2.78 E-8	3.90 E-8	
3RT-7804-1C	2.05 E-8	1.67 E-8	9
2/3RT-7808C	2.76 E-8	3.72 E-8	
2/3RT-7814A	3.21 E-8	4.49 E-8	
2/3RT-7814B	4.24 E-5	3.61 E-5	
2RT-7818A	3.06 E-8	5.30 E-8	
2RT-7818B	5.85 E-5	3.77 E-5	
3RT-7818A	3.14 E-8	4.56 E-8	9
3RT-7818B	3.00 E-5	2.83 E-5	
2RT-7865-1 (low)	1.41 E-8	3.02 E-8	
2RT-7865-1 (mid)		5.33 E-5	
2RT-7865-1 (high)		6.81 E-2	
3RT-7865-1 (low)	1.41 E-8	3.02 E-8	
3RT-7865-1 (mid)		8.02 E-5	
3RT-7865-1 (high)		2.39 E-2	
2RT-7870-1 (low)	1.41 E-8	3.02 E-8	
2RT-7870-1 (mid)		1.07 E-4	
2RT-7870-1 (high)		2.87 E-2	
3RT-7870-1 (low)	1.41 E-8	3.02 E-8	9
3RT-7870-1 (mid)		1.08 E-4	
3RT-7870-1 (high)		2.17 E-2	

*μCi/cc/cpm

2.2 Gaseous Effluents Dose Rate (3.11.2.1)

The methodology used for the purpose of implementation of Specification 3.11.2.1 for the dose rate above background to an individual in an unrestricted area is calculated by using the following expressions:

2.2.1 For noble gases:

$$D_{TB} = \sum_i K_i \overline{(\chi/Q)} \dot{Q}_i \qquad (2\text{-}7)$$

$$D_s = \sum_i [(L_i + 1.1M_i) \overline{(\chi/Q)} \dot{Q}_i] \qquad (2\text{-}8)$$

where:

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

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

M_i = the air dose factor due to gamma emissions for each identified noble gas radionuclide, in mrad/yr per $\mu Ci/m^3$ from Table 2-2. (Unit conversion constant of 1.1 mrem/mrad converts air dose to skin dose.)

$\dot{Q}_i$ = the release rate of radionuclide, i, in gaseous effluents in $\mu Ci/sec$

$\overline{(X/Q)}$ = 2.4 E-5 sec/m^3. The highest calculated annual average relative concentration for any area at or beyond the unrestricted area boundary

D_{TB} = total body dose rate in unrestricted areas due to radioactive materials released in gaseous effluents, in mrem/yr

D_S = skin dose rate in unrestricted areas due to radioactive materials released in gaseous effluents, in mrem/yr

2.2.2 For all radioiodines, radioactive materials in particulate form, and radionuclides other than noble gases with half lives greater than eight days:

$$D_O = \sum_i \left[\sum_k P_{ik} \overline{W}_k \right] \dot{Q}_i \qquad (2\text{-}9)$$

where:

D_o = organ dose rate in unrestricted areas due to radioactive materials released in gaseous effluents, in mrem/yr

$\dot{Q}_i$ = the release rate of radionuclide, i, in gaseous effluents in μCi/sec

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

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

= 2.3 E-5 sec/m^3 for the inhalation pathway. The location is the unrestricted area in the NNW sector.

= 1.5 E-7 m^{-2} for the food and ground plane pathways. The location is the unrestricted area in the ESE sector.

2.3 Gaseous Effluent Dose Calculation

2.3.1 Dose from Noble Gases in Gaseous Effluent (3.11.2.2)

The air dose in unrestricted areas due to noble gases released in gaseous effluents is calculated using the following expressions:

2.3.1.1 For historical methodology:

$$D_\gamma = 3.17 \times 10^{-8} \sum_i M_i \left(\overline{(X/Q)}\, Q_i\right) \qquad (2\text{-}10)$$

$$D_\beta = 3.17 \times 10^{-8} \sum_i N_i \left(\overline{(X/Q)}\, Q_i\right) \qquad (2\text{-}11)$$

where:

D_γ = the total projected gamma air dose from gaseous effluents, in mrad

D_β = the total projected beta air dose from gaseous effluents, in mrad

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

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

$\overline{(X/Q)}$ = 2.4 E-5 sec/m^3. The highest calculated annual average relative concentration for any area at or beyond the unrestricted area boundary.

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

2.3.1.2 For meteorology concurrent with release:

$$D_{\gamma\theta} = 1.14 \times 10^{-4} \sum_i M_i \left(\sum_j (\Delta t_j (X/Q)_{j\theta} \dot{Q}_{ij}) \right) \quad (2\text{-}12)$$

$$D_{\beta\theta} = 1.14 \times 10^{-4} \sum_i N_i \left(\sum_j (\Delta t_j (X/Q)_{j\theta} \dot{Q}_{ij}) \right) \quad (2\text{-}13)$$

where:

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

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

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

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

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

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

Q_{ij} = the average release rate of radionuclide, i, in gaseous effluents during time period, Δt_j, in μCi/sec

2.3.2 Dose from Radioiodines, Radioactive Material in Particulate Form, and Radionuclides other than Noble Gases in Gaseous Effluents. (3.11.2.3)

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

2.3.2.1 For historical meteorology:

$$D_o = 3.17 \times 10^{-8} \sum_i \left[\left(\sum_k R_{ik} W_k \right) Q_i \right] \qquad (2\text{-}14)$$

where:

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

Q_i = the amount of radioiodines, radioactive materials in particulate form and radionuclides other than noble gases with half lives greater than eight days, i, released in gaseous effluents in μCi

$\sum_k R_{ik}W_k$ = the sum of all pathways k for radionuclide, i, of the R_i, W product in mrem/yr per μCi/sec. The $\sum_k R_{ik}W_k$ value for each radionuclide, i, is given in Table 2-4. The given is the maximum $\sum_k R_{ik}W_k$ for all locations and is based on the most restrictive age groups.

R_{ik} = the dose factor for each identified radionuclide, i, for pathway k (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 μCi/sec) at the controlling location. The R_{ik}'s for each controlling location for each age group are given in Tables 2-5 thru 2-13.

W_k = the 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 are given in Tables 2-5 thru 2-13

= $\overline{(D/Q)}$ for the food and ground plane pathways in m^{-2}. The $\overline{(D/Q)}$ for each controlling location are given in Tables 2-5 thru 2-13.

2.3.2.2 For meteorology concurrent with releases.

$$D_\theta = 1.14 \times 10^{-4} \sum_i \left[\sum_j \Delta t_j \left(\sum_k R_{ik\theta} W_{jk\theta} \right) \dot{Q}_{ij} \right] \quad (2\text{-}15)$$

where:

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

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

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

$R_{ik\theta}$ = the 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 2-5 thru 2-13. The θ is determined by the concurrent meteorology.

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

= (X/Q) for the inhalation pathway in sec/m^3

= (D/Q) for the food and ground plane pathways in m^{-2}

TABLE 2-2

DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS

Radionuclide	Total Body Dose Factor K_i (mrem/yr per $\mu Ci/m^3$)	Skin Dose Factor L_i (mrem/yr per $\mu Ci/m^3$)	Gamma Air Dose Factor M_i (mrad/yr per $\mu Ci/m^3$)	Beta Air Dose Factor N_i (mrad/yr per $\mu Ci/m^3$)
Kr- 83m	7.56 E-2*		1.93 E+1	2.88E+2
Kr- 85m	1.17 E+3	1.46 E+3	1.23 E+3	1.97 E+3
Kr- 85	1.61 E+1	1.34 E+3	1.72 E+1	1.95 E+3
Kr- 87	5.92 E+3	9.73 E+3	6.17 E+3	1.03 E+4
Kr- 88	1.47 E+4	2.37 E+3	1.52 E+4	2.93 E+3
Kr- 89	1.66 E+4	1.01 E+4	1.73 E+4	1.06 E+4
Kr- 90	1.56 E+4	7.29 E+3	1.63 E+4	7.83 E+3
Xe- 131m	9.15 E+1	4.76 E+2	1.56 E+2	1.11 E+3
Xe- 133m	2.51 E+2	9.94 E+2	3.27 E+2	1.48 E+3
Xe- 133	2.94 E+2	3.06 E+2	3.53 E+2	1.05 E+3
Xe- 135m	3.12 E+3	7.11 E+2	3.36 E+3	7.39 E+2
Xe- 135	1.81 E+3	1.86 E+3	1.92 E+3	2.46 E+3
Xe- 137	1.42 E+3	1.22 E+4	1.51 E+3	1.27 E+4
Xe- 138	8.83 E+3	4.13 E+3	9.21 E+3	4.75 E+3
Ar- 41	8.84 E+3	2.69 E+3	9.30 E+3	3.28 E+3

* $7.56 \times 10^{-2} = 7.56$ E-2

TABLE 2-3

DOSE PARAMETER P_{ik}

CHILD AGE GROUP

Radionuclide	Inhalation Pathway ($\frac{mrem/yr}{\mu Ci/m^3}$)	Radionuclide	Inhalation Pathway ($\frac{mrem/yr}{\mu Ci/m^3}$)
H - 3	1.1 E+3	Tc - 101	5.8 E+2
C - 14	3.6 E+4	Ru - 103	6.6 E+5
Na - 24	1.6 E+4	Ru - 105	1.0 E+5
P - 32	2.6 E+6	Ru - 106	1.4 E+7
Cr - 54	1.7 E+4	Ag - 110M	5.5 E+6
Mn - 54	1.6 E+6	Te - 125M	4.8 E+5
Mn - 56	1.2 E+5	Te - 127M	1.5 E+6
Fe - 55	1.1 E+5	Te - 127	5.6 E+4
Fe - 59	1.7 E+6	Te - 129M	1.8 E+6
Co - 58	1.1 E+6	Te - 129	2.5 E+4
Co - 60	7.1 E+1	Te - 131M	3.1 E+5
Ni - 63	8.2 E+5	Te - 131	2.1 E+3
Ni - 65	8.4 E+4	Te - 132	3.8 E+5
Cu - 64	3.7 E+4	I - 130	1.8 E+6
Zn - 65	1.0 E+6	I - 131	1.6 E+7
Zn - 69	1.0 E+4	I - 132	1.9 E+5
Br - 83	4.7 E+2	I - 133	3.8 E+6
Br - 84	5.5 E+2	I - 134	5.1 E+4
Br - 85	2.5 E+1	I - 135	7.9 E+5
Rb - 86	2.0 E+5	Cs - 134	1.0 E+6
Rb - 88	5.6 E+2	Cs - 136	1.7 E+5
Rb - 89	3.5 E+2	Cs - 137	9.1 E+5
Sr - 89	2.2 E+6	Cs - 138	8.4 E+2
Sr - 90	1.0 E+8	Ba - 139	5.8 E+4
Sr - 91	1.7 E+5	Ba - 140	1.7 E+6
Sr - 92	2.4 E+5	Ba - 141	2.9 E+3
Y - 90	2.7 E+5	Ba - 142	1.6 E+3
Y - 91M	2.8 E+3	La - 140	2.3 E+5
Y - 91	2.6 E+6	La - 142	7.6 E+4
Y - 92	2.4 E+5	Ce - 141	5.4 E+5
Y - 93	3.9 E+5	Ce - 143	1.3 E+5
Zr - 95	2.2 E+6	Ce - 144	1.2 E+7
Zr - 97	3.5 E+5	Pr - 143	4.3 E+5
Nb - 95	6.1 E+5	Pr - 144	1.6 E+3
Mo - 99	1.4 E+5	Nd - 147	3.3 E+5
Tc - 99M	4.8 E+3	W - 187	9.1 E+4
		Np - 239	6.4 E+4

TABLE 2-4

CONTROLLING LOCATION FACTORS

Radionuclide	$\sum_k R_{ik} W_k$ mrem/yr per µCi/sec	
H - 3	1.5	E-3
Cr- 51	1.5	E-1
Mn- 54	2.0	E+1
Fe- 59	1.1	E+1
Co- 58	8.9	
Co- 60	2.2	E+2
Zn- 65	3.1	E+1
Sr- 89	3.1	E+2
Sr- 90	1.3	E+4
Zr- 95	1.3	E+1
Sb-124	3.2	E+1
I -131	5.8	E+2
I -133	5.6	E+1
Cs-134	2.9	E+2
Cs-136	3.7	
Cs-137	3.0	E+2
Ba-140	3.1	
Ce-141	5.1	
Unidentified	1.2	E+4

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

TABLE 2-5
Dose Parameter R_i for WNW Sector

Pathway	San Onofre Beach		Distance	0.48 miles		
X/Q	1.1E-5		D/Q	2.5 E-8		
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation Pathway*	Food & Ground Pathway**	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H - 3	1.5 E+2	0	2.6 E+2	0	2.4 E+2	0	2.9 E+2	0
P - 32	4.6 E+5	0	5.9 E+5	0	4.3 E+5	0	3.0 E+5	0
Cr - 51	8.2 E+1	1.1 E+6	2.5 E+2	1.1 E+6	6.8 E+2	1.1 E+6	7.6 E+2	1.1 E+6
Mn - 54	5.8 E+3	3.2 E+8	9.8 E+3	3.2 E+8	1.5 E+4	3.2 E+8	1.8 E+4	3.2 E+8
Fe - 59	5.4 E+3	6.2 E+7	7.6 E+3	6.2 E+7	4.1 E+4	6.2 E+7	4.3 E+4	6.2 E+7
Co - 58	2.5 E+3	8.7 E+7	7.8 E+3	8.7 E+7	2.2 E+4	8.7 E+7	2.4 E+4	8.7 E+7
Co - 60	7.3 E+3	4.9 E+9	2.2 E+4	4.9 E+9	5.9 E+4	4.9 E+9	6.5 E+4	4.9 E+9
Zn - 65	1.4 E+4	1.7 E+8	2.6 E+4	1.7 E+8	3.1 E+4	1.7 E+8	2.4 E+4	1.7 E+8
Rb - 86	4.3 E+4	2.1 E+6	4.5 E+4	2.1 E+6	4.3 E+4	2.1 E+6	3.1 E+4	2.1 E+6
Sr - 89	9.1 E+4	4.9 E+3	1.4 E+5	4.9 E+3	9.9 E+4	4.9 E+3	6.9 E+4	4.9 E+3
Sr - 90	9.3 E+6	0	2.3 E+7	0	2.5 E+7	0	2.3 E+7	0
Y - 91	1.6 E+4	2.3 E+5	4.2 E+4	2.5 E+5	9.3 E+4	2.5 E+5	8.8 E+4	2.5 E+5
Zr - 95	5.0 E+3	5.7 E+7	1.4 E+4	5.7 E+7	3.4 E+4	5.7 E+7	3.4 E+4	5.7 E+7
Nb - 95	2.9 E+3	3.1 E+7	8.4 E+3	3.1 E+7	2.2 E+4	3.1 E+7	2.4 E+4	3.1 E+7
Ru - 103	3.7 E+3	2.5 E+7	1.0 E+4	2.5 E+7	2.5 E+4	2.5 E+7	2.5 E+4	2.5 E+7
Ru - 106	3.7 E+4	4.7 E+7	9.8 E+4	9.7 E+7	2.2 E+5	9.7 E+7	2.1 E+5	9.7 E+7
Ag - 110M	7.5 E+3	7.9 E+8	2.3 E+4	7.9 E+8	6.2 E+4	7.9 E+8	6.9 E+4	7.9 E+8
Cd - 113M	1.6 E+4	0	4.2 E+4	0	9.3 E+4	0	8.0 E+4	0
Sn - 123	6.7 E+4	0	1.1 E+5	0	7.6 E+4	0	7.2 E+4	0
Sn - 126	2.7 E+5	6.0 E+9	5.3 E+5	6.0 E+9	4.0 E+5	6.0 E+9	2.9 E+5	6.0 E+9
Sb - 124	1.3 E+4	1.4 E+8	3.7 E+4	1.4 E+8	9.1 E+4	1.4 E+8	9.3 E+4	1.4 E+8
Sb - 125	3.4 E+3	5.3 E+8	4.2 E+3	5.3 E+8	2.3 E+4	5.3 E+8	2.3 E+4	5.3 E+8
Te - 127M	8.6 E+3	2.1 E+4	1.5 E+4	2.1 E+4	1.5 E+4	2.1 E+4	1.0 E+4	2.1 E+4
Te - 129M	7.3 E+3	4.5 E+6	1.1 E+4	4.5 E+6	1.2 E+4	4.5 E+6	8.3 E+3	4.5 E+6
Cs - 134	1.6 E+5	1.6 E+4	2.3 E+5	1.6 E+9	2.6 E+5	1.6 E+9	1.9 E+5	1.6 E+9
Cs - 136	3.1 E+4	3.4 E+7	3.4 E+4	3.4 E+7	4.4 E+4	3.4 E+7	3.3 E+4	3.4 E+7
Cs - 137	1.4 E+5	2.3 E+9	1.9 E+5	2.3 E+9	1.9 E+5	2.3 E+9	1.4 E+5	2.3 E+9
Ba - 140	1.3 E+4	4.7 E+6	1.7 E+4	4.7 E+6	5.2 E+4	4.7 E+6	5.0 E+4	4.7 E+6
Ce - 141	4.9 E+3	3.1 E+6	1.3 E+4	3.1 E+6	2.9 E+4	3.1 E+6	2.7 E+4	3.1 E+6
Ce - 144	3.4 E+4	1.6 E+7	8.9 E+4	1.0 E+7	2.0 E+5	1.6 E+7	1.9 E+5	1.6 E+7
I - 131	3.4 E+6	3.9 E+6	3.7 E+6	3.9 E+6	3.3 E+6	3.9 E+6	2.7 E+6	3.9 E+6
I - 133	8.1 E+5	5.6 E+5	8.8 E+5	5.6 E+5	6.7 E+5	5.6 E+5	4.9 E+5	5.6 E+5
I - 135	1.6 E+5	5.8 E+5	1.8 E+5	5.8 E+5	1.4 E+5	5.8 E+5	1.0 E+5	5.8 E+5
Unidentified	9.3 E+6	0	2.3 E+7	0	2.7 E+7	0	2.3 E+7	0

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-5
Dose Parameter R_i for WNW Sector

Pathway	Nearest Residence		Distance	2.8 miles			
X/Q	2.0E-7		D/Q	3.4E-10			
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
	*Pathway	**Pathway						
H - 3	6.5 E+2		5.1 E+3		3.9 E+3		3.6 E+3	
P - 32	2.0 E+6	0	2.6 E+6	3.3 E+9	1.9 E+6	1.8 E+9	1.3 E+6	1.5 E+9
Cr - 51	3.6 E+2	4.7 E+6	1.1 E+3	1.1 E+7	3.0 E+3	1.5 E+7	3.3 E+3	1.6 E+7
Mn - 54	2.5 E+4	1.4 E+9	4.3 E+4	2.0 E+9	6.7 E+4	2.3 E+9	7.7 E+4	2.3 E+9
Fe - 59	2.4 E+4	2.7 E+8	3.3 E+4	9.0 E+8	1.8 E+5	1.2 E+9	1.9 E+5	1.2 E+9
Co - 58	1.1 E+4	3.8 E+8	3.4 E+4	7.5 E+8	9.5 E+4	9.7 E+8	1.1 E+5	9.9 E+8
Co - 60	3.2 E+4	2.2 E+10	9.6 E+4	2.4 E+10	2.6 E+5	2.5 E+10	2.8 E+5	2.5 E+10
Zn - 65	6.3 E+4	7.5 E+8	1.1 E+5	3.5 E+4	1.3 E+5	2.6 E+9	1.0 E+5	2.0 E+9
Rb - 86	1.9 E+5	9.0 E+6	2.0 E+5	4.7 E+8	1.9 E+5	2.9 E+8	1.4 E+5	2.3 E+8
Sr - 89	4.0 E+5	2.2 E+4	6.0 E+5	3.5 E+10	4.3 E+5	1.5 E+10	3.0 E+5	9.8 E+9
Sr - 90	4.1 E+7	0	1.0 E+8	1.4 E+12	1.1 E+8	8.3 E+11	9.9 E+7	6.7 E+11
Y - 91	7.0 E+4	1.1 E+6	1.8 E+5	2.4 E+9	4.1 E+5	3.1 E+9	3.8 E+5	2.8 E+9
Zr - 95	2.2 E+4	2.5 E+8	6.1 E+4	1.1 E+9	1.5 E+5	1.5 E+9	1.5 E+5	1.4 E+9
Nb - 95	1.3 E+4	1.4 E+8	3.7 E+4	4.3 E+8	9.7 E+4	5.9 E+8	1.0 E+5	6.1 E+8
Ru - 103	1.6 E+4	1.1 E+8	4.5 E+4	5.0 E+8	1.1 E+5	6.8 E+8	1.1 E+5	6.6 E+8
Ru - 106	1.6 E+5	4.2 E+8	4.3 E+5	1.2 E+10	9.6 E+5	1.5 E+10	9.1 E+5	1.3 E+10
Ag - 110M	3.3 E+4	3.5 E+9	1.0 E+5	6.6 E+9	2.7 E+5	7.1 E+9	3.0 E+5	9.8 E+9
Cd - 115M	7.0 E+4	0	1.8 E+5	2.0 E+9	4.1 E+5	2.6 E+9	3.8 E+5	2.3 E+9
Sn - 123	2.9 E+5	0	4.8 E+5	6.3 E+9	3.3 E+5	4.0 E+9	3.1 E+5	3.4 E+9
Sn - 126	1.2 E+6	2.6 E+10	2.3 E+6	3.0 E+10	1.7 E+6	3.6 E+10	1.3 E+6	3.3 E+10
Sb - 124	5.9 E+4	6.1 E+8	1.6 E+5	2.8 E+9	4.0 E+5	3.6 E+9	4.1 E+5	3.5 E+9
Sb - 125	1.5 E+4	2.3 E+9	4.0 E+4	3.5 E+9	9.9 E+4	3.9 E+9	1.0 E+5	3.8 E+9
Te - 127M	3.8 E+4	9.2 E+4	6.4 E+4	5.4 E+9	6.5 E+4	3.2 E+9	4.6 E+4	2.0 E+9
Te - 129M	3.2 E+4	2.0 E+7	5.0 E+4	2.9 E+9	5.2 E+4	1.8 E+9	3.7 E+4	1.2 E+9
Cs - 134	7.0 E+5	6.8 E+9	1.0 E+6	3.3 E+10	1.1 E+6	2.3 E+10	8.5 E+5	1.8 E+10
Cs - 136	1.3 E+5	1.5 E+8	1.7 E+5	3.8 E+8	1.9 E+5	3.2 E+8	1.5 E+5	3.2 E+8
Cs - 137	6.1 E+5	1.0 E+10	8.3 E+5	3.4 E+10	8.5 E+5	2.4 E+10	6.2 E+5	1.9 E+10
Ba - 140	5.6 E+4	2.1 E+7	7.4 E+4	3.0 E+8	2.3 E+5	2.3 E+8	2.2 E+5	2.9 E+8
Ce - 141	2.2 E+4	1.4 E+7	5.7 E+4	4.7 E+8	1.3 E+5	5.5 E+8	1.2 E+5	5.2 E+8
Ce - 144	1.5 E+5	7.0 E+7	3.9 E+5	1.0 E+10	8.1 E+5	1.3 E+10	8.2 E+5	1.1 E+10
I - 131	1.7 E+7	1.7 E+7	1.6 E+7	4.8 E+10	1.5 E+7	3.1 E+10	1.2 E+7	3.8 E+10
I - 133	3.6 E+6	3.4 E+6	3.8 E+6	8.1 E+8	8.9 E+6	4.6 E+8	2.2 E+6	5.3 E+8
I - 135	7.0 E+5	2.5 E+6	7.9 E+5	1.2 E+7	6.2 E+5	8.2 E+6	4.5 E+5	1.1 E+6
Unidentified	4.1 E+7	0	1.0 E+8	1.4 E+12	1.1 E+8	8.3 E+11	9.9 E+7	6.7 E+11

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-5
Dose Parameter R_i for WNW Sector

Pathway	Milk Pathway		Distance		4.5 miles			
X/Q	6.1E-8		D/Q		1.2 E-10			
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation *Pathway	Food & Ground **Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H - 3	0	2.4 E+3	0	1.6 E+3	0	9.9 E+2	0	7.6 E+20
P - 32	0	1.6 E+11	0	7.6 E+10	0	3.1 E+10	0	1.7 E+10
Cr - 51	0	4.2 E+6	0	4.8 E+6	0	7.5 E+6	0	6.4 E+6
Mn - 54	0	3.1 E+7	0	1.7 E+7	0	2.3 E+7	0	2.1 E+7
Fe - 59	0	3.4 E+8	0	1.7 E+8	0	2.5 E+8	0	2.0 E+8
Co - 58	0	5.0 E+7	0	5.9 E+7	0	9.1 E+7	0	7.9 E+7
Co - 60	0	1.7 E+8	0	1.9 E+8	0	2.9 E+8	0	2.4 E+8
Zn - 65	0	1.7 E+10	0	9.9 E+9	0	6.6 E+9	0	3.9 E+9
Rb - 86	0	2.1 E+10	0	8.2 E+9	0	4.4 E+9	0	2.4 E+9
Sr - 89	0	1.1 E+10	0	5.6 E+9	0	2.3 E+9	0	1.2 E+9
Sr - 90	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10
Y - 91	0	4.4 E+6	0	4.4 E+6	0	5.4 E+6	0	4.0 E+6
Zr - 95	0	6.9 E+5	0	7.4 E+5	0	1.0 E+6	0	8.0 E+5
Nb - 95	0	1.8 E+8	0	2.0 E+8	0	2.9 E+8	0	2.4 E+8
Ru - 103	0	9.2 E+4	0	9.6 E+4	0	1.3 E+5	0	1.0 E+5
Ru - 106	0	1.2 E+6	0	1.2 E+6	0	1.4 E+6	0	1.1 E+6
Ag - 110M	0	1.2 E+10	0	1.6 E+10	0	2.1 E+10	0	1.8 E+10
Cd - 115M	0	5.7 E+7	0	5.1 E+7	0	6.4 E+7	0	4.6 E+7
Sn - 123	0	3.7 E+9	0	2.0 E+9	0	1.2 E+9	0	8.8 E+8
Sn - 126	0	8.9 E+9	0	5.4 E+9	0	2.3 E+9	0	1.3 E+9
Sb - 124	0	5.4 E+8	0	5.7 E+8	0	7.8 E+8	0	6.1 E+8
Sb - 125	0	1.6 E+8	0	1.6 E+8	0	2.2 E+8	0	1.8 E+8
Te - 127M	0	1.0 E+9	0	5.8 E+8	0	3.3 E+8	0	1.8 E+8
Te - 129M	0	1.3 E+9	0	7.5 E+8	0	4.3 E+8	0	2.1 E+8
Cs - 134	0	5.4 E+10	0	2.9 E+10	0	1.8 E+10	0	1.1 E+10
Cs - 136	0	5.5 E+9	0	2.6 E+9	0	1.7 E+9	0	9.9 E+8
Cs - 137	0	4.9 E+10	0	2.5 E+10	0	1.4 E+10	0	8.1 E+9
Ba - 140	0	2.3 E+8	0	1.1 E+8	0	7.2 E+7	0	5.3 E+7
Ce - 141	0	1.2 E+7	0	1.2 E+7	0	1.5 E+7	0	1.1 E+7
Ce - 144	0	1.1 E+8	0	1.0 E+8	0	1.3 E+8	0	9.6 E+7
I - 131	0	1.0 E+10	0	4.3 E+11	0	2.2 E+11	0	1.4 E+11
I - 133	0	9.6 E+9	0	3.9 E+9	0	1.7 E+9	0	9.9 E+8
I - 135	0	2.0 E+7	0	8.5 E+6	0	3.7 E+6	0	2.2 E+6
Unidentified	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-6
Dose Parameter R_i for NW Sector

Pathway X/Q	Family Housing 7.1E-7		Distance D/Q	1.8 miles 2.2 E-9		
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation Pathway*	Food & Ground Pathway**	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H - 3	6.5 E+2	0	5.1 E+3	0	3.9 E+3	0	3.6 E+3	0
P - 32	2.0 E+6	0	2.6 E+6	3.3 E+7	1.9 E+6	1.8 E+4	1.3 E+6	1.5 E+9
Cr - 51	3.6 E+2	4.7 E+6	1.1 E+3	1.1 E+7	3.0 E+3	1.5 E+7	3.3 E+3	1.6 E+7
Mn - 54	2.5 E+4	1.4 E+9	4.3 E+4	2.6 E+9	6.7 E+4	2.3 E+9	7.7 E+4	2.3 E+9
Fe - 59	2.4 E+4	2.7 E+8	3.3 E+4	9.0 E+8	1.8 E+5	1.2 E+9	1.9 E+5	1.2 E+9
Co - 58	1.1 E+4	3.8 E+8	3.4 E+4	7.5 E+8	9.5 E+4	9.7 E+8	1.1 E+5	9.9 E+8
Co - 60	3.2 E+4	2.2 E+10	9.6 E+4	2.4 E+10	2.6 E+9	2.5 E+10	2.8 E+5	2.5 E+10
Zn - 65	6.3 E+4	7.5 E+8	1.1 E+5	3.5 E+4	1.3 E+8	2.6 E+9	1.0 E+5	2.0 E+9
Rb - 86	1.9 E+5	9.0 E+6	2.0 E+5	4.7 E+8	1.9 E+5	2.9 E+8	1.4 E+5	2.3 E+8
Sr - 89	4.0 E+5	2.2 E+4	6.0 E+5	3.5 E+10	4.3 E+5	1.5 E+10	3.0 E+5	9.8 E+9
Sr - 90	4.1 E+7	0	1.0 E+8	1.4 E+12	1.1 E+8	8.3 E+11	9.9 E+7	6.7 E+11
Y - 91	7.0 E+4	1.1 E+6	1.8 E+5	2.4 E+9	4.1 E+5	3.1 E+9	3.8 E+5	2.8 E+9
Zr - 95	2.2 E+4	2.5 E+8	6.1 E+4	1.1 E+9	1.5 E+5	1.5 E+9	1.5 E+5	1.4 E+9
Nb - 95	1.3 E+4	1.4 E+8	3.7 E+4	4.3 E+8	9.7 E+4	5.9 E+8	1.0 E+5	6.1 E+8
Ru - 103	1.6 E+4	1.1 E+8	4.5 E+4	5.0 E+8	1.1 E+5	6.8 E+8	1.1 E+5	6.6 E+8
Ru - 106	1.6 E+5	4.2 E+8	4.3 E+5	1.2 E+10	9.6 E+5	1.5 E+10	9.1 E+5	1.3 E+10
Ag - 110M	3.3 E+4	3.5 E+9	1.0 E+5	6.6 E+9	2.7 E+5	7.1 E+9	3.0 E+5	7.8 E+9
Cd - 115M	7.0 E+4	0	1.8 E+5	2.0 E+9	4.1 E+5	2.6 E+9	3.8 E+5	2.3 E+9
Sn - 123	2.9 E+5	0	4.8 E+5	6.3 E+9	3.3 E+5	4.0 E+9	3.1 E+5	3.4 E+9
Sn - 126	1.2 E+6	2.6 E+10	2.3 E+6	5.0 E+10	1.7 E+6	3.6 E+10	1.3 E+6	3.3 E+10
Sb - 124	5.9 E+4	6.0 E+8	1.6 E+5	2.8 E+9	4.0 E+5	3.6 E+9	4.1 E+5	3.5 E+9
Sb - 125	1.5 E+4	2.3 E+9	4.0 E+4	3.5 E+9	9.9 E+4	3.9 E+4	1.0 E+5	3.8 E+9
Te - 123M	3.8 E+4	9.2 E+4	6.4 E+4	5.4 E+9	6.5 E+4	3.2 E+4	4.6 E+4	2.0 E+9
Te - 129M	3.2 E+4	2.0 E+7	5.0 E+4	2.9 E+9	5.2 E+4	1.8 E+9	3.7 E+4	1.2 E+9
Cs - 134	7.0 E+5	6.1 E+9	1.0 E+6	3.3 E+10	1.1 E+6	2.3 E+10	8.5 E+5	1.8 E+10
Cs - 136	1.3 E+5	1.5 E+8	1.7 E+5	3.8 E+8	1.9 E+5	3.2 E+8	1.5 E+5	3.2 E+8
Cs - 137	6.1 E+5	1.0 E+10	8.3 E+5	3.4 E+10	8.5 E+5	2.4 E+10	6.2 E+5	1.9 E+10
Ba - 140	5.6 E+4	2.1 E+7	7.4 E+4	3.0 E+8	2.3 E+5	2.3 E+8	2.2 E+5	2.9 E+8
Ce - 141	2.2 E+4	1.4 E+7	5.9 E+4	4.7 E+8	1.3 E+5	5.5 E+8	1.2 E+5	5.2 E+8
Ce - 144	1.5 E+5	7.0 E+7	3.9 E+5	1.0 E+10	8.6 E+5	1.3 E+10	8.2 E+5	1.1 E+10
I - 131	1.7 E+7	1.7 E+7	1.6 E+7	4.8 E+10	1.5 E+7	3.1 E+10	1.2 E+7	3.8 E+10
I - 133	3.6 E+6	2.4 E+6	3.8 E+6	8.1 E+8	8.9 E+6	4.6 E+8	2.2 E+6	5.3 E+8
I - 135	7.0 E+5	2.5 E+6	7.9 E+5	1.2 E+7	6.2 E+5	8.2 E+6	4.5 E+5	1.1 E+6
Unidentified	4.1 E+7	0	1.0 E+8	1.4 E+12	1.1 E+8	8.3 E+11	9.9 E+7	6.7 E+11

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-6
Dose Parameter R_i for NW Sector

Pathway	Vegetable Garden				Distance	2.2 miles						
X/Q	4.6 E-7				D/Q	1.3 E-9						
	Infant				Child		Teen		Adult	
Radionuclide	Inhalation Pathway	Food & Ground Pathway			Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
	*Pathway	**Pathway								
H - 3	1.6 E+2	0					2.9 E+3		2.6 E+3	
P - 32	5.1 E+5	0		6.5 E+5	3.7 E+9	4.7 E+5	1.8 E+9	3.3 E+5	1.5 E+9
Cr - 51		1.2 E+6			7.3 E+6	7.5 E+2	1.1 E+7	8.3 E+2	1.7 E+7
Mn - 54	6.3 E+3	3.5 E+8		1.1 E+4	1.0 E+9	1.7 E+4	1.3 E+9	1.9 E+4	1.3 E+9
Fe - 59	5.9 E+3	6.8 E+7		8.4 E+3	2.0 E+8	4.5 E+4	1.0 E+9	4.7 E+4	1.0 E+9
Co - 58	2.8 E+3	9.5 E+7		8.6 E+3	4.6 E+8	2.4 E+4	6.8 E+8	2.7 E+4	7.0 E+8
Co - 60	8.0 E+3	5.4 E+9		2.4 E+4	7.5 E+9	6.5 E+4	8.6 E+9	7.1 E+4	8.5 E+9
Zn - 65	1.6 E+4	1.9 E+8		2.8 E+4	2.9 E+9	3.3 E+4	2.1 E+9	2.6 E+4	1.5 E+9
Rb - 86	4.8 E+4	2.3 E+6		5.0 E+4	4.6 E+8	4.8 E+4	1.8 E+8	3.4 E+4	2.2 E+8
Sr - 89	9.9 E+4	5.4 E+3		1.5 E+5	3.5 E+10	1.1 E+5	1.5 E+10	2.6 E+4	9.8 E+9
Sr - 90	1.0 E+7	0		2.5 E+7	1.4 E+12	2.7 E+7	8.3 E+11	2.5 E+7	6.7 E+11
Y - 91	1.8 E+4	2.7 E+5		4.6 E+4	2.4 E+9	1.0 E+5	3.1 E+9	9.6 E+4	2.8 E+9
Zr - 95	5.4 E+3	6.3 E+7		1.5 E+4	9.4 E+8	3.7 E+4	1.3 E+9	3.8 E+4	1.3 E+9
Nb - 95	3.2 E+3	3.4 E+7		9.2 E+3	3.3 E+8	2.4 E+4	4.8 E+8	2.6 E+4	5.1 E+8
Ru - 103	4.0 E+3	2.7 E+7		1.1 E+4	4.2 E+8	2.7 E+4	5.9 E+8	2.8 E+4	5.8 E+8
Ru - 106	4.1 E+4	1.1 E+8		1.1 E+5	1.2 E+10	2.4 E+5	1.5 E+10	2.3 E+5	1.3 E+10
Ag - 110M	8.3 E+3	8.7 E+8		2.5 E+4	4.0 E+9	6.8 E+4	5.2 E+9	7.6 E+4	5.2 E+9
Cd - 115M	1.8 E+4	0		4.6 E+4	2.0 E+9	1.0 E+5	2.6 E+9	9.6 E+4	2.3 E+9
Sn - 123	7.4 E+4	0		1.2 E+5	6.3 E+9	8.3 E+4	4.0 E+9	7.8 E+4	3.4 E+9
Sn - 126	2.9 E+5	6.5 E+9		5.8 E+5	3.0 E+10	4.4 E+5	1.7 E+10	3.2 E+5	1.3 E+10
Sb - 124	1.5 E+4	1.5 E+8		4.1 E+4	2.3 E+9	1.0 E+5	3.2 E+9	1.0 E+5	3.1 E+9
Sb - 125	3.7 E+3	5.8 E+8		1.0 E+4	1.8 E+9	2.5 E+4	2.2 E+9	2.5 E+4	2.1 E+9
Te - 127M	9.4 E+3	2.3 E+4		1.6 E+4	5.4 E+9	1.6 E+4	3.2 E+9	1.1 E+4	2.0 E+9
Te - 129M	7.9 E+3	4.9 E+6		1.3 E+4	2.9 E+9	1.3 E+4	1.8 E+9	9.1 E+3	1.2 E+9
Cs - 134	1.8 E+5	1.7 E+9		2.5 E+5	2.7 E+10	2.8 E+5	1.8 E+10	2.1 E+5	1.3 E+10
Cs - 136	3.4 E+4	3.8 E+7		4.3 E+4	2.6 E+8	4.8 E+4	2.1 E+8	3.7 E+4	2.1 E+8
Cs - 137	1.5 E+5	2.6 E+9		2.1 E+5	2.7 E+10	2.1 E+5	1.7 E+10	1.6 E+5	1.2 E+10
Ba - 140	1.4 E+4	5.1 E+6		1.9 E+4	2.8 E+8	5.7 E+4	2.2 E+8	5.5 E+4	2.7 E+8
Ce - 141	5.4 E+3	3.4 E+6		1.4 E+4	4.1 E+8	3.2 E+4	5.4 E+8	3.0 E+4	5.1 E+8
Ce - 144	3.7 E+4	1.2 E+7		9.7 E+4	1.0 E+10	2.2 E+5	1.3 E+10	2.0 E+5	1.1 E+10
I - 131	3.7 E+6	4.3 E+6		4.1 E+6	4.8 E+10	3.7 E+6	3.1 E+10	3.0 E+6	3.8 E+10
I - 133	8.9 E+5	9.1 E+5		8.6 E+5	8.1 E+8	7.3 E+5	4.6 E+8	5.4 E+5	5.3 E+8
I - 135		6.3 E+5			1.0 E+7	1.6 E+5	6.4 E+4	1.1 E+5	7.2 E+6
Unidentified	1.0 E+17	0		2.5 E+4	1.4 E+12	2.7 E+7	8.3 E+4	2.5 E+7	6.7 E+11

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-6
Dose Parameter R_i for NW Sector

Pathway	Meat (Cattle) Pathway		Distance	4.0 miles					
X/Q	1.4 E-7		D/Q	3.4 E-10					
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation Pathway	Food & Ground *Pathway	Inhalation Pathway	Food & Ground **Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H - 3	3.2 E+1	0	2.9 E+2	0	2.5 E+2	0	3.8 E+2	0
P - 32	1.0 E+5	0	1.3 E+5	7.3 E+9	9.4 E+4	3.9 E+9	6.6 E+4	4.6 E+9
Cr - 51	1.8 E+1	2.3 E+5	5.4 E+1	6.5 E+5	1.5 E+2	1.1 E+6	1.7 E+2	1.8 E+6
Mn - 54	1.3 E+3	6.9 E+7	2.1 E+3	7.6 E+7	3.3 E+3	8.1 E+7	3.9 E+3	9.2 E+7
Fe - 59	1.2 E+3	1.1 E+7	1.7 E+3	5.4 E+8	8.9 E+3	1.0 E+9	9.4 E+3	1.8 E+9
Co - 58	5.6 E+2	1.9 E+7	1.7 E+3	9.9 E+7	4.8 E+3	1.8 E+8	5.3 E+3	3.3 E+8
Co - 60	1.6 E+3	1.1 E+9	4.8 E+3	1.4 E+9	1.3 E+4	1.7 E+9	1.4 E+4	2.2 E+9
Zn - 65	3.1 E+3	3.7 E+7	5.7 E+3	9.4 E+8	6.7 E+3	8.2 E+8	5.2 E+3	1.1 E+9
Rb - 86	9.5 E+3	4.5 E+5	9.9 E+3	5.4 E+8	9.5 E+3	3.8 E+8	6.8 E+3	4.6 E+8
Sr - 89	2.0 E+4	1.1 E+3	3.0 E+3	4.1 E+8	2.2 E+4	2.2 E+8	1.5 E+4	2.6 E+8
Sr - 90	2.0 E+6	0	5.1 E+6	8.6 E+4	5.4 E+6	6.7 E+9	5.0 E+6	1.0 E+10
Y - 91	3.5 E+3	5.4 E+4	9.2 E+3	2.0 E+8	2.0 E+4	3.3 E+8	1.9 E+4	5.2 E+8
Zr - 95	1.1 E+3	1.3 E+7	3.1 E+3	5.5 E+8	7.4 E+3	9.3 E+8	7.5 E+3	1.6 E+9
Nb - 95	6.3 E+2	6.8 E+6	1.8 E+3	2.0 E+9	4.8 E+3	3.7 E+9	5.2 E+3	6.8 E+9
Ru - 103	8.0 E+2	5.4 E+6	2.2 E+3	3.5 E+9	5.4 E+3	6.2 E+9	5.5 E+3	1.1 E+10
Ru - 106	8.2 E+3	2.1 E+7	2.1 E+4	5.6 E+10	4.8 E+4	9.1 E+10	4.6 E+4	1.5 E+11
Ag - 110M	1.7 E+3	1.7 E+8	5.0 E+3	8.1 E+8	1.4 E+4	1.3 E+9	1.5 E+4	2.3 E+9
Cd - 115M	3.5 E+3	0	9.2 E+3	2.1 E+7	2.0 E+4	3.5 E+7	1.9 E+4	5.3 E+7
Sn - 123	1.5 E+4	0	2.4 E+4	7.1 E+9	1.7 E+4	5.7 E+9	1.6 E+4	4.1 E+9
Sn - 126	5.8 E+4	1.3 E+9	1.2 E+5	2.3 E+10	8.7 E+4	1.3 E+10	6.3 E+4	1.6 E+10
Sb - 124	3.0 E+3	3.0 E+7	8.2 E+3	1.8 E+8	8.0 E+4	3.0 E+8	2.0 E+4	5.1 E+8
Sb - 125	7.3 E+2	1.2 E+8	2.0 E+3	1.7 E+8	5.0 E+3	2.1 E+8	5.0 E+3	2.8 E+8
Te - 127M	1.9 E+3	4.6 E+3	3.2 E+3	5.0 E+9	3.3 E+3	3.7 E+9	2.3 E+3	4.4 E+9
Te - 129M	1.6 E+3	9.8 E+5	2.5 E+3	4.9 E+9	2.6 E+3	3.7 E+9	1.8 E+3	4.5 E+9
Cs - 134	3.5 E+4	3.4 E+8	5.1 E+4	1.5 E+9	5.6 E+4	1.3 E+9	4.2 E+4	1.6 E+9
Cs - 136	6.7 E+3	7.5 E+6	8.5 E+3	5.0 E+7	9.7 E+3	4.3 E+7	7.3 E+3	5.3 E+7
Cs - 137	3.1 E+4	5.1 E+8	4.1 E+4	1.6 E+9	4.2 E+4	1.3 E+9	3.1 E+4	1.5 E+9
Ba - 140	2.8 E+3	1.0 E+6	3.7 E+3	4.3 E+7	1.1 E+4	3.6 E+7	1.1 E+4	3.8 E+7
Ce - 141	1.1 E+3	6.8 E+5	2.8 E+3	1.3 E+7	6.3 E+3	2.1 E+7	6.0 E+3	3.3 E+7
Ce - 144	2.4 E+3	3.5 E+6	1.9 E+4	1.5 E+8	4.3 E+4	2.5 E+8	4.1 E+4	3.9 E+8
I - 131	7.4 E+5	8.6 E+5	8.1 E+5	5.4 E+9	2.3 E+5	3.6 E+9	6.0 E+5	5.0 E+9
I - 133	1.8 E+5	1.2 E+5	1.9 E+5	1.2 E+5	1.5 E+5	1.2 E+5	1.1 E+5	1.2 E+5
I - 135	3.5 E+4	1.3 E+5	4.0 E+4	1.3 E+5	3.1 E+4	1.3 E+5	2.2 E+4	1.3 E+5
Unidentified	2.0 E+6	0	5.1 E+6	8.6 E+9	5.6 E+6	6.7 E+9	5.0 E+6	1.0 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-6
Dose Parameter R_i for NW Sector

Pathway X/Q	Milk Pathway 8.5 E-8		Distance D/Q	4.5 miles 2.6 E-10					
	Infant		Child		Teen		Adult		
Radionuclide	Inhalation *Pathway	Food & Ground **Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	
H - 3	0	2.4 E+3	0	1.6 E+3	0	9.9 E+2	0	7.6 E+20	
P - 32	0	1.6 E+11	0	7.6 E+10	0	3.1 E+10	0	1.7 E+10	
Cr - 51	0	4.2 E+6	0	4.8 E+6	0	7.5 E+6	0	6.4 E+6	
Mn - 54	0	3.1 E+7	0	1.7 E+7	0	2.3 E+7	0	2.1 E+7	
Fe - 59	0	3.4 E+8	0	1.7 E+8	0	2.5 E+8	0	2.0 E+8	
Co - 58	0	5.0 E+7	0	5.9 E+7	0	9.1 E+7	0	7.9 E+7	
Co - 60	0	1.7 E+8	0	1.9 E+8	0	2.9 E+8	0	2.4 E+8	
Zn - 65	0	1.7 E+10	0	9.9 E+9	0	6.6 E+9	0	3.9 E+9	
Rb - 86	0	2.1 E+10	0	8.2 E+9	0	4.4 E+9	0	2.4 E+9	
Sr - 89	0	1.1 E+10	0	5.6 E+9	0	2.3 E+9	0	1.2 E+9	
Sr - 90	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10	
Y - 91	0	4.4 E+6	0	4.4 E+6	0	5.4 E+6	0	4.0 E+6	
Zr - 95	0	6.9 E+5	0	7.4 E+5	0	1.0 E+6	0	8.0 E+5	
Nb - 95	0	1.8 E+8	0	2.0 E+8	0	2.9 E+8	0	2.4 E+8	
Ru - 103	0	9.2 E+4	0	9.6 E+4	0	1.3 E+5	0	1.0 E+5	
Ru - 106	0	1.2 E+6	0	1.2 E+6	0	1.4 E+6	0	1.1 E+6	
Ag - 110M	0	1.2 E+10	0	1.6 E+10	0	2.1 E+10	0	1.3 E+10	
Cd - 115M	0	5.7 E+7	0	5.1 E+7	0	6.4 E+7	0	4.6 E+7	
Sn - 123	0	3.7 E+9	0	2.0 E+9	0	1.2 E+9	0	8.8 E+8	
Sn - 126	0	8.9 E+9	0	5.4 E+9	0	2.3 E+9	0	1.3 E+9	
Sb - 124	0	5.4 E+8	0	5.7 E+8	0	7.5 E+8	0	6.1 E+8	
Sb - 125	0	1.6 E+8	0	1.6 E+8	0	2.2 E+8	0	1.8 E+8	
Te - 127M	0	1.0 E+9	0	5.8 E+8	0	3.3 E+8	0	1.8 E+8	
Te - 129M	0	1.3 E+9	0	7.5 E+8	0	4.3 E+8	0	2.4 E+8	
Cs - 134	0	5.4 E+10	0	2.9 E+10	0	1.8 E+10	0	1.1 E+10	
Cs - 136	0	5.5 E+9	0	2.6 E+9	0	1.7 E+9	0	9.9 E+8	
Cs - 137	0	4.9 E+10	0	2.5 E+10	0	1.4 E+10	0	8.1 E+9	
Ba - 140	0	2.3 E+8	0	1.1 E+8	0	7.2 E+7	0	5.3 E+7	
Ce - 141	0	1.2 E+7	0	1.2 E+7	0	1.5 E+7	0	1.1 E+7	
Ce - 144	0	1.1 E+8	0	1.0 E+8	0	1.3 E+8	0	9.6 E+7	
I - 131	0	1.0 E+12	0	4.3 E+11	0	2.2 E+11	0	1.4 E+11	
I - 133	0	9.6 E+9	0	3.9 E+9	0	1.7 E+9	0	9.9 E+8	
I - 135	0	2.0 E+7	0	8.5 E+6	0	3.7 E+6	0	2.2 E+6	
Unidentified	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10	

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-7
Dose Parameter R_i for NNW Sector

Pathway X/Q	Mobile Homes 1.8 E-6		Distance D/Q	1.3 miles 8.8 E-9		
	Infant		Child	Teen		Adult
Radionuclide	Inhalation Pathway*	Food & Ground Pathway**	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H - 3	6.5 E+2	0	5.1 E+3	0	3.9 E+3	0	3.6 E+3	0
P - 32	2.0 E+6	0	2.6 E+6	3.9 E+9	1.9 E+6	1.8 E+9	1.3 E+6	1.5 E+9
Cr - 51	3.6 E+2	4.7 E+6	1.1 E+3	1.1 E+7	3.0 E+3	1.5 E+7	3.3 E+3	1.6 E+7
Mn - 54	2.5 E+4	1.4 E+9	4.3 E+4	2.0 E+9	6.7 E+4	2.3 E+9	7.7 E+4	2.3 E+9
Fe - 59	2.4 E+4	2.7 E+8	3.3 E+4	9.0 E+8	1.8 E+5	1.2 E+9	1.9 E+5	1.2 E+9
Co - 58	1.1 E+4	3.8 E+8	3.4 E+4	7.5 E+8	9.5 E+4	9.7 E+8	1.1 E+5	9.9 E+8
Co - 60	3.2 E+4	2.2 E+10	9.6 E+4	2.4 E+10	2.6 E+5	2.5 E+10	2.8 E+5	2.5 E+10
Zn - 65	6.3 E+4	7.5 E+8	1.1 E+5	3.5 E+4	1.3 E+5	2.6 E+9	1.0 E+5	2.0 E+9
Rb - 86	1.9 E+5	9.0 E+6	2.0 E+5	4.7 E+8	1.9 E+5	2.9 E+8	1.4 E+5	2.3 E+8
Sr - 89	4.0 E+5	2.2 E+4	6.0 E+5	3.5 E+10	4.3 E+5	1.5 E+10	3.0 E+5	9.8 E+9
Sr - 90	4.1 E+7	0	1.0 E+8	1.4 E+12	1.1 E+8	8.3 E+11	9.9 E+7	6.7 E+11
Y - 91	7.0 E+4	1.1 E+6	1.8 E+5	2.4 E+9	4.1 E+5	3.1 E+9	3.8 E+5	2.8 E+9
Zr - 95	2.2 E+4	2.5 E+8	6.1 E+4	1.1 E+9	1.5 E+5	1.5 E+9	1.5 E+5	1.4 E+9
Nb - 95	1.3 E+4	1.4 E+8	3.7 E+4	4.3 E+8	9.7 E+4	5.9 E+8	1.0 E+5	6.1 E+8
Ru - 103	1.6 E+4	1.1 E+8	4.5 E+4	5.0 E+8	1.1 E+5	6.8 E+8	1.1 E+5	6.6 E+8
Ru - 106	1.6 E+5	4.2 E+8	4.3 E+5	1.2 E+10	9.6 E+5	1.5 E+10	9.1 E+5	1.3 E+10
Ag - 110M	3.3 E+4	3.5 E+9	1.0 E+5	6.6 E+9	2.7 E+5	7.1 E+9	3.0 E+5	7.8 E+9
Cd - 115M	7.0 E+4	0	1.8 E+5	2.0 E+9	4.1 E+5	2.6 E+9	3.8 E+5	2.3 E+9
Sn - 123	2.9 E+5	0	4.8 E+5	6.3 E+9	3.3 E+5	4.0 E+9	3.1 E+5	3.4 E+9
Sn - 126	1.2 E+6	2.6 E+10	2.3 E+6	3.0 E+10	1.7 E+6	3.6 E+10	1.3 E+6	3.3 E+10
Sb - 124	5.9 E+4	4.0 E+8	1.6 E+5	2.8 E+9	4.0 E+5	3.6 E+9	4.1 E+5	3.5 E+9
Sb - 125	1.5 E+4	2.3 E+9	4.0 E+4	3.5 E+9	9.9 E+4	3.9 E+9	1.0 E+5	3.8 E+9
Te - 127M	3.8 E+4	9.2 E+4	6.4 E+4	5.4 E+9	6.5 E+4	3.2 E+9	4.6 E+4	2.0 E+9
Te - 129M	3.2 E+4	2.0 E+7	5.0 E+4	2.9 E+9	5.2 E+4	1.8 E+9	3.7 E+4	1.2 E+9
Cs - 134	**7.0 E+5**	**6.8 E+9**	**1.0 E+6**	**3.3 E+10**	**1.1 E+6**	**2.3 E+10**	**8.5 E+5**	**1.8 E+10**
Cs - 136	1.3 E+5	1.5 E+8	1.7 E+5	3.8 E+8	1.9 E+5	3.2 E+8	1.5 E+5	3.2 E+8
Cs - 137	6.1 E+5	1.0 E+10	8.3 E+5	3.4 E+10	8.5 E+5	2.4 E+10	6.2 E+5	1.9 E+10
Ba - 140	5.6 E+4	2.1 E+7	7.4 E+4	3.0 E+8	2.3 E+5	2.3 E+8	2.2 E+5	2.4 E+8
Ce - 141	2.2 E+4	1.4 E+7	5.7 E+4	4.7 E+8	1.3 E+5	5.5 E+8	1.2 E+5	5.2 E+8
Ce - 144	1.5 E+5	7.0 E+7	3.9 E+5	1.0 E+10	8.6 E+5	1.3 E+10	8.2 E+5	1.1 E+10
I - 131	1.7 E+7	1.7 E+7	1.6 E+7	4.2 E+10	1.5 E+7	3.1 E+10	1.2 E+7	3.8 E+10
I - 133	3.6 E+6	2.4 E+8	3.8 E+6	8.1 E+8	2.9 E+6	4.6 E+8	2.2 E+6	5.3 E+8
I - 135	7.0 E+5	2.5 E+8	7.9 E+5	1.2 E+9	6.2 E+5	8.2 E+8	4.5 E+5	1.1 E+9
Unidentified	4.1 E+7	0	1.0 E+8	1.4 E+12	1.1 E+8	8.3 E+11	9.9 E+7	6.7 E+11

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-7
Dose Parameter R_i for NNW Sector

Pathway	Vegetable Garden				Distance	2.2 miles						
X/Q	5.0 E-7				D/Q	1.9 E-9						
	Infant				Child				Teen			
Radionuclide	Inhalation Pathway		Food & Ground Pathway		Inhalation Pathway		Food & Ground Pathway		Inhalation Pathway		Food & Ground Pathway	
	*Pathway		**Pathway									
H - 3	1.6	E+2	0						2.9	E+3		
P - 32	5.1	E+5	0		6.5	E+5	3.7	E+9	4.7	E+5	1.8	E+9
Cr - 51			1.2	E+6			7.3	E+6	7.5	E+2	1.1	E+7
Mn - 54	6.3	E+3	3.5	E+8	1.1	E+4	1.0	E+9	1.7	E+4	1.3	E+9
Fe - 59	5.9	E+3	6.8	E+7	8.4	E+3	7.0	E+8	4.5	E+4	1.0	E+9
Co - 58	2.8	E+3	9.5	E+7	8.6	E+3	4.6	E+8	2.4	E+4	6.8	E+8
Co - 60	8.0	E+3	5.4	E+9	2.4	E+4	7.5	E+9	6.5	E+4	8.6	E+9
Zn - 65	1.6	E+4	1.9	E+8	2.8	E+4	2.9	E+9	3.3	E+4	2.1	E+9
Rb - 86	4.8	E+4	2.3	E+6	5.0	E+4	4.6	E+8	4.8	E+4	1.8	E+8
Sr - 89	9.9	E+4	5.4	E+3	1.5	E+5	3.5	E+10	1.1	E+5	1.5	E+10
Sr - 90	1.0	E+7	0		2.5	E+7	1.4	E+12	2.7	E+7	8.3	E+11
Y - 91	1.8	E+4	2.7	E+5	4.6	E+4	2.4	E+9	1.0	E+5	3.1	E+9
Zr - 95	5.4	E+3	6.3	E+7	1.5	E+4	9.4	E+8	3.7	E+4	1.3	E+9
Nb - 95	3.2	E+3	3.4	E+7	9.2	E+3	3.3	E+8	2.4	E+4	4.8	E+8
Ru - 103	4.0	E+3	2.7	E+7	1.1	E+4	4.2	E+8	2.7	E+4	5.9	E+8
Ru - 106	4.1	E+4	1.1	E+8	1.1	E+5	1.2	E+10	2.4	E+5	1.5	E+10
Ag - 110M	8.3	E+3	8.7	E+8	2.5	E+4	4.0	E+9	6.8	E+4	5.2	E+9
Cd - 115M	1.8	E+4	0		4.6	E+4	2.0	E+9	1.0	E+5	2.6	E+9
Sn - 123	7.4	E+4	0		1.2	E+5	6.3	E+9	8.3	E+4	4.0	E+9
Sn - 126	2.9	E+5	6.5	E+9	5.8	E+5	3.0	E+10	4.4	E+5	1.7	E+10
Sb - 124	1.5	E+4	1.5	E+8	4.1	E+4	2.3	E+9	1.0	E+5	3.1	E+9
Sb - 125	3.7	E+3	5.8	E+8	1.0	E+4	1.8	E+9	2.5	E+4	2.2	E+9
Te - 127M	9.4	E+3	2.3	E+4	1.6	E+4	5.4	E+9	1.6	E+4	3.2	E+9
Te - 129M	7.9	E+3	4.9	E+6	1.3	E+4	2.9	E+9	1.3	E+4	1.8	E+9
Cs - 134	**1.8**	**E+5**	**1.7**	**E+9**	**2.5**	**E+5**	**2.7**	**E+10**	**2.8**	**E+5**	**1.8**	**E+10**
Cs - 136	3.4	E+4	3.8	E+7	4.3	E+4	2.6	E+8	4.8	E+4	2.1	E+8
Cs - 137	1.5	E+5	2.6	E+9	2.1	E+5	2.7	E+10	2.1	E+5	1.7	E+10
Ba - 140	1.4	E+4	5.1	E+6	1.9	E+4	2.8	E+8	5.2	E+4	2.2	E+8
Ce - 141	5.4	E+3	3.4	E+6	1.4	E+4	4.1	E+8	3.2	E+4	5.4	E+8
Ce - 144	3.7	E+4	1.7	E+7	9.7	E+4	1.0	E+10	2.2	E+5	1.3	E+10
I - 131	3.7	E+6	4.3	E+6	4.1	E+6	4.8	E+10	3.7	E+6	3.1	E+10
I - 133	8.9	E+5	8.1	E+5	9.5	E+5	8.1	E+8	7.3	E+5	4.6	E+8
I - 135			6.3	E+5			1.0	E+7	1.6	E+5	6.4	E+6
Unidentified	1.0	E+7	0		2.5	E+7	1.4	E+12	2.7	E+7	8.3	E+4

Adult			
Inhalation Pathway		Food & Ground Pathway	
2.6	E+3		
3.3	E+5	1.5	E+9
8.3	E+2	1.7	E+7
1.9	E+4	1.3	E+9
4.7	E+4	1.0	E+9
2.7	E+4	7.0	E+8
7.1	E+4	8.5	E+9
2.6	E+4	1.5	E+9
3.4	E+4	2.2	E+8
7.6	E+4	9.8	E+9
2.5	E+7	6.7	E+11
9.6	E+4	2.8	E+9
3.8	E+4	1.3	E+9
2.5	E+4	5.1	E+8
2.8	E+4	5.8	E+8
2.3	E+5	1.3	E+10
7.6	E+4	5.2	E+9
9.6	E+4	2.3	E+9
7.8	E+4	3.4	E+9
3.2	E+5	1.3	E+10
1.0	E+5	3.0	E+9
2.5	E+4	2.1	E+9
1.1	E+4	2.0	E+9
9.1	E+3	1.2	E+9
2.1	**E+5**	**1.3**	**E+10**
3.7	E+4	2.1	E+8
1.6	E+5	1.2	E+10
5.5	E+4	2.7	E+8
3.0	E+4	5.1	E+8
2.0	E+5	1.1	E+10
3.0	E+6	3.8	E+10
5.4	E+5	5.3	E+8
1.1	E+5	7.2	E+6
2.5	E+7	4.7	E+11

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-7
Dose Parameter R_i for NNW Sector

Pathway		Meat (Cattle) Pathway		Distance	4.5 miles		
X/Q		1.2 E-7		D/Q	3.7 E-10		
	Infant		Child		Teen		Adult
Radionuclide	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
	*Pathway	**Pathway						
H - 3	3.2 E+1	0	2.9 E+2	0	2.5 E+2	0	3.8 E+2	0
P - 32	1.0 E+5	0	1.3 E+5	7.3 E+9	9.4 E+4	3.4 E+9	6.6 E+4	4.6 E+9
Cr - 51	1.8 E+1	2.3 E+5	5.4 E+1	6.5 E+5	1.5 E+2	1.1 E+6	1.7 E+2	1.8 E+6
Mn - 54	1.3 E+3	6.9 E+7	2.1 E+3	7.6 E+7	3.3 E+3	8.1 E+7	3.9 E+3	9.2 E+7
Fe - 59	1.2 E+3	1.1 E+7	1.7 E+3	5.4 E+8	8.9 E+3	1.0 E+9	9.4 E+3	1.8 E+9
Co - 58	5.6 E+2	1.9 E+7	1.7 E+3	9.9 E+7	4.8 E+3	1.8 E+8	5.3 E+3	3.3 E+8
Co - 60	1.6 E+3	1.1 E+9	4.8 E+3	1.4 E+9	1.3 E+4	1.7 E+9	1.4 E+4	2.2 E+9
Zn - 65	3.1 E+3	3.7 E+7	5.7 E+3	9.4 E+8	6.7 E+3	8.2 E+8	5.2 E+3	1.1 E+9
Rb - 86	9.5 E+3	4.5 E+5	9.9 E+3	5.4 E+8	9.5 E+3	3.8 E+8	6.8 E+3	4.6 E+8
Sr - 89	2.0 E+4	1.1 E+3	3.0 E+3	4.1 E+8	2.2 E+4	2.2 E+8	1.5 E+4	2.6 E+8
Sr - 90	2.0 E+6	0	5.1 E+6	8.6 E+4	5.4 E+6	6.7 E+9	5.0 E+6	1.0 E+10
Y - 91	3.5 E+3	5.4 E+4	9.2 E+3	2.0 E+8	2.0 E+4	3.3 E+8	1.9 E+4	5.2 E+8
Zr - 95	1.1 E+3	1.3 E+7	3.1 E+3	5.5 E+8	7.4 E+3	9.3 E+8	7.5 E+3	1.6 E+9
Nb - 95	6.3 E+2	6.8 E+6	1.8 E+3	2.0 E+9	4.8 E+3	3.7 E+9	5.2 E+3	6.8 E+9
Ru - 103	8.0 E+2	5.4 E+6	2.2 E+3	3.5 E+9	5.4 E+3	6.2 E+9	5.5 E+3	1.1 E+10
Ru - 106	8.2 E+3	2.1 E+7	2.1 E+4	5.6 E+10	4.8 E+4	9.1 E+10	4.6 E+4	1.5 E+11
Ag - 110M	1.7 E+3	1.7 E+8	5.0 E+3	8.1 E+8	1.4 E+4	1.3 E+9	1.5 E+4	2.3 E+9
Cd - 115M	3.5 E+3	0	9.2 E+3	2.1 E+7	2.0 E+4	3.5 E+7	1.9 E+4	5.3 E+7
Sn - 123	1.5 E+4	0	2.4 E+4	7.1 E+9	1.7 E+4	5.7 E+9	1.6 E+4	4.1 E+9
Sn - 126	5.8 E+4	1.3 E+9	1.2 E+5	2.3 E+10	8.7 E+4	1.3 E+10	6.3 E+4	1.6 E+10
Sb - 124	3.0 E+3	3.0 E+7	8.2 E+3	1.8 E+8	2.0 E+4	3.0 E+8	2.0 E+4	5.0 E+8
Sb - 125	7.3 E+2	1.2 E+8	2.0 E+3	1.7 E+8	3.0 E+3	2.1 E+8	5.0 E+3	2.8 E+8
Te - 127M	1.9 E+3	4.6 E+3	3.2 E+3	5.0 E+9	5.3 E+3	3.7 E+9	2.3 E+3	4.4 E+9
Te - 129M	1.6 E+3	9.8 E+5	2.5 E+3	4.9 E+9	2.6 E+3	3.7 E+9	1.8 E+3	4.5 E+9
Cs - 134	3.5 E+4	3.4 E+8	5.1 E+4	1.5 E+9	5.6 E+4	1.3 E+9	4.2 E+4	1.6 E+9
Cs - 136	6.7 E+3	7.5 E+6	8.5 E+3	5.0 E+7	9.7 E+3	4.3 E+7	7.3 E+3	5.3 E+7
Cs - 137	3.1 E+4	5.1 E+8	4.1 E+4	1.6 E+9	4.2 E+4	1.3 E+9	3.1 E+4	1.5 E+9
Ba - 140	2.8 E+3	1.0 E+6	3.7 E+3	1.3 E+7	1.1 E+4	3.6 E+7	1.1 E+4	3.8 E+7
Ce - 141	1.1 E+3	6.8 E+5	2.8 E+3	1.3 E+7	6.3 E+3	2.1 E+7	6.0 E+3	3.3 E+7
Ce - 144	7.4 E+3	3.5 E+6	1.9 E+4	1.5 E+8	4.3 E+4	2.5 E+8	4.1 E+4	3.9 E+8
I - 131	7.4 E+5	8.6 E+5	8.1 E+5	5.4 E+9	7.3 E+5	3.6 E+9	6.0 E+5	5.0 E+9
I - 133	1.6 E+5	1.2 E+5	1.9 E+5	1.2 E+9	1.5 E+5	1.2 E+9	1.1 E+5	1.2 E+9
I - 135	3.5 E+4	1.3 E+6	4.0 E+4	1.3 E+6	3.1 E+4	1.3 E+6	2.2 E+4	1.3 E+6
Unidentified	2.0 E+6	0	5.1 E+6	8.6 E+9	5.6 E+6	6.7 E+9	5.0 E+6	1.0 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-7
Dose Parameter R_i for NNW Sector

Pathway X/Q	Milk Pathway 1.2 E-7			Distance D/Q	4.5 miles 3.7 E-10			
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H - 3		2.4 E+3	0	1.6 E+3	0	9.9 E+2	0	7.6 E+20
P - 32	0	1.6 E+11	0	7.6 E+10	0	3.1 E+10	0	1.7 E+10
Cr - 51	0	4.2 E+6	0	4.8 E+6	0	7.5 E+6	0	6.4 E+6
Mn - 54	0	3.1 E+7	0	1.7 E+7	0	2.3 E+7	0	2.1 E+7
Fe - 59	0	3.4 E+8	0	1.7 E+8	0	2.5 E+8	0	2.0 E+8
Co - 58	0	5.0 E+7	0	5.9 E+7	0	9.1 E+7	0	7.9 E+7
Co - 60	0	1.7 E+8	0	1.9 E+8	0	2.9 E+8	0	2.4 E+8
Zn - 65	0	1.7 E+10	0	9.9 E+9	0	6.6 E+9	0	3.9 E+9
Rb - 86	0	2.1 E+10	0	8.2 E+9	0	4.4 E+9	0	2.4 E+9
Sr - 89	0	1.1 E+10	0	5.6 E+9	0	2.3 E+9	0	1.2 E+9
Sr - 90	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10
Y - 91	0	4.4 E+6	0	4.4 E+6	0	5.4 E+6	0	4.0 E+6
Zr - 95	0	6.9 E+5	0	7.4 E+5	0	1.0 E+6	0	8.0 E+5
Nb - 95	0	1.8 E+8	0	2.0 E+8	0	2.9 E+8	0	2.4 E+8
Ru - 103	0	9.2 E+4	0	9.6 E+4	0	1.3 E+5	0	1.0 E+5
Ru - 106	0	1.2 E+6	0	1.2 E+6	0	1.4 E+6	0	1.1 E+6
Ag - 110M	0	1.2 E+10	0	1.6 E+10	0	2.1 E+10	0	1.8 E+10
Cd - 115M	0	5.7 E+7	0	5.1 E+7	0	6.4 E+7	0	4.6 E+7
Sn - 123	0	3.7 E+9	0	2.0 E+9	0	1.2 E+9	0	8.9 E+8
Sn - 126	0	5.3 E+9	0	5.4 E+9	0	2.3 E+9	0	1.3 E+9
Sb - 124	0	5.4 E+8	0	5.7 E+8	0	7.8 E+8	0	6.1 E+8
Sb - 125	0	1.5 E+8	0	1.6 E+8	0	2.2 E+8	0	1.8 E+8
Te - 127M	0	1.0 E+9	0	5.8 E+8	0	3.3 E+8	0	1.8 E+8
Te - 129M	0	1.3 E+9	0	7.5 E+8	0	4.3 E+8	0	2.4 E+8
Cs - 134	0	5.4 E+10	0	2.9 E+10	0	1.8 E+10	0	1.1 E+10
Cs - 136	0	5.5 E+9	0	2.6 E+9	0	1.7 E+9	0	9.9 E+8
Cs - 137	0	4.9 E+10	0	2.5 E+10	0	1.4 E+10	0	8.1 E+9
Ba - 140	0	2.3 E+8	0	1.1 E+8	0	7.2 E+7	0	5.3 E+7
Ce - 141	0	1.2 E+7	0	1.2 E+7	0	1.5 E+7	0	1.1 E+7
Ce - 144	0	1.1 E+8	0	1.0 E+8	0	1.3 E+8	0	9.6 E+7
I - 131	0	1.2 E+12	0	4.3 E+11	0	2.5 E+11	0	1.4 E+11
I - 133	0	9.5 E+9	0	3.9 E+9	0	1.7 E+9	0	9.9 E+8
I - 135	0	2.0 E+7	0	8.5 E+6	0	3.7 E+6	0	2.2 E+6
Unidentified	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-8
Dose Parameter R_i for N Sector

Pathway X/Q	Milk Pathway 7.0 E-8		Distance D/Q	4.5 miles 3.5 E-10				
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation *Pathway	Food & Ground **Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H - 3	0	2.4 E+3	0	1.6 E+3	0	9.9 E+2	0	7.6 E+20
P - 32	0	1.6 E+11	0	7.6 E+10	0	3.1 E+10	0	1.7 E+10
Cr - 51	0	4.2 E+6	0	4.8 E+6	0	7.5 E+6	0	6.4 E+6
Mn - 54	0	3.1 E+7	0	1.7 E+7	0	2.3 E+7	0	2.1 E+7
Fe - 59	0	3.4 E+8	0	1.7 E+8	0	2.5 E+8	0	2.0 E+8
Co - 58	0	5.0 E+7	0	5.9 E+7	0	9.1 E+7	0	7.9 E+7
Co - 60	0	1.7 E+8	0	1.9 E+8	0	2.9 E+8	0	2.4 E+8
Zn - 65	0	1.7 E+10	0	9.9 E+9	0	6.6 E+9	0	3.9 E+9
Rb - 86	0	2.1 E+10	0	8.2 E+9	0	4.4 E+9	0	2.4 E+9
Sr - 89	0	1.1 E+10	0	5.6 E+9	0	2.3 E+9	0	1.2 E+9
Sr - 90	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10
Y - 91	0	4.4 E+6	0	4.4 E+6	0	5.4 E+6	0	4.0 E+6
Zr - 95	0	6.9 E+5	0	7.4 E+5	0	1.0 E+6	0	8.0 E+5
Nb - 95	0	1.8 E+8	0	2.0 E+8	0	2.9 E+8	0	2.4 E+8
Ru - 103	0	9.2 E+4	0	9.6 E+4	0	1.3 E+5	0	1.0 E+5
Ru - 106	0	1.2 E+6	0	1.2 E+6	0	1.4 E+6	0	1.1 E+6
Ag - 110M	0	1.2 E+10	0	1.6 E+10	0	2.1 E+10	0	1.8 E+10
Cd - 115M	0	5.7 E+7	0	5.1 E+7	0	6.4 E+7	0	4.6 E+7
Sn - 123	0	3.7 E+9	0	2.0 E+9	0	1.2 E+9	0	8.8 E+8
Sn - 126	0	8.9 E+9	0	5.4 E+9	0	2.3 E+9	0	1.3 E+9
Sb - 124	0	5.4 E+8	0	5.7 E+8	0	7.8 E+8	0	6.1 E+8
Sb - 125	0	1.6 E+8	0	1.6 E+8	0	2.2 E+8	0	1.8 E+8
Te - 127M	0	1.0 E+9	0	5.8 E+8	0	3.3 E+8	0	1.6 E+8
Te - 129M	0	1.3 E+9	0	7.5 E+8	0	4.3 E+8	0	2.4 E+8
Cs - 134	0	5.4 E+10	0	2.9 E+10	0	1.8 E+10	0	1.1 E+10
Cs - 136	0	5.5 E+9	0	2.6 E+9	0	1.7 E+9	0	9.9 E+8
Cs - 137	0	4.9 E+10	0	2.5 E+10	0	1.4 E+10	0	8.1 E+9
Ba - 140	0	2.3 E+8	0	1.1 E+8	0	7.2 E+7	0	5.3 E+7
Ce - 141	0	1.2 E+7	0	1.2 E+7	0	1.5 E+7	0	1.1 E+7
Ce - 144	0	1.1 E+8	0	1.0 E+8	0	1.3 E+8	0	9.6 E+7
I - 131	0	1.0 E+12	0	4.3 E+11	0	2.2 E+11	0	1.- E+11
I - 133	0	9.5 E+9	0	3.9 E+9	0	1.7 E+9	0	9.8 E+8
I - 135	0	2.0 E+7	0	8.5 E+6	0	3.7 E+6	0	2.2 E+6
Unidentified	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-9
Dose Parameter R_i for NNE Sector

Pathway	Milk Pathway				Distance	4.5 miles		
X/Q	6.0 E-8				D/Q	3.2 E-10		
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
	*Pathway	**Pathway						
H - 3	0	2.4 E+3	0	1.6 E+3	0	9.9 E+2	0	7.6 E+20
P - 32	0	1.6 E+11	0	7.6 E+10	0	3.1 E+10	0	1.7 E+10
Cr - 51	0	4.2 E+6	0	4.8 E+6	0	7.5 E+6	0	6.4 E+6
Mn - 54	0	3.1 E+7	0	1.7 E+7	0	2.3 E+7	0	2.1 E+7
Fe - 59	0	3.4 E+8	0	1.7 E+8	0	2.5 E+8	0	2.0 E+8
Co - 58	0	5.0 E+7	0	5.9 E+7	0	9.1 E+7	0	7.9 E+7
Co - 60	0	1.7 E+8	0	1.9 E+8	0	2.9 E+8	0	2.4 E+8
Zn - 65	0	1.7 E+10	0	9.9 E+9	0	6.6 E+9	0	3.9 E+9
Rb - 86	0	2.1 E+10	0	8.2 E+9	0	4.4 E+9	0	2.4 E+9
Sr - 89	0	1.1 E+10	0	5.6 E+9	0	2.3 E+9	0	1.2 E+9
Sr - 90	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10
Y - 91	0	4.4 E+6	0	4.4 E+6	0	5.4 E+6	0	4.0 E+6
Zr - 95	0	6.9 E+5	0	7.4 E+5	0	1.0 E+6	0	8.0 E+5
Nb - 95	0	1.8 E+8	0	2.0 E+8	0	2.4 E+8	0	2.4 E+8
Ru - 103	0	9.2 E+4	0	9.6 E+4	0	1.3 E+5	0	1.0 E+5
Ru - 106	0	1.2 E+6	0	1.2 E+6	0	1.4 E+6	0	1.1 E+6
Ag - 110M	0	1.2 E+10	0	1.6 E+10	0	2.1 E+10	0	1.8 E+10
Cd - 115M	0	5.7 E+7	0	5.1 E+7	0	6.4 E+7	0	4.6 E+7
Sn - 123	0	3.7 E+9	0	2.0 E+9	0	1.2 E+9	0	8.8 E+8
Sn - 126	0	8.9 E+9	0	5.4 E+9	0	2.3 E+9	0	1.3 E+9
Sb - 124	0	5.4 E+8	0	5.7 E+8	0	7.8 E+8	0	6.1 E+8
Sb - 125	0	1.6 E+8	0	1.6 E+8	0	2.2 E+8	0	1.8 E+8
Te - 127M	0	1.0 E+9	0	5.8 E+8	0	3.3 E+8	0	1.8 E+8
Te - 129M	0	1.3 E+9	0	7.5 E+8	0	4.3 E+8	0	2.4 E+8
Cs - 134	0	5.4 E+10	0	2.9 E+10	0	1.8 E+10	0	1.1 E+10
Cs - 136	0	5.5 E+9	0	2.6 E+9	0	1.7 E+9	0	9.9 E+8
Cs - 137	0	4.9 E+10	0	2.5 E+10	0	1.4 E+10	0	8.1 E+9
Ba - 140	0	2.3 E+8	0	1.1 E+8	0	7.2 E+7	0	5.3 E+7
Ce - 141	0	1.2 E+7	0	1.2 E+7	0	1.5 E+7	0	1.1 E+7
Ce - 144	0	1.1 E+8	0	1.0 E+8	0	1.3 E+8	0	9.6 E+7
I - 131	0	1.0 E+12	0	4.3 E+11	0	2.2 E+11	0	1.4 E+11
I - 133	0	9.6 E+9	0	3.9 E+9	0	1.7 E+9	0	9.9 E+8
I - 135	0	2.0 E+7	0	8.5 E+6	0	3.7 E+6	0	2.2 E+6
Unidentified	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-10
Dose Parameter R_i for NE Sector

Pathway X/Q	Milk Pathway 4.5 E-8			Distance D/Q	4.5 miles 2.9 E-10			
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation *Pathway	Food & Ground **Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H - 3	0	2.4 E+3	0	1.6 E+3	0	9.9 E+2	0	7.6 E+20
P - 32	0	1.6 E+11	0	7.6 E+10	0	3.1 E+10	0	1.7 E+10
Cr - 51	0	4.2 E+6	0	4.8 E+6	0	7.5 E+6	0	6.4 E+6
Mn - 54	0	3.1 E+7	0	1.7 E+7	0	2.3 E+7	0	2.1 E+7
Fe - 59	0	3.4 E+8	0	1.7 E+8	0	2.5 E+8	0	2.0 E+8
Co - 58	0	5.0 E+7	0	5.9 E+7	0	9.1 E+7	0	7.9 E+7
Co - 60	0	1.7 E+8	0	1.9 E+8	0	2.9 E+8	0	2.4 E+8
Zn - 65	0	1.7 E+10	0	9.9 E+9	0	6.6 E+9	0	3.9 E+9
Rb - 86	0	2.1 E+10	0	8.2 E+9	0	4.4 E+9	0	2.4 E+9
Sr - 89	0	1.1 E+10	0	5.6 E+9	0	2.3 E+9	0	1.2 E+9
Sr - 90	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10
Y - 91	0	4.4 E+6	0	4.4 E+6	0	5.4 E+6	0	4.0 E+6
Zr - 95	0	6.9 E+5	0	7.4 E+5	0	1.0 E+6	0	8.0 E+5
Nb - 95	0	1.8 E+8	0	2.0 E+8	0	2.4 E+8	0	2.4 E+8
Ru - 103	0	9.2 E+4	0	9.6 E+4	0	1.3 E+5	0	1.0 E+5
Ru - 106	0	1.2 E+6	0	1.2 E+6	0	1.4 E+6	0	1.1 E+6
Ag - 110M	0	1.2 E+10	0	1.6 E+10	0	2.1 E+10	0	1.8 E+10
Cd - 115M	0	5.7 E+7	0	5.1 E+7	0	6.4 E+7	0	4.6 E+7
Sn - 123	0	3.7 E+9	0	2.0 E+9	0	1.2 E+9	0	8.8 E+8
Sn - 126	0	8.3 E+9	0	5.4 E+9	0	2.3 E+9	0	1.3 E+9
Sb - 124	0	5.4 E+8	0	5.7 E+8	0	7.8 E+8	0	6.1 E+8
Sb - 125	0	1.6 E+8	0	1.6 E+8	0	2.2 E+8	0	1.8 E+8
Te - 127M	0	1.0 E+9	0	5.8 E+8	0	3.3 E+8	0	1.8 E+8
Te - 129M	0	1.3 E+9	0	7.5 E+8	0	4.3 E+8	0	2.4 E+8
Cs - 134	0	5.4 E+10	0	2.9 E+10	0	1.8 E+10	0	1.1 E+10
Cs - 136	0	5.5 E+9	0	2.6 E+9	0	1.7 E+9	0	9.9 E+8
Cs - 137	0	4.9 E+10	0	2.5 E+10	0	1.4 E+10	0	8.1 E+9
Ba - 140	0	2.3 E+8	0	1.1 E+8	0	7.2 E+7	0	5.3 E+7
Ce - 141	0	1.2 E+7	0	1.2 E+7	0	1.5 E+7	0	1.1 E+7
Ce - 144	0	1.1 E+8	0	1.0 E+8	0	1.3 E+8	0	9.6 E+7
I - 131	0	1.0 E+12	0	4.3 E+11	0	2.2 E+11	0	1.4 E+11
I - 133	0	9.6 E+9	0	3.9 E+9	0	1.7 E+9	0	9.9 E+8
I - 135	0	2.0 E+7	0	8.5 E+6	0	3.7 E+6	0	2.2 E+6
Unidentified	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-11
Dose Parameter R_i for ENE Sector

Pathway X/Q	Milk Pathway 4.8 E-8		Distance D/Q	4.5 miles 3.4 E-10				
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation *Pathway	Food & Ground **Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
H - 3	0	2.4 E+3	0	1.6 E+3	0	9.9 E+2	0	7.6 E+20
P - 32	0	1.6 E+11	0	7.6 E+10	0	3.1 E+10	0	1.7 E+10
Cr - 51	0	4.2 E+6	0	4.8 E+6	0	7.5 E+6	0	6.4 E+6
Mn - 54	0	3.1 E+7	0	1.7 E+7	0	2.3 E+7	0	2.1 E+7
Fe - 59	0	3.4 E+8	0	1.7 E+8	0	2.5 E+8	0	2.0 E+8
Co - 58	0	5.0 E+7	0	5.9 E+7	0	9.1 E+7	0	7.9 E+7
Co - 60	0	1.7 E+8	0	1.9 E+8	0	2.9 E+8	0	2.4 E+8
Zn - 65	0	1.7 E+10	0	9.9 E+9	0	6.6 E+9	0	3.9 E+9
Rb - 86	0	2.1 E+10	0	8.2 E+9	0	4.4 E+9	0	2.4 E+9
Sr - 89	0	1.1 E+10	0	5.6 E+9	0	2.3 E+9	0	1.2 E+9
Sr - 90	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10
Y - 91	0	4.4 E+6	0	4.4 E+6	0	5.4 E+6	0	4.0 E+6
Zr - 95	0	6.9 E+5	0	7.4 E+5	0	1.0 E+6	0	8.0 E+5
Nb - 95	0	1.8 E+8	0	2.0 E+8	0	2.9 E+8	0	2.4 E+8
Ru - 103	0	9.2 E+4	0	9.6 E+4	0	1.3 E+5	0	1.0 E+5
Ru - 106	0	1.2 E+6	0	1.2 E+6	0	1.4 E+6	0	1.1 E+6
Ag - 110M	0	1.2 E+10	0	1.6 E+10	0	2.1 E+10	0	1.8 E+10
Cd - 115M	0	5.7 E+7	0	5.1 E+7	0	6.4 E+7	0	4.6 E+7
Sn - 123	0	3.7 E+9	0	2.0 E+9	0	1.2 E+9	0	8.8 E+8
Sn - 126	0	8.9 E+9	0	5.4 E+9	0	2.3 E+9	0	1.3 E+9
Sb - 124	0	5.4 E+8	0	5.7 E+8	0	7.8 E+8	0	6.1 E+8
Sb - 125	0	1.6 E+8	0	1.6 E+8	0	2.2 E+8	0	1.8 E+8
Te - 127M	0	1.0 E+9	0	5.8 E+8	0	3.3 E+8	0	1.8 E+8
Te - 129M	0	1.3 E+9	0	7.5 E+8	0	4.3 E+8	0	2.4 E+8
Cs - 134	0	5.4 E+10	0	2.9 E+10	0	1.8 E+10	0	1.1 E+10
Cs - 136	0	5.5 E+9	0	2.6 E+9	0	1.7 E+9	0	9.9 E+8
Cs - 137	0	4.9 E+10	0	2.5 E+10	0	1.4 E+10	0	8.1 E+9
Ba - 140	0	2.3 E+8	0	1.1 E+8	0	7.2 E+7	0	5.3 E+7
Ce - 141	0	1.2 E+7	0	1.2 E+7	0	1.5 E+7	0	1.1 E+7
Ce - 144	0	1.1 E+8	0	1.0 E+8	0	1.3 E+8	0	9.6 E+7
I - 131	0	1.0 E+12	0	4.3 E+11	0	2.2 E+11	0	1.4 E+11
I - 133	0	9.6 E+9	0	3.9 E+9	0	1.7 E+9	0	9.9 E+8
I - 135	0	2.0 E+7	0	8.5 E+6	0	3.7 E+6	0	2.2 E+6
Unidentified	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-12
Dose Parameter R_i for E Sector

Pathway X/Q	Milk Pathway 5.8 E-8				Distance D/Q	4.5 miles 4.7 E-10		
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
	*Pathway	**Pathway						
H - 3	0	2.4 E+3	0	1.6 E+3	0	9.9 E+2	0	7.6 E+20
P - 32	0	1.6 E+11	0	7.6 E+10	0	3.1 E+10	0	1.7 E+10
Cr - 51	0	4.2 E+6	0	4.8 E+6	0	7.5 E+6	0	6.4 E+6
Mn - 54	0	3.1 E+7	0	1.7 E+7	0	2.3 E+7	0	2.1 E+7
Fe - 59	0	3.4 E+8	0	1.7 E+8	0	2.5 E+8	0	2.0 E+8
Co - 58	0	5.0 E+7	0	5.9 E+7	0	9.1 E+7	0	7.9 E+7
Co - 60	0	1.7 E+8	0	1.9 E+8	0	2.9 E+8	0	2.4 E+8
Zn - 65	0	1.7 E+10	0	9.9 E+9	0	6.6 E+9	0	3.9 E+9
Rb - 86	0	2.1 E+10	0	8.2 E+9	0	4.4 E+9	0	2.4 E+9
Sr - 89	0	1.1 E+10	0	5.6 E+9	0	2.3 E+9	0	1.2 E+9
Sr - 90	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10
Y - 91	0	4.4 E+6	0	4.4 E+6	0	5.4 E+6	0	4.0 E+6
Zr - 95	0	6.9 E+5	0	7.4 E+5	0	1.0 E+6	0	8.0 E+5
Nb - 95	0	1.8 E+8	0	2.0 E+8	0	2.9 E+8	0	2.4 E+8
Ru - 103	0	9.2 E+4	0	9.6 E+4	0	1.3 E+5	0	1.0 E+5
Ru - 106	0	1.2 E+6	0	1.2 E+6	0	1.4 E+6	0	1.1 E+6
Ag - 110M	0	1.2 E+10	0	1.6 E+10	0	2.1 E+10	0	1.8 E+10
Cd - 115M	0	5.7 E+7	0	5.1 E+7	0	6.4 E+7	0	4.6 E+7
Sn - 123	0	3.7 E+9	0	2.0 E+9	0	1.2 E+9	0	8.8 E+8
Sn - 126	0	8.9 E+9	0	5.4 E+9	0	2.3 E+9	0	1.3 E+9
Sb - 124	0	5.4 E+8	0	5.7 E+8	0	7.8 E+8	0	6.1 E+8
Sb - 125	0	1.6 E+8	0	1.6 E+8	0	2.2 E+8	0	1.8 E+8
Te - 127M	0	1.0 E+9	0	5.8 E+8	0	3.3 E+8	0	1.8 E+8
Te - 129M	0	1.3 E+9	0	7.5 E+8	0	4.3 E+8	0	2.4 E+8
Cs - 134	0	5.4 E+10	0	2.9 E+10	0	1.8 E+10	0	1.1 E+10
Cs - 136	0	5.5 E+9	0	2.6 E+9	0	1.7 E+9	0	9.9 E+8
Cs - 137	0	4.9 E+10	0	2.5 E+10	0	1.4 E+10	0	8.1 E+9
Ba - 140	0	2.3 E+8	0	1.1 E+8	0	7.2 E+7	0	5.3 E+7
Ce - 141	0	1.2 E+7	0	1.2 E+7	0	1.5 E+7	0	1.1 E+7
Ce - 144	0	1.1 E+8	0	1.0 E+8	0	1.3 E+8	0	9.6 E+7
I - 131	0	1.0 E+12	0	4.3 E+11	0	2.2 E+11	0	1.4 E+11
I - 133	0	9.8 E+9	0	3.9 E+9	0	1.7 E+9	0	9.9 E+8
I - 135	0	2.0 E+7	0	8.5 E+6	0	3.7 E+6	0	2.2 E+6
Unidentified	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-13
Dose Parameter R_i for ESE Sector

Pathway	Camp Store				Distance	0.60 miles						
X/Q	3.1 E-6				D/Q	2.8 E-8						
	Infant				Child		Teen		Adult			
Radionuclide	Inhalation Pathway	Food & Ground *Pathway		**Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway		
H - 3	1.5 E+2	0			2.6 E+2	0	2.9 E+2	0	2.9 E+2	0		
P - 32	4.6 E+5	0			5.9 E+5	0	4.3 E+5	0	3.0 E+5	0		
Cr - 51	8.2 E+1	1.1	E+6		2.5 E+2	1.1 E+6	6.8 E+2	1.1 E+6	7.6 E+2	1.1	E+6	
Mn - 54	5.8 E+3	3.2	E+8		9.8 E+3	3.2 E+8	1.5 E+4	3.2 E+8	1.8 E+4	3.2	E+8	
Fe - 59	5.4 E+3	6.2	E+7		7.6 E+3	6.2 E+7	4.1 E+4	6.2 E+7	4.3 E+4	6.2	E+7	
Co - 58	2.5 E+3	8.7	E+7		7.8 E+3	8.7 E+7	2.2 E+4	8.7 E+7	2.4 E+4	8.7	E+7	
Co - 60	7.3 E+3	4.9	E+9		2.2 E+4	4.9 E+9	5.9 E+4	4.9 E+9	6.5 E+4	4.9	E+9	
Zn - 65	1.4 E+4	1.7	E+8		2.6 E+4	1.7 E+8	3.1 E+4	1.7 E+8	2.4 E+4	1.7	E+8	
Rb - 86	4.3 E+4	2.1	E+6		4.5 E+4	2.1 E+6	4.3 E+4	2.1 E+6	3.1 E+4	3.1	E+6	
Sr - 89	9.1 E+4	4.9	E+3		1.4 E+5	4.9 E+3	9.9 E+4	4.9 E+3	6.9 E+4	4.9	E+3	
Sr - 90	9.3 E+6	0			2.3 E+7	0	2.5 E+7	0	2.3 E+7	0		
Y - 91	1.6 E+4	2.3	E+5		4.2 E+4	2.5 E+5	9.3 E+4	2.5 E+5	8.8 E+4	2.5	E+5	
Zr - 95	5.0 E+3	5.7	E+7		1.4 E+4	5.7 E+7	3.4 E+4	5.7 E+7	3.4 E+4	5.7	E+7	
Nb - 95	2.9 E+3	3.1	E+7		8.4 E+3	3.1 E+7	2.2 E+4	3.1 E+7	2.4 E+4	3.1	E+7	
Ru - 103	3.7 E+3	2.5	E+7		1.0 E+4	2.5 E+7	2.5 E+4	2.5 E+7	2.5 E+4	2.5	E+7	
Ru - 106	3.7 E+4	9.7	E+7		9.8 E+4	9.7 E+7	2.2 E+5	9.7 E+7	2.1 E+5	9.7	E+7	
Ag - 110M	7.5 E+3	7.9	E+8		2.3 E+4	7.9 E+8	6.2 E+4	7.9 E+8	6.9 E+4	7.9	E+8	
Cd - 115M	1.6 E+4	0			4.2 E+4	0	9.3 E+4	0	8.0 E+4	0		
Sn - 123	6.7 E+4	0			1.1 E+5	0	7.6 E+4	0	7.2 E+4	0		
Sn - 126	2.7 E+5	6.0	E+9		5.3 E+5	6.0 E+9	4.0 E+5	6.0 E+9	2.9 E+5	6.0	E+9	
Sb - 124	1.3 E+4	1.4	E+8		3.7 E+4	1.4 E+8	9.1 E+4	1.4 E+8	9.3 E+4	1.4	E+8	
Sb - 125	3.4 E+3	5.3	E+8		4.2 E+3	5.3 E+8	2.3 E+4	5.3 E+8	2.3 E+4	5.3	E+8	
Te - 127M	8.6 E+3	2.1	E+4		1.5 E+4	2.1 E+4	1.5 E+4	2.1 E+4	1.0 E+4	2.1	E+4	
Te - 129M	7.3 E+3	4.5	E+6		1.1 E+4	4.5 E+6	1.2 E+4	4.5 E+6	8.3 E+3	4.5	E+6	
Cs - 134	1.6 E+5	1.6	E+9		2.3 E+5	1.6 E+9	2.6 E+5	1.6 E+9	1.9 E+5	1.6	E+9	
Cs - 136	3.1 E+4	3.4	E+7		3.4 E+4	3.4 E+7	4.4 E+4	3.4 E+7	3.3 E+4	3.4	E+7	
Cs - 137	1.4 E+5	2.3	E+9		1.9 E+5	2.3 E+9	1.9 E+5	2.3 E+9	1.4 E+5	2.3	E+9	
Ba - 140	1.3 E+4	4.7	E+6		1.7 E+4	4.7 E+6	5.2 E+4	4.7 E+6	5.0 E+4	4.7	E+6	
Ce - 141	4.9 E+3	3.1	E+6		1.3 E+4	3.1 E+6	2.9 E+4	3.1 E+6	2.7 E+4	3.1	E+6	
Ce - 144	3.4 E+4	1.6	E+7		8.9 E+4	1.0 E+7	2.0 E+5	1.6 E+7	1.9 E+5	1.6	E+7	
I - 131	3.4 E+6	3.9	E+6		3.7 E+6	3.9 E+6	3.3 E+6	3.9 E+6	2.7 E+6	3.9	E+6	
I - 133	8.1 E+5	5.6	E+5		8.8 E+5	5.6 E+5	6.7 E+5	5.6 E+5	4.9 E+5	5.6	E+5	
I - 135	1.6 E+5	5.8	E+5		1.8 E+5	5.8 E+5	1.4 E+5	5.8 E+5	1.0 E+5	5.8	E+5	
Unidentified	9.3 E+6	0			2.3 E+7	0	2.7 E+7	0	2.3 E+7	0		

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-13
Dose Parameter R_i for ESE Sector

Pathway X/Q	Milk Pathway 7.0 E-8		Distance D/Q	4.5 miles 5.8 E-10				
	Infant		Child		Teen		Adult	
Radionuclide	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway	Inhalation Pathway	Food & Ground Pathway
	*Pathway	**Pathway						
H - 3	0	2.4 E+3	0	1.6 E+3	0	9.9 E+2	0	7.6 E+20
P - 32	0	1.6 E+11	0	7.6 E+10	0	3.1 E+10	0	1.7 E+10
Cr - 51	0	4.2 E+6	0	4.8 E+6	0	7.5 E+6	0	6.4 E+5
Mn - 54	0	3.1 E+7	0	1.7 E+7	0	2.3 E+7	0	2.1 E+7
Fe - 59	0	3.4 E+8	0	1.7 E+8	0	2.5 E+8	0	2.0 E+8
Co - 58	0	5.0 E+7	0	5.9 E+7	0	9.1 E+7	0	7.9 E+7
Co - 60	0	1.7 E+8	0	1.9 E+8	0	2.9 E+8	0	2.4 E+8
Zn - 65	0	1.7 E+10	0	9.9 E+9	0	6.6 E+9	0	3.9 E+9
Rb - 86	0	2.1 E+10	0	8.2 E+9	0	4.4 E+9	0	2.4 E+9
Sr - 89	0	1.1 E+10	0	5.6 E+9	0	2.3 E+9	0	1.2 E+9
Sr - 90	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10
Y - 91	0	4.4 E+6	0	4.4 E+6	0	5.4 E+6	0	4.0 E+6
Zr - 95	0	6.9 E+5	0	7.4 E+5	0	1.0 E+6	0	8.0 E+5
Nb - 95	0	1.8 E+8	0	2.0 E+8	0	2.9 E+8	0	2.4 E+8
Ru - 103	0	9.2 E+4	0	9.6 E+4	0	1.3 E+5	0	1.0 E+5
Ru - 106	0	1.2 E+6	0	1.2 E+6	0	1.4 E+6	0	1.1 E+6
Ag - 110M	0	1.2 E+10	0	1.6 E+10	0	2.1 E+10	0	1.8 E+10
Cd - 115M	0	5.7 E+7	0	5.1 E+7	0	6.4 E+7	0	4.6 E+7
Sn - 123	0	3.7 E+9	0	2.0 E+9	0	1.2 E+9	0	8.8 E+8
Sn - 126	0	3.9 E+9	0	5.4 E+9	0	2.3 E+9	0	1.3 E+9
Sb - 124	0	5.4 E+8	0	5.7 E+8	0	7.8 E+8	0	6.1 E+8
Sb - 125	0	1.6 E+8	0	1.6 E+8	0	2.2 E+8	0	1.8 E+8
Te - 127M	0	1.0 E+9	0	5.8 E+8	0	3.3 E+8	0	1.8 E+8
Te - 129M	0	1.3 E+9	0	7.5 E+8	0	4.3 E+8	0	2.4 E+8
Cs - 134	0	5.4 E+10	0	2.9 E+10	0	1.8 E+10	0	1.1 E+10
Cs - 136	0	5.5 E+9	0	2.6 E+9	0	1.7 E+9	0	9.9 E+8
Cs - 137	0	4.9 E+10	0	2.5 E+10	0	1.4 E+10	0	8.1 E+9
Ba - 140	0	2.3 E+8	0	1.1 E+8	0	7.2 E+7	0	5.3 E+7
Ce - 141	0	1.2 E+7	0	1.2 E+7	0	1.5 E+7	0	1.1 E+7
Ce - 144	0	1.1 E+8	0	1.0 E+8	0	1.3 E+8	0	9.6 E+7
I - 131	0	1.0 E+12	0	4.3 E+11	0	2.2 E+11	0	1.4 E+11
I - 133	0	9.6 E+9	0	3.9 E+9	0	1.7 E+9	0	9.3 E+8
I - 135	0	2.0 E+7	0	8.5 E+6	0	3.7 E+6	0	2.2 E+6
Unidentified	0	1.0 E+11	0	9.3 E+10	0	5.5 E+10	0	3.9 E+10

*$\frac{\text{mrem/yr}}{\mu Ci/m^3}$ **$\frac{m^2 - \text{mrem/yr}}{\mu Ci/sec}$

TABLE 2-14

PARAMETERS USED TO CALCULATE R_i

Parameter	Residence		Beach	Camp Store	Vegetable	Meat	Milk
YL	2.0	(default)	2.0	2.0	2.0	2.0	2.0
YV	2.0	(default)	2.0	2.0	2.0	2.0	2.0
YP	0.7	(default)	0.7	0.7	0.7	0.7	0.7
YC	2.0	(default)	2.0	2.0	2.0	2.0	2.0
QC	50	(default)	50	50	50	50	50
QG	6	(default)	6	6	6	6	6
H	8.0	(default)	8.0	8.0	8.0	8.0	8.0
QF	1.00		.0594	.228	.25	0.05	0
ZIN	1.00		.0594	.228	.25	0.05	0
FV	1.00		0	0	1.00	0	0
FP	0		0	0	0	0	1.00
FG	0.76		0	0	0.76	0	0
FPF	0		0	0	0	0	1.00
FGT	0		0	0	0	0	0
FPG	0		0	0	0	0	0
FB	0		0	0	0	1.00	0
FBF	0		0	0	0	1.00	0

NOTE: Parameters defined on Page D-2 of NUREG-0133.

3.0 PROJECTED DOSES

3.1 Liquid Dose Projection (3.11.1.3)

The methodology used for projecting a liquid dose for specification 3.11.1.3 is as follows:

1. Determine the average monthly total body and organ dose resulting from releases during release for the previous twelve months.

2. Use the average monthly total body organ doses to make the dose projections.

3.2 Gaseous Data Projection (3.11.2.4)

The methodology used for projecting a gaseous dose for specification 3.11.2.4 is as follows:

1. Determine the average monthly total body and organ dose resulting from releases during the previous twelve months.
2. Use the average monthly total body and organ dose to make the dose projection.

4.0 OPERABILITY OF 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 4-1 thru 4-3.

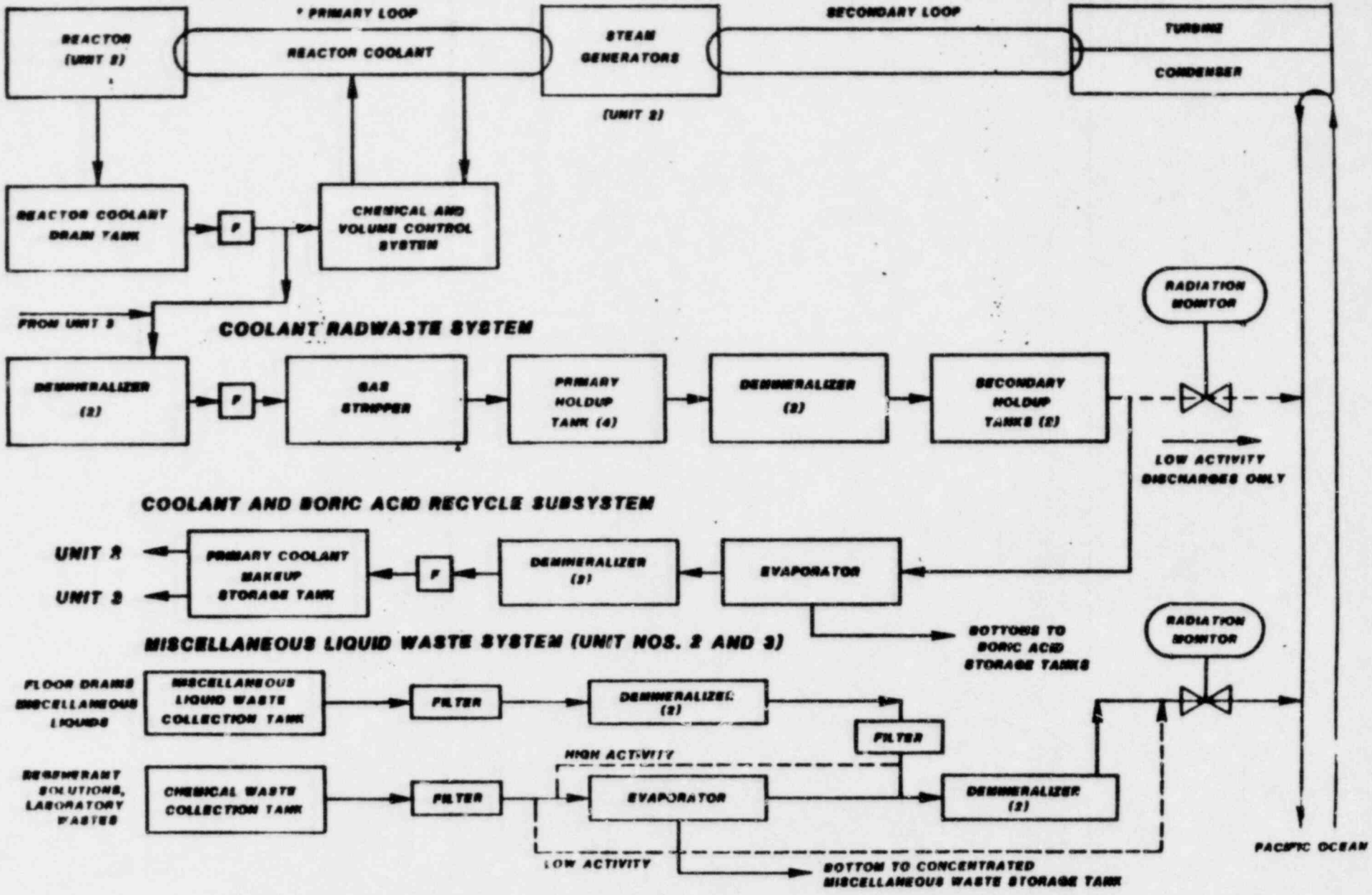

FIGURE 4-1 SONGS 2 & 3 RADIOACTIVE LIQUID WASTE TREATMENT SYSTEMS

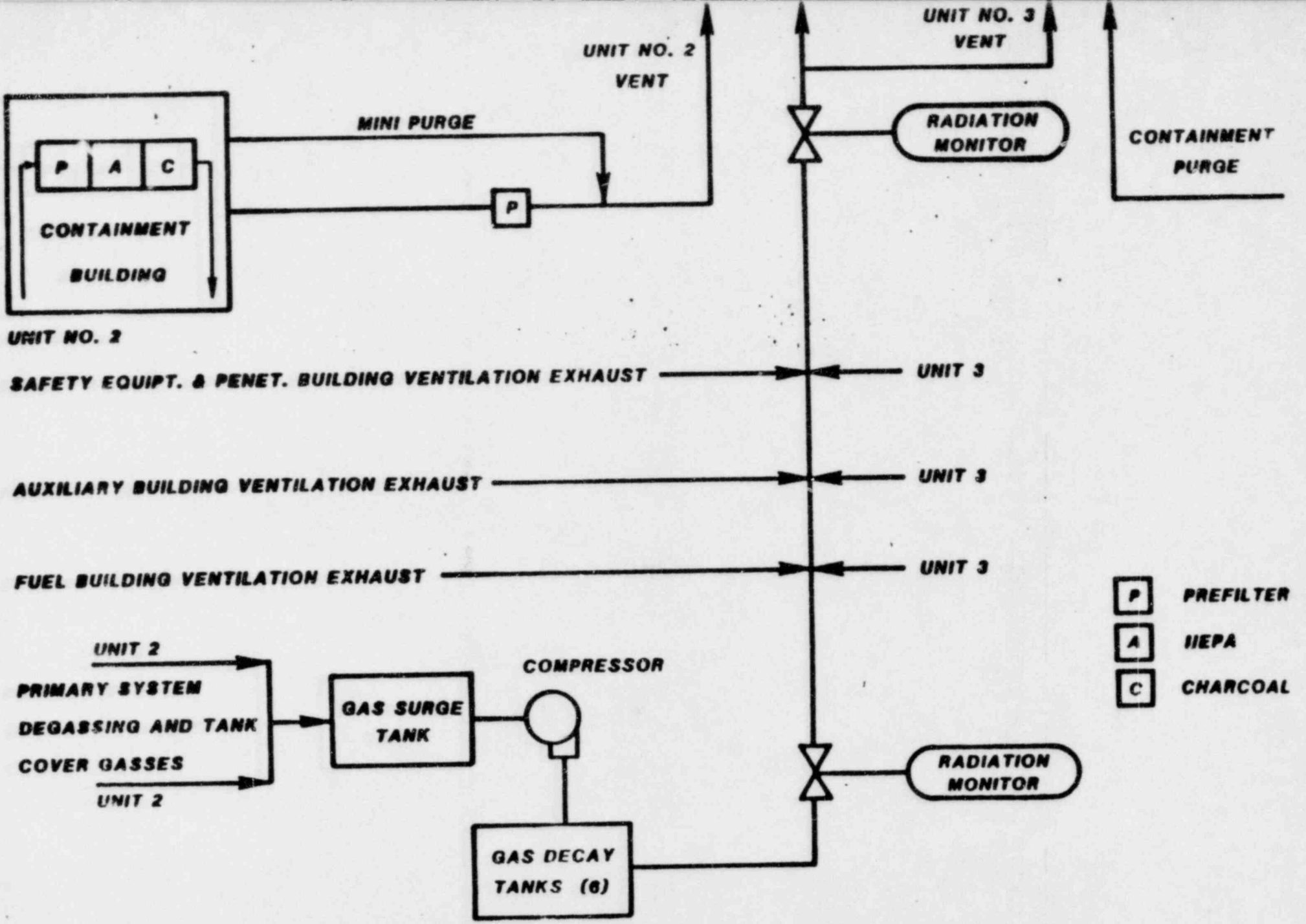

FIGURE 4-2 SONGS 2 & 3 RADIOACTIVE GASEOUS WASTE TREATMENT SYSTEMS

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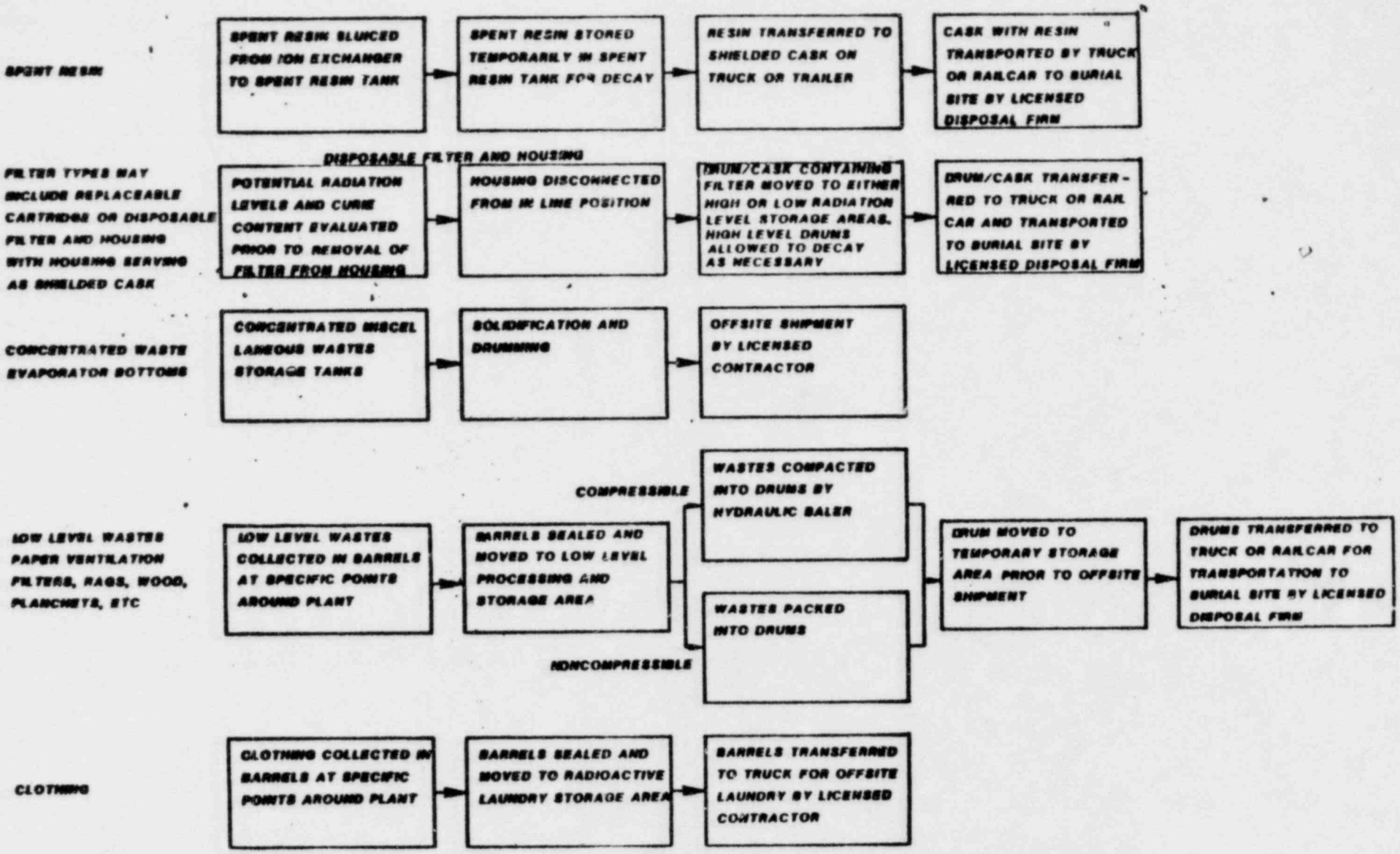

FIGURE 4-3 SONGS 2 & 3 SOLID WASTE HANDLING

5.0 RADIOLOGICAL ENVIRONMENTAL MONITORING*

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

* If a milk producing dairy animal is discovered within the 5 mile radius of the Emergency Planning Zone (EPZ) during the annual land use census, a monthly sampling analysis of the milk will commence.

TABLE 5-1

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

	Type of Sample and Sampling Location	Distance* (Miles)	Direction*
	Direct Radiation 		
59	SONGS Meteorological Tower	0.3	NW
10	Bluff	0.8	NW
40	SCE Training Center - Japanese Mesa	0.8	NW
8	Noncommissioned Officers Beach Club	1.2	NW
34	San Onofre School	1.7	NW
9	Basilone Road/I-5 Freeway Offramp	2.0	NW
21	Concordia Elementary School - San Clemente	3.5	NW
20	San Clemente Pier	5.0	NW
1	City of San Clemente (SDG&E Offices)	5.6	NW
24	San Clemente High School	6.0	NW
25	Convalescent Home - San Clemente	8.0	NW
23	San Clemente General Hospital	8.2	NW
28	Doheny Fire Station - Capistrano Beach	9.5	NW
27	U.S. Post Office - Dana Point	10.5	NW
29	San Juan Capistrano Fire Station	10.8	NW
26	Dana Hills High School	11.0	NW
37	Laguna Niguel Fire Station	13.5	NW
30	Laguna Beach Fire Station	17.5	NW
32	Santa Ana Police Department	32.0	NW

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

TABLE 5-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

	Type of Sample and Sampling Location	Distance* (Miles)	Direction*
14	Huntington Beach Generating Station	37	NW
39	Basilone Road Trailer Park	1.4	NNW
19	San Clemente Highlands	5.0	NNW
31	Aurora Park Mission Viejo	18.6	NNW
2	Camp San Mateo	3.5	N
33	Camp Talega	5.7	N
11	Visitors Center	0.2	NNE
35	Range 312 (Marine Corps Base, Camp Pendleton)	4.7	NNE
12	South Edge of Switchyard	0.2	NE
3	Camp San Onofre	2.6	NE
36	Range 208C (Marine Corps Base, Camp Pendleton)	4.0	NE
41	Old Route 101 - East	0.3	E
16	East Site Boundary	0.5	E
4	Camp Horno	4.5	E
42	Horno Canyon	4.6	E
44	Fallbrook Fire Station	18.0	E
15	ESE Site Boundary	0.2	ESE
7	Old Route 101 - ESE	0.5	ESE
45	Interstate 5 Weigh Station	2.0	ESE
6	Old Route 101 - ESE	3.0	ESE

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

TABLE 5-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

Type of Sample and Sampling Location		Distance* (Miles)	Direction*
5	Camp Las Pulgas	8.5	ESE
49	Camp Chappo	12.8	ESE
48	Mainside (Marine Corps Base, Camp Pendleton)	15.0	ESE
52	Vista Fire Station	21	ESE
54	Escondido Fire Station	32	ESE
13	Site Boundary	0.13	SE
46	San Onofre State Beach Park	1.4	SE
38	San Onofre State Beach Park	3.6	SE
47	Camp Las Flores	8.6	SE
43	Edson Range (Marine Corps Base, Camp Pendleton)	10.6	SE
50	Oceanside Fire Station	15.5	SE
51	Carlsbad Fire Station	18.6	SE
53	San Diego County Operations Center	45	SE
58	San Onofre State Beach (Unit 3)	0.1	S
57	San Onofre State Beach (Unit 2)	0.1	SSW
56	San Onofre State Beach (Unit 1)	0.1	W
55	San Onofre State Beach (Unit 1)	0.2	W
22	Coast Guard Station - San Mateo Point	2.7	WNW
17	Transit Dose	-	-
18	Transit Dose	-	-

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

TABLE 5-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

	Type of Sample and Sampling Location	Distance* (Miles)	Direction*
Airborne 			
6	SONGS Meteorological Tower	0.3	NW
1	City of San Clemente (SDG&E Offices)	5.5	NW
3	Huntington Beach Generating Station	37	NW
4	Northeast Site Boundary	0.2	NNE
2	Camp San Onofre	1.8	NE
5	Units 2&3 Switchyard	0.13	ESE
Soil Samples 			
3	Basilone Road/I-5 Freeway Offramp	2.0	NW
4	Huntington Beach Generating Station	37	NW
5	East Site Boundary	0.2	NNW
1	Camp San Onofre	2.5	NE
2	Old Route 101 - SE	3.0	SE
Ocean water 			
D	Newport Beach	30	NW
A	Station Discharge Outfall - Unit 1	0.5	SW
B	Outfall - Unit 2	0.7	SW
C	Outfall - Unit 3	0.7	SW

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

TABLE 5-1 (Cont.)

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
3	Huntington Beach	37	NW
2	San Clemente Golf Course Well	3.5	NNW
Sediment from Shoreline (Beach Sand) 			
2	San Onofre Surfing Beach	0.9	NW
4	Newport Beach (North End)	30	NW
1	San Onofre State Beach	0.6	SE
3	San Onofre State Beach	3.5	SE
Local Crops 			
1	San Mateo Canyon	2.6	NW
2	Southeast of Oceanside	22	SE

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

TABLE 5-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

	Type of Sample and Sampling Location	Distance* (Miles)	Direction*
Non-Migratory Marine Animals 			
C	Newport Beach	30	NW
B	Units 2&3 Outfall	0.7	SSW
A	Unit 1 Outfall	0.6	WSW
Kelp 			
D	Newport Beach	30	NW
C	Barn Kelp Bed	6.6	SSE
A	San Onofre Kelp Bed	1.5	S
B	San Mateo Kelp Bed	3.5	WNW
Ocean Bottom Sediments 			
E	Newport Beach	30	NW
D	Unit 3 Outfall	0.9	S
C	Unit 2 Outfall	0.8	SSW
A	Unit 1 Outfall	0.5	W
B	Unit 1 Outfall	0.6	W
2	Jack Rabbit 	0.6	NW
1	Jack Rabbit 	0.5	E

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

TABLE 5-2

RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS

Pressurized Ion Chambers		Distance* (Miles)	Direction/Sector*	
(S1)	San Onofre Beach - W	0.40	W	P
(S2)	Visitors Center - NW	0.35	NW	Q
(S3)	Japanese Mesa - NNW	0.44	NNW	R
(S4)	MCB - Camp Pendleton - N	0.44	N	A
(S5)	MCB - Camp Pendleton - NNE	0.41	NNE	B
(S6)	MCB - Camp Pendleton - NE	0.36	NE	C
(S7)	MCB - Camp Pendleton - ENE	0.35	ENE	D
(S8)	MCB - Camp Pendleton - E	0.44	E	E
(S9)	SanOnofre State Beach - ESE	0.39	ESE	F

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

TABLE 5-3

SECTOR AND DIRECTION DESIGNATION FOR RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATION MAP

Degrees True North from SONGS 2&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	56.25	C	NE
56.25	67.5	78.75	D	ENE
78.75	90	101.25	E	E
101.25	112	123.75	F	ESE
123.75	135	146.25	G	SE
146.25	157	168.75	H	SSE
168.75	180	191.25	J	S
191.25	202.5	213.75	K	SSW
213.75	225	236.25	L	SW
236.25	247.5	258.75	M	WSW
258.75	270	281.25	N	SW
281.25	292.5	303.75	P	WNW
303.75	315	326.25	Q	NW
326.25	337.5	348.75	R	NNW

* The letters I and O have been omitted from these sector designators so as to eliminate possible confusion between numbers and letters.

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