OFFSITE DOSE CALCULATION MANUAL

NUCLEAR GENERATION SITE

UNITS 2 AND 3

APPROVED FEB 0 1 1990

ODCM2/
3081cc.man

Revision 20A
02-01-90

February 1, 1990

MR. H. E. MORGAN

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

In accordance with Technical Specification 6.5.2.9 and 6.14.2, Revision 20A to the Units 2/3 ODCM has been prepared and reviewed for adoption on February 1, 1990. This revision incorporates the newest dose parameter tables occasioned by the latest Land Use Census, changes to radiation monitor calibration constants, as well as a changes to the Radiological Environmental Monitoring Section clarifying sampling locations. Your approval of this change is requested.

Copies of this letter are being forwarded to the Site Manager Vice President, and the Nuclear Safety Group as required by Technical Specification 6.5.2.10 (Units 2/3).

If there are any questions, please don't hesitate to call.

J. T. REILLY

Approved by: ____________________
H. E. MORGAN
Station Manager

450KH:caa

cc: R. H. Bridenbecker
P. H. Penseyres
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Chem File
CDM

March 24, 1990

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

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

The affected pages are attached with the following explanations:

Page	
1-18	Several monitor calibration constants revised due to annual isotopic calibrations.
2-8	Change in reference from Technical Specification 3.11.2.1 to ODCM Specification 2.1.1.*
2-15	Several monitor calibration constants revised due to annual isotopic calibrations.
2-17	Change in reference for beta and gamma dose factors from Table 2-2 to Table 2-4.*
2-19	Change in reference for gamma dose factors from Table 2-2 to Table 2-4.*
2-22	Change in reference for controlling dose factor from Table 2-4 to Table 2-6. Change in reference for dose parameters from Tables 2-5 through 2-14 to Tables 2-7 through 2-16.*
2-27	Controlling location factor revised for I-131 due to changes in Dose Parameter tables/updated Land Use Census.
2-35	Addition of a new vegetable garden in Land Use Census; X/Q, D/Q and distance updated.
2-60 through 2-63	New Dose Parameter table added for Sector F: Beach Concession, inserted page 60A. Remaining tables updated to include correct placement and total number of pages.
5-6	Radiological environmental monitoring sample location table updated to include new residential garden in San Clemente as a result of new Land Use Census.

* The change was the reference to a table only and premature. At the time that Rev. 20A was being processed, Effluent was also processing Rev. 21, which transferred the RETS from the Technical Specifications to the ODCM. The actual tables were available in the ODCM. Anyone using the ODCM would have readily discovered the error(s), found the necessary table, and performed the calculations appropriately. The inaccurate references were in place from 2/1/90 to 2/15/90.

Table 1-1(a)

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

MONITOR	Co-60	Ba-133	Cs-137
2RT-6753		2.04E-8	1.95E-8
2RT-6759		1.11E-8	1.92E-8
3RT-6753		1.71E-8	1.92E-8
3RT-6759		1.94E-8	1.94E-8
2/3RT-7813	2.10E-9	3.14E-9	4.77E-9
2RT-7817	2.14E-9	2.76E-9	4.74E-9
2RT-7821	2.10E-9	3.58E-9	5.21E-9
3RT-7817	2.13E-9	3.63E-9	5.26E-9
3RT-7821	2.14E-9	3.26E-9	4.75E-9

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

APPROVED FEB 0 1 1990

2.1.3 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

$$C_{det2} = \frac{(0.45)(P_2)(2120 \frac{cfm}{m^3/sec})(500\ mrem/yr)(10^{-6}\ m^3/cc)}{(Flow\ rate,\ cfm)(X/Q,\ sec/m^3)[\sum_i (K_i,\ \frac{mrem/yr}{\mu Ci/m^3})(\frac{C_i}{C_{tot}})]} \quad (2\text{-}6)$$

$$C_{det3} = \frac{(0.45)(P_3)(2120 \frac{cfm}{m^3/sec})(500\ mrem/yr)(10^{-6}\ m^3/cc)}{(Flow\ rate,\ cfm)(X/Q,\ sec/m^3)[\sum_i (K_i,\ \frac{mrem/yr}{\mu Ci/m^3})(\frac{C_i}{C_{tot}})]} \quad (2\text{-}7)$$

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

Skin

$$C_{det2} = \frac{(0.45)(P_2)(2120 \frac{cfm}{m^3/sec})(3000\ mrem/yr)(10^{-6}\ m^3/cc)}{(Flow\ rate,\ cfm)(X/Q,\ sec/m^3)[\sum_i (L_i + 1.1M_i,\ \frac{mrem/yr}{\mu Ci/m^3})(\frac{C_i}{C_{tot}})]} \quad (2\text{-}6a)$$

$$C_{det3} = \frac{(0.45)(P_3)(2120 \frac{cfm}{m^3/sec})(3000\ mrem/yr)(10^{-6}\ m^3/cc)}{(Flow\ rate,\ cfm)(X/Q,\ sec/m^3)[\sum_i (L_i + 1.1M_i,\ \frac{mrem/yr}{\mu Ci/m^3})(\frac{C_i}{C_{tot}})]} \quad (2\text{-}7a)$$

APPROVED FEB 0 1 1990

Table 2-1[a]

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

MONITOR	Kr-85	Xe-133
2/3RT-7808C	3.90E-8	4.62E-8
2RT-7818A	4.27E-8	6.63E-8
2RT-7818B	7.31E-5	2.07E-5
3RT-7818A	3.73E-8	5.09E-8
3RT-7818B	9.31E-5	2.21E-5

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

APPROVED FEB 01 1990

2.2.1 FOR NOBLE GASES: (Continued)

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

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 2-4. (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 $\mu Ci/sec$

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

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

$$\dot{D}_o = \sum_i \left[\sum_k (P_{ik} \overline{W}_k) \dot{Q}_i\right] \quad (2\text{-}13)$$

Where:

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

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2.3 Gaseous Effluent Dose Calculation

2.3.1 DOSE FROM NOBLE GASES IN GASEOUS EFFLUENTS

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 meteorology:

$$D_\gamma = 3.17\text{x}10^{-8} \sum_i M_i [\, \overline{(X/Q)}\, Q_i] \qquad (2\text{-}14)$$

$$D_\beta = 3.17\text{x}10^{-8} \sum_i N_i [\, \overline{(X/Q)}\, Q_i] \qquad (2\text{-}15)$$

Where:

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

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

$3.17\text{x}10^{-8}$ = (inverse seconds per year)

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 2-4

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

APPROVED FEB 0 1 1990

2.3.2.1 For historical meteorology: (Continued)

Where:

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

Q_i = the amount of each radionuclide, i, (tritium, radioiodine, radioactive material in particulate form with half lives greater than eight days), 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 2-6. 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 2-7 thru 2-16.

APPROVED FEB 01 1990

TABLE 2-4

CONTROLLING LOCATION FACTORS

Radionuclide	$\sum_k R_{ik}W_k$ mrem/yr per μCi/sec
H -3	9.62E-4
Cr-51	1.58E-2
Mn-54	4.02E0
Co-57	9.95E-1
Co-58	1.16E0
Co-60	6.14E1
Sr-89	4.34E1
Sr-90	1.82E3
Zr-95	1.66E0
Nb-95	6.81E0
Te-129m	4.90E0
Cs-134	3.36E1
Cs-136	5.73E-1
Cs-137	3.08E1
Ba-140	2.28E-1
Ce-141	5.74E-1
Ce-144	1.68E1
I -131	1.97E1
I -133	2.82E0
I -135	5.92E-1
UN-ID	3.50E0

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

APPROVED FEB 0 1 1990

TABLE 2-6

DOSE PARAMETER R_i FOR SECTOR Q

Pathway = S. C. Res W Garden
X/Q = 1.2E-7 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	-0-	-0-	-0-	4.0E3	-0-	2.6E3	1.3E3	2.3E3
Cr-51	-0-	-0-	-0-	6.1E6	-0-	1.0E7	3.3E3	1.5E7
Mn-54	-0-	-0-	-0-	6.5E8	-0-	9.2E8	7.7E4	2.0E9
Co-57	-0-	-0-	-0-	2.4E8	-0-	3.2E8	3.1E4	5.6E8
Co-58	-0-	-0-	-0-	3.7E8	-0-	5.9E8	1.1E5	9.1E8
Co-60	-0-	-0-	-0-	2.1E9	-0-	3.2E9	2.8E5	2.0E10
Sr-89	-0-	-0-	-0-	3.5E10	-0-	1.5E10	3.0E5	9.8E9
Sr-90	-0-	-0-	-0-	1.4E12	-0-	8.3E11	9.9E7	6.7E11
Zr-95	-0-	-0-	-0-	8.8E8	-0-	1.2E9	1.5E5	1.4E9
Nb-95	-0-	-0-	-0-	2.9E8	-0-	4.5E8	1.0E5	5.8E8
Te-129m	-0-	-0-	-0-	2.9E9	-0-	1.8E9	3.7E4	1.2E9
Cs-134	-0-	-0-	-0-	2.6E10	-0-	1.6E10	8.5E5	1.6E10
Cs-136	-0-	-0-	-0-	2.2E8	-0-	1.7E8	1.5E5	2.9E8
Cs-137	-0-	-0-	-0-	2.4E10	-0-	1.4E10	6.2E5	1.7E10
Ba-140	-0-	-0-	-0-	2.8E8	-0-	2.1E8	2.2E5	2.8E8
Ce-141	-0-	-0-	-0-	4.0E8	-0-	5.3E8	1.2E5	5.1E8
Ce-144	-0-	-0-	-0-	1.0E10	-0-	1.3E10	8.2E5	1.1E10
I -131	-0-	-0-	-0-	4.8E10	-0-	3.1E10	1.2E7	3.8E10
I -133	-0-	-0-	-0-	8.1E8	-0-	4.6E8	2.2E6	5.3E8
I -135	-0-	-0-	-0-	9.8E6	-0-	5.7E6	4.5E5	8.6E6
UN-ID	-0-	-0-	-0-	2.7E9	-0-	1.9E9	1.0E5	1.9E9

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

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

APPROVED FEB 0 1 1990

DOSE PARAMETER R_i FOR SECTOR F

Pathway = San Onofre State Park Guard Shack   Distance = 0.8 miles
X/Q = 8.1E-7 sec/m^3 D/Q = 7.1E-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-	7.2E1	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	1.9E2	2.7E5
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	4.4E3	7.9E7
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	1.8E3	2.0E7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	6.1E3	2.2E7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	1.6E4	1.2E9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	1.7E4	1.2E3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	5.7E6	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	8.6E3	1.4E7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	5.9E3	7.8E6
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	2.1E3	1.1E6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	4.8E4	3.9E8
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	8.4E3	8.6E6
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	3.5E4	5.9E8
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	1.2E4	1.2E6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	6.9E3	7.8E5
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	4.7E4	4.0E6
I -131	-0-	-0-	-0-	-0-	-0-	-0-	6.8E5	9.8E5
I -133	-0-	-0-	-0-	-0-	-0-	-0-	1.2E5	1.4E5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	2.6E4	1.4E5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	5.9E3	4.3E7

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

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

APPROVED FEB 0 1 1990

TABLE 2-13

DOSE PARAMETER R_i FOR SECTOR F

Pathway = Beach Concession
X/Q = 6.9E-7 sec/m³

Distance = 0.9 miles
D/Q = 6.0E-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-	1.2E2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	3.1E2	4.4E5
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	7.2E3	1.3E9
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	2.9E3	3.2E7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	1.0E4	3.6E7
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	2.7E4	2.0E9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	2.8E4	2.0E3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	9.3E6	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	1.4E4	2.4E7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	9.7E3	1.3E7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	3.4E3	1.8E6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	7.9E4	6.4E8
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	1.4E4	1.4E7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	5.8E4	9.6E8
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	2.0E4	1.9E6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	1.1E4	1.3E6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	7.6E4	6.5E6
I -131	-0-	-0-	-0-	-0-	-0-	-0-	1.1E6	1.6E6
I -133	-0-	-0-	-0-	-0-	-0-	-0-	2.0E5	2.3E5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	4.2E4	2.4E5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	9.7E3	7.0E7

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

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

APPROVED FEB 01 1990

TABLE 2-13

DOSE PARAMETER R_i FOR SECTOR F

Pathway = Border Patrol Checkpt. Distance = 1.8 miles
X/Q = 2.4E-7 sec/m³ D/Q = 1.8E-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-	3.6E2	-0-
Cr-51	-0-	-0-	-0-	-0-	-0-	-0-	9.5E2	1.3E6
Mn-54	-0-	-0-	-0-	-0-	-0-	-0-	2.2E4	3.9E8
Co-57	-0-	-0-	-0-	-0-	-0-	-0-	9.0E3	9.8E7
Co-58	-0-	-0-	-0-	-0-	-0-	-0-	3.0E4	1.1E8
Co-60	-0-	-0-	-0-	-0-	-0-	-0-	8.1E4	6.1E9
Sr-89	-0-	-0-	-0-	-0-	-0-	-0-	8.7E4	6.2E3
Sr-90	-0-	-0-	-0-	-0-	-0-	-0-	2.8E7	-0-
Zr-95	-0-	-0-	-0-	-0-	-0-	-0-	4.3E4	7.2E7
Nb-95	-0-	-0-	-0-	-0-	-0-	-0-	3.0E4	3.9E7
Te-129m	-0-	-0-	-0-	-0-	-0-	-0-	1.0E4	5.6E6
Cs-134	-0-	-0-	-0-	-0-	-0-	-0-	2.4E5	1.9E9
Cs-136	-0-	-0-	-0-	-0-	-0-	-0-	4.2E4	4.3E7
Cs-137	-0-	-0-	-0-	-0-	-0-	-0-	1.8E5	2.9E9
Ba-140	-0-	-0-	-0-	-0-	-0-	-0-	6.2E4	5.9E6
Ce-141	-0-	-0-	-0-	-0-	-0-	-0-	3.4E4	3.9E6
Ce-144	-0-	-0-	-0-	-0-	-0-	-0-	2.3E5	2.0E7
I -131	-0-	-0-	-0-	-0-	-0-	-0-	3.4E6	4.9E6
I -133	-0-	-0-	-0-	-0-	-0-	-0-	6.1E5	7.0E5
I -135	-0-	-0-	-0-	-0-	-0-	-0-	1.3E5	7.2E5
UN-ID	-0-	-0-	-0-	-0-	-0-	-0-	2.9E4	2.1E8

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

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

APPROVED FEB 0 1 1990

DOSE PARAMETER R_i FOR SECTOR F

Pathway = Sheep (Meat) Distance = 0.5 miles
X/Q = 1.9E-6 sec/m³ 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-	1.5E0	-0-	1.2E0	7.0E0	2.1E0
Cr-51	-0-	-0-	-0-	5.1E1	-0-	1.0E2	1.8E1	2.6E4
Mn-54	-0-	-0-	-0-	7.8E2	-0-	1.4E3	4.3E2	7.6E6
Co-57	-0-	-0-	-0-	4.7E3	-0-	8.1E3	1.7E2	1.9E6
Co-58	-0-	-0-	-0-	9.7E3	-0-	2.0E4	5.9E2	2.1E6
Co-60	-0-	-0-	-0-	3.7E4	-0-	7.3E4	1.6E3	1.2E8
Sr-89	-0-	-0-	-0-	5.0E4	-0-	2.6E4	1.7E3	3.1E4
Sr-90	-0-	-0-	-0-	1.0E6	-0-	8.1E5	5.5E5	1.3E6
Zr-95	-0-	-0-	-0-	6.3E4	-0-	1.1E5	8.3E2	1.6E6
Nb-95	-0-	-0-	-0-	2.4E5	-0-	4.5E5	5.7E2	1.6E6
Te-129m	-0-	-0-	-0-	6.0E5	-0-	4.5E5	2.0E2	6.5E5
Cs-134	-0-	-0-	-0-	1.4E5	-0-	1.2E5	4.7E3	3.8E7
Cs-136	-0-	-0-	-0-	5.1E3	-0-	4.3E3	8.1E2	8.3E5
Cs-137	-0-	-0-	-0-	1.3E5	-0-	9.5E4	3.4E3	5.7E7
Ba-140	-0-	-0-	-0-	5.1E3	-0-	4.3E3	1.2E3	1.2E5
Ce-141	-0-	-0-	-0-	1.5E3	-0-	2.4E3	6.6E2	7.9E4
Ce-144	-0-	-0-	-0-	1.8E4	-0-	3.0E4	4.5E3	4.3E5
I -131	-0-	-0-	-0-	6.6E5	-0-	4.4E5	6.6E4	7.0E5
I -133	-0-	-0-	-0-	1.6E-2	-0-	8.7E-3	1.2E4	1.3E4
I -135	-0-	-0-	-0-	1.1E-18	-0-	6.4E-19	2.5E3	1.4E4
UN-ID	-0-	-0-	-0-	1.1E5	-0-	9.5E4	5.7E2	4.2E6

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

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

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TABLE 2-13

DOSE PARAMETER R_i FOR SECTOR F

Pathway = Deer Consumer
X/Q = 3.0E-7 sec/m^3

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

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

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

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TABLE 5-1

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	37.0	NW
Shoreline Sediment (Beach Sand)			
1	San Onofre State Beach (0.6 mile Southeast)	0.6	SE
2	San Onofre Surfing Beach	0.9	NW
3	San Onofre State Beach (3.1 miles Southeast)	3.1	SE
4	Newport Beach (North End)	30.0	NW
Local Crops			
1	San Mateo Canyon (San Clemente Canyon)	2.6	NW
2	Southeast of Oceanside	22.0	SE
3	San Clemente Resident with Garden	4.1	NW

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

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