

ATTACHMENT 7

**RADIOACTIVE EFFLUENT RELEASE REPORT
OFFSITE DOSE CALCULATION MANUAL**

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

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PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

Table of Contents

I.	GASEOUS EFFLUENTS	1
A.	ALARM/TRIP SETPOINT METHOD	1
	1. Allowable Concentration.....	2
	2. Monitor Response	3
B.	DOSE RATE CALCULATION.....	4
C.	DESIGN OBJECTIVE QUANTITY (DBQ) LIMITS ON BATCH AND CONTINUOUS RELEASES	21
	1. Batch Releases	21
	2. Continuous Releases	22
	3. Exceeding DBQ Limits	22
	4. Releasing Radionuclides Not Listed in Table 1.9	22
D.	OPTIONAL QUARTERLY DOSE CALCULATIONS	23
	1. Methodology for Optional Quarterly Dose Calculations	23
E.	GASEOUS RADWASTE TREATMENT SYSTEM OPERATION.....	26
	1. System Description	26
	2. Determination of Satisfactory Operation.....	27
F.	RELEASE RATE FOR OFFSITE EC	27
G.	PARTICULATE AND IODINE SAMPLING	28
H.	NOBLE GAS SAMPLING	29
I.	TRITIUM SAMPLING	29
J.	FIGURES AND TABLES	30
II.	LIQUID EFFLUENTS	69
A.	CONCENTRATION.....	69
	1. Requirements.....	69
	2. Prerelease Analysis.....	69
	3. Effluent Concentration (EC) - Sum of the Ratios.....	70

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

Table of Contents

B.	INSTRUMENT SETPOINTS.....	71
	1. Setpoint Determination	71
	2. Composite Samplers	71
	3. Post-Release Analysis	72
C.	DOSE	72
	1. RETS Requirement.....	72
	2. Release Analysis	73
D.	OPERABILITY OF LIQUID RADWASTE EQUIPMENT	77
E.	RELEASE RATE FOR OFFSITE EC (50 MREM/YR).....	78
F.	FIGURES AND TABLES	79
III.	URANIUM FUEL CYCLE DOSE.....	100
	A. SPECIFICATION.....	100
	B. ASSUMPTIONS	100
	C. DOSE CALCULATION	101

Appendix A, "Relocated Technical Specification"

Appendix B, "Request to Retain Soil in Accordance With 10 CFR 20.302"

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

I. GASEOUS EFFLUENTS

A. ALARM/TRIP SETPOINT METHOD

Appendix A, Section III.B.1 requires that the dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the SITE BOUNDARY shall be limited to the following:

- For noble gases: Less than or equal to 500 mrems/yr to the total body and less than or equal to 3000 mrems/yr to the skin, and
- For iodine-131, for iodine-133, for tritium, and for all radionuclides in particulate form with half lives greater than 8 days: Less than or equal to 1500 mrems/yr to any organ.

Appendix A, Section III.A.1 requires gaseous effluent monitors to have alarm/trip setpoints to ensure that offsite concentrations, when averaged over 1 hour, will not be greater than Appendix A, Section III.B.1. This section of the ODCM describes the methodology that will be used to determine these setpoints.

The methodology for determining alarm/trip setpoints is divided into two major parts. The first consists of calculating an allowable concentration for the nuclide mixture to be released. The second consists of determining monitor response to this mixture in order to establish the physical settings on the monitors.

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

1. Allowable Concentration

The total EC-fraction (R_k) for each release point will be calculated by the relationship defined by Note 4 of Appendix B, 10 CFR 20:

$$R_{(k)} = \left(\frac{X}{Q} \right) (F) \sum_i \frac{C_i}{EC_i} \leq 5.0 \quad (1.1)$$

If gaseous tritium and noble gases are not present then:

$$R_{(k)} \leq 10$$

where:

- C_i = Actual or measured concentration, at ambient temperature and pressure of nuclide i ($\mu\text{Ci/cc}$)
- EC_i = The EC of nuclide i from 10 CFR 20, Appendix B, Table 2
- $R_{(k)}$ = The total EC-fraction for release point k
- X/Q = Most conservative sector site boundary dispersion (sec/m^3) - Table 1.3
- F = Release flow rate ($83,000 \text{ cfm} = 39.2 \text{ m}^3/\text{sec}$) for stack monitor considerations; variable for other monitors

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

NOTE: If a batch release is made while a continuous release or another batch release is in progress, the sum of all values of R_k must be less than 5.0.

2. Monitor Response

Normal radioactivity releases consist mainly of well-decayed fission gases. Therefore, monitor response calibrations are performed to fission gas typical of normal releases (mainly Xe-133). Response of monitors used to define fission product release rates under accident conditions may vary from that of Xe-133, however. Monitor response for the two categories of monitor is determined as follows:

a. Normal Release (aged fission gasses)

Total gas concentration ($\mu\text{Ci/cc}$) at the monitor is calculated. The calibration curve or constant for $\text{cpm}/\mu\text{Ci/cc}$ is applied to determine cpm expected. The setting for monitor alarms is established at some factor (b) greater than 1 but less than $1/R_k$ (Equation 1.1) times the measured concentration (c):

$$s = b \times c \tag{1.2}$$

b. Accident Releases

Monitors are preset to alarm at or before precalculated offsite dose rates would be achieved under hypothetical accident conditions. These setpoints are established in accordance with Emergency Plan requirements for defining Emergency Action Levels and associated actions. Emergency Implementing Procedures contain monitor-specific curves or calibration constants for conversion between cpm and $\mu\text{Ci/cc}$ (or R/hr and $\mu\text{Ci/cc}$), depending on monitor type, for fission product mixtures as a function of mixture decay time.

When these monitors are utilized for other than accident conditions, either an appropriately decayed "accident" conversion curve may be used, or a decayed fission gas calibration factor may be applied. In these cases, setpoints are established as in 1.A above.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

Setpoints of accident monitors (if set to monitor normal releases) are reset to the accident alarm settings at the end of normal release. Setpoints of other release monitors are maintained at the level used at the latest release (well below the level which would allow 10 times EC to be exceeded at the site boundary), or are reset to approximately three times background in order to detect leakage or inadvertent releases of low level gases.

B. DOSE RATE CALCULATION

1. Dose rates are calculated for (1) noble gases and (2) iodines and particulates. Dose rates as defined in this section are based on 10 CFR 50 Appendix I limits of mrem per quarter and millirem per year. All dose pathways of major importance in the Palisades environs are considered.
 - a. Equations and assumptions for calculating doses from noble gases are as follows:
 - 1) Assumptions
 - a) Doses to be calculated are the maximum offsite point in air, total body and skin.
 - b) Exposure pathway is submersion within a cloud of noble gases.
 - c) Noble gas radionuclide mix is based on the historically observed source term given in Table 1.1, plus additional nuclides.
 - d) Basic radionuclide data are given in Table 1.2.
 - e) All releases are treated as ground-level.
 - f) Meteorological data expressed as joint-frequency distribution of wind speed, wind direction, and atmospheric stability for the period resulting in X/Q's and D/Q's shown in Table 1.3.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

- g) Raw meteorological data consists of wind speed and direction measurements at 10m and temperature measurements at 10m and 60m.
- h) Dose is to be evaluated at the offsite exposure points where maximum concentrations are expected to exist (overland sector site boundaries), and nearest residents.
- i) Potential maximum population (resident) exposure points are identified in Table 1.4.
- j) A semi-infinite cloud model is used.
- k) For person exposures, credit is taken for shielding by residence (factor of 0.7).
- l) Radioactive decay is considered for the plume.
- m) Building wake effects on effluent dispersion are considered.
- n) A sector-average dispersion equation is used.
- o) The wind speed classes that are used are as follows:

<u>Wind Speed</u> <u>Class Number</u>	<u>Range (m/s)</u>	<u>Midpoint (m/s)</u>
1	0.0-0.4	0.2
2	0.4-1.5	0.95
3	1.5-3.0	2.25
4	3.0-5.0	4.0
5	5.0-7.5	6.25
6	7.5-10.0	8.75
7	> 10.0	--

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

- p) The stability classes that will be used are the standard A through G classifications. The stability classes 1-7 will correspond to A=1, B=2, ..., G=7.
- q) Terrain effects are not considered.

2) Equations

To calculate the dose for any one of the exposure points, the following equations are used.

For determining the air concentration of any radionuclide:

$$X_i = \sum_{j=1}^9 \sum_{k=1}^7 \left(\frac{2}{\pi}\right)^{1/2} \frac{f_{jk} Q_i p}{\sum_{zk} U^j (2\pi x/n)} \left[\exp\left(-\lambda_i \frac{x}{u_j}\right) \right] \quad (1.3)$$

where:

- X_i = Air concentration of radionuclide i, $\mu\text{Ci}/\text{m}^3$.
- f_{jk} = Joint relative frequency of occurrence of winds in wind speed class j, stability class k, blowing toward this exposure point, expressed as a fraction.
- Q_i = Average release rate of radionuclide i, $\mu\text{Ci}/\text{s}$.
- p = Fraction of radionuclide remaining in plume.
- \sum_{zk} = Vertical dispersion coefficient for stability class k (m).
- u_j = Midpoint value of wind speed class interval j, m/s.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

- x = Downwind distance, m.
- n = Number of sectors, 16.
- λ_i = Radioactive decay coefficient of radionuclide i , s^{-1} .
- $2\pi x/n$ = Sector width at point of interest, m.

For determining the total body dose rate:

$$D_{TB} = \sum_i X_i DFB_i \quad (1.4)$$

where:

- D_{TB} = Total body dose rate, mrem/y.
- X_i = Air concentration of radionuclide i , $\mu\text{Ci}/\text{m}^3$.
- DFB_i = Total body dose factor due to gamma radiation, mrem/y per $\mu\text{Ci}/\text{m}^3$ (Table 1.5).

For determining the skin dose rate:

$$D_s = \sum_i X_i (DFS_i + 1.11DFY_i) \quad (1.5)$$

where:

- D_s = Skin dose rate, mrem/y.
- X_i = Air concentration of radionuclide i , $\mu\text{Ci}/\text{m}^3$.
- DFS_i = Skin dose factor due to beta radiation, mrem/y per $\mu\text{Ci}/\text{m}^3$ (Table 1.5).

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

1.11 = The average ratio of tissue to air energy absorption coefficients, mrem/mrad.

DFY_i = Gamma-to-air dose factor for radionuclide i, mrad/y per $\mu\text{Ci}/\text{m}^3$ (Table 1.5).

For determining dose rate to a point in air:

$$D_a = \sum_i X_i (\text{DFY}_i \text{ or } \text{DFB}_i) \quad (1.6)$$

where:

D_a = Air dose rate, mrad/yr.

DFB_i = Air dose factor for beta radiation (Table 1.5).

b. Equations and assumptions for calculating doses from radioiodines and particulates are as follows:

1) Assumptions

- a) Dose is to be calculated for the critical organ, thyroid, and the critical age groups (adult, teen, child, infant), infant (milk) and child (green, leafy vegetables).
- b) Exposure pathways from iodines and particulates are milk ingestion, ground contamination, green leafy vegetables from home gardens, and inhalation.
- c) The radioiodine and particulate mix is based on the historically observed source term given in Table 1.1.
- d) Basic radionuclide data are given in Table 1.2.
- e) All releases are treated as ground-level.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

- f) Mean annual average X/Q's are given in Table 1.3.
- g) Raw meteorological data for ground-level releases consist of wind speed and direction measurements at 10m and temperature measurements at 10m and 60m.
- h) Dose is to be evaluated at the potential offsite exposure points where maximum doses to man are expected to exist.
- i) Real cow, goat and garden locations are considered.
- j) Potential maximum exposure points (Table 1.4) considered are the nearest cow, goat, and home garden locations in each sector.
- k) Terrain effects and open terrain recirculation factors are not considered.
- l) Building wake effects on effluent dispersion are considered.
- m) Plume depletion and radioactive decay are considered for air-concentration calculations.
- n) Radioactive decay is considered for ground-concentration calculations.
- o) Deposition is calculated based on the curves given in Figure 1.2.
- p) Milk cows and goats obtain 100% of their food from pasture grass May through October of each year. Use default values of 0.58 for cows and 0.67 for goats for fraction of year on pasture.
- q) Credit is taken for shielding by residence (factor of 0.7).

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

2) Equations

To calculate the dose for any one of the potential maximum-exposure points, the following equations in Section 1.2.2 are used.

a) Inhalation

Equation for calculating air concentration, X_i is the same as in the Noble Gas Section (Equation 1.3).

For determining the organ dose rate:

$$D_i = 1 \times 10^6 \sum_i X_i DFI_i BR \quad (1.7)$$

where:

D_i = Organ dose rate due to inhalation, mrem/y.

X_i = Air concentration of radionuclide i , $\mu\text{Ci}/\text{m}^3$.

DFI_i = Inhalation dose factor, mrem/pCi (Table 1.7).

BR = Breathing rate 1400 m^3/y infant; 3700 m^3/y child; or 8000 m^3/y teen and adult.

1×10^6 = pCi/ μCi conversion factor.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

b) Ground Contamination

For determining the ground concentration of any nuclide;

$$G_i = 3.15 \times 10^7 \sum_{k=1}^7 \frac{f_k Q_i DR}{(2\pi x/n)\lambda_i} [1 - \exp(-\lambda_i t_b)] \quad (1.8)$$

where:

G_i = Ground concentration of radionuclide i , $\mu\text{Ci}/\text{m}^2$.

k = Stability class.

f_k = Joint relative frequency of occurrence of winds in stability class k blowing toward this exposure point, expressed as a fraction.

Q_i = Average release rate of radionuclide i , $\mu\text{Ci}/\text{s}$.

DR = Relative deposition rate, m^{-1} (Fig 1.2).

x = Downwind distance, m.

n = Number of sectors, 16.

$2\pi x/n$ = Sector width at point of interest, m.

λ_i = Radioactive decay coefficient of radionuclide i , y^{-1} .

t_b = Time for buildup of radionuclides on the ground, 15 y.

3.15×10^7 = s/y conversion factor.

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

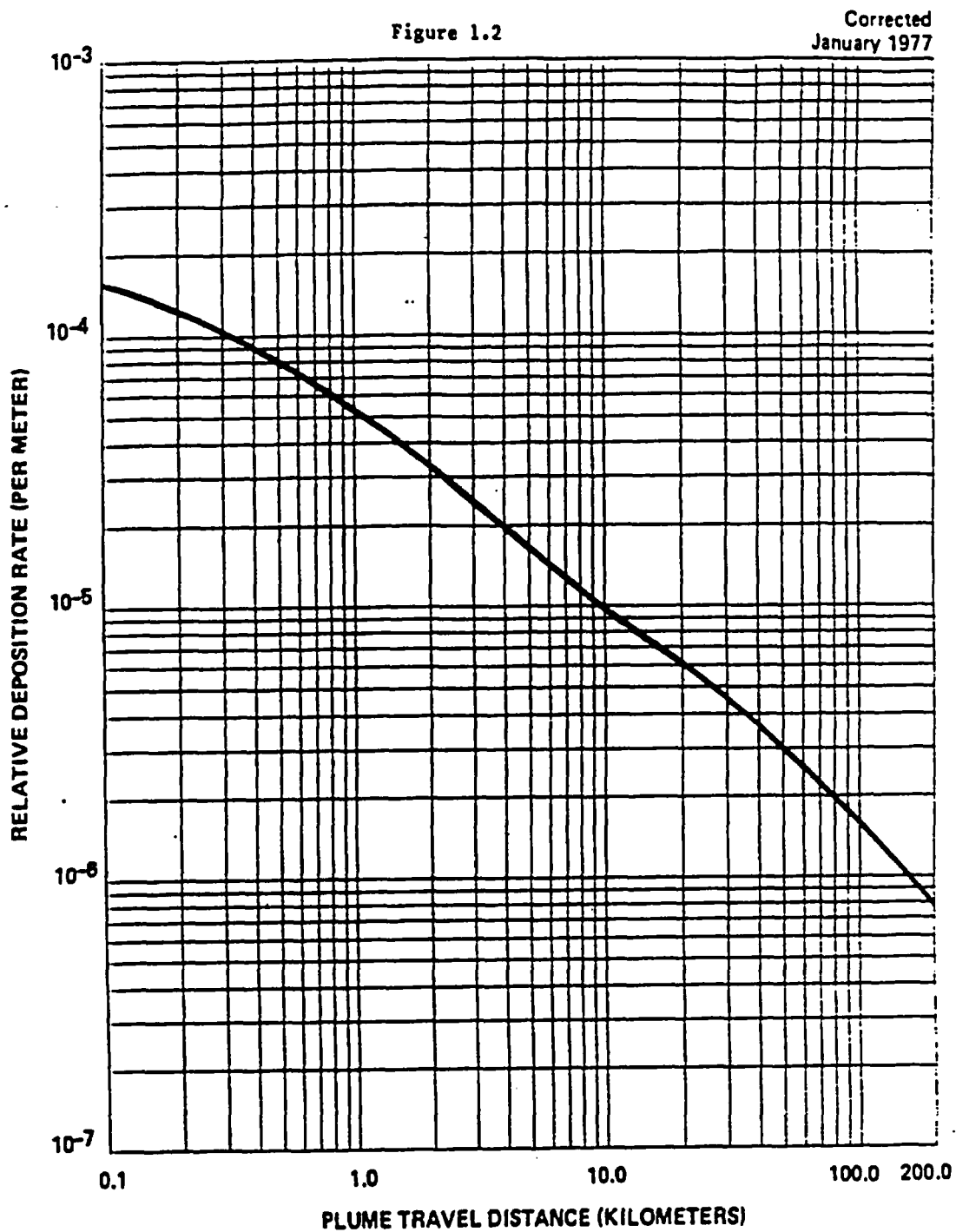


Figure 7. Relative Deposition for Ground Level Releases (All Atmospheric Stability Classes)

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

For determining the total body or organ dose rate from ground contamination:

$$D_G = (8,760)(1 \times 10^6)(0.7) \sum_i G_i DFG_i \quad (1.9)$$

where:

- D_G = Dose rate due to ground contamination, mrem/y.
- G_i = Ground concentration of radionuclide i , $\mu\text{Ci}/\text{m}^2$.
- DFG_i = Dose factor for standing on contaminated ground, mrem/h per pCi/m^2 (Table 1.8).
- 8,760 = Occupation time, h/y.
- 1×10^6 = $\text{pCi}/\mu\text{Ci}$ conversion factor.
- 0.7 = Shielding factor accounting for a distance of 1.0 meter above ordinary ground, dimensionless.

c) Milk and Vegetation Ingestion

For determining the concentration of any nuclide (except C-14 and H-3) in and on vegetation:

$$CV_i = 3,600 \sum_{k=1}^7 \frac{f_k Q_i DR}{(2\pi x/n)} \left(\frac{r[1 - \exp(-\lambda_{EI} t_e)]}{Y_v \lambda_{EI}} + B_{iv} \left[\frac{1 - \exp(-\lambda_i t_b)}{P \lambda_i} \right] \right) [\exp(-\lambda_i t_h)] \quad (1.10)$$

where:

- CV_i = Concentration of radionuclide i in and on vegetation, $\mu\text{Ci}/\text{kg}$.
- k = Stability class.

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

f_k	=	Frequency of this stability class and wind direction combination, expressed as a fraction.
Q_i	=	Average release rate of radionuclide i , $\mu\text{Ci/s}$.
DR	=	Relative deposition rate, m^{-1} (Figure 1.2).
x	=	Downwind distance, m .
n	=	Number of sectors, 16.
$2\pi x/n$	=	Sector width at point of interest, m .
r	=	Fraction of deposited activity retained on vegetation (1.0 for iodines, 0.2 for particulates).
λE_i	=	Effective removal rate constant, $\lambda E_i = \lambda_i + \lambda_w$, where λ_i is the radioactive decay coefficient, h^{-1} , and λ_w is a measure of physical loss by weathering ($\lambda_w = 0.0021 \text{ h}^{-1}$).
t_e	=	Period over which deposition occurs, 720 h.
Y_v	=	Agricultural yield, 0.7 kg/m^2 .
B_{iv}	=	Transfer factor from soil to vegetation of radionuclide i (Table 1.6).
λ_i	=	Radioactive decay coefficient of radionuclide i , h^{-1} .
t_b	=	Time for buildup of radionuclides on the ground, $1.31 \times 10^5 \text{ h}$ (15Y).

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

p = Effective surface density of soil,
240 kg/m².

3,600 = s/h conversion factor.

t_h = Holdup time between harvest and
consumption of food (2,160 hours for
stored food).

For determining the concentration of C-14 in
vegetation:

$$CV_{14} = 1 \times 10^3 X_{14} (0.11/0.16) \quad (1.11)$$

where:

CV₁₄ = Concentration of C-14 in vegetation,
μCi/kg.

X₁₄ = Air concentration of C-14, μCi/m³.

0.11 = Fraction of total Plant mass that is
natural carbon.

0.16 = Concentration of natural carbon in
the atmosphere, g/m³.

1x10³ = g/kg conversion factor.

For determining the concentration of H-3 in
vegetation:

$$CV_T = 1 \times 10^3 X_T (0.75)(0.5/H) \quad (1.12)$$

where:

CV_T = Concentration of H-3 in vegetation,
μCi/m³.

X_T = Air concentration of H-3, μCi/m³.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

- 0.75 = Fraction of total Plant mass that is water.
- 0.5 = Ratio of tritium concentration in Plant water to tritium concentration in atmospheric water.
- H = Absolute humidity of the atmosphere, g/m³.
- 1x10³ = g/kg conversion factor.

For determining the concentration of any nuclide in cow's or goat's milk:

$$CM_i = CV_i FM_i Q_f \exp(-\lambda_i t_f) \quad (1.13)$$

where:

- CM_i = Concentration of radionuclide i (including C-14 and H-3) in milk, μCi/l.
- CV_i = Concentration of radionuclide i in and on vegetation, μCi/kg.
- FM_i = Transfer factor from feed to milk for radionuclide i, d/l (Table 1.6).
- Q_f = Amount of feed consumed by the milk animal per day, kg/d (cow, 50 kg/d or goat 6 kg/d).
- λ_i = Radioactive decay coefficient of radionuclide i, d⁻¹.
- t_f = Transport time of activity from feed to milk to receptor, 2 days.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

For determining the organ dose rate from ingestion of green leafy vegetables and milk:

$$D = 1 \times 10^6 \sum_i C_{M_i} D_{F_i} U_{M} \quad (1.14)$$

where:

D = Organ dose rate due to ingestion, mrem/y.

C_{M_i} = Concentration of radionuclide i in vegetables or milk, $\mu\text{Ci/kg}$ (or liters).

D_{F_i} = Ingestion dose factor, mrem/pCi (Table 2.1).

UM = Ingestion rate for milk, 330 l/y; for vegetables 26 kg/yr (child), no ingestion by infant.

1×10^6 = pCi/ μCi conversion factor.

d) Meat Ingestion (Beef)

To calculate the concentration of a nuclide in animal flesh:

$$C_{f_i} = F_{f_i} C_{V_i} Q_{f_i} \exp(-\lambda_i t_s) \quad (1.15)$$

where:

C_{f_i} = Concentration of nuclide i in the animal flesh, pCi/kg.

F_{f_i} = Fraction of animal's daily intake which appears in each kg of flesh, days/kg (Table 1.6).

C_{V_i} = Concentration of radionuclide i in the animal's feed (Equation 1.10).

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

Q_f = Amount of feed consumed by the cow per day, 50 kg/d.

t_s = Average time from slaughter to consumption, 20 days.

To determine the organ dose from ingestion of beef:

$$D^f = \sum_i C_{fi} D_{fi} U_f \quad (1.16)$$

where:

D_{fi} = Ingestion dose factor for age group, mrem/pCi (Table 2.1) for nuclide i.

U_f = Ingestion rate of meat for age group, kg/y (child-41, teen-65, adult-110).

e) Organ Dose Rates

For determining the total body and organ dose rate from iodines and particulates:

$$D = D_I + D_G + D_M + D_V + D_F \quad (1.17)$$

where:

D = Total organ dose rate, mrem/y.

D_I = Dose rate due to inhalation, mrem/y.

D_G = Dose rate due to ground contamination, mrem/y.

D_M = Dose rate due to milk ingestion, mrem/y.

D_V = Dose rate due to vegetable ingestion, mrem/y.

D_F = Dose rate due to beef ingestion, mrem/y.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

- 3) The maximum organ dose rate, maximum total body dose rate, and maximum skin dose rate calculated in the previous section (Sec I.B) are used to calculate design basis quantities as described in Section I.B.1.3.

c. Design Basis Quantities

The design basis quantity of a radionuclide emitted to the atmosphere is the amount of that nuclide, when released in one year, which would result in a dose not exceeding any of the following:

- 1) 15 millirem to any organ of an individual from iodines and particulates with half-life greater than 8 days (Appendix A, Section III.D.1).
- 2) 15 millirem to skin of an individual from noble gas (Appendix A, Section III.C.1.b).
- 3) 5 millirem to the total body of an individual from noble gas (Appendix A, Section III.C.1.a).

Design basis quantity (C_i) is the smallest value for each nuclide, calculated by dividing the dose limits (a through c above) by the appropriate dose calculated from the amount of radionuclide (C_i) used to conservatively estimate the doses of Section D, as listed in Table 1.1 (or a hypothetical 1 Ci/year); the result is then multiplied by the amount of radionuclide used.

$$DBQ = \frac{D_{AI}}{D_c} (C_c) \quad (1.18)$$

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

where:

D_{AI} = Appendix I dose limit (mrem or mrad).

D_c = Calculated dose (mrem or mrad).

C_c = Quantity of nuclide resulting in dose D_c (Ci).

DBQ = Design Basis Quantity (Ci).

The limiting values for Design Basis Quantities for radionuclides released to the atmosphere are given in Table 1.9.

The inverse of the ratio C_c/D_c in the above equation (ie, D_c/C_c) is a useful value, since it represents the most limiting dose per unit quantity of each nuclide released. Use of the D_c/C_c ratio in quarterly evaluation of offsite dose is discussed in Section D. Values of D_c/C_c are given in Table 1.9.

d. Land Use Census and DBQ Changes

Appendix A, Sections J.3.b and J.3.c describe the requirements for an annual land use census and revision of the ODCM for use in the following calendar year. Areas of the ODCM which will be reviewed, and changed if appropriate, are Table 1.4 (Land Use Census Data by Sector), Table 1.4a (Critical Receptors), and Table 1.9 (Gaseous Design Basis Objective Annual Quantities). Changes will be effective on January 1 of the year following the year of the survey.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

e. **Gaseous Releases From the Steam Generator Blowdown Vent and Atmosphere Release Valves**

Releases from the steam generator blowdown vent and atmospheric relief valves are difficult to quantify as there are no sampling capabilities on these steam release systems. However, neither system is a normal release path. The steam generator blowdown vent is normally routed to the main condenser and recirculated. Radioactive releases will be calculated by analyzing steam generator blowdown liquid and assuming that 100 percent of Noble Gases, 10 percent of the Iodines and 1 percent of the Particulates will be released to the environment in the steam phase. Volumes will be calculated using water balances or alternate means as available.

C. DESIGN OBJECTIVE QUANTITY (DBQ) LIMITS ON BATCH AND CONTINUOUS RELEASES

1. Batch Releases

Prior to each batch release (waste decay tank release or Containment purge), the quantity of each nuclide identified is summed with the quantity of that nuclide released since the first of the current calendar year. The cumulative total for each nuclide then is divided by the design objective quantity for each nuclide (from Table 1.9), and the resultant fractions are summed in order to assure that the sum fraction of all nuclides does not exceed 1.0:

$$\sum_i \frac{A_i}{(DBQ)_i} < 1.0 \quad (1.19)$$

The amount in any calendar quarter should not exceed 0.5. This is checked by subtracting the value obtained at the end of the previous quarter from the value obtained from the cumulative total to date, including the batch to be released.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

2. Continuous Releases

Low level continuous releases from the vent gas collection header and other low level sources are totaled on a weekly basis and summed with any batch releases for the week in order to establish the cumulative DBQ fraction from batch plus continuous released for the year-to-date.

Calculations are performed in the same manner as for batch releases described in C.1.

3. Exceeding DBQ Limits

As discussed under B.1.3, the DBQ is a very conservative estimate of activity which could give doses at Appendix I limits. Because different organs are summed together and doses to different people are summed, the DBQ typically overestimates dose by about a factor of five. Thus, if calculations of DBQ fraction exceed 1.0 for year-to-date or 0.5 for the quarter, technical specifications probably still would not be exceeded. However, further discretionary releases should be deferred until an accurate assessment of dose is made by use of GASPARG computer code or by analysis of appropriate release data via the segment gaussian dose model used in emergency planning (inhalation dose, total body external dose, and boundary dose in air). See also Section D.1.2.

It should be noted that Palisades Plant to date (based on review of semiannual effluent data) has never exceeded the annual or quarterly DBQ fraction, despite its conservatism. Thus, it is not expected that an alternate to the DBQ method will be required unless the Plant is in a significantly off-normal condition.

4. Releasing Radionuclides Not Listed in Table 1.9

Table 1.9 contains all nuclides identified to date as routine constituents of gaseous releases at Palisades Plant, plus those common to PWRs in general, even if not previously detected at Palisades. From time to time, however, other nuclides may be detected.

If the unlisted nuclide constitutes less than 10% of the EC-fraction for the release, and all unlisted nuclides total less than 25% of the EC-fraction, the nuclide may be considered not present.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

If the unlisted nuclide constitutes greater than 10% of the EC-fraction, or all unlisted nuclides together constitute greater than 25%, then each nuclide should be assigned a DBQ equal to the most conservative value listed for the physical form of the nuclide involved (noble gas, halogen, or particulate).

Should a nuclide not listed in Table 1.9 begin to appear in significant quantities on a routine basis, revision to this ODCM should be made in order to include a design basis quantity specific to that nuclide.

D. OPTIONAL QUARTERLY DOSE CALCULATIONS

1. Methodology for Optional Quarterly Dose Calculations

This option may be used in place of, or in addition to, the Design Basis Quantity (DBQ) fraction calculation described by Equation 1.19. This optional conservative calculation relates the DBQ fraction to the doses from which it was originally derived. Use of this method may assist in identification of the critical dose pathway or characteristics of the assumed critical individual (infant, child, teen, and adult), since Table 1.9 indicates these parameters.

a. Simplified Conservative Approach

This method utilizes a limiting dose concept such that the limiting dose for each nuclide is summed with the limiting dose for each other nuclide, regardless if such sum is physically possible. It also assumes critical pathways, such as milk and vegetables, are in effect even in winter when the pathway is absent.

As such, the method is highly conservative and significantly over-estimates dose. If limits appear to be exceeded by this method, Section D.1.2 (a concise method, but requiring computer support) will be utilized.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

1) Assumptions

- a) All assumptions of Section 1.1 are utilized.
- b) Limiting doses for each gaseous nuclide are summed, regardless of limiting decay mode (gamma or beta).
- c) Limiting doses for each particulate and iodine nuclide are summed, regardless of dose point location, exposure pathway, or organ affected.
- d) Doses are summed for detected nuclides such that all nuclides which contribute greater than 10% individually or 25% in aggregate, to the EC of released radioactivity, are included in the dose calculation.

2) Equations

For determining gaseous effluent dose:

$$D_G = \sum_i A_{iG} (D_c / C_c)_{iG} < 5 \text{ millirad/quarter, } 10 \text{ mrad/yr} \quad (1.20)$$

where:

DG = Dose from gaseous effluents (mrad).

A_{iG} = Quantity of gaseous nuclide i released (Ci).

(D_c/C_c)_{iG} = Dose per Ci factor for gaseous nuclide i (mrad/Ci).

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

The limit for this mixture is conservatively taken as that for gamma exposure (5 mrem/quarter, 10 mrem/year) although as indicated in Table 1.9, a majority of the gaseous effluents are beta-limiting and on an individual basis have the higher limit of 10 millirem/quarter and 20 millirem/year.

For determining tritium, particulate and iodine dose to organs:

$$D_{TPI} = \sum_i A_{TPIi} (D_c / C_c)_{TPIi} < 7.5 \text{ mrem/q, } 15 \text{ mrem/y}$$

(1.21)

where:

D_{TPI} = Dose from particulates and iodines (mrem).

A_{TPIi} = Quantity of particulate or iodine nuclide i released (Ci).

$(D_c / C_c)_{TPIi}$ = Dose per Ci factor for particulate or iodine nuclide i (mrad/Ci).

b. Realistic Calculation

This methodology is to be used if the highly conservative calculations described in C.1 or D.1 yield values that appear to exceed applicable limits.

Doses for released particulates, iodines and noble gases will be determined by use of the NRC GASPAR computer code. The computer run will utilize the annual average joint frequency meteorological data based on not less than 3 years of meteorological measurement, and will reflect demographic and land use information from the land use survey generated in the most recent prior year. Where appropriate, seasonal adjustments will be applied to obtain realistic dose estimates since both recreational and agricultural activities can vary greatly in relation to season of the year.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

An alternative to GASPARG for offsite dose calculation is the use of the Palisades Segmented Gaussian Plume Emergency offsite dose calculation program. This dose model allows evaluation of dose under the actual meteorological conditions present at the time of release. It is anticipated that the system may be used in major short-term releases such as Containment purges are to be made under conditions which depart significantly from mean annual conditions.

E. GASEOUS RADWASTE TREATMENT SYSTEM OPERATION

The gaseous radwaste treatment system (GRTS) described below shall be maintained and operated to keep releases ALARA.

1. System Description

A flow diagram for the GRTS is given in Figure 1-1. The system consists of three waste-gas compressor packages, six gas decay tanks, and the associated piping, valves, and instrumentation. Gaseous wastes are received from the following: degassing of the reactor coolant and purging of the volume control tank prior to a cold shutdown, displacing of cover gases caused by liquid accumulation in the tanks connected to the vent header, and boron recycle process operation.

Design of the system precludes hydrogen explosion by means of ignition source elimination (diaphragm valves, low flow diaphragm compressors and system electrical grounding), and minimization of leakage outside the system. Explosive mixtures of hydrogen and oxygen have been demonstrated compatible with the system by operational experience over the past 13 years.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

2. Determination of Satisfactory Operation

Design basis quantity fraction will be calculated for batch and continuous releases as described in Section I.C. These calculations will be used to ensure that the GRTS is operating as designed. Because the Plant was designed to collect and hold for decay a vast majority of the high level gases generated within the primary system, and because the 13-year operating history (to date of writing the initial ODCM) of the Plant has demonstrated the system's consistent performance well below Appendix I limits, no additional operability requirements are specified.

F. RELEASE RATE FOR OFFSITE EC

10 CFR 20.1302 requires radioactive effluent releases to unrestricted areas be in concentrations less than the limits specified in Appendix B, Table 2 when averaged over a period not to exceed one year. (Note: there are no unrestricted areas anywhere within the site boundary as defined by Figure 1-1.) Concentrations at this level if inhaled or ingested continuously for one year will result in a dose of 50 mrem whole body except for submersion dose isotopes (gaseous tritium and noble gasses) which will result in a dose of 100 mrem whole body. 10 CFR 50.36a requires that the release of radioactive materials be kept as low as reasonably achievable. However, the section further states that the licensee is permitted the flexibility of operation, to assure a dependable source of power even under unusual operating conditions, to release quantities of material higher than a small percentage of 10 CFR 20.1302 limits but still within those limits. Appendix I to 10 CFR 50 provides the numerical guidelines on limiting conditions for operations to meet the as low as reasonably achievable requirement.

The GASPAR code has been run to determine the dose due to external radiation and inhalation. The source term used is listed in Table 1.1. The meteorology data is given in Table 1.3. Dose using annual average meteorology, to the most limiting organ of the person assume to be residing at the site boundary with highest X/Q, is 2.15E-02 mrem (for one year). The release rate which would result in a dose rate equivalent to 50 mrem/year (using the more conservative total body limit) is the curies/year given in Table 1.1 multiplied by $50/2.15E-02$ or 0.11 Ci/sec.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

G. PARTICULATE AND IODINE SAMPLING

Particulate and iodine samples are obtained from the continuous sample stream pulled from the Plant stack. Samples typically are obtained to represent an integrated release from a gas batch (waste gas decay tank or Containment purge, for example), or a series of samples are obtained to follow the course of a release. In any event, sample intervals are weekly, at a minimum.

Because HEPA filters are present between most source inputs to the stack and the sample point, releases of particulates normally are significantly less than pre-release calculations indicate. This provides for conservatism in establishing setpoints and in estimation of pre-release design basis quantity fraction. However, for the sake of maintaining accurate release totals, monitor results (for gases) and sample results (for particulates and iodines) are utilized rather than the pre-release estimates, for cumulative records.

Gamma analytical results for particulate and halogen filters are combined for determination of total activity of particulates and halogens released. Beta and alpha counting also is performed on the particulate filters. Beta yields of the gamma isotopes detected on particulate filters are applied to determine "identified" beta, and the "identified" count rate is subtracted from the observed count rate to give "unidentified" beta. The "unidentified" beta is assumed to be Sr-90 until results on actual Sr-90 (chemically separated from a quarterly composite of filters) are obtained. Sampling and analysis will be performed per Appendix A, Table B-1 requirements.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

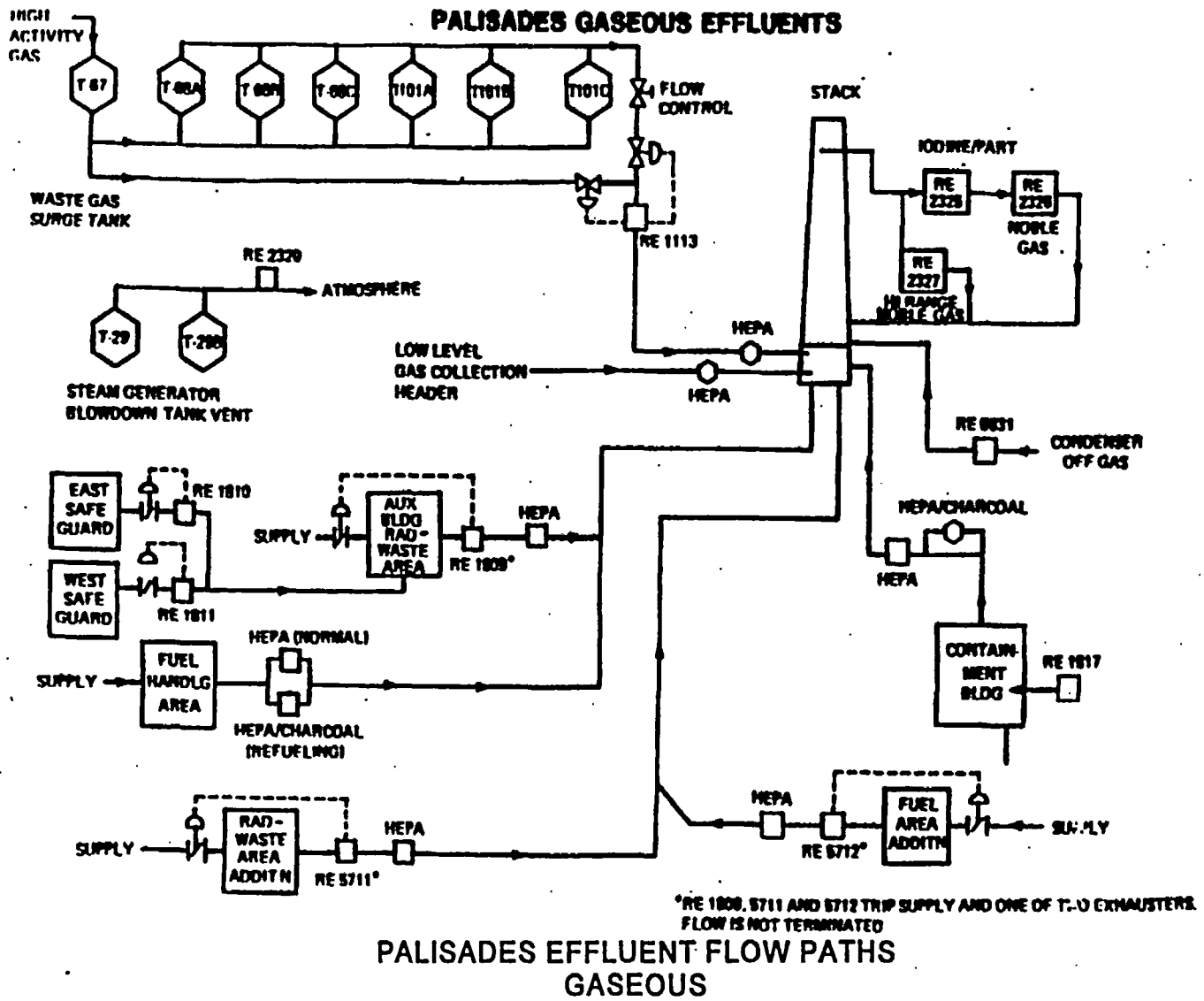
H. NOBLE GAS SAMPLING

Noble gases will be sampled from Waste Gas Decay Tanks prior to release and the Containment prior to purging. Analysis of these samples will be used for accountability of noble gases. Off gas will be sampled at least weekly and used to calculate monthly noble gas releases. Nonroutine releases will be quantified from the stack noble gas monitor (RE 2326) which has a LLD of $1\text{E-}06 \mu\text{Ci/cc}$. Sampling and analysis will be performed per Appendix A, Table B-1 requirements.

I. TRITIUM SAMPLING

Tritium has a low dose consequence to the public because of low production rates. The major contributors to tritium effluents are evaporation from the fuel pool and reactor cavity (when flooded). Because of the low dose impact, gaseous tritium sampling will not be required. Tritium effluents will be estimated using conservative evaporation rate calculations from the fuel pool and reactor cavity.

J. FIGURES AND TABLES



PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.1
PALISADES GASEOUS AND LIQUID SOURCE TERMS, CURIES/YEAR (1)

<u>Nuclide</u>	<u>Gaseous(2)</u>	<u>Liquid(2)</u>
H-3	5.5	159
Kr-85	4.1	NA
Kr-85m	0.12	NA
Kr-87	8.4E-02	NA
Kr-88	2.1E-01	NA
Ar-41	3.1E-02	NA
Xe-131m	2.2	NA
Xe-133	1493	NA
Xe-133m	0.43	NA
Xe-135	1.11	NA
Xe-135m	0.3	NA
I-131	0.025	3.21E-03
I-132	2.91E-03	NA
I-133	6.5E-03	4.7E-05
I-134	4.8E-04	NA
I-135	1.84E-02	NA
Na-24	1.5E-06	NA
Cr-51	2.5E-04	3.9E-03
Mn-54	4.1E-04	7.8E-03
Co-57	2.1E-06	3.2E-05
Co-58	8.6E-04	2.9E-02
Fe-59	6.6E-06	4.1E-04
Co-60	1.1E-03	1.24E-02
Se-75	3.7E-06	NA
Nb-95	2.4E-05	4.53E-04
Zr-95	4.7E-06	1.79E-04
Mo-99	1.5E-07	NA
Ru-103	.3E-07	.1E-05
Sb-127	NA	3.5E-05
Cs-134	4.5E-05	0.7
Cs-136	NA	1.8E-06
Cs-137	2.6E-04	1.36E-02
Ba-140	2.8E-07	NA
La-140	7.5E-07	1.1E-04
Unidentified beta	3.9E-04	3.3E-03

- (1) Data derived from taking the effluents released during July-December 1978 through January-June 1982 and dividing by 4.
- (2) Nuclide values listed as NA have not been observed at detectable levels in these waste streams.

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

**TABLE 1.2
BASIC RADIONUCLIDE DATA**

	<u>NUCLIDE</u>	<u>HALF-LIFE</u> <u>(days)</u>	<u>LAMBDA</u> <u>(1/s)</u>	<u>BETA¹</u> <u>(MEV/DIS)</u>	<u>GAMMA¹</u> <u>(MEV/DIS)</u>
1	Tritium	4.49E 03	1.79E-09	5.68E-03	0.0
2	C-14	2.09E 06	3.84E-12	4.95E-02	0.0
3	N-13	6.94E-03	1.16E-03	4.91E-01	1.02E 00
4	O-19	3.36E-04	2.39E-02	1.02E 00	1.05E 00
5	F-18	7.62E-02	1.05E-04	2.50E-01	1.02E 00
6	NA-24	6.33E-01	1.27E-05	5.55E-01	4.12E 00
7	P-32	1.43E 01	5.61E-07	6.95E-01	0.0
8	AR-41	7.63E-02	1.05E-04	4.64E-01	1.28E 00
9	CR-51	2.78E 01	2.89E-07	3.86E-03	3.28E-02
10	MN-54	3.03E 02	2.65E-08	3.80E-03	8.36E-01
11	MN-56	1.07E-01	7.50E-05	8.29E-01	1.69E 00
12	FE-59	4.50E 01	1.78E-07	1.18E-01	1.19E 00
13	CO-58	7.13E 01	1.12E-07	3.41E-02	9.78E-01
14	CO-60	1.92E 03	4.18E-09	9.68E-02	2.50E 00
15	ZN-69m	5.75E-01	1.39E-05	2.21E-02	4.16E-01
16	ZN-69	3.96E-02	2.03E-04	3.19E-01	0.0
17	BR-84	2.21E-02	3.63E-04	1.28E 00	1.77E 00
18	BR-85	2.08E-03	3.86E-03	1.04E 00	6.60E-02
19	KR-85m	1.83E-01	4.38E-05	2.53E-01	1.59E-01
20	KR-85	3.93E 03	2.04E-09	2.51E-01	2.21E-03
21	KR-87	5.28E-02	1.52E-04	1.32E 00	7.93E-01
22	KR-88	1.17E-01	6.86E-05	3.61E-01	1.96E 00
23	KR-89	2.21E-03	3.63E-03	1.36E 00	1.83E 00
24	RB-88	1.24E-02	6.47E-04	2.06E 00	6.26E-01
25	RB-89	1.07E-02	7.50E-04	1.01E 00	2.05E-00
26	SR-89	5.20E 01	1.54E-07	5.83E-01	8.45E-05
27	SR-90	1.03E 04	7.79E-10	1.96E-01	0.0
28	SR-91	4.03E-01	1.99E-05	6.50E-01	6.95E-01
29	SR-92	1.13E-01	7.10E-05	1.95E-01	1.34E 00
30	SR-93	5.56E-03	1.44E-03	9.20E-01	2.24E 00
31	Y-90	2.67E 00	3.00E-06	9.36E-01	0.0
32	Y-91m	3.47E-02	2.31E-04	2.73E-02	5.30E-01
33	Y-91	5.88E 01	1.36E-07	6.06E-01	3.61E-03
34	Y-92	1.47E-01	5.46E-05	1.44E 00	2.50E-01
35	Y-93	4.29E-01	1.87E-05	1.17E 00	8.94E-02
36	ZR-95	6.50E 01	1.23E-07	1.16E-01	7.35E-01
37	NB-95m	3.75E 00	2.14E-06	1.81E-01	6.06E-02
38	NB-95	3.50E 01	2.29E-07	4.44E-02	7.64E-01
39	MO-99	2.79E 00	2.87E-06	3.96E-01	1.50E-01
40	TC-99m	2.50E-01	3.21E-05	1.56E-02	1.26E-01

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.2 (continued)
BASIC RADIONUCLIDE DATA

	<u>NUCLIDE</u>	<u>HALF-LIFE</u> <u>(days)</u>	<u>LAMBDA</u> <u>(1/s)</u>	<u>BETA¹</u> <u>(MEV/DIS)</u>	<u>GAMMA¹</u> <u>(MEV/DIS)</u>
41	TC-99	7.74E 07	1.04E-13	8.46E-02	0.0
42	TC-104	1.25E-02	6.42E-04	1.60E 00	1.95E 00
43	RU-106	3.67E 02	2.19E-08	1.01E-02	0.0
44	TE-132	3.24E 00	2.48E-06	1.00E-01	2.33E-01
45	I-129	6.21E 09	1.29E-15	5.43E-02	2.46E-02
46	I-131	8.05E 00	9.96E-07	1.94E-01	3.81E-01
47	I-132	9.58E-02	8.37E-05	4.89E-01	2.24E 00
48	I-133	8.75E-01	9.17E-06	4.08E-01	6.02E-01
49	I-134	3.61E-02	2.22E-04	6.16E-01	2.59E 00
50	I-135	2.79E-01	2.87E-05	3.68E-01	1.55E 00
51	XE-131m	1.18E 01	6.80E-07	1.43E-01	2.01E-02
52	XE-133m	2.26E 00	3.55E-06	1.90E-01	4.15E-02
53	XE-133	5.27E 00	1.52E-06	1.35E-01	4.60E-02
54	XE-135m	1.08E-02	7.43E-04	9.58E-02	4.32E-01
55	XE-135	3.83E-01	2.09E-05	3.17E-01	2.47E-01
56	XE-137	2.71E 03	2.96E-03	1.77E 00	1.88E-01
57	XE-138	9.84E-03	8.15E-04	6.65E-01	1.10E 00
58	CS-134	7.48E 02	1.07E-08	1.63E-01	1.55E 00
59	CS-135	1.10E 09	7.29E-15	5.63E-02	0.0
60	CS-136	1.30E 01	6.17E-07	1.37E-01	2.15E 00
61	CS-137	1.10E 04	7.29E-10	1.71E-01	5.97E-01
62	CS-138	2.24E-02	3.58E-04	1.20E 00	2.30E 00
63	BA-139	5.76E-02	1.39E-04	8.96E-01	3.53E-02
64	BA-140	1.28E 01	6.27E-07	3.15E-01	1.71E-01
65	LA-140	1.68E 00	4.77E-06	5.33E-01	2.31E 00
66	CE-144	2.84E 02	2.82E-08	9.13E-02	1.93E-02
67	PR-143	1.36E 01	5.90E-07	3.14E-01	0.0
68	PR-144	1.20E-02	6.68E-04	1.21E 00	3.18E 00

¹ Average energy per disintegration values were obtained from ICRP Publication No 38, Radionuclide Transformations: Energy and Intensity of Emissions 1983 and NUREG/CR-1413 (ORNL/NUREG-70), a Radionuclide Decay Data Base - Index and Summary Table, DC Kocher, May 1980.

***** PALISADES XQDDQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING
NO DECAY, UNDEPLETED

SECTOR	ANNUAL AVERAGE CHI/Q (SEC/METER CUBED)										
	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	4.208E-06	1.381E-06	7.556E-07	4.993E-07	2.782E-07	1.842E-07	1.340E-07	1.033E-07	8.298E-08	6.867E-08	5.813E-08
SSW	3.330E-06	1.086E-06	5.856E-07	3.870E-07	2.160E-07	1.437E-07	1.048E-07	8.108E-08	6.528E-08	5.413E-08	4.590E-08
SW	3.890E-06	1.242E-06	6.590E-07	4.333E-07	2.413E-07	1.614E-07	1.184E-07	9.203E-08	7.440E-08	6.191E-08	5.267E-08
WSW	4.060E-06	1.279E-06	6.715E-07	4.401E-07	2.450E-07	1.648E-07	1.215E-07	9.484E-08	7.694E-08	6.422E-08	5.477E-08
W	5.554E-06	1.759E-06	9.224E-07	6.035E-07	3.349E-07	2.249E-07	1.657E-07	1.292E-07	1.047E-07	8.735E-08	7.447E-08
WNW	7.378E-06	2.346E-06	1.235E-06	8.084E-07	4.487E-07	3.010E-07	2.216E-07	1.726E-07	1.399E-07	1.166E-07	9.937E-08
NW	9.531E-06	2.974E-06	1.551E-06	1.012E-06	5.610E-07	3.784E-07	2.800E-07	2.191E-07	1.781E-07	1.490E-07	1.273E-07
NW	1.286E-05	3.959E-06	2.052E-06	1.339E-06	7.443E-07	5.039E-07	3.741E-07	2.935E-07	2.391E-07	2.003E-07	1.715E-07
N	1.087E-05	3.347E-06	1.739E-06	1.138E-06	6.348E-07	4.300E-07	3.192E-07	2.504E-07	2.040E-07	1.709E-07	1.462E-07
NNE	5.487E-06	1.717E-06	9.119E-07	6.000E-07	3.353E-07	2.256E-07	1.664E-07	1.299E-07	1.054E-07	8.793E-08	7.501E-08
NE	5.450E-06	1.803E-06	9.856E-07	6.476E-07	3.578E-07	2.355E-07	1.705E-07	1.310E-07	1.049E-07	8.657E-08	7.312E-08
ENE	4.258E-06	1.379E-06	7.464E-07	4.886E-07	2.697E-07	1.773E-07	1.282E-07	9.850E-08	7.885E-08	6.507E-08	5.496E-08
E	4.618E-06	1.531E-06	8.321E-07	5.438E-07	2.990E-07	1.959E-07	1.413E-07	1.082E-07	8.645E-08	7.120E-08	6.002E-08
ESE	4.436E-06	1.479E-06	8.008E-07	5.210E-07	2.848E-07	1.860E-07	1.338E-07	1.023E-07	8.153E-08	6.704E-08	5.644E-08
SE	5.091E-06	1.678E-06	9.044E-07	5.872E-07	3.207E-07	2.096E-07	1.509E-07	1.155E-07	9.217E-08	7.586E-08	6.391E-08
SSE	6.044E-06	2.000E-06	1.088E-06	7.106E-07	3.901E-07	2.557E-07	1.845E-07	1.415E-07	1.131E-07	9.317E-08	7.858E-08

SECTOR	ANNUAL AVERAGE CHI/Q (SEC/METER CUBED)										
	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	5.010E-08	2.837E-08	1.901E-08	1.086E-08	7.328E-09	5.410E-09	4.227E-09	3.433E-09	2.869E-09	2.450E-09	2.127E-09
SSW	3.963E-08	2.257E-08	1.519E-08	8.728E-09	5.913E-09	4.379E-09	3.431E-09	2.793E-09	2.338E-09	2.000E-09	1.740E-09
SW	4.560E-08	2.627E-08	1.782E-08	1.037E-08	7.086E-09	5.284E-09	4.163E-09	3.405E-09	2.863E-09	2.458E-09	2.145E-09
WSW	4.753E-08	2.763E-08	1.886E-08	1.106E-08	7.602E-09	5.693E-09	4.501E-09	3.693E-09	3.113E-09	2.678E-09	2.342E-09
W	6.459E-08	3.749E-08	2.557E-08	1.498E-08	1.029E-08	7.706E-09	6.091E-09	4.996E-09	4.211E-09	3.623E-09	3.168E-09
WNW	8.615E-08	4.992E-08	3.400E-08	1.989E-08	1.364E-08	1.021E-08	8.059E-09	6.606E-09	5.565E-09	4.785E-09	4.183E-09
NW	1.106E-07	6.471E-08	4.436E-08	2.618E-08	1.808E-08	1.359E-08	1.077E-08	8.857E-09	7.481E-09	6.449E-09	5.649E-09
NW	1.492E-07	8.772E-08	6.035E-08	3.579E-08	2.479E-08	1.867E-08	1.483E-08	1.221E-08	1.033E-08	8.915E-09	7.817E-09
N	1.273E-07	7.475E-08	5.139E-08	3.045E-08	2.107E-08	1.586E-08	1.259E-08	1.036E-08	8.762E-09	7.559E-09	6.625E-09
NNE	6.508E-08	3.782E-08	2.581E-08	1.513E-08	1.039E-08	7.781E-09	6.148E-09	5.042E-09	4.248E-09	3.654E-09	3.194E-09
NE	6.291E-08	3.539E-08	2.361E-08	1.342E-08	9.033E-09	6.656E-09	5.193E-09	4.213E-09	3.517E-09	3.000E-09	2.604E-09
ENE	4.729E-08	2.665E-08	1.781E-08	1.015E-08	6.847E-09	5.056E-09	3.951E-09	3.211E-09	2.684E-09	2.293E-09	1.993E-09
E	5.155E-08	2.883E-08	1.915E-08	1.083E-08	7.262E-09	5.337E-09	4.155E-09	3.366E-09	2.806E-09	2.392E-09	2.074E-09
ESE	4.843E-08	2.698E-08	1.788E-08	1.007E-08	6.742E-09	4.948E-09	3.848E-09	3.114E-09	2.594E-09	2.210E-09	1.915E-09
SE	5.488E-08	3.069E-08	2.039E-08	1.154E-08	7.748E-09	5.702E-09	4.445E-09	3.604E-09	3.008E-09	2.566E-09	2.227E-09
SSE	6.753E-08	3.785E-08	2.519E-08	1.428E-08	9.595E-09	7.064E-09	5.507E-09	4.466E-09	3.727E-09	3.179E-09	2.758E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT (METERS) 58.10
DIAMETER (METERS) 0.00
EXIT VELOCITY (METERS) 0.00

REP. WIND HEIGHT (METERS) 10.0
BUILDING HEIGHT (METERS) 58.1
BLDG. MIN. CRS. SEC. AREA (SQ. METERS) 2000.0
HEAT EMISSION RATE (CAL/SEC) 0.0

ALL GROUND LEVEL RELEASES.

***** PALISADES XOQDOQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING
NO DECAY, UNDEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	7.808E-07	2.856E-07	1.351E-07	8.334E-08	5.828E-08	2.904E-08	1.110E-08	5.448E-09	3.445E-09	2.454E-09
SSW	6.085E-07	2.219E-07	1.057E-07	6.555E-08	4.602E-08	2.308E-08	8.912E-09	4.409E-09	2.802E-09	2.004E-09
SW	6.883E-07	2.484E-07	1.193E-07	7.468E-08	5.279E-08	2.681E-08	1.057E-08	5.316E-09	3.415E-09	2.462E-09
WSW	7.038E-07	2.527E-07	1.224E-07	7.721E-08	5.489E-08	2.815E-08	1.126E-08	5.725E-09	3.703E-09	2.683E-09
W	9.666E-07	3.457E-07	1.669E-07	1.051E-07	7.463E-08	3.821E-08	1.525E-08	7.749E-09	5.010E-09	3.629E-09
WNW	1.292E-06	4.630E-07	2.232E-07	1.404E-07	9.958E-08	5.089E-08	2.025E-08	1.026E-08	6.625E-09	4.793E-09
NW	1.627E-06	5.800E-07	2.819E-07	1.787E-07	1.276E-07	6.587E-08	2.662E-08	1.366E-08	8.879E-09	6.458E-09
NNW	2.159E-06	7.695E-07	3.765E-07	2.399E-07	1.718E-07	8.923E-08	3.636E-08	1.877E-08	1.224E-08	8.928E-09
N	1.829E-06	6.557E-07	3.212E-07	2.046E-07	1.465E-07	7.604E-08	3.093E-08	1.594E-08	1.039E-08	7.569E-09
NNE	9.521E-07	3.454E-07	1.676E-07	1.057E-07	7.516E-08	3.854E-08	1.540E-08	7.825E-09	5.056E-09	3.660E-09
NE	1.017E-06	3.678E-07	1.720E-07	1.054E-07	7.332E-08	3.627E-08	1.374E-08	6.704E-09	4.227E-09	3.006E-09
ENE	7.724E-07	2.773E-07	1.294E-07	7.922E-08	5.511E-08	2.731E-08	1.038E-08	5.092E-09	3.222E-09	2.298E-09
E	8.592E-07	3.076E-07	1.426E-07	8.686E-08	6.020E-08	2.958E-08	1.109E-08	5.378E-09	3.378E-09	2.397E-09
ESE	8.271E-07	2.934E-07	1.351E-07	8.193E-08	5.661E-08	2.770E-08	1.033E-08	4.986E-09	3.126E-09	2.214E-09
SE	9.353E-07	3.305E-07	1.524E-07	9.262E-08	6.411E-08	3.149E-08	1.182E-08	5.745E-09	3.617E-09	2.571E-09
SSE	1.123E-06	4.016E-07	1.863E-07	1.136E-07	7.881E-08	3.882E-08	1.462E-08	7.116E-09	4.482E-09	3.186E-09

TABLE 1.3

Revision 18

***** PALISADES XOQDOQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING
2.260 DAY DECAY, UNDEPLETED

SECTOR	ANNUAL AVERAGE CHI/Q (SEC/METER CUBED)				DISTANCE IN MILES FROM THE SITE									
	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500			
S	4.205E-06	1.379E-06	7.540E-07	4.979E-07	2.769E-07	1.831E-07	1.330E-07	1.024E-07	8.212E-08	6.785E-08	5.735E-08			
SSW	3.327E-06	1.084E-06	5.842E-07	3.858E-07	2.150E-07	1.428E-07	1.040E-07	8.032E-08	6.457E-08	5.346E-08	4.526E-08			
SW	3.887E-06	1.240E-06	6.575E-07	4.319E-07	2.402E-07	1.604E-07	1.175E-07	9.117E-08	7.359E-08	6.114E-08	5.193E-08			
WSW	4.057E-06	1.277E-06	6.699E-07	4.388E-07	2.439E-07	1.637E-07	1.206E-07	9.394E-08	7.609E-08	6.341E-08	5.400E-08			
W	5.550E-06	1.757E-06	9.203E-07	6.016E-07	3.334E-07	2.235E-07	1.644E-07	1.280E-07	1.036E-07	8.628E-08	7.344E-08			
WNW	7.373E-06	2.343E-06	1.232E-06	8.062E-07	4.468E-07	2.993E-07	2.200E-07	1.712E-07	1.385E-07	1.153E-07	9.810E-08			
NW	9.524E-06	2.969E-06	1.547E-06	1.009E-06	5.585E-07	3.761E-07	2.779E-07	2.171E-07	1.762E-07	1.472E-07	1.256E-07			
NNW	1.285E-05	3.953E-06	2.047E-06	1.335E-06	7.408E-07	5.008E-07	3.712E-07	2.907E-07	2.365E-07	1.979E-07	1.691E-07			
N	1.087E-05	3.341E-06	1.735E-06	1.134E-06	6.316E-07	4.271E-07	3.165E-07	2.478E-07	2.016E-07	1.686E-07	1.440E-07			
NNE	5.483E-06	1.714E-06	9.099E-07	5.982E-07	3.338E-07	2.242E-07	1.652E-07	1.287E-07	1.042E-07	8.687E-08	7.398E-08			
NE	5.447E-06	1.800E-06	9.837E-07	6.458E-07	3.563E-07	2.343E-07	1.693E-07	1.299E-07	1.039E-07	8.564E-08	7.223E-08			
ENE	4.255E-06	1.377E-06	7.448E-07	4.872E-07	2.685E-07	1.763E-07	1.273E-07	9.763E-08	7.804E-08	6.431E-08	5.423E-08			
E	4.615E-06	1.528E-06	8.303E-07	5.423E-07	2.977E-07	1.948E-07	1.403E-07	1.073E-07	8.559E-08	7.039E-08	5.925E-08			
ESE	4.433E-06	1.477E-06	7.992E-07	5.196E-07	2.837E-07	1.850E-07	1.328E-07	1.014E-07	8.075E-08	6.631E-08	5.575E-08			
SE	5.088E-06	1.676E-06	9.026E-07	5.856E-07	3.194E-07	2.085E-07	1.499E-07	1.145E-07	9.128E-08	7.502E-08	6.312E-08			
SSE	6.040E-06	1.997E-06	1.086E-06	7.087E-07	3.885E-07	2.543E-07	1.833E-07	1.403E-07	1.120E-07	9.213E-08	7.760E-08			

SECTOR	ANNUAL AVERAGE CHI/Q (SEC/METER CUBED)				DISTANCE IN MILES FROM THE SITE							
	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	
S	4.936E-08	2.774E-08	1.845E-08	1.039E-08	6.911E-09	5.029E-09	3.874E-09	3.103E-09	2.557E-09	2.153E-09	1.844E-09	
SSW	3.901E-08	2.204E-08	1.472E-08	8.327E-09	5.555E-09	4.051E-09	3.126E-09	2.506E-09	2.067E-09	1.742E-09	1.492E-09	
SW	4.489E-08	2.566E-08	1.727E-08	9.893E-09	6.657E-09	4.889E-09	3.793E-09	3.056E-09	2.531E-09	2.140E-09	1.840E-09	
WSW	4.678E-08	2.698E-08	1.827E-08	1.055E-08	7.141E-09	5.267E-09	4.101E-09	3.314E-09	2.751E-09	2.332E-09	2.009E-09	
W	6.361E-08	3.664E-08	2.480E-08	1.431E-08	9.688E-09	7.147E-09	5.566E-09	4.500E-09	3.738E-09	3.170E-09	2.732E-09	
WNW	8.494E-08	4.886E-08	3.304E-08	1.906E-08	1.289E-08	9.508E-09	7.405E-09	5.987E-09	4.975E-09	4.220E-09	3.639E-09	
NW	1.090E-07	6.323E-08	4.301E-08	2.500E-08	1.700E-08	1.259E-08	9.836E-09	7.972E-09	6.638E-09	5.641E-09	4.872E-09	
NNW	1.469E-07	8.570E-08	5.851E-08	3.417E-08	2.331E-08	1.730E-08	1.354E-08	1.099E-08	9.164E-09	7.796E-09	6.739E-09	
N	1.251E-07	7.285E-08	4.966E-08	2.893E-08	1.969E-08	1.458E-08	1.139E-08	9.223E-09	7.674E-09	6.516E-09	5.622E-09	
NNE	6.410E-08	3.697E-08	2.504E-08	1.446E-08	9.786E-09	7.218E-09	5.620E-09	4.541E-09	3.771E-09	3.196E-09	2.754E-09	
NE	6.206E-08	3.468E-08	2.298E-08	1.289E-08	8.558E-09	6.223E-09	4.791E-09	3.836E-09	3.160E-09	2.662E-09	2.280E-09	
ENE	4.659E-08	2.607E-08	1.729E-08	9.711E-09	6.459E-09	4.702E-09	3.624E-09	2.904E-09	2.395E-09	2.018E-09	1.730E-09	
E	5.082E-08	2.822E-08	1.861E-08	1.037E-08	6.861E-09	4.973E-09	3.819E-09	3.051E-09	2.509E-09	2.110E-09	1.805E-09	
ESE	4.776E-08	2.643E-08	1.739E-08	9.664E-09	6.380E-09	4.619E-09	3.544E-09	2.830E-09	2.327E-09	1.956E-09	1.673E-09	
SE	5.413E-08	3.005E-08	1.983E-08	1.106E-08	7.329E-09	5.320E-09	4.091E-09	3.273E-09	2.695E-09	2.268E-09	1.943E-09	
SSE	6.659E-08	3.706E-08	2.449E-08	1.369E-08	9.073E-09	6.588E-09	5.066E-09	4.053E-09	3.337E-09	2.808E-09	2.404E-09	

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT (METERS)	58.10	REP. WIND HEIGHT (METERS)	10.0
DIAMETER (METERS)	0.00	BUILDING HEIGHT (METERS)	58.1
EXIT VELOCITY (METERS)	0.00	BLDG. MIN. CRS. SEC. AREA (SQ. METERS)	2000.0
		HEAT EMISSION RATE (CAL/SEC)	0.0

ALL GROUND LEVEL RELEASES.

***** PALISADES XOQDOQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING
2.260 DAY DECAY, UNDEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	7.791E-07	2.843E-07	1.341E-07	8.248E-08	5.750E-08	2.842E-08	1.064E-08	5.069E-09	3.115E-09	2.158E-09
SSW	6.072E-07	2.209E-07	1.049E-07	6.484E-08	4.537E-08	2.256E-08	8.515E-09	4.082E-09	2.516E-09	1.746E-09
SW	6.867E-07	2.473E-07	1.184E-07	7.387E-08	5.205E-08	2.621E-08	1.010E-08	4.922E-09	3.066E-09	2.145E-09
WSW	7.022E-07	2.516E-07	1.214E-07	7.636E-08	5.412E-08	2.751E-08	1.075E-08	5.300E-09	3.324E-09	2.337E-09
W	9.645E-07	3.441E-07	1.656E-07	1.040E-07	7.360E-08	3.737E-08	1.459E-08	7.192E-09	4.514E-09	3.176E-09
WNW	1.290E-06	4.611E-07	2.216E-07	1.390E-07	9.832E-08	4.985E-08	1.942E-08	9.569E-09	6.007E-09	4.229E-09
NW	1.624E-06	5.775E-07	2.798E-07	1.768E-07	1.258E-07	6.441E-08	2.545E-08	1.267E-08	7.996E-09	5.651E-09
NNW	2.154E-06	7.661E-07	3.736E-07	2.373E-07	1.694E-07	8.722E-08	3.475E-08	1.740E-08	1.102E-08	7.810E-09
N	1.825E-06	6.524E-07	3.185E-07	2.022E-07	1.443E-07	7.415E-08	2.943E-08	1.466E-08	9.251E-09	6.528E-09
NNE	9.500E-07	3.438E-07	1.663E-07	1.046E-07	7.414E-08	3.770E-08	1.473E-08	7.263E-09	4.556E-09	3.203E-09
NE	1.015E-06	3.664E-07	1.709E-07	1.044E-07	7.244E-08	3.557E-08	1.321E-08	6.272E-09	3.851E-09	2.668E-09
ENE	7.708E-07	2.761E-07	1.285E-07	7.840E-08	5.439E-08	2.673E-08	9.950E-09	4.739E-09	2.916E-09	2.023E-09
E	8.574E-07	3.063E-07	1.416E-07	8.600E-08	5.943E-08	2.897E-08	1.064E-08	5.015E-09	3.064E-09	2.115E-09
ESE	8.255E-07	2.922E-07	1.342E-07	8.115E-08	5.592E-08	2.715E-08	9.921E-09	4.659E-09	2.842E-09	1.961E-09
SE	9.335E-07	3.292E-07	1.514E-07	9.173E-08	6.332E-08	3.086E-08	1.135E-08	5.364E-09	3.286E-09	2.274E-09
SSE	1.121E-06	4.000E-07	1.850E-07	1.125E-07	7.783E-08	3.804E-08	1.404E-08	6.642E-09	4.070E-09	2.815E-09

TABLE 1.3

Revision 18

***** PALISADES XOQDOQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING
8.000 DAY DECAY, DEPLETED

SECTOR	ANNUAL AVERAGE CHI/Q (SEC/METER CUBED)										
	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	3.982E-06	1.261E-06	6.730E-07	4.367E-07	2.359E-07	1.523E-07	1.083E-07	8.186E-08	6.456E-08	5.254E-08	4.378E-08
SSW	3.150E-06	9.913E-07	5.215E-07	3.384E-07	1.832E-07	1.187E-07	8.473E-08	6.423E-08	5.078E-08	4.141E-08	3.457E-08
SW	3.681E-06	1.134E-06	5.869E-07	3.789E-07	2.047E-07	1.334E-07	9.572E-08	7.291E-08	5.787E-08	4.736E-08	3.966E-08
WSW	3.842E-06	1.168E-06	5.980E-07	3.849E-07	2.078E-07	1.362E-07	9.823E-08	7.513E-08	5.985E-08	4.912E-08	4.125E-08
W	5.256E-06	1.606E-06	8.215E-07	5.278E-07	2.841E-07	1.859E-07	1.339E-07	1.023E-07	8.146E-08	6.682E-08	5.608E-08
WNW	6.982E-06	2.141E-06	1.100E-06	7.071E-07	3.806E-07	2.488E-07	1.791E-07	1.368E-07	1.088E-07	8.923E-08	7.486E-08
NW	9.018E-06	2.715E-06	1.381E-06	8.848E-07	4.758E-07	3.128E-07	2.263E-07	1.736E-07	1.386E-07	1.140E-07	9.588E-08
NNW	1.217E-05	3.613E-06	1.827E-06	1.171E-06	6.312E-07	4.165E-07	3.024E-07	2.325E-07	1.860E-07	1.532E-07	1.291E-07
N	1.029E-05	3.055E-06	1.549E-06	9.954E-07	5.384E-07	3.554E-07	2.579E-07	1.983E-07	1.586E-07	1.307E-07	1.101E-07
NNE	5.192E-06	1.567E-06	8.121E-07	5.248E-07	2.844E-07	1.865E-07	1.345E-07	1.029E-07	8.196E-08	6.727E-08	5.649E-08
NE	5.157E-06	1.646E-06	8.778E-07	5.664E-07	3.035E-07	1.947E-07	1.378E-07	1.038E-07	8.162E-08	6.625E-08	5.509E-08
ENE	4.029E-06	1.259E-06	6.648E-07	4.273E-07	2.287E-07	1.466E-07	1.037E-07	7.804E-08	6.135E-08	4.978E-08	4.139E-08
E	4.370E-06	1.397E-06	7.410E-07	4.756E-07	2.536E-07	1.620E-07	1.142E-07	8.576E-08	6.727E-08	5.448E-08	4.522E-08
ESE	4.198E-06	1.350E-06	7.132E-07	4.557E-07	2.416E-07	1.538E-07	1.081E-07	8.103E-08	6.344E-08	5.130E-08	4.252E-08
SE	4.817E-06	1.532E-06	8.055E-07	5.136E-07	2.720E-07	1.733E-07	1.220E-07	9.152E-08	7.172E-08	5.805E-08	4.815E-08
SSE	5.719E-06	1.826E-06	9.691E-07	6.216E-07	3.309E-07	2.114E-07	1.492E-07	1.121E-07	8.798E-08	7.129E-08	5.920E-08

SECTOR	ANNUAL AVERAGE CHI/Q (SEC/METER CUBED)										
	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	3.719E-08	1.987E-08	1.266E-08	6.668E-09	4.208E-09	2.931E-09	2.174E-09	1.683E-09	1.345E-09	1.102E-09	9.195E-10
SSW	2.941E-08	1.580E-08	1.011E-08	5.355E-09	3.392E-09	2.370E-09	1.762E-09	1.367E-09	1.094E-09	8.973E-10	7.499E-10
SW	3.384E-08	1.840E-08	1.187E-08	6.362E-09	4.065E-09	2.860E-09	2.138E-09	1.667E-09	1.340E-09	1.103E-09	9.248E-10
WSW	3.527E-08	1.935E-08	1.256E-08	6.786E-09	4.361E-09	3.081E-09	2.311E-09	1.807E-09	1.457E-09	1.202E-09	1.010E-09
W	4.794E-08	2.626E-08	1.703E-08	9.195E-09	5.907E-09	4.173E-09	3.130E-09	2.448E-09	1.973E-09	1.628E-09	1.368E-09
WNW	6.396E-08	3.498E-08	2.266E-08	1.222E-08	7.839E-09	5.533E-09	4.148E-09	3.241E-09	2.612E-09	2.154E-09	1.810E-09
NW	8.212E-08	4.532E-08	2.954E-08	1.607E-08	1.037E-08	7.352E-09	5.531E-09	4.335E-09	3.502E-09	2.894E-09	2.436E-09
NNW	1.107E-07	6.143E-08	4.019E-08	2.196E-08	1.422E-08	1.011E-08	7.617E-09	5.980E-09	4.836E-09	4.002E-09	3.371E-09
N	9.439E-08	5.231E-08	3.419E-08	1.866E-08	1.207E-08	8.564E-09	6.449E-09	5.058E-09	4.087E-09	3.379E-09	2.844E-09
NNE	4.831E-08	2.649E-08	1.719E-08	9.289E-09	5.967E-09	4.214E-09	3.160E-09	2.470E-09	1.991E-09	1.642E-09	1.379E-09
NE	4.671E-08	2.481E-08	1.574E-08	8.249E-09	5.194E-09	3.612E-09	2.676E-09	2.070E-09	1.653E-09	1.353E-09	1.129E-09
ENE	3.510E-08	1.867E-08	1.186E-08	6.231E-09	3.932E-09	2.740E-09	2.032E-09	1.574E-09	1.259E-09	1.031E-09	8.614E-10
E	3.827E-08	2.020E-08	1.276E-08	6.651E-09	4.172E-09	2.894E-09	2.139E-09	1.652E-09	1.317E-09	1.077E-09	8.971E-10
ESE	3.596E-08	1.891E-08	1.192E-08	6.190E-09	3.875E-09	2.684E-09	1.981E-09	1.529E-09	1.219E-09	9.955E-10	8.292E-10
SE	4.075E-08	2.150E-08	1.359E-08	7.089E-09	4.453E-09	3.093E-09	2.288E-09	1.769E-09	1.413E-09	1.156E-09	9.641E-10
SSE	5.014E-08	2.653E-08	1.679E-08	8.772E-09	5.515E-09	3.831E-09	2.836E-09	2.192E-09	1.750E-09	1.432E-09	1.194E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT (METERS)	58.10	REP. WIND HEIGHT (METERS)	10.0
DIAMETER (METERS)	0.00	BUILDING HEIGHT (METERS)	58.1
EXIT VELOCITY (METERS)	0.00	BLDG. MIN. CRS. SEC. AREA (SQ. METERS)	2000.0
		HEAT EMISSION RATE (CAL/SEC)	0.0

ALL GROUND LEVEL RELEASES.

***** PALISADES XOQDOQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING
8.000 DAY DECAY, DEPLETED

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	6.986E-07	2.434E-07	1.094E-07	6.492E-08	4.393E-08	2.052E-08	6.907E-09	2.969E-09	1.695E-09	1.106E-09
SSW	5.445E-07	1.891E-07	8.560E-08	5.105E-08	3.468E-08	1.630E-08	5.540E-09	2.399E-09	1.376E-09	9.011E-10
SW	6.160E-07	2.117E-07	9.664E-08	5.816E-08	3.979E-08	1.893E-08	6.565E-09	2.892E-09	1.677E-09	1.107E-09
WSW	6.299E-07	2.153E-07	9.911E-08	6.013E-08	4.137E-08	1.987E-08	6.991E-09	3.114E-09	1.818E-09	1.206E-09
W	8.653E-07	2.946E-07	1.351E-07	8.184E-08	5.625E-08	2.697E-08	9.475E-09	4.218E-09	2.462E-09	1.634E-09
WNW	1.157E-06	3.946E-07	1.808E-07	1.094E-07	7.508E-08	3.594E-08	1.259E-08	5.594E-09	3.261E-09	2.162E-09
NW	1.457E-06	4.943E-07	2.283E-07	1.392E-07	9.614E-08	4.648E-08	1.653E-08	7.429E-09	4.359E-09	2.904E-09
NNW	1.932E-06	6.557E-07	3.049E-07	1.868E-07	1.295E-07	6.295E-08	2.257E-08	1.021E-08	6.012E-09	4.016E-09
N	1.637E-06	5.586E-07	2.601E-07	1.593E-07	1.104E-07	5.361E-08	1.918E-08	8.652E-09	5.085E-09	3.391E-09
NNE	8.521E-07	2.943E-07	1.357E-07	8.234E-08	5.665E-08	2.721E-08	9.569E-09	4.260E-09	2.485E-09	1.648E-09
NE	9.101E-07	3.136E-07	1.394E-07	8.210E-08	5.529E-08	2.565E-08	8.556E-09	3.659E-09	2.084E-09	1.359E-09
ENE	6.913E-07	2.364E-07	1.049E-07	6.171E-08	4.155E-08	1.930E-08	6.461E-09	2.775E-09	1.585E-09	1.036E-09
E	7.689E-07	2.622E-07	1.156E-07	6.768E-08	4.539E-08	2.091E-08	6.908E-09	2.932E-09	1.663E-09	1.081E-09
ESE	7.403E-07	2.502E-07	1.095E-07	6.384E-08	4.269E-08	1.959E-08	6.434E-09	2.721E-09	1.540E-09	1.000E-09
SE	8.371E-07	2.818E-07	1.235E-07	7.217E-08	4.834E-08	2.226E-08	7.362E-09	3.134E-09	1.782E-09	1.161E-09
SSE	1.005E-06	3.424E-07	1.510E-07	8.852E-08	5.943E-08	2.745E-08	9.106E-09	3.882E-09	2.208E-09	1.438E-09

TABLE 1.3

Revision 18

***** PALISADES XQDDQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING

***** RELATIVE DEPOSITION PER UNIT AREA (M⁻²) AT FIXED POINTS BY DOWNWIND SECTORS *****

DIRECTION FROM SITE	DISTANCES IN MILES										
	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
S	2.600E-08	8.794E-09	4.515E-09	2.772E-09	1.382E-09	8.383E-10	5.668E-10	4.107E-10	3.123E-10	2.460E-10	1.992E-10
SSW	1.731E-08	5.852E-09	3.005E-09	1.845E-09	9.198E-10	5.579E-10	3.772E-10	2.733E-10	2.078E-10	1.637E-10	1.325E-10
SW	1.866E-08	6.309E-09	3.239E-09	1.989E-09	9.916E-10	6.014E-10	4.066E-10	2.946E-10	2.240E-10	1.765E-10	1.429E-10
WSW	1.829E-08	6.183E-09	3.175E-09	1.949E-09	9.719E-10	5.894E-10	3.985E-10	2.888E-10	2.196E-10	1.730E-10	1.401E-10
W	2.673E-08	9.040E-09	4.641E-09	2.850E-09	1.421E-09	8.618E-10	5.826E-10	4.222E-10	3.210E-10	2.529E-10	2.048E-10
WW	4.142E-08	1.401E-08	7.191E-09	4.416E-09	2.201E-09	1.335E-09	9.027E-10	6.541E-10	4.974E-10	3.919E-10	3.172E-10
NW	4.847E-08	1.639E-08	8.416E-09	5.168E-09	2.576E-09	1.563E-09	1.056E-09	7.656E-10	5.821E-10	4.586E-10	3.713E-10
NNW	5.897E-08	1.994E-08	1.024E-08	6.287E-09	3.135E-09	1.901E-09	1.285E-09	9.314E-10	7.082E-10	5.580E-10	4.517E-10
N	4.172E-08	1.411E-08	7.244E-09	4.448E-09	2.218E-09	1.345E-09	9.093E-10	6.589E-10	5.010E-10	3.947E-10	3.196E-10
NNE	2.423E-08	8.194E-09	4.207E-09	2.583E-09	1.288E-09	7.811E-10	5.281E-10	3.827E-10	2.910E-10	2.292E-10	1.856E-10
NE	4.208E-08	1.423E-08	7.306E-09	4.486E-09	2.237E-09	1.356E-09	9.171E-10	6.646E-10	5.053E-10	3.981E-10	3.223E-10
ENE	3.387E-08	1.145E-08	5.881E-09	3.611E-09	1.800E-09	1.092E-09	7.382E-10	5.349E-10	4.067E-10	3.204E-10	2.594E-10
E	3.926E-08	1.328E-08	6.816E-09	4.185E-09	2.087E-09	1.266E-09	8.556E-10	6.200E-10	4.715E-10	3.714E-10	3.007E-10
ESE	4.148E-08	1.403E-08	7.202E-09	4.423E-09	2.205E-09	1.337E-09	9.041E-10	6.552E-10	4.982E-10	3.925E-10	3.177E-10
SE	4.919E-08	1.663E-08	8.540E-09	5.244E-09	2.614E-09	1.586E-09	1.072E-09	7.769E-10	5.907E-10	4.654E-10	3.768E-10
SSE	5.133E-08	1.736E-08	8.913E-09	5.473E-09	2.728E-09	1.655E-09	1.119E-09	8.107E-10	6.165E-10	4.857E-10	3.932E-10

DIRECTION FROM SITE	DISTANCES IN MILES										
	5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
S	1.648E-10	8.074E-11	5.066E-11	2.561E-11	1.550E-11	1.039E-11	7.446E-12	5.591E-12	4.347E-12	3.473E-12	2.834E-12
SSW	1.096E-10	5.373E-11	3.371E-11	1.704E-11	1.031E-11	6.915E-12	4.955E-12	3.721E-12	2.893E-12	2.311E-12	1.886E-12
SW	1.182E-10	5.792E-11	3.634E-11	1.837E-11	1.112E-11	7.455E-12	5.342E-12	4.011E-12	3.119E-12	2.491E-12	2.033E-12
WSW	1.159E-10	5.677E-11	3.562E-11	1.801E-11	1.090E-11	7.307E-12	5.236E-12	3.931E-12	3.057E-12	2.442E-12	1.993E-12
W	1.694E-10	8.300E-11	5.208E-11	2.632E-11	1.593E-11	1.068E-11	7.654E-12	5.748E-12	4.469E-12	3.570E-12	2.914E-12
WW	2.624E-10	1.286E-10	8.069E-11	4.078E-11	2.468E-11	1.655E-11	1.186E-11	8.905E-12	6.924E-12	5.531E-12	4.514E-12
NW	3.071E-10	1.505E-10	9.443E-11	4.773E-11	2.889E-11	1.937E-11	1.388E-11	1.042E-11	8.103E-12	6.473E-12	5.283E-12
NNW	3.736E-10	1.831E-10	1.149E-10	5.807E-11	3.515E-11	2.357E-11	1.689E-11	1.268E-11	9.859E-12	7.875E-12	6.428E-12
N	2.643E-10	1.295E-10	8.128E-11	4.108E-11	2.487E-11	1.667E-11	1.195E-11	8.970E-12	6.975E-12	5.571E-12	4.547E-12
NNE	1.535E-10	7.523E-11	4.720E-11	2.386E-11	1.444E-11	9.682E-12	6.938E-12	5.210E-12	4.051E-12	3.236E-12	2.641E-12
NE	2.666E-10	1.306E-10	8.198E-11	4.143E-11	2.508E-11	1.681E-11	1.205E-11	9.047E-12	7.034E-12	5.619E-12	4.586E-12
ENE	2.146E-10	1.052E-10	6.598E-11	3.335E-11	2.019E-11	1.353E-11	9.698E-12	7.282E-12	5.662E-12	4.523E-12	3.692E-12
E	2.487E-10	1.219E-10	7.648E-11	3.866E-11	2.340E-11	1.569E-11	1.124E-11	8.441E-12	6.563E-12	5.242E-12	4.279E-12
ESE	2.628E-10	1.288E-10	8.081E-11	4.085E-11	2.472E-11	1.658E-11	1.188E-11	8.919E-12	6.935E-12	5.539E-12	4.521E-12
SE	3.117E-10	1.527E-10	9.583E-11	4.844E-11	2.932E-11	1.966E-11	1.408E-11	1.058E-11	8.223E-12	6.569E-12	5.361E-12
SSE	3.252E-10	1.594E-10	1.000E-10	5.055E-11	3.059E-11	2.051E-11	1.470E-11	1.104E-11	8.581E-12	6.855E-12	5.595E-12

TABLE 1.3

Revision 18

***** PALISADES XOQDOQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING

DIRECTION FROM SITE	RELATIVE DEPOSITION PER UNIT AREA (M ⁻²) BY DOWNWIND SECTORS									
	SEGMENT BOUNDARIES IN MILES									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	4.691E-09	1.449E-09	5.768E-10	3.152E-10	2.003E-10	8.604E-11	2.668E-11	1.057E-11	5.647E-12	3.495E-12
SSW	3.122E-09	9.645E-10	3.838E-10	2.097E-10	1.333E-10	5.726E-11	1.776E-11	7.037E-12	3.758E-12	2.326E-12
SW	3.366E-09	1.040E-09	4.138E-10	2.261E-10	1.437E-10	6.173E-11	1.914E-11	7.587E-12	4.051E-12	2.508E-12
WSW	3.299E-09	1.019E-09	4.055E-10	2.216E-10	1.409E-10	6.050E-11	1.876E-11	7.436E-12	3.971E-12	2.458E-12
W	4.823E-09	1.490E-09	5.929E-10	3.240E-10	2.059E-10	8.845E-11	2.743E-11	1.087E-11	5.805E-12	3.593E-12
WNW	7.472E-09	2.308E-09	9.186E-10	5.020E-10	3.190E-10	1.370E-10	4.249E-11	1.684E-11	8.994E-12	5.567E-12
NW	8.745E-09	2.702E-09	1.075E-09	5.875E-10	3.734E-10	1.604E-10	4.974E-11	1.971E-11	1.053E-11	6.516E-12
NNW	1.064E-08	3.287E-09	1.308E-09	7.147E-10	4.543E-10	1.951E-10	6.051E-11	2.398E-11	1.281E-11	7.927E-12
N	7.527E-09	2.325E-09	9.253E-10	5.057E-10	3.214E-10	1.380E-10	4.281E-11	1.697E-11	9.060E-12	5.608E-12
NNE	4.371E-09	1.351E-09	5.374E-10	2.937E-10	1.866E-10	8.017E-11	2.486E-11	9.853E-12	5.262E-12	3.257E-12
NE	7.591E-09	2.345E-09	9.333E-10	5.100E-10	3.241E-10	1.392E-10	4.317E-11	1.711E-11	9.138E-12	5.656E-12
ENE	6.110E-09	1.888E-09	7.512E-10	4.105E-10	2.609E-10	1.121E-10	3.475E-11	1.377E-11	7.355E-12	4.552E-12
E	7.082E-09	2.188E-09	8.707E-10	4.758E-10	3.024E-10	1.299E-10	4.028E-11	1.596E-11	8.525E-12	5.277E-12
ESE	7.484E-09	2.312E-09	9.200E-10	5.028E-10	3.195E-10	1.373E-10	4.256E-11	1.687E-11	9.008E-12	5.576E-12
SE	8.874E-09	2.742E-09	1.091E-09	5.962E-10	3.789E-10	1.628E-10	5.047E-11	2.000E-11	1.068E-11	6.612E-12
SSE	9.261E-09	2.861E-09	1.139E-09	6.222E-10	3.954E-10	1.699E-10	5.267E-11	2.088E-11	1.115E-11	6.900E-12

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT (METERS)	58.10	REP. WIND HEIGHT (METERS)	10.0
DIAMETER (METERS)	0.00	BUILDING HEIGHT (METERS)	58.1
EXIT VELOCITY (METERS)	0.00	BLDG. MIN. CRS. SEC. AREA (SQ. METERS)	2000.0
		HEAT EMISSION RATE (CAL/SEC)	0.0

ALL GROUND LEVEL RELEASES.

TABLE 1.3

Revision 18

***** PALISADES XOQDOQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING
SPECIFIC POINTS OF INTEREST

RELEASE ID	TYPE OF LOCATION	DIRECTION FROM SITE	DISTANCE (MILES)	DISTANCE (METERS)	X/Q		D/Q	
					NO DECAY		8.000 DAY DECAY	
					(SEC/CUB.METER) UNDEPLETED	(SEC/CUB.METER) UNDEPLETED	(SEC/CUB.METER) DEPLETED	(PER SQ.METER)
A	SITE BOUNDARY	NNE	0.50	805.	1.72E-06	1.71E-06	1.57E-06	8.19E-09
A	SITE BOUNDARY	NE	0.65	1046.	1.22E-06	1.22E-06	1.10E-06	9.30E-09
A	SITE BOUNDARY	ENE	0.87	1400.	5.99E-07	5.98E-07	5.29E-07	4.58E-09
A	SITE BOUNDARY	E	0.82	1320.	7.28E-07	7.27E-07	6.45E-07	5.86E-09
A	SITE BOUNDARY	ESE	0.76	1223.	7.85E-07	7.83E-07	6.98E-07	7.04E-09
A	SITE BOUNDARY	SE	0.63	1014.	1.18E-06	1.18E-06	1.06E-06	1.14E-08
A	SITE BOUNDARY	SSE	0.48	772.	2.13E-06	2.12E-06	1.95E-06	1.86E-08
A	SITE BOUNDARY	S	0.42	676.	1.78E-06	1.78E-06	1.64E-06	1.16E-08
A	SITE BOUNDARY	SSW	0.48	772.	1.16E-06	1.15E-06	1.06E-06	6.26E-09
A	GARDEN	NNE	1.60	2575.	3.06E-07	3.04E-07	2.58E-07	1.15E-09
A	GARDEN	NE	1.20	1931.	4.96E-07	4.95E-07	4.28E-07	3.29E-09
A	GARDEN	ENE	2.70	4345.	1.15E-07	1.14E-07	9.20E-08	6.45E-10
A	GARDEN	E	2.20	3541.	1.70E-07	1.69E-07	1.40E-07	1.07E-09
A	GARDEN	ESE	2.30	3701.	1.51E-07	1.50E-07	1.23E-07	1.05E-09
A	GARDEN	SE	1.80	2897.	2.45E-07	2.44E-07	2.04E-07	1.91E-09
A	GARDEN	SSE	1.60	2575.	3.55E-07	3.53E-07	2.99E-07	2.44E-09
A	GARDEN	S	1.50	2414.	2.78E-07	2.77E-07	2.36E-07	1.38E-09
A	BEEF COW	NE	2.90	4667.	1.38E-07	1.36E-07	1.09E-07	7.06E-10
A	BEEF COW	ENE	4.00	6437.	6.51E-08	6.43E-08	4.98E-08	3.20E-10
A	BEEF COW	E	3.50	5633.	8.64E-08	8.56E-08	6.73E-08	4.71E-10
A	BEEF COW	ESE	4.00	6437.	6.70E-08	6.63E-08	5.13E-08	3.93E-10
A	BEEF COW	SSE	3.00	4828.	1.41E-07	1.40E-07	1.12E-07	8.11E-10
A	DAIRY COW	SE	4.30	6920.	6.83E-08	6.75E-08	5.18E-08	4.09E-10
A	GOAT	NE	3.20	5150.	1.19E-07	1.18E-07	9.39E-08	5.93E-10
A	GOAT	ESE	3.00	4828.	1.02E-07	1.01E-07	8.10E-08	6.55E-10

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT (METERS) 58.10
DIAMETER (METERS) 0.00
EXIT VELOCITY (METERS) 0.00

REP. WIND HEIGHT (METERS) 10.0
BUILDING HEIGHT (METERS) 58.1
BLDG. MIN. CRS. SEC. AREA (SQ. METERS) 2000.0
HEAT EMISSION RATE (CAL/SEC) 0.0

ALL GROUND LEVEL RELEASES.

TABLE 1.3

Revision 18

***** PALISADES XQQDOQ82 ***** USING 01/01/92 - 12/31/96 MET DATA *****

GROUND LEVEL RELEASE - TOP OF CONTAINMENT BUILDING
SPECIFIC POINTS OF INTEREST

RELEASE ID	TYPE OF LOCATION	DIRECTION FROM SITE	DISTANCE		X/Q			D/Q (PER SQ.METER)
			(MILES)	(METERS)	(SEC/CUB.METER)	(SEC/CUB.METER)	(SEC/CUB.METER)	
					NO DECAY UNDEPLETED	2.260 DAY DECAY UNDEPLETED	8.000 DAY DECAY DEPLETED	
A	SITE BOUNDARY	NNE	0.50	805.	1.72E-06	1.71E-06	1.57E-06	8.19E-09
A	SITE BOUNDARY	NE	0.65	1046.	1.22E-06	1.22E-06	1.10E-06	9.30E-09
A	SITE BOUNDARY	ENE	0.87	1400.	5.99E-07	5.98E-07	5.29E-07	4.58E-09
A	SITE BOUNDARY	E	0.82	1320.	7.28E-07	7.27E-07	6.45E-07	5.86E-09
A	SITE BOUNDARY	ESE	0.76	1223.	7.85E-07	7.83E-07	6.98E-07	7.04E-09
A	SITE BOUNDARY	SE	0.63	1014.	1.18E-06	1.18E-06	1.06E-06	1.14E-08
A	SITE BOUNDARY	SSE	0.48	772.	2.13E-06	2.12E-06	1.95E-06	1.86E-08
A	SITE BOUNDARY	S	0.42	676.	1.78E-06	1.78E-06	1.64E-06	1.16E-08
A	SITE BOUNDARY	SSW	0.48	772.	1.16E-06	1.15E-06	1.06E-06	6.26E-09
A	RESIDENCE	NNE	1.10	1770.	5.23E-07	5.21E-07	4.55E-07	2.20E-09
A	RESIDENCE	NE	1.20	1931.	4.96E-07	4.95E-07	4.28E-07	3.29E-09
A	RESIDENCE	ENE	1.30	2092.	3.33E-07	3.31E-07	2.85E-07	2.30E-09
A	RESIDENCE	E	1.00	1609.	5.44E-07	5.42E-07	4.76E-07	4.19E-09
A	RESIDENCE	ESE	1.00	1609.	5.21E-07	5.20E-07	4.56E-07	4.42E-09
A	RESIDENCE	SE	1.00	1609.	5.87E-07	5.86E-07	5.14E-07	5.25E-09
A	RESIDENCE	SSE	0.70	1127.	1.21E-06	1.20E-06	1.08E-06	1.00E-08
A	RESIDENCE	S	0.50	805.	1.38E-06	1.38E-06	1.26E-06	8.79E-09
A	RESIDENCE	SSW	0.70	1127.	6.50E-07	6.49E-07	5.81E-07	3.37E-09
A	BEEF COW	NE	2.90	4667.	1.38E-07	1.36E-07	1.09E-07	7.06E-10
A	BEEF COW	ENE	4.00	6437.	6.51E-08	6.43E-08	4.98E-08	3.20E-10
A	BEEF COW	E	3.50	5633.	8.64E-08	8.56E-08	6.73E-08	4.71E-10
A	BEEF COW	ESE	4.00	6437.	6.70E-08	6.63E-08	5.13E-08	3.93E-10
A	BEEF COW	SSE	3.00	4828.	1.41E-07	1.40E-07	1.12E-07	8.11E-10
A	DAIRY COW	SE	4.30	6920.	6.83E-08	6.75E-08	5.18E-08	4.09E-10
A	GOAT	NE	3.20	5150.	1.19E-07	1.18E-07	9.39E-08	5.93E-10
A	GOAT	ESE	3.00	4828.	1.02E-07	1.01E-07	8.10E-08	6.55E-10

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT (METERS) 58.10
DIAMETER (METERS) 0.00
EXIT VELOCITY (METERS) 0.00

REP. WIND HEIGHT (METERS) 10.0
BUILDING HEIGHT (METERS) 58.1
BLDG. MIN. CRS. SEC. AREA (SQ.METERS) 2000.0
HEAT EMISSION RATE (CAL/SEC) 0.0

ALL GROUND LEVEL RELEASES.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.4

2002 PALISADES LAND USE CENSUS

Distance to the nearest residence, garden, dairy/beef cattle, and goat in each sector.

<u>SECTOR</u>	<u>RESIDENCE</u>	<u>GARDEN</u>	<u>BEEF CATTLE</u>	<u>DAIRY COW</u>	<u>GOAT</u>
NNE	1.1 mi	1.7 mi	>5 mi	>5 mi	>5 mi
NE	1.2 mi	1.2 mi	2.9 mi	>5 mi	3.2 mi
ENE	1.3 mi	1.6 mi	4.0 mi	>5 mi	>5 mi
E	1.0 mi	2.1 mi	3.5 mi	>5 mi	>5 mi
ESE	1.0 mi	*1.0 mi	*4.0 mi	>5 mi	*2.0 mi
SE	1.0 mi	*1.0 mi	2.2 mi	4.3 mi	*2.0 mi
SSE	0.7 mi	1.6 mi	>5 mi	>5 mi	>5 mi
S	0.5 mi	4.0 mi	>5 mi	>5 mi	4.7 mi
SSW	0.7 mi	>5.0 mi	>5 mi	>5 mi	>5 mi

*Note: Garden and Farm bisected by ESE/SE sector line.

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.4a

2002 PALISADES LAND USE CENSUS

Critical Receptor Items

<u>Sector</u>	<u>Distance Miles</u>	<u>Location/Description</u>	<u>Item</u>	<u>*X/Q (sec/m³)</u>
SSE	0.48	Site Boundary	N/A	2.13E-06
S	0.50	Residence, Palisades Park; 1/2 mile west of 29 th Avenue and Blue Star intersection	Residence	1.38E-06
SE	1.0	77550 28 th Avenue	Garden	5.87E-07
SE	2.2	76 th Street, 0.3 miles N of 34 th East side of road	Beef Cattle	1.86E-07
SE	4.3	72401 36 th Ave	Dairy Cow	6.83E-08
SE	2.0	SE corner of 30 th and 76 th	Goat	2.10E-07

*Based on Palisades 5-year composite meteorological data, 1992 - 1996.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.5

DOSE FACTORS FOR SUBMERSION IN NOBLE GASES*

	<u>DFR¹</u>	<u>DFY²</u>	<u>DFS¹</u>	<u>DFB²</u>
Kr-85m	1.17(+3) ³	1.23(+3)	1.46(+3)	1.97(+3)
Kr-85	1.61(+1)	1.72(+1)	1.34(+3)	1.95(+3)
Kr-87	5.92(+3)	6.17(+3)	9.73(+3)	1.03(+4)
Kr-88	1.47(+4)	1.52(+4)	2.37(+3)	2.93(+3)
Kr-89	1.66(+4)	1.73(+4)	1.01(+4)	1.06(+4)
Xe-131m	9.15(+1)	1.56(+2)	4.76(+2)	1.11(+3)
Xe-133m	2.51(+2)	3.27(+2)	9.94(+2)	1.48(+3)
Xe-133	2.94(+2)	3.53(+2)	3.06(+2)	1.05(+3)
Xe-135m	3.12(+3)	3.36(+3)	7.11(+2)	7.39(+3)
Xe-135	1.81(+3)	1.92(+3)	1.86(+3)	2.46(+3)
Xe-137	1.42(+3)	1.51(+3)	1.22(+4)	1.27(+4)
Xe-138	8.83(+3)	9.21(+3)	4.13(+3)	4.75(+3)
Ar-41	8.84(+3)	9.30(+3)	2.69(+3)	3.28(+3)

1. mrem/y per $\mu\text{Ci}/\text{m}^3$
2. mrad/y per $\mu\text{Ci}/\text{m}^3$
3. 1.17(+3) = 1.17×10^3

*Dose factors for exposure to a semi-infinite cloud of noble gases. Values were obtained from USNRC Regulatory Guide 1.109, Revision 1 (October 1977).

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.6

STABLE ELEMENT TRANSFER DATA

<u>ELEMENT</u>	<u>F_m - MILK (COW)</u> <u>(DAYS/L)</u>	<u>F_m - MILK (GOAT)</u> <u>(DAYS/L)</u>	<u>F_f - MEAT</u> <u>(DAYS/KG)</u>	<u>B_{iv}</u> <u>(VEG/SOIL)</u>
H	1.0E-02	1.7E-01	1.2E-02	4.8E-00
C	1.2E-02	1.0E-01	3.1E-02	5.5E-00
Na	4.0E-02	4.0E-02	3.0E-02	5.2E-02
P	2.5E-02	2.5E-01	4.6E-02	1.1E-00
Cr	2.2E-03	2.2E-03	2.4E-03	2.5E-04
Mn	2.5E-04	2.5E-04	8.0E-04	2.9E-02
Fe	1.2E-03	1.3E-04	4.0E-02	6.6E-04
Co	1.0E-03	1.0E-03	1.3E-02	9.4E-03
Ni	6.7E-03	6.7E-03	5.3E-02	1.9E-02
Cu	1.4E-02	1.3E-02	8.0E-03	1.2E-01
Zn	3.9E-02	3.9E-02	3.0E-02	4.0E-01
Rb	3.0E-02	3.0E-02	3.1E-02	1.3E-01
Sr	8.0E-04	1.4E-02	6.0E-04	1.7E-02
Y	1.0E-05	1.0E-05	4.6E-03	2.6E-03
Zr	5.0E-06	5.0E-06	3.4E-02	1.7E-04
Nb	2.5E-03	2.5E-03	2.8E-01	9.4E-03
Mo	7.5E-03	7.5E-03	8.0E-03	1.2E-01
Tc	2.5E-02	2.5E-02	4.0E-01	2.5E-01
Ru	1.0E-06	1.0E-06	4.0E-01	5.0E-02
Rh	1.0E-02	1.0E-02	1.5E-03	1.3E+01
Ag	5.0E-02	5.0E-02	1.7E-02	1.5E-01
Te	1.0E-03	1.0E-03	7.7E-02	1.3E-00
I	6.0E-03	6.0E-02	2.9E-03	2.0E-02
Cs	1.2E-02	3.0E-01	4.0E-03	1.0E-02
Ba	4.0E-04	4.0E-04	3.2E-03	5.0E-03
La	5.0E-06	5.0E-06	2.0E-04	2.5E-03
Ce	1.0E-04	1.0E-04	1.2E-03	2.5E-03
Pr	5.0E-06	5.0E-06	4.7E-03	2.5E-03
Nd	5.0E-06	5.0E-06	3.3E-03	2.4E-03
W	5.0E-04	5.0E-04	1.3E-03	1.8E-02
Np	5.0E-06	5.0E-06	2.0E-04	2.5E-03

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7

INFANT INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3*	0.	4.62E-07	4.62E-07	4.62E-07	4.62E-07	4.62E-07	4.62E-07
BE10	9.49E-04	1.25E-04	2.65E-05	0.	0.	1.49E-03	1.73E-05
C14	1.89E-05	3.79E-06	3.79E-06	3.79E-06	3.79E-06	3.79E-06	3.79E-06
N13	4.39E-08	4.39E-08	4.39E-08	4.39E-08	4.39E-08	4.39E-08	4.39E-08
F18	3.92E-06	0.	3.33E-07	0.	0.	0.	6.10E-07
NA22	7.37E-05	7.37E-05	7.37E-05	7.37E-05	7.37E-05	7.37E-05	7.37E-05
NA24	7.54E-06	7.54E-06	7.54E-06	7.54E-06	7.54E-06	7.54E-06	7.54E-06
P32	1.45E-03	8.03E-05	5.53E-05	0.	0.	0.	1.15E-05
AR39	0.	0.	0.	0.	0.	1.00E-08	0.
AR41	0.	0.	0.	0.	0.	3.14E-08	0.
CA41	7.48E-05	0.	8.16E-06	0.	0.	6.94E-02	2.96E-07
SC46	3.75E-04	5.41E-04	1.69E-04	0.	3.56E-04	0.	2.19E-05
CR51	0.	0.	6.39E-08	4.11E-08	9.45E-09	9.17E-06	2.55E-07
MN54	0.	1.81E-05	3.56E-06	0.	3.56E-06	7.14E-04	5.04E-06
MN56	0.	1.10E-09	1.58E-10	0.	7.86E-10	8.95E-06	5.12E-05
FE55	1.41E-05	8.39E-06	2.38E-06	0.	0.	6.21E-05	7.82E-07
FE59	9.69E-06	1.68E-05	6.77E-06	0.	0.	7.25E-04	1.77E-05
CO57	0.	4.65E-07	4.58E-07	0.	0.	2.71E-04	3.47E-06
CO58	0.	8.71E-07	1.30E-06	0.	0.	5.55E-04	7.95E-06
CO60	0.	5.73E-06	8.41E-06	0.	0.	3.22E-03	2.28E-05
NI59	1.81E-05	5.44E-06	3.10E-06	0.	0.	5.48E-05	6.34E-07
NI63	2.42E-04	1.46E-05	8.29E-06	0.	0.	1.49E-04	1.73E-06
NI65	1.71E-09	2.03E-10	8.79E-11	0.	0.	5.80E-06	3.58E-05
CU64	0.	1.34E-09	5.53E-10	0.	2.84E-09	6.64E-06	1.07E-05
ZN65	1.38E-05	4.47E-05	2.22E-05	0.	2.32E-05	4.62E-04	3.67E-05
ZN69M+D	8.98E-09	1.84E-08	1.67E-09	0.	7.45E-09	1.91E-05	2.92E-05
ZN69	3.85E-11	6.91E-11	5.13E-12	0.	2.87E-11	1.05E-06	9.44E-06
SE79	0.	2.25E-06	4.20E-07	0.	2.47E-06	2.99E-04	3.46E-06
BR82	0.	0.	9.49E-06	0.	0.	0.	0.
BR83+D	0.	0.	2.72E-07	0.	0.	0.	0.
BR84	0.	0.	2.86E-07	0.	0.	0.	0.
BR85	0.	0.	1.46E-08	0.	0.	0.	0.
KR83M	0.	0.	0.	0.	0.	2.50E-09	0.
KR85M	0.	0.	0.	0.	0.	1.31E-08	0.
KR85	0.	0.	0.	0.	0.	1.16E-08	0.
KR87	0.	0.	0.	0.	0.	6.59E-08	0.
KR88+D	0.	0.	0.	0.	0.	1.38E-07	0.
KR89	0.	0.	0.	0.	0.	8.67E-08	0.
RB86	0.	1.36E-04	6.30E-05	0.	0.	0.	2.17E-06
RB87	0.	7.11E-05	2.64E-05	0.	0.	0.	2.99E-07
RB88	0.	3.98E-07	2.05E-07	0.	0.	0.	2.42E-07
RB89+D	0.	2.29E-07	1.47E-07	0.	0.	0.	4.87E-08
SR89+D	2.84E-04	0.	8.15E-06	0.	0.	1.45E-03	4.57E-05
SR90+D	2.92E-02	0.	1.85E-03	0.	0.	8.03E-03	9.36E-05
SR91+D	6.83E-08	0.	2.47E-09	0.	0.	3.76E-05	5.24E-05
SR92+D	7.50E-09	0.	2.79E-10	0.	0.	1.70E-05	1.00E-04

Includes a 50% increase to account for percutaneous transpiration.

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

INFANT INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y90	2.35E-06	0.	6.30E-08	0.	0.	1.92E-04	7.43E-05
Y91M+D	2.91E-10	0.	9.90E-12	0.	0.	1.99E-06	1.68E-06
Y91	4.20E-04	0.	1.12E-05	0.	0.	1.75E-03	5.02E-05
Y92	1.17E-08	0.	3.29E-10	0.	0.	1.75E-05	9.04E-05
Y93	1.07E-07	0.	2.91E-09	0.	0.	5.46E-05	1.19E-04
ZR93+D	2.24E-04	9.51E-05	6.18E-05	0.	3.19E-04	1.37E-03	1.48E-05
ZR95+D	8.24E-05	1.99E-05	1.45E-05	0.	2.22E-05	1.25E-03	1.55E-05
ZR97+D	1.07E-07	1.83E-08	8.36E-09	0.	1.85E-08	7.88E-05	1.00E-04
NB93M	1.38E-04	3.59E-05	1.15E-05	0.	3.68E-05	2.09E-04	2.47E-06
NB95	1.12E-05	4.59E-06	2.70E-06	0.	3.37E-06	3.42E-04	9.05E-06
NB97	2.44E-10	5.21E-11	1.88E-11	0.	4.07E-11	2.37E-06	1.92E-05
MO93	0.	6.46E-06	2.22E-07	0.	1.54E-06	3.40E-04	3.76E-06
MO99+D	0.	1.18E-07	2.31E-08	0.	1.89E-07	9.63E-05	3.48E-05
TC99M	9.98E-13	2.06E-12	2.66E-11	0.	2.22E-11	5.79E-07	1.45E-06
TC99	2.09E-07	2.68E-07	8.85E-08	0.	2.49E-06	6.77E-04	7.82E-06
TC101	4.65E-14	5.88E-14	5.80E-13	0.	6.99E-13	4.17E-07	6.03E-07
RU103+D	1.44E-06	0.	4.85E-07	0.	3.03E-06	3.94E-04	1.15E-05
RU105+D	8.74E-10	0.	2.93E-10	0.	6.42E-10	1.12E-05	3.46E-05
RU106+D	6.20E-05	0.	7.77E-06	0.	7.61E-05	8.26E-03	1.17E-04
RH105	8.26E-09	5.41E-09	3.63E-09	0.	1.50E-08	2.08E-05	1.37E-05
PD107	0.	4.92E-07	4.11E-08	0.	2.75E-06	6.34E-05	7.33E-07
PD109	0.	3.92E-09	1.05E-09	0.	1.28E-08	1.68E-05	2.85E-05
AG110M+D	7.13E-06	5.16E-06	3.57E-06	0.	7.80E-06	2.62E-03	2.36E-05
AG111	3.75E-07	1.45E-07	7.75E-08	0.	3.05E-07	2.06E-04	3.02E-05
CD113M	0.	6.67E-04	2.64E-05	0.	5.80E-04	1.40E-03	1.65E-05
CD115M	0.	1.73E-04	6.19E-06	0.	9.41E-05	1.47E-03	5.02E-05
SN123	2.09E-04	4.21E-06	7.28E-06	4.27E-06	0.	2.22E-03	4.08E-05
SN125+D	1.01E-05	2.51E-07	6.00E-07	2.47E-07	0.	6.43E-04	7.26E-05
SN126+D	8.30E-04	1.44E-05	3.52E-05	3.84E-06	0.	4.93E-03	1.65E-05
SB124	2.71E-05	3.97E-07	8.56E-06	7.18E-08	0.	1.89E-03	4.22E-05
SB125+D	3.69E-05	3.41E-07	7.78E-06	4.45E-08	0.	1.17E-03	1.05E-05
SB126	3.08E-06	6.01E-08	1.11E-06	2.35E-08	0.	6.88E-04	5.33E-05
SB127	2.82E-07	5.04E-09	8.76E-08	3.60E-09	0.	1.54E-04	3.78E-05
TE125M	3.40E-06	1.42E-06	4.70E-07	1.16E-06	0.	3.19E-04	9.22E-06
TE127M+D	1.19E-05	4.93E-06	1.48E-06	3.48E-06	2.68E-05	9.37E-04	1.95E-05
TE127	1.59E-09	6.81E-10	3.49E-10	1.32E-09	3.47E-09	7.39E-06	1.74E-05
TE129M+D	1.01E-05	4.35E-06	1.59E-06	3.91E-06	2.27E-05	1.20E-03	4.93E-05
TE129	5.63E-11	2.48E-11	1.34E-11	4.82E-11	1.25E-10	2.14E-06	1.88E-05
TE131M+D	7.62E-08	3.93E-08	2.59E-08	6.38E-08	1.89E-07	1.42E-04	8.51E-05
TE131+D	1.24E-11	5.87E-12	3.57E-12	1.13E-11	2.85E-11	1.47E-06	5.87E-06
TE132+D	2.66E-07	1.69E-07	1.26E-07	1.99E-07	7.39E-07	2.43E-04	3.15E-05
TE133M+D	6.13E-11	3.59E-11	2.74E-11	5.52E-11	1.72E-10	3.92E-06	1.59E-05
TE134+D	3.18E-11	2.04E-11	1.68E-11	2.91E-11	9.59E-11	2.93E-06	2.53E-06
I129	2.16E-05	1.59E-05	1.16E-05	1.04E-02	1.88E-05	0.	2.12E-07
I130	4.54E-06	9.91E-06	3.98E-06	1.14E-03	1.09E-05	0.	1.42E-06
I131+D	2.71E-05	3.17E-05	1.40E-05	1.06E-02	3.70E-05	0.	7.56E-07

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

INFANT INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
I132	1.21E-06	2.53E-06	8.99E-07	1.21E-04	2.82E-06	0.	1.36E-06
I133+D	9.46E-06	1.37E-05	4.00E-06	2.54E-03	1.60E-05	0.	1.54E-06
I134	6.58E-07	1.34E-06	4.75E-07	3.18E-05	1.49E-06	0.	9.21E-07
I135+D	2.76E-06	5.43E-06	1.98E-06	4.97E-04	6.05E-06	0.	1.31E-06
XE131M	0.	0.	0.	0.	0.	6.77E-09	0.
XE133M	0.	0.	0.	0.	0.	8.89E-09	0.
XE133	0.	0.	0.	0.	0.	7.41E-09	0.
XE135M	0.	0.	0.	0.	0.	8.05E-09	0.
XE135	0.	0.	0.	0.	0.	1.80E-08	0.
XE137	0.	0.	0.	0.	0.	8.30E-08	0.
XE138+D	0.	0.	0.	0.	0.	9.78E-08	0.
CS134M+D	1.32E-07	2.10E-07	1.11E-07	0.	8.50E-08	2.00E-08	1.16E-07
CS134	2.83E-04	5.02E-04	5.32E-05	0.	1.36E-04	5.69E-05	9.53E-07
CS135	1.00E-04	8.66E-05	4.73E-06	0.	2.58E-05	1.01E-05	2.18E-07
CS136	3.45E-05	9.61E-05	3.78E-05	0.	4.03E-05	8.40E-06	1.02E-06
CS137+D	3.92E-04	4.37E-04	3.25E-05	0.	1.23E-04	5.09E-05	9.53E-07
CS138	3.61E-07	5.58E-07	2.84E-07	0.	2.93E-07	4.67E-08	6.26E-07
CS139+D	2.32E-07	3.03E-07	1.22E-07	0.	1.65E-07	2.53E-08	1.33E-08
BA139	1.06E-09	7.03E-13	3.07E-11	0.	4.23E-13	4.25E-06	3.64E-05
BA140+D	4.00E-05	4.00E-08	2.07E-06	0.	9.59E-09	1.14E-03	2.74E-05
BA141+D	1.12E-10	7.70E-14	3.55E-12	0.	4.64E-14	2.12E-06	3.39E-06
BA142+D	2.84E-11	2.36E-14	1.40E-12	0.	1.36E-14	1.11E-06	4.95E-07
LA140	3.61E-07	1.43E-07	3.68E-08	0.	0.	1.20E-04	6.06E-05
LA141	4.85E-09	1.40E-09	2.45E-10	0.	0.	1.22E-05	5.96E-05
LA142	7.36E-10	2.69E-10	6.46E-11	0.	0.	5.87E-06	4.25E-05
CE141	1.98E-05	1.19E-05	1.42E-06	0.	3.75E-06	3.69E-04	1.54E-05
CE143+D	2.09E-07	1.38E-07	1.58E-08	0.	4.03E-08	8.30E-05	3.55E-05
CE144+D	2.28E-03	8.65E-04	1.26E-04	0.	3.84E-04	7.03E-03	1.06E-04
PR143	1.00E-05	3.74E-06	4.99E-07	0.	1.41E-06	3.09E-04	2.66E-05
PR144	3.42E-11	1.32E-11	1.72E-12	0.	4.80E-12	1.15E-06	3.06E-06
ND147+D	5.67E-06	5.81E-06	3.57E-07	0.	2.25E-06	2.30E-04	2.23E-05
PM147	3.91E-04	3.07E-05	1.56E-05	0.	4.93E-05	4.55E-04	5.75E-06
PM148M+D	5.00E-05	1.24E-05	9.94E-06	0.	1.45E-05	1.22E-03	3.37E-05
PM148	3.34E-06	4.82E-07	2.44E-07	0.	5.76E-07	3.20E-04	6.04E-05
PM149	3.10E-07	4.08E-08	1.78E-08	0.	4.96E-08	6.50E-05	3.01E-05
PM151	7.52E-08	1.10E-08	5.55E-09	0.	1.30E-08	3.25E-05	2.58E-05
SM151	3.38E-04	6.45E-05	1.63E-05	0.	5.24E-05	2.98E-04	3.46E-06
SM153	1.53E-07	1.18E-07	9.06E-09	0.	2.47E-08	3.70E-05	1.93E-05
EU152	7.83E-04	1.77E-04	1.72E-04	0.	5.94E-04	1.48E-03	9.88E-06
EU154	2.96E-03	3.46E-04	2.45E-04	0.	1.14E-03	3.05E-03	2.84E-05
EU155	5.97E-04	5.72E-05	3.46E-05	0.	1.58E-04	5.20E-04	5.19E-05
EU156	1.56E-05	9.59E-06	1.54E-06	0.	4.48E-06	6.12E-04	4.14E-05
TB160	1.12E-04	0.	1.40E-05	0.	3.20E-05	1.11E-03	2.14E-05
HO166M	1.45E-03	3.07E-04	2.51E-04	0.	4.22E-04	2.05E-03	1.65E-05
W181	4.86E-08	1.46E-08	1.67E-09	0.	0.	1.33E-05	2.63E-07
W185	1.57E-06	4.83E-07	5.58E-08	0.	0.	4.48E-04	1.12E-05
W187	9.26E-09	6.44E-09	2.23E-09	0.	0.	2.83E-05	2.54E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

INFANT INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	8.62E-02	2.02E-02	3.43E-03	0.	6.85E-02	1.76E-01	3.79E-05
BI210+D	0.	1.33E-05	1.18E-06	0.	1.03E-04	9.96E-03	3.27E-05
PO210	2.98E-03	5.63E-03	7.12E-04	0.	1.30E-02	2.40E-01	4.36E-05
RN222+D	0.	0.	0.	0.	0.	9.88E-06	0.
RA223+D	1.56E-03	2.26E-06	3.12E-04	0.	4.16E-05	2.25E-01	3.04E-04
RA224+D	1.77E-04	4.00E-07	3.54E-05	0.	7.30E-06	7.91E-02	3.42E-04
RA225+D	2.57E-03	2.88E-06	5.13E-04	0.	5.31E-05	2.57E-01	2.87E-04
RA226+D	2.48E-01	1.46E-05	2.05E-01	0.	2.94E-04	7.83E-01	3.05E-04
RA228+D	1.60E-01	7.61E-06	1.80E-01	0.	1.53E-04	1.09E-00	5.19E-05
AC225	3.69E-03	4.72E-03	2.48E-04	0.	3.49E-04	1.96E-01	2.71E-04
AC227+D	5.29E+00	8.76E-01	3.28E-01	0.	1.86E-01	1.62E+00	5.27E-05
TH227+D	1.82E-03	3.03E-05	5.24E-05	0.	1.13E-04	3.27E-01	3.53E-04
TH228+D	8.46E-01	1.10E-02	2.86E-02	0.	5.61E-02	4.65E+00	3.62E-04
TH229	1.34E+01	1.82E-01	6.62E-01	0.	8.99E-01	1.22E+01	3.29E-04
TH230	3.46E+00	1.79E-01	9.65E-02	0.	8.82E-01	2.18E+00	3.87E-05
TH232+D	3.86E+00	1.53E-01	2.29E-01	0.	7.54E-01	2.09E+00	3.29E-05
TH234	1.33E-05	7.17E-07	3.84E-07	0.	2.70E-06	1.62E-03	7.40E-05
PA231+D	9.10E+00	3.00E-01	3.62E-01	0.	1.62E+00	3.85E-01	4.61E-05
PA233	6.84E-06	1.32E-06	1.19E-06	0.	3.68E-06	2.19E-04	9.04E-06
U232+D	2.57E-01	0.	2.13E-02	0.	2.40E-02	1.49E+00	4.36E-05
U233+D	5.44E-02	0.	3.83E-03	0.	1.09E-02	3.56E-01	4.03E-05
U234	5.22E-02	0.	3.75E-03	0.	1.07E-02	3.49E-01	3.95E-05
U235+D	5.01E-02	0.	3.52E-03	0.	1.01E-02	3.28E-01	5.02E-05
U236	5.01E-02	0.	3.60E-03	0.	1.03E-02	3.35E-01	3.71E-05
U237	3.25E-07	0.	8.65E-08	0.	8.08E-07	9.13E-05	1.31E-05
U238+D	4.79E-02	0.	3.29E-03	0.	9.40E-03	3.06E-01	3.54E-05
NP237+D	3.03E+00	2.32E-01	1.26E-01	0.	7.69E-01	3.49E-01	5.10E-05
NP238	2.67E-06	6.73E-08	4.16E-08	0.	1.47E-07	9.19E-05	2.58E-05
NP239	2.65E-07	2.37E-08	1.34E-08	0.	4.73E-08	4.25E-05	1.78E-05
PU238	5.02E+00	6.33E-01	1.27E-01	0.	4.64E-01	9.03E-01	4.69E-05
PU239	5.50E+00	6.72E-01	1.34E-01	0.	4.95E-01	8.47E-01	4.28E-05
PU240	6.49E+00	6.71E-01	1.34E-01	0.	4.94E-01	8.47E-01	4.36E-05
PU241+D	1.55E-01	6.69E-03	3.11E-03	0.	1.15E-02	7.62E-04	8.97E-07
PU242	5.09E+00	6.47E-01	1.29E-01	0.	4.77E-01	8.15E-01	4.20E-05
PU244	5.95E+00	7.40E-01	1.48E-01	0.	5.46E-01	9.33E-01	6.26E-05
AM241	1.84E+00	8.44E-01	1.31E-01	0.	7.94E-01	4.06E-01	4.78E-05
AM242M	1.90E+00	8.24E-01	1.35E-01	0.	8.03E-01	1.64E-01	6.01E-05
AM243	1.82E+00	8.10E-01	1.27E-01	0.	7.72E-01	3.85E-01	5.60E-05
CM242	8.58E-02	7.44E-02	5.70E-03	0.	1.69E-02	2.97E-01	5.10E-05
CM243	1.73E+00	7.94E-01	1.06E-01	0.	3.91E-01	4.24E-01	5.02E-05
CM244	1.43E+00	7.04E-01	8.89E-02	0.	3.21E-01	4.08E-01	4.86E-05
CM245	2.26E+00	8.80E-01	1.36E-01	0.	5.23E-01	3.92E-01	4.53E-05
CM246	2.24E+00	8.79E-01	1.36E-01	0.	5.23E-01	3.99E-01	4.45E-05
CM247+D	2.18E+00	8.64E-01	1.33E-01	0.	5.15E-01	3.92E-01	5.85E-05
CM248	1.82E+01	7.12E+00	1.10E+00	0.	4.24E+00	3.23E+00	9.43E-04
CF252	4.26E+00	0.	1.01E-01	0.	0.	1.37E+00	1.85E-04

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

CHILD INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3*	0.	3.04E-07	3.04E-07	3.04E-07	3.04E-07	3.04E-07	3.04E-07
BE10	8.43E-04	9.83E-05	2.12E-05	0.	0.	7.41E-04	1.72E-05
C14	9.70E-06	1.82E-06	1.82E-06	1.82E-06	1.82E-06	1.82E-06	1.82E-06
N13	2.33E-08	2.33E-08	2.33E-08	2.33E-08	2.33E-08	2.33E-08	2.33E-08
F18	1.88E-06	0.	1.85E-07	0.	0.	0.	3.37E-07
NA22	4.41E-05	4.41E-05	4.41E-05	4.41E-05	4.41E-05	4.41E-05	4.41E-05
NA24	4.35E-06	4.35E-06	4.35E-06	4.35E-06	4.35E-06	4.35E-06	4.35E-06
P32	7.04E-04	3.09E-05	2.67E-05	0.	0.	0.	1.14E-05
AR39	0.	0.	0.	0.	0.	4.89E-09	0.
AR41	0.	0.	0.	0.	0.	1.68E-08	0.
CA41	7.06E-05	0.	7.70E-06	0.	0.	7.21E-02	2.94E-07
SC46	1.97E-04	2.70E-04	1.04E-04	0.	2.39E-04	0.	2.45E-05
CR51	0.	0.	4.17E-08	2.31E-08	6.57E-09	4.59E-06	2.93E-07
MN54	0.	1.16E-05	2.57E-06	0.	2.71E-06	4.26E-04	6.19E-06
MN56	0.	4.48E-10	8.43E-11	0.	4.52E-10	3.55E-06	3.33E-05
FE55	1.28E-05	6.80E-06	2.10E-06	0.	0.	3.00E-05	7.75E-07
FE59	5.59E-06	9.04E-06	4.51E-06	0.	0.	3.43E-04	1.91E-05
CO57	0.	2.44E-07	2.88E-07	0.	0.	1.37E-04	3.58E-06
CO58	0.	4.79E-07	8.55E-07	0.	0.	2.99E-04	9.29E-06
CO60	0.	3.55E-06	6.12E-06	0.	0.	1.91E-03	2.60E-05
NI59	1.66E-05	4.67E-06	2.83E-06	0.	0.	2.73E-05	6.29E-07
NI63	2.22E-04	1.25E-05	7.56E-06	0.	0.	7.43E-05	1.71E-06
NI65	8.08E-10	7.99E-11	4.44E-11	0.	0.	2.21E-06	2.27E-05
CU64	0.	5.39E-10	2.90E-10	0.	1.63E-09	2.59E-06	9.92E-06
ZN65	1.15E-05	3.06E-05	1.90E-05	0.	1.93E-05	2.69E-04	4.41E-06
ZN69M+D	4.26E-09	7.28E-09	8.59E-10	0.	4.22E-09	7.36E-06	2.71E-05
ZN69	1.81E-11	2.61E-11	2.41E-12	0.	1.58E-11	3.84E-07	2.75E-06
SE79	0.	1.23E-06	2.60E-07	0.	1.71E-06	1.49E-04	3.43E-06
BR82	0.	0.	5.66E-06	0.	0.	0.	0.
BR83+D	0.	0.	1.28E-07	0.	0.	0.	0.
BR84	0.	0.	1.48E-07	0.	0.	0.	0.
BR85	0.	0.	6.84E-09	0.	0.	0.	0.
KR83M	0.	0.	0.	0.	0.	1.22E-09	0.
KR85M	0.	0.	0.	0.	0.	6.58E-09	0.
KR85	0.	0.	0.	0.	0.	5.66E-09	0.
KR87	0.	0.	0.	0.	0.	3.38E-08	0.
KR88+D	0.	0.	0.	0.	0.	6.99E-08	0.
KR89	0.	0.	0.	0.	0.	4.55E-08	0.
RB86	0.	5.36E-05	3.09E-05	0.	0.	0.	2.16E-06
RB87	0.	3.16E-05	1.37E-05	0.	0.	0.	2.96E-07
RB88	0.	1.52E-07	9.90E-08	0.	0.	0.	4.66E-09
RB89+D	0.	9.33E-08	7.83E-08	0.	0.	0.	5.11E-10
SR89+D	1.62E-04	0.	4.66E-06	0.	0.	5.83E-04	4.52E-05
SR90+D	2.73E-02	0.	1.74E-03	0.	0.	3.99E-03	9.28E-05
SR91+D	3.28E-08	0.	1.24E-09	0.	0.	1.44E-05	4.70E-05
SR92+D	3.54E-09	0.	1.42E-10	0.	0.	6.49E-06	6.55E-05

*Includes a 50% increase to account for percutaneous transpiration.

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

CHILD INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y90	1.11E-06	0.	2.99E-08	0.	0.	7.07E-05	7.24E-05
Y91M+D	1.37E-10	0.	4.98E-12	0.	0.	7.60E-07	4.64E-07
Y91	2.47E-04	0.	6.59E-06	0.	0.	7.10E-04	4.97E-05
Y92	5.50E-09	0.	1.57E-10	0.	0.	6.46E-06	6.46E-05
Y93	5.04E-08	0.	1.38E-09	0.	0.	2.01E-05	1.05E-04
ZR93+D	2.07E-04	7.80E-05	5.55E-05	0.	3.00E-04	7.10E-04	1.47E-05
ZR95+D	5.13E-05	1.13E-05	1.00E-05	0.	1.61E-05	6.03E-04	1.65E-05
ZR97+D	5.07E-08	7.34E-09	4.32E-09	0.	1.05E-08	3.06E-05	9.49E-05
NB93M	1.27E-04	3.17E-05	1.04E-05	0.	3.44E-05	1.04E-04	2.45E-06
NB95	6.35E-06	2.48E-06	1.77E-06	0.	2.33E-06	1.66E-04	1.00E-05
NB97	1.16E-10	2.08E-11	9.74E-12	0.	2.31E-11	9.23E-07	7.52E-06
MO93	0.	3.76E-06	1.35E-07	0.	1.06E-06	1.70E-04	3.78E-06
MO99+D	0.	4.66E-08	1.15E-08	0.	1.06E-07	3.66E-05	3.42E-05
TC99M	4.81E-13	9.41E-13	1.56E-11	0.	1.37E-11	2.57E-07	1.30E-06
TC99	1.34E-07	1.49E-07	5.35E-08	0.	1.75E-06	3.37E-04	7.75E-06
TC101	2.19E-14	2.30E-14	2.91E-13	0.	3.92E-13	1.58E-07	4.41E-09
RU103+D	7.55E-07	0.	2.90E-07	0.	1.90E-06	1.79E-04	1.21E-05
RU105+D	4.13E-10	0.	1.50E-10	0.	3.63E-10	4.30E-06	2.69E-05
RU106+D	3.68E-05	0.	4.57E-06	0.	4.97E-05	3.87E-03	1.16E-04
RH105	3.91E-09	2.10E-09	1.79E-09	0.	8.39E-09	7.82E-06	1.33E-05
PD107	0.	2.65E-07	2.51E-08	0.	1.97E-06	3.16E-05	7.26E-07
PD109	0.	1.48E-09	4.95E-10	0.	7.06E-09	6.16E-06	2.59E-05
AG110M+D	4.56E-06	3.08E-06	2.47E-06	0.	5.74E-06	1.48E-03	2.71E-05
AG111	1.81E-07	5.68E-08	3.75E-08	0.	1.71E-07	7.73E-05	2.98E-05
CD113M	0.	4.93E-04	2.12E-05	0.	5.13E-04	6.94E-04	1.63E-05
CD115M	0.	7.88E-05	3.39E-06	0.	5.93E-05	5.86E-04	4.97E-05
SN123	1.29E-04	2.14E-06	4.19E-06	2.27E-06	0.	9.59E-04	4.05E-05
SN125+D	4.95E-06	9.94E-08	2.95E-07	1.03E-07	0.	2.43E-04	7.17E-05
SN126+D	6.23E-04	1.04E-05	2.36E-05	2.84E-06	0.	3.02E-03	1.63E-05
SB124	1.55E-05	2.00E-07	5.41E-06	3.41E-08	0.	8.76E-04	4.43E-05
SB125+D	2.66E-05	2.05E-07	5.59E-06	2.46E-08	0.	6.27E-04	1.09E-05
SB126	1.72E-06	2.62E-08	6.16E-07	1.00E-08	0.	2.86E-04	5.67E-05
SB127	1.36E-07	2.09E-09	4.70E-08	1.51E-09	0.	6.17E-05	3.82E-05
TE125M	1.82E-06	6.29E-07	2.47E-07	5.20E-07	0.	1.29E-04	9.13E-06
TE127M+D	6.72E-06	2.31E-06	8.16E-07	1.64E-06	1.72E-05	4.00E-04	1.93E-05
TE127	7.49E-10	2.57E-10	1.65E-10	5.30E-10	1.91E-09	2.71E-06	1.52E-05
TE129M+D	5.19E-06	1.85E-06	8.22E-07	1.71E-06	1.36E-05	4.76E-04	4.91E-05
TE129	2.64E-11	9.45E-12	6.44E-12	1.93E-11	6.94E-11	7.93E-07	6.89E-06
TE131M+D	3.63E-08	1.60E-08	1.37E-08	2.64E-08	1.08E-07	5.56E-05	8.32E-05
TE131+D	5.87E-12	2.28E-12	1.78E-12	4.59E-12	1.59E-11	5.55E-07	3.60E-07
TE132+D	1.30E-07	7.36E-08	7.12E-08	8.58E-08	4.79E-07	1.02E-04	3.72E-05
TE133M+D	2.93E-11	1.51E-11	1.50E-11	2.32E-11	1.01E-10	1.60E-06	4.77E-06
TE134+D	1.53E-11	8.81E-12	9.40E-12	1.24E-11	5.71E-11	1.23E-06	4.87E-07
I129	1.05E-05	6.40E-06	5.71E-06	4.28E-03	1.08E-05	0.	2.15E-07
I130	2.21E-06	4.43E-06	2.28E-06	4.99E-04	6.61E-06	0.	1.38E-06
I131+D	1.30E-05	1.30E-05	7.37E-06	4.39E-03	2.13E-05	0.	7.68E-07

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

CHILD INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
I132	5.72E-07	1.10E-06	5.07E-07	5.23E-05	1.69E-06	0.	8.65E-07
I133+D	4.48E-06	5.49E-06	2.08E-06	1.04E-03	9.13E-06	0.	1.48E-06
I134	3.17E-07	5.84E-07	2.69E-07	1.37E-05	8.92E-07	0.	2.58E-07
I135+D	1.33E-06	2.36E-06	1.12E-06	2.14E-04	3.62E-06	0.	1.20E-06
XE131M	0.	0.	0.	0.	0.	3.30E-09	0.
XE133M	0.	0.	0.	0.	0.	4.36E-09	0.
XE133	0.	0.	0.	0.	0.	3.66E-09	0.
XE135M	0.	0.	0.	0.	0.	4.48E-09	0.
XE135	0.	0.	0.	0.	0.	9.09E-09	0.
XE137	0.	0.	0.	0.	0.	4.07E-08	0.
XE138+D	0.	0.	0.	0.	0.	5.17E-08	0.
CS134M+D	6.33E-08	8.92E-08	6.12E-08	0.	4.94E-08	8.35E-09	7.92E-08
CS134	1.76E-04	2.74E-04	6.07E-05	0.	8.93E-05	3.27E-05	1.04E-06
CS135	6.23E-05	4.13E-05	4.45E-06	0.	1.53E-05	5.22E-06	2.17E-07
CS136	1.76E-05	4.62E-05	3.14E-05	0.	2.58E-05	3.93E-06	1.13E-06
CS137+D	2.45E-04	2.23E-04	3.47E-05	0.	7.63E-05	2.81E-05	9.78E-07
CS138	1.71E-07	2.27E-07	1.50E-07	0.	1.68E-07	1.84E-08	7.29E-08
CS139+D	1.09E-07	1.15E-07	5.80E-08	0.	9.08E-08	9.36E-09	7.23E-12
BA139	4.98E-10	2.66E-13	1.45E-11	0.	2.33E-13	1.56E-06	1.56E-05
BA140+D	2.00E-05	1.75E-08	1.17E-06	0.	5.71E-09	4.71E-04	2.75E-05
BA141+D	5.29E-11	2.95E-14	1.72E-12	0.	2.56E-14	7.89E-07	7.44E-08
BA142+D	1.35E-11	9.73E-15	7.54E-13	0.	7.87E-15	4.44E-07	7.41E-10
LA140	1.74E-07	6.08E-08	2.04E-08	0.	0.	4.94E-05	6.10E-05
LA141	2.28E-09	5.31E-10	1.15E-10	0.	0.	4.48E-06	4.37E-05
LA142	3.50E-10	1.11E-10	3.49E-11	0.	0.	2.35E-06	2.05E-05
CE141	1.06E-05	5.28E-06	7.83E-07	0.	2.31E-06	1.47E-04	1.53E-05
CE143+D	9.89E-08	5.37E-08	7.77E-09	0.	2.26E-08	3.12E-05	3.44E-05
CE144+D	1.83E-03	5.72E-04	9.77E-05	0.	3.17E-04	3.23E-03	1.05E-04
PR143	4.99E-06	1.50E-06	2.47E-07	0.	8.11E-07	1.17E-04	2.63E-05
PR144	1.61E-11	4.99E-12	8.10E-13	0.	2.64E-12	4.23E-07	5.32E-08
ND147+D	2.92E-06	2.36E-06	1.84E-07	0.	1.30E-06	8.87E-05	2.22E-05
PM147	3.52E-04	2.52E-05	1.36E-05	0.	4.45E-05	2.20E-04	5.70E-06
PM148M+D	3.31E-05	6.55E-06	6.55E-06	0.	9.74E-06	5.72E-04	3.58E-05
PM148	1.61E-06	1.94E-07	1.25E-07	0.	3.30E-07	1.24E-04	6.01E-05
PM149	1.47E-07	1.56E-08	8.45E-09	0.	2.75E-08	2.40E-05	2.92E-05
PM151	3.57E-08	4.33E-09	2.82E-09	0.	7.35E-09	1.24E-05	2.50E-05
SM151	3.14E-04	4.75E-05	1.49E-05	0.	4.89E-05	1.48E-04	3.43E-06
SM153	7.24E-08	4.51E-08	4.35E-09	0.	1.37E-08	1.37E-05	1.87E-05
EU152	7.42E-04	1.37E-04	1.61E-04	0.	5.73E-04	9.00E-04	1.14E-05
EU154	2.74E-03	2.49E-04	2.27E-04	0.	1.09E-03	1.66E-03	2.98E-05
EU155	5.60E-04	4.05E-05	3.18E-05	0.	1.51E-04	2.79E-04	5.39E-05
EU156	7.89E-06	4.23E-06	8.75E-07	0.	2.72E-06	2.54E-04	4.24E-05
TB160	7.79E-05	0.	9.67E-06	0.	2.32E-05	5.34E-04	2.28E-05
HO166M	1.34E-03	2.81E-04	2.37E-04	0.	4.01E-04	1.13E-03	1.63E-05
W181	2.66E-08	6.52E-09	8.99E-10	0.	0.	5.71E-06	2.61E-07
W185	8.31E-07	2.08E-07	2.91E-08	0.	0.	1.86E-04	1.11E-05
W187	4.41E-09	2.61E-09	1.17E-09	0.	0.	1.11E-05	2.46E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

CHILD INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	8.03E-02	1.85E-02	3.18E-03	0.	6.31E-02	8.74E-02	3.75E-05
BI210+D	0.	5.11E-06	5.65E-07	0.	5.76E-05	3.70E-03	3.21E-05
PO210	1.70E-03	2.76E-03	4.09E-04	0.	8.85E-03	1.05E-01	4.32E-05
RN222+D	0.	0.	0.	0.	0.	4.82E-06	0.
RA223+D	7.69E-04	8.89E-07	1.54E-04	0.	2.36E-05	8.48E-02	3.00E-04
RA224+D	8.44E-05	1.53E-07	1.69E-05	0.	4.06E-06	2.92E-02	3.34E-04
RA225+D	1.28E-03	1.14E-06	2.56E-04	0.	3.02E-05	9.74E-02	2.84E-04
RA226+D	2.34E-01	7.66E-06	1.92E-01	0.	2.03E-04	3.90E-01	3.02E-04
RA228+D	1.49E-01	3.94E-06	1.68E-01	0.	1.04E-04	5.37E-01	5.14E-05
AC225	1.81E-03	1.87E-03	1.21E-04	0.	1.99E-04	7.37E-02	2.67E-04
AC227+D	4.96E+00	8.05E-01	3.07E-01	0.	1.77E-01	8.04E-01	5.22E-05
TH227+D	9.24E-04	1.26E-05	2.67E-05	0.	6.67E-05	1.26E-01	3.49E-04
TH228+D	8.06E-01	1.04E-02	2.72E-02	0.	5.41E-02	3.34E+00	3.59E-04
TH229	1.28E+01	1.76E-01	6.31E-01	0.	8.68E-01	1.04E+01	3.27E-04
TH230	3.30E+00	1.73E-01	9.20E-02	0.	8.52E-01	1.85E+00	3.84E-05
TH232+D	3.68E+00	1.47E-01	1.28E-01	0.	7.28E-01	1.77E+00	3.27E-05
TH234	6.94E-06	3.07E-07	2.00E-07	0.	1.62E-06	6.31E-04	7.32E-05
PA231+D	8.62E+00	2.86E-01	3.43E-01	0.	1.56E+00	1.92E-01	4.57E-05
PA233	4.14E-06	6.48E-07	7.25E-07	0.	2.38E-06	9.77E-05	8.95E-06
U232+D	2.19E-01	0.	1.56E-02	0.	1.67E-02	7.42E-01	4.33E-05
U233+D	4.64E-02	0.	2.82E-03	0.	7.62E-03	1.77E-01	4.00E-05
U234	4.46E-02	0.	2.76E-03	0.	7.47E-03	1.74E-01	3.92E-05
U235+D	4.27E-02	0.	2.59E-03	0.	7.01E-03	1.63E-01	4.98E-05
U236	4.27E-02	0.	2.65E-03	0.	7.16E-03	1.67E-01	3.67E-05
U237	1.57E-07	0.	4.17E-08	0.	4.53E-07	3.40E-05	1.29E-05
U238+D	4.09E-02	0.	2.42E-03	0.	6.55E-03	1.53E-01	3.51E-05
NP237+D	2.88E+00	2.21E-01	1.19E-01	0.	7.41E-01	1.74E-01	5.06E-05
NP238	1.26E-06	2.56E-08	1.97E-08	0.	8.16E-08	3.39E-05	2.50E-05
NP239	1.26E-07	9.04E-09	6.35E-09	0.	2.63E-08	1.57E-05	1.73E-05
PU238	4.77E+00	6.05E-01	1.21E-01	0.	4.47E-01	6.08E-01	4.65E-05
PU239	5.24E+00	6.44E-01	1.28E-01	0.	4.78E-01	5.72E-01	4.24E-05
PU240	5.23E+00	6.43E-01	1.27E-01	0.	4.77E-01	5.71E-01	4.33E-05
PU241+D	1.46E-01	6.33E-03	2.93E-03	0.	1.10E-02	5.06E-04	8.90E-07
PU242	4.85E+00	6.20E-01	1.23E-01	0.	4.60E-01	5.50E-01	4.16E-05
PU244	5.67E+00	7.10E-01	1.41E-01	0.	5.27E-01	6.30E-01	6.20E-05
AM241	1.74E+00	7.85E-01	1.24E-01	0.	7.63E-01	2.02E-01	4.73E-05
AM242M	1.79E+00	7.65E-01	1.27E-01	0.	7.71E-01	8.14E-02	5.96E-05
AM243	1.72E+00	7.53E-01	1.20E-01	0.	7.42E-01	1.92E-01	5.55E-05
CM242	6.33E-02	4.84E-02	4.20E-03	0.	1.34E-02	1.31E-01	5.06E-05
CM243	1.61E+00	7.33E-01	9.95E-02	0.	3.74E-01	2.10E-01	4.98E-05
CM244	1.33E+00	6.48E-01	8.31E-02	0.	3.06E-01	2.02E-01	4.82E-05
CM245	2.14E+00	8.16E-01	1.28E-01	0.	5.03E-01	1.95E-01	4.49E-05
CM246	2.13E+00	8.15E-01	1.28E-01	0.	5.03E-01	1.99E-01	4.41E-05
CM247+D	2.07E+00	8.02E-01	1.26E-01	0.	4.95E-01	1.95E-01	5.80E-05
CM248	1.72E+01	6.61E+00	1.04E+00	0.	4.08E+00	1.61E+00	9.35E-04
CF252	3.92E+00	0.	9.33E-02	0.	0.	6.62E-01	1.84E-04

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

TEEN INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3*	0.	1.59E-07	1.59E-07	1.59E-07	1.59E-07	1.59E-07	1.59E-07
BE10	2.78E-04	4.33E-05	7.09E-06	0.	0.	3.84E-04	1.77E-05
C14	3.25E-06	6.09E-07	6.09E-07	6.09E-07	6.09E-07	6.09E-07	6.09E-07
N13	8.65E-09	8.65E-09	8.65E-09	8.65E-09	8.65E-09	8.65E-09	8.65E-09
F18	6.52E-07	0.	7.10E-08	0.	0.	0.	3.89E-08
NA22	1.76E-05	1.76E-05	1.76E-05	1.76E-05	1.76E-05	1.76E-05	1.76E-05
NA24	1.72E-06	1.72E-06	1.72E-06	1.72E-06	1.72E-06	1.72E-06	1.72E-06
P32	2.36E-04	1.37E-05	8.95E-06	0.	0.	0.	1.16E-05
AR39	0.	0.	0.	0.	0.	4.00E-09	0.
AR41	0.	0.	0.	0.	0.	1.44E-08	0.
CA41	4.05E-05	0.	4.38E-06	0.	0.	1.01E-01	3.03E-07
SC46	7.24E-05	1.41E-04	4.18E-05	0.	1.35E-04	0.	2.98E-05
CR51	0.	0.	1.69E-08	9.37E-09	3.84E-09	2.62E-06	3.75E-07
MN54	0.	6.39E-06	1.05E-06	0.	1.59E-06	2.48E-04	8.35E-06
MN56	0.	2.12E-10	3.15E-11	0.	2.24E-10	1.90E-06	7.18E-06
FE55	4.18E-06	2.98E-06	6.93E-07	0.	0.	1.55E-05	7.99E-07
FE59	1.99E-06	4.62E-06	1.79E-06	0.	0.	1.91E-04	2.23E-05
CO57	0.	1.18E-07	1.15E-07	0.	0.	7.33E-05	3.93E-06
CO58	0.	2.59E-07	3.47E-07	0.	0.	1.68E-04	1.19E-05
CO60	0.	1.89E-06	2.48E-06	0.	0.	1.09E-03	3.24E-05
NI59	5.44E-06	2.02E-06	9.24E-07	0.	0.	1.41E-05	6.48E-07
NI63	7.25E-05	5.43E-06	2.47E-06	0.	0.	3.84E-05	1.77E-06
NI65	2.73E-10	3.66E-11	1.59E-11	0.	0.	1.17E-06	4.59E-06
CU64	0.	2.54E-10	1.06E-10	0.	8.01E-10	1.39E-06	7.68E-06
ZN65	4.82E-06	1.67E-05	7.80E-06	0.	1.08E-05	1.55E-04	5.83E-06
ZN69M+D	1.44E-09	3.39E-09	3.11E-10	0.	2.06E-09	3.92E-06	2.14E-05
ZN69	6.04E-12	1.15E-11	8.07E-13	0.	7.53E-12	1.98E-07	3.56E-08
SE79	0.	5.43E-07	8.71E-08	0.	8.13E-07	7.71E-05	3.53E-06
BR82	0.	0.	2.28E-06	0.	0.	0.	0.
BR83+D	0.	0.	4.30E-08	0.	0.	0.	0.
BR84	0.	0.	5.41E-08	0.	0.	0.	0.
BR85	0.	0.	2.29E-09	0.	0.	0.	0.
KR83M	0.	0.	0.	0.	0.	9.97E-10	0.
KR85M	0.	0.	0.	0.	0.	5.46E-09	0.
KR85	0.	0.	0.	0.	0.	4.63E-09	0.
KR87	0.	0.	0.	0.	0.	2.82E-08	0.
KR88+D	0.	0.	0.	0.	0.	5.81E-08	0.
KR89	0.	0.	0.	0.	0.	3.85E-08	0.
RB86	0.	2.38E-05	1.05E-05	0.	0.	0.	2.21E-06
RB87	0.	1.40E-05	4.58E-06	0.	0.	0.	3.05E-07
RB88	0.	6.82E-08	3.40E-08	0.	0.	0.	3.65E-15
RB89+D	0.	4.40E-08	2.91E-08	0.	0.	0.	4.22E-17
SR89+D	5.43E-05	0.	1.56E-06	0.	0.	3.02E-04	4.64E-05
SR90+D	1.35E-02	0.	8.35E-04	0.	0.	2.06E-03	9.56E-05
SR91+D	1.10E-08	0.	4.39E-10	0.	0.	7.59E-06	3.24E-05
SR92+D	1.19E-09	0.	5.08E-11	0.	0.	3.43E-06	1.49E-05

*Includes a 50% increase to account for percutaneous transpiration.

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

TEEN INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y90	3.73E-07	0.	1.00E-08	0.	0.	3.66E-05	6.99E-05
Y91M+D	4.63E-11	0.	1.77E-12	0.	0.	4.00E-07	3.77E-09
Y91	8.26E-05	0.	2.21E-06	0.	0.	3.67E-04	5.11E-05
Y92	1.84E-09	0.	5.36E-11	0.	0.	3.35E-06	2.06E-05
Y93	1.69E-08	0.	4.65E-10	0.	0.	1.04E-05	7.24E-05
ZR93+D	6.83E-05	3.38E-05	1.84E-05	0.	1.16E-04	3.67E-04	1.60E-05
ZR95+D	1.82E-05	5.73E-06	3.94E-06	0.	8.42E-06	3.36E-04	1.86E-05
ZR97+D	1.72E-08	3.40E-09	1.57E-09	0.	5.15E-09	1.62E-05	7.88E-05
NB93M	4.14E-05	1.36E-05	3.41E-06	0.	1.59E-05	5.36E-05	2.52E-06
NB95	2.32E-06	1.29E-06	7.08E-07	0.	1.25E-06	9.39E-05	1.21E-05
NB97	3.92E-11	9.72E-12	3.55E-12	0.	1.14E-11	4.91E-07	2.71E-07
MO93	0.	1.66E-06	4.52E-08	0.	5.06E-07	8.81E-05	3.99E-06
MO99+D	0.	2.11E-08	4.03E-09	0.	5.14E-08	1.92E-05	3.36E-05
TC99M	1.73E-13	4.83E-13	6.24E-12	0.	7.20E-12	1.44E-07	7.66E-07
TC99	4.48E-08	6.58E-08	1.79E-08	0.	8.35E-07	1.74E-04	7.99E-06
TC101	7.40E-15	1.05E-14	1.03E-13	0.	1.90E-13	8.34E-08	1.09E-16
RU103+D	2.63E-07	0.	1.12E-07	0.	9.29E-07	9.79E-05	1.36E-05
RU105+D	1.40E-10	0.	5.42E-11	0.	1.76E-10	2.27E-06	1.13E-05
RU106+D	1.23E-05	0.	1.55E-06	0.	2.38E-05	2.01E-03	1.20E-04
RH105	1.32E-09	9.48E-10	6.24E-10	0.	4.04E-09	4.09E-06	1.23E-05
PD107	0.	1.17E-07	8.39E-09	0.	9.39E-07	1.63E-05	7.49E-07
PD109	0.	6.56E-10	1.66E-10	0.	3.36E-09	3.19E-06	1.96E-05
AG110M+D	1.73E-06	1.64E-06	9.99E-07	0.	3.13E-06	8.44E-04	3.41E-05
AG111	6.07E-08	2.52E-08	1.26E-08	0.	8.17E-08	4.00E-05	3.00E-05
CD113M	0.	2.17E-04	7.10E-06	0.	2.43E-04	3.59E-04	1.68E-05
CD115M	0.	3.48E-05	1.14E-06	0.	2.82E-05	3.03E-04	5.10E-05
SN123	4.31E-05	9.44E-07	1.40E-06	7.55E-07	0.	4.96E-04	4.16E-05
SN125+D	1.66E-06	4.42E-08	9.99E-08	3.45E-08	0.	1.26E-04	7.29E-05
SN126+D	2.18E-04	5.39E-06	8.24E-06	1.42E-06	0.	1.72E-03	1.68E-05
SB124	5.38E-06	9.92E-08	2.10E-06	1.22E-08	0.	4.81E-04	4.98E-05
SB125+D	9.23E-06	1.01E-07	2.15E-06	8.80E-09	0.	3.42E-04	1.24E-05
SB126	6.19E-07	1.27E-08	2.23E-07	3.50E-09	0.	1.55E-04	6.01E-05
SB127	4.64E-08	9.92E-10	1.75E-08	5.21E-10	0.	3.31E-05	3.94E-05
TE125M	6.10E-07	2.80E-07	8.34E-08	1.75E-07	0.	6.70E-05	9.38E-06
TE127M+D	2.25E-06	1.02E-06	2.73E-07	5.48E-07	8.17E-06	2.07E-04	1.99E-05
TE127	2.51E-10	1.14E-10	5.52E-11	1.77E-10	9.10E-10	1.40E-06	1.01E-05
TE129M+D	1.74E-06	8.23E-07	2.81E-07	5.72E-07	6.49E-06	2.47E-04	5.06E-05
TE129	8.87E-12	4.22E-12	2.20E-12	6.48E-12	3.32E-11	4.12E-07	2.02E-07
TE131M+D	1.23E-08	7.51E-09	5.03E-09	9.06E-09	5.49E-08	2.97E-05	7.76E-05
TE131+D	1.97E-12	1.04E-12	6.30E-13	1.55E-12	7.72E-12	2.92E-07	1.89E-09
TE132+D	4.50E-08	3.63E-08	2.74E-08	3.07E-08	2.44E-07	5.61E-05	5.79E-05
TE133M+D	1.01E-11	7.33E-12	5.71E-12	8.18E-12	5.07E-11	8.71E-07	1.23E-07
TE134+D	5.31E-12	4.35E-12	3.64E-12	4.46E-12	2.91E-11	6.75E-07	1.37E-09
I129	3.53E-06	2.94E-06	4.90E-06	3.66E-03	5.26E-06	0.	2.29E-07
I130	7.80E-07	2.24E-06	8.96E-07	1.86E-04	3.44E-06	0.	1.14E-06
I131+D	4.43E-06	6.14E-06	3.30E-06	1.83E-03	1.05E-05	0.	8.11E-07

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

TEEN INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
I132	1.99E-07	5.47E-07	1.97E-07	1.89E-05	8.65E-07	0.	1.59E-07
I133+D	1.52E-06	2.56E-06	7.78E-07	3.65E-04	4.49E-06	0.	1.29E-06
I134	1.11E-07	2.90E-07	1.05E-07	4.94E-06	4.58E-07	0.	2.55E-09
I135+D	4.62E-07	1.18E-06	4.36E-07	7.76E-05	1.86E-06	0.	8.69E-07
XE131M	0.	0.	0.	0.	0.	2.70E-09	0.
XE133M	0.	0.	0.	0.	0.	3.59E-09	0.
XE133	0.	0.	0.	0.	0.	2.99E-09	0.
XE135M	0.	0.	0.	0.	0.	3.88E-09	0.
XE135	0.	0.	0.	0.	0.	7.55E-09	0.
XE137	0.	0.	0.	0.	0.	3.33E-08	0.
XE138+D	0.	0.	0.	0.	0.	4.38E-08	0.
CS134M+D	2.20E-08	4.35E-08	2.35E-08	0.	2.54E-08	4.56E-09	2.02E-08
CS134	6.28E-05	1.41E-04	6.86E-05	0.	4.69E-05	1.83E-05	1.22E-06
CS135	2.08E-05	1.82E-05	4.47E-06	0.	7.30E-06	2.70E-06	2.23E-07
CS136	6.44E-06	2.42E-05	1.71E-05	0.	1.38E-05	2.22E-06	1.36E-06
CS137+D	8.38E-05	1.06E-04	3.89E-05	0.	3.80E-05	1.51E-05	1.06E-06
CS138	5.82E-08	1.07E-07	5.58E-08	0.	8.28E-08	9.84E-09	3.38E-11
CS139+D	3.65E-08	5.12E-08	1.97E-08	0.	4.34E-08	4.86E-09	1.66E-23
BA139	1.67E-10	1.18E-13	4.87E-12	0.	1.11E-13	8.08E-07	8.06E-07
BA140+D	6.84E-06	8.38E-09	4.40E-07	0.	2.85E-09	2.54E-04	2.86E-05
BA141+D	1.78E-11	1.32E-14	5.93E-13	0.	1.23E-14	4.11E-07	9.33E-14
BA142+D	4.62E-12	4.63E-15	2.84E-13	0.	3.92E-15	2.39E-07	5.99E-20
LA140	5.99E-08	2.95E-08	7.82E-09	0.	0.	2.68E-05	6.09E-05
LA141	7.63E-10	2.35E-10	3.87E-11	0.	0.	2.31E-06	1.54E-05
LA142	1.20E-10	5.31E-11	1.32E-11	0.	0.	1.27E-06	1.50E-06
CE141	3.55E-06	2.37E-06	2.71E-07	0.	1.11E-06	7.67E-05	1.58E-05
CE143+D	3.32E-08	2.42E-08	2.70E-09	0.	1.08E-08	1.63E-05	3.19E-05
CE144+D	6.11E-04	2.53E-04	3.28E-05	0.	1.51E-04	1.67E-03	1.08E-04
PR143	1.67E-06	6.64E-07	8.28E-08	0.	3.86E-07	6.04E-05	2.67E-05
PR144	5.37E-12	2.20E-12	2.72E-13	0.	1.26E-12	2.19E-07	2.94E-14
ND147+D	9.83E-07	1.07E-06	6.41E-08	0.	6.28E-07	4.65E-05	2.28E-05
PM147	1.15E-04	1.10E-05	4.50E-06	0.	2.10E-05	1.14E-04	5.87E-06
PM148M+D	1.32E-05	3.35E-06	2.62E-06	0.	5.07E-06	3.20E-04	4.10E-05
PM148	5.44E-07	8.88E-08	4.48E-08	0.	1.60E-07	6.52E-05	6.14E-05
PM149	4.91E-08	6.89E-09	2.84E-09	0.	1.31E-08	1.24E-05	2.79E-05
PM151	1.20E-08	1.99E-09	1.01E-09	0.	3.57E-09	6.56E-06	2.27E-05
SM151	1.07E-04	2.10E-05	4.86E-06	0.	2.27E-05	7.68E-05	3.53E-06
SM153	2.43E-08	2.01E-08	1.47E-09	0.	6.56E-09	7.11E-06	1.77E-05
EU152	2.96E-04	7.19E-05	6.30E-05	0.	3.34E-04	5.01E-04	1.35E-05
EU154	9.43E-04	1.23E-04	8.60E-05	0.	5.44E-04	9.12E-04	3.34E-05
EU155	2.00E-04	1.96E-05	1.21E-05	0.	7.65E-05	1.51E-03	5.97E-05
EU156	2.70E-06	2.03E-06	3.30E-07	0.	1.36E-06	1.37E-04	4.56E-05
TB160	3.04E-05	0.	3.79E-06	0.	1.20E-05	2.97E-04	2.60E-05
HO166M	4.40E-04	1.36E-04	9.87E-05	0.	2.00E-04	6.24E-04	1.68E-05
W181	8.90E-09	2.88E-09	3.01E-10	0.	0.	2.95E-06	2.69E-07
W185	2.78E-07	9.17E-08	9.73E-09	0.	0.	9.60E-05	1.14E-05
W187	1.50E-09	1.22E-09	4.29E-10	0.	0.	5.92E-06	2.21E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

TEEN INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	3.09E-02	8.28E-03	1.07E-03	0.	2.95E-02	4.52E-02	3.87E-05
BI210+D	0.	2.26E-06	1.89E-07	0.	2.74E-05	1.91E-03	3.19E-05
PO210	5.68E-04	1.22E-03	1.37E-04	0.	4.21E-03	5.41E-02	4.45E-05
RN222+D	0.	0.	0.	0.	0.	3.94E-06	0.
RA223+D	2.57E-04	3.93E-07	5.14E-05	0.	1.12E-05	4.39E-02	3.04E-04
RA224+D	2.83E-05	6.77E-08	5.65E-06	0.	1.93E-06	1.51E-02	3.29E-04
RA225+D	4.28E-04	5.04E-07	8.56E-05	0.	1.44E-05	5.04E-02	2.89E-04
RA226+D	1.33E-01	3.38E-06	9.87E-02	0.	9.67E-05	2.02E-01	3.11E-04
RA228+D	5.34E-02	1.74E-06	5.88E-02	0.	4.97E-05	2.78E-01	5.30E-05
AC225	6.04E-04	8.25E-04	4.06E-05	0.	9.47E-05	3.81E-02	2.70E-04
AC227+D	2.49E+00	3.69E-01	1.48E-01	0.	1.07E-01	4.16E-01	5.38E-05
TH227+D	3.09E-04	5.56E-06	8.93E-06	0.	3.18E-05	6.50E-02	3.57E-04
TH228+D	2.60E-01	4.37E-03	8.78E-03	0.	2.45E-02	1.69E+00	3.70E-04
TH229	9.06E+00	1.36E-01	4.45E-01	0.	6.67E-01	5.05E+00	3.36E-04
TH230	2.34E+00	1.34E-01	6.49E-02	0.	6.55E-01	8.98E-01	3.95E-05
TH232+D	2.61E+00	1.14E-01	9.21E-02	0.	5.60E-01	8.60E-01	3.36E-05
TH234	2.32E-06	1.35E-07	6.71E-08	0.	7.73E-07	3.26E-04	7.49E-05
PA231+D	5.32E+00	2.00E-01	2.07E-01	0.	1.12E+00	9.91E-02	4.71E-05
PA233	1.68E-06	3.24E-07	2.89E-07	0.	1.22E-06	5.39E-05	1.00E-05
U232+D	7.31E-02	0.	5.23E-03	0.	7.94E-03	3.84E-01	4.46E-05
U233+D	1.55E-02	0.	9.42E-04	0.	3.63E-03	9.18E-02	4.12E-05
U234	1.48E-02	0.	9.23E-04	0.	3.55E-03	8.99E-02	4.04E-05
U235+D	1.42E-02	0.	8.67E-04	0.	3.34E-03	8.44E-02	5.13E-05
U236	1.42E-02	0.	8.86E-04	0.	3.41E-03	8.62E-02	3.79E-05
U237	5.25E-08	0.	1.40E-08	0.	2.16E-07	1.76E-05	1.29E-05
U238+D	1.36E-02	0.	8.10E-04	0.	3.12E-03	7.89E-02	3.62E-05
NP237+D	1.77E+00	1.54E-01	7.21E-02	0.	5.35E-01	8.99E-02	5.22E-05
NP238	4.23E-07	1.13E-08	6.59E-09	0.	3.88E-08	1.75E-05	2.38E-05
NP239	4.23E-08	3.99E-09	2.21E-09	0.	1.25E-08	8.11E-06	1.65E-05
PU238	2.86E+00	4.06E-01	7.22E-02	0.	3.10E-01	3.12E-01	4.79E-05
PU239	3.31E+00	4.50E-01	8.05E-02	0.	3.44E-01	2.93E-01	4.37E-05
PU240	3.31E+00	4.49E-01	8.04E-02	0.	3.43E-01	2.93E-01	4.46E-05
PU241+D	6.97E-02	3.57E-03	1.40E-03	0.	6.47E-03	2.60E-04	9.17E-07
PU242	3.07E+00	4.33E-01	7.75E-02	0.	3.31E-01	2.82E-01	4.29E-05
PU244	3.59E+00	4.96E-01	8.88E-02	0.	3.79E-01	3.23E-01	6.39E-05
AM241	1.06E+00	4.07E-01	7.10E-02	0.	5.32E-01	1.05E-01	4.88E-05
AM242M	1.07E+00	3.93E-01	7.15E-02	0.	5.30E-01	4.21E-02	6.14E-05
AM243	1.06E+00	3.92E-01	6.95E-02	0.	5.21E-01	9.91E-02	5.72E-05
CM242	2.12E-02	2.14E-02	1.41E-03	0.	6.40E-03	6.76E-02	5.21E-05
CM243	8.45E-01	3.50E-01	5.00E-02	0.	2.34E-01	1.09E-01	5.13E-05
CM244	6.46E-01	3.03E-01	3.88E-02	0.	1.81E-01	1.05E-01	4.96E-05
CM245	1.32E+00	4.11E-01	7.53E-02	0.	3.52E-01	1.01E-01	4.63E-05
CM246	1.31E+00	4.11E-01	7.52E-02	0.	3.51E-01	1.03E-01	4.54E-05
CM247+D	1.28E+00	4.04E-01	7.41E-02	0.	3.46E-01	1.01E-01	5.97E-05
CM248	1.06E+01	3.33E+00	6.11E-01	0.	2.85E+00	8.32E-01	9.63E-04
CF252	1.29E+00	0.	3.07E-02	0.	0.	3.43E-01	1.89E-04

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

ADULT INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3*	0.	1.58E-07	1.58E-07	1.58E-07	1.58E-07	1.58E-07	1.58E-07
BE10	1.98E-04	3.06E-05	4.96E-06	0.	0.	2.22E-04	1.67E-05
C14	2.27E-06	4.26E-07	4.26E-07	4.26E-07	4.26E-07	4.26E-07	4.26E-07
N13	6.27E-09	6.27E-09	6.27E-09	6.27E-09	6.27E-09	6.27E-09	6.27E-09
F18	4.71E-07	0.	5.19E-08	0.	0.	0.	9.24E-09
NA22	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05
NA24	1.28E-06	1.28E-06	1.28E-06	1.28E-06	1.28E-06	1.28E-06	1.28E-06
P32	1.65E-04	9.64E-06	6.26E-06	0.	0.	0.	1.08E-05
AR39	0.	0.	0.	0.	0.	2.08E-09	0.
AR41	0.	0.	0.	0.	0.	8.06E-09	0.
CA41	3.83E-05	0.	4.13E-06	0.	0.	3.83E-06	2.86E-07
SC46	5.51E-05	1.07E-04	3.11E-05	0.	9.99E-05	0.	3.23E-05
CR51	0.	0.	1.25E-08	7.44E-09	2.85E-09	1.80E-06	4.15E-07
MN54	0.	4.95E-06	7.87E-07	0.	1.23E-06	1.75E-04	9.67E-06
MN56	0.	1.55E-10	2.29E-11	0.	1.63E-10	1.18E-06	2.53E-06
FE55	3.07E-06	2.12E-06	4.93E-07	0.	0.	9.01E-06	7.54E-07
FE59	1.47E-06	3.47E-06	1.32E-06	0.	0.	1.27E-04	2.35E-05
CO57	0.	8.65E-08	8.39E-08	0.	0.	4.62E-05	3.93E-06
CO58	0.	1.98E-07	2.59E-07	0.	0.	1.16E-04	1.33E-05
CO60	0.	1.44E-06	1.85E-06	0.	0.	7.46E-04	3.56E-05
NI59	4.06E-06	1.46E-06	6.77E-07	0.	0.	8.20E-06	6.11E-07
NI63	5.40E-05	3.93E-06	1.81E-06	0.	0.	2.23E-05	1.67E-06
NI65	1.92E-10	2.62E-11	1.14E-11	0.	0.	7.00E-07	1.54E-06
CU64	0.	1.83E-10	7.69E-11	0.	5.78E-10	8.48E-07	6.12E-06
ZN65	4.05E-06	1.29E-05	5.82E-06	0.	8.62E-06	1.08E-04	6.68E-06
ZN69M+D	1.02E-09	2.45E-09	2.24E-10	0.	1.48E-09	2.38E-06	1.71E-05
ZN69	4.23E-12	8.14E-12	5.65E-13	0.	5.27E-12	1.15E-07	2.04E-09
SE79	0.	3.83E-07	6.09E-08	0.	5.69E-07	4.47E-05	3.33E-06
BR82	0.	0.	1.69E-06	0.	0.	0.	1.30E-06
BR83+D	0.	0.	3.01E-08	0.	0.	0.	2.90E-08
BR84	0.	0.	3.91E-08	0.	0.	0.	2.05E-13
BR85	0.	0.	1.60E-09	0.	0.	0.	0.
KR83M	0.	0.	0.	0.	0.	5.19E-10	0.
KR85M	0.	0.	0.	0.	0.	2.91E-09	0.
KR85	0.	0.	0.	0.	0.	2.41E-09	0.
KR87	0.	0.	0.	0.	0.	1.53E-08	0.
KR88+D	0.	0.	0.	0.	0.	3.13E-08	0.
KR89	0.	0.	0.	0.	0.	2.13E-08	0.
RB86	0.	1.69E-05	7.37E-06	0.	0.	0.	2.08E-06
RB87	0.	9.86E-06	3.21E-06	0.	0.	0.	2.88E-07
RB88	0.	4.84E-08	2.41E-08	0.	0.	0.	4.18E-19
RB89+D	0.	3.20E-08	2.12E-08	0.	0.	0.	1.16E-21
SR89+D	3.80E-05	0.	1.09E-06	0.	0.	1.75E-04	4.37E-05
SR90+D	1.24E-02	0.	7.62E-04	0.	0.	1.20E-03	9.02E-05
SR91+D	7.74E-09	0.	3.13E-10	0.	0.	4.56E-06	2.39E-05
SR92+D	8.43E-10	0.	3.64E-11	0.	0.	2.06E-06	5.38E-06

*Includes a 50% increase to account for percutaneous transpiration.

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

ADULT INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y90	2.61E-07	0.	7.01E-09	0.	0.	2.12E-05	6.32E-05
Y91M+D	3.26E-11	0.	1.27E-12	0.	0.	2.40E-07	1.66E-10
Y91	5.78E-05	0.	1.55E-06	0.	0.	2.13E-04	4.81E-05
Y92	1.29E-09	0.	3.77E-11	0.	0.	1.96E-06	9.19E-06
Y93	1.18E-08	0.	3.26E-10	0.	0.	6.06E-06	5.27E-05
ZR93+D	5.22E-05	2.92E-06	1.37E-06	0.	1.11E-05	2.13E-05	1.51E-06
ZR95+D	1.34E-05	4.30E-06	2.91E-06	0.	6.77E-06	2.21E-04	1.88E-05
ZR97+D	1.21E-08	2.45E-09	1.13E-09	0.	3.71E-09	9.84E-06	6.54E-05
NB93M	3.10E-05	1.01E-05	2.49E-06	0.	1.16E-05	3.11E-05	2.38E-06
NB95	1.76E-06	9.77E-07	5.26E-07	0.	9.67E-07	6.31E-05	1.30E-05
NB97	2.78E-11	7.03E-12	2.56E-12	0.	8.18E-12	3.00E-07	3.02E-08
MO93	0.	1.17E-06	3.17E-08	0.	3.55E-07	5.11E-05	3.79E-06
MO99+D	0.	1.51E-08	2.87E-09	0.	3.64E-08	1.14E-05	3.10E-05
TC99M	1.29E-13	3.64E-13	4.63E-12	0.	5.52E-12	9.55E-08	5.20E-07
TC99	3.13E-08	4.64E-08	1.25E-08	0.	5.85E-07	1.01E-04	7.54E-06
TC101	5.22E-15	7.52E-15	7.38E-14	0.	1.35E-13	4.99E-08	1.36E-21
RU103+D	1.91E-07	0.	8.23E-08	0.	7.29E-07	6.31E-05	1.38E-05
RU105+D	9.88E-11	0.	3.89E-11	0.	1.27E-10	1.37E-06	6.02E-06
RU106+D	8.64E-06	0.	1.09E-06	0.	1.67E-05	1.17E-03	1.14E-04
RH105	9.24E-10	6.73E-10	4.43E-10	0.	2.86E-09	2.41E-06	1.09E-05
PD107	0.	8.27E-08	5.87E-09	0.	6.57E-07	9.47E-06	7.06E-07
PD109	0.	4.63E-10	1.16E-10	0.	2.35E-09	1.85E-06	1.52E-05
AG110M+D	1.35E-06	1.25E-06	7.43E-07	0.	2.46E-06	5.79E-04	3.78E-05
AG111	4.25E-08	1.78E-08	8.87E-09	0.	5.74E-08	2.33E-05	2.79E-05
CD113M	0.	1.54E-04	4.97E-06	0.	1.71E-04	2.08E-04	1.59E-05
CD115M	0.	2.46E-05	7.95E-07	0.	1.98E-05	1.76E-04	4.80E-05
SN123	3.02E-05	6.67E-07	9.82E-07	5.67E-07	0.	2.88E-04	3.92E-05
SN125+D	1.16E-06	3.12E-08	7.03E-08	2.59E-08	0.	7.37E-05	6.81E-05
SN126+D	1.58E-04	4.18E-06	6.00E-06	1.23E-06	0.	1.17E-03	1.59E-05
SB124	3.90E-06	7.36E-08	1.55E-06	9.44E-09	0.	3.10E-04	5.08E-05
SB125+D	6.67E-06	7.44E-08	1.58E-06	6.75E-09	0.	2.18E-04	1.26E-05
SB126	4.50E-07	9.13E-09	1.62E-07	2.75E-09	0.	9.57E-05	6.01E-05
SB127	3.30E-08	7.22E-10	1.27E-08	3.97E-10	0.	2.05E-05	3.77E-05
TE125M	4.27E-07	1.98E-07	5.84E-08	1.31E-07	1.55E-06	3.92E-05	8.83E-06
TE127M+D	1.58E-06	7.21E-07	1.96E-07	4.11E-07	5.72E-06	1.20E-04	1.87E-05
TE127	1.75E-10	8.03E-11	3.87E-11	1.32E-10	6.37E-10	8.14E-07	7.17E-06
TE129M+D	1.22E-06	5.84E-07	1.98E-07	4.30E-07	4.57E-06	1.45E-04	4.79E-05
TE129	6.22E-12	2.99E-12	1.55E-12	4.87E-12	2.34E-11	2.42E-07	1.96E-08
TE131M+D	8.74E-09	5.45E-09	3.63E-09	6.88E-09	3.86E-08	1.82E-05	6.95E-05
TE131+D	1.39E-12	7.44E-13	4.49E-13	1.17E-12	5.46E-12	1.74E-07	2.30E-09
TE132+D	3.25E-08	2.69E-08	2.02E-08	2.37E-08	1.82E-07	3.60E-05	6.37E-05
TE133M+D	7.24E-12	5.40E-12	4.17E-12	6.27E-12	3.74E-11	5.51E-07	5.49E-08
TE134+D	3.84E-12	3.22E-12	1.57E-12	3.44E-12	2.18E-11	4.343-07	2.97E-11
I129	2.48E-06	2.11E-06	6.91E-06	5.54E-03	4.53E-06	0.	2.22E-07
I130	5.72E-07	1.68E-06	6.60E-07	1.42E-04	2.61E-06	0.	9.61E-07
I131+D	3.15E-06	4.47E-06	2.56E-06	1.49E-03	7.66E-06	0.	7.85E-07

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

ADULT INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
I132	1.45E-07	4.07E-07	1.45E-07	1.43E-05	6.48E-07	0.	5.08E-08
I133+D	1.08E-06	1.85E-06	5.65E-07	2.69E-04	3.23E-06	0.	1.11E-06
I134	8.05E-08	2.16E-07	7.69E-08	3.73E-06	3.44E-07	0.	1.26E-10
I135+D	3.35E-07	8.73E-07	3.21E-07	5.60E-05	1.39E-06	0.	6.56E-07
XE131M	0.	0.	0.	0.	0.	1.40E-09	0.
XE133M	0.	0.	0.	0.	0.	1.89E-09	0.
XE133	0.	0.	0.	0.	0.	1.57E-09	0.
XE135M	0.	0.	0.	0.	0.	2.22E-09	0.
XE135	0.	0.	0.	0.	0.	4.05E-09	0.
XE137	0.	0.	0.	0.	0.	1.74E-08	0.
XE138+D	0.	0.	0.	0.	0.	2.44E-08	0.
CS134M+D	1.59E-08	3.20E-08	1.72E-08	0.	1.83E-08	2.93E-09	7.92E-09
CS134	4.66E-05	1.06E-04	9.10E-05	0.	3.59E-05	1.22E-05	1.30E-06
CS135	1.46E-05	1.29E-05	5.99E-06	0.	5.11E-06	1.57E-06	2.11E-07
CS136	4.88E-06	1.83E-05	1.38E-05	0.	1.07E-05	1.50E-06	1.46E-06
CS137+D	5.98E-05	7.76E-05	5.35E-05	0.	2.78E-05	9.40E-06	1.05E-06
CS138	4.14E-08	7.76E-08	4.05E-08	0.	6.00E-08	6.07E-09	2.33E-13
CS139+D	2.56E-08	3.63E-08	1.39E-08	0.	3.05E-08	2.84E-09	5.49E-31
BA139	1.17E-10	8.32E-14	3.42E-12	0.	7.78E-14	4.70E-07	1.12E-07
BA140+D	4.88E-06	6.13E-09	3.21E-07	0.	2.09E-09	1.59E-04	2.73E-05
BA141+D	1.25E-11	9.41E-15	4.20E-13	0.	8.75E-15	2.42E-07	1.45E-17
BA142+D	3.29E-12	3.38E-15	2.07E-13	0.	2.86E-15	1.49E-07	1.96E-26
LA140	4.30E-08	2.17E-08	5.73E-09	0.	0.	1.70E-05	5.73E-05
LA141	5.34E-10	1.66E-10	2.71E-11	0.	0.	1.35E-06	7.31E-06
LA142	8.54E-11	3.88E-11	9.65E-12	0.	0.	7.91E-07	2.64E-07
CE141	2.49E-06	1.69E-06	1.91E-07	0.	7.83E-07	4.52E-05	1.50E-05
CE143+D	2.33E-08	1.72E-08	1.91E-09	0.	7.60E-09	9.97E-06	2.83E-05
CE144+D	4.29E-04	1.79E-04	2.30E-05	0.	1.06E-04	9.72E-04	1.02E-04
PR143	1.17E-06	4.69E-07	5.80E-08	0.	2.70E-07	3.51E-05	2.50E-05
PR144	3.76E-12	1.56E-12	1.91E-13	0.	8.81E-13	1.27E-07	2.69E-18
ND147+D	6.59E-07	7.62E-07	4.56E-08	0.	4.45E-07	2.76E-05	2.16E-05
PM147	8.37E-05	7.87E-06	3.19E-06	0.	1.49E-05	6.60E-05	5.54E-06
PM148M+D	9.82E-06	2.54E-06	1.94E-06	0.	3.85E-06	2.14E-04	4.18E-05
PM148	3.84E-07	6.37E-08	3.20E-08	0.	1.20E-07	3.91E-05	5.80E-05
PM149	3.44E-08	4.87E-09	1.99E-09	0.	9.19E-09	7.21E-06	2.50E-05
PM151	8.50E-09	1.42E-09	7.21E-10	0.	2.55E-09	3.94E-06	2.00E-05
SM151	8.59E-05	1.48E-05	3.55E-06	0.	1.66E-05	4.45E-05	3.25E-06
SM153	1.70E-08	1.42E-08	1.04E-09	0.	4.59E-09	4.14E-06	1.58E-05
EU152	2.38E-04	5.41E-05	4.76E-05	0.	3.35E-04	3.43E-04	1.59E-05
EU154	7.40E-04	9.10E-05	6.48E-05	0.	4.36E-04	5.84E-04	3.40E-05
EU155	1.01E-04	1.43E-05	9.21E-06	0.	6.59E-05	9.46E-05	5.95E-06
EU156	1.93E-06	1.48E-06	2.40E-07	0.	9.95E-07	8.56E-05	4.50E-05
TB160	2.21E-05	0.	2.75E-06	0.	9.10E-06	1.92E-04	2.68E-05
HO166M	3.37E-04	1.05E-04	8.00E-05	0.	1.57E-04	3.94E-04	1.59E-05
W181	6.23E-09	2.03E-09	2.17E-10	0.	0.	1.71E-06	2.53E-07
W185	1.95E-07	6.47E-08	6.81E-09	0.	0.	5.57E-05	1.07E-05
W187	1.06E-09	8.85E-10	3.10E-10	0.	0.	3.63E-06	1.94E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 1.7 (continued)

ADULT INHALATION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INHALED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	2.64E-02	6.73E-03	8.37E-04	0.	2.12E-02	2.62E-02	3.65E-05
BI210+D	0.	1.59E-06	1.32E-07	0.	1.92E-05	1.11E-03	2.95E-05
PO210	3.97E-04	8.60E-04	9.58E-05	0.	2.95E-03	3.14E-02	4.19E-05
RN222+D	0.	0.	0.	0.	0.	2.05E-06	0.
RA223+D	1.80E-04	2.77E-07	3.60E-05	0.	7.85E-06	2.55E-02	2.84E-04
RA224+D	1.98E-05	4.78E-08	3.96E-06	0.	1.35E-06	8.77E-03	3.01E-04
RA225+D	3.00E-04	3.56E-07	5.99E-05	0.	1.01E-05	2.92E-02	2.71E-04
RA226+D	1.25E-01	2.39E-06	9.14E-02	0.	6.77E-05	1.17E-01	2.94E-04
RA228+D	4.41E-02	1.23E-06	4.78E-02	0.	3.48E-05	1.61E-01	5.00E-05
AC225	4.23E-04	5.82E-04	2.84E-05	0.	6.63E-05	2.21E-02	2.52E-04
AC227+D	2.30E+00	3.05E-01	1.36E-01	0.	9.82E-02	2.41E-01	5.08E-05
TH227+D	2.17E-04	3.92E-06	6.25E-06	0.	2.22E-05	3.77E-02	3.34E-04
TH226+D	2.00E-01	3.39E-03	6.77E-03	0.	1.89E-02	1.01E+00	3.49E-04
TH229	8.88E+00	1.33E-01	4.36E-01	0.	6.52E-01	3.49E+00	3.17E-04
TH230	2.29E+00	1.31E-01	6.36E-02	0.	6.40E-01	6.21E-01	3.73E-05
TH232+D	2.56E+00	1.12E-01	9.04E-02	0.	5.47E-01	5.96E-01	3.17E-05
TH234	1.63E-06	9.56E-08	4.70E-08	0.	5.41E-07	1.89E-04	7.03E-05
PA231+D	5.08E+00	1.91E-01	1.98E-01	0.	1.07E+00	5.75E-02	4.44E-05
PA233	1.21E-06	2.42E-07	2.09E-07	0.	9.15E-07	3.52E-05	1.02E-05
U232+D	5.14E-02	0.	3.66E-03	0.	5.56E-03	2.22E-01	4.21E-05
U233+D	1.09E-02	0.	6.60E-04	0.	2.54E-03	5.32E-02	3.89E-05
U234	1.04E-02	0.	6.46E-04	0.	2.49E-03	5.22E-02	3.81E-05
U235+D	1.00E-02	0.	6.07E-04	0.	2.34E-03	4.90E-02	4.84E-05
U236	1.00E-02	0.	6.20E-04	0.	2.39E-03	5.00E-02	3.57E-05
U237	3.67E-08	0.	9.77E-09	0.	1.51E-07	1.02E-05	1.20E-05
U238+D	9.58E-03	0.	5.67E-04	0.	2.18E-03	4.58E-02	3.41E-05
NP237+D	1.69E+00	1.47E-01	6.87E-02	0.	5.10E-01	5.22E-02	4.92E-05
NP238	2.96E-07	8.00E-09	4.61E-09	0.	2.72E-08	1.02E-05	2.13E-05
NP239	2.87E-08	2.82E-09	1.55E-09	0.	8.75E-09	4.70E-06	1.49E-05
PU238	2.74E+00	3.87E-01	6.90E-02	0.	2.96E-01	1.82E-01	4.52E-05
PU239	3.19E+00	4.31E-01	7.75E-02	0.	3.30E-01	1.72E-01	4.13E-05
PU240	3.18E+00	4.30E-01	7.73E-02	0.	3.29E-01	1.72E-01	4.21E-05
PU241+D	6.41E-02	3.28E-03	1.29E-03	0.	5.93E-03	1.52E-04	8.65E-07
PU242	2.95E+00	4.15E-01	7.46E-02	0.	3.17E-01	1.65E-01	4.05E-05
PU244	3.45E+00	4.76E-01	8.54E-02	0.	3.64E-01	1.89E-01	6.03E-05
AM241	1.01E+00	3.59E-01	6.71E-02	0.	5.04E-01	6.06E-02	4.60E-05
AM242M	1.02E+00	3.46E-01	6.73E-02	0.	5.01E-01	2.44E-02	5.79E-05
AM243	1.01E+00	3.47E-01	6.57E-02	0.	4.95E-01	5.75E-02	5.40E-05
CM242	1.48E-02	1.51E-02	9.84E-04	0.	4.48E-03	3.92E-02	4.91E-05
CM243	7.86E-01	2.97E-01	4.61E-02	0.	2.15E-01	6.31E-02	4.84E-05
CM244	5.90E-01	2.54E-01	3.51E-02	0.	1.64E-01	6.06E-02	4.68E-05
CM245	1.26E+00	3.59E-01	7.14E-02	0.	3.33E-01	5.85E-02	4.36E-05
CM246	1.25E+00	3.59E-01	7.13E-02	0.	3.33E-01	5.96E-02	4.29E-05
CM247+D	1.22E+00	3.53E-01	7.03E-02	0.	3.28E-01	5.85E-02	5.63E-05
CM248	1.01E+01	2.91E+00	5.79E-01	0.	2.70E+00	4.82E-01	9.09E-04
CF252	9.78E-01	0.	2.33E-02	0.	0.	1.99E-01	1.78E-04

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.8
EXTERNAL DOSE FACTORS FOR STANDING ON CONTAMINATION GROUND
(DFG)
(MREM/HR PER PCI/M²)

<u>ELEMENT</u>	<u>TOTAL BODY</u>	<u>SKIN</u>
H-3	0.0	0.0
C-14	0.0	0.0
Na-24	2.50E-08	2.90E-08
P-32	0.0	0.0
Cr-51	2.20E-10	2.60E-10
Mn-54	5.80E-09	6.80E-09
Mn-56	1.10E-08	1.30E-08
Fe-55	0.0	0.0
Fe-59	8.00E-09	9.40E-09
Co-58	7.00E-09	8.20E-09
Co-60	1.70E-08	2.00E-08
Ni-63	0.0	0.0
Ni-65	3.70E-09	4.30E-09
Cu-64	1.50E-09	1.70E-09
Zn-65	4.00E-09	4.60E-09
Zn-69	0.0	0.0
Br-83	6.40E-11	9.30E-11
Br-84	1.20E-08	1.40E-08
Br-85	0.0	0.0
Rb-86	6.30E-10	7.20E-10
Rb-88	3.50E-09	4.00E-09
Rb-89	1.50E-08	1.80E-08
Sr-89	5.60E-13	6.50E-13
Sr-91	7.10E-09	8.30E-09
Sr-92	9.00E-09	1.00E-08
Y-90	2.20E-12	2.60E-12
Y-91m	3.80E-09	4.40E-09
Y-91	2.40E-11	2.70E-11
Y-92	1.60E-09	1.90E-09
Y-93	5.70E-10	7.80E-10
Zr-95	5.00E-09	5.80E-09
Zr-97	5.50E-09	6.40E-09
Nb-95	5.10E-09	6.00E-09
Mo-99	1.90E-09	2.20E-09
Tc-99m	9.60E-10	1.10E-09
Tc-101	2.70E-09	3.00E-09

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.8 (continued)

EXTERNAL DOSE FACTORS FOR STANDING ON CONTAMINATION GROUND
(DFG)
(MREM/HR PER PCI/M²)

<u>ELEMENT</u>	<u>TOTAL BODY</u>	<u>SKIN</u>
Ru-103	3.60E-09	4.20E-09
Ru-105	4.50E-09	5.10E-09
Ru-106	1.50E-09	1.80E-09
Ag-110m	1.80E-08	2.10E-08
Te-125m	3.50E-11	4.80E-11
Te-127m	1.10E-12	1.30E-12
Te-127	1.00E-11	1.10E-11
Te-129m	7.70E-10	9.00E-10
Te-129	7.10E-10	8.40E-10
Te-131m	8.40E-09	9.90E-09
Te-131	2.20E-09	2.60E-06
Te-132	1.70E-09	2.00E-09
I-130	1.40E-08	1.70E-08
I-131	2.80E-09	3.40E-09
I-132	1.70E-08	2.00E-08
I-133	3.70E-09	4.50E-09
I-134	1.60E-08	1.90E-08
I-135	1.20E-08	1.40E-08
Cs-134	1.20E-08	1.40E-08
Cs-136	1.50E-08	1.70E-08
Cs-137	4.20E-09	4.90E-09
Cs-138	2.10E-08	2.40E-08
Ba-139	2.40E-09	2.70E-09
Ba-140	2.10E-09	2.40E-09
Ba-141	4.30E-09	4.90E-09
Ba-142	7.90E-09	9.00E-09
La-140	1.50E-08	1.70E-08
La-142	1.50E-08	1.80E-08
Ce-141	5.50E-10	6.20E-10
Ce-143	2.20E-09	2.50E-09
Ce-144	3.20E-10	3.70E-10
Pr-143	0.0	0.0
Pr-144	2.00E-10	2.30E-10
Nd-147	1.00E-09	1.20E-09
W-187	3.10E-09	3.60E-09
Np-239	9.50E-10	1.10E-09

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.9
PALISADES GASEOUS DESIGN
OBJECTIVE ANNUAL QUANTITIES

<u>Nuclide</u>	<u>Organ</u>	<u>Dose Factor</u> <u>Mrem/Ci</u>	<u>Design</u> <u>Objective</u> <u>Annual Quantity</u> <u>Ci</u>
Ag-110m	GI-Tract-T	2.13E+00	7.04E+00
Ar-41	Total Body	3.64E - 04	1.37E+04
Ba-139	GI-Tract-C	2.97E - 03	5.05E+03
Ba-140	Lung-T	1.26E - 01	1.19E+02
Br-82	total Body-C	4.97E - 03	1.01E+03
C-14	Bone-C	1.48E - 01	1.01E+02
Ce-141	GI Tract-T	1.34E - 01	1.12E+02
Ce-144	GI Tract-T	3.37E+00	4.45E+00
Co-57	GI Tract-T	8.53E - 02	1.76E+02
Co-58	GI Tract-T	2.59E - 01	5.79E+01
Co-60	GI Tract-T	6.86E+00	2.19E+00
Cr-51	GI Tract-A	3.75E - 03	1.33E+03
Cs-134	Liver-C	8.77E+00	1.71E+00
Cs-136	Liver-I	5.32E-01	2.82E+01
Cs-137	Bone-C	9.58E+00	1.57E+00
Cs-138	Total body-C	1.00E - 01	5.00E+01
Fe-55	Bone-C	2.06E - 01	7.28E+01
Fe-59	GI Tract-T	3.20E - 01	4.69E+01
H-3	Total Body-C	2.19E - 04	2.28E+04
I-129	Thyroid-A	3.66E+02	4.10E - 02
I-131	Thyroid-I	1.97E+01	7.61E - 01
I-132	Thyroid-C	1.12E - 02	1.34E+03
I-133	Thyroid-C	2.46E - 01	6.11E+01
I-134	Thyroid-C	2.45E - 03	6.12E+03
I-135	Thyroid-C	4.93E - 02	3.04E+02

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.9
PALISADES GASEOUS DESIGN
OBJECTIVE ANNUAL QUANTITIES

<u>Nuclide</u>	<u>Organ</u>	<u>Dose Factor</u> <u>Mrem/Ci</u>	<u>Design</u> <u>Objective</u> <u>Annual Quantity</u> <u>Ci</u>
Kr-83m	Skin	8.82E - 07	1.70E+07
Kr-85	Skin	9.14E - 05	1.64E+05
Kr-85m	Total Body	5.22E - 05	9.58E+04
Kr-87	Skin	8.03E - 04	1.87E+04
Kr-88	Total Body	6.35E - 04	7.87E+03
Kr-89	Total Body	5.08E - 04	9.84E+03
La-140	GI Tract-T	3.04E - 02	4.93E+02
Mn-54	GI Tract-T	6.29E - 01	2.38E+01
Mn-56	GI Tract-C	6.91E - 03	2.17E+03
Mo-99	GI Tract-T	1.66E - 02	9.04E+02
N-13	Total Body-C	3.44E - 06	1.45E+06
Na-24	Total Body-C	4.02E - 03	1.24E+03
Nb-95	GI Tract-A	1.92E - 01	7.81E+01
Ni-63	Bone-C	1.21E+01	1.24E+00
Ni-65	GI Tract-C	4.70E - 03	3.19E+03
Np-239	GI Tract-T	8.13E - 03	1.84E+03
Rb-88	Total Body-C	2.38E - 05	2.10E+05
Ru-103	GI Tract-A	2.93E - 01	5.12E+01
Ru-105	GI Tract-C	5.82E - 03	2.58E+03
Sb-124	GI Tract-T	9.47E - 01	1.58E+01
Sb-125	GI Tract-T	4.35E - 01	3.45E+01
Sr-89	Bone-C	8.98E+00	1.67E+00
Sr-90	Bone-C	3.73E+02	4.02E - 02
Sr-91	Bone-I	2.46E+00	6.10E+00
Sr-92	GI Tract-C	1.37E - 02	1.09E+03

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 1.9
PALISADES GASEOUS DESIGN
OBJECTIVE ANNUAL QUANTITIES

<u>Nuclide</u>	<u>Organ</u>	<u>Dose Factor</u> <u>Mrem/Ci</u>	<u>Design</u> <u>Objective</u> <u>Annual Quantity</u> <u>Ci</u>
Tc-99	GI Tract-T	5.85E - 01	2.62E+01
Tc-99m	GI Tract-T	3.64E - 04	4.12E+04
Tc-101	GI Tract-T	8.33E - 05	1.80E+05
Te-127	GI Tract-T	4.87E - 03	3.08E+03
Xe-131m	Skin	4.03E - 05	3.72E+05
Xe-133	Total Body	1.39E - 05	3.60E+05
Xe-133m	Skin	8.39E - 05	1.79E+05
Xe-135	Total Body	8.32E - 05	6.01E+04
Xe-135m	Total Body	9.55E - 05	5.24E+04
Xe-137	Skin	5.85E - 04	2.56E+04
Xe-138	Total body	2.70E - 04	1.85E+04
Zn-65	Liver-C	9.38E - 01	1.60E+01
Zr-95	GI Tract-T	3.90E - 01	3.85E+01
Pu-238	Bone-T	1.42E+03	1.06E - 02
Pu-239	Bone-T	1.64E+03	9.15E - 03
Pu-241	Bone-T	3.45E+01	4.35E - 01
Am-241	Bone-T	5.25E+02	2.86E - 02
Cm-242	Lung-T	3.35E+01	4.48E - 01
Cm-244	Bone-T	3.20E+02	4.69E - 02

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

II. LIQUID EFFLUENTS

A. CONCENTRATION

1. Requirements

Appendix A, Section III.G requires that the concentration of radioactive material released at any time from the site to unrestricted areas shall be limited to ten times the Effluent Concentration (EC) specified in 10 CFR 20, Appendix B, Table 2, Column 2 for nuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-04 $\mu\text{Ci/ml}$ total activity. To ensure compliance, the following approach will be used for each release.

2. Prerelease Analysis

Most tanks will be recirculated through two volume changes prior to sampling for release to the environment to ensure that a representative sample is obtained. The appropriate recirculation time for those tanks too large to provide two volume changes will be the time that the suspended particulate concentration reaches steady state. Either a one-time test, or prior sampling data, may be used to determine appropriate recirculation time.

Prior to release, a grab sample will be analyzed for each release, and the concentration of each radionuclide determined.

$$C = \sum_{i=1}^n C_i \quad (2.1)$$

where:

C = Total concentration in the liquid effluent at the release point, $\mu\text{Ci/ml}$.

C_i = Concentration of a single radionuclide *i*, $\mu\text{Ci/ml}$.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

3. Effluent Concentration (EC) - Sum of the Ratios

The EC-Fraction (R_j) for each release point will be calculated by the relationship defined by Note 4 of Appendix B, 10 CFR 20:

$$R_j = \sum_i \frac{C_i}{EC_i} \leq 10.0 \quad (2.2)$$

where:

C_i = Effluent concentration of radionuclide i , $\mu\text{Ci/ml}$.

EC_i = The EC of radionuclide i , 10 CFR 20, Appendix B, Table 2, Column 2 - $\mu\text{Ci/ml}$.

R_j = The Total EC-Fraction for the release point.

The sum of the ratios at the discharge to the lake must be ≤ 10 due to the releases from any or all concurrent releases. The following relationship will assure this criterion is met:

$$f_1(R_1 - 1) + f_2(R_2 - 1) + f_3(R_3 - 1) \leq F \quad (2.3)$$

where:

f_1, f_2, f_3 = The effluent flow rate (gallons/minute) for the respective releases, determined by Plant personnel.

R_1, R_2, R_3 = The Total EC-Fractions for the respective releases as determined by Equation 2.2.

F = Minimum required dilution flow rate. Normally, a conservatively high dilution flow rate is used, that is, flow rate used = $(b_i)(F)$ where b_i is a conservative factor greater than 1.0.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

B. INSTRUMENT SETPOINTS

1. Setpoint Determination

Appendix A, Section III.F requires alarm setpoints for each liquid effluent monitor will be established using Plant instructions to ensure the requirements of Appendix A, Section III.G are not exceeded. Concentration, flow rate, dilution, principal gamma emitter, geometry, and detector efficiency are combined to give an equivalent setpoint in counts per minute (cpm). The identification number for each liquid effluent radiation detector is contained in Figure 2-2.

The respective alarm/trip setpoints at each release point will be set such that the sum of the ratios at each point, as calculated by Equation 2.2, will not be exceeded. The value of R is directly related to the total concentration calculated by Equation 2.1. An increase in the concentration would indicate an increase in the value of R. A large increase would cause the limits specified in Section 2.1.1 to be exceeded. The minimum alarm/trip setpoint value is equal to the release concentration, but for ease of operation it may be desired that the setpoint (S) be set above the effluent concentration (C) by the same factor (b) utilized in setting dilution flow. That is:

$$S = b \times C \tag{2.4}$$

Liquid effluent flow paths and release points are indicated in Figure 2.1.

2. Composite Samplers

Effluent pathways, Turbine Sump and Service Water, are equipped with continuous compositors to meet the requirements of Appendix A, Table D-1. These compositors are adjustable and normally set in a time mode and collect three to six samples hourly, 24 hours a day with a total collection of approximately one gallon per day. A representative sample is collected daily from the compositor and saved for the weekly, monthly analysis requirements of Appendix A, Table D-1. In the event that a compositor is not operational, effluent releases via this pathway may continue provided that grab samples are collected and analyzed for gross beta or gamma radioactivity at least once per 24 hours per Appendix A, Table C-1, Action 3.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

3. Post-Release Analysis

A post-release analysis will be done using actual release data to ensure that the limits specified in Section 1 were not exceeded.

A composite list on concentrations (C_i), by isotope, will be used with the actual liquid radwaste (f) and dilution (F) flow rates (or volumes) during the release. The data will be substituted into Equation 2.3 to demonstrate compliance with the limits in Section 1. This data and setpoints will be recorded in auditable records by Plant personnel.

C. DOSE

1. RETS Requirement

Appendix A, Section III.H.1 requires that the quantity of radionuclides released be limited such that the dose or dose commitment to an individual from radioactive materials in liquid effluents release to unrestricted areas from the reactor (see Figure 2-1) will not exceed:

- a. During any calendar quarter, 1.5 mrem to the total body and 5 mrem to any organ, and
- b. During any calendar year, 3 mrem to the total body and 10 mrem to any organ.

To ensure compliance, quantities of activity of each radionuclide released will be summed for each release and accumulated for each quarter as follows in Section 2.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

2. Release Analysis

Calculations shall be performed for each batch release, and weekly for continuous releases according to the formula:

$$\sum_i A_i / C_i \leq 0.5 \quad (2.5)$$

where:

A_i = Cumulative quarterly activity of nuclide i identified in liquid release (C_i).

C_i = Design objective annual quantity of radionuclide i from Table 2.2.

The design basis quantities are derived in such a conservative manner that doses may be greatly overestimated by this technique. As a consequence of this conservatism, and in light of historically consistent operations with releases well below annual design basis quantities, the Appendix A, effluent requirements do not require monthly dose projections. Instead, if at any time, calculations by Equation (2.5) results in values greater than 0.5 for a given quarter or 1.0 for year-to-date, the NRC LADTAP code will be run to ensure that Appendix A, Section III.H.1 has been met.

Values for the design basis quantities (C_i), and the dose per Curie (D_c/C_c) $_i$ for each nuclide i shown in Table 2.2, were calculated as follows in Sections 2.1 and 2.2.

a. Water Ingestion

The dose to an individual from ingestion of radioactivity from any source as described by the following equation:

$$D_j = \sum_{i=1}^i (DCF)_{ij} \times I_i \quad (2.6)$$

where:

D_j = Dose for the j th organ from radionuclides releases, mrem.

j = The organ of interest.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

$(DCF)_{ij}$ = Ingestion dose commitment factor for the jth organ from the i^{th} radionuclide mrem/pCi, see Table 2.1.

I_i = Activity ingested of the i^{th} radionuclide, pCi.

I_i is described by:

$$I_i = \frac{(A_i)(V)(365)}{(1000)(d)} (1E06) \quad (2.7)$$

where:

365 = Days per year.

A_i = Annual activity released of i^{th} radionuclide, μCi .

V = Average rate of water consumption
(2000 ml/d - adult, 1400 ml/d - teen and child,
900 ml/d - infant, ICRP 23, p 358).

d = Dilution water flow for year, ml.

1000 = Dispersion factor from discharge to nearest drinking water supply.

1E06 = Conversion μCi to pCi.

The dose equation then becomes:

$$D_j = \frac{(3.65E05)(V)}{d} \sum_{i=1}^i (DCF)_{ij} \times A_i \text{ mrem} \quad (2.8)$$

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

b. Fish Ingestion

The dose to an individual from the consumption of fish is described by Equation 2.10. In this case, the activity ingested of the i^{th} radionuclide (I_i) is described by:

$$I_i = \frac{A_i B_i F (1E09)}{15d} = \mu\text{Ci} \quad (2.9)$$

where:

- A_i = Annual released of i^{th} radionuclide, μCi .
- B_i = Fish concentration factor of i^{th} radionuclide $\frac{\mu\text{Ci/gm}}{\mu\text{Ci/ml}}$
(see Table 2.0).
- F = Amount of fish eaten per year (21 kg adult, 16 kg teen, 6.9 kg child, none infant).
- 15 = Dispersion factor from discharge to fish exposure point.
- d = Dilution water flow for year, ml.
- $1E09$ = Conversion of μCi and Kgm to gross.

Substitution of Equation 2.9 into Equation 2.6 gives:

$$D_j = \frac{(6.7E07)F}{d} \sum_{i=1}^i A_i \times B_i \times DCF_i \text{ mrem} \quad (2.10)$$

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

c. Annual Analysis

A complete analysis utilizing the NRC computer code LADTAP with the total source release will be done annually in conjunction with the annual environmental report. This analysis will provide estimates of dose to the total body and various organs in addition to the dose limiting organs considered in the method of Section 2. The following approach is utilized on LADTAP. The dose to the j^{th} organ from m radionuclides, D_j , is described by:

$$D_j = \sum_{i=1}^m D_{ij} \text{ mrem} \tag{2.11}$$

$$= \sum_{i=1}^m (\text{DCF})_{ij} \times I_i \text{ mrem}$$

where:

- D_j = Dose to the j^{th} organ from the i^{th} radionuclide, mrem.
- j = The organ of interest (bone, GI tract, thyroid, liver, kidney, lung, or total body).
- $(\text{DCF})_{ij}$ = Adult ingestion dose commitment factor for the j^{th} organ from the i^{th} radionuclide, mrem/pCi (see Table 2.1).
- I_i = Activity ingested of the i^{th} radionuclide, μCi .

I_i for water ingestion is described by:

$$I_i = \frac{A_i V_r}{v d} \mu\text{Ci} \tag{2.13}$$

and for fish ingestion I_i is described by:

$$I_i = \frac{A_i B_i F_r}{v d} \mu\text{Ci}$$

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

where:

A_i = Activity release of j^{th} radionuclide during the year, μCi .

V = Average rate of water consumption (2000 ml/d).

Γ = Number of days during the year (365 d).

v = Dispersion factor from point of discharge to point of exposure.

d = Dilution water volume (ml).

B_i = Fish concentration factor of the i^{th} radionuclide,

Table 2.0, $\frac{\mu\text{Ci/gm}}{\mu\text{Ci/ml}}$

F = Amount of fish eaten per day (57.5 gm/d).

D. OPERABILITY OF LIQUID RADWASTE EQUIPMENT

The Palisades liquid radwaste system is designed to reduce the radioactive materials in liquid wastes prior to their discharge (by recycle or shipment for disposal) so that radioactivity in liquid effluent releases to unrestricted areas (see Figure 2-1) will not exceed the limits of Appendix A, III.H.1. Maintaining the cumulative fraction if allowable release for each batch release and weekly for continuous releases assures compliance with this requirement. In addition, 13 years of operating experience (to the date this ODCM was first adopted) has shown that design basis quantities never have been exceeded.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

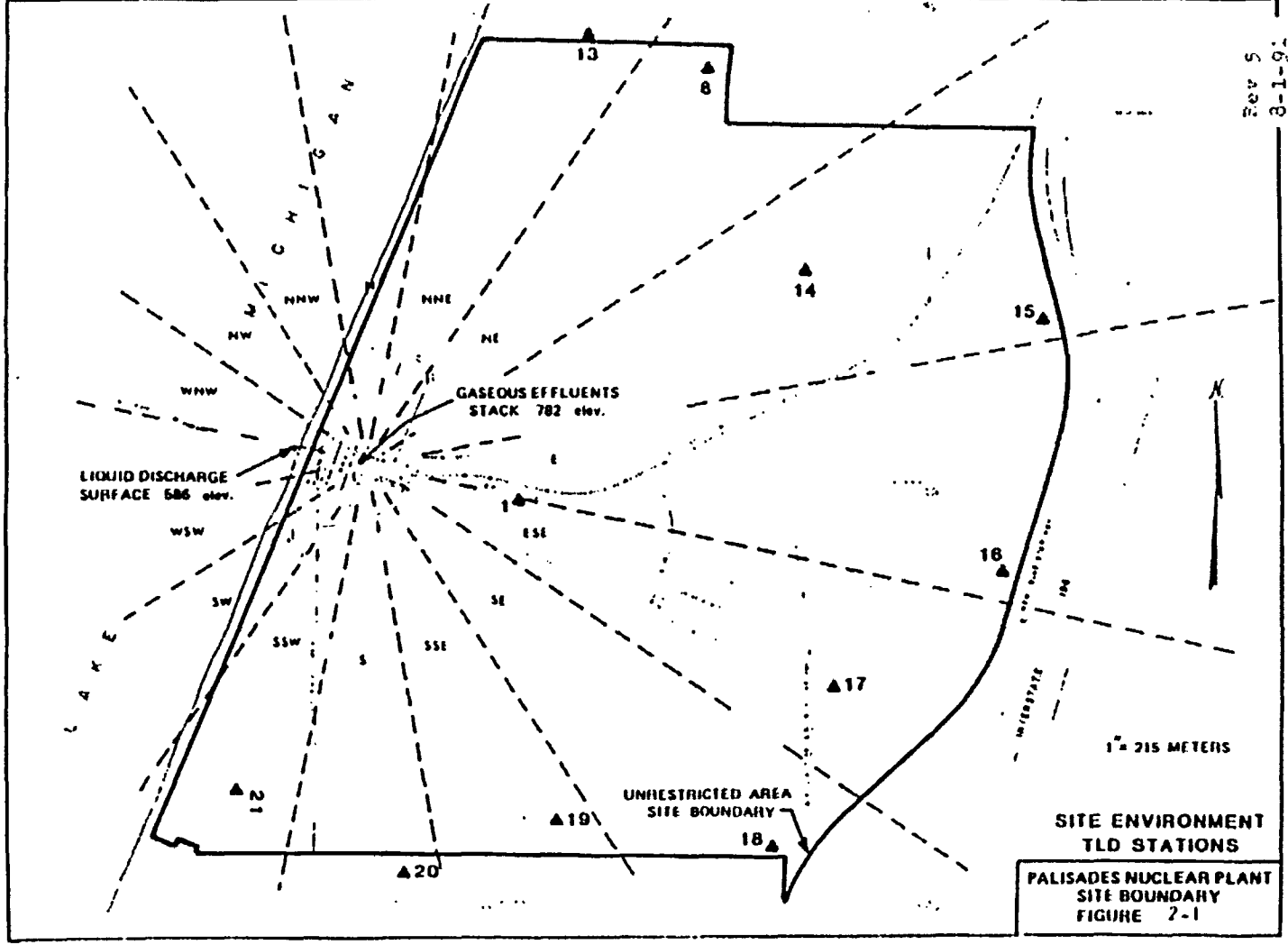
E. RELEASE RATE FOR OFFSITE EC (50 MREM/YR)

10 CFR 20.1302 requires radioactive effluent releases to unrestricted areas be less than the limits specified in Appendix B, Table 2 when averaged over a period not to exceed one year. Concentrations at this Effluent Concentration (EC) level, if ingested for one year, will result in a dose of 50 millirem to the total body. In addition, 10 CFR 50.36a requires that the release of radioactive materials be kept as low as is reasonably achievable. Appendix I to 10 CFR 50 provides the numerical guidelines on limiting conditions for operations to meet the as low as is reasonably achievable requirement.

The LADTAP code has been run to determine the dose due to drinking water at Plant discharge concentration (1,000 x nearest drinking water intake concentration). The nominal average source term used is given in Table 1.1. Dose to the most limiting organ of the person hypothetically drinking this water is 3.88E-03 mrem. This is only 0.13% of the more conservative 50 mrem/yr total body value.

F. FIGURES AND TABLES

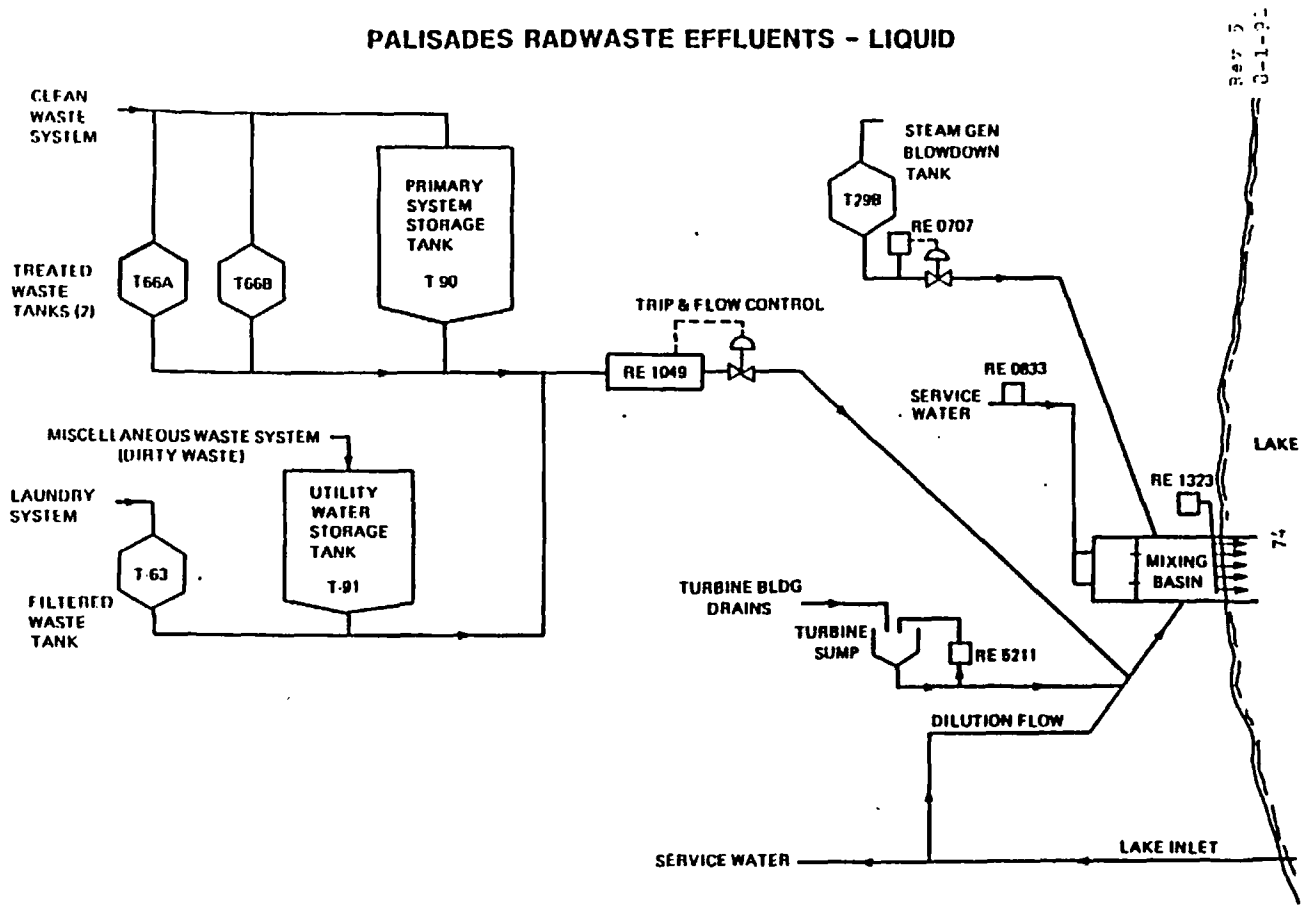
Figure 2-1



Rev 5
8-1-91

Revision 18

Figure 2-2



PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 2.0

BIOACCUMULATION FACTORS
μCi/gm per μCi/ml

<u>ELEMENT</u>	<u>FRESHWATER FISH</u>
H	9.0E-01
C	4.6E 03
NA	1.0E 02
P	1.0E 05
CR	2.0E 02
MN	4.0E 02
FE	1.0E 02
CO	5.0E 01
NI	1.0E 02
CU	5.0E 01
ZN	2.0E 03
BR	4.2E 02
RB	2.0E 03
SR	3.0E 01
Y	2.5E 01
ZR	3.3E 00
NB	3.0E 04
MO	1.0E 01
TC	1.5E 01
RU	1.0E 01
RH	1.0E 01
TE	4.0E 02
I	1.5E 01
CS	2.0E 03
BA	4.0E 00
LA	2.5E 01
CE	1.0E 00
PR	2.5E 01
ND	2.5E 01
W	1.2E 03
NP	1.0E 01

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

INFANT INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3	0.	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07
BE10	1.71E-05	2.49E-06	5.16E-07	0.	1.64E-06	0.	2.78E-05
C14	2.37E-05	5.06E-06	5.06E-06	5.06E-06	5.06E-06	5.06E-06	5.06E-06
N13	5.85E-08	5.85E-08	5.85E-08	5.835E-08	5.85E-08	5.85E-08	5.85E-08
F18	5.19E-06	0.	4.43E-07	0.	0.	0.	1.22E-06
NA22	9.83E-05	9.83E-05	9.83E-05	9.83E-05	9.83E-05	9.83E-05	9.83E-05
NA24	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05
P32	1.70E-03	1.00E-04	6.59E-05	0.	0.	0.	2.30E-05
AR39	0.	0.	0.	0.	0.	0.	0.
AR41	0.	0.	0.	0.	0.	0.	0.
CA41	3.74E-04	0.	4.08E-05	0.	0.	0.	1.91E-07
SC46	3.75E-08	5.41E-08	1.69E-08	0.	3.56E-08	0.	3.53E-05
CR51	0.	0.	1.41E-08	9.20E-09	2.01E-09	1.79E-08	4.11E-07
MN54	0.	1.99E-05	4.51E-06	0.	4.41E-06	0.	7.31E-06
MN56	0.	8.18E-07	1.41E-07	0.	7.03E-07	0.	7.43E-05
FE55	1.39E-05	8.98E-06	2.40E-06	0.	0.	4.39E-06	1.14E-06
FE59	3.08E-05	5.38E-05	2.12E-05	0.	0.	1.59E-05	2.57E-05
CO57	0.	1.15E-06	1.87E-06	0.	0.	0.	3.92E-06
CO58	0.	3.60E-06	8.98E-06	0.	0.	0.	8.97E-06
CO60	0.	1.08E-05	2.55E-05	0.	0.	0.	2.57E-05
NI59	4.78E-05	1.45E-05	8.17E-06	0.	0.	0.	7.16E-07
NI63	6.34E-04	3.92E-05	2.20E-05	0.	0.	0.	1.95E-06
NI65	4.70E-06	5.32E-07	2.42E-07	0.	0.	0.	4.05E-05
CU64	0.	6.09E-07	2.82E-07	0.	1.03E-06	0.	1.25E-05
ZN65	1.84E-05	6.31E-05	2.91E-05	0.	3.06E-05	0.	5.33E-05
ZN69M+D	1.50E-06	3.06E-06	2.79E-07	0.	1.24E-06	0.	4.24E-05
ZN69	9.33E-08	1.68E-07	1.25E-08	0.	6.98E-08	0.	1.37E-05
SE79	0.	2.10E-05	3.90E-06	0.	2.43E-05	0.	5.58E-07
BR82	0.	0.	1.27E-05	0.	0.	0.	0.
BR83+D	0.	0.	3.63E-07	0.	0.	0.	0.
BR84	0.	0.	3.82E-07	0.	0.	0.	0.
BR85	0.	0.	1.94E-08	0.	0.	0.	0.
KR83M	0.	0.	0.	0.	0.	0.	0.
KR85M	0.	0.	0.	0.	0.	0.	0.
KR85	0.	0.	0.	0.	0.	0.	0.
KR87	0.	0.	0.	0.	0.	0.	0.
KR88+D	0.	0.	0.	0.	0.	0.	0.
KR89	0.	0.	0.	0.	0.	0.	0.
RB86	0.	1.70E-04	8.40E-05	0.	0.	0.	4.35E-06
RB87	0.	8.88E-05	3.52E-05	0.	0.	0.	5.98E-07
RB88	0.	4.98E-07	2.73E-07	0.	0.	0.	4.85E-07
RB89+D	0.	2.86E-07	1.97E-07	0.	0.	0.	9.74E-08
SR89+D	2.51E-03	0.	7.20E-05	0.	0.	0.	5.16E-05
SR90+D	1.85E-02	0.	4.71E-03	0.	0.	0.	2.31E-04
SR91+D	5.00E-05	0.	1.81E-06	0.	0.	0.	5.92E-05
SR92+D	1.92E-05	0.	7.13E-07	0.	0.	0.	2.07E-04

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

INFANT INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y90	8.69E-08	0.	2.33E-09	0.	0.	0.	1.20E-04
Y91M+D	8.10E-10	0.	2.76E-11	0.	0.	0.	2.70E-06
Y91	1.13E-06	0.	3.01E-08	0.	0.	0.	8.10E-05
Y92	7.65E-09	0.	2.15E-10	0.	0.	0.	1.46E-04
Y93	2.43E-08	0.	6.62E-10	0.	0.	0.	1.92E-04
ZR93+D	1.93E-07	9.18E-08	5.54E-08	0.	2.71E-07	0.	2.39E-05
ZR95+D	2.06E-07	5.02E-08	3.56E-08	0.	5.41E-08	0.	2.50E-05
ZR97+D	1.48E-08	2.54E-09	1.16E-09	0.	2.56E-09	0.	1.62E-04
NB93M	1.23E-07	3.33E-08	1.04E-08	0.	3.25E-08	0.	3.98E-06
NB95	4.20E-08	1.73E-08	1.00E-08	0.	1.24E-08	0.	1.46E-05
NB97	4.59E-10	9.79E-11	3.53E-11	0.	7.65E-11	0.	3.09E-05
MO93	0.	5.65E-05	1.82E-06	0.	1.13E-05	0.	1.21E-06
MO99+D	0.	3.40E-05	6.63E-06	0.	5.08E-05	0.	1.12E-05
TC99M	1.92E-09	3.96E-09	5.10E-08	0.	4.26E-08	2.07E-09	1.15E-06
TC99	1.08E-06	1.46E-06	4.55E-07	0.	1.23E-05	1.42E-07	6.31E-06
TC101	2.27E-09	2.86E-09	2.83E-08	0.	3.40E-08	1.56E-09	4.86E-07
RU103+D	1.48E-06	0.	4.95E-07	0.	3.08E-06	0.	1.80E-05
RU105+D	1.36E-07	0.	4.58E-08	0.	1.00E-06	0.	5.41E-05
RU106+D	2.41E-05	0.	3.01E-06	0.	2.85E-05	0.	1.83E-04
RH105	1.09E-06	7.13E-07	4.79E-07	0.	1.98E-06	0.	1.77E-05
PD107	0.	1.19E-06	8.45E-08	0.	6.79E-06	0.	9.46E-07
PD109	0.	1.50E-06	3.62E-07	0.	5.51E-06	0.	3.68E-05
AG110M+D	9.96E-07	7.27E-07	4.81E-07	0.	1.04E-06	0.	3.77E-05
AG111	5.20E-07	2.02E-07	1.07E-07	0.	4.22E-07	0.	4.82E-05
CD113M	0.	1.77E-05	6.52E-07	0.	1.34E-05	0.	2.66E-05
CD115M	0.	1.42E-05	4.93E-07	0.	7.41E-06	0.	8.09E-05
SN123	2.49E-04	3.89E-06	6.50E-06	3.91E-06	0.	0.	6.58E-05
SN125+D	7.41E-05	1.38E-06	3.29E-06	1.36E-06	0.	0.	1.11E-04
SN126+D	5.53E-04	7.26E-06	1.80E-05	1.91E-06	0.	0.	2.52E-05
SB124	2.14E-05	3.15E-07	6.63E-06	5.68E-08	0.	1.34E-05	6.60E-05
SB125+D	1.23E-05	1.19E-07	2.53E-06	1.54E-08	0.	7.72E-06	1.64E-05
SB126	8.06E-06	1.58E-07	2.91E-06	6.19E-08	0.	5.07E-06	8.35E-05
SB127	2.23E-06	3.98E-08	6.90E-07	2.84E-08	0.	1.15E-06	5.91E-05
TE125M	2.33E-05	7.79E-06	3.15E-06	7.84E-06	0.	0.	1.11E-05
TE127M+D	5.85E-05	1.94E-05	7.08E-06	1.69E-05	1.44E-04	0.	2.36E-05
TE127	1.00E-06	3.35E-07	2.15E-07	8.14E-07	2.44E-06	0.	2.10E-05
TE129M+D	1.00E-04	3.43E-05	1.54E-05	3.84E-05	2.50E-04	0.	5.97E-05
TE129	2.84E-07	9.79E-08	6.63E-08	2.38E-07	7.07E-07	0.	2.27E-05
TE131M+D	1.52E-05	6.12E-06	5.05E-06	1.24E-05	4.21E-05	0.	1.03E-04
TE131+D	1.76E-07	6.50E-08	4.94E-08	1.57E-07	4.50E-07	0.	7.11E-06
TE132+D	2.08E-05	1.03E-05	9.61E-06	1.52E-05	6.44E-05	0.	3.81E-05
TE133M+D	3.91E-07	1.79E-07	1.71E-07	3.45E-07	1.22E-06	0.	1.93E-05
TE134+D	2.67E-07	1.34E-07	1.38E-07	2.39E-07	9.03E-07	0.	3.06E-06
I129	2.86E-05	2.12E-05	1.55E-05	1.36E-02	2.51E-05	0.	4.24E-07
I130	6.00E-06	1.32E-05	5.30E-06	1.48E-03	1.45E-05	0.	2.83E-06
I131+D	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	0.	1.51E-06

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

INFANT INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
I132	1.66E-06	3.37E-06	1.20E-06	1.58E-04	3.76E-06	0.	2.73E-06
I133+D	1.25E-05	1.82E-05	5.33E-06	3.31E-03	2.14E-05	0.	3.08E-06
I134	8.69E-07	1.78E-06	6.33E-07	4.15E-05	1.99E-06	0.	1.84E-06
I135+D	3.64E-06	7.24E-06	2.64E-06	6.49E-04	8.07E-06	0.	2.62E-06
XE131M	0.	0.	0.	0.	0.	0.	0.
XE133M	0.	0.	0.	0.	0.	0.	0.
XE133	0.	0.	0.	0.	0.	0.	0.
XE135M	0.	0.	0.	0.	0.	0.	0.
XE135	0.	0.	0.	0.	0.	0.	0.
XE137	0.	0.	0.	0.	0.	0.	0.
XE138+D	0.	0.	0.	0.	0.	0.	0.
CS134M+D	1.76E-07	2.93E-07	1.48E-07	0.	1.13E-07	2.60E-08	2.32E-07
CS134	3.77E-04	7.03E-04	7.10E-05	0.	1.81E-04	7.42E-05	1.91E-06
CS135	1.33E-04	1.21E-04	6.30E-06	0.	3.44E-05	1.31E-05	4.37E-07
CS136	4.59E-05	1.35E-04	5.04E-05	0.	5.38E-05	1.10E-05	2.05E-06
CS137+D	5.22E-04	6.11E-04	4.33E-05	0.	1.64E-04	6.64E-05	1.91E-06
CS138	4.81E-07	7.82E-07	3.79E-07	0.	3.90E-07	6.09E-08	1.25E-06
CS139+D	3.10E-07	4.24E-07	1.62E-07	0.	2.19E-07	3.30E-08	2.66E-08
BA139	8.81E-07	5.84E-10	2.55E-08	0.	3.51E-10	3.54E-10	5.58E-05
BA140+D	1.71E-04	1.71E-07	8.81E-06	0.	4.06E-08	1.05E-07	4.20E-05
BA141+D	4.25E-07	2.91E-10	1.34E-08	0.	1.75E-10	1.77E-10	5.19E-06
BA142+D	1.84E-07	1.53E-10	9.06E-09	0.	8.81E-11	9.26E-11	7.59E-07
LA140	2.11E-08	8.32E-09	2.14E-09	0.	0.	0.	9.77E-05
LA141	2.89E-09	8.38E-10	1.46E-10	0.	0.	0.	9.61E-05
LA142	1.10E-09	4.04E-10	9.67E-11	0.	0.	0.	6.86E-05
CE141	7.87E-08	4.80E-08	5.65E-09	0.	1.48E-08	0.	2.48E-05
CE143+D	1.48E-08	9.82E-06	1.12E-09	0.	2.86E-09	0.	5.73E-05
CE144+D	2.98E-06	1.22E-06	1.67E-07	0.	4.93E-07	0.	1.71E-04
PR143	8.18E-08	3.04E-08	4.03E-09	0.	1.13E-08	0.	4.29E-05
PR144	2.74E-10	1.06E-10	1.38E-11	0.	3.84E-11	0.	4.93E-06
ND147+D	5.53E-08	5.68E-08	3.48E-09	0.	2.19E-08	0.	3.60E-05
PM147	3.88E-07	3.27E-08	1.59E-08	0.	4.88E-08	0.	9.27E-06
PM148M+D	1.65E-07	4.18E-08	3.28E-08	0.	4.80E-08	0.	5.44E-05
PM148	6.32E-08	9.13E-09	4.60E-09	0.	1.09E-08	0.	9.74E-05
PM149	1.38E-08	1.81E-09	7.90E-10	0.	2.20E-09	0.	4.86E-05
PM151	6.18E-09	9.01E-10	4.56E-10	0.	1.07E-09	0.	4.17E-05
SM151	2.90E-07	6.67E-08	1.44E-08	0.	4.53E-08	0.	5.58E-06
SM153	7.72E-09	5.97E-09	4.58E-10	0.	1.25E-09	0.	3.12E-05
EU152	6.74E-07	1.79E-07	1.51E-07	0.	5.02E-07	0.	1.59E-05
EU154	2.64E-06	3.67E-07	2.20E-07	0.	9.95E-07	0.	4.58E-05
EU155	5.42E-07	6.25E-08	3.23E-08	0.	1.40E-07	0.	8.37E-05
EU156	1.14E-07	7.06E-08	1.12E-08	0.	3.26E-08	0.	6.67E-05
TB160	2.59E-07	0.	3.24E-08	0.	7.37E-08	0.	3.45E-05
HO166M	1.25E-06	2.69E-07	2.13E-07	0.	3.57E-07	0.	0.
W181	8.85E-08	2.72E-08	3.04E-09	0.	0.	0.	3.82E-07
W185	3.62E-06	1.13E-06	1.29E-07	0.	0.	0.	1.62E-05
W187	9.03E-07	6.28E-07	2.17E-07	0.	0.	0.	3.69E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

INFANT INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)							
ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	5.28E-02	1.42E-02	2.38E-03	0.	4.33E-02	0.	5.62E-05
BI210+D	4.16E-06	2.68E-05	3.58E-07	0.	2.08E-04	0.	5.27E-05
PO210	3.10E-03	5.93E-03	7.41E-04	0.	1.26E-02	0.	6.61E-05
RN222+D	0.	0.	0.	0.	0.	0.	0.
RA223+D	4.41E-02	6.42E-05	8.82E-03	0.	1.17E-03	0.	3.43E-04
RA224+D	1.46E-02	3.29E-05	2.91E-03	0.	6.00E-04	0.	3.86E-04
RA225+D	5.78E-02	6.42E-05	1.15E-02	0.	1.19E-03	0.	3.24E-04
RA226+D	6.20E-01	4.76E-05	5.14E-01	0.	8.71E-04	0.	3.44E-04
RA228+D	4.32E-01	2.58E-05	4.86E-01	0.	4.73E-04	0.	5.86E-05
AC225	3.92E-05	5.03E-05	2.63E-06	0.	3.69E-06	0.	4.36E-04
AC227+D	4.49E-03	7.67E-04	2.79E-04	0.	1.56E-04	0.	8.50E-05
TH227+D	1.20E-04	2.01E-06	3.45E-06	0.	7.41E-06	0.	5.70E-04
TH228+D	2.47E-03	3.38E-05	8.36E-05	0.	1.58E-04	0.	5.84E-04
TH229	1.48E-02	1.94E-04	7.29E-04	0.	9.29E-04	0.	5.31E-04
TH230	3.80E-03	1.90E-04	1.06E-04	0.	9.12E-04	0.	6.24E-05
TH232+D	4.24E-03	1.63E-04	1.65E-04	0.	7.79E-04	0.	5.31E-05
TH234	6.92E-07	3.77E-08	2.00E-08	0.	1.39E-07	0.	1.19E-04
PA231+D	7.57E-03	2.50E-04	3.02E-04	0.	1.34E-03	0.	7.44E-05
PA233	3.11E-08	6.09E-09	5.43E-09	0.	1.67E-08	0.	1.46E-05
U232+D	2.42E-02	0.	2.16E-03	0.	2.37E-03	0.	7.04E-05
U233+D	5.08E-03	0.	3.87E-04	0.	1.08E-03	0.	6.51E-05
U234	4.88E-03	0.	3.80E-04	0.	1.06E-03	0.	6.37E-05
U235+D	4.67E-03	0.	3.56E-04	0.	9.93E-04	0.	8.10E-05
U236	4.67E-03	0.	3.64E-04	0.	1.01E-03	0.	5.98E-05
U237	4.95E-07	0.	1.32E-07	0.	1.23E-06	0.	2.11E-05
U238+D	4.47E-03	0.	3.33E-04	0.	9.28E-04	0.	5.71E-05
NP237+D	2.53E-03	1.93E-04	1.05E-04	0.	6.34E-04	0.	8.23E-05
NP238	1.24E-07	3.12E-09	1.92E-09	0.	6.81E-09	0.	4.17E-05
NP239	1.11E-08	9.93E-10	5.61E-10	0.	1.98E-09	0.	2.87E-05
PU238	1.34E-03	1.69E-04	3.40E-05	0.	1.21E-04	0.	7.57E-05
PU239	1.45E-03	1.77E-04	3.54E-05	0.	1.28E-04	0.	6.91E-05
PU240	1.45E-03	1.77E-04	3.54E-05	0.	1.28E-04	0.	7.04E-05
PU241+D	4.38E-05	1.90E-06	8.82E-07	0.	3.17E-06	0.	1.45E-06
PU242	1.35E-03	1.70E-04	3.41E-05	0.	1.23E-04	0.	6.77E-05
PU244	1.57E-03	1.95E-04	3.91E-05	0.	1.41E-04	0.	1.01E-04
AM241	1.53E-03	7.18E-04	1.09E-04	0.	6.55E-04	0.	7.70E-05
AM242M	1.58E-03	7.02E-04	1.13E-04	0.	6.64E-04	0.	9.69E-05
AM243	1.51E-03	6.88E-04	1.06E-04	0.	6.36E-04	0.	9.03E-05
CM242	1.37E-04	1.24E-04	9.10E-06	0.	2.62E-05	0.	8.23E-05
CM243	1.45E-03	6.88E-04	8.98E-05	0.	3.27E-04	0.	8.10E-05
CM244	1.22E-03	6.16E-04	7.59E-05	0.	2.71E-04	0.	7.84E-05
CM245	1.88E-03	7.49E-04	1.13E-04	0.	4.32E-04	0.	7.30E-05
CM246	1.87E-03	7.49E-04	1.13E-04	0.	4.31E-04	0.	7.17E-05
CM247+D	1.82E-03	7.36E-04	1.11E-04	0.	4.24E-04	0.	9.43E-05
CM248	1.51E-02	6.07E-03	9.16E-04	0.	3.50E-03	0.	1.52E-03
CF252	1.24E-03	0.	2.95E-05	0	0.	0.	2.99E-04

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

CHILD INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3	0.	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07
BE10	1.35E-05	1.57E-06	3.39E-07	0.	1.11E-06	0.	2.75E-05
C14	1.21E-05	2.42E-06	2.42E-06	2.42E-06	2.42E-06	2.42E-06	2.42E-06
N13	3.10E-08	3.10E-08	3.10E-08	3.10E-08	3.10E-08	3.10E-08	3.10E-08
F18	2.49E-06	0.	2.47E-07	0.	0.	0.	6.74E-07
NA22	5.88E-05	5.88E-05	5.88E-05	5.88E-05	5.88E-05	5.88E-05	5.88E-05
NA24	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06
P32	8.25E-04	3.86E-05	3.18E-05	0.	0.	0.	2.28E-05
AR39	0.	0.	0.	0.	0.	0.	0.
AR41	0.	0.	0.	0.	0.	0.	0.
CA41	3.47E-04	0.	3.79E-05	0.	0.	0.	1.90E-07
SC46	1.97E-08	2.70E-08	1.04E-08	0.	2.30E-08	0.	3.95E-05
CR51	0.	0.	8.90E-09	4.94E-09	1.35E-09	9.02E-09	4.72E-07
MN54	0.	1.07E-05	2.85E-06	0.	3.00E-06	0.	8.98E-06
MN56	0.	3.34E-07	7.54E-08	0.	4.04E-07	0.	4.84E-05
FE55	1.15E-05	6.10E-06	1.89E-06	0.	0.	3.45E-06	1.13E-06
FE59	1.65E-05	2.67E-05	1.33E-05	0.	0.	7.74E-06	2.78E-05
CO57	0.	4.93E-07	9.98E-07	0.	0.	0.	4.04E-06
CO58	0.	1.80E-06	5.51E-06	0.	0.	0.	1.05E-05
CO60	0.	5.29E-06	1.56E-05	0.	0.	0.	2.93E-05
NI59	4.02E-05	1.07E-05	6.82E-06	0.	0.	0.	7.10E-07
NI63	5.38E-04	2.88E-05	1.83E-05	0.	0.	0.	1.94E-06
NI65	2.22E-06	2.09E-07	1.22E-07	0.	0.	0.	2.56E-05
CU64	0.	2.45E-07	1.48E-07	0.	5.92E-07	0.	1.15E-05
ZN65	1.37E-05	3.65E-05	2.27E-05	0.	2.30E-05	0.	6.41E-06
ZN69M+D	7.10E-07	1.21E-06	1.43E-07	0.	7.03E-07	0.	3.94E-05
ZN69	4.38E-08	6.33E-08	5.85E-09	0.	3.84E-08	0.	3.99E-06
SE79	0.	8.43E-06	1.87E-06	0.	1.37E-05	0.	5.53E-07
BR82	0.	0.	7.55E-06	0.	0.	0.	0.
BR83+D	0.	0.	1.71E-07	0.	0.	0.	0.
BR84	0.	0.	1.98E-07	0.	0.	0.	0.
BR85	0.	0.	9.12E-09	0.	0.	0.	0.
KR83M	0.	0.	0.	0.	0.	0.	0.
KR85M	0.	0.	0.	0.	0.	0.	0.
KR85	0.	0.	0.	0.	0.	0.	0.
KR87	0.	0.	0.	0.	0.	0.	0.
KR88+D	0.	0.	0.	0.	0.	0.	0.
KR89	0.	0.	0.	0.	0.	0.	0.
RB86	0.	6.70E-05	4.12E-05	0.	0.	0.	4.31E-06
RB87	0.	3.95E-05	1.83E-05	0.	0.	0.	5.92E-07
RB88	0.	1.90E-07	1.32E-07	0.	0.	0.	9.32E-09
RB89+D	0.	1.17E-07	1.04E-07	0.	0.	0.	1.02E-09
SR89+D	1.32E-03	0.	3.77E-05	0.	0.	0.	5.11E-05
SR90+D	1.70E-02	0.	4.31E-03	0.	0.	0.	2.29E-04
SR91+D	2.40E-05	0.	9.06E-07	0.	0.	0.	5.30E-05
SR92+D	9.03E-06	0.	3.62E-07	0.	0.	0.	1.71E-04

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

CHILD INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y90	4.11E-08	0.	1.10E-09	0.	0.	0.	1.17E-04
Y91M+D	3.82E-10	0.	1.39E-11	0.	0.	0.	7.48E-07
Y91	6.02E-07	0.	1.61E-08	0.	0.	0.	8.02E-05
Y92	3.60E-09	0.	1.03E-10	0.	0.	0.	1.04E-04
Y93	1.14E-08	0.	3.13E-10	0.	0.	0.	1.70E-04
ZR93+D	1.67E-07	6.25E-08	4.45E-08	0.	2.42E-07	0.	2.37E-05
ZR95+D	1.16E-07	2.55E-08	2.27E-08	0.	3.65E-08	0.	2.66E-05
ZR97+D	6.99E-09	1.01E-09	5.96E-10	0.	1.45E-09	0.	1.53E-04
NB93M	1.05E-07	2.62E-08	8.61E-09	0.	2.83E-08	0.	3.95E-06
NB95	2.25E-08	8.76E-09	6.26E-09	0.	8.23E-09	0.	1.62E-05
NB97	2.17E-10	3.92E-11	1.83E-11	0.	4.35E-11	0.	1.21E-05
MO93	0.	2.41E-05	8.65E-07	0.	6.35E-06	0.	1.22E-06
MO99+D	0.	1.33E-05	3.29E-06	0.	2.84E-05	0.	1.10E-05
TC99M	9.23E-10	1.81E-09	3.00E-08	0.	2.63E-08	9.19E-10	1.03E-06
TC99	5.35E-07	5.96E-07	2.14E-07	0.	7.02E-06	5.27E-08	6.25E-06
TC101	1.07E-09	1.12E-09	1.42E-08	0.	1.91E-08	5.92E-10	3.56E-09
RU103+D	7.31E-07	0.	2.81E-07	0.	1.84E-06	0.	1.89E-05
RU105+D	6.45E-08	0.	2.34E-08	0.	5.67E-07	0.	4.21E-05
RU106+D	1.17E-05	0.	1.46E-06	0.	1.58E-05	0.	1.82E-04
RH105	5.14E-07	2.76E-07	2.36E-07	0.	1.10E-06	0.	1.71E-05
PD107	0.	4.72E-07	4.01E-08	0.	3.95E-06	0.	9.37E-07
PD109	0.	5.67E-07	1.70E-07	0.	3.04E-06	0.	3.35E-05
AG110M+D	5.39E-07	3.64E-07	2.91E-07	0.	6.78E-07	0.	4.33E-05
AG111	2.48E-07	7.76E-08	5.12E-08	0.	2.34E-07	0.	4.75E-05
CD113M	0.	1.02E-05	4.34E-07	0.	1.05E-05	0.	2.63E-05
CD115M	0.	5.89E-06	2.51E-07	0.	4.38E-06	0.	8.01E-05
SN123	1.33E-04	1.65E-06	3.24E-06	1.75E-06	0.	0.	6.52E-05
SN125+D	3.55E-05	5.35E-07	1.59E-06	5.55E-07	0.	0.	1.10E-04
SN126+D	3.33E-04	4.15E-06	9.46E-06	1.14E-06	0.	0.	2.50E-05
SB124	1.11E-05	1.44E-07	3.89E-06	2.45E-08	0.	6.16E-06	6.94E-05
SB125+D	7.16E-06	5.52E-08	1.50E-06	6.63E-09	0.	3.99E-06	1.71E-05
SB126	4.40E-06	6.73E-08	1.58E-06	2.58E-08	0.	2.10E-06	8.87E-05
SB127	1.06E-06	1.64E-08	3.68E-07	1.18E-08	0.	4.60E-07	5.97E-05
TE125M	1.14E-05	3.09E-06	1.52E-06	3.20E-06	0.	0.	1.10E-05
TE127M+D	2.89E-05	7.78E-06	3.43E-06	6.91E-06	8.24E-05	0.	2.34E-05
TE127	4.71E-07	1.27E-07	1.01E-07	3.26E-07	1.34E-06	0.	1.84E-05
TE129M+D	4.87E-05	1.36E-05	7.56E-06	1.57E-05	1.43E-04	0.	5.94E-05
TE129	1.34E-07	3.74E-08	3.18E-08	9.56E-08	3.92E-07	0.	8.34E-06
TE131M+D	7.20E-06	2.49E-06	2.65E-06	5.12E-06	2.41E-05	0.	1.01E-04
TE131+D	8.30E-08	2.53E-08	2.47E-08	6.35E-08	2.51E-07	0.	4.36E-07
TE132+D	1.01E-05	4.47E-06	5.40E-06	6.51E-06	4.15E-05	0.	4.50E-05
TE133M+D	1.87E-07	7.56E-08	9.37E-08	1.45E-07	7.18E-07	0.	5.77E-06
TE134+D	1.29E-07	5.80E-08	7.74E-08	1.02E-07	5.37E-07	0.	5.89E-07
I129	1.39E-05	8.53E-06	7.62E-06	5.58E-03	1.44E-05	0.	4.29E-07
I130	2.92E-06	5.90E-06	3.04E-06	6.50E-04	8.82E-06	0.	2.76E-06
I131+D	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	0.	1.54E-06

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

CHILD INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
I132	8.00E-07	1.47E-06	6.76E-07	6.82E-05	2.25E-06	0.	1.73E-06
I133+D	5.92E-06	7.32E-06	2.77E-06	1.36E-03	1.22E-05	0.	2.95E-06
I134	4.19E-07	7.78E-07	3.58E-07	1.79E-05	1.19E-06	0.	5.16E-07
I135+D	1.75E-06	3.15E-06	1.49E-06	2.79E-04	4.83E-06	0.	2.40E-06
XE131M	0.	0.	0.	0.	0.	0.	0.
XE133M	0.	0.	0.	0.	0.	0.	0.
XE133	0.	0.	0.	0.	0.	0.	0.
XE135M	0.	0.	0.	0.	0.	0.	0.
XE135	0.	0.	0.	0.	0.	0.	0.
XE137	0.	0.	0.	0.	0.	0.	0.
XE138+D	0.	0.	0.	0.	0.	0.	0.
CS134M+D	8.44E-08	1.25E-07	8.16E-08	0.	6.59E-08	1.09E-08	1.58E-07
CS134	2.34E-04	3.84E-04	8.10E-05	0.	1.19E-04	4.27E-05	2.07E-06
CS135	8.30E-05	5.78E-05	5.93E-06	0.	2.04E-05	6.81E-06	4.33E-07
CS136	2.35E-05	6.46E-05	4.18E-05	0.	3.44E-05	5.13E-06	2.27E-06
CS137+D	3.27E-04	3.13E-04	4.62E-05	0.	1.02E-04	3.67E-05	1.96E-06
CS138	2.28E-07	3.17E-07	2.01E-07	0.	2.23E-07	2.40E-08	1.46E-07
CS139+D	1.45E-07	1.61E-07	7.74E-08	0.	1.21E-07	1.22E-08	1.45E-11
BA139	4.14E-07	2.21E-10	1.20E-08	0.	1.93E-10	1.30E-10	2.39E-05
BA140+D	8.31E-05	7.28E-08	4.85E-06	0.	2.37E-08	4.34E-08	4.21E-05
BA141+D	2.00E-07	1.12E-10	6.51E-09	0.	9.69E-11	6.58E-10	1.14E-07
BA142+D	8.74E-08	6.29E-11	4.88E-09	0.	5.09E-11	3.70E-11	1.14E-09
LA140	1.01E-08	3.53E-09	1.19E-09	0.	0.	0.	9.84E-05
LA141	1.35E-09	3.17E-10	6.88E-11	0.	0.	0.	7.05E-05
LA142	5.24E-10	1.67E-10	5.23E-11	0.	0.	0.	3.31E-05
CE141	3.97E-08	1.98E-08	2.94E-09	0.	8.68E-09	0.	2.47E-05
CE143+D	6.99E-09	3.79E-06	5.49E-10	0.	1.59E-09	0.	5.55E-05
CE144+D	2.08E-06	6.52E-07	1.11E-07	0.	3.61E-07	0.	1.70E-04
PR143	3.93E-08	1.18E-08	1.95E-09	0.	6.39E-09	0.	4.24E-05
PR144	1.29E-10	3.99E-11	6.49E-12	0.	2.11E-11	0.	8.59E-08
ND147+D	2.79E-08	2.26E-08	1.75E-09	0.	1.24E-08	0.	3.58E-05
PM147	3.18E-07	2.27E-08	1.22E-08	0.	4.01E-08	0.	9.19E-06
PM148M+D	1.03E-07	2.05E-08	2.05E-08	0.	3.04E-08	0.	5.78E-05
PM148	3.02E-08	3.63E-09	2.35E-09	0.	6.17E-09	0.	9.70E-05
PM149	6.49E-09	6.90E-10	3.74E-10	0.	1.22E-09	0.	4.71E-05
PM151	2.92E-09	3.55E-10	2.31E-10	0.	6.02E-10	0.	4.03E-05
SM151	2.56E-07	3.81E-08	1.20E-08	0.	3.94E-08	0.	5.53E-06
SM153	3.65E-09	2.27E-09	2.19E-10	0.	6.91E-10	0.	3.02E-05
EU152	6.15E-07	1.12E-07	1.33E-07	0.	4.73E-07	0.	1.84E-05
EU154	2.30E-06	2.07E-07	1.89E-07	0.	9.09E-07	0.	4.81E-05
EU155	4.82E-07	3.47E-08	2.72E-08	0.	1.30E-07	0.	8.69E-05
EU156	5.62E-08	3.01E-08	6.23E-09	0.	1.94E-08	0.	6.83E-05
TB160	1.66E-07	0.	2.06E-08	0.	4.94E-08	0.	3.68E-05
HO166M	1.08E-06	2.26E-07	1.91E-07	0.	3.22E-07	0.	0.
W181	4.23E-06	1.04E-08	1.43E-09	0.	0.	0.	3.79E-07
W185	1.73E-06	4.32E-07	6.05E-08	0.	0.	0.	1.61E-05
W187	4.29E-07	2.54E-07	1.14E-07	0.	0.	0.	3.57E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

CHILD INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

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PB210+D	4.75E-02	1.22E-02	2.09E-03	0.	3.67E-02	0.	5.57E-05
BI210+D	1.97E-06	1.02E-05	1.69E-07	0.	1.15E-04	0.	5.17E-05
PO210	1.52E-03	2.43E-03	3.67E-04	0.	7.56E-03	0.	6.55E-05
RN222+D	0.	0.	0.	0.	0.	0.	0.
RA223+D	2.12E-02	2.45E-05	4.24E-03	0.	6.50E-04	0.	3.38E-04
RA224+D	6.89E-03	1.25E-05	1.38E-03	0.	3.31E-04	0.	3.78E-04
RA225+D	2.80E-02	2.50E-05	5.59E-03	0.	6.62E-04	0.	3.21E-04
RA226+D	5.75E-01	1.84E-05	4.72E-01	0.	4.88E-04	0.	3.41E-04
RA228+D	3.85E-01	9.99E-06	4.32E-01	0.	2.65E-04	0.	5.81E-05
AC225	1.88E-05	1.94E-05	1.26E-06	0.	2.07E-06	0.	4.31E-04
AC227+D	4.12E-03	6.63E-04	2.55E-04	0.	1.46E-04	0.	8.43E-05
TH227+D	5.85E-05	7.96E-07	1.69E-06	0.	4.22E-06	0.	5.63E-04
TH228+D	2.07E-03	2.65E-05	7.00E-05	0.	1.38E-04	0.	5.79E-04
TH229	1.38E-02	1.81E-04	6.80E-04	0.	8.84E-04	0.	5.27E-04
TH230	3.55E-03	1.78E-04	9.91E-05	0.	8.67E-04	0.	6.19E-05
TH232+D	3.96E-03	1.52E-04	3.01E-04	0.	7.41E-04	0.	5.27E-05
TH234	3.42E-07	1.51E-08	9.88E-09	0.	8.01E-08	0.	1.18E-04
PA231+D	7.07E-03	2.34E-04	2.81E-04	0.	1.28E-03	0.	7.37E-05
PA233	1.81E-08	2.82E-09	3.16E-09	0.	1.04E-08	0.	1.44E-05
U232+D	1.76E-02	0.	1.26E-03	0.	1.34E-03	0.	6.98E-05
U233+D	3.72E-03	0.	2.25E-04	0.	6.10E-04	0.	6.45E-05
U234	3.57E-03	0.	2.21E-04	0.	5.98E-04	0.	6.32E-05
U235+D	3.42E-03	0.	2.07E-04	0.	5.61E-04	0.	8.03E-05
U236	3.42E-03	0.	2.12E-04	0.	5.73E-04	0.	5.92E-05
U237	2.36E-07	0.	6.27E-08	0.	6.81E-07	0.	2.08E-05
U238+D	3.27E-03	0.	1.94E-04	0.	5.24E-04	0.	5.66E-05
NP237+D	2.36E-03	1.81E-04	9.79E-05	0.	6.05E-04	0.	8.16E-05
NP238	5.83E-08	1.18E-09	9.08E-10	0.	3.76E-09	0.	4.04E-05
NP239	5.25E-09	3.77E-10	2.65E-10	0.	1.09E-09	0.	2.79E-05
PU238	1.25E-03	1.56E-04	3.16E-05	0.	1.15E-04	0.	7.50E-05
PU239	1.36E-03	1.65E-04	3.31E-05	0.	1.22E-04	0.	6.85E-05
PU240	1.36E-03	1.65E-04	3.31E-05	0.	1.22E-04	0.	6.98E-05
PU241+D	4.00E-05	1.72E-06	8.04E-07	0.	2.96E-06	0.	1.44E-06
PU242	1.26E-03	1.59E-04	3.19E-05	0.	1.17E-04	0.	6.71E-05
PU244	1.47E-03	1.82E-04	3.65E-05	0.	1.35E-04	0.	1.00E-04
AM241	1.43E-03	6.40E-04	1.02E-04	0.	6.23E-04	0.	7.64E-05
AM242M	1.47E-03	6.25E-04	1.04E-04	0.	6.30E-04	0.	9.61E-05
AM243	1.41E-03	6.14E-04	9.83E-05	0.	6.06E-04	0.	8.95E-05
CM242	8.80E-05	6.73E-05	5.84E-06	0.	1.87E-05	0.	8.16E-05
CM243	1.33E-03	6.03E-04	8.24E-05	0.	3.08E-04	0.	8.03E-05
CM244	1.11E-03	5.36E-04	6.93E-05	0.	2.54E-04	0.	7.77E-05
CM245	1.76E-03	6.64E-04	1.05E-04	0.	4.11E-04	0.	7.24E-05
CM246	1.74E-03	6.64E-04	1.05E-04	0.	4.10E-04	0.	7.11E-05
CM247+D	1.70E-03	6.53E-04	1.03E-04	0.	4.04E-04	0.	9.35E-05
CM248	1.41E-02	5.38E-03	8.52E-04	0.	3.33E-03	0.	1.51E-03
CF252	1.07E-03	0.	2.54E-05	0.	0.	0.	2.96E-04

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 2.1

TEEN INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3	0.	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07
BE10	4.48E-06	6.94E-07	1.13E-07	0.	5.30E-07	0.	2.84E-05
C14	4.06E-06	8.12E-07	8.12E-07	8.12E-07	8.12E-07	8.12E-07	8.12E-07
N13	1.15E-08	1.15E-08	1.15E-08	1.15E-08	1.15E-08	1.15E-08	1.15E-08
F18	8.64E-07	0.	9.47E-08	0.	0.	0.	7.78E-08
NA22	2.34E-05	2.34E-05	2.34E-05	2.34E-05	2.34E-05	2.34E-05	2.34E-05
NA24	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06
P32	2.76E-04	1.71E-05	1.07E-05	0.	0.	0.	2.32E-05
AR39	0.	0.	0.	0.	0.	0.	0.
AR41	0.	0.	0.	0.	0.	0.	0.
CA41	1.97E-04	0.	2.13E-05	0.	0.	0.	1.95E-07
SC46	7.24E-09	1.41E-08	4.18E-09	0.	1.35E-08	0.	4.80E-05
CR51	0.	0.	3.60E-09	2.00E-09	7.89E-10	5.14E-09	6.05E-07
MN54	0.	5.90E-06	1.17E-06	0.	1.76E-06	0.	1.21E-05
MN56	0.	1.58E-07	2.81E-08	0.	2.00E-07	0.	1.04E-05
FE55	3.78E-06	2.68E-06	6.25E-07	0.	0.	1.70E-06	1.16E-06
FE59	5.87E-06	1.37E-05	5.29E-06	0.	0.	4.32E-06	3.24E-05
CO57	0.	2.38E-07	3.99E-07	0.	0.	0.	4.44E-06
CO58	0.	9.72E-07	2.24E-06	0.	0.	0.	1.34E-05
CO60	0.	2.81E-06	6.33E-06	0.	0.	0.	3.66E-05
NI59	1.32E-05	4.66E-06	2.24E-06	0.	0.	0.	7.31E-07
NI63	1.77E-04	1.25E-05	6.00E-06	0.	0.	0.	1.99E-06
NI65	7.49E-07	9.57E-08	4.36E-08	0.	0.	0.	5.19E-06
CU64	0.	1.15E-07	5.41E-08	0.	2.91E-07	0.	8.92E-06
ZN65	5.76E-06	2.00E-05	9.33E-06	0.	1.28E-05	0.	8.47E-06
ZN69M+D	2.40E-07	5.66E-07	5.19E-08	0.	3.44E-07	0.	3.11E-05
ZN69	1.47E-08	2.80E-08	1.96E-09	0.	1.83E-08	0.	5.16E-08
SE79	0.	3.73E-06	6.27E-07	0.	6.50E-06	0.	5.70E-07
BR82	0.	0.	3.04E-06	0.	0.	0.	0.
BR83+D	0.	0.	5.74E-08	0.	0.	0.	0.
BR84	0.	0.	7.22E-08	0.	0.	0.	0.
BR85	0.	0.	3.05E-09	0.	0.	0.	0.
KR83M	0.	0.	0.	0.	0.	0.	0.
KR85M	0.	0.	0.	0.	0.	0.	0.
KR85	0.	0.	0.	0.	0.	0.	0.
KR87	0.	0.	0.	0.	0.	0.	0.
KR88+D	0.	0.	0.	0.	0.	0.	0.
KR89	0.	0.	0.	0.	0.	0.	0.
RB86	0.	2.98E-05	1.40E-05	0.	0.	0.	4.41E-06
RB87	0.	1.75E-05	6.11E-06	0.	0.	0.	6.11E-07
RB88	0.	8.52E-08	4.54E-08	0.	0.	0.	7.30E-15
RB89+D	0.	5.50E-08	3.89E-08	0.	0.	0.	8.43E-17
SR89+D	4.40E-04	0.	1.26E-05	0.	0.	0.	5.24E-05
SR90+D	8.30E-03	0.	2.05E-03	0.	0.	0.	2.33E-04
SR91+D	8.07E-06	0.	3.21E-07	0.	0.	0.	3.66E-05
SR92+D	3.05E-06	0.	1.30E-07	0.	0.	0.	7.77E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

TEEN INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y90	1.37E-08	0.	3.69E-10	0.	0.	0.	1.13E-04
Y91M+D	1.29E-10	0.	4.93E-12	0.	0.	0.	6.09E-09
Y91	2.01E-07	0.	5.39E-09	0.	0.	0.	8.24E-05
Y92	1.21E-09	0.	3.50E-11	0.	0.	0.	3.32E-05
Y93	3.83E-09	0.	1.05E-10	0.	0.	0.	1.17E-04
ZR93+D	5.53E-08	2.73E-08	1.49E-08	0.	9.65E-08	0.	2.58E-05
ZR95+D	4.12E-08	1.30E-08	8.94E-09	0.	1.91E-08	0.	3.00E-05
ZR97+D	2.37E-09	4.69E-10	2.16E-10	0.	7.11E-10	0.	1.27E-04
NB93M	3.44E-08	1.13E-08	2.83E-09	0.	1.32E-08	0.	4.07E-06
NB95	8.22E-09	4.56E-09	2.51E-09	0.	4.42E-09	0.	1.95E-05
NB97	7.37E-11	1.83E-11	6.68E-12	0.	2.14E-11	0.	4.37E-07
MO93	0.	1.06E-05	2.90E-07	0.	3.04E-06	0.	1.29E-06
MO99+D	0.	6.03E-06	1.15E-06	0.	1.38E-05	0.	1.08E-05
TC99M	3.32E-10	9.26E-10	1.20E-08	0.	1.38E-08	5.14E-10	6.08E-07
TC99	1.79E-07	2.63E-07	7.17E-08	0.	3.34E-06	2.72E-08	6.44E-06
TC101	3.60E-10	5.12E-10	5.03E-09	0.	9.26E-09	3.12E-10	8.75E-17
RU103+D	2.55E-07	0.	1.09E-07	0.	8.99E-07	0.	2.13E-05
RU105+D	2.18E-08	0.	8.46E-09	0.	2.75E-07	0.	1.76E-05
RU106+D	3.92E-06	0.	4.94E-07	0.	7.56E-06	0.	1.88E-04
RH105	1.73E-07	1.25E-07	8.20E-08	0.	5.31E-07	0.	1.59E-05
PD107	0.	2.08E-07	1.34E-08	0.	1.88E-06	0.	9.66E-07
PD109	0.	2.51E-07	5.70E-08	0.	1.45E-06	0.	2.53E-05
AG110M+D	2.05E-07	1.94E-07	1.18E-07	0.	3.70E-07	0.	5.45E-05
AG111	8.29E-08	3.44E-08	1.73E-08	0.	1.12E-07	0.	4.80E-05
CD113M	0.	4.51E-06	1.45E-07	0.	4.99E-06	0.	2.71E-05
CD115M	0.	2.60E-06	8.39E-08	0.	2.08E-06	0.	8.23E-05
SN123	4.44E-05	7.29E-07	1.08E-06	5.84E-07	0.	0.	6.71E-05
SN125+D	1.19E-05	2.37E-07	5.37E-07	1.86E-07	0.	0.	1.12E-04
SN126+D	1.16E-04	2.16E-06	3.30E-06	5.69E-07	0.	0.	2.58E-05
SB124	3.87E-06	7.13E-08	1.51E-06	8.78E-09	0.	3.38E-06	7.80E-05
SB125+D	2.48E-06	2.71E-08	5.80E-07	2.37E-09	0.	2.18E-06	1.93E-05
SB126	1.59E-06	3.25E-08	5.71E-07	8.99E-09	0.	1.14E-06	9.41E-05
SB127	3.63E-07	7.76E-09	1.37E-07	4.08E-09	0.	2.47E-07	6.16E-05
TE125M	3.83E-06	1.38E-06	5.12E-07	1.07E-06	0.	0.	1.13E-05
TE127M+D	9.67E-06	3.43E-06	1.15E-06	2.30E-06	3.92E-05	0.	2.41E-05
TE127	1.58E-07	5.60E-08	3.40E-08	1.09E-07	6.40E-07	0.	1.22E-05
TE129M+D	1.63E-05	6.05E-06	2.58E-06	5.26E-06	6.82E-05	0.	6.12E-05
TE129	4.48E-08	1.67E-08	1.09E-08	3.20E-08	1.88E-07	0.	2.45E-07
TE131M+D	2.44E-06	1.17E-06	9.76E-07	1.76E-06	1.22E-05	0.	9.39E-05
TE131+D	2.79E-08	1.15E-08	8.72E-09	2.15E-08	1.22E-07	0.	2.29E-09
TE132+D	3.49E-06	2.21E-06	2.08E-06	2.33E-06	2.12E-05	0.	7.00E-05
TE133M+D	6.44E-08	3.66E-08	3.56E-08	5.11E-08	3.62E-07	0.	1.48E-07
TE134+D	4.47E-08	2.87E-08	3.00E-08	3.67E-08	2.74E-07	0.	1.66E-09
I129	4.66E-06	3.92E-06	6.54E-06	4.77E-03	7.01E-06	0.	4.57E-07
I130	1.03E-06	2.98E-06	1.19E-06	2.43E-04	4.59E-06	0.	2.29E-06
I131+D	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	0.	1.62E-06

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

TEEN INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
I132	2.79E-07	7.30E-07	2.62E-07	2.46E-05	1.15E-06	0.	3.18E-07
I133+D	2.01E-06	3.41E-06	1.04E-06	4.76E-04	5.98E-06	0.	2.58E-06
I134	1.46E-07	3.87E-07	1.39E-07	6.45E-06	6.10E-07	0.	5.10E-09
I135+D	6.10E-07	1.57E-06	5.82E-07	1.01E-04	2.48E-06	0.	1.74E-06
XE131M	0.	0.	0.	0.	0.	0.	0.
XE133M	0.	0.	0.	0.	0.	0.	0.
XE133	0.	0.	0.	0.	0.	0.	0.
XE135M	0.	0.	0.	0.	0.	0.	0.
XE135	0.	0.	0.	0.	0.	0.	0.
XE137	0.	0.	0.	0.	0.	0.	0.
XE138+D	0.	0.	0.	0.	0.	0.	0.
CS134M+D	2.94E-08	6.09E-08	3.13E-08	0.	3.39E-08	5.95E-09	4.05E-08
CS134	8.37E-05	1.97E-04	9.14E-05	0.	6.26E-05	2.39E-05	2.45E-06
CS135	2.78E-05	2.55E-05	5.96E-06	0.	9.73E-06	3.52E-06	4.46E-07
CS136	8.59E-06	3.38E-05	2.27E-05	0.	1.84E-05	2.90E-06	2.72E-06
CS137+D	1.12E-04	1.49E-04	5.19E-05	0.	5.07E-05	1.97E-05	2.12E-06
CS138	7.76E-08	1.49E-07	7.45E-08	0.	1.10E-07	1.28E-08	6.76E-11
CS139+D	4.87E-08	7.17E-08	2.63E-08	0.	5.79E-08	6.34E-09	3.33E-23
BA139	1.39E-07	9.78E-11	4.05E-09	0.	9.22E-11	6.74E-11	1.24E-06
BA140+D	2.84E-05	3.48E-08	1.83E-06	0.	1.18E-08	2.34E-08	4.38E-05
BA141+D	6.71E-08	5.01E-11	2.24E-09	0.	4.65E-11	3.43E-11	1.43E-13
BA142+D	2.99E-08	2.99E-11	1.84E-09	0.	2.53E-11	1.99E-11	9.18E-20
LA140	3.48E-09	1.71E-09	4.55E-10	0.	0.	0.	9.82E-05
LA141	4.55E-10	1.40E-10	2.31E-11	0.	0.	0.	2.48E-05
LA142	1.79E-10	7.95E-11	1.98E-11	0.	0.	0.	2.42E-06
CE141	1.33E-08	8.88E-09	1.02E-09	0.	4.18E-09	0.	2.54E-05
CE143+D	2.35E-09	1.71E-06	1.91E-10	0.	7.67E-10	0.	5.14E-05
CE144+D	6.96E-07	2.88E-07	3.74E-08	0.	1.72E-07	0.	1.75E-04
PR143	1.31E-08	5.23E-09	6.52E-10	0.	3.04E-09	0.	4.31E-05
PR144	4.30E-11	1.76E-11	2.18E-12	0.	1.01E-11	0.	4.74E-14
ND147+D	9.38E-09	1.02E-08	6.11E-10	0.	5.99E-09	0.	3.68E-05
PM147	1.05E-07	9.96E-09	4.06E-09	0.	1.90E-08	0.	9.47E-06
PM148M+D	4.14E-08	1.05E-08	8.21E-09	0.	1.59E-08	0.	6.61E-05
PM148	1.02E-08	1.66E-09	8.36E-10	0.	3.00E-09	0.	9.90E-05
PM149	2.17E-09	3.05E-10	1.25E-10	0.	5.81E-10	0.	4.49E-05
PM151	9.87E-10	1.63E-10	8.25E-11	0.	2.93E-10	0.	3.66E-05
SM151	8.73E-08	1.68E-08	3.94E-09	0.	1.84E-08	0.	5.70E-06
SM153	1.22E-09	1.01E-09	7.43E-11	0.	3.30E-10	0.	2.85E-05
EU152	2.45E-07	5.90E-08	5.20E-08	0.	2.74E-07	0.	2.17E-05
EU154	7.91E-07	1.02E-07	7.19E-08	0.	4.56E-07	0.	5.39E-05
EU155	1.74E-07	1.68E-08	1.04E-08	0.	6.57E-08	0.	9.63E-05
EU156	1.92E-08	1.44E-08	2.35E-09	0.	9.69E-09	0.	7.36E-05
TB160	6.47E-08	0.	8.07E-09	0.	2.56E-08	0.	4.19E-05
HO166M	3.57E-07	1.10E-07	7.96E-08	0.	1.61E-07	0.	0.
W181	1.42E-08	4.58E-09	4.79E-10	0.	0.	0.	3.90E-07
W185	5.79E-07	1.91E-07	2.02E-08	0.	0.	0.	1.65E-05
W187	1.46E-07	1.19E-07	4.17E-08	0.	0.	0.	3.22E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

TEEN INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	1.81E-02	5.44E-03	7.01E-04	0.	1.72E-02	0.	5.74E-05
BI210+D	6.59E-07	4.51E-06	5.66E-08	0.	5.48E-05	0.	5.15E-05
PO210	6.09E-04	1.07E-03	1.23E-04	0.	3.60E-03	0.	6.75E-05
RN222+D	0.	0.	0.	0.	0.	0.	0.
RA223+D	7.11E-03	1.08E-05	1.42E-03	0.	3.10E-04	0.	3.43E-04
RA224+D	2.31E-03	5.52E-06	4.61E-04	0.	1.58E-04	0.	3.71E-04
RA225+D	9.37E-03	1.10E-05	1.87E-03	0.	3.15E-04	0.	3.27E-04
RA226+D	3.22E-01	8.13E-06	2.39E-01	0.	2.32E-04	0.	3.51E-04
RA228+D	1.37E-01	4.41E-06	1.51E-01	0.	1.26E-04	0.	5.98E-05
AC225	6.29E-06	8.59E-06	4.22E-07	0.	9.85E-07	0.	4.36E-04
AC227+D	2.05E-03	3.03E-04	1.22E-04	0.	8.81E-05	0.	8.68E-05
TH227+D	1.96E-05	3.52E-07	5.65E-07	0.	2.01E-06	0.	5.75E-04
TH228+D	6.80E-04	1.14E-05	2.30E-05	0.	6.41E-05	0.	5.97E-04
TH229	8.39E-03	1.26E-04	4.11E-04	0.	6.10E-04	0.	5.43E-04
TH230	2.16E-03	1.23E-04	6.00E-05	0.	5.99E-04	0.	6.38E-05
TH232+D	2.42E-03	1.05E-04	1.63E-04	0.	5.11E-04	0.	5.43E-05
TH234	1.14E-07	6.68E-09	3.31E-09	0.	3.81E-08	0.	1.21E-04
PA231+D	4.31E-03	1.62E-04	1.68E-04	0.	9.10E-04	0.	7.60E-05
PA233	7.33E-09	1.41E-09	1.26E-09	0.	5.32E-09	0.	1.61E-05
U232+D	5.89E-03	0.	4.21E-04	0.	6.38E-04	0.	7.19E-05
U233+D	1.24E-03	0.	7.54E-05	0.	2.90E-04	0.	6.65E-05
U234	1.19E-03	0.	7.39E-05	0.	2.85E-04	0.	6.51E-05
U235+D	1.14E-03	0.	6.94E-05	0.	2.67E-04	0.	8.28E-05
U236	1.14E-03	0.	7.09E-05	0.	2.73E-04	0.	6.11E-05
U237	7.89E-08	0.	2.10E-08	0.	3.24E-07	0.	2.09E-05
U238+D	1.09E-03	0.	6.49E-05	0.	2.50E-04	0.	5.83E-05
NP237+D	1.44E-03	1.25E-04	5.85E-05	0.	4.33E-04	0.	8.41E-05
NP238	1.95E-08	5.22E-10	3.04E-10	0.	1.79E-09	0.	3.83E-05
NP239	1.76E-09	1.66E-10	9.22E-11	0.	5.21E-10	0.	2.67E-05
PU238	7.21E-04	1.02E-04	1.82E-05	0.	7.80E-05	0.	7.73E-05
PU239	8.27E-04	1.12E-04	2.01E-05	0.	8.57E-05	0.	7.06E-05
PU240	8.26E-04	1.12E-04	2.01E-05	0.	8.56E-05	0.	7.19E-05
PU241+D	1.84E-05	9.42E-07	3.69E-07	0.	1.71E-06	0.	1.48E-06
PU242	7.66E-04	1.08E-04	1.94E-05	0.	8.25E-05	0.	6.92E-05
PU244	8.95E-04	1.23E-04	2.22E-05	0.	9.45E-05	0.	1.03E-04
AM241	8.62E-04	3.29E-04	5.75E-05	0.	4.31E-04	0.	7.87E-05
AM242M	8.70E-04	3.19E-04	5.80E-05	0.	4.30E-04	0.	9.90E-05
AM243	8.60E-04	3.17E-04	5.62E-05	0.	4.22E-04	0.	9.23E-05
CM242	2.94E-05	2.97E-05	1.95E-06	0.	8.89E-06	0.	8.40E-05
CM243	6.91E-04	2.86E-04	4.09E-05	0.	1.91E-04	0.	8.28E-05
CM244	5.32E-04	2.49E-04	3.19E-05	0.	1.49E-04	0.	8.00E-05
CM245	1.07E-03	3.33E-04	6.10E-05	0.	2.85E-04	0.	7.46E-05
CM246	1.06E-03	3.32E-04	6.09E-05	0.	2.84E-04	0.	7.33E-05
CM247+D	1.03E-03	3.27E-04	6.00E-05	0.	2.80E-04	0.	9.63E-05
CM248	8.60E-03	2.69E-03	4.95E-04	0.	2.31E-03	0.	1.55E-03
CR252	3.51E-04	0.	8.37E-06	0.	0.	0.	3.05E-04

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

ADULT INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3	0.	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07
BE10	3.18E-06	4.91E-07	7.94E-08	0.	3.71E-07	0.	2.68E-05
C14	2.84E-06	5.68E-07	5.68E-07	5.68E-07	5.68E-07	5.68E-07	5.68E-07
N13	8.36E-09	8.36E-09	8.36E-09	8.36E-09	8.36E-09	8.36E-09	8.36E-09
F18	6.24E-07	0.	6.92E-08	0.	0.	0.	1.85E-08
NA22	1.74E-05	1.74E-05	1.74E-05	1.74E-05	1.74E-05	1.74E-05	1.74E-05
NA24	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06
P32	1.93E-04	1.20E-05	7.46E-06	0.	0.	0.	2.17E-05
AR39	0.	0.	0.	0.	0.	0.	0.
AR41	0.	0.	0.	0.	0.	0.	0.
CA41	1.83E-05	0.	2.00E-05	0.	0.	0.	1.84E-07
SC46	5.51E-09	1.07E-08	3.11E-09	0.	9.99E-09	0.	5.21E-05
CR51	0.	0.	2.66E-09	1.59E-09	5.86E-10	3.53E-09	6.69E-07
MN54	0.	4.57E-06	8.72E-07	0.	1.36E-06	0.	1.40E-05
MN56	0.	1.15E-07	2.04E-08	0.	1.46E-07	0.	3.67E-06
FE55	2.75E-06	1.90E-06	4.43E-07	0.	0.	1.06E-06	1.09E-06
FE59	4.34E-06	1.02E-05	3.91E-06	0.	0.	2.85E-06	3.40E-05
CO57	0.	1.75E-07	2.91E-07	0.	0.	0.	4.44E-06
CO58	0.	7.45E-07	1.67E-06	0.	0.	0.	1.51E-05
CO60	0.	2.14E-06	4.72E-06	0.	0.	0.	4.02E-05
NI59	9.76E-06	3.35E-06	1.63E-06	0.	0.	0.	6.90E-07
NI63	1.30E-04	9.01E-06	4.36E-06	0.	0.	0.	1.88E-06
NI65	5.28E-07	6.86E-08	3.13E-08	0.	0.	0.	1.74E-06
CU64	0.	8.33E-08	3.91E-08	0.	2.10E-07	0.	7.10E-06
ZN65	4.84E-06	1.54E-05	6.96E-06	0.	1.03E-05	0.	9.70E-06
ZN69M+D	1.70E-07	4.08E-07	3.73E-08	0.	2.47E-07	0.	2.49E-05
ZN69	1.03E-08	1.97E-08	1.37E-09	0.	1.28E-08	0.	2.96E-09
SE79	0.	2.63E-06	4.39E-07	0.	4.55E-06	0.	5.38E-07
BR82	0.	0.	2.26E-06	0.	0.	0.	2.59E-06
BR83+D	0.	0.	4.02E-08	0.	0.	0.	5.79E-08
BR84	0.	0.	5.21E-08	0.	0.	0.	4.09E-13
BR85	0.	0.	2.14E-09	0.	0.	0.	0.
KR83M	0.	0.	0.	0.	0.	0.	0.
KR85M	0.	0.	0.	0.	0.	0.	0.
KR85	0.	0.	0.	0.	0.	0.	0.
KR87	0.	0.	0.	0.	0.	0.	0.
KR88+D	0.	0.	0.	0.	0.	0.	0.
KR89	0.	0.	0.	0.	0.	0.	0.
RB86	0.	2.11E-05	9.83E-06	0.	0.	0.	4.16E-06
RB87	0.	1.23E-05	4.28E-06	0.	0.	0.	5.76E-07
RB88	0.	6.05E-08	3.21E-08	0.	0.	0.	8.36E-19
RB89+D	0.	4.01E-08	2.82E-08	0.	0.	0.	2.33E-21
SR89+D	3.08E-04	0.	8.84E-06	0.	0.	0.	4.94E-05
SR90+D	7.58E-03	0.	1.86E-03	0.	0.	0.	2.19E-04
SR91+D	5.67E-06	0.	2.29E-07	0.	0.	0.	2.70E-05
SR92+D	2.15E-06	0.	9.30E-08	0.	0.	0.	4.26E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

ADULT INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y90	9.62E-09	0.	2.58E-10	0.	0.	0.	1.02E-04
Y91M+D	9.09E-11	0.	3.52E-12	0.	0.	0.	2.67E-10
Y91	1.41E-07	0.	3.77E-09	0.	0.	0.	7.76E-05
Y92	8.45E-10	0.	2.47E-11	0.	0.	0.	1.48E-05
Y93	2.68E-09	0.	7.40E-11	0.	0.	0.	8.50E-05
ZR93+D	4.18E-08	2.34E-09	1.09E-09	0.	8.87E-09	0.	2.43E-06
ZR95+D	3.04E-08	9.75E-09	6.60E-09	0.	1.53E-08	0.	3.09E-05
ZR97+D	1.68E-09	3.39E-10	1.55E-10	0.	5.12E-10	0.	1.05E-04
NB93M	2.55E-08	8.32E-09	2.05E-09	0.	9.57E-09	0.	3.84E-06
NB95	6.22E-09	3.46E-09	1.86E-09	0.	3.42E-09	0.	2.10E-05
NB97	5.22E-11	1.32E-11	4.82E-12	0.	1.54E-11	0.	4.87E-08
MO93	0.	7.51E-06	2.03E-07	0.	2.13E-06	0.	1.22E-06
MO99+D	0.	4.31E-06	8.20E-07	0.	9.76E-06	0.	9.99E-06
TC99M	2.47E-10	6.98E-10	8.89E-09	0.	1.06E-08	3.42E-10	4.13E-07
TC99	1.25E-07	1.86E-07	5.02E-08	0.	2.34E-06	1.58E-08	6.08E-06
TC101	2.54E-10	3.66E-10	3.59E-09	0.	6.59E-09	1.87E-10	1.10E-21
RU103+D	1.85E-07	0.	7.97E-08	0.	7.06E-07	0.	2.16E-05
RU105+D	1.54E-08	0.	6.08E-09	0.	1.99E-07	0.	9.42E-06
RU106+D	2.75E-06	0.	3.48E-07	0.	5.31E-06	0.	1.78E-04
RH105	1.21E-07	8.85E-08	5.83E-08	0.	3.76E-07	0.	1.41E-05
PD107	0.	1.47E-07	9.40E-09	0.	1.32E-06	0.	9.11E-07
PD109	0.	1.77E-07	3.99E-08	0.	1.01E-06	0.	1.96E-05
AG110M+D	1.60E-07	1.48E-07	8.79E-08	0.	2.91E-07	0.	6.04E-05
AG111	5.81E-08	2.43E-08	1.21E-08	0.	7.84E-08	0.	4.46E-05
CD113M	0.	3.18E-06	1.02E-07	0.	3.50E-06	0.	2.56E-05
CD115M	0.	1.84E-06	5.87E-08	0.	1.46E-06	0.	7.74E-05
SN123	3.11E-05	5.15E-07	7.59E-07	4.38E-07	0.	0.	6.33E-05
SN125+D	8.33E-06	1.68E-07	3.78E-07	1.39E-07	0.	0.	1.04E-04
SN126+D	8.45E-05	1.67E-06	2.40E-06	4.92E-07	0.	0.	2.43E-05
SB124	2.80E-06	5.29E-08	1.11E-06	6.79E-09	0.	2.18E-06	7.95E-05
SB125+D	1.79E-06	2.00E-08	4.26E-07	1.82E-09	0.	1.38E-06	1.97E-05
SB126	1.15E-06	2.34E-08	4.15E-07	7.04E-09	0.	7.05E-07	9.40E-05
SB127	2.58E-07	5.65E-09	9.90E-08	3.10E-09	0.	1.53E-07	5.90E-05
TE125M	2.68E-06	9.71E-07	3.59E-07	8.06E-07	1.09E-05	0.	1.07E-05
TE125M+D	6.77E-06	2.42E-06	8.25E-07	1.73E-06	2.75E-05	0.	2.27E-05
TE127	1.10E-07	3.95E-08	2.38E-08	8.15E-08	4.48E-07	0.	8.68E-06
TE129M+D	1.15E-05	4.29E-06	1.82E-06	3.95E-06	4.80E-05	0.	5.79E-05
TE129	3.14E-08	1.18E-08	7.65E-09	2.41E-08	1.32E-07	0.	2.37E-08
TE131M+D	1.73E-06	8.46E-07	7.05E-07	1.34E-06	8.57E-06	0.	8.40E-05
TE131+D	1.97E-08	8.23E-09	6.22E-09	1.62E-08	8.63E-08	0.	2.79E-09
TE132+D	2.52E-06	1.63E-06	1.53E-06	1.80E-06	1.57E-05	0.	7.71E-05
TE133M+D	4.62E-08	2.70E-08	2.60E-08	3.91E-08	2.67E-07	0.	6.64E-08
TE134+D	3.24E-08	2.12E-08	1.30E-08	2.83E-08	2.05E-07	0.	3.59E-11
I129	3.27E-06	2.81E-06	9.21E-06	7.23E-03	6.04E-06	0.	4.44E-07
I130	7.56E-07	2.23E-06	8.80E-07	1.89E-04	3.48E-06	0.	1.92E-06
I131+D	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	0.	1.57E-06

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

ADULT INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
I132	2.03E-07	5.43E-07	1.90E-07	1.90E-05	8.65E-07	0.	1.02E-07
I133+D	1.42E-06	2.47E-06	7.53E-07	3.63E-04	4.31E-06	0.	2.22E-06
I134	1.06E-07	2.88E-07	1.03E-07	4.99E-06	4.58E-07	0.	2.51E-10
I135+D	4.43E-07	1.16E-06	4.28E-07	7.65E-05	1.86E-06	0.	1.31E-06
XE131M	0.	0.	0.	0.	0.	0.	0.
XE133M	0.	0.	0.	0.	0.	0.	0.
XE133	0.	0.	0.	0.	0.	0.	0.
XE135M	0.	0.	0.	0.	0.	0.	0.
XE135	0.	0.	0.	0.	0.	0.	0.
XE137	0.	0.	0.	0.	0.	0.	0.
XE138+D	0.	0.	0.	0.	0.	0.	0.
CS134M+D	2.13E-08	4.48E-08	2.29E-08	0.	2.43E-08	3.83E-09	1.58E-08
CS134	6.22E-05	1.48E-04	1.21E-04	0.	4.79E-05	1.59E-05	2.59E-06
CS135	1.95E-05	1.80E-05	7.99E-06	0.	6.81E-06	2.04E-06	4.21E-07
CS136	6.51E-06	2.57E-05	1.85E-05	0.	1.43E-05	1.96E-06	2.92E-06
CS137+D	7.97E-05	1.09E-04	7.14E-05	0.	3.70E-05	1.23E-05	2.11E-06
CS138	6.52E-08	1.09E-07	5.40E-08	0.	8.01E-08	7.91E-09	4.65E-13
CS139+D	3.41E-08	5.08E-08	1.85E-08	0.	4.07E-08	3.70E-09	1.10E-30
BA139	9.70E-08	6.91E-11	2.84E-09	0.	6.46E-11	3.92E-11	1.72E-07
BA140+D	2.03E-05	2.55E-08	1.33E-06	0.	8.67E-09	1.46E-08	4.18E-05
BA141+D	4.71E-08	3.56E-11	1.59E-09	0.	3.31E-11	2.02E-11	2.22E-17
BA142+D	2.13E-08	2.19E-11	1.34E-09	0.	1.85E-11	1.24E-11	3.00E-26
LA140	2.50E-09	1.26E-09	3.33E-10	0.	0.	0.	9.25E-05
LA141	3.19E-10	9.90E-11	1.62E-11	0.	0.	0.	1.18E-05
LA142	1.28E-10	5.82E-11	1.45E-11	0.	0.	0.	4.25E-07
CE141	9.36E-09	6.33E-09	7.18E-10	0.	2.94E-09	0.	2.42E-05
CE143+D	1.65E-09	1.22E-06	1.35E-10	0.	5.37E-10	0.	4.56E-05
CE144+D	4.88E-07	2.04E-07	2.62E-08	0.	1.21E-07	0.	1.65E-04
PR143	9.20E-09	3.69E-09	4.56E-10	0.	2.13E-09	0.	4.03E-05
PR144	3.01E-11	1.25E-11	1.53E-12	0.	7.05E-12	0.	4.33E-18
ND147+D	6.29E-09	7.27E-09	4.35E-10	0.	4.25E-09	0.	3.49E-05
PM147	7.54E-08	7.09E-09	2.87E-09	0.	1.34E-08	0.	8.93E-06
PM148M+D	3.07E-08	7.95E-09	6.08E-09	0.	1.20E-08	0.	6.74E-05
PM148	7.17E-09	1.19E-09	5.99E-10	0.	2.25E-09	0.	9.35E-05
PM149	1.52E-09	2.15E-10	8.78E-11	0.	4.06E-10	0.	4.03E-05
PM151	6.97E-10	1.17E-10	5.91E-11	0.	2.09E-10	0.	3.22E-05
SM151	6.90E-08	1.19E-08	2.85E-09	0.	1.33E-08	0.	5.25E-06
SM153	8.57E-10	7.15E-10	5.22E-11	0.	2.31E-10	0.	2.55E-05
EU152	1.95E-07	4.44E-08	3.90E-08	0.	2.75E-07	0.	2.56E-05
EU154	6.15E-07	7.56E-08	5.38E-08	0.	3.62E-07	0.	5.48E-05
EU155	8.60E-08	1.22E-08	7.87E-09	0.	5.63E-08	0.	9.60E-06
EU156	1.37E-08	1.06E-08	1.71E-09	0.	7.08E-09	0.	7.26E-05
TB160	4.70E-08	0.	5.86E-09	0.	1.94E-08	0.	4.33E-05
HO166M	2.70E-07	8.43E-08	6.40E-08	0.	1.26E-07	0.	0.
W181	9.91E-09	3.23E-09	3.46E-10	0.	0.	0.	3.68E-07
W185	4.05E-07	1.35E-07	1.42E-08	0.	0.	0.	1.56E-05
W187	1.03E-07	8.61E-08	3.01E-08	0.	0.	0.	2.82E-05

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.1

ADULT INGESTION DOSE COMMITMENT FACTORS (MREM/50Y PER PCI INGESTED IN FIRST YR)

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PB210+D	1.53E-02	4.37E-03	5.44E-04	0.	1.23E-02	0.	5.42E-05
BI210+D	4.61E-07	3.18E-06	3.96E-08	0.	3.83E-05	0.	4.75E-05
PO210	3.56E-04	7.56E-04	8.59E-05	0.	2.52E-03	0.	6.36E-05
RN222+D	0.	0.	0.	0.	0.	0.	0.
RA223+D	4.97E-03	7.65E-06	9.94E-04	0.	2.17E-04	0.	3.21E-04
RA224+D	1.61E-03	3.90E-06	3.23E-04	0.	1.10E-04	0.	3.40E-04
RA225+D	6.56E-03	7.78E-06	1.31E-03	0.	2.21E-04	0.	3.06E-04
RA226+D	3.02E-01	5.74E-06	2.20E-01	0.	1.63E-04	0.	3.32E-04
RA228+D	1.12E-01	3.12E-06	1.21E-01	0.	8.83E-05	0.	5.64E-05
AC225	4.40E-06	6.06E-06	2.96E-07	0.	6.90E-07	0.	4.07E-04
AC227+D	1.87E-03	2.48E-04	1.11E-04	0.	8.00E-05	0.	8.19E-05
TH227+D	1.37E-05	2.48E-07	3.95E-07	0.	1.41E-06	0.	5.40E-04
TH228+D	4.96E-04	8.40E-06	1.68E-05	0.	4.67E-05	0.	5.63E-04
TH229	7.98E-03	1.19E-04	3.91E-04	0.	5.75E-04	0.	5.12E-04
TH230	2.06E-03	1.17E-04	5.70E-05	0.	5.65E-04	0.	6.02E-05
TH232+D	2.30E-03	1.00E-04	1.50E-04	0.	4.82E-04	0.	5.12E-05
TH234	8.01E-08	4.71E-09	2.31E-09	0.	2.67E-08	0.	1.13E-04
PA231+D	4.10E-03	1.54E-04	1.59E-04	0.	8.64E-04	0.	7.17E-05
PA233	5.26E-09	1.06E-09	9.12E-10	0.	3.99E-09	0.	1.64E-05
U232+D	4.13E-03	0.	2.95E-04	0.	4.47E-04	0.	6.78E-05
U233+D	8.71E-04	0.	5.28E-05	0.	2.03E-04	0.	6.27E-05
U234	8.36E-04	0.	5.17E-05	0.	1.99E-04	0.	6.14E-05
U235+D	8.01E-04	0.	4.86E-05	0.	1.87E-04	0.	7.81E-05
U236	8.01E-04	0.	4.96E-05	0.	1.91E-04	0.	5.76E-05
U237	5.52E-8	0.	1.47E-08	0.	2.27E-07	0.	1.94E-05
U238+D	7.67E-04	0.	4.54E-05	0.	1.75E-04	0.	5.50E-05
NP237+D	1.37E-03	1.19E-04	5.54E-05	0.	4.12E-04	0.	7.94E-05
NP238	1.37E-08	3.69E-10	2.13E-10	0.	1.25E-09	0.	3.43E-05
NP239	1.19E-09	1.17E-10	6.45E-11	0.	3.65E-10	0.	2.40E-05
PU238	6.80E-04	9.58E-05	1.71E-05	0.	7.32E-05	0.	7.30E-05
PU239	7.87E-04	1.06E-04	1.91E-05	0.	8.11E-05	0.	6.66E-05
PU240	7.85E-04	1.06E-04	1.91E-05	0.	8.10E-05	0.	6.78E-05
PU241+D	1.65E-05	8.44E-07	3.32E-07	0.	1.53E-06	0.	1.40E-06
PU242	7.29E-04	1.02E-04	1.84E-05	0.	7.81E-05	0.	6.53E-05
PU244	8.52E-04	1.17E-04	2.11E-05	0.	8.95E-05	0.	9.73E-05
AM241	8.19E-04	2.88E-04	5.41E-05	0.	4.07E-04	0.	7.42E-05
AM242M	8.24E-04	2.78E-04	5.43E-05	0.	4.05E-04	0.	9.34E-05
AM243	8.18E-04	2.78E-04	5.30E-05	0.	3.99E-04	0.	8.70E-05
CM242	2.06E-05	2.10E-05	1.37E-06	0.	6.22E-06	0.	7.92E-05
CM243	6.39E-04	2.41E-04	3.75E-05	0.	1.75E-04	0.	7.81E-05
CM244	4.83E-04	2.07E-04	2.87E-05	0.	1.34E-04	0.	7.55E-05
CM245	1.02E-03	2.87E-04	5.76E-05	0.	2.69E-04	0.	7.04E-05
CM246	1.01E-03	2.87E-04	5.75E-05	0.	2.68E-04	0.	6.91E-05
CM247+D	9.84E-04	2.83E-04	5.67E-05	0.	2.64E-04	0.	9.09E-05
CM248	8.18E-03	2.33E-03	4.67E-04	0.	2.18E-03	0.	1.47E-03
CF252	2.64E-04	0.	6.29E-06	0.	0.	0.	2.88E-04

**PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL**

Revision 18

TABLE 2.2

**PALISADES
Liquid Effluent**

Design Objective Annual Quantity

<u>Nuclide</u>	<u>Half-Life</u>	<u>Dose Conversion Factors (mrem/Ci)</u>	<u>Individual/Organ</u>	<u>Design Objective Annual Quantity (Curies)</u>
H-3	12.3 yr	1.75E-06	Adult/TB	1.71E+06
Na-24	15 h	5.44E-03	Teen/TB	551.5
Sc-46	83.9 d	2.02E-02	Teen/TB	148.5
Cr-51	27.8 d	1.56E-03	Adult/GI (LLI)	6,410.0
Mn-54	303 d	3.50E-02	Teen/TB	85.7
Fe-55	2.6 yr	4.48E-03	Child/Bone	2,232.0
Mn-56	2.576 h	1.86E-03	Teen/TB	1,612.0
Co-57	270 d	4.39E-03	Teen/TB	683.4
Co-58	71.3 d	1.03E-02	Teen/TB	291.3
Fe-59	45.6 d	4.08E-02	Adult/GI (LLI)	245.1
Co-60	5.26 yr	4.71E-01	Teen/TB	6.37
Cu-64	12.8 h	1.32E-03	Teen/GI (LLI)	7,575.0
Ni-65	2.56 h	5.82E-04	Teen/TB	5,154.0
Zn-65	245 d	1.83E-01	Teen/TB	16.4
Br-84	31.8 mo	2.02E-03	Teen/TB	1,485.2
Rb-86	1.02 mo	3.06E-01	Child/TB	9.80
Rb-88	17.8 mo	6.92E-04	Teen/TB	4,335.3
Sr-89	52.7 d	1.56E-01	Child/Bone	64.1
Sr-90	27.7 yr	2.71E-00	Adult/Bone	3.69
Sr-91	9.67 h	1.16E-03	Teen/TB	2,586.0
Sr-92	2.71 h	1.51E-03	Teen/TB	1,986.8
Y-92	3.53 h	2.69E-04	Teen/TB	11,150.0
Nb-95	35 d	7.24E+00	Adult/GI (LLI)	1.38
Zr-95	65.5 d	6.17E-03	Teen/TB	486.2
Nb-97	72 mo	6.95E-04	Teen/TB	4,316.6
Zr-97	17 h	9.28E-04	Teen/TB	3,232.8
Mo-99	66.7 h	1.11E-03	Teen/Kidney	9,009.0
Tc-99m	6.05 h	1.42E-04	Teen/TB	21,126.8
Ru-103	39.5 d	2.74E-03	Teen/TB	1,094.9
Ag-110m	255 d	7.75E-02	Teen/TB	38.7

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

TABLE 2.2 (continued)

PALISADES
Liquid Effluent

Design Objective Annual Quantity

<u>Nuclide</u>	<u>Half-Life</u>	<u>Dose Conversion Factors (mrem/Ci)</u>	<u>Individual/Organ</u>	<u>Design Objective Annual Quantity (Curies)</u>
Cd-113m	13.6 yr	6.02E-02	Adult/GI (LLI)	166.1
Sb-124	60 d	1.51E-02	Teen/TB	198.7
Sb-125	2.7 yr	5.11E-02	Teen/TB	58.7
Te-127	9.4 h	7.38E-03	Teen/GI (LLI)	1,355.0
Te-127m	109 d	1.39E-01	Teen/Kidney	71.9
Te-129m	34.1 d	2.66E-01	Adult/GI (LLI)	37.6
I-130	12.3 h	1.17E-02	Child/Thyroid	854.7
I-131	8.05 d	3.27E-01	Child/Thyroid	30.6
Te-131m	30 h	2.27E-01	Adult/GI (LLI)	44.0
I-132	2.26 h	3.18E-05	Teen/TB	94,339.0
Te-132	77.7 h	2.93E-01	Adult/GI (LLI)	34.1
I-133	20.3 h	3.94E-02	Child/Thyroid	253.8
Cs-134	2 yr	2.86E+00	Adult/TB	1.04
I-134	52 mo	2.43E-03	Teen/TB	1,234.0
I-135	6.68 h	1.64E-03	Child/Thyroid	6,097.0
Cs-136	13.7 d	4.13E-01	Adult/TB	7.26
Cs-137	30 yr	1.71E+00	Adult/TB	1.75
Cs-138	32.2 mo	2.31E-03	Teen/TB	1,298.0
Ba-139	82.9 mo	4.66E-05	Teen/TB	64,377.0
Ba-140	12.8 d	7.96E-04	Teen/TB	3,768.0
La-140	40.22 h	1.85E-02	Adult/GI (LLI)	540.5
Ce-141	32.5 d	3.70E-04	Teen/TB	8,108.0
Ce-144	284 d	1.56E-03	Teen/TB	1,923.0
Eu-152	12.7 yr	3.24E-01	Teen/TB	9.25
W-187	23.9 h	1.98E-01	Adult/GI (LLI)	50.5
Np-239	2.346 d	2.26E-03	Adult/GI (LLI)	4,424.0

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

III. URANIUM FUEL CYCLE DOSE

A. SPECIFICATION

In accordance with Appendix A, Section III.I.1, if either liquid or gaseous quarterly releases exceed the quantity which would cause offsite doses more than twice the limit of Appendix A, Sections III.C.1, III.D.1, or III.H.1, then the cumulative dose contributions from combined release plus direct radiation sources (from the reactor unit and radwaste storage tanks) shall be calculated. The dose is to be determined for the member of the public protected to be the most highly exposed to these combined sources.

B. ASSUMPTIONS

1. The full time resident determined to be maximally exposed individual (excluding infant) is assumed also to be a fisherman. This individual is assumed to drink water and ingest local fish at the rates specified in Sections II.C.2.1 and II.C.2.2.
2. Amount of shore line fishing (at accessible shoreline adjacent to site security fence) is conservatively assumed as 48 hours per quarter (average of approximately 1/2 hour per day each day of the quarter) for the second and third quarters of the year, 36 hours for the fourth quarter and 16 hours for the first quarter.

PALISADES NUCLEAR PLANT
OFFSITE DOSE CALCULATION MANUAL

Revision 18

C. DOSE CALCULATION

Maximum doses to the total body and internal organs of an individual shall be determined by use of LADTAP and GASPAP computer codes, and doses to like organs and total body summed. Added to this sum will be a mean dose rate, calculated or measured for the shoreline due to Plant present during the quarter in question, times the assumed fishing time.

$$D_{40} = D_G + D_L + (R_T)(T) \quad (2.15)$$

where:

- D_{40} = 40 CFR 190 dose (mrem).
- D_G = Limiting dose to an individual from gaseous source term (mrem).
- D_L = Limiting dose to an individual from liquid source term (mrem).
- R_T = Mean dose rate calculated to be applicable to Lake Michigan shoreline adjacent to Plant site (mrem/hr).
- T = Assumed shoreline fishing time for the quarter in question (hours).

Pallsades Nuclear Plant
50.59 SCREEN

Proc No 3.07
Attachment 1
Revision 13
Page 1 of 5

Log No. SDR- 02-1193

Activity/Document No. ODCM Revision No. 18

Title Offsite Dose Calculation Manual

PART I - Describe the Proposed Activity and Search the UFSAR
(Admin Proc 3.07, Attachment 6, Section 1.3.1)

1. Summarize the proposed activity.

(You may reference or attach appropriate descriptive materials).

Tables 1.4 and 1.4a are being revised as a result of the 2002 Land Use Environmental Survey. These Tables are updated annually to reflect the current locations of all critical receptors within 5 miles of the Plant.

2. Does the activity involve a change to the Technical Specifications?

Yes No

3. Describe the design function(s), performance requirements, and methods of evaluation of the affected SSCs and indicate where the function(s) are described in the UFSAR. Search the Updated Final Safety Analysis Report (UFSAR) and other relevant documents to identify the relevant sections.

(It is acceptable to attach and highlight applicable portions of the UFSAR.)

The operational environmental survey is an extension of the preoperational survey. The results of the operational environmental survey are submitted in annual reports to the NRC. UFSAR section 2.6

A land use census shall be conducted and shall identify within a distance of 8km the location in each of the 9 overland meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden of greater than 50 m² producing broad leaf vegetation. ODCM Appendix A section III J 3 (b&c).

¹ Changes to the Technical Specifications require a Technical Specifications Change Request per

Palisades Nuclear Plant
50.59 SCREEN

Proc No 3.07
Attachment 1
Revision 13
Page 2 of 5

PART II - Determine If the Activity Involves a Design Function
(Admin Proc 3.07, Attachment 6, Section 1.3.2)

1. Compare the proposed activity to the relevant portions of the UFSAR and answer the following questions:

YES NO QUESTION

- Does the proposed activity involve Safety Analyses or an SSC(s) credited in the Safety Analyses?
- Does the proposed activity involve SSCs that support SSC(s) credited in the Safety Analyses?
- Does the proposed activity involve SSCs whose failure could initiate a transient (e.g., scram, loss of feedwater, etc) or accident

OR whose failure _____ could impact SSC(s) credited in the Safety Analyses?

- Does the proposed activity involve UFSAR-described SSCs or procedural controls that perform functions that are required by, or otherwise necessary to comply with, regulations, license conditions, orders or technical specifications?
- Does the proposed activity involve a *method of evaluation* described in the UFSAR?
- Is the proposed activity a *test or experiment*?
- ² Does the proposed activity exceed or potentially affect a *design basis limit for a fission product barrier (DBLFPB)*?

If the answer to all of these questions is **NO**, skip PART III and proceed directly to PART IV.

2. If any of the above questions are marked **YES**, identify the specific design function, method of evaluation or DBLFPB involved.

The results of the land use census shall be included in the Annual Radiological Environmental Report and shall be included in a revision of the ODCM for use in the following calendar year.

Palisades Nuclear Plant
50.59 SCREEN

Proc No 3.07
Attachment 1
Revision 13
Page 3 of 5

PART III - Determine Whether the Activity Involves Adverse Effects
(Admin Proc 3.07, Attachment 6, Section 1.3.3)

Answer the following questions to determine if the activity involves any adverse effects. Any **YES** answer means that a 10 CFR 50.59 evaluation is required except where noted in Question 3.

1. Changes to the Facility or Procedures

(If the activity does not involve a change to the facility or procedures, these questions are Not Applicable.)

YES NO QUESTION

- Does the activity adversely affect the *design function(s)* that were identified in Part II?
- Does the activity adversely affect the method of performing or controlling the *design function(s)* that were identified in Part II?

If either answer is **YES**, a 10 CFR 50.59 Evaluation is required. If both answers are **NO**, describe the basis for the conclusion (attach additional discussion, as necessary):

The proposed activity is based on the Land Use Census environmental survey conducted this year. The results of this survey are to be included in the ODCM in Tables 1.4 and 1.4a. This activity does not involve the design function of any SSC.

2. Changes to a Method of Evaluation

(If the activity does not involve a method of evaluation, these questions are Not Applicable.)

YES NO QUESTION

- Does the activity use a revised or different method of evaluation for performing safety analyses than that described in the UFSAR?
- Does the activity use a revised or different method of evaluation for evaluating SSCs credited in safety analyses than that described in the UFSAR?

If either answer is **YES**, a 10 CFR 50.59 Evaluation is required. If both answers are **NO**, describe the basis for the conclusion (attach additional discussion, as necessary).

NOTE: The UFSAR section (or reference) that describes the method should be identified in Part I, Item #3.

Palisades Nuclear Plant
50.59 SCREEN

Proc No 3.07
Attachment 1
Revision 13
Page 4 of 5

3. Tests or Experiments

(If the activity is not a test or experiment, then the questions in 3.a and 3.b are
 Not Applicable.)

a. Answer these two questions first:

YES	NO	QUESTION
<input type="checkbox"/>	<input type="checkbox"/>	Is the proposed test or experiment bounded by other tests or experiments that are described in the UFSAR?
<input type="checkbox"/>	<input type="checkbox"/>	Are the SSCs affected by the proposed test or experiment isolated from the facility?

If the answer to both questions is NO, continue to 3.b. If the answer to either question is YES, then briefly describe the basis.

b. Answer these additional questions only for tests or experiments which do not meet the criteria given above. If the answer to either question in 3.a is YES, then these three questions are Not Applicable:

YES	NO	QUESTION
<input type="checkbox"/>	<input type="checkbox"/>	Does the activity utilize or control an SSC in a manner that is outside the reference bounds of the design bases as described in the UFSAR?
<input type="checkbox"/>	<input type="checkbox"/>	Does the activity utilize or control an SSC in a manner that is inconsistent with the analyses or descriptions in the UFSAR?
<input type="checkbox"/>	<input type="checkbox"/>	Does the activity place the facility in a condition not previously evaluated or that could affect the capability of an SSC to perform its intended functions?

If any answer in 3.b is YES, a 10 CFR 50.59 Evaluation is required. If the answers are all NO, describe the basis for the conclusion (attach additional discussion, as necessary):

Palisades Nuclear Plant
50.59 SCREEN

Proc No 3.07
Attachment 1
Revision 13
Page 5 of 5

Part IV - Conclusion
(Admin Proc 3.07, Attachment 6, Section 1.3.4)

Check all that apply:

1. A 10 CFR 50.59 Evaluation is required or NOT required
2. A UFSAR change is ³ required or NOT required.

Additional Comments

Prepared By: Lin O'Neil Date 11/25/02

Reviewed By: Paul F. Bruce Date 12-10-02

³ If an UFSAR Change Request has not already been initiated, then ensure that an UFSAR Change Request is initiated in accordance with Admin Proc 3.10, UFSAR C...