POINT BEACH NUCLEAR PLANT
UNITS 1 AND 2

OFFSITE DOSE CALCULATION MANUAL

WISCONSIN ELECTRIC POWER COMPANY

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Revision 3

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1.0 OFFSITE DOSE CALCULATION MANUAL ADMINISTRATION

1.1 Purpose

The PBNP Offsite Dose Calculation Manual contains the current methodology and parameters for the calculation of offsite doses due to radioactive gaseous and liquid effluents. This manual describes a methodology for demonstrating compliance with 10 CFR 50, Appendix I dose limits. Compliance with Appendix I is demonstrated by periodic calculation of offsite doses based on actual plant releases or by the calculation and comparison of actual plant releases to predetermined release limits. Release limits are those quantities of radioactivity which if released from PBNP will result in doses within the limits of Appendix I. Release limits are specified in this manual.

The manual also details the methodology for the determination of gaseous and liquid effluent monitor alarm setpoints. The PBNP Radiation Monitoring System (RMS) effluent monitor alarm setpoints are established to ensure that controlled releases of liquid and gaseous radioactive effluents are maintained as low as is reasonably achievable, to ensure releases result in concentrations to unrestricted areas within limits specified in 10 CFR 20, and to ensure that design objective release limits are not exceeded.

The manual also details the methodology for evaluating the radiological impact of sewage treatment sludge disposal. This methodology addresses the commitments made to the United States Nuclear Regulatory Commission in our application dated October 8, 1987 (NRC-87-104) and accepted by the USNRC in a letter dated January 13, 1988. This application was submitted in accordance with the provisions of 10 CFR 20.302(a). Dose limits are established in the application to ensure the health and safety of the maximally exposed member of the general public and the inadvertent intruder. 10 CFR 50 Appendix I dose limits do not apply to sewage treatment sludge disposal.

1.2 General Responsibilities

The primary responsibility for the implementation of the PBNP offsite dose calculation program and for any actions required by the program resides with the General Superintendent and the staff of the Nuclear Plant Engineering and Regulation Section (NPERS). NPERS will provide the technical, regulatory, licensing, and administrative support necessary to fulfill the requirements of this manual. The calculation of offsite doses and analysis of data are NPERS responsibilities.

The Manager, PBNP is responsible for assuring that Radiation Monitoring System alarm setpoints are established and maintained in accordance with the methodologies outlined in this manual. The Manager, PBNP is also responsible for assuring the performance of periodic release summaries for the purpose of demonstrating compliance with PBNP effluent release limits.

1.3 Manual Revisions

This manual describes the current scope of the PBNP offsite dose calculation program. The program and the manual are maintained by NPERS. Program items or procedures may be periodically updated or changed, either to reflect new parameters or to improve program effectiveness. This manual may be revised at the discretion of NPERS with the concurrence of the PBNP Manager's Supervisory Staff.

2.0 RADIATION MONITORING SYSTEM AND RELEASE ACCOUNTING

A computerized Radiation Monitoring System (RMS) is installed at Point Beach Nuclear Plant (PBNP). The RMS includes area, process, and effluent monitors. A description of those monitors used for liquid and gaseous effluents is presented in Tables 2-1 and 2-2. The liquid and gaseous waste processing flow paths, equipment, and monitoring systems are depicted in Figures 2-1 and 2-2. Calibration of the RMS detectors is accomplished in accordance with procedures contained in the PBNP Health Physics Calibration Manual.

The RMS is designed to detect and measure liquid and gaseous releases from the plant effluent pathways. The RMS will initiate isolation and control functions on certain effluent streams. Complete monitoring and accounting of nuclides released in liquid and gaseous effluents is accomplished with the RMS together with the characterization of nuclide distributions by laboratory analysis of grab samples. Sampling frequencies and analysis requirements are described in Tables 15.7.6-1 and 15.7.6-2 of the PBNP Technical Specifications. The various aspects of grab sampling and release accountability are described in the PBNP Release Accountability Manual.

TABLE 2-1
RADIOACTIVE LIQUID WASTE EFFLUENT MONITORS

Channel Number	Name	Control Function	Detector Type
1(2)RE-216	Containment Fan Coolers Liquid Monitors	None	Scintillation
RE-218	Waste Disposal System Liquid Monitor	Shuts waste liquid overboard	Scintillation
1(2)RE-219	Steam Generator Blowdown Liquid Monitors	Shuts steam generator blowdown isolation valves, blowdown tank outlet valves and steam generator sample valves	Scintillation
RE-220	Spent Fuel Pool Liquid Monitor	None	Scintillation
RE-223	Waste Distillate Overboard Liquid Monitor	Shuts waste distillate overboard isolation valve	Scintillation
1(2)RE-229	Service Water Discharge Monitors	None	Scintillation
RE-230	Retention Pond Discharge Liquid Monitor	None	Scintillation
1(2)RE-222	Steam Generator Blowdown Tank Outlet Monitor	Shuts steam generator blowdown isolation valves and blowdown tank outlet valves	GM Tube

TABLE 2-2

RADIOACTIVE GASEOUS WASTE EFFLUENT MONITORS

Channel Number	Name	Control Function	Detector Type
1(2)RE-212	Containment Noble Gas Monitor	Actuates containment ventilation isolation	Scintillation
RE-214	Auxiliary Building Exhaust Ventilation Noble Gas Monitor	Shuts gas release valve and shifts auxiliary building exhaust through carbon filters	Scintillation
1(2)RE-215	Condenser Air Ejector Noble Gas Monitors	None	Scintillation
RE-225	Combined Air Ejector Low-Range Noble Gas Monitor	None	Scintillation
RE-221	Drumming Area Vent Noble Gas Monitor	None	Scintillation
RE-224	Gas Stripper Building Exhaust Noble Gas Monitor	None	Scintillation
1(2)RE-305	Unit 1 and 2 Purge Exhaust Noble Gas Monitors (Channel 5 on SPING Units No. 21 and No. 22)	Containment ventilation isolation	Scintillation
RE-315	Auxiliary Building Exhaust Ventilation Noble Gas Monitor (Channel 5 on SPING Unit No. 23)	None	Scintillation
RE-325	Drumming Area Ventilation Noble Gas Monitor (Channel 5 on SPING Unit No. 24)	None	Scintillation

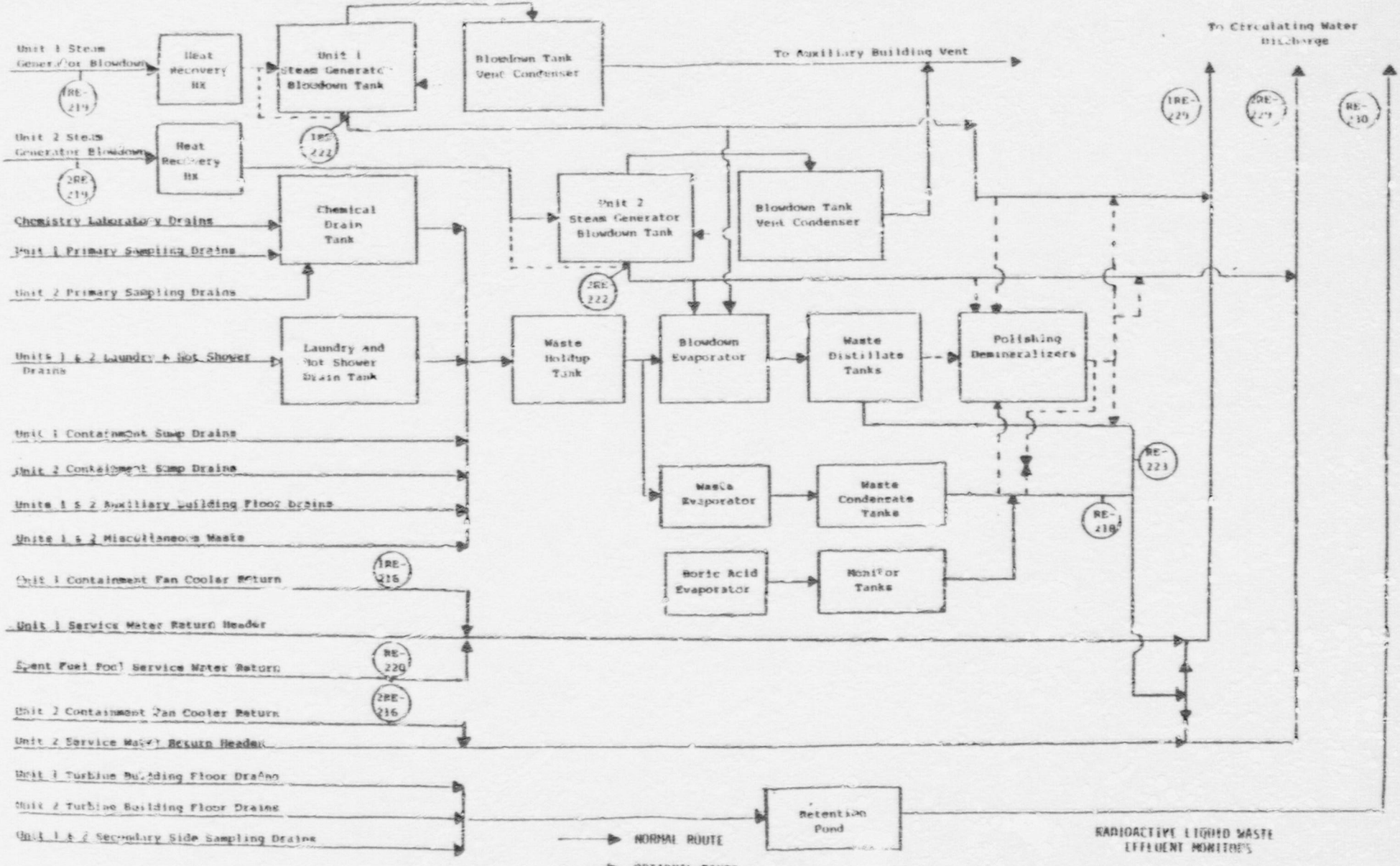
Unit 1 Steam Generator Blowdown
Heat Recovery HX
Unit 1 Steam Generator Blowdown Tank
Blowdown Tank Vent Condenser
To Auxiliary Building Vent
To Circulating Water Discharge
1RE-219
Unit 2 Steam Generator Blowdown
Heat Recovery HX
2RE-219
1RE-222
1RE-229
2RE-229
RE-230
Chemistry Laboratory Drains
Unit 1 Primary Sampling Drains
Unit 2 Primary Sampling Drains
Chemical Drain Tank
Unit 2 Steam Generator Blowdown Tank
Blowdown Tank Vent Condenser
2RE-222
Units 1 & 2 Laundry & Hot Shower Drains
Laundry and Hot Shower Drain Tank
Waste Holdup Tank
Blowdown Evaporator
Waste Distillate Tanks
Polishing Demineralizers
Unit 1 Containment Sump Drains
Unit 2 Containment Sump Drains
Units 1 & 2 Auxiliary Building Floor Drains
Units 1 & 2 Miscellaneous Waste
RE-223
Waste Evaporator
Waste Condensate Tanks
RE-218
Unit 1 Containment Fan Cooler Return
1RE-216
Boric Acid Evaporator
Monitor Tanks
Unit 1 Service Water Return Header
Spent Fuel Pool Service Water Return
RE-220
Unit 2 Containment Fan Cooler Return
2RE-216
Unit 2 Service Water Return Header
Unit 1 Turbine Building Floor Drains
Unit 2 Turbine Building Floor Drains
Unit 1 & 2 Secondary Side Sampling Drains
Retention Pond
NORMAL ROUTE
OPTIONAL ROUTE
RADIOACTIVE LIQUID WASTE EFFLUENT MONITORS

Figure 2-1

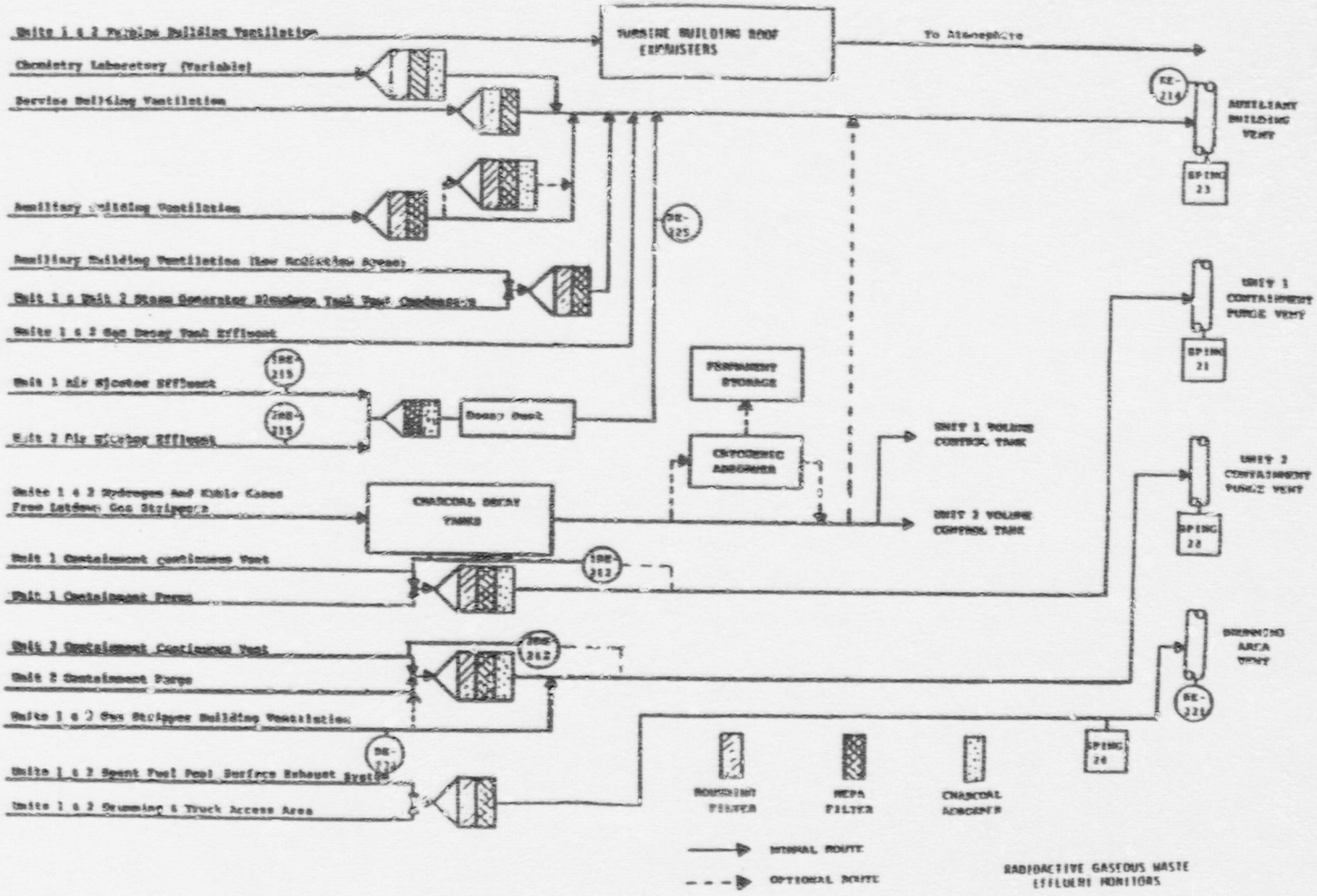
Units 1 & 2 Turbine Building Ventilation
Chemistry Laboratory (Variable)
Service Building Ventilation
Auxiliary Building Ventilation
Auxiliary Building Ventilation (Low Radiation Areas)
Unit 1 & Unit 2 Steam Generator Blowdown Tank Vent Condensate
Units 1 & 2 Gas Decay Tank Effluent
Unit 1 Air Ejector Effluent
Unit 2 Air Ejector Effluent
Units 1 & 2 Hydrogen And Kilo Gases From Letdown Gas Strippers
Unit 1 Containment Continuous Vent
Unit 1 Containment Purge
Unit 2 Containment Continuous Vent
Unit 2 Containment Purge
Units 1 & 2 Gas Stripper Building Ventilation
Units 1 & 2 Spent Fuel Pool Surface Exhaust System
Units 1 & 2 Drumming & Truck Access Area
TURBINE BUILDING ROOF EXHAUSTERS
To Atmosphere
RE-214
AUXILIARY BUILDING VENT
SPING 23
RE-125
UNIT 1 CONTAINMENT PURGE VENT
SPING 21
PERMANENT STORAGE
Decay Tank
CRYOGENIC ADSORBER
UNIT 1 VOLUME CONTROL TANK
UNIT 2 VOLUME CONTROL TANK
CHARCOAL DELAY TANKS
UNIT 2 CONTAINMENT PURGE VENT
SPING 22
RE-212
DRUMMING AREA VENT
RE-221
SPING 24
PARTICULATE FILTER
HEPA FILTER
CHARCOAL ADSORBER
NORMAL ROUTE
OPTIONAL ROUTE
RADIOACTIVE GASEOUS WASTE EFFLUENT MONITORS

Figure 2-2

3.0 METHODOLOGY FOR DETERMINING ALARM SETPOINTS

3.1 Introduction

The selection and maintenance of alert and alarm setpoints for each effluent monitor of the PBNP radiation monitoring system will be accomplished within the guidelines of this section. The computerized PBNP radiation monitoring system permits each effluent radiation monitor to be programmed to alarm at two distinct setpoints. The alert setpoint is intended to delineate a changing plant condition which may warrant corrective action. The high alarm or trip setpoint will actuate a control function as applicable or require corrective action.

3.2 Objective

The effluent monitor setpoints are established to ensure that controlled releases of liquid and gaseous radioactive effluents are maintained as low as is reasonably achievable, to ensure releases result in concentrations to unrestricted areas within limits specified in 10 CFR 20, and to ensure that design objective releases are not exceeded.

3.3 Alert Setpoint Guidelines

The alert setpoint of each effluent monitor will generally be set to alarm at two times the established steady-state reading. The alert setpoint is normally set at concentrations well below the alarm setpoint value and is never to be set in excess of the alarm setpoint. In the course of plant operations, certain situations may require a deviation from the two times steady-state guideline. The intent of the alert setpoint is to warn of changing plant conditions which may warrant an evaluation of the cause of the increased radiation. If the increased reading is actually due to an increased radiation inventory within the system being monitored, as opposed to an increased background radiation field in the vicinity of the detector, an evaluation should be made to determine the impact of the release. The alert setpoint may be adjusted with the approval of the Duty Shift Superintendent. Alert setpoint adjustments are to be made in accordance with the PBNP RMS Alarm Setpoint and Response Book.

3.4 Alarm or Trip Setpoint Guidelines

In accordance with the requirements of Technical Specifications 15.7.5.A.2 and 15.7.5.C.2, the alarm or trip setpoint for effluent monitors shall be established to annunciate at radiation levels which would result in unrestricted area concentrations equal to or

less than the applicable maximum permissible concentrations contained in 10 CFR 20, Appendix B, Table II. The appropriate detailed response to an effluent alarm is described in the PBNP RMS Alarm Setpoint and Response Book.

3.5 Monitor Calibration and Calibration Constant Determination

Calibration of the RMS effluent detectors is accomplished in accordance with procedures contained in the PBNP Health Physics Calibration Manual. Each detector is exposed to a calibration source with isotopic distribution and intensity characteristics similar to effluents normally released via the applicable pathway. The detector response to the calibration source is normalized to a reference isotope.

The liquid effluent monitors apply the derived calibration constant to standardize all liquid releases to equivalent concentrations of Co-60. The calibration constants are normalized to permit each monitor channel to display effluent concentrations in equivalent concentrations of the Co-60 reference isotope. Calibration constants are normalized to Co-60 based on dose conversion factors contained in Regulatory Guide 1.109, Revision 1, October 1977.

Noble gas effluent monitors apply the calibration constant to standardize all gaseous releases to equivalent concentrations of Xe-133. The calibration constants are normalized to permit each monitor channel to display gaseous effluent concentrations in equivalent concentrations of the Xe-133 reference isotope. Calibration constants are normalized to Xe-133 based on dose conversion factors contained in Regulatory Guide 1.109, Revision 1, October 1977.

Calibration constants are derived from the following formulae:

$$\text{Cal. Constant} = \frac{1}{\text{Sensitivity}}$$

and

$$\text{Sensitivity} = \frac{\text{Monitor Response}}{\Sigma\ (\mu Ci/cc_i)\ (DF_i/DF_j)}$$

where:

Cal. Constant = a derived calibration constant normalized to standard isotope (μCi/cc/cpm); represents equivalent concentration per monitor response,

Sensitivity = monitor sensitivity normalized to standard isotope (cpm/μCi/cc),

Monitor response = the counts per minute registered by monitor when exposed to calibration source (cpm),

$\mu Ci/cc_i$ = concentration of isotope i in calibration source,

DF_i = dose conversion factor for isotope i as given in Regulatory Guide 1.109, Revision 1, October 1977,

DF_j = dose conversion factor for reference isotope j as given in Regulatory Guide 1.109, Revision 1, October 1977 and,

$\frac{DF_i}{DF_j}$ = factor for converting actual concentrations to equivalent concentrations. Table 5-1 lists dose conversion factors for common isotopes in liquid releases, and Table 5-2 lists the conversion factors for common isotopes in gaseous releases.

The QAD computer program may be utilized to predict or determine monitor calibration constants. Application of the QAD program may be appropriate for determining monitor response for accident source terms or other instances when the use of a calibration source is impracticable.

3.6 Determination of Liquid Effluent Monitor Alarm Setpoint

The alarm setpoint for each monitor will be correlated to the unrestricted area maximum permissible concentration (MPC) of the reference isotope to which the monitor calibration constant was normalized. The liquid monitors referenced to Co-60 equivalent concentrations will have alarm setpoints correlated to the unrestricted area MPC value for Co-60.

Setpoints shall be determined as follows:

$$SP = MPC \times \frac{\text{Dilution Water Flow Rate}}{\text{Waste Discharge Flow Rate}}$$

where:

SP = RMS alarm setpoint in equivalent concentrations of Co-60 (μCi/cc)

MPC = unrestricted area MPC for Co-60 from 10 CFR 20 Appendix B Table II.

Dilution Water Flow Rate = dilution from circulating water discharge pumps (gpm)

Waste Discharge Flow Rate = maximum liquid effluent flow rate from waste pathway into circulating water (gpm).

Dilution water flow rates are as follows:

a) Dilution from one recirculation pump = 213,600 gpm

b) Dilution from two recirculation pumps = 356,000 gpm

Maximum waste discharge flow rates and monitors associated with each liquid effluent pathway are described in Table 3-1.

Alarm setpoints are to be normally established based upon maximum waste discharge flow rates and minimum circulation water flow rates. The alarm setpoints may be adjusted during periods of batch releases, when actual flow rates are known. Alarm setpoint adjustments are to be accomplished in accordance with the provisions and methodologies of this section and require approval of the Manager's Supervisory Staff.

3.7 Determination of Gaseous Effluent Monitor Alarm Setpoints

The alarm setpoint for each monitor will be correlated to the unrestricted area maximum permissible concentration (MPC) of the reference isotope to which the monitor calibration constant was normalized. The noble gas effluent monitors will have alarm setpoints correlated to the unrestricted area MPC value for Xe-133.

Setpoints shall be determined as follows:

$$SP = \frac{(2.12E+03)\ (MPC)}{(\chi/Q)\ (\text{Waste Discharge Flow Rate})}$$

where:

SP = RMS alarm setpoint in equivalent concentration of Xe-133 (μCi/cc)

MPC = unrestricted area MPC for Xe-133 from 10 CFR 20 Appendix B Table II.

χ/Q = highest average annual χ/Q value at unrestricted area of 1.5E-06 sec/m^3

Waste Discharge Flow Rate = flow rate of effluent pathway being monitored (ft^3/min).

2.12E+03 = conversion factor for ft^3/min to m^3/sec.

Gaseous effluent pathway discharge flow rates and monitors associated with each pathway are summarized in Table 3-2.

Alarm setpoints are to be normally established based upon maximum waste discharge flow rates and the average annual χ/Q value. The alarm setpoints may be adjusted for release periods if actual flow rates are reduced to less than maximum or actual χ/Q values are calculated. Alarm setpoint adjustments are to be made in accordance with the provisions and methodologies of this section and require Manager's Supervisory Staff approval.

TABLE 3-1
SUMMARY OF LIQUID DILUTION AND EFFLUENT PATHWAY FLOW RATES

Liquid Effluent Pathway	Discharge Flow Rate (gpm)	Monitor(s) in Effluent Pathway
a. Recirculation Water		none
1) 1 recirc. pump	213,600	
2) 2 recirc. pumps	356,000	
b. Service Water Return		1(2)RE-229
1) Flow rate per pump	6,600	
2) Max. 4 pumps		
c. Steam Generator Blowdown		1(2)RE-219 and
1) Max. flow rate from each generator	50	1(2)RE-222
d. Retention Pond		
1) Max. Flow Rate	1,670	RE-230
e. Spent Fuel Pool		
1) Max. Flow Rate	700	RE-220
f. Waste Distillate & Condensate Tank Discharge		RE-218 & RE-223
1) Max. Flow Rate	100	
g. Containment Fan Cooler Return		
1) Max. Flow Rate per Containment	4,000	1(2)RE-216

TABLE 3-2
SUMMARY OF GASEOUS EFFLUENT PATHWAY DISCHARGE FLOW RATES

Gaseous Effluent Pathway	Discharge Flow Rate (CFM)	Monitor(s) In Effluent Pathway
a. Auxiliary Building Vent	61,400	RE-214 & SPING 23
b. Combined Air Ejector	20	RE-225
c. Unit Air Ejector	10	1(2)RE-215
d. Containment Purge Vent		
1) 1 Fan operating	12,500	1(2)RE-212 & SPINGS 21 & 22
2) 2 Fans operating	25,000	
e. Gas Stripper Building	13,000	RE-224
f. Drumming Area Vent	43,100	RE-221 & SPING 24

4.0 DEMONSTRATING COMPLIANCE WITH 10 CFR 50, APPENDIX I

4.1 Introduction

Maintaining effluents within the dose objectives of Appendix I is demonstrated at PBNP by periodic calculations. Compliance with Appendix I limits is demonstrated by using either of the following methods:

A. A summation of all releases in equivalent curies may be performed on a quarterly basis. These sums are compared with previously calculated release limits, i.e., quantities which result in doses within the limits of Appendix I to 10 CFR 50. If the equivalent curies released during the calendar quarter are less than or equal to 1/4 of the annual equivalent curie release limits, then de facto compliance with Appendix I exists and no further action is required.

B. Dose calculations may be performed on a quarterly basis. These calculations may be performed in either of two ways.

1. Hand Calculations - Based on the meteorology, plant parameters, and dose pathways given in Appendix I of the PBNP FSAR and on the dose conversion factors set forth in Regulatory Guide 1.109 or in NUREG-0172. Section 6.0 of this manual describes dose calculation methodologies.

2. Computer - This capability will be provided in the future.

If release or dose calculations exceed the corresponding quarterly limit during any calender quarter, a summary of radioactive effluent releases or dose calculations shall be made monthly until it is determined that release quantities are within the annual limits. If the quarterly calculations exceed twice the corresponding quarterly limit, it is mandatory to calculate doses in accordance with Section 6.0 of this manual.

4.2 Dose Limits

To define the limits and conditions for the controlled release of radioactive materials in liquid and gaseous effluents to the environment, to ensure that these releases are as low as is reasonably achievable in conformance with 10 CFR Parts 50.34a and 50.36a, to ensure that these releases result in concentrations of radioactive materials in liquid and gaseous effluents released to unrestricted areas that are within the limits specified in 10 CFR 20, and to ensure that

the releases of radioactive material above background to unrestricted areas are as low as is reasonably achievable, the following design release limits as defined in Appendix I to 10 CFR 50 apply:

A. The annual total quantity of all radioactive material above background that may be released from each light-water-cooled nuclear power reactor to unrestricted areas should not result in an annual dose or dose commitment from liquid effluents for any individual in an unrestricted area from all pathways of exposure in excess of 3 millirems to the total body or 10 millirems to any organ.

B. The annual total quantity of all radioactive material above background that may be released from each light-water-cooled nuclear power reactor to the atmosphere should not result in an annual air dose from gaseous effluents at any location near ground level which could be occupied by individuals in unrestricted areas in excess of 10 millirads for gamma radiation or 20 millirads for beta radiation, or that this quantity should not result in an annual external dose from gaseous effluents to any individual in unrestricted areas in excess of 5 millirems to the total body or 15 millirems to the skin.

C. The annual total quantity of all radioactive iodine and radioactive material in particulate form above background that may be released from each light-water-cooled nuclear power reactor in effluents to the atmosphere should not result in an annual dose or dose commitment from such radioactive iodine and radioactive material in particulate form for any individual in an unrestricted area from all pathways of exposure in excess of 15 millirems to any organ.

4 3 Release Limits

The design releases limits are derived from the dose evaluation performed in accordance with Appendix I to 10 CFR 50. In the evaluation, certain maximum calculated doses to an organ or the total body of an individual result from the calculated effluent releases. Design release limits are defined by conservatively scaling calculated releases upward to the point at which corresponding doses reach the applicable limit specified in Appendix I to 10 CFR 50. The scaling factor (SF) used in these calculations is defined by the equation:

$$SF = \frac{\text{Appendix I dose limit x 2 reactors}}{\text{calculated dose to limiting organ}}$$

The limiting organ is the organ whose dose and dose limit yields the most restrictive scaling factor. The limiting organ may or may not be the critical organ for a radionuclide group. The critical organ is the organ receiving the highest calculated Appendix I dose for a given radionuclide group.

Conservative scaling factors are obtained by the judicious choice of the limiting organ for each release category. This ensures Appendix I compliance while allowing for fluctuations in the isotopic composition of radionuclides within a release category and while accommodating for contributions from other radionuclides.

Design release limits are calculated in terms of "equivalent curies" to allow for minor shifts in the radionuclide distribution within an effluent release group. An equivalent curie is obtained by scaling a radionuclide's activity to an appropriate single radionuclide within each release group by the ratio of their dose factors. Dose factors used in the calculation of equivalent curies are selected for the age group in which the dose limit is most closely approached. From the Appendix I evaluation, it is observed that, except for noble gases, ingestion is generally the most significant dose pathway for both effluents released to the atmosphere and for liquid effluents; hence, ingestion dose factors are used in evaluating effluent releases except when noted otherwise. Conservatively, no credit is given for radioactive decay; and, in one case, the highest dose factor listed for each radionuclide within the applicable age group is used for calculating equivalent curies. For each effluent category, the release limit is calculated as follows:

$$\Sigma DCE_{ijk} = \frac{\Sigma\ ACE_{ijk} \times L_k \times 2}{D_k}$$

where ΣDCE_{ijk} = Dose release limit in total equivalent curies for all radionuclides of effluent type k,

ΣACE_{ijk} = Calculated release in total equivalent curies for all radionuclides for effluent type k,

L_k = Dose limit per reactor from Appendix I of 10 CFR 50,

2 = Two units per plant,

D_k = Calculated dose resulting from release of ΣACE_{ijk} curies.

A. The following notes apply to the calculation of design release limits for gaseous effluents:

1. For noble gases, the total body gamma dose is limiting,

2. For radioiodines, the thyroid dose to the infant is limiting; the thyroid dose contribution from other isotopes is negligible,

3. For remaining isotopes, the liver dose to the child is limiting.

B. The following notes apply to the calculation of equivalent curies design release limits for liquid effluents:

1. For radioiodines, the child thyroid is the critical organ. However, the adult whole body is limiting because it yields a more conservative scaling factor (SF). For the child thyroid,

$$SF = \frac{10 \times 2}{0.20} = 100$$

whereas, the adult whole body dose limit yields a more conservative factor

$$SF = \frac{3 \times 2}{0.19} = 31.6$$

Because, in reality, radioiodines contribute very little to the whole body dose, this conservative methodology for deriving the radioiodine equivalent curies design release limit leaves room to accommodate contributions from other radionuclides and assures that the RETS (or Appendix I) dose limits will not be exceeded even if all radionuclide groups are at their respective equivalent curie design release limit.

2. For tritium and particulates, the total body dose to an adult is limiting even though the teen liver is the critical organ because of its slightly higher dose from the reference radionuclide mixture. Following the above conservative methodology, the adult whole body dose and dose limit yields

$$SF = \frac{3 \times 2}{0.19} = 31.6$$

which is more conservative than the scaling factor derived from the liver dose and dose limit,

$$SF = \frac{10 \times 2}{0.26} = 76.9$$

Design release limits calculated in the manner described above are quantities of radioactivity in effluents which, for the particular environmental parameters and conditions at Point Beach Nuclear Plant, would result in maximum doses to an individual that are within the limits set forth in Appendix I to 10 CFR 50. Actual plant releases are expected to be well within the design release quantities. The periodic review required by this section ensures that plant releases remain as low as is reasonably achievable.

4.4 EPA Regulations

Compliance with the provisions of Appendix I to 10 CFR 50 is adequate demonstration of conformance to the standards set forth in 40 CFR 190 regarding the dose commitment to individuals from the uranium fuel cycle. If release or dose calculations exceed twice the annual limits, dose calculations shall be performed as described in Section 6.0 of this manual and shall include exposures from effluent pathways and direct radiation contributions from the reactor units and from any outside storage tanks.

The above calculations do not include contributions from the Kewaunee Nuclear Power Plant (KNPP) which is some four miles north of PBNP. Under normal operations using the PBNP annual average X/Q and assuming that the KNPP source term is identical to either PBNP unit, the greatest KNPP dose contribution occurs at the north sector PBNP boundary. However, the total KNPP-PBNP dose at that point is less than the dose in the highest sector (south boundary) from PBNP alone. The KNPP contribution in this sector adds only 1% to 8% to the total dose depending upon the release mode. Even in the highly unlikely event that PBNP and KNPP operated for an entire year at twice the Appendix I levels, the small percentage contribution from KNPP would be insufficient to yield doses exceeding 40 CFR 190 limits.

5.0 CALCULATION AND COMPARISON OF EFFLUENT RELEASES TO RELEASE LIMITS

Technical Specifications 15.7.5.B.3 and 15.7.5.D.3 require that an effluent release summary or dose calculation be performed quarterly. This section describes the methodology for the calculation and comparison of equivalent curie releases to equivalent curie release limits.

5.1 Definitions

$$CE_{ij} = C_i \times \frac{DF_i}{DF_j}$$

CE_{ij} = Activity of radionuclide i expressed in terms of an equivalent number of curies of radionuclide j.

C_i = Actual number of curies of radionuclide i.

DF_i = Dose factor for radionuclide i as given in Regulatory Guide 1.109, Revision 1, October 1977.

DF_j = Dose factor for reference radionuclide j as given in Regulatory Guide 1.109, Revision 1, October 1977.

$\frac{DF_i}{DF_j}$ = Factor for converting actual curies to equivalent curies. Table 5-1 lists conversion factors for common radionuclides in liquid releases, and Table 5-2 lists the conversion factors for common radionuclides in gaseous releases.

5.2 Calculation of Liquid Effluent Releases

The annual design release limits for liquid effluents are as follows:

A. Tritium: $C_i \leq$ 1.93E+04 curies

B. Radioiodines: $\Sigma CE_{ij} \leq$ 2.62E+01 I-131 equivalent curies

Where 1. The reference isotope, j, is I-131.

2. DF_i is the adult total body dose factor for isotope i given in Table E-11 of Regulatory Guide 1.109, Revision 1, October 1977 or Table 5-1.

3. DF_j is the adult total body dose factor for the reference isotope, I-131, as given in Table E-11 of Regulatory Guide 1.109, Revision 1, October 1977.

C. Others (isotopes other than tritium, noble gases, or radioiodines):

$\Sigma CE_{ij} \leq$ 9.47E+01 Co-60 equivalent curies

Where 1. The reference radionuclide, j, is Co-60.

2. DF_i is the adult total body dose factor for radionuclide i in Table E-11 of Regulatory Guide 1.109, Revision 1, October 1977, or Table 5-1.

3. DF_j is the adult total body dose factor for the reference radionuclide Co-60 in Table E-11 of Regulatory Guide 1.109, Revision 1, October 1977.

D. Noble gases released in liquid effluents are to be included with noble gases released in gaseous effluents.

Quarterly limits are defined as 1/4 of the annual limits.

As the result of the conservatisms used in formulating the design equivalent curie release limits, the RETS (or Appendix I) dose limits will not be exceeded even if each radionuclide group simultaneously were at its limit. Briefly, the two conservatisms are: (1) The choice of restrictive scaling factors; and (2) the scaling of the total dose to the limiting organ, not just the portion of the dose attributable to the radionuclide group of interest.

5.3 Calculation of Gaseous Effluent Releases

The annual design release limits for gaseous effluents are as follows:

A. Tritium: $C_i \leq$ 2.90E+04 curies

B. Noble Gases: $\Sigma CE_{ij} \leq$ 1.04E+06 Xe-133 equivalent curies

Where 1. The reference radionuclide j, is Xe-133.

2. DF_i is the dose factor for radionuclide i given as DFB_i in Table B-1 of Regulatory Guide 1.109, Revision 1, October 1977.

3. DF_j is the dose factor for the reference radionuclide Xe-133 given under DFB_i in Table B-1 of Regulatory Guide 1.109, Revision 1, October 1977.

C. Radioiodines: $\Sigma CE_{ij} \leq$ 3.52E-01 I-131 equivalent curies

Where 1. The reference isotope, j, is I-131.

2. DF_i is the infant thyroid dose factor for isotope i given in Table E-14 of Regulatory Guide 1.109, Revision 1, October 1977, or Table 5-2.

3. DF_j is the infant thyroid dose factor for the reference isotope I-131 as given in Table E-14 of Regulatory Guide 1.109, Revision 1, October 1977.

D. Particulates (isotopes other than tritium, noble gases or radioiodines):

$\Sigma CE_{ij} \leq$ 1.72E+00 Co-60 equivalent curies

Where 1. The reference radionuclide j, is Co-60.

2. DF_i is the highest dose factor for radionuclide i in any column of Table E-13 of Regulatory Guide 1.109, Revision 1, October 1977, or Table 5-2.

3. DF_j is the highest dose factor for the reference radionuclide, Co-60, given in any column of Table E-13 of Regulatory Guide 1.109, Revision 1, October 1977.

Quarterly limits are defined as 1/4 of the annual limits.

Even if all four airborne radionuclide categories were released at the limits specified in this section, the RETS (or Appendix I) dose limits would not be exceeded. The methodology for determining airborne equivalent curie release limits is similar, but not identical, to that used for determining liquid release limits. The difference derives from the manner in which Appendix I establishes the airborne release dose limits.

Appendix I specifies two airborne release categories: gaseous and other. The latter category is defined as the total of radioiodine and particulates. For the purpose of establishing equivalent curie release limits, the other category has been further subdivided to provide a separate limit for tritium in order to accomplish the tritium balance between liquid and atmospheric releases allowed by RETS (see following section). In addition to creating two major release categories, Appendix I sets a different dose standard for each category. The noble gas release is limited by the external

whole body dose (Appendix I, section II, B.2(b)) whereas the release of the other radionuclides is limited by the internal organ dose (section II, C). Furthermore, the external whole body dose limit is independent from the internal dose contributions of the other radionuclides. The following discussion explains why the RETS (or Appendix I) dose limits will not be exceeded when the radioiodine, particulate and tritium radionuclide groups simultaneously are at their release limits.

Following the methodology established for liquid releases, the FSAR calculated atmospheric equivalent curies release is multiplied by a scaling factor to arrive at a release limit. The scaling factor (SF) is defined by the formula

$$SF = \frac{\text{Appendix I organ dose limit x 2 reactors}}{\text{calculated organ dose}}$$

Based on the 15 mrem per year organ dose limit, this formula reduces to

$$SF = 30 \text{ mrem/calculated organ dose.}$$

One feature common to deriving the radioiodine, tritium, and particulate equivalent curie release limits is to assume a goat-milk pathway for all doses in the critical south sector where, in fact, no goats have been noted. This yields a headroom of 6 mrem for the infant thyroid dose when scaling radioiodine and about 0.1 mrem when scaling particulates and tritium for the child liver doses. In an identical conservative fashion to the liquid release limit methodology, the atmospheric release scaling factors are derived from the total dose to the limiting organ, not just the portion of the dose attributable to the radionuclide of interest. As a further conservatism, the particulate release limit for the child liver was determined, not with the dose factors for the critical organ, but with the highest dose factor for each radionuclide in the group. This reduces the particulate release limit by 75 percent from the value needed to produce 15 mrem. Finally, the tritium release limit is on the order of one order of magnitude greater than the total plant tritium inventory. Therefore, the potential consequence from a tritium release would be negligible.

5.4 Tritium in Liquid and Gaseous Effluents

The design release limit for tritium in liquid effluents may be increased, provided it is accompanied by a proportional decrease in the design release limit for tritium in gaseous effluents. Similarly, the design release limit for tritium in gaseous effluents may be increased, provided it is accompanied by a proportional

decrease in the design release limit for tritium in liquid effluents. The tritium adjustment will be made in accordance with the following formula:

$$\frac{\text{Annual Liq. H-3 Release}}{\text{Annual Liq. H-3 Release Limit}} + \frac{\text{Annual Gaseous H-3 Release}}{\text{Annual Gaseous H-3 Release Limit}} \leq 2.0$$

5.5 Quarterly Summary

Effluent release summaries are made in accordance with this section. Either release summaries or dose calculations are to be accomplished quarterly. In the event that actual quantities of radioactive materials released in liquid and gaseous effluents for any quarter exceed twice the quarterly limit as described in this section, actual doses must be calculated in accordance with Section 6.0 and a special report shall be prepared and submitted to the NRC.

TABLE 5-1
LIQUID EFFLUENT CONVERSION FACTORS

A. Tritium: The conversion factor is unity because tritium is considered by itself.

B. Noble Gases: The noble gases released in liquid effluents are to be added to noble gases released in gaseous effluents. They are normally insignificant.

C. Radioiodine: For iodines, use Regulatory Guide 1.109 Revision 1, Table E-11, total body dose factors for an adult. Reference isotope (DF_j) is I-131.

ISOTOPE	DF_i (mrem/pCi)	DF_i/DF_j
I-130	8.80E-07	2.58E-01
I-131	3.41E-06	1.00E+00
I-132	1.90E-07	5.57E-02
I-133	7.53E-07	2.21E-01
I-134	1.03E-07	3.02E-02
I-135	4.28E-07	1.26E-01

D. Other: For non-iodine and non-tritium in liquids, use Regulatory Guide 1.109 Revision 1, Table E-11, adult total body dose factors. Although the teen liver receives the highest organ dose, the adult total body dose is limiting because fewer real Curies are required to yield the 6 mrem whole body dose limit than the 20 mrem organ dose limit as determined from calculations based on Appendix I analysis as given in the PBNP FSAR. Radionuclides are normalized to Co-60.

ISOTOPE	DF_i (mrem/pCi)	DF_i/DF_j	ISOTOPE	DF_i (mrem/pCi)	DF_i/DF_j
F-18	6.92E-08	1.47E-02	Ru-106	3.48E-07	7.37E-02
Na-22	1.74E-05	3.69E+00	Rh-103m	(included in Ru-103)	
Na-24	1.70E-06	3.60E-01	Rh-105	5.83E-08	1.24E-02
Cl-38	8.65E-08	1.83E-02	Rh-106	(included in Ru-106)	
Sc-46	3.11E-08	6.59E-04	Cd-109	8.81E-09	1.87E-03
Cr-51	2.66E-09	5.64E-04	Ag-110m	8.79E-08	1.86E-02
Mn-54	8.72E-07	1.85E-01	Sn-113	9.45E-08	2.00E-02
Mn-56	2.04E-08	4.32E-03	Sb-122	7.40E-07	1.57E-01
Fe-55	4.43E-07	9.39E-02	Sb-124	1.11E-06	2.35E-01
Fe-59	3.91E-06	8.28E-01	Sb-125	4.26E-07	9.03E-02
Co-56	1.67E-06	3.54E-01	Te-125m	3.59E-07	7.61E-02
Co-57	2.91E-07	6.17E-02	Te-127m	8.25E-07	1.75E-01
Co-58	1.67E-06	3.54E-01	Te-127	2.38E-08	5.04E-03

Table 5-1 (Continued)

ISOTOPE	DF_i (mrem/pCi)	DF_i/DF_j	ISOTOPE	DF_i (mrem/pCi)	DF_i/DF_j
Co-60	4.72E-06	1.00E+00	Te-129m	1.82E-06	3.86E-01
Zn-65	6.96E-06	1.47E+00	Te-129	7.65E-09	1.62E-03
Cu-64	3.91E-08	8.28E-03	Te-131m	7.05E-07	1.49E-01
Zn-69m	3.73E-08	7.90E-03	Te-131	6.22E-09	1.32E-03
As-76	1.11E-06	2.35E-01	Te-132	1.53E-06	3.24E-01
Se-75	4.39E-07	9.30E-02	Cs-134m	2.29E-08	4.85E-03
Br-82	2.26E-06	4.79E-01	Cs-134	1.21E-04	2.56E+01
Br-83	4.02E-08	8.51E-03	Cs-136	1.85E-05	3.92E+00
Br-84	5.21E-08	1.10E-02	Cs-137	7.14E-05	1.51E+01
Br-85	2.14E-09	4.53E-04	Cs-138	5.40E-08	1.14E-02
Rb-86	9.83E-06	2.08E+00	Ba-133	4.43E-07	9.39E-02
Rb-88	3.21E-08	6.80E-03	Ba-139	2.84E-09	6.02E-04
Rb-89	2.82E-08	5.97E-03	Ba-140	1.33E-06	2.82E-01
Sr-85m	7.97E-08	1.69E-02	Ba-141	1.59E-09	3.37E-04
Sr-85	5.58E-06	1.18E+00	La-140	3.33E-10	7.06E-05
Sr-89	8.84E-06	1.87E+00	La-142	1.45E-11	3.07E-06
Sr-90	1.86E-03	3.94E+02	Ce-139	1.05E-09	2.22E-04
Sr-91	2.29E-07	4.85E-02	Ce-141	7.18E-10	1.52E-04
Sr-92	9.30E-08	1.97E-02	Ce-143	1.35E-10	2.86E-05
Y-88	1.29E-10	2.73E-05	Ce-144	2.62E-08	5.55E-03
Y-90	2.58E-10	5.47E-05	Pr-143	4.56E-10	9.66E-05
Y-91m	3.52E-12	7.46E-07	Pr-144	1.53E-12	3.24E-07
Y-91	3.77E-09	7.99E-04	Nd-147	4.35E-10	9.22E-05
Y-92	2.47E-11	5.23E-06	Eu-152	3.90E-08	8.26E-03
Y-93	7.40E-11	1.57E-05	Ta-182	4.65E-09	9.85E-04
Zr-95	6.60E-09	1.40E-03	W-187	3.01E-08	6.38E-03
Zr-97	1.55E-10	3.28E-05	Au-198	9.08E-09	1.92E-02
Nb-94	3.72E-09	7.88E-04	Hg-203	6.52E-09	1.38E-03
Nb-95	1.86E-09	3.94E-04	Bi-207	2.64E-08	5.59E-03
Nb-97	4.82E-12	1.02E-06	Np-239	6.45E-11	1.37E-05
Mo-90	2.46E-07	5.21E-02	U-235	4.86E-05	1.03E+01
Mo-99	8.20E-07	1.74E-01	U-238	4.54E-05	9.62E+00
Tc-99m	8.89E-09	1.88E-03	Am-241	5.41E-05	1.15E+01
Tc-101	3.59E-09	7.61E-04			
Ru-103	7.97E-08	1.69E-02			
Ru-105	6.08E-09	1.29E-03			

E. Additional Isotopes - To obtain dose factors for isotopes not in this table, consult Regulatory Guide 1.109 Revision 1 or NUREG-0172. For DF_i of isotopes not listed in either Regulatory Guide 1.109, Revision 1, or NUREG-0172, DF_i values may be calculated by scaling to another isotope of the same element by the ratio of MPCs (10 CFR 20, Table II, Col. 2). If the MPC is not available, use the ALI from ICRP-30. If there is no DF for any isotope of an element, use the DF of an isotope of an element in the same chemical family, i.e. Au and Ag, whose ALI is similar. Then scale by ratio of ALIs.

TABLE 5-2
GASEOUS EFFLUENT CONVERSION FACTORS

A. Tritium: The conversion factor is unity because tritium is considered by itself.

B. Noble Gases: Use gamma-body dose factors, DFB_i, from Table B-1 of Regulatory Guide 1.109, Revision 1. Normalize to Xe-133:

ISOTOPE	DFB_i	DFB_i/DFB_j
Ar-41	8.84E-03	3.01E+01
Kr-83m	7.56E-08	2.57E-04
Kr-85m	1.17E-03	3.98E+00
Kr-85	1.61E-05	5.48E-02
Kr-87	5.92E-03	2.01E+01
Kr-88	1.47E-02	5.00E+01
Kr-89	1.66E-02	5.65E+01
Kr-90	1.56E-02	5.31E+01
Xe-131m	9.15E-05	3.11E-01
Xe-133m	2.51E-04	8.54E-01
Xe-133	2.94E-04	1.00E+00
Xe-135m	3.12E-03	1.06E+01
Xe-135	1.81E-03	6.16E+00
Xe-137	1.42E-03	4.83E+00
Xe-138	8.83E-03	3.00E+01

C. Radioiodine: For iodines in gaseous effluents, use thyroid dose factors for an infant from Table E-14 of Regulatory Guide 1.109, Revision 1. Normalize to I-131.

ISOTOPE	DF_i	DF_i/DF_j
I-130	1.48E-03	1.06E-01
I-131	1.39E-02	1.00E+00
I-132	1.58E-04	1.14E-02
I-133	3.31E-03	2.38E-01
I-134	4.15E-05	2.99E-03
I-135	6.49E-04	4.67E-02

D. Other: For particulates in effluents released to the atmosphere, use the ingestion dose factors for a child from Table E-13 of Regulatory Guide 1.109, Revision 1. For isotopes not listed in Table E-13, use NUREG-0172 Table 2. Normalize to Co-60. In using Regulatory Guide 1.109, Revision 1, or NUREG-0172 the table is scanned for the highest DF_i for any organ.

ISOTOPE	DF_i	DF_i/DF_j	ISOTOPE	DF_i	DF_i/DF_j
F-18	2.49E-06	8.50E-02	Tc-101	1.91E-08	6.52E-04
Na-22	5.88E-05	2.01E+00	Ru-103	1.89E-05	6.45E-01
Na-24	5.80E-06	1.98E-01	Ru-105	4.21E-05	1.44E+00
Cl-38	3.11E-06	1.06E-01	Ru-106	1.82E-04	6.21E+00
Sc-46	3.95E-05	1.35E+00	Rh-103m	(included in Ru-103)	
Cr-51	4.72E-07	1.61E-02	Rh-105	1.71E-05	5.84E-01
Mn-54	1.07E-05	3.65E-01	Rh-106	(included in Ru-106)	
Mn-56	4.84E-05	1.65E+00	Cd-109	1.20E-05	4.10E-01
Fe-55	1.15E-05	3.92E-01	Ag-110m	4.33E-05	1.48E+00
Fe-59	2.78E-05	9.49E-01	Sn-113	2.75E-05	9.39E-01
Co-56	3.15E-05	1.08E+00	Sb-122	4.63E-05	1.58E+00
Co-57	4.04E-06	1.38E-01	Sb-124	6.94E-05	2.37E+00
Co-58	1.05E-05	3.58E-01	Sb-125	1.71E-05	5.84E-01
Co-60	2.93E-05	1.00E+00	Te-125m	1.14E-05	3.89E-01
Cu-64	1.15E-05	3.92E-01	Te-127m	8.24E-05	2.81E+00
Zn-65	3.65E-05	1.25E+00	Te-127	1.84E-05	6.28E-01
Zn-69m	3.94E-05	1.34E+00	Te-129m	1.43E-04	4.88E+00
Br-82	7.55E-06	2.58E-01	Te-129	8.34E-06	2.85E-01
Br-83	1.71E-05	5.84E-01	Te-131m	1.01E-04	3.45E+00
Br-84	1.98E-07	6.76E-03	Te-131	4.36E-07	1.49E-02
Br-85	9.12E-04	3.11E-04	Te-132	4.50E-05	1.54E+00
Se-75	1.37E-05	4.68E-01	Cs-134m	1.58E-07	5.39E-03
As-76	6.94E-05	2.37E+00	Cs-134	3.84E-04	1.31E+01
Rb-86	6.70E-05	2.29E+00	Cs-136	6.46E-05	2.20E+00
Rb-88	1.90E-07	6.48E-03	Cs-137	3.27E-04	1.12E+01
Rb-89	1.17E-07	3.99E-03	Cs-138	3.17E-07	1.08E-02
Sr-85m	7.29E-07	2.49E-02	Ba-133	2.77E-05	9.45E-01
Sr-85	5.10E-05	1.74E+00	Ba-139	2.39E-05	8.16E-01
Sr-89	1.32E-03	4.51E+01	Ba-140	8.31E-05	2.84E+00
Sr-90	1.70E-02	5.80E+02	Ba-141	2.00E-07	6.83E-03
Sr-91	5.30E-05	1.81E+00	La-140	9.48E-05	3.24E+00
Sr-92	1.71E-04	5.84E+00	La-142	3.31E-05	1.13E+00
Y-88	5.85E-05	2.00E+00	Ce-141	2.47E-05	8.43E-01
Y-90	1.17E-04	3.99E+00	Ce-139	6.80E-04	2.32E-01
Y-91	8.02E-05	2.74E+00	Ce-143	5.55E-05	1.89E+00
Y-91m	7.48E-07	2.55E-02	Ce-144	1.70E-04	5.80E+00
Y-92	1.04E-04	3.55E+00	Pr-143	4.24E-05	1.45E+00
Y-93	1.70E-04	5.80E+00	Pr-144	8.59E-09	2.93E-03
Zr-95	2.66E-05	9.08E-01	Nd-147	3.58E-05	1.22E+00
Zr-97	1.53E-04	5.22E+00			

TABLE 5-2 (Continued)

ISOTOPE	DF_i	DF_i/DF_j	ISOTOPE	DF_i	DF_i/DF_j
Nb-94	3.24E-05	1.11E+00	Eu-152	1.84E-05	6.28E-01
Nb-95	1.62E-05	5.53E-01	Ta-182	4.05E-05	1.38E+00
Nb-97	1.21E-05	4.13E-01	W-187	3.57E-05	1.22E+00
Mo-90	8.52E-06	2.91E-01	Au-198	3.56E-05	1.22E+00
Mo-99	2.84E-05	9.69E-01	Hg-203	8.90E-06	3.04E-01
Tc-99m	1.03E-06	3.51E-02	Bi-207	7.67E-05	2.62E+00
U-235	3.42E-03	1.17E+02			
U-238	3.27E-03	1.12E+02			
Np-239	2.79E-05	9.52E-01			
Am-241	1.43E-03	4.88E+01			

E. Additional Isotopes: To obtain DF_i/DF_j for isotopes not in this table, use the approach as described in item D, above. For DF_i of isotopes not listed in either Regulatory Guide 1.109, Revision 1 or NUREG-0172, DF_i values may be calculated by scaling to another isotope of the same element by the ratio of MPCs (10 CFR 20, Table II, Col. 2). If the MPC is not available, use the ALI from ICRP-30. If there is no DF for any isotope of an element, use the DF of an isotope in the same chemical family, i.e. Cd and Hg, whose ALI is similar. Then scale by ratio of the ALIs.

F. Notes

(1) For radioiodines in gaseous effluents, ingestion dose factors are used, because the grass-cow-milk pathway is limiting.

(2) For particulates in gaseous effluents, ingestion dose factors are used, because ingestion was generally the most significant dose pathway. Note also that a significant portion of inhaled particulates is eventually swallowed, thereby further confirming the appropriateness of this approach.

6.0 MANUAL CALCULATION OF DOSES RESULTING FROM EFFLUENTS

The methodology for calculating doses resulting from PBNP radioactive effluents is presented in this section. Doses are only required to be calculated if quarterly releases exceed twice the quarterly limit. Compliance with Appendix I dose objectives are demonstrated quarterly by either summarizing releases in accordance with Section 5.0 or calculating doses in accordance with this section.

6.1 Basis

There are, of course, a very large number of exposure pathways that can be considered for calculating dose to any offsite individual. However, the actual pathways to be considered for this procedure are limited to those pathways found most significant in the 10 CFR 50 Appendix I evaluation for PBNP as contained in Appendix I of the PBNP FSAR. These are as follows:

A. Gaseous Releases

1. Radioiodine dose to an infant thyroid via the cow or goat milk pathway at the site boundary (1300 m) in SSE sector.

2. Noble gas dose:

   (a) Gamma dose to the whole body at the site boundary (1460 m) in the SSW sector.

   (b) Beta dose to the skin at the site boundary (1460 m) in the SSW sector.

3. Tritium dose is not normally limiting and should only be calculated if tritium releases are exceptionally high. Calculate adult inhalation dose to the whole body at the site boundary (1460 m) in the SSW sector.

4. Dose from particulates is not normally limiting and should only be calculated if particulate releases are exceptionally high. Calculate the liver dose to a child at the site boundary (1460 m) in the SSW sector via the stored vegetable pathway as described in Appendix I to the PBNP FSAR.

B. Liquid Effluents

1. Radioiodine dose from liquid effluents is not normally limiting and should only be calculated if radioiodine releases in liquid effluents are exceptionally high. Calculate dose to adult thyroid from the fish pathway with fish at the edge of the initial mixing zone (dilution factor of 5) and a consumption rate of 21 Kg/year. Further assume 24 hours holdup time before consumption.

2. Noble gases from liquid effluents are normally several orders of magnitude less than those in gaseous effluents. They may be presumed to diffuse into the air and should be added to the noble gases in gaseous effluents.

3. Tritium dose is not normally limiting and should only be calculated if tritium releases are exceptionally high. Calculate adult ingestion dose to the whole body from drinking water at Two Rivers, using a total dilution factor of 100.

4. For other isotopes, the limiting dose is that to the whole body of the adult from eating fish obtained at the edge of the initial mixing zone. The critical organ is the liver of the teenager from eating fish obtained at the edge of the initial mixing zone.

C. Other Pathways

In the course of the Appendix I evaluation for PBNP, the exposure pathways listed in A. and B., above, were found to be the most significant. Other pathways, however, were also considered. These need not be analyzed, unless the unique circumstances of a particulate release suggest their consideration. A complete description of all pathways is presented in Section 8.0 of Appendix I of the PBNP FSAR. They are:

1. Gaseous: Doses to total body, skin, bone, liver, thyroid, kidney, lung, and GI tract:

   Inhalation - SSW (1460 m)
   Deposition on ground - SSW (1460 m)
   Fresh Vegetables - SSW (1460 m)
   Stored Vegetables - SSW (1460 m)
   Cow milk - SSE (1300 m)
   Goat milk - SSE (1300 m)
   Direct exposure (β, γ) - SSW (1460 m)

2. Liquid: Doses to total body, skin, bone, liver, thyroid, kidney, lung, and GI tract:

Ingestion of potable water - Two Rivers (12 mi. S)
Ingestion of fish - edge of initial mixing zone
Ingestion of fresh vegetables - Two Rivers (12 mi. S)
Ingestion of stored vegetables - Two Rivers (12 mi. S)
Ingestion of cow's milk - Two Rivers (12 mi. S)
Ingestion of meat - Two Rivers (12 mi. S)
Swimming - edge of initial mixing zone
Boating - edge of initial mixing zone
Shoreline deposits - (1500 m, S)

6.2 Meteorology

Table I.4-2 of Appendix I to the PBNP FSAR is included herewith as a convenient summary of χ/Q and D/Q values. The Drumming Area Vent (DAV) is not shown separately in the table, because its exit velocity is identical with the Auxiliary Building Vent (ABV). Hence, DAV releases are to be included with ABV releases. For purposes of this procedure, gaseous releases should be summarized as follows:

A. Category IA: Auxiliary Building Vent (ABV) - Include releases from ABV, gas decay tanks, and drumming area vent (DAV).

B. Category IB: Gas decay tank through the ABV.

C. Category IIA: Purge Vent - Include releases from continuous purge, intermittent purge, gas stripper building, and turbine building roof exhausters.

Thus, in applying this procedure, the χ/Q's and D/Q's from only lines IA, IB, and IIA of Table I.4-2 are required.

6.3 Procedure for Gaseous Effluents

A. Group all releases into the categories described above.

B. Calculate Infant Thyroid Dose:

During growing season (April through September)

1. Perform this section for all iodines for each release type.

2. Select grazing season D/Q's from Table I.4-2. Assume nearest cow is at site boundary at 1300 meters in SSE direction.

3. Use the following:

$$D_{ij} = DK_i \times Q_{ij} \times D/Q_j$$

where: D_{ij} = dose to thyroid in mrem for iodine i and release type.

Q_{ij} = curies released of iodine i and release type j.

D/Q_j = deposition constant in m^{-2} for release type j.

DK_i = combined dose conversion constants derived from equations C-5, C-7, C-10, C-11, and C-13 of Regulatory Guide 1.109 in units of mrem-m^2 per Ci:

Isotope	DK_i
I-130	6.96E+06
I-131	8.18E+09
I-132	1.12E+00
I-133	7.64E+07
I-134	6.85E-12
I-135	1.59E+05

4. Sum the results for all iodines and all release types.

Non-grazing season (October through March)

1. Perform this section for all iodines for each release type.

2. Select annual χ/Q values from Table I.4-2. Assume receptor is at site boundary at 1460 meters in SSW direction.

3. Use the following:

$$D_{ij} = DL_i \times Q_{ij} \times \chi/Q_j$$

where: D_{ij} = dose to thyroid in mrem for iodine i and release type j.

Q_{ij} = curies released of iodine j and release type j.

χ/Q_j = annual diffusion factor in sec/m^3 for release type j.

DL_i = combined dose conversion constants derived from equations C-3 and C-4 of Regulatory Guide 1.109 Revision 1 in units of mrem-m^3 per Ci-sec:

Isotope	DL_i
I-130	5.06E+04
I-131	4.70E+05
I-132	5.37E+03
I-133	1.13E+05
I-134	1.41E+03
I-135	2.21E+04

4. Sum the results for all iodines and all release types.

C. Calculate gamma and beta doses to whole body and skin, respectively, from noble gases:

1. Perform this section for all noble gases for each release type.

2. Select annual χ/Q values from Table I.4-2. Assume receptor is at site boundary (1460 m) in SSW sector.

3. Use the following:

$$D_{ij} = 3.17 \times 10^{4} \times DN_i \times Q_{ij} \times \chi/Q_j$$

where: D_{ij} = dose in mrem from noble gas i in effluent type j.

DN_i = dose conversion factor in mrem-m^3 per pCi-yr from Table B-1 of Regulatory Guide 1.109 Revision 1 (October 1977). Use DFS_i for skin dose and DFB_i for whole body gamma dose.

Q_{ij} = curies released of noble gas i and release type j.

χ/Q_j = diffusion constant in sec/m^3 for release type j.

3.17×10^{4} = pCi/Ci divided by sec/yr

4. Sum the beta dose results for all noble gases and all release types.

5. Sum the whole body gamma dose results for all noble gases and all release types.

6. Sum the beta and gamma doses to obtain total skin dose.

D. If tritium calculations appear advisable, calculate adult inhalation dose (about twice the infant inhalation dose) as follows:

$$D_j = 40.1 \times Q_j \times \chi/Q_j$$

where: D_j = the tritium dose to an adult in mrem.

Q_j = curies of tritium in release type j.

χ/Q_j = diffusion factor in sec/m^3 for release type j.

40.1 = dose conversion factor for tritium in $mrem\text{-}m^3$ per Ci-sec based on equations C-3 and C-4 in Regulatory Guide 1.109 Revision 1.

E. Particulates in gaseous releases will not be limiting under any reasonably anticipated conditions. If particulates are suspected to be high, child inhalation dose to whole body will be calculated. Based on the ratios observed in the Appendix I evaluation for PBNP, the inhalation dose will be multiplied by a factor of 17.9 to obtain an approximate screening criterion for dose to a child's liver via the stored vegetable pathway. If this dose exceeds the limits of 10 CFR 50 Appendix I a more precise calculation of particulate doses will be performed by the Nuclear Plant Engineering and Regulation Section in accordance with Regulatory Guide 1.109 Revision 1. Child inhalation dose is calculated as follows:

1. Perform this section for all particulates for each release type.

2. Select annual χ/Q values from Table I.4-2. Assume receptor is at site boundary (1460 meters) in SSW sector.

3. Use the following:

$$D_{ij} = 1.17 \times 10^8 \times Q_{ij} \times \chi/Q_j \times DF_i$$

where: D_{ij} = total body inhalation dose in mrem from the particulate i in effluent type j,

1.17×10^8 = conversion factor in $pCi\text{-}m^3$ per Ci-sec.

Q_{ij} = curies of particulate i in effluent type j.

χ/Q_j = diffusion factor in sec/m^3 for release type j,

DF_i = dose factor in mrem/pCi for isotope i from Table E-9 of Regulatory Guide 1.109 Revision 1 or NUREG-0172, Table 6 under total body column.

4. Sum the results for all isotopes and all release types.

5. Multiply by 17.9 to obtain screening dose to child's liver.

6.4 Procedure for Liquid Effluents

A. Calculate radioiodine dose to the adult thyroid from eating fish obtained at the edge of the initial mixing zone (dilution factor = 5). Assume a consumption rate of 21 Kg/yr and a 24-hour holdup time before consumption.

1. Use the following:

$$D_i = \frac{1120\ UaM}{F}\ Q_i\ B_i\ DF_i e^{-\lambda_i t_p}$$

where: D_i = dose in mrem from isotope i

1120 = factor to convert Ci/yr per ft^3/sec to pCi/l. It therefore has units of (pCi/Ci) per (ℓ/yr)/(ft^3/sec)

Ua = consumption rate = 21 Kg/yr

M = mixing ratio = 1/5 (inverse of dilution factor)

F = discharge flow in ft^3/sec. Average for PBNP = 644.

Q_i = curies of isotope i released during period.

B_i = bioaccumulation factor for freshwater fish = 15 (Table A-1 of Regulatory Guide 1.109 Revision 1)

DF_i = dose conversion factor from Table E-11 of Regulatory Guide 1.109 Revision 1 in mrem/pCi ingested for adult thyroid.

λ_i = decay constant for isotope i in hr^{-1}.

t_p = holdup time = 24 hours.

2. The equation then simplifies to:

$$D_i = 1.1E+02\ Q_i\ DF_i e^{-\lambda_i t_p}$$

3. The exponential term may be ignored for all isotopes with half lives longer than two days.

4. Sum the results for all radioiodines.

5. Multiply the results in Step 4 by the following dose constants to estimate the total thyroid dose for the appropriate age group.

Age Group	Total Thyroid Dose Constants
Adult	1.23
Teen	1.25
Child	1.54
Infant	1.08

(The dose constants are obtained by dividing the total thyroid dose for each age group by the adult thyroid fish pathway dose as presented in FSAR Tables I.8-1 to I.8-4 and I.8-6 to I.8-9.)

6. Radioiodine decay constants, half-lives, dose factors and decay factors are listed below:

ISOTOPE	T(½)	$\lambda(hr^{-1})$	DF adult thyroid -ingestion	$e^{-\lambda_i t_p}$
I-130	12.36h	5.61E-02	1.89E-04	2.60E-01
I-131	8.04d	3.59E-03	1.95E-03	9.17E-01
I-132	2.30h	3.01E-01	1.90E-05	7.29E-04
I-133	20.8 h	3.33E-02	3.63E-04	4.50E-01
I-134	52.6 m	7.91E-01	4.99E-06	5.69E-09
I-135	6.61h	1.05E-01	7.65E-05	8.05E-02

Half-life values are from ICRP Publication 30, Supplements to Parts 1, 2, 3.

B. Noble gas releases in liquid effluents are usually several orders of magnitude less than those in gaseous effluents. They may be presumed to diffuse into the air and should be added to the noble gases in gaseous effluents in release type IIA (ground level release).

C. Tritium dose is not normally limiting and usually need not be calculated. If tritium releases are exceptionally high, calculate the maximum adult ingestion dose to whole body from drinking water at Two Rivers, with a dilution factor of 100.

1. The equation is similar to that for radioiodines in A.1, above, except that the bioaccumulation factor (B_i) = 1.

2. With the following values for the constants, M = 0.01; a consumption rate, Ua, of 730 ℓ/yr; and a dose conversion factor, DF_i, of 1.05E-07 mrem/pCi, formula A.1 simplifies to:

$$D_T = 1.33E\text{-}06\ Q_T$$

where: D_T = dose from tritium in mrem

Q_T = curies of tritium released in liquid effluents.

D. For all isotopes other than radioiodine, noble gas, or tritium, calculate the dose to the liver of a teenager from eating fish obtained at the edge of the initial mixing zone.

1. The equation is similar to that for radioiodines in A.1, above, except for a different consumption rate. Consumption rate is 16 Kg/yr.

2. Use the following:

$$D_i = 5.57\ Q_i\ B_i\ DF_i\ e^{-\lambda_i t_p}$$

where: D_i = dose from isotope i in mrem,

Q_i = curies of isotope i released,

B_i = bioaccumulation factor for freshwater fish from Table A-1 of Regulatory Guide 1.109 Revision 1,

DF_i = dose conversion factor from Table E-12 of Regulatory Guide 1.109 Revision 1 or NUREG-0172, Table 3 in mrem/pCi ingested for teenager liver.

λ_i = decay constant for isotope i in hr^{-1},

t_p = holdup time = 24 hours

3. The exponential may be ignored for all isotopes with half-lives longer than two days.

4. Sum the results for all radioisotopes.

The dose to the whole body of an adult from eating fish obtained from the edge of the initial mixing zone is accomplished by utilizing formula A.1 and the appropriate adult whole body dose conversion factors from Table E-11 (or NUREG-0172, Table 4) and bioaccumulation factor from Table A-1 of Regulatory Guide 1.109. Based on the FSAR analysis, Cs-134, 136, and 137 account for >99% of the adult whole body dose and teen liver dose via the fish pathway.

TABLE I.4-2

POINT BEACH NUCLEAR PLANT
SUMMARY OF ANNUAL AND GRAZING SEASON X/Q's AND D/Q's FOR HIGHEST OFFSITE SECTORS

Release Mode				Highest Sectors for Site Boundary & Animal Locations						Highest Sector for Nearest Resident & Vegetable Garden Location		
				S Sector (1,270 m)			SSE Sector (1,300 m)			SSW Sector (1,440 m)		
	Location	Type			X/Q x 10^7	D/Q x 10^9		X/Q x 10^7	D/Q x 10^9		X/Q x 10^7	D/Q x 10^9
IA	Auxiliary Building Vent	Continuous	Conditionally elevated	A	4.01	13.3	A	3.11	20.1	A	2.86	5.90
				GS	2.75	6.78	GS	2.08	11.7	GS	1.57	7.08
IB	Auxiliary Building Vent	Intermittent (during gas decay tank releases)	Conditionally elevated	A	9.36	31.0	A	9.35	60.5	A	8.02	16.6
				GS	7.61	18.8	GS	8.46	47.6	GS	9.02	17.9
IIA	Unit 1 and Unit II Purge Vent	Continuous 10 cfm Vent	Ground Level	A	60.7	47.9	A	19.5	24.6	A	23.9	21.8
				GS	51.9	34.1	GS	13.1	14.7	GS	28.0	26.3
IIB	Unit 1 and Unit II Purge Vent	Intermittent (purge)	Conditionally elevated	A	26.9	47.3	A	16.8	50.2	A	18.9	28.7
				GS	22.3	33.5	GS	12.4	37.8	GS	21.0	30.5
IIC	Gas Stripper Building (through Unit 2 Purge Vent)	Continuous	Ground Level	A	60.7	47.9	A	19.5	24.6	A	23.9	21.8
				GS	51.9	34.1	GS	13.1	14.7	GS	28.0	26.3
III	Turbine Building Roof Exhausters	Continuous	Ground Level	A	70.4	47.9	A	21.0	24.6	A	26.6	21.8
				GS	60.8	34.1	GS	14.1	14.7	GS	31.4	26.3

Notes: A = Annual Average; GS = Grazing or Growing Season; X/Q in sec/m^3; D/Q in m^{-2}
Units of X/Q are in 10^{-7} sec/m^3, Units of D/Q are in $10^{-9} m^{-2}$

TABLE A-1

BIOACCUMULATION FACTORS TO BE USED IN THE ABSENCE OF SITE-SPECIFIC DATA
(pCi/kg per pCi/liter)*

ELEMENT	FRESHWATER		SALTWATER	
	FISH	INVERTEBRATE	FISH	INVERTEBRATE
H	9.0E-01	9.0E-01	9.0E-01	9.3E-01
C	4.6E 03	9.1E 03	1.8E 03	1.4E 03
NA	1.0E 02	2.0E 02	6.7E-02	1.9E-01
P	1.0E 05	2.0E 04	2.9E 04	3.0E 04
CR	2.0E 02	2.0E 03	4.0E 02	2.0E 03
MN	4.0E 02	9.0E 04	5.5E 02	4.0E 02
FE	1.0E 02	3.2E 03	3.0E 03	2.0E 04
CO	5.0E 01	2.0E 02	1.0E 02	1.0E 03
NI	1.0E 02	1.0E 02	1.0E 02	2.5E 02
CU	5.0E 01	4.0E 02	6.7E 02	1.7E 03
ZN	2.0E 03	1.0E 04	2.0E 03	5.0E 04
BR	4.2E 02	3.3E 02	1.5E-02	3.1E 00
RB	2.0E 03	1.0E 03	8.3E 00	1.7E 01
SR	3.0E 01	1.0E 02	2.0E 00	2.0E 01
Y	2.5E 01	1.0E 03	2.5E 01	1.0E 03
ZR	3.3E 00	6.7E 00	2.0E 02	8.0E 01
NB	3.0E 04	1.0E 02	3.0E 04	1.0E 02
MO	1.0E 01	1.0E 01	1.0E 01	1.0E 01
TC	1.5E 01	5.0E 00	1.0E 01	5.0E 01
RU	1.0E 01	3.0E 02	3.0E 00	1.0E 03
RH	1.0E 01	3.0E 02	1.0E 01	2.0E 03
TE**	4.0E 02	6.1E 03	1.0E 01	1.0E 02
I	1.5E 01	5.0E 00	1.0E 01	5.0E 01
CS	2.0E 03	1.0E 03***	4.0E 01	2.5E 01
BA	4.0E 00	2.0E 02	1.0E 01	1.0E 02
LA	2.5E 01	1.0E 03	2.5E 01	1.0E 03
CE	1.0E 00	1.0E 03	1.0E 01	6.0E 02
PR	2.5E 01	1.0E 03	2.5E 01	1.0E 03
ND	2.5E 01	1.0E 03	2.5E 01	1.0E 03
W	1.2E 03	1.0E 01	3.0E 01	3.0E 01
NP	1.0E 01	4.0E 02	1.0E 01	1.0E 01

*Values in Table A-1 are taken from Reference 6 unless otherwise indicated.
**Data taken from Reference 8.
***Data taken from Reference 7.

TABLE B-1

DOSE FACTORS FOR EXPOSURE TO A SEMI-INFINITE CLOUD OF NOBLE GASES

Nuclide	β-air* (DF_i^β)	β-Skin** (DFS_i)	γ-Air* (DF_i^γ)	γ-Body** (DFB_i)
Kr-83m	2.88E-04***	---	1.93E-05	7.56E-08
Kr-85m	1.97E-03	1.46E-03	1.23E-03	1.17E-03
Kr-85	1.95E-03	1.34E-03	1.72E-05	1.61E-05
Kr-87	1.03E-02	9.73E-03	6.17E-03	5.92E-03
Kr-88	2.93E-03	2.37E-03	1.52E-02	1.47E-02
Kr-89	1.06E-02	1.01E-02	1.73E-02	1.66E-02
Kr-90	7.83E-03	7.29E-03	1.63E-02	1.56E-02
Xe-131m	1.11E-03	4.76E-04	1.56E-04	9.15E-05
Xe-133m	1.48E-03	9.94E-04	3.27E-04	2.51E-04
Xe-133	1.05E-03	3.06E-04	3.53E-04	2.94E-04
Xe-135m	7.39E-04	7.11E-04	3.36E-03	3.12E-03
Xe-135	2.46E-03	1.86E-03	1.92E-03	1.81E-03
Xe-137	1.27E-02	1.22E-02	1.51E-03	1.42E-03
Xe-138	4.75E-03	4.13E-03	9.21E-03	8.83E-03
Ar-41	3.28E-03	2.69E-03	9.30E-03	8.84E-03

* $\frac{\text{mrad-m}^3}{\text{pCi-yr}}$

** $\frac{\text{mrem-m}^3}{\text{pCi-yr}}$

*** 2.88E-04 = 2.88×10^{-4}

TABLE E-4

RECOMMENDED VALUES FOR U_{ap} TO BE USED FOR THE AVERAGE INDIVIDUAL IN LIEU OF SITE-SPECIFIC DATA

Pathway	Child	Teen	Adult
Fruits, vegetables, & grain (kg/yr)*	200	240	190
Milk (ℓ/yr)*	170	200	110
Meat & poultry (kg/yr)*	37	59	95
Fish (kg/yr)*	2.2	5.2	6.9
Seafood (kg/yr)*	0.33	0.75	1.0
Drinking water (ℓ/yr)**	260	260	370
Shoreline recreation (hr/yr)**	9.5	67	8.3
Inhalation (m^3/yr)	3700***	8000***	8000†

*Consumption rate obtained from Reference 19 and age-prorated using techniques in Reference 10.

**Data obtained directly from Reference 10.

***Inhalation rate derived from data provided in Reference 20.

†Data obtained directly from Reference 20.

TABLE E-5

RECOMMENDED VALUES FOR U_{ap} TO BE USED FOR THE MAXIMUM EXPOSED INDIVIDUAL IN LIEU OF SITE-SPECIFIC DATA

Pathway	Infant	Child	Teen	Adult
Fruits, vegetables & grain (kg/yr)*,**	-	520	630	520
Leafy vegetables (kg/yr)*	-	26	42	64
Milk (ℓ/yr)*	330	330	400	310
Meat & poultry (kg/yr)*	-	41	65	110
Fish (fresh or salt) (kg/yr)***	-	6.9	16	21
Other seafood (kg/yr)*	-	1.7	3.8	5
Drinking water (ℓ/yr)†	330	510	510	730
Shoreline recreation (hr/yr)†	-	14	67	12
Inhalation (m^3/yr)	1400††	3700†††	8000†††	8000††

*Consumption rate obtained from Reference 19 for average individual and age-prorated and maximized using techniques contained in Reference 10.

**Consists of the following (on a mass basis): 22% fruit, 54% vegetables (including leafy vegetables), and 24% grain.

***Consumption rate for adult obtained by averaging data from References 10 and 21-24 and age-prorated using techniques contained in Reference 10.

†Data obtained directly from Reference 10.

††Data obtained directly from Reference 20.

†††Inhalation rate derived from data provided in Reference 20.

TABLE E-7

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INHALATION DOSE FACTORS FOR ADULTS
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H 3	NO DATA	1.58E-07	1.58E-07	1.58E-07	1.58E-07	1.58E-07	1.58E-07
C 14	2.27E-06	4.26E-07	4.26E-07	4.26E-07	4.26E-07	4.26E-07	4.26E-07
NA 24	1.28E-06	1.28E-06	1.28E-06	1.28E-06	1.28E-06	1.28E-06	1.28E-06
P 32	1.65E-04	9.64E-06	6.26E-06	NO DATA	NO DATA	NO DATA	1.08E-05
CR 51	NO DATA	NO DATA	1.25E-08	7.44E-09	2.85E-09	1.80E-06	4.15E-07
MN 54	NO DATA	4.95E-06	7.87E-07	NO DATA	1.23E-06	1.75E-04	9.67E-06
MN 56	NO DATA	1.55E-10	2.29E-11	NO DATA	1.63E-10	1.18E-06	2.53E-06
FE 55	3.07E-06	2.12E-06	4.93E-07	NO DATA	NO DATA	9.01E-06	7.54E-07
FE 59	1.47E-06	3.47E-06	1.32E-06	NO DATA	NO DATA	1.27E-04	2.35E-05
CO 58	NO DATA	1.98E-07	2.59E-07	NO DATA	NO DATA	1.16E-04	1.33E-05
CO 60	NO DATA	1.44E-06	1.85E-06	NO DATA	NO DATA	7.46E-04	3.56E-05
NI 63	5.40E-05	3.93E-06	1.81E-06	NO DATA	NO DATA	2.23E-05	1.67E-06
NI 65	1.92E-10	2.62E-11	1.14E-11	NO DATA	NO DATA	7.00E-07	1.54E-06
CU 64	NO DATA	1.83E-10	7.69E-11	NO DATA	5.78E-10	8.48E-07	6.17E-06
ZN 65	4.05E-06	1.29E-05	5.82E-06	NO DATA	8.62E-06	1.08E-04	6.68E-06
ZN 69	4.23E-12	8.14E-12	5.65E-13	NO DATA	5.27E-12	1.15E-07	2.04E-09
BR 83	NO DATA	NO DATA	3.01E-08	NO DATA	NO DATA	NO DATA	2.90E-08
BR 84	NO DATA	NO DATA	3.91E-08	NO DATA	NO DATA	NO DATA	2.05E-13
BR 85	NO DATA	NO DATA	1.60E-09	NO DATA	NO DATA	NO DATA	LT E-24
RB 86	NO DATA	1.69E-05	7.37E-06	NO DATA	NO DATA	NO DATA	2.08E-06
RB 88	NO DATA	4.84E-08	2.41E-08	NO DATA	NO DATA	NO DATA	4.18E-19
RB 89	NO DATA	3.20E-08	2.12E-08	NO DATA	NO DATA	NO DATA	1.19E-21
SR 89	3.80E-05	NO DATA	1.09E-06	NO DATA	NO DATA	1.75E-04	4.37E-05
SR 90	1.24E-02	NO DATA	7.62E-04	NO DATA	NO DATA	1.20E-03	9.02E-05
SR 91	7.74E-09	NO DATA	3.13E-10	NO DATA	NO DATA	4.56E-06	2.39E-05
SR 92	8.43E-10	NO DATA	3.64E-11	NO DATA	NO DATA	2.06E-06	5.38E-06
Y 90	2.61E-07	NO DATA	7.01E-09	NO DATA	NO DATA	2.12E-05	6.32E-05
Y 91M	3.26E-11	NO DATA	1.27E-12	NO DATA	NO DATA	2.40E-07	1.66E-10
Y 91	5.78E-05	NO DATA	1.55E-06	NO DATA	NO DATA	2.13E-04	4.81E-05
Y 92	1.29E-09	NO DATA	3.77E-11	NO DATA	NO DATA	1.96E-06	9.19E-06

TABLE E-7, CONT'D

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INHALATION DOSE FACTORS FOR ADULTS
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	1.18E-08	NO DATA	3.26E-10	NO DATA	NO DATA	6.06E-06	5.27E-05
ZR 95	1.34E-05	4.30E-06	2.91E-06	NO DATA	6.77E-06	2.21E-04	1.88E-05
ZR 97	1.21E-08	2.45E-09	1.13E-09	NO DATA	3.71E-09	9.84E-06	6.54E-05
NB 95	1.76E-06	9.77E-07	5.26E-07	NO DATA	9.67E-07	6.31E-05	1.30E-05
MO 99	NO DATA	1.51E-08	2.87E-09	NO DATA	3.64E-08	1.14E-05	3.10E-05
TC 99M	1.29E-13	3.64E-13	4.63E-12	NO DATA	5.52E-12	9.55E-08	5.20E-07
TC101	5.22E-15	7.52E-15	7.38E-14	NO DATA	1.35E-13	4.99E-08	1.36E-21
RU103	1.91E-07	NO DATA	8.23E-08	NO DATA	7.29E-07	6.31E-05	1.38E-05
RU105	9.88E-11	NO DATA	3.89E-11	NO DATA	1.27E-10	1.37E-06	6.02E-06
RU106	8.64E-06	NO DATA	1.09E-06	NO DATA	1.67E-05	1.17E-03	1.14E-04
AG110M	1.35E-06	1.25E-06	7.43E-07	NO DATA	2.46E-06	5.79E-04	3.78E-05
TE125M	4.27E-07	1.98E-07	5.84E-08	1.31E-07	1.55E-06	3.92E-05	8.83E-06
TE127M	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	1.22E-06	5.64E-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	8.74E-09	5.45E-09	3.63E-09	6.88E-09	3.86E-08	1.82E-05	6.95E-05
TE131	1.39E-12	7.44E-13	4.49E-13	1.17E-12	5.66E-12	1.74E-07	2.30E-09
TE132	3.25E-08	2.09E-08	2.02E-08	2.37E-08	1.82E-07	3.60E-05	6.37E-05
I 130	5.72E-07	1.68E-06	6.60E-07	1.42E-04	2.61E-06	NO DATA	9.61E-07
I 131	3.15E-06	4.47E-06	2.56E-06	1.49E-03	7.66E-06	NO DATA	7.85E-07
I 132	1.45E-07	4.07E-07	1.45E-07	1.43E-05	6.48E-07	NO DATA	5.08E-08
I 133	1.08E-06	1.85E-06	5.65E-07	2.69E-04	3.23E-06	NO DATA	1.11E-06
I 134	8.05E-08	2.16E-07	7.69E-08	3.73E-06	3.44E-07	NO DATA	1.26E-10
I 135	3.35E-07	8.73E-07	3.21E-07	5.50E-05	1.39E-06	NO DATA	6.56E-07
CS134	4.66E-05	1.06E-04	9.10E-05	NO DATA	3.59E-05	1.22E-05	1.30E-06
CS136	4.88E-06	1.83E-05	1.38E-05	NO DATA	1.07E-05	1.50E-06	1.46E-06
CS137	5.98E-05	7.76E-05	5.35E-05	NO DATA	2.78E-05	9.40E-06	1.05E-06
CS138	4.14E-08	7.76E-08	4.05E-08	NO DATA	6.08E-08	6.87E-09	2.33E-13
BA139	1.17E-10	8.32E-14	3.42E-12	NO DATA	7.78E-14	4.70E-07	1.12E-07

TABLE E-7, CONT'D

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INHALATION DOSE FACTORS FOR ADULTS
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
BA140	4.88E-06	6.13E-09	4.21E-07	NO DATA	2.09E-09	1.59E-04	2.73E-05
BA141	1.25E-11	9.41E-15	4.20E-13	NO DATA	8.75E-15	2.42E-07	1.45E-17
BA142	3.29E-12	3.38E-15	2.07E-13	NO DATA	2.96E-15	1.49E-07	1.96E-26
LA140	4.30E-08	2.17E-08	5.73E-09	NO DATA	NO DATA	1.70E-05	5.73E-05
LA142	8.54E-11	3.88E-11	9.65E-12	NO DATA	NO DATA	7.91E-07	2.64E-07
CE141	2.49E-06	1.69E-06	1.91E-07	NO DATA	7.83E-07	4.52E-05	1.50E-05
CE143	2.33E-08	1.72E-08	1.91E-09	NO DATA	7.60E-09	9.97E-06	2.83E-05
CE144	4.29E-04	1.79E-04	2.30E-05	NO DATA	1.06E-04	9.72E-04	1.02E-04
PR143	1.17E-06	4.69E-07	5.87E-08	NO DATA	2.70E-07	3.51E-05	2.50E-05
PR144	3.76E-12	1.56E-12	1.91E-13	NO DATA	8.81E-13	1.27E-07	2.69E-18
ND147	6.59E-07	7.62E-07	4.56E-08	NO DATA	4.45E-07	2.76E-05	2.16E-05
W 187	1.06E-09	8.85E-10	3.10E-10	NO DATA	NO DATA	3.63E-06	1.94E-05
NP239	2.87E-08	2.82E-09	1.55E-09	NO DATA	8.75E-09	4.70E-06	1.49E-05

TABLE E-8

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INHALATION DOSE FACTORS FOR TEENAGER
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H 3	NO DATA	1.59E-07	1.59E-07	1.59E-07	1.59E-07	1.59E-07	1.59E-07
C 14	3.25E-06	6.09E-07	6.09E-07	6.09E-07	6.09E-07	6.09E-07	6.09E-07
NA 24	1.72E-06	1.72E-06	1.72E-06	1.72E-06	1.72E-06	1.72E-06	1.72E-06
P 32	2.36E-04	1.37E-05	8.95E-06	NO DATA	NO DATA	NO DATA	1.16E-05
CR 51	NO DATA	NO DATA	1.69E-08	9.57E-09	3.84E-09	2.62E-06	3.75E-07
MN 54	NO DATA	6.37E-06	1.05E-06	NO DATA	1.59E-06	2.48E-04	8.35E-06
MN 56	NO DATA	2.12E-10	3.15E-11	NO DATA	2.24E-10	1.90E-06	7.18E-06
FE 55	4.18E-06	2.98E-06	6.93E-07	NO DATA	NO DATA	1.55E-05	7.99E-07
FE 59	1.09E-06	4.62E-06	1.79E-06	NO DATA	NO DATA	1.91E-04	2.23E-05
CO 58	NO DATA	2.59E-07	3.47E-07	NO DATA	NO DATA	1.68E-04	1.19E-05
CO 60	NO DATA	1.87E-06	2.48E-06	NO DATA	NO DATA	1.09E-03	3.24E-05
NI 63	7.25E-05	5.43E-06	2.47E-06	NO DATA	NO DATA	3.84E-05	1.77E-06
NI 65	2.73E-10	3.66E-11	1.59E-11	NO DATA	NO DATA	1.17E-06	4.59E-06
CU 64	NO DATA	2.54E-10	1.06E-10	NO DATA	8.01E-10	1.39E-06	7.68E-06
ZN 65	4.82E-06	1.07E-05	7.80E-06	NO DATA	1.08E-05	1.55E-04	5.83E-06
ZN 69	6.04E-12	1.15E-11	8.07E-13	NO DATA	7.53E-12	1.98E-07	3.56E-08
NB 93	NO DATA	NO DATA	4.30E-08	NO DATA	NO DATA	NO DATA	LT E-24
MO 94	NO DATA	NO DATA	5.41E-08	NO DATA	NO DATA	NO DATA	LT E-24
RB 86	NO DATA	NO DATA	2.29E-09	NO DATA	NO DATA	NO DATA	LT E-24
RB 88	NO DATA	2.38E-05	1.05E-05	NO DATA	NO DATA	NO DATA	2.21E-06
RB 89	NO DATA	6.82E-08	3.40E-08	NO DATA	NO DATA	NO DATA	3.65E-15
SR 89	NO DATA	4.40E-08	2.91E-08	NO DATA	NO DATA	NO DATA	4.22E-17
SR 90	5.43E-05	NO DATA	1.56E-06	NO DATA	NO DATA	3.02E-04	4.64E-05
SR 91	1.35E-02	NO DATA	8.35E-04	NO DATA	NO DATA	2.06E-03	9.56E-05
SR 91	1.10E-08	NO DATA	4.39E-10	NO DATA	NO DATA	7.59E-06	3.24E-05
SR 92	1.19E-09	NO DATA	5.08E-11	NO DATA	NO DATA	3.43E-06	1.49E-05
Y 90	3.73E-07	NO DATA	1.00E-08	NO DATA	NO DATA	3.66E-05	6.99E-05
Y 91M	4.63E-11	NO DATA	1.77E-12	NO DATA	NO DATA	4.00E-07	3.77E-09
Y 91	8.26E-05	NO DATA	2.21E-06	NO DATA	NO DATA	3.67E-04	5.11E-05
Y 92	1.84E-09	NO DATA	5.36E-11	NO DATA	NO DATA	3.35E-06	2.06E-05

TABLE E-8, CONT'D

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INHALATION DOSE FACTORS FOR TEENAGER
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	1.69E-08	NO DATA	4.65E-10	NO DATA	NO DATA	1.04E-05	7.24E-05
ZR 95	1.82E-05	5.73E-06	3.94E-06	NO DATA	8.42E-06	3.36E-04	1.86E-05
ZR 97	1.72E-08	3.40E-09	1.57E-09	NO DATA	5.15E-09	1.62E-05	7.88E-05
NB 95	2.32E-06	1.29E-06	7.08E-07	NO DATA	1.25E-06	9.39E-05	1.21E-05
MO 99	NO DATA	2.11E-08	4.03E-09	NO DATA	5.14E-08	1.92E-05	3.36E-05
TC 99M	1.73E-13	4.83E-13	6.24E-12	NO DATA	7.20E-12	1.44E-07	7.66E-07
TC101	7.40E-15	1.05E-14	1.03E-13	NO DATA	1.90E-13	8.34E-08	1.09E-16
RU103	2.63E-07	NO DATA	1.12E-07	NO DATA	9.29E-07	9.79E-05	1.36E-05
RU105	1.40E-10	NO DATA	5.42E-11	NO DATA	1.76E-10	2.27E-06	1.13E-05
RU106	1.23E-05	NO DATA	1.55E-06	NO DATA	2.38E-05	2.01E-03	1.20E-04
AG110M	1.73E-06	1.64E-06	9.99E-07	NO DATA	3.13E-06	8.44E-04	3.41E-05
TE125M	6.10E-07	2.80E-07	8.34E-08	1.75E-07	NO DATA	6.70E-05	9.38E-06
TE127M	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	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	1.23E-08	7.51E-09	5.03E-09	9.06E-09	5.49E-08	2.97E-05	7.76E-05
TE131	1.97E-12	1.04E-12	6.30E-13	1.55E-12	7.72E-12	2.92E-07	1.89E-09
TE132	4.50E-08	3.03E-08	2.74E-08	3.07E-08	2.44E-07	5.61E-05	5.79E-05
I 130	7.80E-07	2.24E-06	8.90E-07	1.86E-04	3.44E-06	NO DATA	1.14E-06
I 131	4.43E-06	6.14E-06	3.30E-06	1.83E-03	1.05E-05	NO DATA	8.11E-07
I 132	1.99E-07	5.47E-07	1.97E-07	1.89E-05	8.65E-07	NO DATA	1.59E-07
I 133	1.52E-06	2.96E-06	7.78E-07	3.65E-04	4.49E-06	NO DATA	1.29E-06
I 134	1.11E-07	2.90E-07	1.05E-07	4.94E-06	4.58E-07	NO DATA	2.55E-09
I 135	4.62E-07	1.18E-06	4.36E-07	7.76E-05	1.86E-06	NO DATA	8.69E-07
CS134	6.28E-05	1.41E-04	6.80E-05	NO DATA	4.69E-05	1.83E-05	1.22E-06
CS136	6.44E-06	2.42E-05	1.71E-05	NO DATA	1.38E-05	2.22E-06	1.36E-06
CS137	8.38E-05	1.06E-04	3.89E-05	NO DATA	3.80E-05	1.51E-05	1.06E-06
CS138	5.82E-08	1.07E-07	5.58E-08	NO DATA	8.28E-08	9.84E-09	3.38E-11
BA139	1.67E-10	1.18E-13	4.87E-12	NO DATA	1.11E-13	8.08E-07	8.06E-07

TABLE E-8, CONT'D

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INHALATION DOSE FACTORS FOR TEENAGER
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
BA140	6.84E-06	8.38E-09	4.40E-07	NO DATA	2.85E-09	2.54E-04	2.86E-05
BA141	1.78E-11	1.32E-14	5.93E-13	NO DATA	1.23E-14	4.11E-07	9.33E-10
BA142	4.62E-12	4.63E-15	2.84E-13	NO DATA	3.92E-15	2.39E-07	5.09E-20
LA140	5.99E-08	2.95E-08	7.82E-09	NO DATA	NO DATA	2.68E-05	6.09E-05
LA142	1.20E-10	5.31E-11	1.32E-11	NO DATA	NO DATA	1.27E-06	1.50E-06
CE141	3.55E-06	2.37E-06	2.71E-07	NO DATA	1.11E-06	7.67E-05	1.58E-05
CE143	3.32E-08	2.42E-08	2.70E-09	NO DATA	1.08E-08	1.63E-05	3.19E-05
CE144	6.11E-04	2.53E-04	3.28E-05	NO DATA	1.51E-04	1.67E-03	1.08E-04
PR143	1.67E-06	6.64E-07	8.28E-08	NO DATA	3.86E-07	6.04E-05	2.67E-05
PR144	5.37E-12	2.20E-12	2.72E-13	NO DATA	1.26E-12	2.19E-07	2.94E-14
ND147	9.83E-07	1.07E-06	6.41E-08	NO DATA	6.28E-07	4.65E-05	2.28E-05
W 187	1.50E-09	1.22E-09	4.29E-10	NO DATA	NO DATA	5.92E-06	2.21E-05
NP239	4.23E-08	3.49E-09	2.21E-09	NO DATA	1.25E-08	8.11E-06	1.65E-05

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INHALATION DOSE FACTORS FOR CHILD
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H 3	NO DATA	3.04E-07	3.04E-07	3.04E-07	3.04E-07	3.04E-07	3.04E-07
C 14	9.70E-06	1.82E-06	1.82E-06	1.82E-06	1.82E-06	1.82E-06	1.82E-06
NA 24	4.35E-06	4.35E-06	4.35E-06	4.35E-06	4.35E-06	4.35E-06	4.35E-06
P 32	7.04E-04	3.09E-05	2.67E-05	NO DATA	NO DATA	NO DATA	1.14E-05
CR 51	NO DATA	NO DATA	4.17E-08	2.81E-08	6.57E-09	4.59E-06	2.93E-07
MN 54	NO DATA	1.16E-05	2.57E-06	NO DATA	2.71E-06	4.26E-04	6.19E-06
MN 56	NO DATA	4.48E-10	8.43E-11	NO DATA	4.52E-10	3.55E-06	3.33E-05
FE 55	1.28E-05	6.80E-06	2.10E-06	NO DATA	NO DATA	3.00E-05	7.75E-07
FE 59	5.59E-06	9.64E-06	4.51E-06	NO DATA	NO DATA	3.43E-04	1.91E-05
CO 58	NO DATA	4.70E-07	8.55E-07	NO DATA	NO DATA	2.99E-04	9.29E-06
CO 60	NO DATA	3.55E-06	6.12E-06	NO DATA	NO DATA	1.91E-03	2.60E-05
NI 63	2.22E-04	1.25E-05	7.56E-06	NO DATA	NO DATA	7.43E-05	1.71E-06
NI 65	8.08E-10	7.99E-11	4.44E-11	NO DATA	NO DATA	2.21E-06	2.27E-05
CU 64	NO DATA	5.39E-10	2.90E-10	NO DATA	1.63E-09	2.59E-06	9.92E-06
ZN 65	1.15E-05	3.06E-05	1.90E-05	NO DATA	1.93E-05	2.69E-04	4.41E-06
ZN 69	1.81E-11	2.61E-11	2.41E-12	NO DATA	1.58E-11	3.84E-07	2.75E-06
BR 83	NO DATA	NO DATA	1.28E-07	NO DATA	NO DATA	NO DATA	LT E-24
BR 84	NO DATA	NO DATA	1.48E-07	NO DATA	NO DATA	NO DATA	LT E-24
RB 86	NO DATA	NO DATA	6.84E-09	NO DATA	NO DATA	NO DATA	LT E-24
SR 89	NO DATA	5.30E-05	3.09E-05	NO DATA	NO DATA	NO DATA	2.16E-06
SR 90	NO DATA	1.52E-07	9.90E-08	NO DATA	NO DATA	NO DATA	4.66E-09
SR 89	NO DATA	9.33E-08	7.85E-08	NO DATA	NO DATA	NO DATA	5.11E-10
SR 89	1.62E-04	NO DATA	4.66E-06	NO DATA	NO DATA	5.83E-04	4.52E-05
SR 90	2.73E-02	NO DATA	1.74E-03	NO DATA	NO DATA	3.99E-03	9.28E-05
SR 91	3.28E-08	NO DATA	1.24E-09	NO DATA	NO DATA	1.44E-05	4.70E-05
SR 92	3.54E-09	NO DATA	1.42E-10	NO DATA	NO DATA	6.49E-06	6.55E-05
Y 90	1.11E-06	NO DATA	2.99E-08	NO DATA	NO DATA	7.07E-05	7.24E-05
Y 91M	1.37E-10	NO DATA	4.98E-12	NO DATA	NO DATA	7.60E-07	4.64E-07
Y 91	2.47E-04	NO DATA	6.59E-06	NO DATA	NO DATA	7.10E-04	4.97E-05
Y 92	5.50E-09	NO DATA	1.57E-10	NO DATA	NO DATA	6.46E-06	6.46E-05

TABLE E-9, CONT'D

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INHALATION DOSE FACTORS FOR CHILD
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	5.04E-08	NO DATA	1.38E-09	NO DATA	NO DATA	2.01E-05	1.05E-04
ZR 95	5.13E-05	1.13E-05	1.00E-05	NO DATA	1.61E-05	6.03E-04	1.65E-05
ZR 97	5.07E-08	7.34E-09	4.32E-09	NO DATA	1.05E-08	3.06E-05	9.49E-05
NB 95	6.35E-06	2.48E-06	1.77E-06	NO DATA	2.33E-06	1.66E-04	1.00E-05
MO 99	NO DATA	4.66E-06	1.15E-06	NO DATA	1.06E-07	3.66E-05	3.42E-05
TC 99M	4.81E-13	9.41E-13	1.56E-11	NO DATA	1.37E-11	2.57E-07	1.30E-06
TC101	2.19E-14	2.30E-14	2.91E-13	NO DATA	3.92E-13	1.58E-07	4.41E-09
RU103	7.45E-07	NO DATA	2.90E-07	NO DATA	1.90E-06	1.79E-04	1.21E-05
RU105	4.13E-10	NO DATA	1.50E-10	NO DATA	3.63E-10	4.30E-06	2.69E-05
RU106	3.68E-05	NO DATA	4.57E-06	NO DATA	4.97E-05	3.87E-03	1.16E-04
AG110M	4.56E-06	3.08E-06	2.47E-06	NO DATA	5.74E-06	1.48E-03	2.71E-05
TE125M	1.82E-06	6.29E-07	2.47E-07	5.20E-07	NO DATA	1.29E-04	9.13E-06
TE127M	5.72E-06	2.31E-06	8.10E-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	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	3.63E-08	1.60E-08	1.37E-08	2.64E-08	1.08E-07	5.56E-05	8.32E-05
TE131	9.87E-12	2.28E-12	1.78E-12	4.59E-12	1.59E-11	5.55E-07	3.60E-07
TE132	1.30E-07	7.36E-08	7.12E-08	8.58E-08	4.79E-07	1.02E-04	3.72E-05
I 130	2.21E-06	4.45E-06	2.28E-06	4.99E-04	6.61E-06	NO DATA	1.38E-06
I 131	1.30E-05	1.30E-05	7.37E-06	4.39E-03	2.13E-05	NO DATA	7.68E-07
I 132	5.72E-07	1.10E-06	5.07E-07	5.23E-05	1.69E-06	NO DATA	8.65E-07
I 133	4.48E-06	5.49E-06	2.08E-06	1.04E-03	9.13E-06	NO DATA	1.48E-06
I 134	3.17E-07	5.84E-07	2.69E-07	1.37E-05	8.92E-07	NO DATA	2.58E-07
I 135	1.33E-06	2.36E-06	1.12E-06	2.14E-04	3.62E-06	NO DATA	1.20E-06
CS134	1.76E-04	2.74E-04	6.07E-05	NO DATA	8.93E-05	3.27E-05	1.04E-06
CS136	1.76E-05	4.62E-05	3.14E-05	NO DATA	2.58E-05	3.93E-06	1.13E-06
CS137	2.45E-04	2.23E-04	3.47E-05	NO DATA	7.63E-05	2.81E-05	9.78E-07
CS138	1.71E-07	2.27E-07	1.50E-07	NO DATA	1.68E-07	1.84E-08	7.29E-08
BA139	4.98E-10	2.66E-13	1.45E-11	NO DATA	2.33E-13	1.56E-06	1.56E-05

TABLE E-9, CONT'D

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INHALATION DOSE FACTORS FOR CHILD
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
BA140	2.00E-05	1.75E-08	1.17E-06	NO DATA	5.71E-09	4.71E-04	2.75E-05
BA141	5.29E-11	2.95E-14	1.72E-12	NO DATA	2.56E-14	7.89E-07	7.44E-08
BA142	1.35E-11	9.73E-15	7.54E-13	NO DATA	7.87E-15	4.44E-07	7.41E-10
LA140	1.74E-07	8.08E-08	2.04E-08	NO DATA	NO DATA	4.94E-05	6.10E-05
LA142	3.50E-10	1.11E-10	3.49E-11	NO DATA	NO DATA	2.35E-06	2.05E-05
CE141	1.06E-05	5.28E-06	7.85E-07	NO DATA	2.31E-06	1.47E-04	1.53E-05
CE143	9.89E-08	5.37E-08	7.77E-09	NO DATA	2.26E-08	3.12E-05	3.44E-05
CE144	1.83E-03	5.72E-04	9.77E-05	NO DATA	3.17E-04	3.23E-03	1.05E-04
PR143	4.99E-06	1.50E-06	2.47E-07	NO DATA	8.11E-07	1.17E-04	2.63E-05
PR144	1.61E-11	4.99E-12	8.10E-13	NO DATA	2.64E-12	4.23E-07	5.32E-08
ND147	2.92E-06	2.36E-06	1.84E-07	NO DATA	1.30E-06	8.87E-05	2.22E-05
W 187	4.41E-09	2.61E-09	1.17E-09	NO DATA	NO DATA	1.11E-05	2.46E-05
NP239	1.26E-07	9.04E-09	6.35E-09	NO DATA	2.63E-08	1.57E-05	1.73E-05

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INHALATION DOSE FACTORS FOR INFANT
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H 3	NO DATA	4.62E-07	4.62E-07	4.62E-07	4.62E-07	4.62E-07	4.62E-07
C 14	1.89E-05	3.79E-06	3.79E-06	3.79E-06	3.79E-06	3.79E-06	3.79E-06
NA 24	7.54E-06	7.54E-06	7.54E-06	7.54E-06	7.54E-06	7.54E-06	7.54E-06
P 32	1.45E-03	8.03E-05	5.53E-05	NO DATA	NO DATA	NO DATA	1.15E-05
CR 51	NO DATA	NO DATA	6.39E-08	4.11E-08	9.45E-09	9.17E-06	2.55E-07
MN 54	NO DATA	1.81E-05	3.56E-06	NO DATA	3.56E-06	7.14E-04	5.04E-06
MN 56	NO DATA	1.10E-09	1.58E-10	NO DATA	7.86E-10	8.95E-06	5.17E-05
FE 55	1.41E-05	8.39E-06	2.38E-06	NO DATA	NO DATA	6.21E-05	7.82E-07
FE 59	9.69E-06	1.68E-05	6.77E-06	NO DATA	NO DATA	7.25E-04	1.77E-05
CO 58	NO DATA	8.71E-07	1.30E-06	NO DATA	NO DATA	5.55E-04	7.95E-06
CO 60	NO DATA	5.73E-06	8.41E-06	NO DATA	NO DATA	3.22E-03	2.28E-05
NI 63	2.42E-04	1.46E-05	8.29E-06	NO DATA	NO DATA	1.49E-04	1.73E-06
NI 65	1.71E-09	2.03E-10	8.79E-11	NO DATA	NO DATA	5.80E-06	3.58E-05
CU 64	NO DATA	1.34E-09	5.53E-10	NO DATA	2.84E-09	6.64E-06	1.07E-05
ZN 65	1.38E-05	4.47E-05	2.22E-05	NO DATA	2.32E-05	4.62E-04	3.67E-05
ZN 69	3.85E-11	6.91E-11	5.13E-12	NO DATA	2.87E-11	1.05E-06	9.44E-06
BR 83	NO DATA	NO DATA	2.72E-07	NO DATA	NO DATA	NO DATA	LT E-24
BR 84	NO DATA	NO DATA	2.86E-07	NO DATA	NO DATA	NO DATA	LT E-24
BR 85	NO DATA	NO DATA	1.46E-08	NO DATA	NO DATA	NO DATA	LT E-24
RB 86	NO DATA	1.36E-04	6.30E-05	NO DATA	NO DATA	NO DATA	2.17E-06
RB 88	NO DATA	3.98E-07	2.09E-07	NO DATA	NO DATA	NO DATA	2.42E-07
RB 89	NO DATA	2.29E-07	1.47E-07	NO DATA	NO DATA	NO DATA	4.87E-08
SR 89	2.84E-04	NO DATA	8.15E-06	NO DATA	NO DATA	1.45E-03	4.57E-05
SR 90	2.92E-02	NO DATA	1.85E-03	NO DATA	NO DATA	8.03E-03	9.36E-05
SR 91	6.83E-08	NO DATA	2.47E-09	NO DATA	NO DATA	3.76E-05	3.24E-05
SR 92	7.50E-09	NO DATA	2.79E-10	NO DATA	NO DATA	1.70E-05	1.00E-04
Y 90	2.35E-06	NO DATA	6.30E-08	NO DATA	NO DATA	1.92E-04	7.43E-05
Y 91M	2.91E-10	NO DATA	9.90E-12	NO DATA	NO DATA	1.99E-06	1.68E-06
Y 91	4.20E-04	NO DATA	1.12E-05	NO DATA	NO DATA	1.75E-03	5.02E-05
Y 92	1.17E-08	NO DATA	3.29E-10	NO DATA	NO DATA	1.75E-05	9.04E-05

TABLE E-10, CONT'D

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INHALATION DOSE FACTORS FOR INFANT
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	1.07E-07	NO DATA	2.91E-09	NO DATA	NO DATA	5.46E-05	1.19E-04
ZR 95	8.24E-06	1.99E-05	1.45E-05	NO DATA	2.22E-05	1.25E-03	1.55E-05
ZR 97	1.07E-07	1.83E-08	8.36E-09	NO DATA	1.85E-08	7.88E-06	1.00E-04
NB 95	1.12E-05	4.59E-06	2.70E-06	NO DATA	3.57E-06	3.42E-04	9.05E-06
MO 99	NO DATA	1.18E-07	2.31E-08	NO DATA	1.89E-07	9.63E-05	3.48E-05
TC 99M	9.98E-13	2.06E-12	2.66E-11	NO DATA	2.22E-11	5.79E-07	1.45E-06
TC101	4.65E-14	5.98E-14	5.80E-13	NO DATA	6.99E-13	4.17E-07	6.03E-07
RU103	1.44E-06	NO DATA	4.85E-07	NO DATA	3.03E-06	3.94E-04	1.15E-05
RU105	8.74E-10	NO DATA	2.93E-10	NO DATA	6.42E-10	1.12E-05	3.46E-05
RU106	6.20E-05	NO DATA	7.77E-06	NO DATA	7.61E-05	8.26E-03	1.17E-04
AG110M	7.13E-06	5.16E-06	3.57E-06	NO DATA	7.80E-06	2.62E-03	2.36E-05
TE125M	3.40E-06	1.42E-06	4.70E-07	1.16E-06	NO DATA	3.19E-04	9.22E-06
TE127M	1.19E-05	4.93E-06	1.48E-06	3.48E-06	2.69E-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	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	7.62E-08	3.93E-08	2.59E-08	6.38E-08	1.89E-07	1.42E-04	8.51E-05
TE131	1.24E-11	5.87E-12	3.57E-12	1.13E-11	2.85E-11	1.47E-06	5.87E-06
TE132	2.66E-07	1.69E-07	1.26E-07	1.99E-07	7.39E-07	2.43E-04	4.15E-05
I 130	4.54E-06	9.91E-06	3.98E-06	1.14E-03	1.09E-05	NO DATA	1.42E-06
I 131	2.71E-05	3.17E-05	1.40E-05	1.06E-02	3.70E-05	NO DATA	7.56E-07
I 132	1.71E-06	2.53E-06	8.99E-07	1.21E-04	2.82E-06	NO DATA	1.36E-06
I 133	9.46E-06	1.37E-05	4.00E-06	2.54E-03	1.60E-05	NO DATA	1.54E-06
I 134	6.58E-07	1.34E-06	4.75E-07	3.18E-05	1.49E-06	NO DATA	9.21E-07
I 135	2.76E-06	5.43E-06	1.98E-06	4.97E-04	6.05E-06	NO DATA	1.31E-06
CS134	2.83E-04	5.02E-04	5.32E-05	NO DATA	1.36E-04	5.69E-05	9.53E-07
CS136	3.45E-05	9.61E-05	3.78E-05	NO DATA	4.03E-05	8.40E-06	1.02E-06
CS137	3.92E-04	4.37E-04	3.23E-05	NO DATA	1.23E-04	5.09E-05	9.53E-07
CS138	3.61E-07	5.58E-07	2.84E-07	NO DATA	2.93E-07	4.67E-08	6.26E-07
BA139	1.06E-09	7.03E-13	3.07E-11	NO DATA	4.73E-13	4.25E-06	3.64E-05

TABLE E-10, CONT'D

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INHALATION DOSE FACTORS FOR INFANT
(MREM PER PCI INHALED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
BA140	4.00E-05	4.00E-08	2.07E-06	NO DATA	9.59E-09	1.14E-03	2.74E-05
BA141	1.12E-10	7.70E-14	3.55E-12	NO DATA	4.64E-14	2.12E-06	3.39E-06
BA142	2.84E-11	2.36E-14	1.40E-12	NO DATA	1.36E-14	1.11E-06	4.95E-07
LA140	3.61E-07	1.43E-07	3.68E-08	NO DATA	NO DATA	1.20E-04	6.96E-05
LA142	7.36E-10	2.69E-10	6.40E-11	NO DATA	NO DATA	5.87E-06	4.25E-05
CE141	1.98E-05	1.19E-05	1.42E-06	NO DATA	3.75E-06	3.69E-04	1.54E-05
CE143	2.00E-07	1.38E-07	1.54E-08	NO DATA	4.03E-08	8.30E-05	3.55E-05
CE144	2.28E-03	8.65E-04	1.26E-04	NO DATA	3.84E-04	7.03E-03	1.06E-04
PR143	1.00E-05	3.74E-06	4.99E-07	NO DATA	1.41E-06	3.09E-04	2.66E-05
PR144	3.42E-11	1.32E-11	1.72E-12	NO DATA	4.80E-12	1.15E-06	3.06E-06
ND147	5.67E-06	5.81E-06	3.57E-07	NO DATA	2.25E-06	2.30E-04	2.23E-05
W 187	9.26E-09	6.44E-09	2.21E-09	NO DATA	NO DATA	2.83E-05	2.54E-05
NP239	2.65E-07	2.37E-08	1.34E-08	NO DATA	4.73E-08	4.25E-05	1.78E-05

TABLE E-11

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INGESTION DOSE FACTORS FOR ADULTS
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H 3	NO DATA	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07
C 14	2.84E-06	5.68E-07	5.68E-07	5.68E-07	5.68E-07	5.68E-07	5.68E-07
NA 24	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06
P 32	1.93E-04	1.20E-05	7.46E-06	NO DATA	NO DATA	NO DATA	2.17E-05
CR 51	NO DATA	NO DATA	2.66E-09	1.59E-09	5.86E-10	3.53E-09	6.69E-07
MN 54	NO DATA	4.57E-06	8.72E-07	NO DATA	1.36E-06	NO DATA	1.40E-05
MN 56	NO DATA	1.15E-07	2.04E-08	NO DATA	1.46E-07	NO DATA	3.67E-06
FE 55	2.75E-06	1.90E-06	4.43E-07	NO DATA	NO DATA	1.06E-06	1.09E-06
FE 59	4.34E-06	1.02E-05	3.91E-06	NO DATA	NO DATA	2.85E-06	3.40E-05
CO 58	NO DATA	7.45E-07	1.67E-06	NO DATA	NO DATA	NO DATA	1.51E-05
CO 60	NO DATA	2.14E-06	4.72E-06	NO DATA	NO DATA	NO DATA	4.02E-05
NI 63	1.30E-04	9.01E-06	4.36E-06	NO DATA	NO DATA	NO DATA	1.88E-06
NI 65	5.28E-07	6.86E-08	3.13E-08	NO DATA	NO DATA	NO DATA	1.74E-06
CU 64	NO DATA	8.33E-08	3.91E-08	NO DATA	2.10E-07	NO DATA	7.10E-06
ZN 65	4.84E-06	1.54E-05	6.96E-06	NO DATA	1.03E-05	NO DATA	9.70E-06
ZN 69	1.03E-08	1.97E-08	1.37E-09	NO DATA	1.78E-08	NO DATA	2.96E-09
BR 83	NO DATA	NO DATA	4.02E-08	NO DATA	NO DATA	NO DATA	5.79E-08
BR 84	NO DATA	NO DATA	5.21E-08	NO DATA	NO DATA	NO DATA	4.09E-13
BR 85	NO DATA	NO DATA	2.14E-09	NO DATA	NO DATA	NO DATA	LT E-24
RB 86	NO DATA	2.11E-05	9.83E-06	NO DATA	NO DATA	NO DATA	4.16E-06
RB 88	NO DATA	6.05E-08	3.21E-08	NO DATA	NO DATA	NO DATA	8.36E-19
RB 89	NO DATA	4.01E-08	2.82E-08	NO DATA	NO DATA	NO DATA	2.33E-21
SR 89	3.08E-04	NO DATA	8.84E-06	NO DATA	NO DATA	NO DATA	4.94E-05
SR 90	7.58E-03	NO DATA	1.86E-03	NO DATA	NO DATA	NO DATA	2.19E-04
SR 91	5.67E-06	NO DATA	2.29E-07	NO DATA	NO DATA	NO DATA	2.70E-05
SR 92	2.15E-06	NO DATA	9.30E-08	NO DATA	NO DATA	NO DATA	4.26E-05
Y 90	9.62E-09	NO DATA	2.58E-10	NO DATA	NO DATA	NO DATA	1.02E-04
Y 91M	9.09E-11	NO DATA	3.52E-12	NO DATA	NO DATA	NO DATA	2.67E-10
Y 91	1.41E-07	NO DATA	3.77E-09	NO DATA	NO DATA	NO DATA	7.76E-05
Y 92	8.45E-10	NO DATA	2.47E-11	NO DATA	NO DATA	NO DATA	1.48E-05

TABLE E-11, CONT'D

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INGESTION DOSE FACTORS FOR ADULTS
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	2.68E-09	NO DATA	7.40E-11	NO DATA	NO DATA	NO DATA	8.50E-05
ZR 95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05
ZR 97	1.68E-09	3.39E-10	1.55E-10	NO DATA	5.12E-10	NO DATA	1.05E-04
NB 95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05
MO 99	NO DATA	4.31E-06	8.20E-07	NO DATA	9.76E-06	NO DATA	9.99E-06
TC 99M	2.47E-10	6.98E-10	8.89E-09	NO DATA	1.06E-08	3.42E-10	4.13E-07
TC101	2.54E-10	3.66E-10	3.59E-09	NO DATA	6.59E-09	1.87E-10	1.10E-21
RU103	1.85E-07	NO DATA	7.97E-08	NO DATA	7.06E-07	NO DATA	2.16E-05
RU105	1.54E-08	NO DATA	6.08E-09	NO DATA	1.99E-07	NO DATA	9.42E-06
RU106	2.75E-06	NO DATA	3.48E-07	NO DATA	5.31E-06	NO DATA	1.78E-04
AG110M	1.60E-07	1.48E-07	8.79E-08	NO DATA	2.91E-07	NO DATA	6.04E-05
TE125M	2.69E-06	9.71E-07	3.59E-07	8.06E-07	1.09E-05	NO DATA	1.07E-05
TE127M	6.77E-06	2.42E-06	8.25E-07	1.73E-06	2.75E-05	NO DATA	2.27E-05
TE127	1.10E-07	3.95E-08	2.38E-08	8.15E-08	4.48E-07	NO DATA	8.68E-06
TE129M	1.15E-05	4.29E-06	1.82E-06	3.95E-06	4.80E-05	NO DATA	5.79E-05
TE129	3.14E-08	1.18E-08	7.69E-09	2.41E-08	1.32E-07	NO DATA	2.37E-08
TE131M	1.73E-06	8.46E-07	7.05E-07	1.34E-06	8.57E-06	NO DATA	8.40E-05
TE131	1.97E-08	8.23E-09	6.22E-09	1.62E-08	8.63E-08	NO DATA	2.79E-09
TE132	2.52E-06	1.63E-06	1.53E-06	1.80E-06	1.57E-05	NO DATA	7.71E-05
I 130	7.56E-07	2.23E-06	8.80E-07	1.89E-04	3.48E-06	NO DATA	1.92E-06
I 131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06
I 132	2.03E-07	5.43E-07	1.90E-07	1.90E-05	8.65E-07	NO DATA	1.02E-07
I 133	1.42E-06	2.47E-06	7.53E-07	3.63E-04	4.31E-06	NO DATA	2.22E-06
I 134	1.06E-07	2.88E-07	1.03E-07	4.99E-06	4.58E-07	NO DATA	2.51E-10
I 135	4.43E-07	1.16E-06	4.28E-07	7.65E-05	1.86E-06	NO DATA	1.31E-06
CS134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06
CS136	6.51E-06	2.57E-05	1.85E-05	NO DATA	1.43E-05	1.96E-06	2.92E-06
CS137	7.97E-05	1.09E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06
CS138	5.52E-08	1.09E-07	5.40E-08	NO DATA	8.01E-08	7.91E-09	4.65E-13
BA139	9.70E-08	6.91E-11	2.84E-09	NO DATA	6.46E-11	3.92E-11	1.72E-07

TABLE E-11, CONT'D

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INGESTION DOSE FACTORS FOR ADULTS
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
BA140	2.03E-05	2.55E-08	1.33E-06	NO DATA	8.67E-09	1.46E-08	4.18E-05
BA141	4.71E-08	3.56E-11	1.59E-09	NO DATA	3.31E-11	2.02E-11	2.22E-17
BA142	2.13E-08	2.19E-11	1.34E-09	NO DATA	1.85E-11	1.24E-11	3.00E-26
LA140	2.50E-09	1.26E-09	8.33E-10	NO DATA	NO DATA	NO DATA	9.25E-05
LA142	1.28E-10	5.82E-11	1.45E-11	NO DATA	NO DATA	NO DATA	4.25E-07
CE141	9.36E-09	6.33E-09	7.18E-10	NO DATA	2.94E-09	NO DATA	2.42E-05
CE143	1.65E-09	1.22E-06	1.35E-10	NO DATA	5.37E-10	NO DATA	4.56E-05
CE144	4.88E-07	2.04E-07	2.62E-08	NO DATA	1.21E-07	NO DATA	1.65E-04
PR143	9.20E-09	3.69E-09	4.56E-10	NO DATA	2.13E-09	NO DATA	4.03E-05
PR144	3.01E-11	1.25E-11	1.53E-12	NO DATA	7.05E-12	NO DATA	9.33E-18
ND147	6.29E-09	7.27E-09	4.35E-10	NO DATA	4.25E-09	NO DATA	3.49E-05
W 187	1.03E-07	8.61E-08	3.01E-08	NO DATA	NO DATA	NO DATA	2.82E-05
NP239	1.19E-09	1.17E-10	6.45E-11	NO DATA	3.65E-10	NO DATA	2.40E-05

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INGESTION DOSE FACTORS FOR TEENAGER
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H 3	NO DATA	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07
C 14	4.06E-06	8.12E-07	8.12E-07	8.12E-07	8.12E-07	8.12E-07	8.12E-07
NA 24	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06
P 32	2.76E-04	1.71E-05	1.07E-05	NO DATA	NO DATA	NO DATA	2.32E-05
CR 51	NO DATA	NO DATA	3.60E-09	2.00E-09	7.89E-10	5.14E-09	6.05E-07
MN 54	NO DATA	5.70E-06	1.17E-06	NO DATA	1.76E-06	NO DATA	1.21E-05
MN 56	NO DATA	1.58E-07	2.81E-08	NO DATA	2.00E-07	NO DATA	1.04E-05
FE 55	3.78E-06	2.68E-06	6.25E-07	NO DATA	NO DATA	1.70E-06	1.16E-06
FE 59	5.87E-06	1.37E-05	5.29E-06	NO DATA	NO DATA	4.32E-06	3.24E-05
CO 58	NO DATA	9.72E-07	2.24E-06	NO DATA	NO DATA	NO DATA	1.34E-05
CO 60	NO DATA	2.61E-06	6.33E-06	NO DATA	NO DATA	NO DATA	3.66E-05
NI 63	1.77E-04	1.25E-05	8.00E-06	NO DATA	NO DATA	NO DATA	1.99E-06
NI 65	7.49E-07	9.57E-08	4.36E-08	NO DATA	NO DATA	NO DATA	5.19E-06
CU 64	NO DATA	1.15E-07	5.41E-08	NO DATA	2.91E-07	NO DATA	8.92E-06
ZN 65	5.76E-06	2.00E-05	9.33E-06	NO DATA	1.78E-05	NO DATA	8.47E-06
ZN 69	1.47E-08	2.60E-08	1.96E-09	NO DATA	1.83E-08	NO DATA	5.16E-08
BR 83	NO DATA	NO DATA	5.74E-08	NO DATA	NO DATA	NO DATA	LT E-24
BR 84	NO DATA	NO DATA	7.22E-08	NO DATA	NO DATA	NO DATA	LT E-24
BR 85	NO DATA	NO DATA	3.05E-09	NO DATA	NO DATA	NO DATA	LT E-24
RB 86	NO DATA	2.98E-05	1.40E-05	NO DATA	NO DATA	NO DATA	4.41E-06
RB 88	NO DATA	8.52E-08	4.54E-08	NO DATA	NO DATA	NO DATA	7.30E-15
RB 89	NO DATA	5.50E-08	3.89E-08	NO DATA	NO DATA	NO DATA	8.43E-17
SR 89	4.40E-04	NO DATA	1.26E-05	NO DATA	NO DATA	NO DATA	5.24E-05
SR 90	8.30E-03	NO DATA	2.05E-03	NO DATA	NO DATA	NO DATA	2.33E-04
SR 91	8.07E-06	NO DATA	3.21E-07	NO DATA	NO DATA	NO DATA	3.66E-05
SR 92	3.05E-06	NO DATA	1.30E-07	NO DATA	NO DATA	NO DATA	7.77E-05
Y 90	1.37E-08	NO DATA	3.69E-10	NO DATA	NO DATA	NO DATA	1.13E-04
Y 91M	1.29E-10	NO DATA	4.93E-12	NO DATA	NO DATA	NO DATA	6.09E-09
Y 91	2.01E-07	NO DATA	5.39E-09	NO DATA	NO DATA	NO DATA	8.24E-05
Y 92	1.21E-09	NO DATA	3.50E-11	NO DATA	NO DATA	NO DATA	3.32E-05

TABLE E-12, CONT'D

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INGESTION DOSE FACTORS FOR TEENAGER
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	3.83E-09	ND DATA	1.05E-10	ND DATA	ND DATA	ND DATA	1.17E-04
ZR 95	4.12E-08	1.30E-08	8.04E-09	ND DATA	1.91E-08	ND DATA	3.00E-05
ZR 97	2.37E-09	4.69E-10	2.36E-10	ND DATA	7.11E-10	ND DATA	1.27E-04
NB 95	8.22E-09	4.86E-09	2.51E-09	ND DATA	4.42E-09	ND DATA	1.95E-05
MO 99	ND DATA	6.03E-06	1.19E-06	ND DATA	1.38E-05	ND DATA	1.08E-05
TC 99M	3.52E-10	9.26E-10	1.20E-08	ND DATA	1.38E-08	5.14E-10	6.00E-07
TC101	3.60E-10	3.12E-10	5.03E-09	ND DATA	1.26E-09	3.12E-10	8.75E-17
RU103	2.55E-07	NO DATA	1.09E-07	ND DATA	4.99E-07	ND DATA	2.13E-05
RU105	2.18E-08	ND DATA	8.46E-09	ND DATA	2.75E-07	ND DATA	1.76E-05
RU106	3.72E-06	ND DATA	4.94E-07	ND DATA	7.96E-06	ND DATA	1.88E-04
AG110M	2.05E-07	1.94E-07	1.14E-07	ND DATA	3.70E-07	ND DATA	5.45E-05
TE129M	3.83E-06	1.38E-06	5.12E-07	1.07E-06	ND DATA	ND DATA	1.13E-05
TE127M	9.67E-06	3.45E-06	1.15E-06	2.30E-06	3.92E-05	ND DATA	2.41E-05
TE127	1.58E-07	5.60E-08	3.40E-08	1.09E-07	9.40E-07	ND DATA	1.22E-05
TE129M	1.63E-05	6.05E-06	2.58E-06	5.20E-06	6.82E-05	ND DATA	6.12E-05
TE129	4.48E-08	1.67E-08	1.03E-08	3.20E-08	1.99E-07	ND DATA	2.45E-07
TE131M	2.44E-06	1.17E-06	9.76E-07	1.74E-06	1.22E-05	ND DATA	9.39E-06
TE131	2.79E-08	1.15E-08	8.72E-09	2.15E-08	1.22E-07	ND DATA	2.89E-09
TE132	3.49E-06	2.23E-06	2.08E-06	2.33E-06	2.12E-05	ND DATA	7.00E-05
I 130	1.03E-06	2.98E-06	1.19E-06	2.43E-04	4.59E-06	ND DATA	2.29E-06
I 131	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	ND DATA	1.62E-06
I 132	2.79E-07	7.80E-07	2.62E-07	2.46E-05	1.15E-06	ND DATA	3.18E-07
I 133	2.01E-06	5.41E-06	1.04E-06	4.76E-04	5.98E-06	ND DATA	2.58E-06
I 134	1.46E-07	3.87E-07	1.39E-07	6.45E-06	6.15E-07	ND DATA	5.10E-09
I 135	6.10E-07	1.57E-06	5.82E-07	1.01E-04	2.48E-06	ND DATA	1.74E-06
CS134	8.37E-05	1.97E-04	9.18E-05	ND DATA	8.26E-05	2.39E-05	2.49E-06
CS136	8.59E-06	3.38E-05	2.27E-05	ND DATA	1.84E-05	2.90E-06	2.72E-06
CS137	1.12E-04	1.49E-04	5.19E-05	ND DATA	5.07E-05	1.97E-05	2.12E-06
CS138	7.76E-08	1.49E-07	7.45E-08	ND DATA	1.10E-07	1.28E-08	6.76E-11
BA139	1.39E-07	9.78E-11	4.05E-09	ND DATA	9.22E-11	6.74E-11	1.26E-06

TABLE E-12, CONT'D

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INGESTION DOSE FACTORS FOR TEENAGER
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
BA140	2.84E-05	3.48E-08	1.83E-06	ND DATA	1.18E-08	2.34E-08	4.30E-05
BA141	6.71E-08	5.01E-11	2.24E-09	ND DATA	4.65E-11	3.43E-11	1.43E-13
BA142	2.99E-08	2.99E-11	1.84E-09	ND DATA	2.53E-11	1.99E-11	9.18E-20
LA140	3.48E-09	1.71E-09	4.55E-10	ND DATA	NO DATA	ND DATA	9.82E-05
LA142	1.79E-10	7.95E-11	1.98E-11	ND DATA	ND DATA	ND DATA	2.42E-06
CE141	1.33E-08	8.80E-09	1.02E-09	ND DATA	4.18E-09	ND DATA	2.54E-05
CE143	2.35E-09	1.71E-06	1.91E-10	ND DATA	3.67E-10	ND DATA	5.14E-05
CE144	6.96E-07	2.88E-07	3.74E-08	ND DATA	1.72E-07	ND DATA	1.75E-04
PR143	1.31E-08	5.23E-09	6.52E-10	ND DATA	3.04E-09	ND DATA	4.31E-05
PR144	4.30E-11	1.76E-11	2.18E-12	ND DATA	1.01E-11	ND DATA	4.74E-14
ND147	9.38E-09	1.02E-08	6.11E-10	ND DATA	5.99E-09	ND DATA	3.68E-05
W 187	1.46E-07	1.13E-07	4.17E-08	ND DATA	ND DATA	ND DATA	3.22E-05
NP239	1.76E-09	1.66E-10	9.22E-11	ND DATA	5.21E-10	ND DATA	2.67E-05

TABLE E-13

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INGESTION DOSE FACTORS FOR CHILD
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H 3	NO DATA	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07
C 14	1.21E-05	2.42E-06	2.42E-06	2.42E-06	2.42E-06	2.42E-06	2.42E-06
NA 24	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06
P 32	8.75E-04	3.86E-05	3.18E-05	NO DATA	NO DATA	NO DATA	2.28E-05
CR 51	NO DATA	NO DATA	8.90E-09	4.94E-09	1.35E-09	9.02E-09	4.72E-07
MN 54	NO DATA	1.07E-05	2.85E-06	NO DATA	3.00E-06	NO DATA	8.98E-06
MN 56	NO DATA	3.36E-07	7.54E-08	NO DATA	4.04E-07	NO DATA	4.84E-05
FE 55	1.15E-05	6.10E-06	1.89E-06	NO DATA	NO DATA	3.45E-06	1.13E-06
FE 59	1.65E-05	2.67E-05	1.35E-05	NO DATA	NO DATA	7.74E-06	2.78E-05
CO 58	NO DATA	1.80E-06	3.51E-06	NO DATA	NO DATA	NO DATA	1.05E-05
CO 60	NO DATA	5.29E-06	1.56E-05	NO DATA	NO DATA	NO DATA	2.93E-05
NI 63	5.38E-04	2.68E-05	1.85E-05	NO DATA	NO DATA	NO DATA	1.94E-06
NI 65	2.23E-06	2.09E-07	1.22E-07	NO DATA	NO DATA	NO DATA	2.56E-05
CU 64	NO DATA	2.45E-07	1.48E-07	NO DATA	5.92E-07	NO DATA	1.15E-05
ZN 65	1.37E-05	3.65E-05	2.27E-05	NO DATA	2.30E-05	NO DATA	6.41E-06
ZN 69	4.38E-08	6.83E-08	5.85E-09	NO DATA	3.84E-08	NO DATA	3.99E-06
BR 83	NO DATA	NO DATA	1.71E-07	NO DATA	NO DATA	NO DATA	LT E-24
BR 84	NO DATA	NO DATA	1.95E-07	NO DATA	NO DATA	NO DATA	LT E-24
RB 86	NO DATA	NO DATA	9.12E-09	NO DATA	NO DATA	NO DATA	LT E-24
RB 86	NO DATA	6.70E-05	4.12E-05	NO DATA	NO DATA	NO DATA	4.31E-06
RB 88	NO DATA	1.90E-07	1.52E-07	NO DATA	NO DATA	NO DATA	9.82E-09
RB 89	NO DATA	1.17E-07	8.04E-07	NO DATA	NO DATA	NO DATA	1.02E-09
SR 89	1.32E-03	NO DATA	3.77E-05	NO DATA	NO DATA	NO DATA	5.11E-05
SR 90	1.70E-02	NO DATA	4.31E-03	NO DATA	NO DATA	NO DATA	2.79E-04
SR 91	2.40E-05	NO DATA	9.06E-07	NO DATA	NO DATA	NO DATA	5.30E-05
SR 92	9.03E-06	NO DATA	3.62E-07	NO DATA	NO DATA	NO DATA	1.71E-04
Y 90	4.11E-08	NO DATA	1.10E-09	NO DATA	NO DATA	NO DATA	9.17E-04
Y 91M	3.82E-10	NO DATA	1.37E-11	NO DATA	NO DATA	NO DATA	7.48E-07
Y 91	6.02E-07	NO DATA	1.61E-08	NO DATA	NO DATA	NO DATA	8.02E-05
Y 92	3.60E-09	NO DATA	1.03E-10	NO DATA	NO DATA	NO DATA	1.04E-04

TABLE E-13, CONT'D

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INGESTION DOSE FACTORS FOR CHILD
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	1.16E-08	NO DATA	3.13E-10	NO DATA	NO DATA	NO DATA	1.70E-04
ZR 95	1.16E-07	2.95E-08	3.27E-08	NO DATA	3.65E-08	NO DATA	2.66E-05
ZR 97	6.99E-09	5.61E-09	5.66E-10	NO DATA	1.45E-09	NO DATA	1.53E-04
NB 95	2.25E-08	8.76E-09	6.26E-09	NO DATA	8.23E-09	NO DATA	1.62E-05
MO 99	NO DATA	1.33E-05	3.29E-06	NO DATA	2.84E-05	NO DATA	1.10E-05
TC 99M	9.23E-10	1.81E-09	3.00E-08	NO DATA	2.63E-08	9.19E-10	1.05E-06
TC101	1.07E-09	1.12E-09	1.42E-08	NO DATA	1.91E-08	5.92E-10	3.56E-09
RU103	7.31E-07	NO DATA	2.81E-07	NO DATA	1.84E-06	NO DATA	1.89E-05
RU105	6.45E-08	NO DATA	2.94E-08	NO DATA	5.67E-07	NO DATA	4.21E-05
RU106	1.17E-05	NO DATA	1.46E-06	NO DATA	1.58E-05	NO DATA	1.62E-04
AG110M	5.39E-07	3.04E-07	2.91E-07	NO DATA	6.78E-07	NO DATA	4.33E-05
TE129M	1.14E-05	3.09E-06	1.52E-06	3.20E-06	NO DATA	NO DATA	1.10E-05
TE127M	2.89E-05	7.78E-06	3.43E-06	6.91E-06	8.24E-05	NO DATA	2.34E-05
TE127	4.71E-07	1.27E-07	1.01E-07	3.26E-07	1.34E-06	NO DATA	1.84E-05
TE129M	4.87E-05	1.36E-05	7.56E-06	1.57E-05	1.43E-04	NO DATA	5.94E-05
TE129	1.54E-09	3.74E-08	3.18E-08	9.16E-08	3.92E-07	NO DATA	8.34E-06
TE131M	7.20E-06	2.69E-06	2.65E-06	5.12E-06	2.41E-05	NO DATA	1.01E-04
TE131	8.30E-08	2.53E-08	2.47E-08	4.35E-08	2.51E-07	NO DATA	4.36E-07
TE132	1.01E-05	4.47E-06	5.40E-06	6.51E-06	4.15E-05	NO DATA	4.50E-05
I 130	2.92E-06	5.90E-06	3.04E-06	6.90E-04	8.82E-06	NO DATA	2.74E-06
I 131	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	NO DATA	1.84E-06
I 132	8.00E-07	1.47E-06	6.76E-07	6.82E-05	2.25E-06	NO DATA	1.70E-06
I 133	5.92E-06	7.32E-06	2.77E-06	1.36E-03	1.22E-05	NO DATA	2.95E-06
I 134	4.19E-07	7.78E-07	3.58E-07	1.79E-05	1.19E-06	NO DATA	5.16E-07
I 135	1.75E-06	3.15E-06	1.49E-06	2.79E-04	4.83E-06	NO DATA	2.40E-06
CS134	2.34E-04	3.84E-04	8.10E-05	NO DATA	1.19E-04	4.27E-05	2.07E-06
CS136	2.39E-05	6.40E-05	4.18E-05	NO DATA	3.44E-05	5.13E-06	2.27E-06
CS137	3.27E-04	3.13E-04	4.62E-05	NO DATA	1.02E-04	3.67E-05	1.96E-06
CS138	2.28E-07	3.17E-07	2.01E-07	NO DATA	2.73E-07	2.40E-08	1.46E-07
BA139	4.14E-07	2.21E-10	1.20E-08	NO DATA	1.93E-10	1.30E-10	9.99E-05

TABLE E-13, CONT'D

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INGESTION DOSE FACTORS FOR CHILD
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
BA140	8.51E-05	7.28E-08	4.85E-06	NO DATA	2.37E-08	4.34E-08	4.21E-05
BA141	2.00E-07	1.12E-10	6.51E-09	NO DATA	9.69E-11	6.58E-10	1.14E-07
BA142	8.74E-08	6.29E-11	4.88E-09	NO DATA	5.09E-11	3.70E-11	1.14E-09
LA140	1.01E-08	5.53E-09	1.19E-09	NO DATA	NO DATA	NO DATA	9.84E-05
LA142	5.74E-10	1.67E-10	5.23E-11	NO DATA	NO DATA	NO DATA	3.31E-05
CE141	9.97E-08	1.98E-08	2.94E-09	NO DATA	8.68E-09	NO DATA	2.47E-05
CE143	6.99E-09	3.79E-06	5.49E-10	NO DATA	1.59E-09	NO DATA	5.5[illegible]-05
CE144	2.08E-06	6.52E-07	1.11E-07	NO DATA	3.61E-07	NO DATA	1.70E-04
PR143	3.93E-08	1.18E-08	1.95E-09	NO DATA	6.19E-09	NO DATA	4.24E-05
PR144	1.29E-10	3.99E-11	6.49E-12	NO DATA	2.11E-11	NO DATA	8.59E-08
ND147	2.79E-08	2.26E-08	1.75E-09	NO DATA	1.24E-08	NO DATA	3.58E-05
W 187	4.29E-07	2.54E-07	1.14E-07	NO DATA	NO DATA	NO DATA	3.57E-05
NP239	5.25E-09	3.77E-10	2.65E-10	NO DATA	1.09E-09	NO DATA	2.79E-05

TABLE E-14

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INGESTION DOSE FACTORS FOR INFANT
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
H 3	NO DATA	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07
C 14	2.37E-05	5.06E-06	5.06E-06	5.06E-06	5.06E-06	5.06E-06	5.06E-06
NA 24	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05
P 32	1.70E-03	1.00E-04	6.59E-05	NO DATA	NO DATA	NO DATA	2.30E-05
CR 51	NO DATA	NO DATA	1.41E-08	9.20E-09	2.01E-09	1.79E-08	4.11E-07
MN 54	NO DATA	1.99E-05	4.51E-06	NO DATA	4.41E-06	NO DATA	7.91E-06
MN 56	NO DATA	8.18E-07	1.41E-07	NO DATA	7.03E-07	NO DATA	7.43E-05
FE 55	1.38E-05	8.98E-06	2.40E-06	NO DATA	NO DATA	4.99E-06	1.14E-06
FE 59	3.08E-05	5.68E-05	2.12E-05	NO DATA	NO DATA	1.59E-05	2.57E-05
CO 58	NO DATA	3.60E-06	8.98E-06	NO DATA	NO DATA	NO DATA	8.97E-04
CO 60	NO DATA	1.08E-05	2.56E-05	NO DATA	NO DATA	NO DATA	2.57E-05
NI 63	6.34E-04	2.92E-05	2.20E-05	NO DATA	NO DATA	NO DATA	1.99E-06
NI 65	4.70E-06	5.82E-07	2.42E-07	NO DATA	NO DATA	NO DATA	4.65E-05
CU 64	NO DATA	6.09E-07	2.82E-07	NO DATA	1.03E-06	NO DATA	1.25E-05
ZN 65	1.96E-05	[illegible]	2.91E-05	NO DATA	3.06E-05	NO DATA	5.33E-05
ZN 69	9.33E-08	1.68E-07	1.25E-08	NO DATA	6.98E-08	NO DATA	1.37E-05
BR 83	NO DATA	NO DATA	3.63E-07	NO DATA	NO DATA	NO DATA	LT E-24
BR 84	NO DATA	NO DATA	3.82E-07	NO DATA	NO DATA	NO DATA	LT E-24
BR 85	NO DATA	NO DATA	1.96E-08	NO DATA	NO DATA	NO DATA	LT E-24
RB 86	NO DATA	1.70E-04	8.40E-05	NO DATA	NO DATA	NO DATA	4.35E-06
RB 88	NO DATA	6.98E-07	2.73E-07	NO DATA	NO DATA	NO DATA	4.85E-07
RB 89	NO DATA	2.86E-07	1.97E-07	NO DATA	NO DATA	NO DATA	9.74E-08
SR 89	2.51E-03	NO DATA	7.20E-05	NO DATA	NO DATA	NO DATA	5.16E-05
SR 90	1.85E-02	NO DATA	6.71E-03	NO DATA	NO DATA	NO DATA	2.31E-04
SR 91	5.00E-05	NO DATA	1.81E-06	NO DATA	NO DATA	NO DATA	5.92E-05
SR 92	1.92E-05	NO DATA	7.13E-07	NO DATA	NO DATA	NO DATA	2.07E-04
Y 90	8.69E-08	NO DATA	2.35E-09	NO DATA	NO DATA	NO DATA	1.70E-04
Y 91M	8.10E-10	NO DATA	2.76E-11	NO DATA	NO DATA	NO DATA	2.70E-06
Y 91	1.13E-06	NO DATA	3.01E-08	NO DATA	NO DATA	NO DATA	8.10E-05
Y 92	7.65E-09	NO DATA	2.15E-10	NO DATA	NO DATA	NO DATA	1.46E-04

TABLE E-14, CONT'D

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INGESTION DOSE FACTORS FOR INFANT
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	2.43E-08	NO DATA	6.62E-10	NO DATA	NO DATA	NO DATA	1.92E-04
ZR 95	2.06E-07	5.02E-08	3.56E-08	NO DATA	5.41E-08	NO DATA	2.50E-05
ZR 97	1.48E-08	2.54E-09	1.16E-09	NO DATA	2.56E-09	NO DATA	1.62E-04
NB 95	4.20E-08	1.78E-08	1.03E-08	NO DATA	1.74E-08	NO DATA	1.46E-05
MO 99	NO DATA	3.40E-05	6.63E-06	NO DATA	5.08E-05	NO DATA	1.12E-05
TC 99M	1.92E-09	3.96E-09	5.10E-08	NO DATA	4.26E-08	2.07E-09	1.15E-06
TC101	2.27E-09	2.86E-09	2.83E-08	NO DATA	3.40E-08	1.56E-09	4.86E-07
RU103	1.48E-06	NO DATA	4.95E-07	NO DATA	3.08E-06	NO DATA	1.80E-05
RU105	1.36E-07	NO DATA	4.58E-08	NO DATA	1.00E-06	NO DATA	5.41E-05
RU106	2.41E-05	NO DATA	3.01E-06	NO DATA	2.85E-05	NO DATA	1.83E-04
AG110M	9.96E-07	7.27E-07	6.81E-07	NO DATA	1.04E-06	NO DATA	3.77E-05
TE125M	2.33E-05	7.79E-06	3.15E-06	7.84E-06	NO DATA	NO DATA	1.11E-05
TE127M	5.85E-05	1.94E-05	7.08E-06	1.69E-05	1.44E-04	NO DATA	2.36E-05
TE127	1.00E-06	3.35E-07	2.15E-07	8.14E-07	2.44E-06	NO DATA	2.10E-05
TE129M	1.00E-04	3.43E-05	1.54E-05	3.84E-05	2.50E-04	NO DATA	5.87E-05
TE129	2.84E-07	9.79E-08	6.63E-08	2.38E-07	7.07E-07	NO DATA	2.27E-05
TE131M	1.52E-05	6.12E-06	5.05E-06	1.24E-05	4.21E-05	NO DATA	1.03E-04
TE131	1.76E-07	6.50E-08	4.94E-08	1.57E-07	4.50E-07	NO DATA	7.11E-06
TE132	2.08E-05	1.03E-05	9.61E-06	1.52E-05	6.44E-05	NO DATA	3.81E-05
I 130	6.00E-06	1.32E-05	5.30E-06	1.48E-03	1.45E-05	NO DATA	2.83E-06
I 131	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	NO DATA	1.51E-06
I 132	1.66E-06	3.37E-06	1.20E-06	1.58E-04	3.76E-06	NO DATA	2.73E-06
I 133	1.25E-05	1.82E-05	5.33E-06	3.31E-03	2.14E-05	NO DATA	3.08E-06
I 134	8.69E-07	1.78E-06	6.33E-07	4.15E-05	1.99E-06	NO DATA	1.84E-06
I 135	3.64E-06	7.24E-06	2.64E-06	6.49E-04	9.07E-06	NO DATA	2.62E-06
CS134	3.77E-04	7.03E-04	7.10E-05	NO DATA	1.81E-04	7.42E-05	1.91E-06
CS136	4.59E-05	1.35E-04	5.04E-05	NO DATA	5.38E-05	1.10E-05	2.05E-06
CS137	5.22E-04	6.11E-04	4.33E-05	NO DATA	1.64E-04	6.64E-05	1.91E-06
CS138	4.81E-07	7.82E-07	3.79E-07	NO DATA	3.90E-07	6.09E-08	1.25E-06
BA139	8.81E-07	5.84E-10	2.55E-08	NO DATA	3.51E-10	3.54E-10	5.58E-05

TABLE E-14, CONT'D

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INGESTION DOSE FACTORS FOR INFANT
(MREM PER PCI INGESTED)

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
BA140	1.71E-04	1.71E-07	8.81E-06	NO DATA	4.06E-08	1.05E-07	4.20E-05
BA141	4.25E-07	2.91E-10	1.34E-08	NO DATA	1.75E-10	1.77E-10	5.19E-06
BA142	1.84E-07	1.53E-10	9.06E-09	NO DATA	8.81E-11	9.26E-11	7.59E-07
LA140	2.11E-08	8.32E-09	2.14E-09	NO DATA	NO DATA	NO DATA	9.77E-05
LA142	1.10E-09	4.04E-10	9.67E-11	NO DATA	NO DATA	NO DATA	6.86E-05
CE141	7.87E-08	4.80E-08	5.65E-09	NO DATA	1.48E-08	NO DATA	2.48E-05
CE143	1.48E-08	9.82E-09	1.17E-09	NO DATA	2.56E-09	NO DATA	5.73E-05
CE144	2.98E-06	1.22E-06	1.67E-07	NO DATA	4.93E-07	NO DATA	1.71E-04
PR143	8.13E-08	3.64E-08	4.03E-09	NO DATA	1.13E-08	NO DATA	4.29E-05
PR144	2.74E-10	1.06E-10	1.38E-11	NO DATA	3.84E-11	NO DATA	4.93E-06
ND147	5.53E-08	5.68E-08	3.48E-09	NO DATA	2.19E-08	NO DATA	3.60E-05
W 187	9.03E-07	6.28E-07	2.17E-07	NO DATA	NO DATA	NO DATA	3.69E-05
NP239	1.11E-08	9.93E-10	5.81E-10	NO DATA	1.98E-09	NO DATA	2.87E-05

TABLE 1

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INFANT INGESTION DOSE COMMITMENT FACTORS(MREM/SOY 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	5.85E-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.	1.58E-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	9.96E-06	0.	0.	0.	8.97E-06
CO60	0.	1.08E-05	2.55E-05	0.	0.	0.	2.57E-05
NI59	4.73E-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.	3.08E-05	0.	5.33E-05
ZN69M+D	1.50E-06	3.05E-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
RB82	0.	0.	1.27E-05	0.	0.	0.	0.
RB83+D	0.	0.	3.63E-07	0.	0.	0.	0.
RB84	0.	0.	3.82E-07	0.	0.	0.	0.
RB85	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.	4.74E-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

TABLE 1 (contd)

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

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y90	9.69E-08	0.	2.33E-09	0.	0.	0.	1.20E-04
Y91M+D	9.10E-10	0.	2.76E-11	0.	0.	0.	2.70E-06
Y91	1.73E-06	0.	3.01E-08	0.	0.	0.	8.10E-05
Y92	7.45E-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	3.31E-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.	3.89E-05
MO93	0.	5.65E-05	1.82E-06	0.	1.13E-05	0.	1.21E-05
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-05
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-08	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	1.36E-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	8.60E-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.	5.87E-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	1.78E-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.	3.68E-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-08	1.48E-03	1.45E-05	0.	2.83E-06
I131+D	3.54E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	0.	1.51E-06

TABLE 1 (contd)

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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.	9.81E-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	8.13E-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	6.85E-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

TABLE 1 (contd)

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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.	1.28E-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-06
RA224+D	1.46E-02	3.29E-05	2.91E-03	0.	3.00E-04	0.	3.86E-04
RA225+D	5.78E-02	6.52E-05	1.15E-02	0.	1.19E-03	0.	3.24E-04
RA226+D	5.20E-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	6.49E-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	7.24E-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-04
TH232+D	4.24E-03	1.63E-04	1.65E-04	0.	7.79E-04	0.	5.31E-05
TH234	5.92E-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-06	6.09E-09	5.43E-09	0.	1.67E-08	0.	1.46E-05
U232+D	2.42E-02	0.	2.14E-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	4.68E-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	1.65E-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.	6.66E-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	5.16E-04	7.59E-05	0.	2.71E-04	0.	7.84E-05
CM245	1.89E-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

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CHILD INGESTION DOSE COMMITMENT FACTORS (MREM/SOY 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-06	2.70E-06	1.04E-08	0.	2.39E-06	0.	3.95E-05
CR51	0.	0.	8.40E-09	4.04E-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	2.47E-05	1.33E-05	0.	0.	7.74E-06	2.78E-05
CO57	0.	4.93E-07	9.93E-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	2.48E-05	1.83E-05	0.	0.	0.	1.94E-06
NI65	2.22E-06	2.04E-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

TABLE 2 (contd)

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CHILD INGESTION DOSE COMMITMENT FACTORS (MREM/SOY 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	6.89E-09	1.01E-09	5.96E-10	0.	1.45E-09	0.	1.53E-06
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	1.54E-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	7.29E-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	1.34E-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	6.56E-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

TABLE 2 (contd)

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

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
I132	9.00E-07	1.47E-06	8.74E-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	2.74E-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-05	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-06	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	1.36E-09	3.17E-10	6.86E-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	2.96E-09	0.	8.68E-09	0.	2.47E-05
CE143+D	6.99E-09	3.79E-08	5.49E-10	0.	1.59E-09	0.	5.55E-05
CE144+D	2.06E-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.	4.19E-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.	8.17E-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	8.15E-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
H0166M	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

TABLE 2 (contd)

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

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	4.75E-02	1.72E-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.	8.55E-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	5.89E-03	1.25E-05	1.34E-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
AC225	3.85E-01	9.95E-06	4.32E-01	0.	2.65E-04	0.	5.81E-05
AC227+D	1.48E-05	1.94E-05	1.26E-06	0.	2.07E-06	0.	4.31E-04
TH227+D	4.12E-03	6.63E-04	2.55E-04	0.	1.46E-04	0.	8.43E-05
TH228+D	5.85E-05	7.96E-07	1.69E-06	0.	4.22E-06	0.	5.63E-04
TH229	2.07E-03	2.65E-05	7.00E-05	0.	1.38E-04	0.	5.79E-04
TH230	1.39E-02	1.81E-04	6.80E-04	0.	8.84E-04	0.	5.27E-04
TH232+D	3.55E-03	1.78E-04	9.91E-05	0.	8.67E-04	0.	6.19E-05
TH234	3.96E-03	1.52E-04	3.61E-04	0.	7.41E-04	0.	5.27E-05
PA231+D	3.42E-07	1.51E-08	9.68E-09	0.	8.01E-08	0.	1.18E-04
PA233	7.07E-03	2.34E-04	2.61E-04	0.	1.28E-03	0.	7.37E-05
U232+D	1.81E-08	2.82E-09	3.16E-09	0.	1.04E-08	0.	1.44E-05
U233+D	1.76E-02	0.	1.26E-03	0.	1.34E-03	0.	6.98E-05
U234	3.72E-03	0.	2.25E-04	0.	6.10E-04	0.	6.45E-05
U235+D	3.57E-03	0.	2.21E-04	0.	5.98E-04	0.	6.32E-05
U236	3.42E-03	0.	2.07E-04	0.	5.61E-04	0.	8.03E-05
U237	3.42E-03	0.	2.12E-04	0.	5.73E-04	0.	5.92E-05
U238+D	3.36E-07	0.	6.27E-08	0.	6.81E-07	0.	2.08E-05
NP237+D	3.27E-03	0.	1.94E-04	0.	5.24E-04	0.	5.66E-05
NP238	2.36E-03	1.81E-04	9.79E-05	0.	6.05E-04	0.	8.16E-05
NP239	5.83E-08	1.18E-09	9.08E-10	0.	3.76E-09	0.	4.04E-05
PU238	5.25E-09	3.77E-10	2.65E-10	0.	1.09E-09	0.	2.79E-05
PU239	1.25E-03	1.56E-04	3.16E-05	0.	1.15E-04	0.	7.50E-05
PU240	1.36E-03	1.65E-04	3.31E-05	0.	1.22E-04	0.	6.85E-05
PU241+D	1.35E-03	1.65E-04	3.31E-05	0.	1.22E-04	0.	6.98E-05
PU242	4.00E-05	1.72E-06	8.04E-07	0.	2.96E-06	0.	1.44E-06
PU244	1.26E-03	1.99E-04	3.19E-05	0.	1.17E-04	0.	6.71E-05
AM241	1.47E-03	1.82E-04	3.65E-05	0.	1.35E-04	0.	1.00E-04
AM242M	1.43E-03	6.40E-04	1.02E-04	0.	6.23E-04	0.	7.64E-05
AM243	1.47E-03	4.25E-04	1.04E-04	0.	6.30E-04	0.	9.61E-05
CM242	1.41E-03	6.14E-04	9.83E-05	0.	6.04E-04	0.	8.95E-05
CM243	9.80E-05	4.73E-05	5.84E-06	0.	1.87E-05	0.	8.16E-05
CM244	1.33E-03	6.03E-04	8.24E-05	0.	3.08E-04	0.	8.03E-05
CM245	1.11E-03	5.36E-04	6.93E-05	0.	2.54E-04	0.	7.77E-05
CM246	1.76E-03	8.64E-04	1.05E-04	0.	4.11E-04	0.	7.24E-05
CM247+D	1.74E-03	8.64E-04	1.05E-04	0.	4.10E-04	0.	7.11E-05
CM248	1.70E-03	8.53E-04	1.03E-04	0.	4.04E-04	0.	9.35E-05
CF252	1.41E-02	5.38E-03	8.52E-04	0.	3.33E-03	0.	1.51E-03
	1.07E-03	0.	2.54E-05	0.	0.	0.	2.96E-04

TABLE 3

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TEEN INGESTION DOSE COMMITMENT FACTORS(MREM/SOY 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-06
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	1.37E-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-04	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	7.69E-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.	1.44E-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	8.27E-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.	3.65E-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	8.11E-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

TABLE 3 (contd)

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TEEN INGESTION DOSE COMMITMENT FACTORS(MREM/SOY 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-08
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.	3.09E-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.	1.08E-05	2.90E-07	0.	3.04E-06	0.	1.29E-04
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-06	6.44E-08
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	8.	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	1.16E-07	0.	3.70E-07	0.	5.45E-05
AG111	8.29E-08	3.44E-06	1.73E-08	0.	1.12E-07	0.	4.80E-05
CD113M	0.	4.51E-06	1.65E-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
SN126	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-0	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	9.87E-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	9.48E-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.	7.05E-05
TE133M+D	8.44E-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.	1.46E-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

TABLE 3 (contd)

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TEEN INGESTION DOSE COMMITMENT FACTORS(MREM/SOY 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	8.45E-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	8.09E-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.	6.20E-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	8.54E-06	3.38E-05	2.27E-05	0.	1.84E-05	2.98E-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	4.30E-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	8.84E-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	4.86E-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

TABLE 3 (contd)

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TEEN INGESTION DOSE COMMITMENT FACTORS(MREM/SOY 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.	5.24E-05
BI210+D	5.59E-07	4.51E-06	5.66E-08	0.	5.48E-05	0.	5.15E-09
PO210	5.09E-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.	3.03E-04
RA224+D	2.31E-03	5.52E-06	4.61E-04	0.	1.58E-04	0.	3.71E-04
RA225+D	3.37E-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.	1.24E-04	0.	5.98E-05
AC225	5.24E-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	5.80E-04	1.14E-05	2.30E-05	0.	6.41E-05	0.	5.97E-04
TH229	8.39E-03	1.20E-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	6.48E-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.	6.05E-05
U234	1.19E-03	0.	7.39E-05	0.	2.85E-04	0.	6.91E-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.	6.13E-05
U237	7.84E-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-09	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	1.24E-04	5.75E-05	0.	4.31E-04	0.	7.87E-05
AM242M	9.70E-04	3.19E-04	5.80E-05	0.	4.30E-04	0.	9.90E-05
AM243	8.50E-04	3.17E-04	5.62E-05	0.	4.22E-04	0.	9.23E-05
CM242	2.94E-05	7.97E-05	1.95E-06	0.	8.89E-06	0.	8.40E-05
CM243	5.91E-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.	7.44E-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
CF252	3.51E-04	0.	8.37E-06	0.	0.	0.	3.05E-04

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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-6		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.	2.64E-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-05	1.02E-05	3.91E-06	0.	0.	2.85E-06	5.40E-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-05	3.35E-05	1.63E-06	0.	0.	0.	4.90E-07
NI63	1.30E-04	9.01E-06	4.36E-06	0.	0.	0.	1.88E-06
NI65	5.28E-07	8.86E-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

TABLE 4 (contd)

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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-06
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	3.45E-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	1.37E-10	1.10E-21
RU103+D	1.85E-07	0.	7.97E-08	0.	7.06E-07	0.	2.16E-05
RU105+D	1.56E-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.	5.41E-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	5.47E-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	3.76E-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	9.43E-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.	1.67E-05
TE127M+D	6.77E-06	2.62E-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-07
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	3.68E-06	0.	1.92E-06
I131+D	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.82E-05	0.	1.57E-06

TABLE 4 (contd)

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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.	2.27E-06
I134	1.06E-07	2.88E-07	1.03E-07	4.99E-06	4.58E-07	0.	2.51E-10
I135+D	6.43E-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	1.89E-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	5.52E-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-38
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	4.10E-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-06	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.	7.22E-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	3.60E-08	1.22E-08	7.67E-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.	2.33E-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

TABLE 4 (contd)

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

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	1.53E-07	4.37E-03	5.44E-04	0.	1.23E-02	0.	5.42E-05
BI210+D	4.61E-07	3.18E-06	3.94E-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	7.45E-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	5.56E-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	8.06E-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	7.95E-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	1.08E-04	1.50E-04	0.	4.82E-04	0.	5.12E-05
TH234	8.01E-08	4.91E-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-06	0.	5.28E-05	0.	2.03E-04	0.	6.27E-05
U234	8.30E-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.	5.78E-05
U237	5.52E-08	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	3.49E-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-04
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.	8.78E-05
CM242	2.06E-05	2.10E-05	1.37E-06	0.	6.22E-06	0.	7.92E-05
CM243	5.79E-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.	1.32E-04	0.	7.55E-05
CM245	1.02E-03	2.87E-04	5.76E-05	0.	2.69E-04	0.	7.06E-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	2.84E-04	0.	6.29E-06	0.	0.	0.	2.88E-04

TABLE 5

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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.
CA45	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.	3.54E-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	3.54E-06	0.	3.56E-06	7.14E-06	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	9.64E-06	1.68E-05	6.77E-06	0.	0.	7.25E-04	1.77E-05
CO57	0.	4.45E-07	4.54E-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-08
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.	7.13E-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	9.38E-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.

TABLE 5 (contd)

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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	1.08E-06
Y91	4.20E-04	0.	1.12E-05	0.	0.	1.75E-03	5.03E-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	1.97E-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-08
MO93	0.	6.44E-06	2.22E-07	0.	1.54E-06	3.40E-04	3.76E-08
MO99+D	0.	1.18E-07	2.31E-08	0.	1.89E-	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	2.60E-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.	5.85E-07	0.	3.03E-06	3.94E-04	1.15E-05
RU105+D	8.76E-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-05	5.16E-06	3.57E-06	0.	7.90E-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	9.38E-06	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	5.84E-09	8.76E-08	3.40E-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	8.27E-05	1.20E-03	4.73E-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	9.61E-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

TABLE 5 (contd)

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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.	9.76E-06	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	1.9ME-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	1.08E-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-05	3.00E-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	2.56E-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

TABLE 5 (contd)

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

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PA210+D	9.62E-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.	1.33E-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	1.75E-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	2.78E-06	5.13E-04	0.	5.31E-05	2.57E-01	2.87E-04
RA226+D	2.48E-01	1.46E-05	2.05E-02	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.	1.75E-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	2.84E-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	7.00E-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.	3.63E-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	1.24E-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	5.49E+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	5.69E+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	8.64E-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	1.71E+00	7.94E-01	1.04E-01	0.	3.91E-01	4.24E-01	5.02E-05
CM244	1.41E+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

TABLE 6

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CHILD INHALATION DOSE COMMITMENT FACTORS (MREM/S0Y PER PCI INHALED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3*	0.	3.06E-07	3.04E-07	3.04E-07	3.05E-07	3.04E-07	3.04E-07
BE10	6.43E-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	1.08E-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.
CA42	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	9.09E-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	4.28E-09	7.28E-09	8.59E-10	0.	4.22E-09	7.36E-06	2.71E-05
ZN69	1.81E-11	2.81E-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	8.43E-06
BR82	0.	0.	5.64E-06	0.	0.	0.	0.
BR83+D	0.	0.	1.26E-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.	6.49E-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.

TABLE 6 (contd)

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CHILD INHALATION DOSE COMMITMENT FACTORS (MREM/S0Y 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	1.94E-04	2.45E-06
NB95	6.35E-06	2.48E-06	1.77E-06	0.	2.33E-06	2.46E-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	7.05E-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-03
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	4.63E-05
SB125+D	2.66E-05	2.05E-07	5.59E-06	2.46E-08	0.	8.27E-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.	8.17E-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	5.72E-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	4.70E-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	3.58E-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

TABLE 6 (contd)

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CHILD INHALATION DOSE COMMITMENT FACTORS(MREM/SOY 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-13	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-06	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	1.40E-04	2.43E-05
SM153	7.24E-08	4.51E-08	4.35E-09	0.	1.37E-08	1.31E-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

TABLE 6 (contd)

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CHILD INHALATION DOSE COMMITMENT FACTORS(MREM/SOY PER PCI INHALED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PH210+D	8.03E-02	1.85E-02	3.18E-03	0.	6.31E-02	8.74E-02	3.75E-05
PI210+D	0.	5.11E-06	5.65E-07	0.	5.76E-05	3.70E-03	3.21E-05
PO210	1.70E-03	2.75E-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	9.89E-07	1.54E-04	0.	2.36E-05	8.48E-02	3.00E-04
RA224+D	9.44E-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	7.65E-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.	1.79E-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	1.78E-01	6.31E-01	0.	8.58E-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	1.26E-01	0.	7.28E-01	1.77E+00	3.27E-05
TH234	6.96E-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	4.48E-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	4.09E-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-06	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	1.24E-07	9.04E-09	6.35E-09	0.	2.63E-08	1.57E-05	1.73E-05
PU235	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	4.30E-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	5.94E-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.	3.04E-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	8.62E-01	1.26E-01	0.	4.95E-01	1.95E-01	5.80E-05
CF252	1.72E+01	6.61E+00	1.04E+00	0.	4.08E+00	1.61E+00	9.35E-04
	3.92E+00	0.	9.33E-02	0.	0.	6.62E-01	1.84E-04

TABLE 7

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TEEN INHALATION DOSE COMMITMENT FACTORS(MREM/SOY 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	2.79E-04	4.33E-05	7.09E-06	0.	0.	3.84E-04	1.77E-05
C14	3.25E-06	8.09E-07	8.09E-07	8.09E-07	8.09E-07	8.09E-07	8.09E-07
N13	8.65E-09	8.65E-09	8.65E-09	8.65E-09	8.65E-09	8.65E-09	8.65E-09
F18	8.52E-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.	4.34E-06	0.	0.	1.01E-01	3.03E-07
SC46	7.24E-05	1.41E-04	4.18E-05	0.	1.33E-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.	4.39E-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.	3.17E-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-08
ZN69	6.04E-12	1.15E-11	8.07E-13	0.	7.53E-12	1.48E-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.	5.40E-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.

TABLE 7 (contd)

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TEEN INHALATION DOSE COMMITMENT FACTORS(MREM/SOY 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	1.61E-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	8.72E-12	3.55E-12	0.	1.14E-11	4.91E-07	2.71E-07
MO93	0.	1.86E-06	4.52E-08	0.	5.96E-07	8.81E-05	3.99E-06
MO99+D	0.	2.11E-08	4.03E-09	0.	5.14E-08	1.42E-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	1.38E-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	8.07E-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.	6.78E-05	9.37E-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

TABLE 7 (contd)

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TEEN INHALATION DOSE COMMITMENT FACTORS (MREM/SOY 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	2.09E-05	1.82E-05	4.47E-06	0.	7.50E-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	1.08E-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-06
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.	3.08E-08	1.63E-05	3.19E-05
CE144+D	6.11E-05	2.53E-04	3.28E-05	0.	1.51E-04	1.67E-03	1.08E-04
PR143	1.67E-06	8.64E-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	8.89E-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	7.48E-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.	1.38E-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	1.56E-09	1.22E-09	4.29E-10	0.	0.	5.92E-06	2.21E-05

TABLE 7 (contd)

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TEEN INHALATION DOSE COMMITMENT FACTORS (MREM/SOY PER PCI INHALED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	3.89E-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	2.93E-05	6.77E-06	5.65E-06	0.	1.93E-06	1.51E-02	2.29E-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-05	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	9.57E-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	3.55E+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

TABLE B

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

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
H3[a]	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	5.27E-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	1.88E-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.	1.54E-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.	1.93E-10	7.49E-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

[a] Includes a 50% increase to account for percutaneous transpiration.

TABLE B (contd)

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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	1.68E-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.	2.17E-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	8.64E-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	6.50E-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	6.74E-09	5.45E-09	3.63E-09	6.86E-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	1.60E-05	6.37E-05
TE133M+D	7.24E-12	5.40E-12	4.17E-12	6.27E-12	3.74E-11	3.51E-07	5.49E-08
TE134+D	3.84E-12	3.22E-12	1.57E-12	3.44E-12	2.18E-11	4.34E-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

TABLE 8 (contd)

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ADULT INHALATION DOSE COMMITMENT FACTORS (MREM/SOY 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.	5.68E-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	1.96E-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.	8.00E-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	2.58E-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	2.78E-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	8.37E-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	4.78E-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	4.58E-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-04	8.85E-10	3.10E-10	0.	0.	3.63E-06	1.94E-05

TABLE 8 (contd)

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ADULT INHALATION DOSE COMMITMENT FACTORS (MREM/SOY PER PCI INHALED IN FIRST YR)

ISOTOPE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
PB210+D	2.64E-02	8.73E-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	8.50E-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	1.90E-04	2.77E-07	3.50E-05	0.	7.85E-06	2.55E-02	2.84E-04
RA224+D	1.94E-05	4.[illegible]E-06	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	2.64E-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
TH228+D	2.00E-01	3.34E-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.	8.52E-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-05	9.58E-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.	5.54E-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	7.44E-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	1.99E-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

7.0 COMPUTER CALCULATION OF DOSES RESULTING FROM EFFLUENTS

Software for calculating doses from normal releases will be installed on the plant process computer sometime in the future. A description and operating instructions will be provided at that time. Should dose calculations be required, either the manual technique of Section 6.0 or the computer technique of this section may be used.

8.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Requirements for the PBNP environmental monitoring program are detailed in Technical Specification 15.7.7. A complete description of the PBNP radiological environmental monitoring program, including procedures and responsibilities, is contained in the PBNP Environmental Manual. The latter is hereby incorporated into the Offsite Dose Calculation Manual (ODCM) by reference.

9.0 Radiological Impact Evaluation of Sewage Treatment Sludge Disposal

The methodology for determining the radiological impact of sewage treatment sludge disposal is presented in this section. The radiological impact evaluation must be performed for each sewage treatment sludge disposal prior to land application.

9.1 Basis

Wisconsin Electric's commitment with the United States Nuclear Regulatory Commission in a letter dated October 8, 1987 (VPNPD-87-430, NRC-87-104) requires Wisconsin Electric to measure the concentrations of radionuclides in the sewage treatment sludge and compare them to concentration limits prior to disposal. In addition, the appropriate exposure pathways will be evaluated prior to each application of sludge to insure that the dose to the maximally exposed member of the general public is maintained less than 1 mrem/year and the dose to the inadvertent intruder is maintained less than 5 mrem/year.

The exposure pathways evaluated for the maximally exposed individual are the following:

1. External whole body exposure due to a ground plane source of radionuclides.

2. Milk ingestion pathway from cows fed alfalfa grown on plot.

3. Meat ingestion pathway from cows fed alfalfa grown on plot.

4. Vegetable ingestion pathway from vegetables grown on plot.

5. Inhalation of radioactivity resuspended in air above plot.

6. Pathways associated with a release to Lake Michigan. These pathways are ingestion of potable water at the Two Rivers, Wisconsin municipal water supply, ingestion of fish from edge of initial mixing zone of radionuclide release, ingestion of fresh and stored vegetables irrigated with water from Lake Michigan, ingestion of milk and meat from cows utilizing Lake Michigan as drinking water source, swimming and boating activities at the edge of the initial mixing zone, and shoreline deposits.

The exposure pathways evaluated for the inadvertent intruder are the same as items 1, 4, 5, and 6 identified above for the maximally exposed individual.

9.2 Procedure

The following steps are to be performed by the Responsible Engineer - NPERS for each sewage treatment sludge disposal:

9.2.1 Obtain from PBNP - Chemistry the radionuclide concentrations in each representative sewage treatment sludge sample. The minimum number of representative samples required is three from each sludge storage tank. The average of all statistically valid concentration determinations will be utilized in determining the sludge storage tank concentration values.

9.2.2 Verify that the concentration of each radionuclide meets the concentration and activity limit criteria. The methodology for determining compliance with the concentration and activity limit criteria are contained in Appendix A-1.

9.2.3 Verify that the proposed disposal of the sewage treatment sludge will maintain doses within the applicable limits. This calculation will include radionuclides disposed of in previous sludge applications. The activity from these prior disposals will be corrected for radiological decay prior to performing dose calculations for the meat, milk, and vegetable ingestion pathways, the inhalation of resuspended radionuclides, and all pathways associated with a potential release to Lake Michigan. The residual radioactivity will be corrected, if applicable, for the mixing of radionuclides in the soil prior to performing external exposure calculations.

Wisconsin Electric utilizes QAD, a nationally recognized computer code, to perform shielding and dose rate analyses. QAD will be used to calculate the dose rate due to standing on a plot of land utilized for sludge disposal in which the radionuclides from prior disposals have been incorporated into the plot by plowing. This calculated dose rate will be used to assess the radiological consequences from prior disposals with the consequences of proposed future disposals. The total radiological dose consequence of the past and the proposed disposal will be compared to the applicable limits to insure the dose is maintained at or below the limits.

The methodology for calculating the radiological impact of the sewage treatment sludge disposal is contained in Appendix A-1.

9.2.4 Inform PBNP - Chemistry that the sewage treatment sludge disposal may proceed after verifying that the sewage treatment sludge meets the concentration, activity, and dose limits.

9.2.5 Forward all calculations to PBNP - Chemistry to be included with the sewage treatment sludge disposal record.

APPENDIX A-1

Wisconsin Electric submittal to the United States Nuclear Regulatory Commission, dated October 8, 1987 (VPNPD-87-430, NRC-87-104).

Wisconsin Electric POWER COMPANY
231 W MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

(414) 277-2345

VPNPD-87-430
NRC-87-104

October 8, 1987

U.S. NUCLEAR REGULATORY COMMISSION
Document Control Desk
Washington, D.C. 20555

Gentlemen:

DOCKET NOS. 50-266 AND 50-301
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
FOR 10 CFR 20.302 APPLICATION
POINT BEACH NUCLEAR PLANT

On July 14, 1987, Wisconsin Electric Power Company submitted an application, under the provisions of 10 CFR 20.302, for approval of a proposed procedure to dispose of sewage treatment sludge containing minute quantities of radioactive materials. Subsequent to the application, Mr. Ted Quay of the NRC staff requested additional information regarding the environmental characteristics of the area surrounding the Point Beach Nuclear Plant. The responses to this request were furnished in our submittal dated August 6, 1987.

By letter dated September 9, 1987, the NRC has requested Wisconsin Electric supply additional information in order to complete the review of our application. This Request for Additional Information (RAI) contains ten specific items which require responses or commitments from Wisconsin Electric. In addition, the NRC requests the previously submitted information and the information supplied in response to the RAI be compiled into "one complete, extensive, and self-contained package". To facilitate your review, Attachment I is included to provide direct responses to the ten items contained in the RAI. Attachment II is provided as the complete application, including the information from our letters dated July 14, 1987, and August 6, 1987, and information supplied in response to the NRC RAI.

We request that you complete your review of this complete, self-contained package and issue an approval of our application

as soon as possible. In order to facilitate your review and to expedite processing, we would be pleased to discuss these matters or provide additional information by telephone. Please feel free to contact us.

Very truly yours,

C. W. Fay
Vice President
Nuclear Power

bjm

Attachments

Copies to NRC Resident Inspector
NRC Regional Administrator, Region III

Blind copies to Britt/Gorske/Finke, Burstein, Charnoff, Fay, Krieser, Lipke, Newton, Zach

ATTACHMENT I

RESPONSES TO QUESTIONS CONTAINED IN THE REQUEST FOR ADDITIONAL INFORMATION (RAI) ON POINT BEACH 1 AND 2 REQUEST FOR DISPOSAL OF LOW LEVEL RADIOACTIVITY CONTAMINATED SEWAGE SLUDGE BY LAND APPLICATION WISCONSIN ELECTRIC POWER COMPANY UNDER 10 CFR 20.302(a)

The numbering system used in these responses corresponds directly to numbering used in the NRC RAI, dated September 9, 1987.

1. a. This request is for multiple applications, approximately 2 to 4 per year.
   b. This request is for multiple years, expiration to coincide with conclusion of decommissioning activities associated with retirement of PBNP Units 1 & 2.
   c. Please refer to the response to question number 10.

2. The pathways used to determine doses to both the maximally exposed individual and the inadvertent intruder are documented in Attachment II, Appendices D and E.

   Due to the extremely low concentrations of radionuclides in the sewage sludge and the associate low doses, Wisconsin Electric will control access to the disposal sites by conditions of use defined in lease agreements with the lease. Use of the land is not controlled beyond the conditions of the lease, thereby not restraining a casual visitor from the disposal site. However continuous occupancy would be readily observed, and remedial action would be taken.

3. Information contained in previous submittals has been included in Attachment II with modifications to provide specific commitments to the NRC.

4. Please refer to the response to question number 10.

5. Site maps have been updated and are included in Attachment II, Appendix C.

6. The direct grazing of cattle on the proposed disposal sites is controlled by restrictions contained in the lease agreement.

   There will be no restrictions placed on fishermen on Lake Michigan. Calculations of doses due to all pathways associated with a release to Lake Michigan (Attachment II, Appendix E) do not indicate a need to apply restrictions to fishermen.

7. Please refer to revised site maps included in Attachment II, Appendix C. Site number 5 is located on company owned land beyond the PBNP site boundary. All other sites are within the PBNP site boundary area.

8. a. Please refer to Attachment II, Section 3.2, Disposal Procedure.
   b. Please refer to Attachment II, Section 3.2, Disposal Procedure.
   c. Please refer to Attachment II, Section 3.2, Disposal Procedure.
   d. Please refer to Attachment II, Appendix A.

9. Please refer to Attachment II, including Appendix D and Appendix E for additional pathways analyzed for this submittal. These identified pathways will be analyzed prior to all subsequent disposals to insure doses are maintained within prescribed limits, i.e., 1 mrem/year to the maximally exposed individual and 5 mrem/year to the inadvertent intruder.

10. A limiting concentration level for the sludge contained in the storage tank is discussed, in Attachment II, Appendix F. Since this application is for multiple applications over multiple years, Attachment II, Appendix F also addresses an activity limit.

ATTACHMENT II

COMPLETE ANALYSIS AND EVALUATION

POINT BEACH NUCLEAR PLANT

10 CFR 20.302(a) APPLICATION

1.0 Purpose

By this submittal Wisconsin Electric Power Company requests approval of the U.S. Nuclear Regulatory Commission for a proposed procedure to dispose of sewage treatment sludge containing trace quantities of radionuclides generated at the Point Beach Nuclear Plant. This request is submitted in accordance with the provisions of 10 CFR 20.302(a).

2.0 Waste Description

The waste involved in this disposal process consists of the residual solids remaining in solution upon completion of the aerobic digestion sewage treatment process utilized at PBNP. The PBNP sewage treatment plant is used to process waste water from the plant sanitary and potable water systems. These systems produce non-radioactive waste streams with the possible exception of wash basins located in the radiologically controlled area of the plant. These wash basins are believed to be the primary source of the extremely small quantities of radionuclides in the sludge.

The sewage sludge generated at PBNP is allowed to accumulate in the sewage plant digestor and aeration basin. Two to four times annually, depending on work activities and corresponding work force at PBNP, the volume of the sludge in the digestor and aeration basin needs to be reduced to allow continued efficient operation of the treatment facility. The total volume of sludge removed during each disposal operation is typically on the order of 15,000 gallons. The maximum capacity for the entire PBNP treatment facility and hence the maximum disposal volume is about 30,000 gallons. In the case of a maximum capacity disposal, doses would not necessarily increase in proportion to the volume, since more than one disposal site may be used.

Trace amounts of radionuclides have been identified in PBNP sludge currently being stored awaiting disposal. The radionuclides identified and their concentrations in the sludge are summarized below:

Nuclide	Concentration (μCi/cc)
Co-60	2.33E-07
Cs-137	1.50E-07

The total activity of the radionuclides in the stored sludge, based on the identified concentrations and a total volume of 15,000 gallons of sewage sludge, are as follows:

Nuclide	Activity (μCi)
Co-60	13.2
Cs-137	8.5

These concentrations and activities are consistent with expected values based on prior analyses of sewage sludge. The radionuclide concentration in the sewage sludge has remained relatively constant during sampling conducted since December 30, 1983. A detailed summary of the results of this sampling program are contained in Appendix A for your review.

In addition to monitoring for the radionuclide content of the sludge, the WDNR requires several other physical and chemical properties of the sludge to be determined. These properties are the percent total solids, percent total nitrogen, percent ammonium nitrogen, pH, percent total phosphorus, percent total potassium, cadmium, copper, lead, nickel. mercury, zinc, and boron. An example of a typical sludge sample analysis is included in Appendix B.

3.0 Disposal Method

In the context of this application, Wisconsin Electric commits to the following methodology. No distinction is made or intended between "shall" or "will", as used in the descriptions contained in this section.

3.1 Transport of Sludge

The method used to dispose of the sludge shall utilize a technique approved by the WDNR. The process of transporting the sewage sludge for disposal involves pumping the sludge from the PBNP sewage treatment plant storage tanks into a truck mounted tank. The truck mounted tank shall be required to be maintained tightly closed to prevent spillage while in transit to the disposal site. The sludge shall be transported to one or more of the six sites approved by the WDNR for land application of the sewage sludge from PBNP.

3.2 Disposal Procedure

The radionuclide concentrations in the sludge shall be determined prior to each disposal by obtaining three representative samples from each of the sludge storage tanks. The sludge contained in the sludge tanks is prevented from going septic by a process known as complete mix and continuous aeration. This process completely mixes the sludge allowing for representative samples to be obtained.

The samples shall be counted utilizing a GeLi detector and multi-channel analyzer with appropriate geometry. The detection system is routinely calibrated and checked to ensure the lower limits of detection are within values specified in the Radiological Effluent Technical Specifications (RETS).

To insure the samples are representative of the overall concentration in the storage tanks, the radionuclide concentration determination for each of the three samples shall be analyzed to insure each sample is within two standard deviations of the average value of the three samples. If this criteria is not met, additional samples will be obtained and analyzed to insure a truly representative radionuclide concentration is utilized for dose calculations and concentration limit determinations. The average of all statistically valid concentration determinations will be utilized in determining the storage tank concentration values.

Prior to disposal the waste stream will be monitored to determine the physical and chemical properties of the sludge, as discussed in the last paragraph of Section 2.0, Waste Description. The results will be compared to State of Wisconsin limits to insure the sludge does not pose a chemical hazard to people or to the environment.

The radionuclides identified in the sludge, along with their respective concentrations, will be compared to concentration limits prior to disposal. The methodology discussed in Appendix F will be used in determining compliance with the proposed concentration limit. The total activity of the proposed disposal will be compared to the proposed activity limit as described in Appendix F.

If the concentration and activity limit criteria are met, the appropriate exposure pathways (as described in Appendix D) will be evaluated prior to each application of sludge. These exposures will be evaluated to insure the dose to the maximally exposed individual will be maintained less than 1 mrem/year and the dose to the inadvertent intruder is maintained less than 5 mrem/year. The exposures will be calculated utilizing the methodology used in Appendix E, including the current activity to be landspread along with the activity from all prior disposal. The remaining radioactivity from prior disposals will be corrected for radiological decay prior to performing dose calculations for the meat, milk, and vegetable ingestion pathways, the inhalation of resuspended radionuclides, and all pathways associated with a release to Lake Michigan. The residual radioactivity will be corrected for radiological decay and, if appropriate, the mixing of the radionuclides in the soil by plowing prior to performing external exposure calculations.

The sewage sludge is applied on the designated area of land utilizing the WDNR approved technique and adhering to the following requirements of WPDES Permit Number WI-0000957-3.

- Discharge to the land disposal system shall be limited so that during surface spreading all of the sludge and any precipitation falling onto or flowing onto the disposal field shall not overflow the perimeter of the system.

- Sludge shall not be land spread on land with a slope greater than 12%. During the period from December 15 through March 31 sludge shall not be land spread on land with a slope greater than 6% unless the wastes are injected immediately into the soil.

- Sludge shall not be surface spread closer than 500 feet from the nearest inhabited dwelling except that this distance may be reduced with the dwelling owner's written consent.

- Sludge shall not be spread closer than 1,000 feet from a public water supply well or 250 feet from a private water supply well.

- Sludge shall not be land spread within 200 feet of any surface water unless a vegetative buffer strip is maintained between the surface watercourse and the land spreading system, in which case a minimum separation distance of at least 100 feet is required between the system and the surface watercourse.

- Depth to groundwater and bedrock shall be greater than 3 feet from the land surface elevation during use of any site.

- Sludge shall not be land spread in a floodway.

- Sludge shall not be land spread within 50 feet of a property line road or ditch unless the sludge is incorporated with the soil, in which case a minimum separation distance of at least 25 feet is required.

- The pH of the sludge-soil mixture shall be maintained at 6.5 or higher.

- Low areas of the approved fields, subject to seasonally high groundwater levels, are excluded from the sludge application.

- Crops for human consumption shall not be grown on the land for up to one year following the application of the sludge.

- The sludge shall be plowed, disked, injected or otherwise incorporated into the surface soil layer at appropriate intervals.

The flexibility implied in the latter provision for soil incorporation is intended to allow for crops which require more than a one year cycle. For the Point Beach disposal sites, alfalfa is a common crop which is harvested for several years after a single planting. Sludge disposal on an alfalfa plot constitutes good fertilization, but the plot cannot be plowed without destroying the crop. The alfalfa in this case aids in binding the layer of sludge on the surface of the plot. At a minimum, however, plowing (or disking or other method of injection and mixing to a nominal depth of 6 inches) shall be done prior to planting any new crop, regardless of the crop.

3.3 Administrative Procedures

Complete records of each disposal will be maintained. These records will include the concentration of radionuclides in the sludge, the total volume of sludge disposed, the total activity, the plot on which the sludge was applied, the results of the chemical composition determinations, and all dose calculations.

The annual disposal rate for each of the approved land spread sites will be limited to 4,000 gallons/acre, provided WDNR chemical composition, NRC dose guidelines, and concentration and activity limits are maintained within the appropriate values.

The farmer leasing the site used for the disposal will be notified of the applicable restrictions placed on the site due to the land spreading of sewage sludge.

4.0 Evaluation of Environmental Impact

4.1 Site Characteristics

4.1.1 Site Topography

The disposal sites are located in the Town of Two Creeks in the northeast corner of Manitowoc County, Wisconsin, on the

west shore of Lake Michigan about 30 miles southeast of the center of the city of Green Bay, and 90 miles NE of Milwaukee. This site is located at longitude 87° 32.5'W and latitude 44° 17.0'N. The six sites are on property owned and controlled by Wisconsin Electric and are within or directly adjacent to the Point Beach site boundary. The sites are described below and are outlined on the map contained in Appendix C as Figure 3.

Site No. PB-01 - The approximately 15 acres located in the NE 1/4 of the NE 1/4 of Section 23, T. 21N - R. 24E.

Site No. PB-02 - The approximately 20 acres located in the SE 1/4 of the SE 1/4 of Section 14, T. 21N - R. 24E.

Site No. PB-03 - The approximately 5 acres located in the NW 1/4 of Section 24, T. 21N - R. 24E.

Site No. PB-04 - The approximately 5 acres located in the NW 1/4 of the SW 1/4 of Section 24, T. 21N - R. 24E.

Site No. PB-05 - The approximately 5 acres located in the NE 1/4 of the NW 1/4 of Section 25, T. 21N - R. 24E.

Site No. PB-06 - The approximately 5 acres located in the NE 1/4 of the SW 1/4 of Section 14, T. 21N - R. 24E.

The overall ground surface at the site of the Point Beach Nuclear Plant is gently rolling to flat with elevations varying from 5 to 60 feet above the level of Lake Michigan. Subdued knob and kettle topography is visible from aerial photographs. The land surface slopes gradually toward the lake from the higher glacial moraine areas west of the site. Higher ground adjacent to the lake, however, diverts the drainage to the north and south.

The major surface drainage features are two small creeks which drain to the north and south. One creek discharges into the lake about 1500 feet above the northern corner of the site and the other near the center of the site. During the spring, ponds of water may occupy the shallow depressions. As mentioned in Section 3.2, Disposal Procedure, these low areas are excluded from the sludge application.

A site topographic map covering details out to a 5 mile radius may be found in the FSAR at Figure 2.2-3 and is included in Appendix C as Figure 2.

The disposal of sewage sludge at these six sites will have no impact on the topography of this area.

4.1.2 Site Geology

Prior to construction of the Point Beach Nuclear Plant, an evaluation of the geological characteristics of the area in and surrounding the site was made. The geologic structure of the region is essentially simple. Gently dipping sedimentary rock

strata of Paleozoic age outcrop in a horseshoe pattern around a shield of Precambrian crystalline rock which occupies the western part of the region. The site is located on the western flank of the Michigan Basin, which is a broad downwarp ringed by discontinuous outcrops of more resistant formations. The bedrock formations are principally limestones, dolomites, and sandstones with subordinate shale layers. The rocks form a succession of extensive layers that are relatively uniform in thickness. The bedrock strata dip very gently towards Lake Michigan at rates from 15 to 35 feet per mile.

The uppermost bedrock under the site is Niagara Dolomite. Bedrock does not outcrop on the site but is covered by glacial till and lake deposits. The soils contain expansive clay minerals and have moderately high base exchange capacity.

In the area of the site, the overburden soils are approximately 70 to 100 feet in thickness. Although the character of the glacial deposits may vary greatly within relatively short distances, a generalized section through the overburden soils adjacent to Lake Michigan at the site consists of the following sequence:

1. An upper layer of brown clay silt topsoil underlain with several feet of brown silty clay with layers of silty sand;

2. A layer of 20 feet of reddish-brown silty clay with some sand and gravel and occasional lenses of silt;

3. A layer of 25 feet of reddish-brown silty clay with layers of silty sand and lenses of silt;

4. A layer of 50 feet of reddish-brown silty clay with some sand and gravel, the lower portion of which contains gravels, cobbles, and boulders resting on a glacial eroded surface of Niagara dolomite bedrock.

Site drainage is poor due to the high clay content of the soil combined with the pock-marked surface. Additional information on site geology may be found in Section 2.8 of the FSAR.

The use of these sites for disposal of sewage sludge will not impact the geology of the area.

4.2 Area Characteristics

4.2.1 Meteorology

The climate of the site region is influenced by the general storms which move eastward along the northern tier of the United States and by those which move northeastward from the southwestern part of the country to the Great Lakes. This continental type of climate is modified by Lake Michigan. During spring, summer, and fall months the lake temperature differs markedly from the air temperature. Wind shifts from westerly to easterly directions produce marked cooling of day-time

temperatures in spring and summer. In autumn the relatively warm water to the lake prevents night-time temperatures from falling as low as they do a few miles inland from the shoreline. Summer time temperatures exceed 90°F for six days on the average. Freezing temperatures occur 147 days and below zero on 14 days of the winter on the average. Rainfall averages about 28 inches per year with 55 percent falling in the months of May through September. Snowfall averages about 45 inches per year. Sludge spreading shall be managed such that the surface spreading together with any precipitation falling on the field shall not overflow the perimeter of the field. Additional information on site meteorology may be found in Section 2.6 of the FSAR.

There will be no impact on the meteorology of the area due to the disposal of the sewage sludge.

4.2.2 Hydrology

The dominant hydrological feature of this site is Lake Michigan, one of the largest of the Great Lakes. The normal water level in Lake Michigan is approximately 580 feet above mean sea level. In the general vicinity of the site, the 30 foot depth contour is between 1 and 1-1/2 miles offshore and the 60 foot contour is 3 to 3-1/2 miles off shore. The disposal sites are twenty or more feet above the normal lake level. There is no record that the sites have been flooded by the lake during modern times. There are no rivers or large streams which could create a flood hazard at or near the sites.

The subsurface water table at the Point Beach site has a definite slope eastward toward the lake. The gradient indicated by test drilling on the site is approximately 30 feet per mile. It is therefore extremely unlikely that any release of radioactivity on the site could spread inland. Furthermore, the rate of subsurface flow is small due to the relative impervious nature of the soil and will not promote the spread of releases. Further information on site hydrology is detailed in the PBNP FSAR Section 2.5.

There will be no adverse impact on hydrology of the area due to disposal of sewage sludge by land spreading.

4.3 Water Usage

4.3.1 Surface Water

Lake Michigan is used as the source of potable water supplies in the vicinity of the site for the cities of Two Rivers (12 miles south), Manitowoc (16 miles sourth), Sheboygan (40 miles south), and Green Bay (intake at Rostok 1 mile north of Kewaunee, 13 miles north). No other potable water uses are recorded within 50 miles of the site along the lake shore. All public water supplies drawn from Lake Michigan are treated in purification plants. The nearest surface water used for drinking other than Lake Michigan are the Fox River 30 miles NW and

Lake Winnebago 40 miles W of the site.

Lake Michigan is also utilized by various recreational activities, including fishing, swimming and boating.

There will be no impact on surface water usage due to the disposal of sewage sludge.

4.3.2 Ground Water

Ground water provides the remaining population with potable supplies. Public ground water supplies within a 20 mile radius of the site are listed in Table 2.5-3 of the FSAR. Additional wells for private use are in existence throughout the region. The location of private wells within a two mile radius of PBNP are indicated on Figure 3, Appendix C.

The potable water for use at the Point Beach Nuclear Plant is drawn from a 257 feet deep well located at the southwest corner of the plant yard. Water from this well is routinely sampled as part of the environmental monitoring program.

There will be no adverse impact on ground water usage due to the disposal of sewage sludge.

4.4 Land Usage

Manitowoc County, in which the site is located, and the adjacent counties of Kewaunee, Brown, Calumet, and Sheboygan are predominantly rural. Agricultural pursuits account for approximately 90% of the total county acreage. With the exception of the Kewaunee Nuclear Plant located 4.5 miles north, the region within a radius of five miles of the site is presently devoted exclusively to agriculture. Dairy products and livestock account for 95% of the counties' farm production, with field crops and vegetables accounting for most of the remainder. The principal crops are grain corn, silage corn, oats, barley, hay, potatoes, green peas, lima beans, snap beans, beets, cabbage, sweet corn, cucumbers, and cranberries. Within the township of Two Creeks surrounding the site (15 sq. miles), there are about 800 producing cows on about 40 dairy farms. Some beef cattle are raised 2.5 miles north of the site. Cows are on pasture from the first of June to late September or early October. During the winter, cows are fed on locally produced hay and silage. Of the milk produced in this area, about 25 percent is consumed as fluid milk and 50 percent is converted to cheese, with the remainder being used in butter making and other by-products.

It has been the policy of Wisconsin Electric to permit the controlled use of crop land and pasture land on company owned property. No direct grazing of dairy or beef cattle or other animals is permitted on these company owned properties. Crops intended for human consumption shall not be grown on the disposal sites for at least one year following the application of the sludge.

The proposed land application of sewage sludge will not have any direct effect on the adjacent facilities. Additional land use

information may be found in Section 2.4 of the FSAR.

4.5 Radiological Impact

The rate of sewage sludge application on each of the six proposed sites will be monitored to insure doses are maintained within applicable limits. These limits are based on NRC Nuclear Reactor Regulation (NRR) staff proposed guidance (described in AIF/NESP-037, August, 1986). These limits require doses to the maximally exposed member of the general public to be maintained less than 1 mrem/year due to the disposal material. In addition, NRR guidance requires doses of less than 5 mrem/year to an inadvertent intruder.

To assess the doses received by the maximally exposed individual and the inadvertent intruder, six credible pathways have been identified for the maximally exposed individual and four credible pathways for the inadvertent intruder. The identified credible pathways are described in Appendix D.

Calculations detailed in Appendix E demonstrate the disposal of the currently stored PBNP sewage sludge would remain below these limits. The total annual exposure to the maximally exposed individual based on the identified exposure pathways is equal to 0.072 mrem. The dose to a hypothetical intruder assuming an overly conservative occupancy factor of 100% is calculated to be 0.115 mrem/year. By definition, the inadvertent intruder would not be exposed to the processed food pathways (meat and milk).

The calculational methodology used in determining doses for the proposed disposal of sludge stored at PBNP shall be utilized prior to each additional land application to insure doses are maintained less than those proposed by NRR. This calculation will include radionuclides disposed of in previous sludge applications. The activity from these prior disposals will be corrected for radiological decay prior to performing dose calculations for the meat, milk, and vegetable ingestion pathways, the inhalation of resuspended radionuclides, and all pathways associated with a potential release to Lake Michigan. The residual radioactivity will be corrected for radiological decay and, if applicable, the mixing of radionuclides in the soil prior to performing external exposure calculations. In addition, the dose to a farmer potentially leasing more than one application site will be addressed by summing the doses received from the external exposure from a ground plane source and resuspension inhalation pathways for each leased site. In addition, the maximum site specific dose due to the other pathways identified in Appendix D, will be utilized in the total exposure estimation.

5.0 Radiation Protection

The disposal operation will follow the applicable PBNP procedures to maintain doses as low as reasonably achievable. Technical review and guidance will be provided by the PBNP Superintendent - Health Physics.

APPENDIX A

SUMMARY OF RADIOLOGICAL ANALYSES OF SEWAGE SLUDGE SINCE DECEMBER 30, 1983

Sample Date	Tank	Tank Volume (Gallons)	Radionuclide	Concentration (µCi/cc)
12-30-83	Digester	8400	Co-58	5.58E-07
			Co-60	1.87E-06
			Cr-51	4.88E-07
			Cs-134	1.59E-07
			Cs-137	3.57E-07
4-06-84	Digester	7560	Co-60	7.89E-07
	Aeration	6667	Co-60	1.87E-07
12-05-84	Digester	7560	Co-58	1.75E-07
	Aeration	6667	Co-60	8.29E-07
6-03-85	Digester	7560	Co-60	8.29E-07
			Cs-137	2.46E-07
	Aeration	6700	Co-60	3.27E-07
			Cs-137	1.33E-07
4-10-86	Digester	7560	Co-60	6.79E-07
			Cs-137	1.72E-07
			Mn-54	4.91E-08
			Co-60	1.05E-07
11-04-86	Digester	7560	Co-58	8.04E-08
	Aeration & Clarifier	25100	Co-58	1.37E-07
			Co-60	2.18E-07
			Cs-137	1.64E-07

APPENDIX B

CHEMICAL COMPOSITION ANALYSIS OF SEWAGE SLUDGE

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

SLUDGE CHARACTERISTIC

Wisconsin Statute 147.02(1) and
Wisconsin Administrative Code NR 110.27(6)
FORM 3400-49 REV. 10-80

Sewage Treatment Plant Sludge

Please complete this form and send to the Department of Natural Resources appropriate District/Area Office. Keep one copy for your records.
For additional forms, please contact your appropriate District/Area Office.

PERMITTEE	WPDES PERMIT NUMBER
Wisconsin Electric Power Company	WI 00 0 0 2 9 5 7
STREET OR ROUTE: 231 W. Michigan Street	COUNTY: Milwaukee
CITY, STATE, ZIP CODE: Milwaukee, WI 53203	TELEPHONE NUMBER (INCLUDE AREA CODE): 414-277-2153

1. Please report laboratory testing results for the following parameters:

*Parameter	Abbreviation	Result	*Parameter	Abbreviation	Result
Total Solids, %	–	1.63	Chromium, ppm	Cr	-
Total Nitrogen, %	TOT N	1.0	Copper, ppm	Cu	2200
Ammonium Nitrogen, %	NH_4^+–N	0.34	Lead, ppm	Pb	190
Total Phosphorous, %	P	< 0.01	Mercury, ppm	Hg	5.6
Total Potassium, %	K	0.25	Nickel, ppm	Ni	12
Arsenic, ppm	As	1.0	Zinc, ppm	Zn	2800
Cadmium, ppm	Cd	12.	pH	–	7.0

*Suggested analysis procedures for the above parameters can be found in NR 219, analytical tests and procedures, Wisconsin Administrative Code. All parameters other than percent solids and pH shall be reported on a dry weight basis.

2. What is the name of the laboratory that did the analysis and when was it performed?

Laboratory Name: Wisconsin Electric Power Co. Laboratory Services Division — Date sent to lab: April 12, 1983

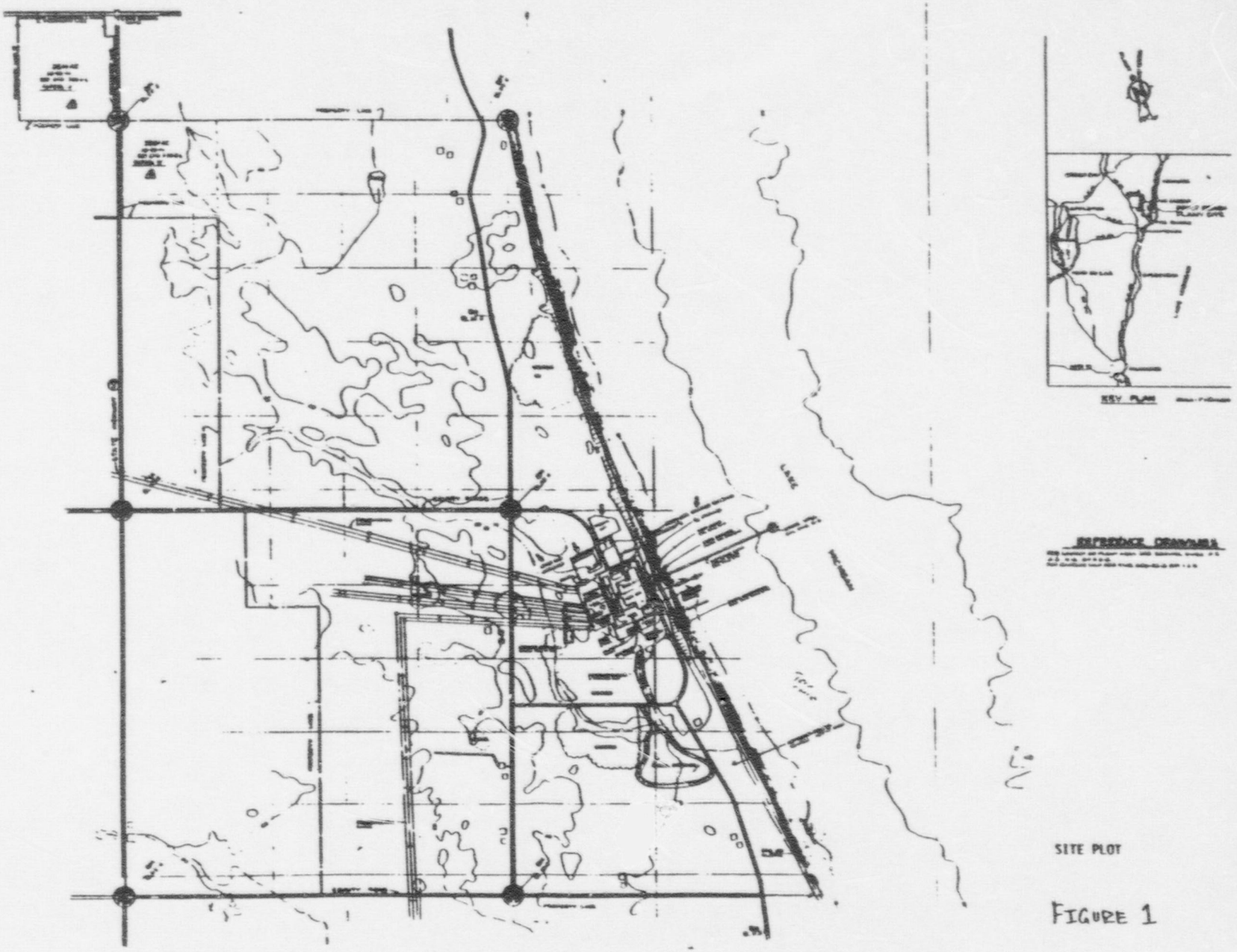
3. Where at the treatment plant was the sample taken? From sludge holding tank prior to hauling

4. When was the sample taken? April 12, 1983

SIGNATURE	TITLE	DATE
[signature]	Water Quality Engineer	–

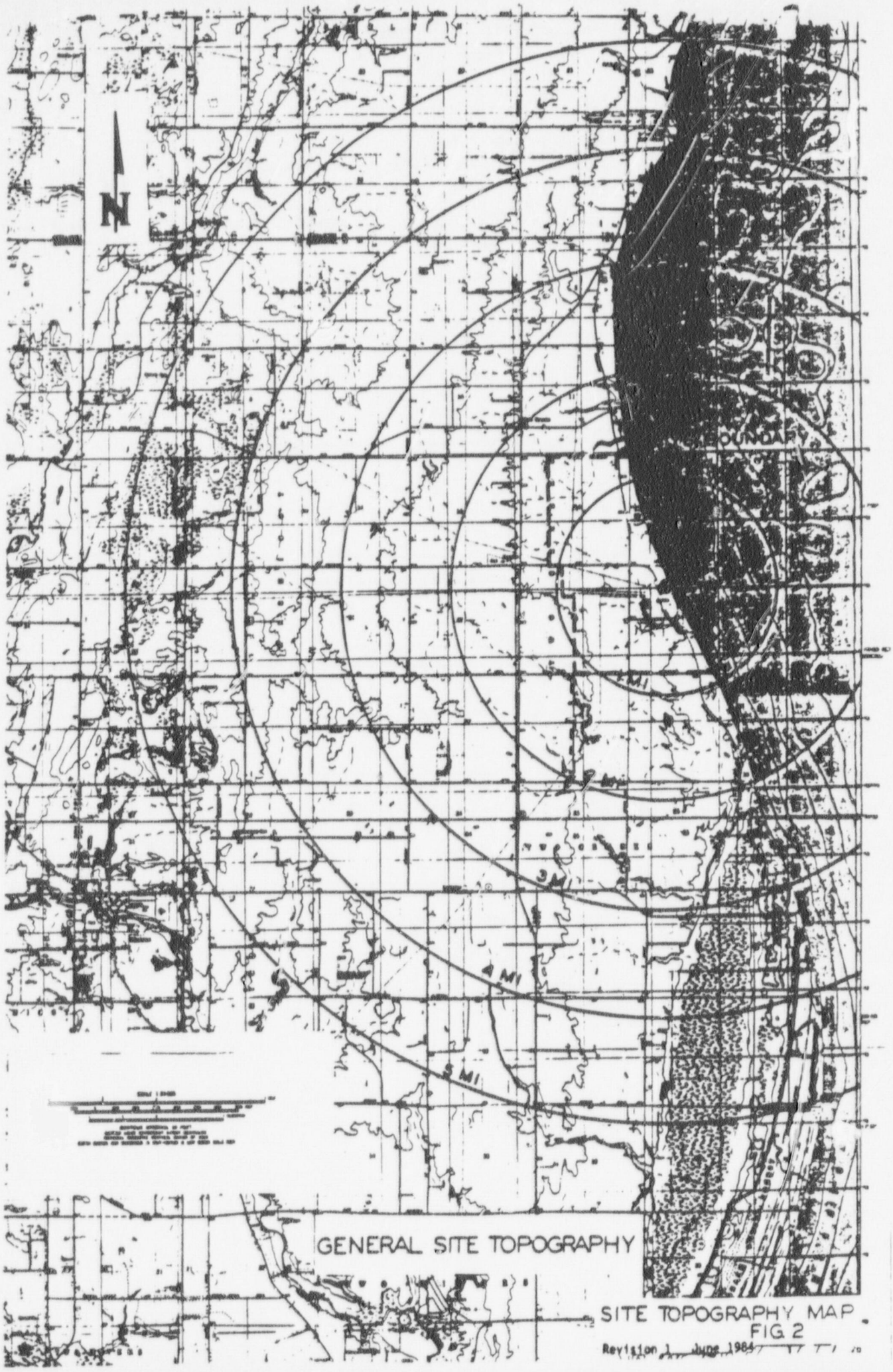
APPENDIX C

SITE MAPS



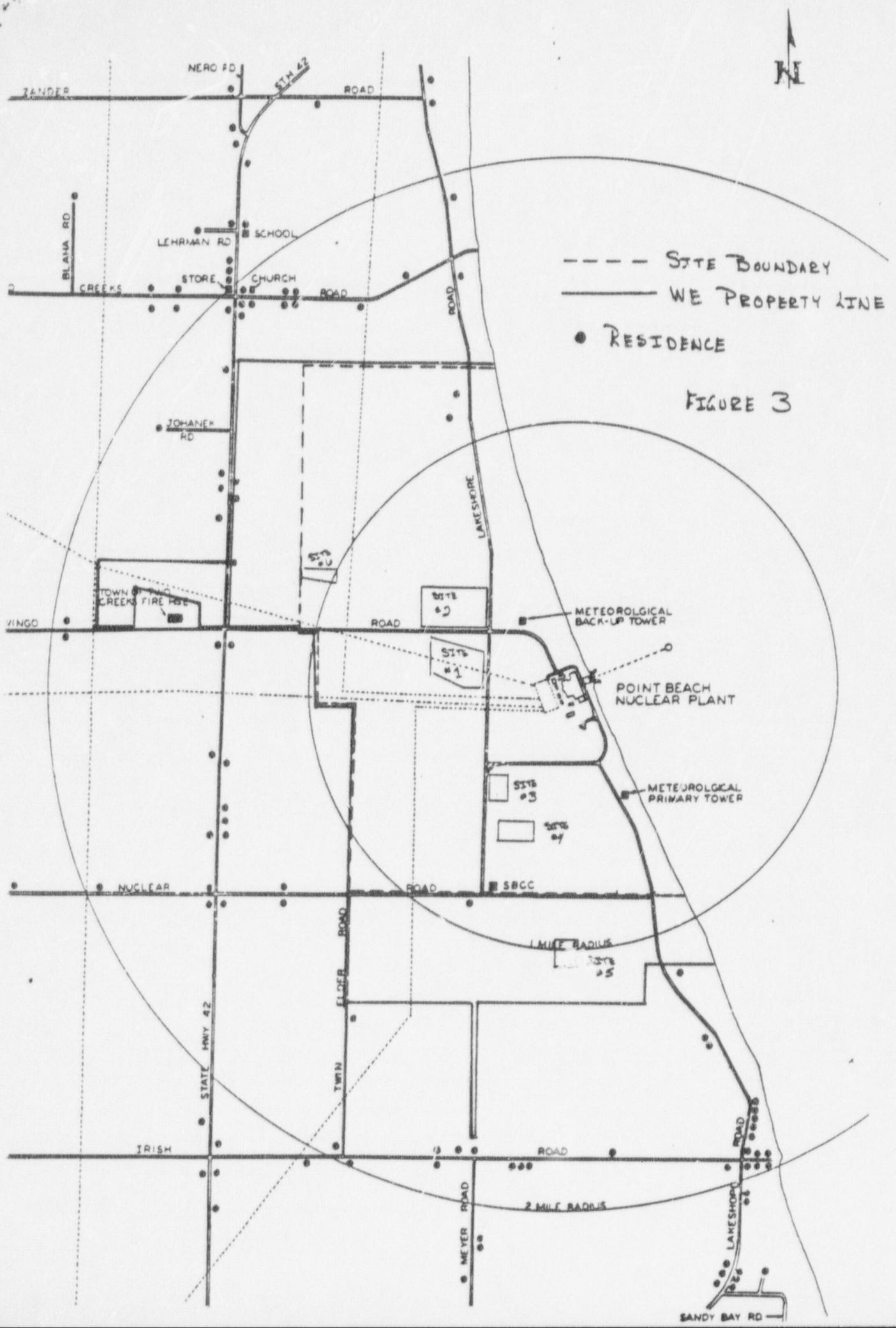
SITE PLOT

FIGURE 1



SITE TOPOGRAPHY MAP
FIG 2

Revision 1 JUNE 1984


N
NERO RD
STH 42
ZANDER
ROAD
BLAHA RD
LEHRMAN RD
SCHOOL
STORE
CHURCH
CREEKS
ROAD
ROAD
JOHANEK RD
LAKESHORE
SITE #2
TOWN OF TWO CREEKS FIRE PDE
VINGO
ROAD
SITE #5
METEOROLGICAL BACK-UP TOWER
SITE #1
POINT BEACH NUCLEAR PLANT
SITE #3
METEOROLGICAL PRIMARY TOWER
SITE #4
NUCLEAR
ROAD
SBCC
1 MILE RADIUS
SITE #5
ELDER ROAD
STATE HWY 42
TWIN
IRISH
ROAD
ROAD
2 MILE RADIUS
MEYER ROAD
LAKESHORE
SANDY BAY RD
---- SITE BOUNDARY
—— WE PROPERTY LINE
• RESIDENCE
FIGURE 3