

Enclosure (8)

CA06608 WPI

Radiological Consequences

Design Basis Calculation

Using AST

ESP No.:	ES200100401	Supp No.	000	Rev. No.	0000	Page 1 of 155
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FORM 19, CALCULATION COVER SHEET

A. INITIATION (Control Doc Type - DCALC)

Page of

DCALC No.: CA06608

Revision No.: 0000

Vendor Calculation (Check one):

☐ Yes☒ No

Responsible Group: Fuel Operations Support Unit

Responsible Engineer: J. R. Massari

B. CALCULATION

ENGINEERING
DISCIPLINE:☐ Civil☐ Instr & Controls☒ Nuc Engrg☐ Electrical☐ Mechanical☐ Nuc Fuel Mngmt☐ Other:☐ Reliability Engrg

Title:

WASTE PROCESSING INCIDENT FOR ALTERNATE SOURCE TERM

Unit

☐ 1☐ 2☒ COMMON

Proprietary or Safeguards Calculation

☐ YES☒ NO

Comments:

Vendor Calc No.:

N/A

REVISION No.:

Vendor Name:

N/A

Safety Class (Check one):

☒ SR☐ AQ☐ NSRThere are assumptions that require Verification during
walkdown:

AIT #:

This calculation SUPERSEDES:

C. REVIEW AND APPROVAL:

Responsible Engineer:

J. R. Massari

Printed Name and Signature

Date

Independent

Reviewer/Verifier:

G. E. Gryczkowski

Printed Name and Signature

Date

Approval:

P. I. Wengloski

Printed Name and Signature

Date

IF the results or conclusions of this calculation or revision might affect a procedure or the basis of a procedure, a Change Notification Form (Form 14) shall be forwarded to the Procedure Development Unit with a summary of the calculation's purpose and results.

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1.0 INTRODUCTION AND OBJECTIVE

UFSAR Section 5A.2.1.2 identifies the seismic design requirements for various systems in the plant, among them the radioactive liquid waste systems. Safety Guide 29 (Reference 1) as referenced in UFSAR 5A.2.1.2, was the original licensing basis for the seismic classification of the radioactive liquid waste system at CCNPP. Among the systems required by Safety Guide 29 (Section C.1.i) to be designed to Seismic Category I (SSE) standards were: "radioactive waste treatment, handling and disposal systems, except those portions of these systems whose postulated simultaneous failure would not result in conservatively calculated potential offsite exposures comparable to the guideline exposures of 10CFR100."

With the exception of the waste evaporators, the radioactive liquid waste processing system was classified as Seismic Category I. During construction, the reactor coolant and miscellaneous waste evaporators in the liquid waste and miscellaneous waste processing systems could not be procured to Seismic Category I standards. The Environmental Services Division of the NUS Corporation was requested to perform a calculation (Reference 10) to determine the site boundary doses from failure of these components to determine if they were less than the 10CFR100 limits of 25 rem whole body and 300 rem thyroid. This calculation assumed that the evaporator feed tank concentrations were at their respective maximum and iodine was concentrated to the same degree as elements such as cesium. It was further assumed that feed to the evaporator feed tanks continued from the receiver tanks for 15 minutes following the evaporator failure. The 0-2 hour accident meteorology was used for the analysis. Since the evaporator feed tanks are at 160°F, no flashing was assumed, and 10% of each evaporator feed tank volume was assumed to evaporate. Feed to the reactor coolant waste evaporators was assumed to be initially reactor coolant with a radionuclide concentration corresponding to 1% failed fuel (from UFSAR Table 11-5). The radionuclide concentration of feed to the miscellaneous waste evaporator was assumed to be 25% of the concentration in reactor coolant with 1% failed fuel. Credit for processing prior to evaporator processing was assumed. The processing credited prior to the evaporators included:

- A total ion exchange decontamination factor (DF) of 100 for all fission products except noble gases and tritium, for which a DF of 1 was used. This was considered to include processing by the CVCS ion exchangers and the reactor coolant waste processing system ion exchangers.
- A DF of 10^4 for removal of noble gases by the reactor coolant bleed degasifiers.

The dose contributors were as follows: a) 10^{-3} of all of the iodine in solution was assumed to come out of solution; b) All noble gases are released; c) All of the iodine and tritium in the evaporated portion of the evaporator feed tanks was assumed to be released. The calculated site boundary doses were 375 mrem thyroid and 1.3 mrem whole body for the reactor coolant waste evaporator failure, and 55 mrem thyroid and 0.3 mrem whole body for the miscellaneous waste evaporator failure. The total dose for simultaneous failure of both evaporators was 430 mrem thyroid and 1.6 mrem whole body, which was "considerably less than" the 10CFR100 limits. This analysis was originally included in the UFSAR as Chapter 14.23 to provide the justification for not designing the evaporators to Seismic Category I standards, in accordance with Safety Guide 29 Section C.1.i.

The dose contributions from the miscellaneous waste evaporators were eventually removed from UFSAR Chapter 14.23 in Revision 7 when the miscellaneous waste evaporators were retired-in-place (References 11 and 12). More recently, a NUKEM waste processing skid was installed in parallel to the evaporators. Like the evaporators, the NUKEM skid could not be procured to Seismic Category I standards, but was designed to meet the current requirements of Regulatory Guide 1.143 (Reference 26). Therefore, the reactor coolant waste evaporator dose calculation supporting the Safety Guide 29 exemption from Seismic Category I requirements was updated and expanded in Reference 3 to cover the NUKEM skid as well as other parts of the waste processing system. Reference 3 also utilized the original methodology to update the 1% failed fuel RCS specific activities for 24-month cycles at 2754 MWt with Value Added Pellet (VAP) fuel. ICRP 30 dose conversion factors and calculation methodology were also utilized, which had been previously approved by the NRC for other Chapter 14 accidents. Assumptions from the design basis evaporator evaluation were maintained, and credit for prior processing DFs utilized to calculate the source term for the skid and other waste processing system components were maintained consistent with the original evaporator evaluation and NUREG-0017 (Reference 24). The

resultant dose for simultaneous failure of the majority of the components in the waste processing system (excluding parts of the system upstream of containment isolation valves 1/2-CV-4260) was calculated to be 32 mrem whole body and 731 mrem thyroid. Using the 50.59 process (Reference 29) these doses were found to represent a minimal increase in dose compared to the current site boundary dose acceptance criteria for Seismic Category I exemption of 500 mrem whole body or its equivalent to any organ, specified in later revisions of Safety Guide 29 (Reg. Guide 1.29) and in subsequent seismic design guidance for radioactive waste systems in Regulatory Guide 1.143. In addition, 30-day control room doses of 149 mrem whole body and 4.84 rem thyroid were calculated using the AX2 code, which was well within the 10CFR50 Appendix A GDC 19 limits of 5 rem whole body, or its equivalent for the thyroid of 50 rem. While Reference 3 demonstrated that Seismic Category I design requirements for the majority of the liquid radioactive waste processing system were not required, the system remains classified as AQ-WPS (functionally non-safety related but designed to Seismic Category I) with the exception of the evaporators, the NUKEM skid, and its associated piping.

The objective of this calculation is to utilize the alternate source term (AST) methodology of 10 CFR 50.67 and Regulatory Guide 1.183 (Reference 2) to calculate offsite and control room doses for a Waste Processing Incident. A bounding control room inleakage value of 3500 cfm was assumed. Also credited was installation of automatic isolation dampers and radiation monitors at Access Controls 11 and 13 on the Auxiliary Building Roof. This modification limits activity egress into the control room from either the West Road Inlet or the Turbine Building, thus limiting the atmospheric dispersion coefficient value. Finally, the reactor coolant waste evaporator source terms are being eliminated from the dose calculation because the evaporators have not been used in 4 years, and engineering is currently in process to retire them in-place (Reference 25)

A simplified layout of the RC Waste Processing System is shown in Figure 1-1, including the NUKEM skid. Figure 1-2 provides a simplified diagram of the NUKEM skid. Note that these diagrams are intended to show only the major system components and typical line-ups. They do not indicate all possible system line-ups.

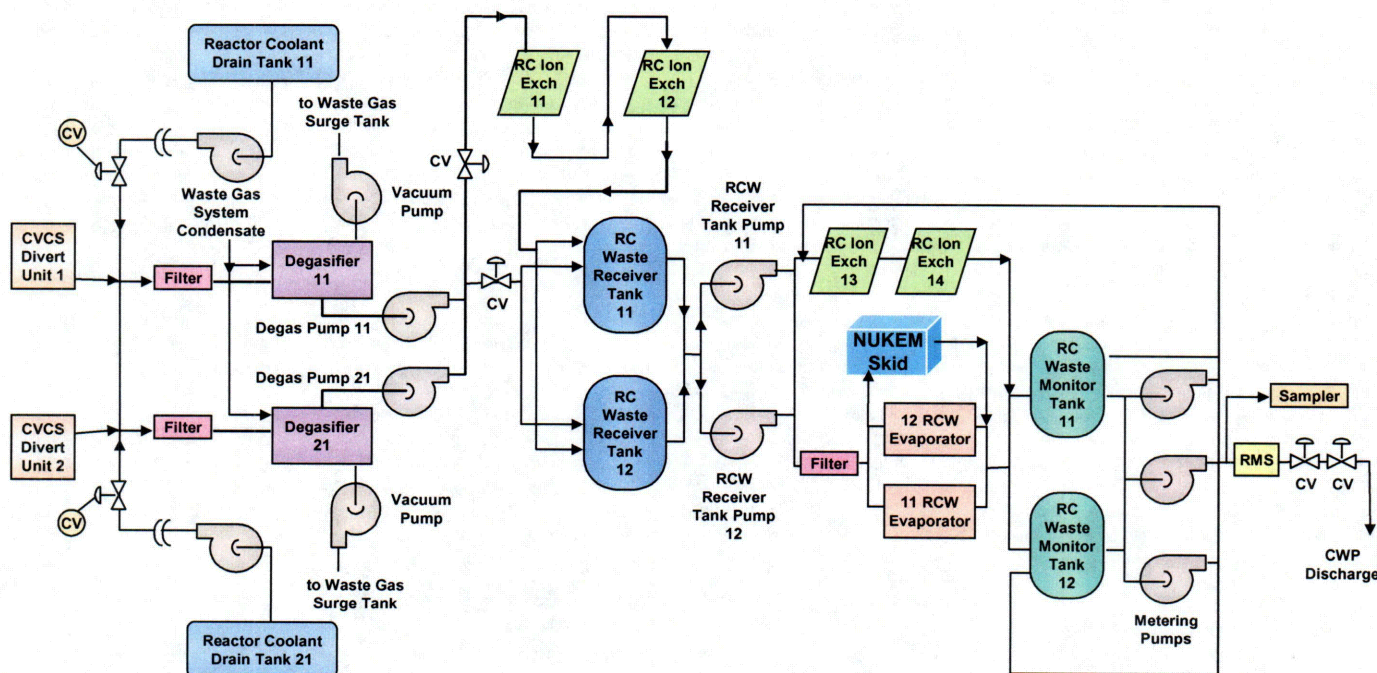


Figure 1-1. RC Waste Processing System Overview

NUKEM Skid

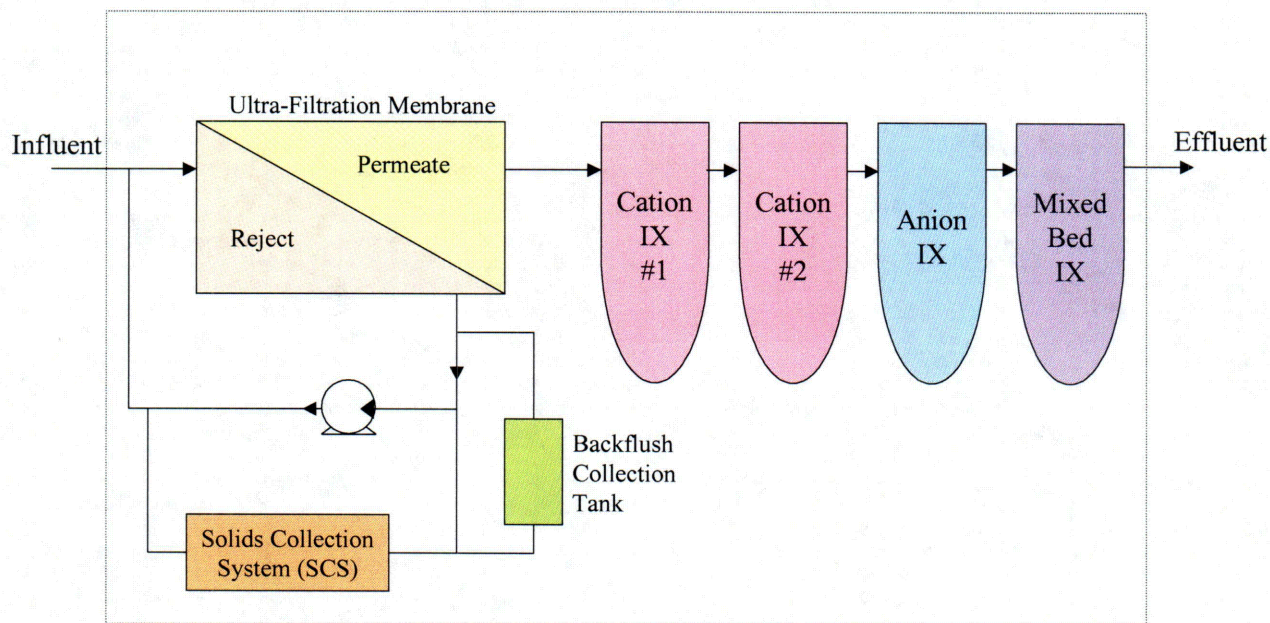


Figure 1-2. Simplified Layout of NUKEM Skid Components

2.0 INPUT

2.1 Reactor Coolant System Isotopic Inventory

Regulatory Guide 1.183 (Reference 2) does not specifically provide guidance for evaluating failures of components in the waste processing system, but requires that if no or minimal fuel damage is postulated for a particular design basis accident, the activity released should be the maximum coolant activity allowed by the technical specifications. Calvert Cliffs Technical Specification 3.4.15 requires that in Modes 1 and 2 and in Mode 3 with RCS average temperature greater than 500°F that the noble gas activity be less than 100/Ebar $\mu\text{Ci/gm}$ and the Dose Equivalent I-131 (DEQ I-131) in the primary system be less than 1 $\mu\text{Ci/gm}$. The Calvert Cliffs UFSAR 14.23 design basis evaluation was based on long term operation with 1% failed-fuel RCS specific activity for halogens, noble gasses, and tritium, which is consistent with the NRC Standard Review Plan Section 11.2 requirements for design of liquid radioactive waste processing systems.

Reference 4 calculates the total RCS noble gas equilibrium activities for 1% failed fuel and for the 100/Ebar $\mu\text{Ci/gm}$ condition with an activity distribution based on 1% failed fuel. Both are presented along with their half-lives in Table 2.1 below. The 100 $\mu\text{Ci/gm}$ noble gas activities will be utilized for this calculation since they are more limiting than the 1% failed fuel noble gas activities and are based on a Technical Specification limit. Similarly, Reference 4 also calculates the total RCS iodine equilibrium activities for 1% failed fuel and for 1 $\mu\text{Ci/gm}$ DEQ I-131 with an activity distribution based on 1% failed fuel. Both are presented along with their half-lives in Table 2.2 below. Equilibrium activities for tellurium isotopes from Reference 4 are also presented to support calculation of equilibrium resin inventories. This evaluation utilizes the 1% failed fuel equilibrium activities for iodine since it is consistent with the design basis and bounds the Technical Specifications limit by a factor of 5.7. An RCS equilibrium tritium concentration of 3.5 $\mu\text{Ci/cc}$ based on 1% failed fuel from Reference 3 (Table 6.2-1) will be utilized since there is no Technical Specification limit on RCS tritium concentrations. Tritium is not required to be considered by AST, but is being included for consistency with the original evaluation.

Table 2.1 - 1% Failed Fuel and 100/Ebar $\mu\text{Ci/gm}$ RCS Noble Gas Activity

Isotope	1% Failed Fuel Total Activity (Ci)	100/Ebar $\mu\text{Ci/gm}$ Total Activity (Ci)	100/Ebar $\mu\text{Ci/gm}$ RCS Sp. Activity ($\mu\text{Ci/cc}$)	Half-life (sec)
Kr-85	6.332E+03	7.997E+03	2.81E+01	3.39E+08
Kr-85m	3.323E+02	4.198E+02	1.47E+00	1.61E+04
Kr-87	1.919E+02	2.424E+02	8.50E-01	4.57E+03
Kr-88	5.975E+02	7.547E+02	2.65E+00	1.02E+04
Xe-133	6.538E+04	8.257E+04	2.90E+02	4.53E+05
Xe-133m	9.314E+02	1.176E+03	4.13E+00	1.89E+05
Xe-135	1.562E+03	1.973E+03	6.92E+00	3.28E+04
Xe-135m	2.044E+02	2.581E+02	9.06E-01	9.18E+02
Xe-138	1.078E+02	1.362E+02	4.78E-01	8.46E+02
Total	75636	95532	-	-
Reference	4 (Table 4, Col. P)	4 (Table 4, Col. S)	4 (Tbl 4, Col S/RCS Vol*)	4 (Table 4, Col. A)

* Total RCS volume including pressurizer of 2.8507E8 cm³ from Reference 4 at 574.5°F and 2250 psia (UFSAR T4.1 F4.9)

Table 2.2 - 1% Failed Fuel and 1 $\mu\text{Ci/gm}$ DEQ I-131 RCS Iodine and Parent Isotope Activities

Isotope	1 $\mu\text{Ci/gm}$ DEQ I131			1% Failed Fuel			Half-life (sec)
	$\mu\text{Ci/gm}$	$\mu\text{Ci/cc}^{**}$	Total Ci	$\mu\text{Ci/gm}$	$\mu\text{Ci/cc}^{**}$	Total Ci	
I-131	7.79E-01	5.64E-01	1.61E+02	4.43E+00	3.21E+00	9.15E+02	6.93E+05
I-132	2.59E-01	1.87E-01	5.34E+01	1.47E+00	1.07E+00	3.04E+02	8.21E+03
I-133	1.10E+00	7.94E-01	2.26E+02	6.25E+00	4.52E+00	1.29E+03	7.49E+04
I-134	1.48E-01	1.07E-01	3.05E+01	8.42E-01	6.10E-01	1.74E+02	3.16E+03
I-135	6.02E-01	4.36E-01	1.24E+02	3.43E+00	2.48E+00	7.07E+02	2.37E+04
Total Iodine	2.88E+00	2.09E+00	5.95E+02	1.64E+01	1.19E+01	3.39E+03	-
Te-131	-	-	1.69E+00*	-	-	9.62E+00	1.50E+03
Te-132	-	-	1.28E+01*	-	-	7.31E+01	2.76E+05
Te-133	-	-	2.50E-01*	-	-	1.43E+00	7.44E+02
Te-134	-	-	1.20E+00*	-	-	6.86E+00	2.52E+03
Te-135	-	-	5.11E-03*	-	-	2.91E-02	1.90E+01
Reference	4 (Tbl 1 Col R)	4 (Tbl 1 Col S)	4 (Tbl 1 Col T)	4 (Tbl 1 Col O)	4 (Tbl 1 Col N)	4 (Tbl 1 Col H * 2754 MWt)	4 (Tbl 1 Col A)

* Tellurium activities for 1 $\mu\text{Ci/gm}$ DEQ I-131 case assumed to be the same proportion of the 1% failed fuel activities as the iodine isotopes (factor of 5.7)

** Equilibrium specific activities calculated at RCS STP of 574.5°F and 2250 psia (UFSAR T4.1 F4.9)

2.2 Dose Conversion Factors

Dose conversion factors (DCFs) for submersion were obtained from Reference 13 and are summarized in Table 2.3 below. Submersion DCFs may be converted to conventional units of mrem per $\mu\text{Ci y cm}^{-3}$ by multiplying by 1.168E23 (Ref. 13, p. 57). This data is included in the Conversion Factor File WasteProc15.INP in Attachment B for use by RADTRAD. Inhalation DCFs were obtained from Reference 31 and are summarized in Table 2.4 below. Inhalation DCFs were converted to conventional units of mrem/ μCi by multiplying by 3.7E9 (Ref. 31, p. 121). Note that the cloudshine data in WasteProc15.INP corresponds to the FGR-12 data, while the inhaled chronic data in WasteProc15.INP corresponds to the worst-case effective data in FGR-11. The remaining data in WasteProc15.INP is extraneous and not used by RADTRAD. Only inhalation and submersion DCFs were entered for tritium (e.g., groundshine and ingestion DCFs were not entered since they are not used by RADTRAD).

Table 2.3 Submersion Dose Conversion Factors

Isotope	Submersion Dose Conversion Factors	
	Thyroid (Sv/Bq per s/m ³)	Effective (Sv/Bq per s/m ³)
H-3	0.0	3.31E-19
Kr-85m	7.33E-15	7.48E-15
Kr-85	1.18E-16	1.19E-16
Kr-87	4.13E-14	4.12E-14
Kr-88	1.03E-13	1.02E-13
I-131	1.81E-14	1.82E-14
I-132	1.12E-13	1.12E-13
I-133	2.93E-14	2.94E-14
I-134	1.30E-13	1.30E-13
I-135	8.32E-14	8.29E-14
Xe-133	1.51E-15	1.56E-15
Xe-135	1.18E-14	1.19E-14
Xe-138	5.77E-14	5.77E-14

Table 2.4 Inhalation Dose Conversion Factors

Isotope	Lung Clearance Class Used	Inhalation Dose Conversion Factors	
		Thyroid (Sv/Bq)	Effective (Sv/Bq)
H-3	V	1.73E-11	1.73E-11
I-131	D	2.92E-07	8.89E-09
I-132	D	1.74E-09	1.03E-10
I-133	D	4.86E-08	1.58E-09
I-134	D	2.88E-10	3.55E-11
I-135	D	8.46E-09	3.32E-10

2.4 Atmospheric Dispersion Factors

The ventilation stack-to-site boundary, two-hour, atmospheric dispersion coefficient of 1.44E-4 sec/m³ was calculated via the Gifford wake model extracted from UFSAR 2.3.6 (Ref. 14), as follows

$$\chi/Q = 1/[\mu * (\pi\sigma_y\sigma_z + cA)] = 1.44E-4 \text{ sec/m}^3$$

where for 1150 m exclusion area boundary distance and 5% frequency

μ = average wind speed = 1 m/sec

σ_y = standard deviation of the distribution in the lateral direction = 92 m (UFSAR Table 2-14)

σ_z = standard deviation of the distribution in the vertical direction = 24 m (UFSAR Table 2-14)

c = wake factor

A = cross-sectional area of structure from which material is released = 0 m

Atmospheric dispersion coefficients from containment to low population zone (2 miles; UFSAR Fig.2.3-3/UFSAR 14.24.3) are given in Table 2.5 below. Note that the 0-2 hour value was adjusted via the Gifford wake model for a vent stack release rather than a containment release.

Table 2.5 Low Population Zone Atmospheric Dispersion Factors

Time (hours)	χ/Q (sec/m ³)
0-2	3.39E-05
2-24	2.20E-06
24-720	5.40E-07

The waste processing system is mostly located below ground level on Auxiliary Building elevations -10', 5', and 27', with the exception of the NUKEM skid, RCW evaporators, and the spent resin metering tank which are located at the 45' elevation (ground level). Any failure of a waste processing system component would release the contents into the Auxiliary Building, where curbs and floor drains would direct the fluid from failed components to the miscellaneous waste receiver tank (-5' el.) and any airborne component would be drawn into the ventilation system and discharged to the atmosphere through the plant vent stack.

The main control room inleakage points include the west road inlets, the turbine building, and Access Controls 11 and 13 on the Auxiliary Building roof. Installation of automatic isolation dampers and radiation monitors at Access Controls 11 and 13 on the Auxiliary Building Roof are credited in this work. Atmospheric dispersion factors for the west road inlets and turbine building are obtained from Reference 17 and given in Table 2.6 below. The atmospheric dispersion coefficients corresponding to the Unit 2 vent stack to the turbine building will be conservatively utilized for this calculation.

Table 2.6 Control Room Atmospheric Dispersion Factors

Time (hours)	vs1-wr χ/Q (sec/m ³)	vs2-tb χ/Q (sec/m ³)
0-2	9.54E-04	1.68E-03
2-8	6.86E-04	1.34E-03
8-24	2.95E-04	5.14E-04
24-96	2.13E-04	3.84E-04
96-720	1.56E-04	3.12E-04

2.5 Breathing Rates

The breathing rates are extracted from Reference 2 and are given in Table 2.7 below.

Table 2.7 Breathing Rates

Time (hours)	Off-site Breathing Rate (m ³ /sec)	Control Room Breathing Rate (m ³ /sec)
0-8	3.5E-04	3.5E-04
8-24	1.8E-04	3.5E-04
24-720	2.3E-04	3.5E-04

2.6 Control Room Input Parameters

The control room volume of 289194 ft³ is extracted from Reference 17. The control room occupancy factors are extracted from Reference 2 and are given in Table 2.8 below. No credit for control room recirculation filters is utilized in this calculation.

Table 2.8 Control Room Occupancy Factors

Time (hours)	Occupancy Factor
0-24	1.0
24-96	0.6
96-720	0.4

The control room leakages for the two trains Air Conditioning Units (ACU) 11 and 12 were measured by NUCON International Inc. via sulfur hexafluoride (SF_6) tracer gas tests as documented in References 18-21. An additional leakage test was performed by Brookhaven National Laboratory (BNL) via a perfluorocarbon tracer gas (PFT) test as documented in Ref.22. The results are summarized in Table 2.9 below. The latest SF_6 and PFT tests show fairly good agreement. A conservative leakage value of 3500 cfm will be utilized in this calculation.

Table 2.9 Control Room In-leakage Test Results

	ACU 11	ACU 12
SF_6 Test 11/11/97	4300 \pm 300 cfm	3000 \pm 300 cfm
SF_6 Test 11/11/97	3600 \pm 600 cfm	2550 \pm 450 cfm
SF_6 Test 11/11/97	2900 \pm 250 cfm	2750 \pm 380 cfm
SF_6 Test 1/18/00	2600 \pm 200 cfm	3000 \pm 250 cfm
PFT Test 5/1/02	2930 \pm 185 cfm	2930 \pm 185 cfm

The control room leakage points were deduced from the PFT testing carried out by Brookhaven National Laboratory and include the Auxiliary Building West Road inlet (WR), the Turbine Building inlet (TB), Access Control 11 (AC11), Access Control 13 (AC13), the Switchgear Rooms (SWGRs), and the Main Steam Isolation Valve Rooms (MSIVs). AC11 and AC13 will be equipped with dampers and radiation monitors, which will isolate this leakage path in case of an accident. The SWGRs are in continual recirculation mode and thus are also isolated from the environment. The MSIV rooms are also isolated from the environment, except for the Main Steam Line Break Accident which occurs in these rooms, due to the thermal buoyancy of the air in these rooms and due to the J-neck exhaust. For conservatism, all of the measured leakage will be assumed to enter the control room from the most conservative pathway of either the West Road or Turbine Building inlets.

2.7 Decontamination Factors

The original dose analyses associated with failure of the evaporators credited prior processing of the reactor coolant waste stream. The processing credited prior to the evaporators included:

- A total ion exchange DF of 100 for all fission products except noble gasses and tritium, for which a DF of 1 was used. This was considered to include processing by the CVCS ion exchangers and the reactor coolant waste processing system ion exchangers 11 & 12.
- A DF of 10^4 for removal of noble gasses by the reactor coolant bleed degasifiers.

These design basis ion exchanger DFs are very conservative compared to those that were later recommended for use by the NRC in NUREG-0017 (Ref. 24 pp. 1-20 and 1-21). NUREG-0017 allows a fission product anion DF of 100 for the CVCS ion exchangers and a DF of between 10 and 100 for the RCW ion exchangers, for a total fission product anion DF of 10^3 to 10^4 prior to the evaporators, or other components in parallel. Therefore, the design basis anion DFs will continue to be conservatively used for dose analyses associated with failure of RCW components downstream of RCW Ion Exchangers 11 and 12 and upstream of the Monitor Tanks. RCW

components upstream of, and including, the RCW Ion Exchangers 11 and 12 will use an anion DF of 10 to conservatively account for prior processing by the CVCS IXs only (to remain consistent with the original DFs). The design basis degasifier noble gas DF of 10,000 was originally considered conservative compared to the value of 10^5 calculated by the equipment vendor (Reference 30, see Attachment E). Recently, the measured noble gas DF of the degasifier has declined significantly (see Attachment E), with noble gas DF's as low as 3 being measured. Maintenance found and repaired a vacuum leak and replaced spray nozzles, and while this improved the measured DF, performance has not been restored to the level previously credited. Therefore, an evaluation for degasifier noble gas DFs as low as 3 will also be performed to determine the minimum acceptable DF for input to performance monitoring. The degasifier DFs will be applied to all components downstream of the degasifiers. Components upstream of, and including, the degasifiers, will conservatively utilize a noble gas DF of 1. Since a portion of system piping is upstream of the degasifier, it will be conservatively treated as if it is all upstream of the degasifier to simplify the calculation.

Prior processing DFs are also needed for components downstream of the NUKEM skid or RCW ion exchangers 13 and 14. RCW IXs 13 and 14 would have the same DFs indicated above for IXs 11 and 12 (1 for noble gas and 10 for anions). As indicated in Figure 1-2, the NUKEM skid process liquid first through a membrane, then through a series of cation, anion, and mixed-bed IXs. Since Reference 24 (p. 1-21) indicates that the membrane, anion, and mixed-bed IXs each have an anion DF of 10, the resulting total anion DF for the NUKEM skid is 1000. The noble gas DF for the skid would be expected to be 1 since there is no mechanism for removing noble gasses from the fluid stream. For comparison to the skid, the design basis evaporator system DFs were 50 for iodine, 10 for noble gases, 1 for tritium, and 250 for other fission products (Reference 3). Therefore, since the RCW IXs 13 and 14 have the lowest DFs of any of the RCWPS components downstream of the RCW Receiver Tanks, those DFs will be used for components downstream of the evaporators, skid or RCW IXs 13 and 14.

Table 2.10 summarizes the DFs discussed above for each processing component, and the amount of prior processing credited for each component in the dose calculations presented in Section 6.3.

Table 2.10 Summary of Component Decontamination Factors and Amount of Prior Processing Credited for Fluid in Each Failed Component

for Field in Each Packed Component					
Pre-Component Processing DFs	CVCS IX	Degasifier	RCW IXs 11&12	Evaporator or Skid or RCW IXs 13 & 14	Total Pre-Component DF Used (NG/A/T)
Noble Gas (NG) DF	1	*	1	1	
Anion (A) DF	10	1	10	10	
Tritium (T) DF	1	1	1	1	
Pre-Processing Credited (indicated by ✓) for Each RCWPS or MWPS Component					
NUKEM Skid	✓	✓	✓		*100/1
RCW Receiver Tanks	✓	✓	✓		*100/1
RCW Monitor Tanks	✓	✓	✓	✓	*1E3/1
RCW IXs (11 & 12)	✓	✓			*10/1
RCW IXs (13 & 14)	✓	✓	✓		*100/1
RCW Degasifiers	✓				1/10/1
RCW Filters	✓				1/10/1
Misc. Waste System Components	See Assumption 4				4/4/4
System Piping	✓				1/10/1
Spent Resin Metering Tank	See Assumption 10				1/1/1

* Degasifier noble gas DF applied varies by case (values ranging from 10^4 to 3 are evaluated)

2.8 Capacities of Various Components

The fluid volumes of various components of the RCW and MW processing systems, and the associated references, are provided in Table 2.11. RCW and MWPS piping volumes are tallied in Appendix D of Reference 3. Only the portions of the MWPS piping downstream of the receiver and monitor tanks were considered in the piping volume calculation, as the lines upstream of the tanks gravity feed to them from various drains, and thus, are not fluid filled. The total volume of all failed components is 1.42E9 cc or 50,138 ft³.

Table 2.11 Fluid Volumes of Various System Components

Component	Quantity	Volume	Units	Reference	Volume in cm ³
RCW Receiver Tank	2	90,000	gallons	32	3.41E+08
RCW Monitor Tank	2	90,000	gallons	32	3.41E+08
Spent Resin Metering Tank	1	276	ft ³	36 App B	7.90E+06
NUKEM Solids Concentration System	1	50	gallons	3 App C	1.89E+05
NUKEM UF Membrane & Associated Piping	1	120	gallons	3 App C	4.54E+05
NUKEM CIP Backflush Tank	1	100	gallons	3 App C	3.79E+05
NUKEM Ion Exchanger Vessel	4	30	ft ³ each	3 App C	8.49E+05
RCW Ion Exchanger Vessel	4	56	ft ³ each	33	1.59E+06
RCW Degasifier	2	240	gallons	34	9.08E+05
RCW Filter Vessel	2	1.79	ft ³ each	35	5.07E+04
RCW System Piping	1	300*	ft ³	3 App D x 1.5	8.49E+06
Misc. Waste Receiver and Monitor Tanks	2	4000	gal. each	32	1.51E+07

* System piping volume of 196 ft³ from Reference 3, Appendix D conservatively multiplied by a factor of 1.5 to account for small instrument lines not considered in the volume calculations

The spent resin metering tank was originally designed to hold 276 ft³ of resin, however, it is currently procedurally limited to a resin volume of 160 ft³ due to resin being stuck to the walls (Ref. 36, Appendix B). Resin from the ion exchangers in Table 2.12 is sluiced to the spent resin metering tank. All of the ion exchangers have a maximum design resin capacity of 36 ft³. Resin transfers to the spent resin metering tank will vary in volume of resin transferred due to varying operational resin loads.

Table 2.12 Resin Capacity of Various Ion Exchangers (Ref. 36, App. B)

Ion Exchanger	Normal Operational Resin Load (ft ³)
Blowdown IX	30
Misc. Waste IX	25-30
CVCS Purification IX	35
RC Waste IX	35
Spent Fuel Pool IX	35

With the above mentioned procedural limit, the spent resin metering tank can hold a maximum of five ion exchanger's worth of resin and the associated process fluid that was in the ion exchangers when they were isolated from their respective systems.

3.0 ASSUMPTIONS

This calculation package assumes the following:

1. Only noble gases, halogens (iodine) and tritium are considered. Regulatory Guide 1.183 (Ref. 2, Section 3.5) indicates that "with the exception of elemental and organic iodine and noble gases, fission products should be assumed to be in particulate form." Particulates would not become airborne as a result of fluid evaporation only, as noted in the guidance provided for a fuel handling accident in Regulatory Guide 1.183, "Particulate radionuclides are assumed to be retained by the water in the fuel pool or reactor cavity" (Ref. 2, App. B, Section 3). Tritium is included even though not required by AST for consistency with the previous evaluation.
2. It is assumed that no flashing of the fluid in reactor coolant waste and miscellaneous waste processing system occurs upon failure, and release fractions for tritium, iodine, and noble gases are assumed to be 10%, 10.1%, and 100%, respectively, based on water evaporation. The release is conservatively treated as an instantaneous puff release. The basis for this assumption is that all of the piping in the portion of the reactor coolant waste processing system being evaluated is HC-2 (Refs. 37 – 41), with a design temperature of 180°F, and a normal operating temperature of 100°F (Ref. 42). Some RC waste system components, such as the degasifiers and the ion exchanger vessels, have design temperatures as high as 250°F (Refs. 33 & 34), but the maximum system fluid temperature is limited by the lower design temperature of the piping. Therefore, these release fractions are conservatively consistent with the design basis release fractions used for the evaporator (as discussed in Section 1.0), which had a heat source driving evaporation, as well as those typically required for water outside containment that is less than 212°F (Ref. 27, p. 15.6.5-17).
3. For the NUKEM skid, it is assumed that the specific activity of halogens, noble gas, and tritium in the skid UF membrane reject stream will not be greater than in the influent. The basis for this assumption is that the UF membrane only removes/rejects suspended solids, and dissolved species pass through with a DF of 1.
4. For the miscellaneous waste receiver and monitor tanks, it conservatively is assumed that the specific activity of the fluid in the tanks is equivalent 25% of the RCS specific activity (e.g., a prior processing DF of 4 is assumed). This assumption is consistent with the design basis for the miscellaneous waste system. The MWRT collects fluids from various drains and sumps in the Auxiliary Building. The MWMT collects fluids that could be contaminated (but generally are not) from soapy drains (i.e., laundry, showers) and hot lab drains, and also provides for overflow from the MWRT via 2"HC-10-1030 (Ref. 43). In addition, both tanks have 1" overflow lines (HC-10-1039 and 1040) leading to floor drains, and a 2"vent line (HC-10-1030) leading to the main plant vent (Ref. 43). Thus, this assumption is very conservative because any noble gasses and volatile halogens that may have been present in the fluid at its source would have already had the opportunity to become airborne prior to any postulated failure of either tank.
5. The volume displaced by resins in ion exchangers and the spent resin metering tank is conservatively ignored when calculating the volume of fluid contained in these components. The basis for this assumption is that it conservatively increases the fluid source in those components and simplifies the calculation.
6. Doses are calculated with and without credit for radioactive decay in the fluid during the time required for the fluid to fill one 90,000 gallon receiver tank in the waste processing system. No credit for decay is the most conservative assumption, and is used for most cases. Credit for a minimum amount of decay is utilized to determine the minimum acceptable degasifier performance. UFSAR Section 11.1.2.1.1 indicates that the waste processing system is designed to process 28

reactor coolant system volumes (14 per unit) per year. Reference 4 (Vtot) indicates that the RCS volume, including the pressurizer, is 75,308 gallons, and the RCS specific volume is 0.022131 ft³/lbm @ 574.5°F, 2250 psia. Therefore, 28 RCS volumes per year corresponds to a steady state flow rate of 4 gpm [$28 \times 75,308 \text{ gal/yr} / (8760 \text{ hrs/yr} \times 60 \text{ min/hr}) = 4.01 \text{ gpm}$] at RCS conditions. However, the fluid is cooled by the CVCS letdown heat exchanger prior to being diverted to waste processing, and Reference 42 indicates that normal operating conditions for the waste processing system receiver and monitor tanks are 100°F and atmospheric pressure (0.0161306 ft³/lbm @ 100°F, 14.7 psia; Ref. 44). Thus, the effective steady state flow rate into the receiver tank for 28 RCS volumes/year is $4.01 \times (0.0161306 / 0.022131) = \sim 3 \text{ gpm}$. It would require 373 hours to fill a 90,000 gallon tank at 4 gpm, and 512 hours at 3 gpm. As shown in Figure 1-1, there are two receiver tanks, and one tank is filled while the other tank is processed through the skid or RC IXs 13 & 14 to the monitor tanks. Therefore, for cases where radioactive decay is considered, a minimum value of 300 hours of decay will be conservatively assumed for the receiver tank not being filled and both monitor tanks. No credit for decay will be conservatively assumed for the receiver tank actively being filled, as well as other components in the waste processing system.

7. Upon failure of an ion exchanger, 10% of the equilibrium halogen inventory on the resin is assumed to instantaneously and non-mechanistically transfer to the water. The equilibrium halogen inventory is determined based on processing 28 reactor coolant system volumes (14 per unit) per year, which is the design basis for the reactor coolant waste processing system per UFSAR Section 11.1.2.1.1. This is conservative since these isotopes are chemically adsorbed onto the ion exchange resins, and a rupture of the ion exchanger would not cause these isotopes to desorb and become airborne. This assumption is also consistent with NRC approved evaluations of ion exchanger failure for other licensees (Ref. 23, p. 52). No additional halogen source from resins in the spent resin metering tank is assumed since only a temporary hose connection is assumed to fail, not the tank itself.
8. For control room dose calculations, no credit is taken for removal of iodine prior to reaching the control room, or removal of iodine within the control room via filtration. Credit for tritium removal via condensation of water vapor is also conservatively ignored. The basis for this assumption is that it is conservative and simplifies the calculation.
9. For evaluation of the temporary spent resin metering tank dewatering connection to the NUKEM skid, it is conservatively assumed that no operator action to prevent the complete draining of the spent resin metering tank occurs following failure of the temporary connection. The spent resin metering tank itself is not assumed to fail (i.e., no resin is released).
10. The spent resin metering tank is assumed to contain resin and process fluid from five CVCS ion exchangers. The CVCS ion exchangers are assumed to have contained unprocessed reactor coolant. This is conservative because the fluid in these ion exchangers would have the highest specific activity of halogens and noble gases of any of the ion exchangers listed in Section 2.1 of this CCN.
11. Buildup of daughter nuclides is taken into account as source term nuclides decay.
12. A control room inleakage rate of 3500 cfm is conservatively assumed.

4.0 REFERENCES

1. NRC Safety Guide 29, "Seismic Design Classification," U.S Nuclear Regulatory Commission, June 7, 1972 (see NORMS Doc ID 81790, attachment 2).
2. NRC Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000.
3. CCNPP Calculation CA05994, "Reactor Coolant Waste Processing System Incident and Waste Gas Incident Dose Analysis," Rev. 0000.
4. CCNPP Calculation CA06422, "Primary and Secondary Isotopic Calculations," Rev. 0000.
5. NUREG/CR-6604, "RADTRAD: A Simplified Model for Radionuclide Transport and Removal and Dose Estimation," U.S. Nuclear Regulatory Commission, April 1998.
6. NUREG/CR-6604 Supplement 1, "RADTRAD: A Simplified Model for Radionuclide Transport and Removal and Dose Estimation," U.S. Nuclear Regulatory Commission, June 1999.
7. NUREG/CR-6604 Supplement 2, "RADTRAD: A Simplified Model for Radionuclide Transport and Removal and Dose Estimation," U.S. Nuclear Regulatory Commission, October 2002.
8. CCNPP Calculation CA06209, "RADTRAD 3.03 Installation and Verification on PC0496," Rev. 0000.
9. CCNPP Calculation CA06207, "RADTRAD 3.03 Validation," Rev. 0000.
10. NUS Corporation Letter Report ESD-73-349 on Site Boundary Doses for Evaporator Failure, File 2037-06, February 8, 1973 (see plant history microfilm tape 56, frame 4258.038-041).
11. CCNPP Facility Change Request FCR86-0107, "FSAR Change to Delete Reference to Miscellaneous Waste Evaporators," Rev. 0000
12. CCNPP 50.59 Evaluation 86-B-199-026-R00, "General Revision of Chapter 11 of UFSAR, Rev. 0000.
13. EPA Report EPA-402-R-93-081, "Federal Guidance Report No. 12: External Exposure to Radionuclides in Air, Water, and Soil," U.S. Environmental Protection Agency, September 1993.
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18. CCNPP ETP-97-064R, "Control Room HVAC Inleakage Test", Rev.0, 11/11/1997 (First Run)
19. CCNPP ETP-97-064R, "Control Room HVAC Inleakage Test", Rev.0, 11/11/1997 (Third Run)

20. CCNPP ETP-97-064R, "Control Room HVAC Inleakage Test", Rev.0, 11/11/1997 (Fourth Run)
21. CCNPP ETP-97-064R, "Control Room HVAC Inleakage Test", Rev.0, 1/18/2000.
22. CCNPP ETP-01-035R, "Perfluorocarbon Tracer Gas Testing", Rev.0, 5/1/2002.
23. NRC ADAMS Accession No. ML013030027, "Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 201 to Facility Operating License No. DPR-40, Omaha Public Power District, Fort Calhoun Station, Unit No. 1, Docket No. 50-285," December 5, 2001.
24. NUREG-0017, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors," U.S. Nuclear Regulatory Commission, Rev. 1, April 1985.
25. CCNPP ESP ES200400745-000, "Retire the 11 and 21 Reactor Coolant Waste Evaporators and their Associated Components in place," Rev. 0000.
26. NRC Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures and Components Installed in Light-Water-Cooled Power Plants," Revision 2.
27. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants – LWR Edition," U.S. Nuclear Regulatory Commission, June, 1987.
28. ANSI/ANS-55.6-1993, "Liquid Radioactive Waste Processing System for Light Water Reactor Plants," American Nuclear Society.
29. CCNPP 50.59 Evaluation SE00482, "50.59 Evaluation Supporting Installation of New Rad Waste Processing Skid," Rev. 0000.
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31. EPA Report EPA-520/1-88-020, "Federal Guidance Report No. 11: Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," U.S. Environmental Protection Agency, 1988.
32. CCNPP Drawing 92772SH0002T, "CCNPP Units 1 and 2, Equipment List – Tanks and Pressure Vessels," Rev. 9.
33. CCNPP Drawing 83231, "Ion Exchanger Combustion Engineering," Rev. 7, October 20, 1997.
34. CCNPP Drawing 12313-01, "Reactor Coolant Bleed Degasifiers," Rev. 0, March 9, 1971.
35. CCNPP Drawing 12303-0001, "Reverse Flow Filter Assembly," Rev. 10, April, 19, 1996.
36. CCNPP Procedure OI-17A, "Solid Waste," Revision 23, April 14, 2003.
37. CCNPP Drawing 60734SH0001, "Reactor Coolant Waste Processing System," Rev. 34
38. CCNPP Drawing 60734SH0002, "Reactor Coolant Waste Processing System," Rev. 29
39. CCNPP Drawing 60734SH0003, "Reactor Coolant Waste Processing System," Rev. 39.

- 40. CCNPP Drawing 60734SH0004, "Reactor Coolant Waste Processing System," Rev. 27.
- 41. CCNPP Drawing 60734SH0005, "Reactor Coolant Waste Processing System," Rev. 20.
- 42. CCNPP Drawing 92770SH0009, "Piping Class Summary Analysis Requirements – M-601B," Rev. 13.
- 43. CCNPP Drawing FSK-MP-141, "Gaseous Radioactive Waste," Rev. 7.
- 44. 1967 Steam Tables

5.0 METHOD OF ANALYSIS

This calculation reanalyzes control room habitability and off-site doses for the waste processing system incident based on the alternate source term methodology of Reference 2 and control room inleakage of 3500 cfm. This was accomplished by utilizing the RADTRAD computer code (References 5 - 7).

The RADTRAD computer code calculates TEDE and thyroid doses to personnel at the site boundary, low population zone, and control room per 10 CFR 50.67 resulting from any postulated accident which releases radioactivity within the containment, spent fuel pool, or within any other area. RADTRAD models the transport of radioactivity (elemental, particulate, and/or organic) from the sprayed and unsprayed regions of a primary containment, spent fuel pool, or other area where a release can occur, through the secondary containment if any, and then to the environment and to the control room. The code includes the capability to model time-dependent activity release; containment spray, filtration, and leakage; control room filtration and inleakage; primary and secondary containment purge filters; control room intake and recirculation filters; atmospheric dispersion; and natural decay. Doses are calculated for individuals residing at the site boundary or low population zone and in the control room. RADTRAD is documented and benchmarked in References 5 - 9.

The waste processing system incident model is constructed assuming that failure of all waste processing system components occurs at time $t=0$. The decay and daughtering option of RADTRAD is utilized. No cleanup mechanisms (spray, filtration, plateout) are assumed, thus the sprayed/unsprayed classification has no effect on the results. The rate of escape of this activity to the environment is assumed to occur with a matter of minutes (an escape rate of one waste processing system volume per minute is utilized) and is transported to the site boundary and to the control room via appropriate atmospheric dispersion coefficients. While time-dependent control room inleakage can be modeled by RADTRAD, it is a constant in this work. The control room and site boundary doses are calculated based on appropriate breathing rates and occupancy factors and on ICRP 30 dose conversion factors. Figure 5.1 provides simple schematic of the RADTRAD model utilized for this calculation.

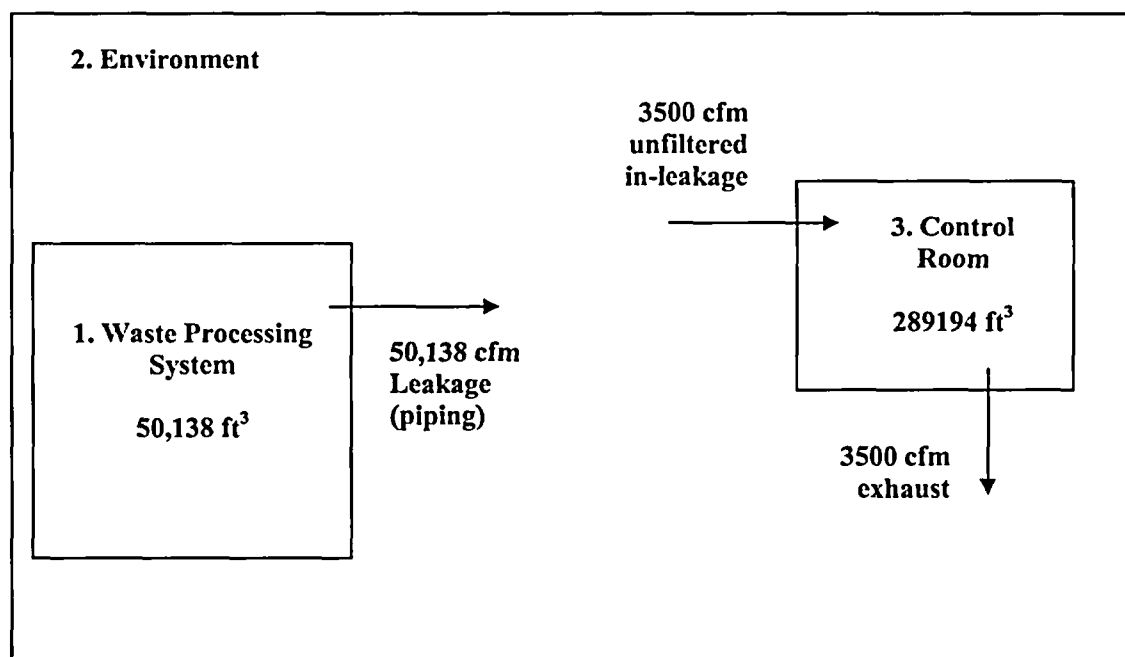


Figure 5.1 – Schematic of Waste Gas Incident RADTRAD Model

6.0 CALCULATION AND COMPUTATIONS

6.1 Total Activity of Fluid in Waste Processing System Components Assumed to Fail

Tables 6.1 – 6.4 summarizes the calculation of the total fluid activity in each waste system component assumed to fail, and sums the activity over all components, for each of the cases evaluated (degasifier noble gas DFs of 10^4 , 10^3 , 10^2 , and 10^1). The fluid activity for a given isotope in a particular type of component, $A_{\text{comp}}(i)$ is determined by:

$$A_{\text{comp}}(i) = 1.372 * S_{\text{RCS}}(i) * Q_{\text{comp}} * V_{\text{comp}} / DF_{\text{prior}}(i) * \exp(-(\ln(2)/t_{1/2}(i)) * t)$$

where, $S_{\text{RCS}}(i)$ is the bounding RCS equilibrium specific activity for isotope i from Section 2.1, V_{comp} is the fluid volume of the component, Q_{comp} is the quantity of that type of component in the system, $t_{1/2}(i)$ is the half-life for isotope i from Section 2.1, $DF_{\text{prior}}(i)$ is the prior processing DF for isotope i for that component from Section 2.7, and t is the decay time for fluid in the component. The unitless factor of 1.372 ($0.022131/0.0161306$) is applied to account for thermal contraction of the fluid as it is cooled from RCS conditions to waste processing conditions (see assumption 6). Note that this fluid activity does not include any contribution from the non-mechanistic resin release assumed for failure of resin containing components (see Section 6.2). In addition decay time is conservatively assumed to be zero for all components in Tables 6.1 - 6.3. For Table 6.4, a decay time of 300 hours has been credited only for one RC Waste Receiver Tank and both RC Waste Monitor Tanks (see assumption 6). Only the fluid activity for the minimum degasifier noble gas DF which produced acceptable dose results is provided in Table 6.4.

6.2 Total Equilibrium Activity on RC Waste Ion Exchanger Resin

The equilibrium iodine activity on RC waste ion exchangers is determined based on the bounding RCS equilibrium activity. Since all RC ion exchangers are assumed to fail, the activity calculated is not assigned to a specific ion exchanger. Only prior processing by the CVCS purification ion exchangers is credited ($DF = 10$). All iodine activity entering the RC waste system is conservatively treated as being retained in resins somewhere within the system, with radioactive decay as the only means for removal. The equilibrium RC resin activity is determined in Table 6.5 as follows:

- Column A: Nuclide half lives ($t_{1/2}$) from Table 2.2.
- Column B: Nuclide bounding RCS equilibrium activity from Table 2.2
- Column C: RCS bleed to waste processing rate in 1/sec based on 28 RCS volumes per year ($28 / 8760 \text{ hrs/yr} / 3600 \text{ sec/hr} = 8.88\text{E-}7 \text{ 1/sec}$).
- Column D: Nuclide decay constants are defined as $\ln(2)/t_{1/2}(i)$.
- Column E: Fraction of nuclide not removed by the CVCS ion exchangers, defined as the inverse of the anion DF for the CVCS ion exchangers.
- Column F: The equilibrium resin isotopic activity assuming no parent contribution.

$$F(i) = B(i) * E(i) * C(i) / D(i)$$
- Column G: The equilibrium resin isotopic activity assuming parents.

$$G(i) = F(i) + F(i+1), \text{ where } i+1 \text{ denotes the parent isotope.}$$

During failure of the ion exchangers, 10% of the activity on the resins is assumed to be non-mechanistically transferred to the fluid (assumption 7).

Table 6.1. Total Fluid Activity in Waste Processing System Failed Components – Degasifier Noble Gas DF=10,000

Component		RCW Filter Vessel	RCW Degasifier	RCW IX 11 & 12	RCW Receiver Tank	NUKEM Skid	RCW IX 13 & 14	RCW Monitor Tank	Misc. Waste IX	MW Receiver Tank	MW Monitor Tank	RC & MW System Piping	Dewatering Spent Resin Tank
Noble Gas Prior Processing DF		1	1	10000	10000	10000	10000	10000	4	4	4	1	1
Iodine Prior Processing DF		10	10	10	100	100	100	1000	4	4	4	10	1
Tritium Prior Processing DF		1	1	1	1	1	1	1	4	4	4	1	1
Component Volume (cc)		5.07E+04	9.08E+05	1.59E+06	3.41E+08	4.42E+06	1.59E+06	3.41E+08	1.59E+06	1.51E+07	1.51E+07	8.49E+06	7.82E+06
Void Fraction		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fluid Volume (cc)		5.07E+04	9.08E+05	1.59E+06	3.41E+08	4.42E+06	1.59E+06	3.41E+08	1.59E+06	1.51E+07	1.51E+07	8.49E+06	7.82E+06
Quantity In System		2	2	2	2	1	2	2	1	1	1	1	1

Isotope	RCW Corrected RCS equilibrium $\mu\text{Ci/cc}$	RCW Filter Vessel Fluid Activity (Ci)	RCW Degasifier Fluid Activity (Ci)	RCW IX 11 & 12 Fluid Activity (Ci)	RCW Receiver Tank Fluid Activity (Ci)	NUKEM Skid Fluid Activity (Ci)	RCW IX 13 & 14 Fluid Activity (Ci)	RCW Monitor Tank Fluid Activity (Ci)	Misc. Waste IX Fluid Activity (Ci)	MW Receiver Tank Fluid Activity (Ci)	MW Monitor Tank Fluid Activity (Ci)	RC & MW Sys Piping Fluid Activity (Ci)	Dewatering Spent Resin Tank Fluid Activity (Ci)	RC & MW Total Fluid Activity (Ci)
I-131	4.40E+00	4.46E-02	8.00E-01	1.40E+00	3.00E+01	1.95E-01	1.40E-01	3.00E+00	1.75E+00	1.67E+01	1.67E+01	3.74E+00	3.44E+01	1.09E+02
I-132	1.47E+00	1.49E-02	2.67E-01	4.66E-01	1.00E+01	6.49E-02	4.66E-02	1.00E+00	5.82E-01	5.56E+00	5.56E+00	1.25E+00	1.15E+01	3.63E+01
I-133	6.20E+00	6.29E-02	1.13E+00	1.97E+00	4.23E+01	2.74E-01	1.97E-01	4.23E+00	2.46E+00	2.35E+01	2.35E+01	5.26E+00	4.85E+01	1.53E+02
I-134	8.37E-01	8.48E-03	1.52E-01	2.65E-01	5.70E+00	3.70E-02	2.65E-02	5.70E-01	3.32E-01	3.17E+00	3.17E+00	7.11E-01	6.54E+00	2.07E+01
I-135	3.40E+00	3.45E-02	6.18E-01	1.08E+00	2.32E+01	1.50E-01	1.08E-01	2.32E+00	1.35E+00	1.29E+01	1.29E+01	2.89E+00	2.66E+01	8.41E+01
Kr-85	3.85E+01	3.90E+00	6.99E+01	1.22E-02	2.62E+00	1.70E-02	1.22E-02	2.62E+00	1.53E+01	1.46E+02	1.46E+02	3.27E+02	3.01E+02	1.01E+03
Kr-85m	2.02E+00	2.05E-01	3.67E+00	6.41E-04	1.38E-01	8.93E-04	6.41E-04	1.38E-01	8.01E-01	7.65E+00	7.65E+00	1.72E+01	1.58E+01	5.32E+01
Kr-87	1.17E+00	1.18E-01	2.12E+00	3.70E-04	7.95E-02	5.16E-04	3.70E-04	7.95E-02	4.62E-01	4.42E+00	4.42E+00	9.90E+00	9.12E+00	3.07E+01
Kr-88	3.63E+00	3.68E-01	6.60E+00	1.15E-03	2.47E-01	1.61E-03	1.15E-03	2.47E-01	1.44E+00	1.37E+01	1.37E+01	3.08E+01	2.84E+01	9.56E+01
Xe-133	3.97E+02	4.03E+01	7.22E+02	1.26E-01	2.71E+01	1.76E-01	1.26E-01	2.71E+01	1.58E+02	1.50E+03	1.50E+03	3.37E+03	3.11E+03	1.05E+04
Xe-133m	5.66E+00	5.74E-01	1.03E+01	1.80E-03	3.86E-01	2.50E-03	1.80E-03	3.86E-01	2.24E+00	2.14E+01	2.14E+01	4.81E+01	4.42E+01	1.49E+02
Xe-135	9.49E+00	9.62E-01	1.73E+01	3.01E-03	6.47E-01	4.20E-03	3.01E-03	6.47E-01	3.76E+00	3.59E+01	3.59E+01	8.06E+01	7.42E+01	2.50E+02
Xe-135m	1.24E+00	1.26E-01	2.26E+00	3.94E-04	8.47E-02	5.49E-04	3.94E-04	8.47E-02	4.93E-01	4.70E+00	4.70E+00	1.05E+01	9.71E+00	3.27E+01
Xe138	6.56E-01	6.65E-02	1.19E+00	2.08E-04	4.47E-02	2.90E-04	2.08E-04	4.47E-02	2.60E-01	2.48E+00	2.48E+00	5.57E+00	5.12E+00	1.73E+01
H-3	4.80E+00	4.87E-01	8.73E+00	1.52E+01	3.27E+03	2.12E+01	1.52E+01	3.27E+03	1.90E+00	1.82E+01	1.82E+01	4.08E+01	3.75E+01	6.72E+03

Table 6.2. Total Fluid Activity in Waste Processing System Failed Components – Degasifier Noble Gas DF=17

Component		RCW Filter Vessel	RCW Degasifier	RCW IX 11 & 12	RCW Receiver Tank	NUKEM Skid	RCW IX 13 & 14	RCW Monitor Tank	Misc. Waste IX	MW Receiver Tank	MW Monitor Tank	RC & MW System Piping	Dewatering Spent Resin Tank	
Noble Gas Prior Processing DF		1	1	9	9	9	9	9	4	4	4	1	1	
Iodine Prior Processing DF		10	10	10	100	100	100	1000	4	4	4	10	1	
Tritium Prior Processing DF		1	1	1	1	1	1	1	4	4	4	1	1	
Component Volume (cc)		5.07E+04	9.08E+05	1.59E+06	3.41E+08	4.42E+06	1.59E+06	3.41E+08	1.59E+06	1.51E+07	1.51E+07	8.49E+06	7.82E+06	
Void Fraction		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Fluid Volume (cc)		5.07E+04	9.08E+05	1.59E+06	3.41E+08	4.42E+06	1.59E+06	3.41E+08	1.59E+06	1.51E+07	1.51E+07	8.49E+06	7.82E+06	
Quantity in System		2	2	2	2	1	2	2	1	1	1	1	1	
Isotope	RCW Corrected RCS equilibrium μCi/cc	RCW Filter Vessel Fluid Activity (Ci)	RCW Degasifier Fluid Activity (Ci)	RCW IX 11 & 12 Fluid Activity (Ci)	RCW Recler Tank Fluid Activity (Ci)	NUKEM Skid Fluid Activity (Ci)	RCW IX 13 & 14 Fluid Activity (Ci)	RCW Monitor Tank Fluid Activity (Ci)	Misc. Waste IX Fluid Activity (Ci)	MW Receiver Tank Fluid Activity (Ci)	MW Monitor Tank Fluid Activity (Ci)	RC & MW Sys Piping Fluid Activity (Ci)	Dewatering Spent Resin Tank Fluid Activity (Ci)	RC & MW Total Fluid Activity (Ci)
I-131	4.40E+00	4.46E-02	8.00E-01	1.40E+00	3.00E+01	1.95E-01	1.40E-01	3.00E+00	1.75E+00	1.67E+01	1.67E+01	3.74E+00	3.44E+01	1.09E+02
I-132	1.47E+00	1.49E-02	2.67E-01	4.66E-01	1.00E+01	6.49E-02	4.66E-02	1.00E+00	5.82E-01	5.56E+00	5.56E+00	1.25E+00	1.15E+01	3.63E+01
I-133	6.20E+00	6.29E-02	1.13E+00	1.97E+00	4.23E+01	2.74E-01	1.97E-01	4.23E+00	2.46E+00	2.35E+01	2.35E+01	5.26E+00	4.85E+01	1.53E+02
I-134	8.37E-01	8.48E-03	1.52E-01	2.65E-01	5.70E+00	3.70E-02	2.65E-02	5.70E-01	3.32E-01	3.17E+00	3.17E+00	7.11E-01	6.54E+00	2.07E+01
I-135	3.40E+00	3.45E-02	6.18E-01	1.08E+00	2.32E+01	1.50E-01	1.08E-01	2.32E+00	1.35E+00	1.29E+01	1.29E+01	2.89E+00	2.66E+01	8.41E+01
Kr-85	3.85E+01	3.90E+00	6.99E+01	7.18E+00	1.54E+03	1.00E+01	7.18E+00	1.54E+03	1.53E+01	1.46E+02	1.46E+02	3.27E+02	3.01E+02	4.12E+03
Kr-85m	2.02E+00	2.05E-01	3.67E+00	3.77E-01	8.10E+01	5.25E-01	3.77E-01	8.10E+01	8.01E-01	7.65E+00	7.65E+00	1.72E+01	1.58E+01	2.16E+02
Kr-87	1.17E+00	1.18E-01	2.12E+00	2.18E-01	4.68E+01	3.03E-01	2.18E-01	4.68E+01	4.62E-01	4.42E+00	4.42E+00	9.90E+00	9.12E+00	1.25E+02
Kr-88	3.63E+00	3.68E-01	6.60E+00	6.78E-01	1.46E+02	9.44E-01	6.78E-01	1.46E+02	1.44E+00	1.37E+01	1.37E+01	3.08E+01	2.84E+01	3.89E+02
Xe-133	3.97E+02	4.03E+01	7.22E+02	7.41E+01	1.59E+04	1.03E+02	7.41E+01	1.59E+04	1.58E+02	1.50E+03	1.50E+03	3.37E+03	3.11E+03	4.25E+04
Xe-133m	5.66E+00	5.74E-01	1.03E+01	1.06E+00	2.27E+02	1.47E+00	1.06E+00	2.27E+02	2.24E+00	2.14E+01	2.14E+01	4.81E+01	4.42E+01	6.06E+02
Xe-135	9.49E+00	9.62E-01	1.73E+01	1.77E+00	3.81E+02	2.47E+00	1.77E+00	3.81E+02	3.76E+00	3.59E+01	3.59E+01	8.06E+01	7.42E+01	1.02E+03
Xe-135m	1.24E+00	1.26E-01	2.26E+00	2.32E-01	4.98E+01	3.23E-01	2.32E-01	4.98E+01	4.93E-01	4.70E+00	4.70E+00	1.05E+01	9.71E+00	1.33E+02
Xe138	6.56E-01	6.65E-02	1.19E+00	1.22E-01	2.63E+01	1.70E-01	1.22E-01	2.63E+01	2.60E-01	2.48E+00	2.48E+00	5.57E+00	5.12E+00	7.01E+01
H-3	4.80E+00	4.87E-01	8.73E+00	1.52E+01	3.27E+03	2.12E+01	1.52E+01	3.27E+03	1.90E+00	1.82E+01	1.82E+01	4.08E+01	3.75E+01	6.72E+03

Table 6.3. Total Fluid Activity in Waste Processing System Failed Components – Degasifier Noble Gas DF=3

Table 6.10: Total Fluid Activity in Waste Processing System and Components (Degasifier, Noble Gas DF, Iodine DF, Tritium DF)														
Component		RCW Filter Vessel	RCW Degasifier	RCW IX 11 & 12	RCW Receiver Tank	NUKEM Skid	RCW IX 13 & 14	RCW Monitor Tank	Misc. Waste IX	MW Receiver Tank	MW Monitor Tank	RC & MW System Piping	Dewatering Spent Resin Tank	
Noble Gas Prior Processing DF		1	1	3	3	3	3	3	4	4	4	1	1	
Iodine Prior Processing DF		10	10	10	100	100	100	1000	4	4	4	10	1	
Tritium Prior Processing DF		1	1	1	1	1	1	1	4	4	4	1	1	
Component Volume (cc)		5.07E+04	9.08E+05	1.59E+06	3.41E+08	4.42E+06	1.59E+06	3.41E+08	1.59E+06	1.51E+07	1.51E+07	8.49E+06	7.82E+06	
Void Fraction		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Fluid Volume (cc)		5.07E+04	9.08E+05	1.59E+06	3.41E+08	4.42E+06	1.59E+06	3.41E+08	1.59E+06	1.51E+07	1.51E+07	8.49E+06	7.82E+06	
Quantity in System		2	2	2	2	1	2	2	1	1	1	1	1	
Isotope	RCW Corrected RCS equilibrium $\mu\text{Ci/cc}$	RCW Filter Vessel Fluid Activity (Ci)	RCW Degasifier Fluid Activity (Ci)	RCW IX 11 & 12 Fluid Activity (Ci)	RCW Receiver Tank Fluid Activity (Ci)	NUKEM Skid Fluid Activity (Ci)	RCW IX 13 & 14 Fluid Activity (Ci)	RCW Monitor Tank Fluid Activity (Ci)	Misc. Waste IX Fluid Activity (Ci)	MW Receiver Tank Fluid Activity (Ci)	MW Monitor Tank Fluid Activity (Ci)	RC & MW Sys Piping Fluid Activity (Ci)	Dewatering Spent Resin Tank Fluid Activity (Ci)	RC & MW Total Fluid Activity (Ci)
I-131	4.40E+00	4.46E-02	8.00E-01	1.40E+00	3.00E+01	1.95E-01	1.40E-01	3.00E+00	1.75E+00	1.67E+01	1.67E+01	3.74E+00	3.44E+01	1.09E+02
I-132	1.47E+00	1.49E-02	2.67E-01	4.66E-01	1.00E+01	6.49E-02	4.66E-02	1.00E+00	5.82E-01	5.56E+00	5.56E+00	1.25E+00	1.15E+01	3.63E+01
I-133	6.20E+00	6.29E-02	1.13E+00	1.97E+00	4.23E+01	2.74E-01	1.97E-01	4.23E+00	2.46E+00	2.35E+01	2.35E+01	5.26E+00	4.85E+01	1.53E+02
I-134	8.37E-01	8.48E-03	1.52E-01	2.65E-01	5.70E+00	3.70E-02	2.65E-02	5.70E-01	3.32E-01	3.17E+00	3.17E+00	7.11E-01	6.54E+00	2.07E+01
I-135	3.40E+00	3.45E-02	6.18E-01	1.08E+00	2.32E+01	1.50E-01	1.08E-01	2.32E+00	1.35E+00	1.29E+01	1.29E+01	2.89E+00	2.66E+01	8.41E+01
Kr-85	3.85E+01	3.90E+00	6.99E+01	4.07E+01	8.74E+03	5.67E+01	4.07E+01	8.74E+03	1.53E+01	1.46E+02	1.46E+02	3.27E+02	3.01E+02	1.86E+04
Kr-85m	2.02E+00	2.05E-01	3.67E+00	2.14E+00	4.59E+02	2.98E+00	2.14E+00	4.59E+02	8.01E-01	7.65E+00	7.65E+00	1.72E+01	1.58E+01	9.78E+02
Kr-87	1.17E+00	1.18E-01	2.12E+00	1.23E+00	2.65E+02	1.72E+00	1.23E+00	2.65E+02	4.62E-01	4.42E+00	4.42E+00	9.90E+00	9.12E+00	5.65E+02
Kr-88	3.63E+00	3.68E-01	6.60E+00	3.84E+00	8.25E+02	5.35E+00	3.84E+00	8.25E+02	1.44E+00	1.37E+01	1.37E+01	3.08E+01	2.84E+01	1.76E+03
Xe-133	3.97E+02	4.03E+01	7.22E+02	4.20E+02	9.03E+04	5.86E+02	4.20E+02	9.03E+04	1.58E+02	1.50E+03	1.50E+03	3.37E+03	3.11E+03	1.92E+05
Xe-133m	5.66E+00	5.74E-01	1.03E+01	5.99E+00	1.29E+03	8.34E+00	5.99E+00	1.29E+03	2.24E+00	2.14E+01	2.14E+01	4.81E+01	4.42E+01	2.74E+03
Xe-135	9.49E+00	9.62E-01	1.73E+01	1.00E+01	2.16E+03	1.40E+01	1.00E+01	2.16E+03	3.76E+00	3.59E+01	3.59E+01	8.06E+01	7.42E+01	4.60E+03
Xe-135m	1.24E+00	1.26E-01	2.26E+00	1.31E+00	2.82E+02	1.83E+00	1.31E+00	2.82E+02	4.93E-01	4.70E+00	4.70E+00	1.05E+01	9.71E+00	6.01E+02
Xe138	6.56E-01	6.65E-02	1.19E+00	6.93E-01	1.49E+02	9.66E-01	6.93E-01	1.49E+02	2.60E-01	2.48E+00	2.48E+00	5.57E+00	5.12E+00	3.17E+02
H-3	4.80E+00	4.87E-01	8.73E+00	1.52E+01	3.27E+03	2.12E+01	1.52E+01	3.27E+03	1.90E+00	1.82E+01	1.82E+01	4.08E+01	3.75E+01	6.72E+03

Table 6.4. Total Fluid Activity in Waste Processing System Failed Components – Degasifier Noble Gas DF=6, 300 h decay for three 90k gal. tanks

Component		RCW Filter Vessel	RCW Degasifier	RCW IX 11 & 12	RCW Receiver Tank 11	RCW Receiver Tank 21	NUKEM Skid	RCW IX 13 & 14	RCW Monitor Tank	Misc. Waste IX	MW Receiver Tank	MW Monitor Tank	RC & MW System Piping	Dewatering Spent Resin Tank	
Noble Gas Prior Processing DF		1	1	7	7	7	7	7	7	4	4	4	1	1	
Iodine Prior Processing DF		10	10	10	100	100	100	100	1000	4	4	4	10	1	
Tritium Prior Processing DF		1	1	1	1	1	1	1	1	4	4	4	1	1	
Component Volume (cc)		5.07E+04	9.08E+05	1.59E+06	3.41E+08	3.41E+08	4.42E+06	1.59E+06	3.41E+08	1.59E+06	1.51E+07	1.51E+07	8.49E+06	7.82E+06	
Void Fraction		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Fluid Volume (cc)		5.07E+04	9.08E+05	1.59E+06	3.41E+08	3.41E+08	4.42E+06	1.59E+06	3.41E+08	1.59E+06	1.51E+07	1.51E+07	8.49E+06	7.82E+06	
Quantity In System		2	2	2	1	1	1	2	2	1	1	1	1	1	
Decay Time (h)		0	0	0	0	300	0	0	300	0	0	0	0	0	
Isotope	RCW Corrected RCS equilibrium $\mu\text{Ci/cc}$	RCW Filter Vessel Fluid Activity (Ci)	RCW Degasifier Fluid Activity (Ci)	RCW IX 11 & 12 Fluid Activity (Ci)	RCW Receiver Tank 11 Fluid Activity (Ci)	RCW Receiver Tank 21 Fluid Activity (Ci)	NUKEM Skid Fluid Activity (Ci)	RCW IX 13 & 14 Fluid Activity (Ci)	RCW Monitor Tank Fluid Activity (Ci)	Misc. Waste IX Fluid Activity (Ci)	MW Receiver Tank Fluid Activity (Ci)	MW Monitor Tank Fluid Activity (Ci)	RC & MW Sys Piping Fluid Activity (Ci)	Dewatering Spent Resin Tank Fluid Activity (Ci)	RC & MW Total Fluid Activity (Ci)
I-131	4.40E+00	4.46E-02	8.00E-01	1.40E+00	1.50E+01	5.09E+00	1.95E-01	1.40E-01	1.02E+00	1.75E+00	1.67E+01	1.67E+01	3.74E+00	3.44E+01	9.69E+01
I-132	1.47E+00	1.49E-02	2.67E-01	4.66E-01	5.00E+00	1.23E-39	6.49E-02	4.66E-02	2.46E-40	5.82E-01	5.56E+00	5.56E+00	1.25E+00	1.15E+01	3.03E+01
I-133	6.20E+00	6.29E-02	1.13E+00	1.97E+00	2.11E+01	9.62E-04	2.74E-01	1.97E-01	1.92E-04	2.46E+00	2.35E+01	2.35E+01	5.26E+00	4.85E+01	1.28E+02
I-134	8.37E-01	8.48E-03	1.52E-01	2.65E-01	2.85E+00	2.76E-103	3.70E-02	2.65E-02	5.52E-104	3.32E-01	3.17E+00	3.17E+00	7.11E-01	6.54E+00	1.73E+01
I-135	3.40E+00	3.45E-02	6.18E-01	1.08E+00	1.16E+01	2.08E-13	1.50E-01	1.08E-01	4.16E-14	1.35E+00	1.29E+01	1.29E+01	2.89E+00	2.66E+01	7.02E+01
Kr-85	3.85E+01	3.90E+00	6.99E+01	2.03E+01	2.19E+03	2.18E+03	2.84E+01	2.03E+01	4.36E+03	1.53E+01	1.46E+02	1.46E+02	3.27E+02	3.01E+02	9.80E+03
Kr-85m	2.02E+00	2.05E-01	3.67E+00	1.07E+00	1.15E+02	7.35E-19	1.49E+00	1.07E+00	1.47E-18	8.01E-01	7.65E+00	7.65E+00	1.72E+01	1.58E+01	1.71E+02
Kr-87	1.17E+00	1.18E-01	2.12E+00	6.17E-01	6.62E+01	4.79E-70	8.59E-01	6.17E-01	9.58E-70	4.62E-01	4.42E+00	4.42E+00	9.90E+00	9.12E+00	9.89E+01
Kr-88	3.63E+00	3.68E-01	6.60E+00	1.92E+00	2.06E+02	2.76E-30	2.68E+00	1.92E+00	5.52E-30	1.44E+00	1.37E+01	1.37E+01	3.08E+01	2.84E+01	3.08E+02
Xe-133	3.97E+02	4.03E+01	7.22E+02	2.10E+02	2.26E+04	4.32E+03	2.93E+02	2.10E+02	8.65E+03	1.58E+02	1.50E+03	1.50E+03	3.37E+03	3.11E+03	4.67E+04
Xe-133m	5.66E+00	5.74E-01	1.03E+01	2.99E+00	3.21E+02	6.12E+00	4.17E+00	2.99E+00	1.22E+01	2.24E+00	2.14E+01	2.14E+01	4.81E+01	4.42E+01	4.98E+02
Xe-135	9.49E+00	9.62E-01	1.73E+01	5.02E+00	5.39E+02	6.60E-08	6.99E+00	5.02E+00	1.32E-07	3.76E+00	3.59E+01	3.59E+01	8.06E+01	7.42E+01	8.05E+02
Xe-135m	1.24E+00	1.26E-01	2.26E+00	6.57E-01	7.05E+01	0.00E+00	9.15E-01	6.57E-01	0.00E+00	4.93E-01	4.70E+00	4.70E+00	1.05E+01	9.71E+00	1.05E+02
Xe138	6.56E-01	6.65E-02	1.19E+00	3.47E-01	3.72E+01	0.00E+00	4.83E-01	3.47E-01	0.00E+00	2.60E-01	2.48E+00	2.48E+00	5.57E+00	5.12E+00	5.56E+01
H-3	4.80E+00	4.87E-01	8.73E+00	1.52E+01	1.64E+03	1.64E+03	2.12E+01	1.52E+01	3.27E+03	1.90E+00	1.82E+01	1.82E+01	4.08E+01	3.75E+01	6.72E+03

Table 6.5. Total Equilibrium Activity on RC Waste Ion Exchanger Resins

		Half-life	RCS eq Activity	Diversion Rate to Waste Processing	Decay Constant	Fraction not Removed by CVCS IX	RC Resin eq Activity w/o D	RC Resin eq Activity w/ D
Isotope		(sec)	(Ci)	(1/sec)	(/sec)	1/DF _{CVCS}	(Ci)	(Ci)
Daughter	Parent	A	B	C	D	E	F	G
I131		6.93E+05	9.15E+02	8.88E-07	1.00E-06	0.10	8.12E+01	8.12E+01
	Te-131	1.50E+03	9.62E+00	8.88E-07	4.62E-04	0.10	1.85E-03	
I132		8.21E+03	3.04E+02	8.88E-07	8.44E-05	0.10	3.19E-01	2.91E+00
	Te-132	2.76E+05	7.31E+01	8.88E-07	2.51E-06	0.10	2.59E+00	
I133		7.49E+04	1.29E+03	8.88E-07	9.26E-06	0.10	1.24E+01	1.24E+01
	Te-133	7.44E+02	1.43E+00	8.88E-07	9.32E-04	0.10	1.36E-04	
I134		3.16E+03	1.74E+02	8.88E-07	2.20E-04	0.10	7.03E-02	7.25E-02
	Te-134	2.52E+03	6.86E+00	8.88E-07	2.75E-04	0.10	2.21E-03	
I135		2.37E+04	7.07E+02	8.88E-07	2.93E-05	0.10	2.14E+00	2.14E+00
	Te-135	1.90E+01	2.91E-02	8.88E-07	3.65E-02	0.10	7.08E-08	

6.3 Total Activity Released

Tables 6.6 – 6.9 summarize the calculation of the total activity released (i.e., becoming airborne) from a waste processing system failure with various assumptions. The released activity A(i) for an isotope is calculated as follows:

$$A(i) = RF_F(i) * F(i) + RF_F(i) * RF_R(i) * R(i)$$

where, F(i) and R(i) are the activity in the fluid and resin, respectively, $RF_R(i)$ is the resin-to-fluid release fraction from assumption 7, and $RF_F(i)$ is the fluid-to-air release fraction from assumption 2.

Table 6.6. Total Activity Released from Waste Processing System Failure – Degasifier DF=10⁴, no decay

Isotope	RC IX Resin Activity (Ci)	Resin Release Fraction	RC & MW Total Fluid Activity (Ci)	Fluid Release Fraction	Released Activity (Ci)
I-131	8.12E+01	0.100	1.09E+02	0.101	1.18E+01
I-132	2.91E+00	0.100	3.63E+01	0.101	3.69E+00
I-133	1.24E+01	0.100	1.53E+02	0.101	1.56E+01
I-134	7.25E-02	0.100	2.07E+01	0.101	2.09E+00
I-135	2.14E+00	0.100	8.41E+01	0.101	8.51E+00
Kr-85	0.00E+00	0.000	1.01E+03	1.000	1.01E+03
Kr-85m	0.00E+00	0.000	5.32E+01	1.000	5.32E+01
Kr-87	0.00E+00	0.000	3.07E+01	1.000	3.07E+01
Kr-88	0.00E+00	0.000	9.56E+01	1.000	9.56E+01
Xe-133	0.00E+00	0.000	1.05E+04	1.000	1.05E+04
Xe-133m	0.00E+00	0.000	1.49E+02	1.000	1.49E+02
Xe-135	0.00E+00	0.000	2.50E+02	1.000	2.50E+02
Xe-135m	0.00E+00	0.000	3.27E+01	1.000	3.27E+01
Xe138	0.00E+00	0.000	1.73E+01	1.000	1.73E+01
H-3	0.00E+00	0.000	6.72E+03	0.100	6.72E+02

Table 6.7. Total Activity Released from Waste Processing System Failure – Degasifier DF=17, no decay

Isotope	RC IX Resin Activity (Ci)	Resin Release Fraction	RC & MW Total Fluid Activity (Ci)	Fluid Release Fraction	Released Activity (Ci)
I-131	8.12E+01	0.100	1.09E+02	0.101	1.18E+01
I-132	2.91E+00	0.100	3.63E+01	0.101	3.69E+00
I-133	1.24E+01	0.100	1.53E+02	0.101	1.56E+01
I-134	7.25E-02	0.100	2.07E+01	0.101	2.09E+00
I-135	2.14E+00	0.100	8.41E+01	0.101	8.51E+00
Kr-85	0.00E+00	0.000	4.12E+03	1.000	4.12E+03
Kr-85m	0.00E+00	0.000	2.16E+02	1.000	2.16E+02
Kr-87	0.00E+00	0.000	1.25E+02	1.000	1.25E+02
Kr-88	0.00E+00	0.000	3.89E+02	1.000	3.89E+02
Xe-133	0.00E+00	0.000	4.25E+04	1.000	4.25E+04
Xe-133m	0.00E+00	0.000	6.06E+02	1.000	6.06E+02
Xe-135	0.00E+00	0.000	1.02E+03	1.000	1.02E+03
Xe-135m	0.00E+00	0.000	1.33E+02	1.000	1.33E+02
Xe138	0.00E+00	0.000	7.01E+01	1.000	7.01E+01
H-3	0.00E+00	0.000	6.72E+03	0.100	6.72E+02

Table 6.8. Total Activity Released from Waste Processing System Failure – Degasifier DF=3, no decay

Isotope	RC IX Resin Activity (Ci)	Resin Release Fraction	RC & MW Total Fluid Activity (Ci)	Fluid Release Fraction	Released Activity (Ci)
I-131	8.12E+01	0.100	1.09E+02	0.101	1.18E+01
I-132	2.91E+00	0.100	3.63E+01	0.101	3.69E+00
I-133	1.24E+01	0.100	1.53E+02	0.101	1.56E+01
I-134	7.25E-02	0.100	2.07E+01	0.101	2.09E+00
I-135	2.14E+00	0.100	8.41E+01	0.101	8.51E+00
Kr-85	0.00E+00	0.000	1.86E+04	1.000	1.86E+04
Kr-85m	0.00E+00	0.000	9.78E+02	1.000	9.78E+02
Kr-87	0.00E+00	0.000	5.65E+02	1.000	5.65E+02
Kr-88	0.00E+00	0.000	1.76E+03	1.000	1.76E+03
Xe-133	0.00E+00	0.000	1.92E+05	1.000	1.92E+05
Xe-133m	0.00E+00	0.000	2.74E+03	1.000	2.74E+03
Xe-135	0.00E+00	0.000	4.60E+03	1.000	4.60E+03
Xe-135m	0.00E+00	0.000	6.01E+02	1.000	6.01E+02
Xe138	0.00E+00	0.000	3.17E+02	1.000	3.17E+02
H-3	0.00E+00	0.000	6.72E+03	0.100	6.72E+02

Table 6.9. Total Activity Released from Waste Processing System Failure – Degasifier DF=6 - with three 90,000 gal. tank 300h decay credit

Isotope	RC IX Resin Activity (Ci)	Resin Release Fraction	RC & MW Total Fluid Activity (Ci)	Fluid Release Fraction	Released Activity (Ci)
I-131	8.12E+01	0.100	9.69E+01	0.101	1.06E+01
I-132	2.91E+00	0.100	3.03E+01	0.101	3.09E+00
I-133	1.24E+01	0.100	1.28E+02	0.101	1.30E+01
I-134	7.25E-02	0.100	1.73E+01	0.101	1.74E+00
I-135	2.14E+00	0.100	7.02E+01	0.101	7.11E+00
Kr-85	0.00E+00	0.000	9.80E+03	1.000	9.80E+03
Kr-85m	0.00E+00	0.000	1.71E+02	1.000	1.71E+02
Kr-87	0.00E+00	0.000	9.89E+01	1.000	9.89E+01
Kr-88	0.00E+00	0.000	3.08E+02	1.000	3.08E+02
Xe-133	0.00E+00	0.000	4.67E+04	1.000	4.67E+04
Xe-133m	0.00E+00	0.000	4.98E+02	1.000	4.98E+02
Xe-135	0.00E+00	0.000	8.05E+02	1.000	8.05E+02
Xe-135m	0.00E+00	0.000	1.05E+02	1.000	1.05E+02
Xe138	0.00E+00	0.000	5.56E+01	1.000	5.56E+01
H-3	0.00E+00	0.000	6.72E+03	0.100	6.72E+02

6.4 Dose Calculation

The total released activity from Tables 6.6 – 6.9 were entered into RADTRAD nuclear inventory files. Release fractions for noble gases, iodine, and tritium (grouped in with noble gases) were set to 1.0 since they had already been accounted for in Section 6.3. Table 6.10 summarizes the RADTRAD calculations that were performed as described in Section 5.

Table 6.10 Summary of RADTRAD Cases

Location of Release	Waste Processing System, Aux. Bldg.	Waste Processing System, Aux. Bldg.	Waste Processing System, Aux. Bldg.	Waste Processing System, Aux. Bldg.
Fluid Decay Time*	0 hours	0 hours	0 hours	300 hrs for 3 90k gal. tanks; 0 hours for other SSCs
Degasifier Noble Gas DF	10,000	17	3	6
Nuclear Inventory File	WasteProc-NG10k.NIF	WasteProc-NG17.NIF	WasteProc-NG3.NIF	WasteProc-NG6.NIF
Release Fraction File	WasteProc.RFT	WasteProc.RFT	WasteProc.RFT	WasteProc.RFT
DCF File	WasteProc15.INP	WasteProc15.INP	WasteProc15.INP	WasteProc15.INP
Case File	WasteProc-NG10k.PSF	WasteProc-NG17.PSF	WasteProc-NG3.PSF	WasteProc-NG6d.PSF
Output File	WasteProc-NG10k.o0	WasteProc-NG17.o0	WasteProc-NG3.o0	WasteProc-NG6d.o0
Control Room Inleakage	3500 cfm	3500 cfm	3500 cfm	3500 cfm
Control Room Filtration	Not Credited	Not Credited	Not Credited	Not Credited
Release Point to Environment	Unit 2 Vent Stack	Unit 2 Vent Stack	Unit 2 Vent Stack	Unit 2 Vent Stack
Entrance Point to Control Room	Turbine Building	Turbine Building	Turbine Building	Turbine Building

*Decay time applied prior to source input as discussed in Section 6.1. RADTRAD delay time not used.

7.0 DOCUMENTATION OF COMPUTER CODES

This work employed the RADTRAD computer code, which was verified, benchmarked, and documented in References 5 – 9 and which models the transport of radionuclides from a primary containment to a secondary containment and thence to the environment and control room. The installation of RADTRAD is detailed in Reference 8 and the validation in Reference 9. RADTRAD was executed on Constellation Energy personal computer PC0496 running the Windows NT4 operating system.

The RADTRAD computer code calculated TEDE and thyroid doses to personnel at the site boundary, low population zone, and control room per the alternate source term methodology 10CFR50.67 and Regulatory Guide 1.183 or calculates whole body and thyroid doses to personnel at the site boundary, low population zone, and control room per the standard source term methodology of TID-14844 (Reference 10) resulting from any postulated accident which releases radioactivity within the containment, spent fuel pool, or any other area where a radionuclide release can occur. RADTRAD models the transport of radioactivity from up to 63 radionuclides from the sprayed and unsprayed regions of a primary containment, spent fuel pool, or other auxiliary building area, through the secondary containment if any, and then to the environment and control room. The code includes the capability to model time-dependent activity; containment spray, filtration, and leakage; control room filtration and in-leakage; primary and secondary containment purge filters; control room intake filters; atmospheric dispersion; and natural decay. Doses are calculated for individuals residing at the site boundary or low population zone and in the control room.

All inputs, outputs, and spreadsheets used in this calculation are included on the CD-ROM associated with this calculation and are summarized in Table 7.1 below. Microsoft Excel was also utilized to prepare input, tabulate results, and check RADTRAD site boundary dose results.

Table 7.1. Directory Listing of CD-ROM

Volume in drive D is CA06608			
Volume Serial Number is 96B9-8786			
Directory of D:\Waste Processing Incident for AST - CA06608			
09/28/2005	11:02 PM	<DIR>	.
09/28/2005	11:02 PM	<DIR>	..
09/28/2005	10:57 PM		1,371,136 Waste Processing Incident - CA06608c.doc
09/28/2005	05:06 PM		165,376 Waste Processing Incident - CA06608c.xls
09/28/2005	04:28 PM		58,397 WasteProc-NG10k.o0
09/28/2005	04:28 PM		2,905 WasteProc-NG10k.psf
09/28/2005	04:52 PM		58,401 WasteProc-NG17.o0
09/28/2005	04:52 PM		2,904 WasteProc-NG17.psf
09/28/2005	04:37 PM		58,389 WasteProc-NG3.o0
09/28/2005	04:37 PM		2,901 WasteProc-NG3.psf
09/28/2005	05:01 PM		58,550 WasteProc-NG6d.o0
09/28/2005	05:01 PM		2,930 WasteProc-NG6d.psf
09/28/2005	04:24 PM		2,253 wasteproc-NG10k.nif
09/28/2005	04:36 PM		2,253 wasteproc-NG3.nif
09/28/2005	04:43 PM		2,253 wasteproc-ng17.nif
09/28/2005	05:00 PM		2,253 wasteproc-ng6.nif
07/23/2005	11:34 AM		828 wasteproc.RFT
07/23/2005	01:06 PM		11,824 wasteproc15.inp
	16 File(s)		1,803,553 bytes

8.0 RESULTS AND CONCLUSIONS

The RADTRAD calculated Total Effective Dose Equivalent (TEDE) for the waste processing system incident cases evaluated are presented in Table 8.1 below. Reference 2 (Table 6) does not provide TEDE acceptance criteria for the waste processing system incident. In all cases, the site boundary TEDE is considerably below the 10CFR100 limit of 25 rem whole body (i.e., below 0.5 rem) originally used as the acceptance criteria for this calculation, and below the 0.5 rem site boundary dose limit established in later revisions of Safety Guide 29 (Regulatory Guide 1.29), as well as Regulatory Guide 1.143 (indicated as being consistent with 10CFR20). A major revision to 10CFR20 occurred in 1991, and the limit in 10CFR20.1301(a)(1) is now 0.1 rem TEDE. Therefore, this limit will be utilized for the site boundary and LPZ TEDE dose limits for this event. A minimum degasifier noble gas DF of 6 is required to meet the new limit. Values measured following recent degasifier maintenance are higher than this DF.

The 0-30 day control room dose is below the 5 rem TEDE limit established in 10CFR50.67(b)(2)(iii) for all cases.

Based on meeting the above mentioned dose limits, this evaluation supports a non-Seismic Category I designation for the majority of the waste processing system (excluding parts of the system upstream of containment isolation valves 1/2-CV-4260).

Table 8.1 Summary of RADTRAD Results for the Waste Processing System Incident

Case	0-2 hr Site Boundary TEDE (Rem)	0-30 day Low Population Zone TEDE (Rem)	0-30 day Control Room TEDE (Rem)
Degasifier Noble Gas DF = 10,000; no decay	0.045	0.011	0.316
Degasifier Noble Gas DF = 17; no decay	0.099	0.023	0.347
Degasifier Noble Gas DF = 3; no decay	0.347	0.082	0.494
Degasifier Noble Gas DF = 6; 300h decay for three-of-four 90k gal tanks	0.092	0.022	0.314
NRC Limit for Event	0.1	0.1	5.0

ATTACHMENT A – RADTRAD NUCLEAR INVENTORY FILE WASTEPROC-NG10K.NIF

Nuclide Inventory Name:
CCNPP Waste Processing Incident
Power Level:
2.754E+03
Nuclides:
15
Nuclide 001:
Kr-85
1
0.3382974720E+09
0.8500E+02
1.01E+03
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 002:
Kr-85m
1
0.1612800000E+05
0.8500E+02
5.32E+01
Kr-85 0.2100E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 003:
Kr-87
1
0.4578000000E+04
0.8700E+02
3.07E+01
Rb-87 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 004:
Kr-88
1
0.1022400000E+05
0.8800E+02
9.56E+01
Rb-88 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 005:
I-131
2
0.6946560000E+06
0.1310E+03
1.18E+01
Xe-131m 0.1100E-01
none 0.0000E+00
none 0.0000E+00
Nuclide 006:
I-132
2
0.8280000000E+04
0.1320E+03
3.69E+00
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 007:

I-133
2
0.7488000000E+05
0.1330E+03
1.56E+01
Xe-133m 0.2900E-01
Xe-133 0.9700E+00
none 0.0000E+00
Nuclide 008:
I-134
2
0.3156000000E+04
0.1340E+03
2.09E+00
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 009:
I-135
2
0.2379600000E+05
0.1350E+03
8.51E+00
Xe-135m 0.1500E+00
Xe-135 0.8500E+00
none 0.0000E+00
Nuclide 010:
Xe-133
1
0.4531680000E+06
0.1330E+03
1.05E+04
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 011:
Xe-135
1
0.3272400000E+05
0.1350E+03
2.50E+02
Cs-135 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 012:
Xe-133m
1
0.1892200000E+06
0.1330E+03
1.49E+02
Xe-133 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 013:
Xe-135m
1
0.9180000000E+03
0.1350E+03
3.27E+01
Xe-135 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 014:
Xe-138

```
1
0.8460000000E+03
0.1380E+03
1.73E+01
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 015:
H-3
1
3.8663136E+08
3.01605
6.72E+02
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
End of Nuclear Inventory File
```

ATTACHMENT B – RADTRAD RELEASE FRACTION AND TIMING FILE WASTEPROC.RTF

Release Fraction and Timing Name:
Waste Processing Incident, 1m Release
Duration (h): Design Basis Accident
1.6666E-02 0.0000E+00 0.0000E+00 0.0000E+00
Noble Gases:
1.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Iodine:
1.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Cesium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Tellurium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Strontium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Barium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Ruthenium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Cerium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Lanthanum:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Non-Radioactive Aerosols (kg):
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
End of Release File

ATTACHMENT C – RADTRAD DOSE CONVERSION FACTOR FILE WASTEPROC15.INP

FGRDCF 10/24/95 03:24:50 beta-test version 1.10, minor FORTRAN fixes 5/4/95
 Implicit daughter halflives (m) less than 90 and less than 0.100 of parent
 9 ORGANS DEFINED IN THIS FILE:

GONADS
 BREAST
 LUNGS
 RED MARR
 BONE SUR
 THYROID
 REMAINDER
 EFFECTIVE
 SKIN(FGR)

15 NUCLIDES DEFINED IN THIS FILE:

Kr-85
 Kr-85m
 Kr-87
 Kr-88
 I-131 D
 I-132 D
 I-133 D
 I-134 D
 I-135 D Including: Xe-135m
 Xe-133
 Xe-135
 Xe-133m
 Xe-135m
 Xe-138
 H-3

	CLOUDSHINE	GROUND SHINE 8HR	GROUND SHINE 7DAY	GROUND SHINE RATE	INHALED ACUTE	INHALED CHRONIC	INGESTION
Kr-85							
GONADS	1.170E-16	8.121E-14	1.704E-12	2.820E-18	-1.000E+00	0.000E+00	0.000E+00
BREAST	1.340E-16	7.891E-14	1.656E-12	2.740E-18	-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.140E-16	7.056E-14	1.481E-12	2.450E-18	-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.090E-16	6.998E-14	1.469E-12	2.430E-18	-1.000E+00	0.000E+00	0.000E+00
BONE SUR	2.200E-16	1.287E-13	2.702E-12	4.470E-18	-1.000E+00	0.000E+00	0.000E+00
THYROID	1.180E-16	7.459E-14	1.565E-12	2.590E-18	-1.000E+00	0.000E+00	0.000E+00
REMAINDER	1.090E-16	6.941E-14	1.457E-12	2.410E-18	-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	1.190E-16	7.603E-14	1.596E-12	2.640E-18	-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	1.320E-14	2.304E-11	4.835E-10	8.000E-16	-1.000E+00	0.000E+00	0.000E+00
Kr-85m							
GONADS	7.310E-15	2.594E-12	3.653E-12	1.570E-16	-1.000E+00	0.000E+00	0.000E+00
BREAST	8.410E-15	2.527E-12	3.560E-12	1.530E-16	-1.000E+00	0.000E+00	0.000E+00
LUNGS	7.040E-15	2.379E-12	3.351E-12	1.440E-16	-1.000E+00	0.000E+00	0.000E+00
RED MARR	6.430E-15	2.346E-12	3.304E-12	1.420E-16	-1.000E+00	0.000E+00	0.000E+00
BONE SUR	1.880E-14	5.286E-12	7.446E-12	3.200E-16	-1.000E+00	0.000E+00	0.000E+00
THYROID	7.330E-15	2.395E-12	3.374E-12	1.450E-16	-1.000E+00	0.000E+00	0.000E+00
REMAINDER	6.640E-15	2.313E-12	3.257E-12	1.400E-16	-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	7.480E-15	2.511E-12	3.537E-12	1.520E-16	-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	2.240E-14	2.247E-11	3.164E-11	1.360E-15	-1.000E+00	0.000E+00	0.000E+00
Kr-87							
GONADS	4.000E-14	4.962E-12	5.026E-12	7.610E-16	-1.000E+00	0.000E+00	0.000E+00
BREAST	4.500E-14	4.740E-12	4.802E-12	7.270E-16	-1.000E+00	0.000E+00	0.000E+00
LUNGS	4.040E-14	4.603E-12	4.663E-12	7.060E-16	-1.000E+00	0.000E+00	0.000E+00
RED MARR	4.000E-14	4.708E-12	4.769E-12	7.220E-16	-1.000E+00	0.000E+00	0.000E+00
BONE SUR	6.020E-14	6.514E-12	6.598E-12	9.990E-16	-1.000E+00	0.000E+00	0.000E+00
THYROID	4.130E-14	4.473E-12	4.531E-12	6.860E-16	-1.000E+00	0.000E+00	0.000E+00
REMAINDER	3.910E-14	4.590E-12	4.650E-12	7.040E-16	-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	4.120E-14	4.773E-12	4.835E-12	7.320E-16	-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	1.370E-13	8.802E-11	8.916E-11	1.350E-14	-1.000E+00	0.000E+00	0.000E+00
Kr-88							
GONADS	9.900E-14	2.278E-11	2.655E-11	1.800E-15	-1.000E+00	0.000E+00	0.000E+00
BREAST	1.110E-13	2.177E-11	2.537E-11	1.720E-15	-1.000E+00	0.000E+00	0.000E+00

LUNGS	1.010E-13	2.139E-11	2.493E-11	1.690E-15-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.000E-13	2.190E-11	2.552E-11	1.730E-15-1.000E+00	0.000E+00	0.000E+00
BONE SUR	1.390E-13	2.886E-11	3.363E-11	2.280E-15-1.000E+00	0.000E+00	0.000E+00
THYROID	1.030E-13	2.012E-11	2.345E-11	1.590E-15-1.000E+00	0.000E+00	0.000E+00
REMAINDER	9.790E-14	2.139E-11	2.493E-11	1.690E-15-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	1.020E-13	2.202E-11	2.567E-11	1.740E-15-1.000E+00	0.000E+00	0.000E+00
SKIN (FGR)	1.350E-13	5.607E-11	6.534E-11	4.430E-15-1.000E+00	0.000E+00	0.000E+00
I-131						
GONADS	1.780E-14	1.119E-11	1.789E-10	3.940E-16-1.000E+00	2.530E-11	4.070E-11
BREAST	2.040E-14	1.082E-11	1.730E-10	3.810E-16-1.000E+00	7.880E-11	1.210E-10
LUNGS	1.760E-14	1.016E-11	1.626E-10	3.580E-16-1.000E+00	6.570E-10	1.020E-10
RED MARR	1.680E-14	1.022E-11	1.635E-10	3.600E-16-1.000E+00	6.260E-11	9.440E-11
BONE SUR	3.450E-14	1.675E-11	2.679E-10	5.900E-16-1.000E+00	5.730E-11	8.720E-11
THYROID	1.810E-14	1.053E-11	1.685E-10	3.710E-16-1.000E+00	2.920E-07	4.760E-07
REMAINDER	1.670E-14	9.908E-12	1.585E-10	3.490E-16-1.000E+00	8.030E-11	1.570E-10
EFFECTIVE	1.820E-14	1.067E-11	1.707E-10	3.760E-16-1.000E+00	8.890E-09	1.440E-08
SKIN (FGR)	2.980E-14	1.825E-11	2.920E-10	6.430E-16-1.000E+00	0.000E+00	0.000E+00
I-132						
GONADS	1.090E-13	2.523E-11	2.771E-11	2.320E-15-1.000E+00	9.950E-12	2.330E-11
BREAST	1.240E-13	2.414E-11	2.652E-11	2.220E-15-1.000E+00	1.410E-11	2.520E-11
LUNGS	1.090E-13	2.305E-11	2.532E-11	2.120E-15-1.000E+00	2.710E-10	2.640E-11
RED MARR	1.070E-13	2.360E-11	2.592E-11	2.170E-15-1.000E+00	1.400E-11	2.460E-11
BONE SUR	1.730E-13	3.327E-11	3.655E-11	3.060E-15-1.000E+00	1.240E-11	2.190E-11
THYROID	1.120E-13	2.381E-11	2.616E-11	2.190E-15-1.000E+00	1.740E-09	3.870E-09
REMAINDER	1.050E-13	2.283E-11	2.509E-11	2.100E-15-1.000E+00	3.780E-11	1.650E-10
EFFECTIVE	1.120E-13	2.403E-11	2.640E-11	2.210E-15-1.000E+00	1.030E-10	1.820E-10
SKIN (FGR)	1.580E-13	8.199E-11	9.007E-11	7.540E-15-1.000E+00	0.000E+00	0.000E+00
I-133						
GONADS	2.870E-14	1.585E-11	6.748E-11	6.270E-16-1.000E+00	1.950E-11	3.630E-11
BREAST	3.280E-14	1.519E-11	6.468E-11	6.010E-16-1.000E+00	2.940E-11	4.680E-11
LUNGS	2.860E-14	1.446E-11	6.156E-11	5.720E-16-1.000E+00	8.200E-10	4.530E-11
RED MARR	2.770E-14	1.466E-11	6.242E-11	5.800E-16-1.000E+00	2.720E-11	4.300E-11
BONE SUR	4.870E-14	2.161E-11	9.202E-11	8.550E-16-1.000E+00	2.520E-11	4.070E-11
THYROID	2.930E-14	1.502E-11	6.393E-11	5.940E-16-1.000E+00	4.860E-08	9.100E-08
REMAINDER	2.730E-14	1.418E-11	6.038E-11	5.610E-16-1.000E+00	5.000E-11	1.550E-10
EFFECTIVE	2.940E-14	1.509E-11	6.425E-11	5.970E-16-1.000E+00	1.580E-09	2.800E-09
SKIN (FGR)	5.830E-14	1.150E-10	4.897E-10	4.550E-15-1.000E+00	0.000E+00	0.000E+00
I-134						
GONADS	1.270E-13	1.200E-11	1.202E-11	2.640E-15-1.000E+00	4.250E-12	1.100E-11
BREAST	1.440E-13	1.145E-11	1.147E-11	2.520E-15-1.000E+00	6.170E-12	1.170E-11
LUNGS	1.270E-13	1.100E-11	1.102E-11	2.420E-15-1.000E+00	1.430E-10	1.260E-11
RED MARR	1.250E-13	1.127E-11	1.129E-11	2.480E-15-1.000E+00	6.080E-12	1.090E-11
BONE SUR	1.960E-13	1.568E-11	1.571E-11	3.450E-15-1.000E+00	5.310E-12	9.320E-12
THYROID	1.300E-13	1.127E-11	1.129E-11	2.480E-15-1.000E+00	2.880E-10	6.210E-10
REMAINDER	1.220E-13	1.091E-11	1.093E-11	2.400E-15-1.000E+00	2.270E-11	1.340E-10
EFFECTIVE	1.300E-13	1.150E-11	1.152E-11	2.530E-15-1.000E+00	3.550E-11	6.660E-11
SKIN (FGR)	1.870E-13	4.477E-11	4.485E-11	9.850E-15-1.000E+00	0.000E+00	0.000E+00
I-135						
GONADS	8.078E-14	3.113E-11	5.489E-11	1.599E-15-1.000E+00	1.700E-11	3.610E-11
BREAST	9.143E-14	2.971E-11	5.240E-11	1.526E-15-1.000E+00	2.340E-11	3.850E-11
LUNGS	8.145E-14	2.886E-11	5.089E-11	1.482E-15-1.000E+00	4.410E-10	3.750E-11
RED MARR	8.054E-14	2.965E-11	5.228E-11	1.523E-15-1.000E+00	2.240E-11	3.650E-11
BONE SUR	1.184E-13	3.983E-11	7.024E-11	2.046E-15-1.000E+00	2.010E-11	3.360E-11
THYROID	8.324E-14	2.852E-11	5.030E-11	1.465E-15-1.000E+00	8.460E-09	1.790E-08
REMAINDER	7.861E-14	2.883E-11	5.084E-11	1.481E-15-1.000E+00	4.700E-11	1.540E-10
EFFECTIVE	8.294E-14	2.989E-11	5.271E-11	1.535E-15-1.000E+00	3.320E-10	6.080E-10
SKIN (FGR)	1.156E-13	9.826E-11	1.733E-10	5.047E-15-1.000E+00	0.000E+00	0.000E+00
Xe-133						
GONADS	1.610E-15	1.465E-12	2.052E-11	5.200E-17-1.000E+00	0.000E+00	0.000E+00
BREAST	1.960E-15	1.505E-12	2.107E-11	5.340E-17-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.320E-15	1.045E-12	1.464E-11	3.710E-17-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.070E-15	8.791E-13	1.231E-11	3.120E-17-1.000E+00	0.000E+00	0.000E+00
BONE SUR	5.130E-15	4.254E-12	5.958E-11	1.510E-16-1.000E+00	0.000E+00	0.000E+00
THYROID	1.510E-15	1.181E-12	1.653E-11	4.190E-17-1.000E+00	0.000E+00	0.000E+00

REMAINDER	1.240E-15	1.042E-12	1.460E-11	3.700E-17-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	1.560E-15	1.299E-12	1.819E-11	4.610E-17-1.000E+00	0.000E+00	0.000E+00
SKIN (FGR)	4.970E-15	1.953E-12	2.734E-11	6.930E-17-1.000E+00	0.000E+00	0.000E+00
Xe-135						
GONADS	1.170E-14	5.455E-12	1.194E-11	2.530E-16-1.000E+00	0.000E+00	0.000E+00
BREAST	1.330E-14	5.325E-12	1.166E-11	2.470E-16-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.130E-14	4.959E-12	1.086E-11	2.300E-16-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.070E-14	4.959E-12	1.086E-11	2.300E-16-1.000E+00	0.000E+00	0.000E+00
BONE SUR	2.570E-14	9.120E-12	1.997E-11	4.230E-16-1.000E+00	0.000E+00	0.000E+00
THYROID	1.180E-14	5.023E-12	1.100E-11	2.330E-16-1.000E+00	0.000E+00	0.000E+00
REMAINDER	1.080E-14	4.829E-12	1.058E-11	2.240E-16-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	1.190E-14	5.217E-12	1.142E-11	2.420E-16-1.000E+00	0.000E+00	0.000E+00
SKIN (FGR)	3.120E-14	4.506E-11	9.867E-11	2.090E-15-1.000E+00	0.000E+00	0.000E+00
Xe-133m						
GONADS	1.420E-15	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
BREAST	1.700E-15	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.190E-15	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.100E-15	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
BONE SUR	3.230E-15	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
THYROID	1.360E-15	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
REMAINDER	1.150E-15	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	1.370E-15	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
SKIN (FGR)	1.040E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
Xe-135m						
GONADS	2.000E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
BREAST	2.290E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.980E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.910E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
BONE SUR	3.500E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
THYROID	2.040E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
REMAINDER	1.890E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	2.040E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
SKIN (FGR)	2.970E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
Xe-138						
GONADS	5.590E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
BREAST	6.320E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
LUNGS	5.660E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
RED MARR	5.600E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
BONE SUR	8.460E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
THYROID	5.770E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
REMAINDER	5.490E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	5.770E-14	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
SKIN (FGR)	1.070E-13	0.000E+00	0.000E+00	0.000E+00-1.000E+00	0.000E+00	0.000E+00
H-3						
GONADS	0.000E+00	0.000E+00	0.000E+00	0.000E+00-1.000E+00	1.730E-11	0.000E+00
BREAST	0.000E+00	0.000E+00	0.000E+00	0.000E+00-1.000E+00	1.730E-11	0.000E+00
LUNGS	2.750E-18	0.000E+00	0.000E+00	0.000E+00-1.000E+00	1.730E-11	0.000E+00
RED MARR	0.000E+00	0.000E+00	0.000E+00	0.000E+00-1.000E+00	1.730E-11	0.000E+00
BONE SUR	0.000E+00	0.000E+00	0.000E+00	0.000E+00-1.000E+00	1.730E-11	0.000E+00
THYROID	0.000E+00	0.000E+00	0.000E+00	0.000E+00-1.000E+00	1.730E-11	0.000E+00
REMAINDER	0.000E+00	0.000E+00	0.000E+00	0.000E+00-1.000E+00	1.730E-11	0.000E+00
EFFECTIVE	3.310E-19	0.000E+00	0.000E+00	0.000E+00-1.000E+00	1.730E-11	0.000E+00
SKIN (FGR)	0.000E+00	0.000E+00	0.000E+00	0.000E+00-1.000E+00	1.730E-11	0.000E+00

ATTACHMENT D – RADTRAD OUTPUT FILE WASTEPROC-NG10K.O0

```
#####
RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:28:55
#####
```

```
#####
File information
#####
```

```
Plant file          = D:\RADTRAD\Defaults\WasteProc-NG10k.psf
Inventory file      = d:\radtrad\defaults\wasteproc-ng10k.nif
Release file       = d:\radtrad\defaults\wasteproc.rft
Dose Conversion file = d:\radtrad\defaults\wasteproc15.inp
```

```
#####      #####      #####      # #      # #####      # #      #####
# # #      # #      # #      # #      # #      # #      #
# # #      # #      # #      # #      # #      # #      #
#####      #####      #####      # #      # #####      # #      #
# #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      #
```

Radtrad 3.03 4/15/2001

Nuclide Inventory File:

d:\radtrad\defaults\wasteproc-ng10k.nif

Plant Power Level:

2.7540E+03

Compartments:

3

Compartment 1:

Waste Processing System

3

5.0140E+04

0

0

0

0

0

Compartment 2:

Environment

2

0.0000E+00

0

0

0

0

0

Compartment 3:

Control Room

1

2.8919E+05

0

0

0

0

0

Pathways:

3

Pathway 1:
Waste Processing System to Environment

1

2

1

Pathway 2:
Environment to Control Room

2

3

2

Pathway 3:
Control Room to Environment

3

2

2

End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:

1

1 1.0000E+00

d:\radtrad\defaults\wasteproc15.inp

d:\radtrad\defaults\wasteproc.rft

0.0000E+00

1

9.5000E-01 4.8500E-02 1.5000E-03 1.0000E+00

Overlying Pool:

0

0.0000E+00

0

0

0

0

Compartments:

3

Compartment 1:

1

1

0

0

0

0

0

0

0

Compartment 2:

1

1

0

0

0

0

0

0

0

Compartment 3:

1

1

0

0

0

0

```

0
0
0
Pathways:
3
Pathway 1:
0
0
1
1
0.0000E+00    1.0000E+00    5.0138E+04
1
1
0.0000E+00    1.0000E+00    5.0138E+04
1
1
0.0000E+00    1.0000E+00    5.0138E+04
0
0
0
0
0
0
0
0
Pathway 2:
0
0
0
0
0
1
1
0.0000E+00    3.5000E+03    0.0000E+00    0.0000E+00    0.0000E+00
0
0
0
0
0
0
Pathway 3:
0
0
0
0
0
1
1
0.0000E+00    3.5000E+03    1.0000E+02    1.0000E+02    1.0000E+02
0
0
0
0
0
0
Dose Locations:
3
Location 1:
EAB - Site Boundary
2
1
2
0.0000E+00    1.4400E-04
2.0000E+00    0.0000E+00
1

```

4
 0.0000E+00 3.5000E-04
 8.0000E+00 1.8000E-04
 2.4000E+01 2.3000E-04
 7.2000E+02 0.0000E+00
 0

Location 2:

LPZ - Low Population Zone

2
 1
 4
 0.0000E+00 3.3900E-05
 2.0000E+00 2.2000E-06
 2.4000E+01 5.4000E-07
 7.2000E+02 0.0000E+00
 1
 4
 0.0000E+00 3.5000E-04
 8.0000E+00 1.8000E-04
 2.4000E+01 2.3000E-04
 7.2000E+02 0.0000E+00
 0

Location 3:

Control Room

3
 0
 1
 2
 0.0000E+00 3.5000E-04
 7.2000E+02 0.0000E+00
 1
 4
 0.0000E+00 1.0000E+00
 2.4000E+01 6.0000E-01
 9.6000E+01 4.0000E-01
 7.2000E+02 0.0000E+00

Effective Volume Location:

1
 6
 0.0000E+00 1.6800E-03
 2.0000E+00 1.3400E-03
 8.0000E+00 5.1400E-04
 2.4000E+01 3.8400E-04
 9.6000E+01 3.1200E-04
 7.2000E+02 0.0000E+00

Simulation Parameters:

0

Output Filename:

D:\RADTRAD\Defaults\WasteProc-NG10k.o0

1

1

1

0

0

End of Scenario File


```
#####  
RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:28:55  
#####
```

```
#####  
Plant Description  
#####
```

Number of Nuclides = 15

Inventory Power = 2.7540E+03 MWth
Plant Power Level = 2.7540E+03 MWth

Number of compartments = 3

Compartment information

Compartment number 1 (Source term fraction = 1.0000E+00
)

Name: Waste Processing System

Compartment volume = 5.0140E+04 (Cubic feet)

Compartment type is Normal

Pathways into and out of compartment 1

Exit Pathway Number 1: Waste Processing System to Environment

Compartment number 2

Name: Environment

Compartment type is Environment

Pathways into and out of compartment 2

Inlet Pathway Number 1: Waste Processing System to Environment

Inlet Pathway Number 3: Control Room to Environment

Exit Pathway Number 2: Environment to Control Room

Compartment number 3

Name: Control Room

Compartment volume = 2.8919E+05 (Cubic feet)

Compartment type is Control Room

Pathways into and out of compartment 3

Inlet Pathway Number 2: Environment to Control Room

Exit Pathway Number 3: Control Room to Environment

Total number of pathways = 3

 RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:28:55
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 Scenario Description
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Radioactive Decay is enabled
 Calculation of Daughters is enabled

Release Fractions and Timings

	GAP	EARLY IN-VESSEL	LATE RELEASE	RELEASE MASS
	0.016666 hr	0.0000 hrs	0.0000 hrs	(gm)
NOBLES	1.0000E+00	0.0000E+00	0.0000E+00	2.700E+00
IODINE	1.0000E+00	0.0000E+00	0.0000E+00	1.118E-04
CESIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
TELLURIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
STRONTIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
BARIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
RUTHENIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
CERIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
LANTHANUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00

Inventory Power = 1. MWt

Nuclide Name	Group	Specific Inventory (Ci/MWt)	half life (s)	Whole Body DCF (Sv-m3/Bq-s)	Inhaled Thyroid (Sv/Bq)	Inhaled Effective (Sv/Bq)
Kr-85	1	1.010E+03	3.383E+08	1.190E-16	0.000E+00	0.000E+00
Kr-85m	1	5.320E+01	1.613E+04	7.480E-15	0.000E+00	0.000E+00
Kr-87	1	3.070E+01	4.578E+03	4.120E-14	0.000E+00	0.000E+00
Kr-88	1	9.560E+01	1.022E+04	1.020E-13	0.000E+00	0.000E+00
I-131	2	1.180E+01	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	3.690E+00	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	1.560E+01	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	2.090E+00	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	8.510E+00	2.380E+04	8.294E-14	8.460E-09	3.320E-10
Xe-133	1	1.050E+04	4.532E+05	1.560E-15	0.000E+00	0.000E+00
Xe-135	1	2.500E+02	3.272E+04	1.190E-14	0.000E+00	0.000E+00
Xe-133m	1	1.490E+02	1.892E+05	1.370E-15	0.000E+00	0.000E+00
Xe-135m	1	3.270E+01	9.180E+02	2.040E-14	0.000E+00	0.000E+00
Xe-138	1	1.730E+01	8.460E+02	5.770E-14	0.000E+00	0.000E+00
H-3	1	6.720E+02	3.866E+08	3.310E-19	1.730E-11	1.730E-11

Nuclide	Daughter	Fraction	Daughter	Fraction	Daughter	Fraction
Kr-85m	Kr-85	0.21	none	0.00	none	0.00
Kr-87	Rb-87	1.00	none	0.00	none	0.00
Kr-88	Rb-88	1.00	none	0.00	none	0.00
I-131	Xe-131m	0.01	none	0.00	none	0.00
I-133	Xe-133m	0.03	Xe-133	0.97	none	0.00
I-135	Xe-135m	0.15	Xe-135	0.85	none	0.00
Xe-135	Cs-135	1.00	none	0.00	none	0.00
Xe-133m	Xe-133	1.00	none	0.00	none	0.00
Xe-135m	Xe-135	1.00	none	0.00	none	0.00

Iodine fractions

Aerosol = 9.5000E-01
 Elemental = 4.8500E-02
 Organic = 1.5000E-03

COMPARTMENT DATA

Compartment number 1: Waste Processing System

Compartment number 2: Environment

Compartment number 3: Control Room

PATHWAY DATA

Pathway number 1: Waste Processing System to Environment

Piping: Removal Data

Time (hr)	Flow Rate (cfm)	Aerosol	DF Elemental	Organic
0.0000E+00	5.0138E+04	1.0000E+00	1.0000E+00	1.0000E+00

Pathway number 2: Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.5000E+03	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Control Room to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.5000E+03	1.0000E+02	1.0000E+02	1.0000E+02

LOCATION DATA

Location EAB - Site Boundary is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m ⁻³)
0.0000E+00	1.4400E-04
2.0000E+00	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m ³ * sec ⁻¹)
0.0000E+00	3.5000E-04
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location LPZ - Low Population Zone is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m ⁻³)
0.0000E+00	3.3900E-05
2.0000E+00	2.2000E-06
2.4000E+01	5.4000E-07
7.2000E+02	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m ³ * sec ⁻¹)
0.0000E+00	3.5000E-04
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location Control Room is in compartment 3

Location X/Q Data

Time (hr)	X/Q (s * m ⁻³)
0.0000E+00	1.6800E-03
2.0000E+00	1.3400E-03
8.0000E+00	5.1400E-04
2.4000E+01	3.8400E-04
9.6000E+01	3.1200E-04
7.2000E+02	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m ³ * sec ⁻¹)
0.0000E+00	3.5000E-04
7.2000E+02	0.0000E+00

Location Occupancy Factor Data

Time (hr)	Occupancy Factor
0.0000E+00	1.0000E+00
2.4000E+01	6.0000E-01
9.6000E+01	4.0000E-01
7.2000E+02	0.0000E+00

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RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:28:55
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Dose, Detailed model and Detailed Inventory Output
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EAB - Site Boundary Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.8233E-03	2.9458E-01	1.6733E-02	
Accumulated dose (rem)	6.8233E-03	2.9458E-01	1.6733E-02	

LPZ - Low Population Zone Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.6063E-03	6.9350E-02	3.9391E-03	
Accumulated dose (rem)	1.6063E-03	6.9350E-02	3.9391E-03	

Control Room Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.6928E-05	1.9447E-02	6.8108E-04	
Accumulated dose (rem)	2.6928E-05	1.9447E-02	6.8108E-04	

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	0.0167	Ci	kg	Atoms	Decay
Kr-85	6.3846E+02	1.6273E-03	1.1530E+22	1.3301E+15	
Kr-85m	3.3543E+01	4.0760E-09	2.8878E+16	6.9965E+13	
Kr-87	1.9231E+01	6.7894E-10	4.6996E+15	4.0236E+13	
Kr-88	6.0187E+01	4.7999E-09	3.2848E+16	1.2563E+14	
I-131	7.4588E+00	6.0164E-08	2.7658E+17	1.5539E+13	
I-132	2.3209E+00	2.2485E-10	1.0258E+15	4.8466E+12	
I-133	9.8559E+00	8.7004E-09	3.9395E+16	2.0538E+13	
I-134	1.3039E+00	4.8877E-11	2.1966E+14	2.7332E+12	
I-135	5.3701E+00	1.5291E-09	6.8213E+15	1.1197E+13	
Xe-133	6.6369E+03	3.5457E-05	1.6055E+20	1.3827E+16	
Xe-135	1.5787E+02	6.1818E-08	2.7576E+17	3.2902E+14	
Xe-133m	9.4168E+01	2.1006E-07	9.5115E+17	1.9620E+14	
Xe-135m	1.9792E+01	2.1742E-10	9.6985E+14	4.2049E+13	
Xe-138	1.0411E+01	1.0774E-10	4.7017E+14	2.2198E+13	
H-3	4.2480E+02	4.3908E-05	8.7671E+21	8.8498E+14	

Waste Processing System Transport Group Inventory:

Time (h) =	0.0167	Atmosphere	Sump
Noble gases (atoms)	2.0458E+22	0.0000E+00	
Elemental I (atoms)	1.5716E+16	0.0000E+00	
Organic I (atoms)	4.8606E+14	0.0000E+00	

Aerosols (kg)	6.7134E-08	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			6.5290E-09
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			7.4982E-09
Total I (Ci)			2.6310E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	0.0167	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00		1.2129E+22
Elemental I (atoms)	0.0000E+00		9.3186E+15
Organic I (atoms)	0.0000E+00		2.8821E+14
Aerosols (kg)	0.0000E+00		3.9807E-08

Environment Integral Nuclide Release:

Time (h) =	0.0167	Ci	kg	Atoms	Bq
Kr-85		3.7154E+02	9.4699E-04	6.7093E+21	1.3747E+13
Kr-85m		1.9520E+01	2.3719E-09	1.6805E+16	7.2224E+11
Kr-87		1.1192E+01	3.9511E-10	2.7349E+15	4.1409E+11
Kr-88		3.5025E+01	2.7933E-09	1.9115E+16	1.2959E+12
I-131		4.3405E+00	3.5011E-08	1.6095E+17	1.6060E+11
I-132		1.3506E+00	1.3085E-10	5.9696E+14	4.9973E+10
I-133		5.7354E+00	5.0630E-09	2.2925E+16	2.1221E+11
I-134		7.5882E-01	2.8445E-11	1.2783E+14	2.8076E+10
I-135		3.1250E+00	8.8985E-10	3.9695E+15	1.1563E+11
Xe-133		3.8622E+03	2.0633E-05	9.3426E+19	1.4290E+14
Xe-135		9.1867E+01	3.5974E-08	1.6047E+17	3.3991E+12
Xe-133m		5.4799E+01	1.2224E-07	5.5350E+17	2.0276E+12
Xe-135m		1.1520E+01	1.2655E-10	5.6452E+14	4.2625E+11
Xe-138		6.0604E+00	6.2715E-11	2.7368E+14	2.2423E+11
H-3		2.4720E+02	2.5551E-05	5.1018E+21	9.1464E+12

Environment Transport Group Inventory:

Time (h) =	0.0167	Total Release	Rate/s
Noble gases (atoms)		1.1905E+22	1.9843E+20
Elemental I (atoms)		9.1455E+15	1.5243E+14
Organic I (atoms)		2.8285E+14	4.7143E+12
Aerosols (kg)		3.9067E-08	6.5114E-10
Dose Effective (Ci) I-131 (Thyroid)			5.3944E+00
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			6.1952E+00
Total I (Ci)			1.5310E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	0.0167	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00		1.2129E+22
Elemental I (atoms)	0.0000E+00		9.3186E+15
Organic I (atoms)	0.0000E+00		2.8821E+14
Aerosols (kg)	0.0000E+00		3.9807E-08

Environment to Control Room Transport Group Inventory:

Time (h) =	0.0167	Pathway	Transported
Noble gases (atoms)	0.0000E+00	Filtered	3.3038E+19
Elemental I (atoms)	0.0000E+00		2.5383E+13
Organic I (atoms)	0.0000E+00		7.8505E+11
Aerosols (kg)	0.0000E+00		1.0843E-10

Control Room to Environment Transport Group Inventory:

Pathway

Time (h) =	0.0167	Filtered	Transported
Noble gases (atoms)	1.3555E+17	0.0000E+00	
Elemental I (atoms)	1.0414E+11	0.0000E+00	
Organic I (atoms)	3.2209E+09	0.0000E+00	
Aerosols (kg)	4.4487E-13	0.0000E+00	

Control Room Compartment Nuclide Inventory:

Time (h) =	0.0167	Ci	kg	Atoms	Decay
Kr-85		1.0266E+00	2.6166E-06	1.8538E+19	2.1275E+12
Kr-85m		5.3933E-02	6.5536E-12	4.6432E+13	1.1191E+11
Kr-87		3.0921E-02	1.0916E-12	7.5563E+12	6.4356E+10
Kr-88		9.6774E-02	7.7177E-12	5.2815E+13	2.0094E+11
I-131		1.1993E-02	9.6736E-11	4.4470E+14	2.4855E+10
I-132		3.7317E-03	3.6153E-13	1.6494E+12	7.7520E+09
I-133		1.5847E-02	1.3989E-11	6.3342E+13	3.2851E+10
I-134		2.0965E-03	7.8588E-14	3.5319E+11	4.3717E+09
I-135		8.6345E-03	2.4587E-12	1.0968E+13	1.7909E+10
Xe-133		1.0671E+01	5.7010E-08	2.5814E+17	2.2117E+13
Xe-135		2.5383E-01	9.9395E-11	4.4339E+14	5.2626E+11
Xe-133m		1.5141E-01	3.3775E-10	1.5293E+15	3.1383E+11
Xe-135m		3.1823E-02	3.4958E-13	1.5594E+12	6.7250E+10
Xe-138		1.6740E-02	1.7324E-13	7.5598E+11	3.5502E+10
H-3		6.8302E-01	7.0599E-08	1.4096E+19	1.4155E+12

Control Room Transport Group Inventory:

Time (h) =	0.0167	Atmosphere	Sump
Noble gases (atoms)	3.2895E+19	0.0000E+00	
Elemental I (atoms)	2.5269E+13	0.0000E+00	
Organic I (atoms)	7.8152E+11	0.0000E+00	
Aerosols (kg)	1.0794E-10	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)	1.8201E-12	
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)	2.0903E-12	
Total I (Ci)		4.2303E-02	

Environment to Control Room Transport Group Inventory:

	Pathway
Time (h) =	0.0167
	Filtered
Noble gases (atoms)	0.0000E+00
Elemental I (atoms)	0.0000E+00
Organic I (atoms)	0.0000E+00
Aerosols (kg)	0.0000E+00

Control Room to Environment Transport Group Inventory:

	Pathway
Time (h) =	0.0167
	Filtered
Noble gases (atoms)	1.3555E+17
Elemental I (atoms)	1.0414E+11
Organic I (atoms)	3.2209E+09
Aerosols (kg)	4.4487E-13

EAB - Site Boundary Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		1.1681E-02	5.0614E-01	2.8706E-02
Accumulated dose (rem)		1.8504E-02	8.0072E-01	4.5439E-02

LPZ - Low Population Zone Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		2.7498E-03	1.1915E-01	6.7579E-03
Accumulated dose (rem)		4.3562E-03	1.8850E-01	1.0697E-02

Control Room Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.6235E-03	6.9024E+00	2.4075E-01	
Accumulated dose (rem)	8.6504E-03	6.9218E+00	2.4143E-01	

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	2.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) =	2.0000	Atmosphere	Sump
Noble gases (atoms)	4.2838E-30	0.0000E+00	
Elemental I (atoms)	3.2261E-36	0.0000E+00	
Organic I (atoms)	9.9775E-38	0.0000E+00	
Aerosols (kg)	1.3778E-59	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			1.3386E-60
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			1.5170E-60
Total I (Ci)			4.7204E-51

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	2.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	7.3807E+22	
Elemental I (atoms)	0.0000E+00	5.6699E+16	
Organic I (atoms)	0.0000E+00	1.7536E+15	
Aerosols (kg)	0.0000E+00	2.4220E-07	

Environment Integral Nuclide Release:

Time (h) =	2.0000	Ci	kg	Atoms	Bq
Kr-85	1.0100E+03	2.5743E-03	1.8239E+22	3.7370E+13	
Kr-85m	5.2547E+01	6.3852E-09	4.5238E+16	1.9442E+12	
Kr-87	2.9400E+01	1.0379E-09	7.1846E+15	1.0878E+12	
Kr-88	9.3758E+01	7.4772E-09	5.1169E+16	3.4690E+12	
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11	
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11	
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11	
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10	
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11	
Xe-133	1.0495E+04	5.6071E-05	2.5388E+20	3.8833E+14	
Xe-135	2.4870E+02	9.7386E-08	4.3442E+17	9.2018E+12	
Xe-133m	1.4884E+02	3.3203E-07	1.5034E+18	5.5072E+12	
Xe-135m	2.6811E+01	2.9452E-10	1.3138E+15	9.9200E+11	
Xe-138	1.3807E+01	1.4289E-10	6.2353E+14	5.1088E+11	
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13	

Environment Transport Group Inventory:

	Total	Release
Time (h) =	2.0000	Rate/s
Noble gases (atoms)	3.2364E+22	4.4949E+18
Elemental I (atoms)	2.4844E+16	3.4506E+12
Organic I (atoms)	7.6838E+14	1.0672E+11
Aerosols (kg)	1.0613E-07	1.4740E-11
Dose Effective (Ci) I-131 (Thyroid)		1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		1.6821E+01
Total I (Ci)		4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	2.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	7.3807E+22	

Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	7.0482E+19	0.0000E+00
Elemental I (atoms)	5.3757E+13	0.0000E+00
Organic I (atoms)	1.6626E+12	0.0000E+00
Aerosols (kg)	2.2962E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
Kr-85	6.6798E-01	1.7026E-06	1.2063E+19	3.8270E+14
Kr-85m	2.5821E-02	3.1376E-12	2.2230E+13	1.7944E+13
Kr-87	6.8257E-03	2.4097E-13	1.6680E+12	7.9520E+12
Kr-88	3.8807E-02	3.0949E-12	2.1179E+13	3.0245E+13
I-131	7.7484E-03	6.2500E-11	2.8731E+14	4.4588E+12
I-132	1.3357E-03	1.2940E-13	5.9036E+11	1.1217E+12
I-133	9.6523E-03	8.5206E-12	3.8581E+13	5.7613E+12
I-134	2.8434E-04	1.0659E-14	4.7902E+10	4.6758E+11
I-135	4.5635E-03	1.2995E-12	5.7966E+12	2.9778E+12
Xe-133	6.8696E+00	3.6700E-08	1.6618E+17	3.9619E+15
Xe-135	1.4319E-01	5.6072E-11	2.5013E+14	8.9753E+13
Xe-133m	9.5988E-02	2.1412E-10	9.6953E+14	5.5887E+13
Xe-135m	8.9969E-04	9.8832E-15	4.4087E+10	3.6236E+12
Xe-138	3.1372E-05	3.2465E-16	1.4167E+09	1.6374E+12
H-3	4.4444E-01	4.5938E-08	9.1725E+18	2.5463E+14

Control Room Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump
Noble gases (atoms)	2.1403E+19	0.0000E+00
Elemental I (atoms)	1.6118E+13	0.0000E+00
Organic I (atoms)	4.9850E+11	0.0000E+00
Aerosols (kg)	6.8837E-11	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		1.1595E-12
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.3141E-12
Total I (Ci)		2.3584E-02

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported

Noble gases (atoms)	7.0482E+19	0.0000E+00
Elemental I (atoms)	5.3757E+13	0.0000E+00
Organic I (atoms)	1.6626E+12	0.0000E+00
Aerosols (kg)	2.2962E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)		1.8504E-02	8.0072E-01	4.5439E-02

LPZ - Low Population Zone Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		2.9447E-56	1.5854E-54	8.2755E-56
Accumulated dose (rem)		4.3562E-03	1.8850E-01	1.0697E-02

Control Room Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		2.2033E-03	2.1264E+00	7.3706E-02
Accumulated dose (rem)		1.0854E-02	9.0482E+00	3.1514E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	8.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) =	8.0000	Atmosphere	Sump
Noble gases (atoms)		1.9584-186	0.0000E+00
Elemental I (atoms)		1.4027-192	0.0000E+00
Organic I (atoms)		4.3382-194	0.0000E+00
Aerosols (kg)		5.9876-216	0.0000E+00
Dose Effective (Ci/cc)	I-131 (Thyroid)		5.7830-217
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		6.3863-217
Total I (Ci)			1.6604-207

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	8.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	7.3807E+22
Elemental I (atoms)		0.0000E+00	5.6699E+16
Organic I (atoms)		0.0000E+00	1.7536E+15
Aerosols (kg)		0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) =	8.0000	Ci	kg	Atoms	Bq
Kr-85		1.0100E+03	2.5743E-03	1.8239E+22	3.7370E+13
Kr-85m		5.2547E+01	6.3852E-09	4.5238E+16	1.9442E+12
Kr-87		2.9400E+01	1.0379E-09	7.1846E+15	1.0878E+12
Kr-88		9.3758E+01	7.4772E-09	5.1169E+16	3.4690E+12
I-131		1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132		3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133		1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134		1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135		8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133		1.0495E+04	5.6071E-05	2.5388E+20	3.8833E+14
Xe-135		2.4870E+02	9.7386E-08	4.3442E+17	9.2018E+12
Xe-133m		1.4884E+02	3.3203E-07	1.5034E+18	5.5072E+12
Xe-135m		2.6811E+01	2.9452E-10	1.3138E+15	9.9200E+11
Xe-138		1.3807E+01	1.4289E-10	6.2353E+14	5.1088E+11
H-3		6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total Release	Release Rate/s	
Time (h) = 8.0000			
Noble gases (atoms)	3.2364E+22	1.1237E+18	
Elemental I (atoms)	2.4844E+16	8.6265E+11	
Organic I (atoms)	7.6838E+14	2.6680E+10	
Aerosols (kg)	1.0613E-07	3.6850E-12	
Dose Effective (Ci) I-131 (Thyroid)			1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.6821E+01
Total I (Ci)			4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

	Pipe Walls	Transported
Time (h) = 8.0000		
Noble gases (atoms)	0.0000E+00	7.3807E+22
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 8.0000		
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 8.0000		
Noble gases (atoms)	9.1609E+19	0.0000E+00
Elemental I (atoms)	6.9492E+13	0.0000E+00
Organic I (atoms)	2.1492E+12	0.0000E+00
Aerosols (kg)	2.9681E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 8.0000	Ci	kg	Atoms	Decay
Kr-85	8.5610E-03	2.1821E-08	1.5460E+17	4.9932E+14
Kr-85m	1.3079E-04	1.5893E-14	1.1260E+11	2.1689E+13
Kr-87	3.3235E-06	1.1733E-16	8.1218E+08	8.6410E+12
Kr-88	1.1500E-04	9.1716E-15	6.2764E+10	3.5365E+13
I-131	9.7192E-05	7.8397E-13	3.6039E+12	5.8052E+12
I-132	2.8067E-06	2.7191E-16	1.2405E+09	1.2883E+12
I-133	1.0129E-04	8.9416E-14	4.0487E+11	7.3763E+12
I-134	3.1720E-08	1.1891E-18	5.3438E+06	4.9164E+11
I-135	3.1176E-05	8.8775E-15	3.9601E+10	3.6781E+12
Xe-133	8.5227E-02	4.5532E-10	2.0616E+15	5.1528E+15
Xe-135	1.1772E-03	4.6097E-13	2.0563E+12	1.1254E+14
Xe-133m	1.1369E-03	2.5361E-12	1.1483E+13	7.2363E+13
Xe-135m	5.5564E-06	6.1038E-17	2.7228E+08	3.7366E+12
H-3	5.6961E-03	5.8876E-10	1.1756E+17	3.3222E+14

Control Room Transport Group Inventory:

	Atmosphere	Sump
Time (h) = 8.0000		
Noble gases (atoms)	2.7423E+17	0.0000E+00
Elemental I (atoms)	1.9641E+11	0.0000E+00
Organic I (atoms)	6.0745E+09	0.0000E+00
Aerosols (kg)	8.3841E-13	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		1.4040E-14
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.5504E-14

Total I (Ci) 2.3250E-04

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	9.1609E+19	0.0000E+00
Elemental I (atoms)	6.9492E+13	0.0000E+00
Organic I (atoms)	2.1492E+12	0.0000E+00
Aerosols (kg)	2.9681E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.8504E-02	8.0072E-01	4.5439E-02

LPZ - Low Population Zone Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	9.8913E-213	3.5232E-211	2.1750E-212
Accumulated dose (rem)	4.3562E-03	1.8850E-01	1.0697E-02

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.2038E-05	2.6146E-02	9.0240E-04
Accumulated dose (rem)	1.0876E-02	9.0743E+00	3.1604E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	0.0000E+00	0.0000E+00	
Elemental I (atoms)	0.0000E+00	0.0000E+00	
Organic I (atoms)	0.0000E+00	0.0000E+00	
Aerosols (kg)	0.0000E+00	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			0.0000E+00
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			0.0000E+00
Total I (Ci)			0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 24.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	7.3807E+22
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) = 24.0000	Ci	kg	Atoms	Bq
Kr-85	1.0100E+03	2.5743E-03	1.8239E+22	3.7370E+13

Kr-85m	5.2547E+01	6.3852E-09	4.5238E+16	1.9442E+12
Kr-87	2.9400E+01	1.0379E-09	7.1846E+15	1.0878E+12
Kr-88	9.3758E+01	7.4772E-09	5.1169E+16	3.4690E+12
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133	1.0495E+04	5.6071E-05	2.5388E+20	3.8833E+14
Xe-135	2.4870E+02	9.7386E-08	4.3442E+17	9.2018E+12
Xe-133m	1.4884E+02	3.3203E-07	1.5034E+18	5.5072E+12
Xe-135m	2.6811E+01	2.9452E-10	1.3138E+15	9.9200E+11
Xe-138	1.3807E+01	1.4289E-10	6.2353E+14	5.1088E+11
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total Release	Release Rate/s	
Time (h) = 24.0000			
Noble gases (atoms)	3.2364E+22	3.7458E+17	
Elemental I (atoms)	2.4844E+16	2.8755E+11	
Organic I (atoms)	7.6838E+14	8.8933E+09	
Aerosols (kg)	1.0613E-07	1.2283E-12	
Dose Effective (Ci) I-131 (Thyroid)			1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.6821E+01
Total I (Ci)			4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 24.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	7.3807E+22
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	9.1883E+19	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
Kr-85	7.7011E-08	1.9629E-13	1.3907E+12	5.0082E+14
Kr-85m	9.8983E-11	1.2028E-20	8.5215E+04	2.1708E+13
Kr-88	2.0838E-11	1.6618E-21	1.1372E+04	3.5380E+13
I-131	8.2556E-10	6.6591E-18	3.0612E+07	5.8222E+12
I-133	5.3468E-10	4.7199E-19	2.1372E+06	7.3933E+12
I-135	5.2389E-11	1.4918E-20	6.6546E+04	3.6829E+12
Xe-133	7.0293E-07	3.7553E-15	1.7004E+10	5.1677E+15
Xe-135	3.2103E-09	1.2571E-18	5.6077E+06	1.1273E+14

Xe-133m	8.2866E-09	1.8485E-17	8.3699E+07	7.2559E+13
H-3	5.1240E-08	5.2963E-15	1.0575E+12	3.3322E+14

Control Room Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump
Noble gases (atoms)	2.4653E+12	0.0000E+00
Elemental I (atoms)	1.5916E+06	0.0000E+00
Organic I (atoms)	4.9224E+04	0.0000E+00
Aerosols (kg)	6.7888E-18	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		1.1187E-19
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.1880E-19
Total I (Ci)		1.4128E-09

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	9.1883E+19	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.8504E-02	8.0072E-01	4.5439E-02

LPZ - Low Population Zone Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	4.3562E-03	1.8850E-01	1.0697E-02

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	9.9296E-11	1.3095E-07	4.5352E-09
Accumulated dose (rem)	1.0876E-02	9.0743E+00	3.1604E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump
Noble gases (atoms)	0.0000E+00	0.0000E+00
Elemental I (atoms)	0.0000E+00	0.0000E+00
Organic I (atoms)	0.0000E+00	0.0000E+00
Aerosols (kg)	0.0000E+00	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		0.0000E+00
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		0.0000E+00
Total I (Ci)		0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 96.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	7.3807E+22
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) = 96.0000	Ci	kg	Atoms	Bq
Kr-85	1.0100E+03	2.5743E-03	1.8239E+22	3.7370E+13
Kr-85m	5.2547E+01	6.3852E-09	4.5238E+16	1.9442E+12
Kr-87	2.9400E+01	1.0379E-09	7.1846E+15	1.0878E+12
Kr-88	9.3758E+01	7.4772E-09	5.1169E+16	3.4690E+12
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133	1.0495E+04	5.6071E-05	2.5388E+20	3.8833E+14
Xe-135	2.4870E+02	9.7386E-08	4.3442E+17	9.2018E+12
Xe-133m	1.4884E+02	3.3203E-07	1.5034E+18	5.5072E+12
Xe-135m	2.6811E+01	2.9452E-10	1.3138E+15	9.9200E+11
Xe-138	1.3807E+01	1.4289E-10	6.2353E+14	5.1088E+11
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

Time (h) = 96.0000	Total Release	Release Rate/s
Noble gases (atoms)	3.2364E+22	9.3645E+16
Elemental I (atoms)	2.4844E+16	7.1888E+10
Organic I (atoms)	7.6838E+14	2.2233E+09
Aerosols (kg)	1.0613E-07	3.0708E-13
Dose Effective (Ci) I-131 (Thyroid)		1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		1.6821E+01
Total I (Ci)		4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 96.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	7.3807E+22
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	9.1883E+19	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
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Control Room Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	4.8309E-11	0.0000E+00	
Elemental I (atoms)	2.2711E-17	0.0000E+00	
Organic I (atoms)	7.0239E-19	0.0000E+00	
Aerosols (kg)	9.6780E-41	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.5489E-42
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.5607E-42
Total I (Ci)			1.3480E-32

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	9.1883E+19	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.8504E-02	8.0072E-01	4.5439E-02

LPZ - Low Population Zone Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	4.3562E-03	1.8850E-01	1.0697E-02

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.3834E-34	1.2133E-30	4.3332E-32
Accumulated dose (rem)	1.0876E-02	9.0743E+00	3.1604E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	0.0000E+00	0.0000E+00	
Elemental I (atoms)	0.0000E+00	0.0000E+00	
Organic I (atoms)	0.0000E+00	0.0000E+00	
Aerosols (kg)	0.0000E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		0.0000E+00
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		0.0000E+00
Total I (Ci)			0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 720.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	7.3807E+22
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) = 720.0000	Ci	kg	Atoms	Bq
Kr-85	1.0100E+03	2.5743E-03	1.8239E+22	3.7370E+13
Kr-85m	5.2547E+01	6.3852E-09	4.5238E+16	1.9442E+12
Kr-87	2.9400E+01	1.0379E-09	7.1846E+15	1.0878E+12
Kr-88	9.3758E+01	7.4772E-09	5.1169E+16	3.4690E+12
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133	1.0495E+04	5.6071E-05	2.5388E+20	3.8833E+14
Xe-135	2.4870E+02	9.7386E-08	4.3442E+17	9.2018E+12
Xe-133m	1.4884E+02	3.3203E-07	1.5034E+18	5.5072E+12
Xe-135m	2.6811E+01	2.9452E-10	1.3138E+15	9.9200E+11
Xe-138	1.3807E+01	1.4289E-10	6.2353E+14	5.1088E+11
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total	Release	
Time (h) = 720.0000	Release	Rate/s	
Noble gases (atoms)	3.2364E+22	1.2486E+16	
Elemental I (atoms)	2.4844E+16	9.5850E+09	
Organic I (atoms)	7.6838E+14	2.9644E+08	
Aerosols (kg)	1.0613E-07	4.0944E-14	
Dose Effective (Ci) I-131 (Thyroid)			1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.6821E+01
Total I (Ci)			4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 720.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	7.3807E+22
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	9.1883E+19	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 720.0000 Ci kg Atoms Decay

Control Room Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	7.7501-208	0.0000E+00	
Elemental I (atoms)	3.8756-215	0.0000E+00	
Organic I (atoms)	1.1986-216	0.0000E+00	
Aerosols (kg)	1.6513-238	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.6316-240
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.6316-240
Total I (Ci)			2.1550-230

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.9811E+19
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	9.1883E+19	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

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 I-131 Summary
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Time (hr)	Waste Processing Syst I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
0.000	3.8686E-01	6.4833E-03	1.7989E-05
0.017	7.4588E+00	4.3405E+00	1.1993E-02
0.417	2.8145E-10	1.1797E+01	2.4605E-02
0.717	4.2849E-18	1.1797E+01	1.9767E-02
1.017	6.5235E-26	1.1797E+01	1.5880E-02
1.317	9.9317E-34	1.1797E+01	1.2758E-02
1.617	1.5120E-41	1.1797E+01	1.0249E-02
1.917	2.3020E-49	1.1797E+01	8.2342E-03
2.000	1.5509E-51	1.1797E+01	7.7484E-03
2.300	2.3611E-59	1.1797E+01	6.2249E-03
2.600	3.5947E-67	1.1797E+01	5.0010E-03
2.900	5.4727E-75	1.1797E+01	4.0177E-03
3.200	8.3319E-83	1.1797E+01	3.2277E-03
3.500	1.2685E-90	1.1797E+01	2.5931E-03
3.800	1.9312E-98	1.1797E+01	2.0832E-03
4.100	2.9402-106	1.1797E+01	1.6736E-03
4.400	4.4763-114	1.1797E+01	1.3446E-03
4.700	6.8149-122	1.1797E+01	1.0802E-03
5.000	1.0375-129	1.1797E+01	8.6780E-04
5.300	1.5796-137	1.1797E+01	6.9718E-04
5.600	2.4048-145	1.1797E+01	5.6010E-04
5.900	3.6612-153	1.1797E+01	4.4997E-04
6.200	5.5741-161	1.1797E+01	3.6150E-04

6.500	8.4862-169	1.1797E+01	2.9042E-04
6.800	1.2920-176	1.1797E+01	2.3332E-04
7.100	1.9670-184	1.1797E+01	1.8744E-04
7.400	2.9946-192	1.1797E+01	1.5059E-04
7.700	4.5592-200	1.1797E+01	1.2098E-04
8.000	6.9411-208	1.1797E+01	9.7192E-05
8.300	1.0567-215	1.1797E+01	7.8082E-05
8.600	1.6088-223	1.1797E+01	6.2730E-05
8.900	2.4494-231	1.1797E+01	5.0396E-05
9.200	3.7291-239	1.1797E+01	4.0487E-05
9.500	5.6773-247	1.1797E+01	3.2526E-05
9.800	8.6434-255	1.1797E+01	2.6131E-05
10.100	1.3159-262	1.1797E+01	2.0993E-05
10.400	2.0034-270	1.1797E+01	1.6866E-05
24.000	0.0000E+00	1.1797E+01	8.2556E-10
96.000	0.0000E+00	1.1797E+01	1.2525E-32
720.000	0.0000E+00	1.1797E+01	2.1550-230

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Cumulative Dose Summary

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Time (hr)	EAB - Site Boundary		LPZ - Low Population		Control Room	
	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.017	2.9458E-01	1.6733E-02	6.9350E-02	3.9391E-03	1.9447E-02	6.8108E-04
0.417	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	2.1680E+00	7.5824E-02
0.717	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	3.5371E+00	1.2361E-01
1.017	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	4.6348E+00	1.6187E-01
1.317	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	5.5147E+00	1.9251E-01
1.617	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	6.2201E+00	2.1705E-01
1.917	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	6.7857E+00	2.3670E-01
2.000	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	6.9218E+00	2.4143E-01
2.300	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	7.3483E+00	2.5624E-01
2.600	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	7.6902E+00	2.6811E-01
2.900	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	7.9644E+00	2.7762E-01
3.200	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.1842E+00	2.8524E-01
3.500	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.3605E+00	2.9135E-01
3.800	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.5019E+00	2.9624E-01
4.100	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.6152E+00	3.0017E-01
4.400	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.7061E+00	3.0331E-01
4.700	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.7790E+00	3.0584E-01
5.000	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.8375E+00	3.0786E-01
5.300	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.8844E+00	3.0948E-01
5.600	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.9220E+00	3.1078E-01
5.900	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.9521E+00	3.1182E-01
6.200	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.9763E+00	3.1266E-01
6.500	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	8.9957E+00	3.1333E-01
6.800	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0112E+00	3.1386E-01
7.100	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0237E+00	3.1430E-01
7.400	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0337E+00	3.1464E-01
7.700	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0418E+00	3.1492E-01
8.000	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0482E+00	3.1514E-01
8.300	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0534E+00	3.1532E-01
8.600	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0575E+00	3.1546E-01
8.900	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0608E+00	3.1558E-01
9.200	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0635E+00	3.1567E-01
9.500	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0656E+00	3.1574E-01
9.800	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0674E+00	3.1580E-01
10.100	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0687E+00	3.1585E-01
10.400	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0698E+00	3.1589E-01
24.000	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0743E+00	3.1604E-01
96.000	8.0072E-01	4.5439E-02	1.8850E-01	1.0697E-02	9.0743E+00	3.1604E-01

720.000 8.0072E-01 4.5439E-02 1.8850E-01 1.0697E-02 9.0743E+00 3.1604E-01

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Worst Two-Hour Doses

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EAB - Site Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	1.8504E-02	8.0072E-01	4.5439E-02

**ATTACHMENT E – REACTOR COOLANT BLEED DEGASIFIER NOBLE GAS
DECONTAMINATION FACTOR INFORMATION**

Tap 21

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AMERICAN WATER SOFTENER

REX CHAINBELTING

CONSHOHOCKEN, PENNSYLVANIA 19428
Phone • 215-828-5911
November 16, 1971

Baltimore Gas & Electric Company
P. O. Box 1472
Engineering Department
Baltimore, Maryland 21203

Attention: Sherwood Zimmermann

Subject: Baltimore Gas & Electric Company
Calvert Cliffs Nuclear Power Plant
Units #1 and #2
Reactor Coolant Bleed Degasifiers
Baltimore Gas & Electric Order No. 31923
Bechtel Job No. 6750
Bechtel File No. 750-M-211
Our Job HZ-3330

*Vacuum will
be used for
water
pressure*

Gentlemen:

This will serve to confirm our telephone conversation in which our review of the design of the Reactor Coolant Bleed Degasifiers furnished on Baltimore Gas & Electric Company Order No. 31923-D (our HZ-3330) indicates that the planned operation will provide a Decontamination Factor in excess of 10^5 (reduction of inlet concentration) as concerns the Noble Gases - Xenon-131M, Xenon-133, and Krypton.

The calculations are based on the following:

- A. Inlet Coolant Bleed
 - 1. Temperature 120°F
 - 2. Flow Rate 120 GPM (60,000 #/Hr.)
- B. Use of either a vacuum pump to withdraw the gases removed (hydrogen, xenon and krypton) plus water vapor, or, alternatively, the use of nitrogen as a "scrubbing" gas.
- C. Concentration of gases in solution in the Coolant Bleed:
 - 1. Hydrogen - not more than 50 cc/Kg.

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AMERICAN WATER SOFTENER

Section REX CHAINBELT INC.



CONSHOHOCKEN, PENNSYLVANIA 19428
Phone • 215-828-5911

November 16, 1971
Page 2

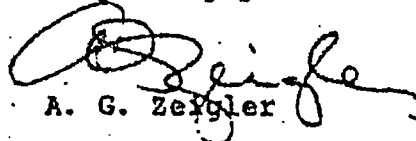
2. Noble Gases (each) 2×10^{-6} gram-mols/240 gallons
of coolant

For this particular unit, the height of a transfer unit has been calculated according to formulae (7) and (8) page 66 of the Proceedings of the American Institute of Chemical Engineers, Performance of Packed Towers - Liquid Film Data for Several Packings by T. K. Sherwood and F. A. L. Holloway, presented at the Providence, Rhode Island, Meeting, November 15-17, 1939 and corroborated by data in Absorption and Extraction, T. K. Sherwood and Robert L. Pigford, McGraw-Hill Book Company, Inc.

Conventional design and performance calculations for desorption of these gases in the stripping columns furnished confirm the desired performance for reduction of the concentration of dissolved gases (xenon and krypton) to a value less than 10^{-5} times that present in the inlet coolant bleed stream.

We will be pleased to provide any additional information or data you may desire.

Very truly yours,


A. G. Ziegler

AGZ/hk

original & 2 copies to addressee

cc: Bechtel Associates
P. O. Box 607
Gaithersburg, Md. 20760
Attn. R. C. Williams, Project Engineer,
for Jerry Boldt

cc: Kissick Corporation
Old York Road & Township Line
Jenkintown, Pa. 19046

Massari, John

From: Conatser, Richard L
Sent: Tuesday, August 02, 2005 6:06 AM
To: Bauder, Douglas
Cc: Sanders, Steve R; Tonacci, Mark E; Davis, Jesse J; Mahaffee, Wes; Thomas, Ron; Massari, John
Subject: RE:

Doug,

Doug, let me know when you want to meet. In the meantime, I've provided some info below that you may find worthwhile.

The DF results for 11 degassifier were measured (last year) as 3 and more recently (last month) as 9. This is not really a lot of variance. If the true DF is 9 and we measured the DF 10 times in a row, I would not be surprised to find a range of results from 4 to 25. This is because the DF is expected to vary with the flow rate through the degassifier as well as the pressure in the degassifier. Also, keep in mind that the DF is the product of 2 numbers, so the uncertainties in the measurement are additive (square root of the sum of the squares).

The DF on 21 degassifier was measured as 8 (earlier this year) and 56 (last month). Because 21 degassifier was not worked, it is fair to conclude that 21 Degassifier's performance has been shown to vary from 8 to 56. It is my observation that the DF seems to decrease with increasing flow through the degassifier, so putting both units on 21 degassifier may not achieve any gain with respect to noble gases discharged to the environment. I wonder if that is worth the extra valving etc. required to swap the line ups.

It is certain that the UFSAR specified value of 10,000 is not being achieved. That is the real issue. At this point it seems obvious that the degassifiers can't achieve the UFSAR specified value (10,000). The questions we need to asking are:

1. What safety analyses use a DF of 10,000 in their evaluations, and are there implications? (Chapter 14? And John Massari's current evaluation?)
2. Do we need to revise the UFSAR?

I'm in the drill (EOF) today, but let me know when you'd like to meet.

Richard L. Conatser
 RETS/REMP Program Manager
 Calvert Cliffs Nuclear Power Plant
 Lusby, MD 20657
 Ph: 410-495-2086
 Fax: 410-495-2559

From: Bauder, Douglas
Sent: Friday, July 29, 2005 10:21 AM
To: Sanders, Steve R; Conatser, Richard L
Subject: RE:

I'm having trouble understanding the DF results. Looks like a wide variance in data. I would like to discuss the test conditions and variables.

Thanks
 Doug

From: Sanders, Steve R
Sent: Friday, July 29, 2005 3:52 AM
To: Conatser, Richard L
Cc: Bauder, Douglas
Subject: FW:

Richard, sounds like #21 performance is superior to # 11 assuming the test was valid. At this stage in core life for both

units could we operate with only #21 degasifier and also preferentially use #21 degasifier for the shutdown of unit 1 in Feb, aligning #11 to unit 2 during that period?

-----Original Message-----

From: Hargus, William S
Sent: Thursday, July 28, 2005 3:44 PM
To: Carnes, James E; Sams, David W; King, Keith; Sloan, Dan; Beavers, Pete; Holland, Bobby; Brevig, Chris; Hoefen, Bret
Cc: Pilkerton, Tom; Dionne, Jeffrey A; Midget, Scott S; Conatser, Richard L; York, Jeffrey A; Sanders, Steve R
Subject:

Teammates,

I just received word from Chemistry on the testing performed on 11 and 21 degasifiers.

The Decontamination Factor (DF) has been measured for both degasifiers twice. No maintenance was performed on 21 degasifier between the two measurements. 11, as you know, was opened for inspection. During the inspection, the packing, packing support plate and general condition of the degasifier were found to be in excellent condition. The nozzles were replaced to allow closer inspection. There was no clogging or degradation of the nozzles. The only difference noted was the size of the outlet. The original nozzle had a discharge opening of 11/16". The replacement nozzles had an outlet of approximately 1/2". The only questionable finding in the degasifier was the amount of packing in the tank. The packing was piled up so high that there was only about 12" between the top of the packing and the discharge of the nozzles. Scott Midgett has contacted the manufacturer to determine if there is any minimum distance required.

The DF test results were:

	11 degasifier	21 degasifier
First test	3	8
2nd test	9	56

As you can see we gain more improvement if we don't perform any maintenance on the equipment.

I have asked Scott and Richard Conatser to look at how the rest of the industry measures their DF to ensure we are using an appropriate method. Scott will also ask the manufacturer for potential causes of the poor performance.

If you have any questions, please give me a call.

Thanks for all of your work to make the inspection such a success. It was a complicated evolution, but the only way we could find out if there was an issue in the tank was to open it up. The work was well thought out and I think it was performed VERY well. The team work and positive attitude demonstrated during this job are a direct cause for its successful performance. We didn't discover the cause for the poor performance of the degasifiers, but we did determine what can be eliminated as a potential cause. A lot of unknowns have been answered. This will go a long way to determining the cause of the poor performance.

Thanks again,

Scott

ATTACHMENT F – RADTRAD NUCLEAR INVENTORY FILE WASTEPROC-NG17.NIF

Nuclide Inventory Name:
CCNPP Waste Processing Incident
Power Level:
2.754E+03
Nuclides:
15
Nuclide 001:
Kr-85
1
0.3382974720E+09
0.8500E+02
4.12E+03
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 002:
Kr-85m
1
0.1612800000E+05
0.8500E+02
2.16E+02
Kr-85 0.2100E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 003:
Kr-87
1
0.4578000000E+04
0.8700E+02
1.25E+02
Rb-87 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 004:
Kr-88
1
0.1022400000E+05
0.8800E+02
3.89E+02
Rb-88 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 005:
I-131
2
0.6946560000E+06
0.1310E+03
1.18E+01
Xe-131m 0.1100E-01
none 0.0000E+00
none 0.0000E+00
Nuclide 006:
I-132
2
0.8280000000E+04
0.1320E+03
3.69E+00
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 007:
I-133
2
0.7488000000E+05

0.1330E+03
1.56E+01
Xe-133m 0.2900E-01
Xe-133 0.9700E+00
none 0.0000E+00
Nuclide 008:
I-134
2
0.3156000000E+04
0.1340E+03
2.09E+00
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 009:
I-135
2
0.2379600000E+05
0.1350E+03
8.51E+00
Xe-135m 0.1500E+00
Xe-135 0.8500E+00
none 0.0000E+00
Nuclide 010:
Xe-133
1
0.4531680000E+06
0.1330E+03
4.25E+04
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 011:
Xe-135
1
0.3272400000E+05
0.1350E+03
1.02E+03
Cs-135 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 012:
Xe-133m
1
0.1892200000E+06
0.1330E+03
6.06E+02
Xe-133 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 013:
Xe-135m
1
0.9180000000E+03
0.1350E+03
1.33E+02
Xe-135 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 014:
Xe-138
1
0.8460000000E+03
0.1380E+03

7.01E+01
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 015:
H-3
1
3.8663136E+08
3.01605
6.72E+02
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
End of Nuclear Inventory File

ATTACHMENT G – RADTRAD OUTPUT FILE WASTEPROC-NG17.O0

```
#####
RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:52:40
#####
```

```
#####
File information
#####
```

```
Plant file           = D:\RADTRAD\Defaults\WasteProc-NG17.psf
Inventory file       = D:\RADTRAD\Defaults\wasteproc-ng17.nif
Release file        = d:\radtrad\defaults\wasteproc.rft
Dose Conversion file = d:\radtrad\defaults\wasteproc15.inp
```

```
#####      #####      #####      # #      # #####      # #      #####
# #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      #
#####      #####      #####      # #      # #      #####      # #      #
# #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      #
```

Radtrad 3.03 4/15/2001

Nuclide Inventory File:

D:\RADTRAD\Defaults\wasteproc-ng17.nif

Plant Power Level:

2.7540E+03

Compartments:

3

Compartment 1:

Waste Processing System

3

5.0140E+04

0

0

0

0

0

Compartment 2:

Environment

2

0.0000E+00

0

0

0

0

0

Compartment 3:

Control Room

1

2.8919E+05

0

0

0

0

0

Pathways:

3

Pathway 1:
Waste Processing System to Environment

1
2
1

Pathway 2:
Environment to Control Room

2
3
2

Pathway 3:
Control Room to Environment

3
2
2

End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:

1
1 1.0000E+00
d:\radtrad\defaults\wasteproc15.inp
d:\radtrad\defaults\wasteproc.rft
0.0000E+00
1
9.5000E-01 4.8500E-02 1.5000E-03 1.0000E+00

Overlying Pool:

0
0.0000E+00
0
0
0
0

Compartments:

3
Compartment 1:

1
1
0
0
0
0
0
0
0
0

Compartment 2:

1
1
0
0
0
0
0
0
0
0

Compartment 3:

1
1
0
0
0
0


```

0
0
0
Pathways:
3
Pathway 1:
0
0
1
1
0.0000E+00    1.0000E+00    5.0138E+04
1
1
0.0000E+00    1.0000E+00    5.0138E+04
1
1
0.0000E+00    1.0000E+00    5.0138E+04
0
0
0
0
0
0
0
0
0
0
Pathway 2:
0
0
0
0
0
1
1
0.0000E+00    3.5000E+03    0.0000E+00    0.0000E+00    0.0000E+00
0
0
0
0
0
0
0
0
Pathway 3:
0
0
0
0
0
1
1
0.0000E+00    3.5000E+03    1.0000E+02    1.0000E+02    1.0000E+02
0
0
0
0
0
0
0
Dose Locations:
3
Location 1:
EAB - Site Boundary
2
1
2
0.0000E+00    1.4400E-04
2.0000E+00    0.0000E+00
1

```

4
 0.0000E+00 3.5000E-04
 8.0000E+00 1.8000E-04
 2.4000E+01 2.3000E-04
 7.2000E+02 0.0000E+00
 0

Location 2:

LPZ - Low Population Zone

2
 1
 4
 0.0000E+00 3.3900E-05
 2.0000E+00 2.2000E-06
 2.4000E+01 5.4000E-07
 7.2000E+02 0.0000E+00
 1
 4
 0.0000E+00 3.5000E-04
 8.0000E+00 1.8000E-04
 2.4000E+01 2.3000E-04
 7.2000E+02 0.0000E+00
 0

Location 3:

Control Room

3
 0
 1
 2
 0.0000E+00 3.5000E-04
 7.2000E+02 0.0000E+00
 1
 4
 0.0000E+00 1.0000E+00
 2.4000E+01 6.0000E-01
 9.6000E+01 4.0000E-01
 7.2000E+02 0.0000E+00

Effective Volume Location:

1
 6
 0.0000E+00 1.6800E-03
 2.0000E+00 1.3400E-03
 8.0000E+00 5.1400E-04
 2.4000E+01 3.8400E-04
 9.6000E+01 3.1200E-04
 7.2000E+02 0.0000E+00

Simulation Parameters:

0

Output Filename:

D:\RADTRAD\Defaults\WasteProc-NG17.00

1

1

1

0

0

End of Scenario File

```
#####  
RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:52:40  
#####
```

```
#####  
Plant Description  
#####
```

Number of Nuclides = 15

Inventory Power = 2.7540E+03 MWth
Plant Power Level = 2.7540E+03 MWth

Number of compartments = 3

Compartment information

Compartment number 1 (Source term fraction = 1.0000E+00
)

Name: Waste Processing System

Compartment volume = 5.0140E+04 (Cubic feet)

Compartment type is Normal

Pathways into and out of compartment 1

Exit Pathway Number 1: Waste Processing System to Environment

Compartment number 2

Name: Environment

Compartment type is Environment

Pathways into and out of compartment 2

Inlet Pathway Number 1: Waste Processing System to Environment

Inlet Pathway Number 3: Control Room to Environment

Exit Pathway Number 2: Environment to Control Room

Compartment number 3

Name: Control Room

Compartment volume = 2.8919E+05 (Cubic feet)

Compartment type is Control Room

Pathways into and out of compartment 3

Inlet Pathway Number 2: Environment to Control Room

Exit Pathway Number 3: Control Room to Environment

Total number of pathways = 3

 RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:52:40
 #####

 Scenario Description
 #####

Radioactive Decay is enabled
 Calculation of Daughters is enabled

Release Fractions and Timings

	GAP	EARLY IN-VESSEL	LATE RELEASE	RELEASE MASS
	0.016666 hr	0.0000 hrs	0.0000 hrs	(gm)
NOBLES	1.0000E+00	0.0000E+00	0.0000E+00	1.080E+01
IODINE	1.0000E+00	0.0000E+00	0.0000E+00	1.118E-04
CESIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
TELLURIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
STRONTIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
BARIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
RUTHENIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
CERIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
LANTHANUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00

Inventory Power = 1. MWt

Nuclide Name	Group	Specific Inventory (Ci/MWt)	half life (s)	Whole Body DCF (Sv-m3/Bq-s)	Inhaled Thyroid (Sv/Bq)	Inhaled Effective (Sv/Bq)
Kr-85	1	4.120E+03	3.383E+08	1.190E-16	0.000E+00	0.000E+00
Kr-85m	1	2.160E+02	1.613E+04	7.480E-15	0.000E+00	0.000E+00
Kr-87	1	1.250E+02	4.578E+03	4.120E-14	0.000E+00	0.000E+00
Kr-88	1	3.890E+02	1.022E+04	1.020E-13	0.000E+00	0.000E+00
I-131	2	1.180E+01	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	3.690E+00	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	1.560E+01	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	2.090E+00	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	8.510E+00	2.380E+04	8.294E-14	8.460E-09	3.320E-10
Xe-133	1	4.250E+04	4.532E+05	1.560E-15	0.000E+00	0.000E+00
Xe-135	1	1.020E+03	3.272E+04	1.190E-14	0.000E+00	0.000E+00
Xe-133m	1	6.060E+02	1.892E+05	1.370E-15	0.000E+00	0.000E+00
Xe-135m	1	1.330E+02	9.180E+02	2.040E-14	0.000E+00	0.000E+00
Xe-138	1	7.010E+01	8.460E+02	5.770E-14	0.000E+00	0.000E+00
H-3	1	6.720E+02	3.866E+08	3.310E-19	1.730E-11	1.730E-11

Nuclide	Daughter	Fraction	Daughter	Fraction	Daughter	Fraction
Kr-85m	Kr-85	0.21	none	0.00	none	0.00
Kr-87	Rb-87	1.00	none	0.00	none	0.00
Kr-88	Rb-88	1.00	none	0.00	none	0.00
I-131	Xe-131m	0.01	none	0.00	none	0.00
I-133	Xe-133m	0.03	Xe-133	0.97	none	0.00
I-135	Xe-135m	0.15	Xe-135	0.85	none	0.00
Xe-135	Cs-135	1.00	none	0.00	none	0.00
Xe-133m	Xe-133	1.00	none	0.00	none	0.00
Xe-135m	Xe-135	1.00	none	0.00	none	0.00

Iodine fractions

Aerosol = 9.5000E-01
 Elemental = 4.8500E-02
 Organic = 1.5000E-03

COMPARTMENT DATA

Compartment number 1: Waste Processing System

Compartment number 2: Environment

Compartment number 3: Control Room

PATHWAY DATA

Pathway number 1: Waste Processing System to Environment

Piping: Removal Data

Time (hr)	Flow Rate (cfm)	Aerosol	DF Elemental	Organic
0.0000E+00	5.0138E+04	1.0000E+00	1.0000E+00	1.0000E+00

Pathway number 2: Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.5000E+03	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Control Room to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.5000E+03	1.0000E+02	1.0000E+02	1.0000E+02

LOCATION DATA

Location EAB - Site Boundary is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m ⁻³)
0.0000E+00	1.4400E-04
2.0000E+00	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m ³ * sec ⁻¹)
0.0000E+00	3.5000E-04
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location LPZ - Low Population Zone is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m ⁻³)
0.0000E+00	3.3900E-05
2.0000E+00	2.2000E-06
2.4000E+01	5.4000E-07
7.2000E+02	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m ³ * sec ⁻¹)
0.0000E+00	3.5000E-04
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location Control Room is in compartment 3

Location X/Q Data

Time (hr)	X/Q (s * m ⁻³)
0.0000E+00	1.6800E-03
2.0000E+00	1.3400E-03
8.0000E+00	5.1400E-04
2.4000E+01	3.8400E-04
9.6000E+01	3.1200E-04
7.2000E+02	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m ³ * sec ⁻¹)
0.0000E+00	3.5000E-04
7.2000E+02	0.0000E+00

Location Occupancy Factor Data

Time (hr)	Occupancy Factor
0.0000E+00	1.0000E+00
2.4000E+01	6.0000E-01
9.6000E+01	4.0000E-01
7.2000E+02	0.0000E+00

```
#####
RADTRAD Version 3.03 (Spring 2001) run on  9/28/2005  at 16:52:40
#####
```

```

#####
#   #   #   #   #   #   #   #   #   #
#   #   #   #   #   #   #   #   #
#   #   #   #   #   #   #   #   #
#   #   #   #   #   #   #   #   #
#   #   #   #   #   #   #   #   #
#####
```

```
#####
Dose, Detailed model and Detailed Inventory Output
#####
```

EAB - Site Boundary Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)		2.6457E-02	2.9458E-01	3.6366E-02
Accumulated dose (rem)		2.6457E-02	2.9458E-01	3.6366E-02

LPZ - Low Population Zone Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)		6.2284E-03	6.9350E-02	8.5612E-03
Accumulated dose (rem)		6.2284E-03	6.9350E-02	8.5612E-03

Control Room Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)		1.0441E-04	1.9447E-02	7.5857E-04
Accumulated dose (rem)		1.0441E-04	1.9447E-02	7.5857E-04

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	0.0167	Ci	kg	Atoms	Decay
Kr-85		2.6044E+03	6.6383E-03	4.7031E+22	5.4258E+15
Kr-85m		1.3619E+02	1.6549E-08	1.1725E+17	2.8407E+14
Kr-87		7.8303E+01	2.7644E-09	1.9135E+16	1.6383E+14
Kr-88		2.4490E+02	1.9531E-08	1.3366E+17	5.1119E+14
I-131		7.4588E+00	6.0164E-08	2.7658E+17	1.5539E+13
I-132		2.3209E+00	2.2485E-10	1.0258E+15	4.8466E+12
I-133		9.8559E+00	8.7004E-09	3.9395E+16	2.0538E+13
I-134		1.3039E+00	4.8877E-11	2.1966E+14	2.7332E+12
I-135		5.3701E+00	1.5291E-09	6.8213E+15	1.1197E+13
Xe-133		2.6864E+04	1.4352E-04	6.4983E+20	5.5967E+16
Xe-135		6.4408E+02	2.5221E-07	1.1251E+18	1.3424E+15
Xe-133m		3.8299E+02	8.5435E-07	3.8684E+18	7.9797E+14
Xe-135m		8.0388E+01	8.8306E-10	3.9392E+15	1.7101E+14
Xe-138		4.2187E+01	4.3657E-10	1.9052E+15	8.9949E+13
H-3		4.2480E+02	4.3908E-05	8.7671E+21	8.8498E+14

Waste Processing System Transport Group Inventory:

Time (h) =	0.0167	Atmosphere	Sump
Noble gases (atoms)		5.6453E+22	0.0000E+00
Elemental I (atoms)		1.5716E+16	0.0000E+00
Organic I (atoms)		4.8606E+14	0.0000E+00

Aerosols (kg)	6.7134E-08	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			6.5290E-09
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			7.4982E-09
Total I (Ci)			2.6310E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	0.0167	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00		3.3468E+22
Elemental I (atoms)	0.0000E+00		9.3186E+15
Organic I (atoms)	0.0000E+00		2.8821E+14
Aerosols (kg)	0.0000E+00		3.9807E-08

Environment Integral Nuclide Release:

Time (h) =	0.0167	Ci	kg	Atoms	Bq
Kr-85		1.5156E+03	3.8630E-03	2.7369E+22	5.6076E+13
Kr-85m		7.9254E+01	9.6304E-09	6.8230E+16	2.9324E+12
Kr-87		4.5569E+01	1.6087E-09	1.1136E+16	1.6860E+12
Kr-88		1.4252E+02	1.1366E-08	7.7780E+16	5.2732E+12
I-131		4.3405E+00	3.5011E-08	1.6095E+17	1.6060E+11
I-132		1.3506E+00	1.3085E-10	5.9696E+14	4.9973E+10
I-133		5.7354E+00	5.0630E-09	2.2925E+16	2.1221E+11
I-134		7.5882E-01	2.8445E-11	1.2783E+14	2.8076E+10
I-135		3.1250E+00	8.8985E-10	3.9695E+15	1.1563E+11
Xe-133		1.5633E+04	8.3515E-05	3.7815E+20	5.7841E+14
Xe-135		3.7481E+02	1.4677E-07	6.5471E+17	1.3868E+13
Xe-133m		2.2287E+02	4.9717E-07	2.2511E+18	8.2463E+12
Xe-135m		4.6791E+01	5.1401E-10	2.2929E+15	1.7313E+12
Xe-138		2.4557E+01	2.5412E-10	1.1090E+15	9.0860E+11
H-3		2.4720E+02	2.5551E-05	5.1018E+21	9.1464E+12

Environment Transport Group Inventory:

	Total	Release
Time (h) =	0.0167	Rate/s
Noble gases (atoms)	3.2852E+22	5.4755E+20
Elemental I (atoms)	9.1455E+15	1.5243E+14
Organic I (atoms)	2.8285E+14	4.7143E+12
Aerosols (kg)	3.9067E-08	6.5114E-10
Dose Effective (Ci) I-131 (Thyroid)		5.3944E+00
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		6.1952E+00
Total I (Ci)		1.5310E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	0.0167	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00		3.3468E+22
Elemental I (atoms)	0.0000E+00		9.3186E+15
Organic I (atoms)	0.0000E+00		2.8821E+14
Aerosols (kg)	0.0000E+00		3.9807E-08

Environment to Control Room Transport Group Inventory:

	Pathway
Time (h) =	Filtered
Noble gases (atoms)	0.0000E+00
Elemental I (atoms)	0.0000E+00
Organic I (atoms)	0.0000E+00
Aerosols (kg)	0.0000E+00

Control Room to Environment Transport Group Inventory:

Pathway

Time (h) =	0.0167	Filtered	Transported
Noble gases (atoms)	3.7403E+17	0.0000E+00	
Elemental I (atoms)	1.0414E+11	0.0000E+00	
Organic I (atoms)	3.2209E+09	0.0000E+00	
Aerosols (kg)	4.4487E-13	0.0000E+00	

Control Room Compartment Nuclide Inventory:

Time (h) =	0.0167	Ci	kg	Atoms	Decay
Kr-85		4.1876E+00	1.0673E-05	7.5620E+19	8.6786E+12
Kr-85m		2.1898E-01	2.6609E-11	1.8852E+14	4.5437E+11
Kr-87		1.2590E-01	4.4448E-12	3.0767E+13	2.6204E+11
Kr-88		3.9378E-01	3.1403E-11	2.1490E+14	8.1764E+11
I-131		1.1993E-02	9.6736E-11	4.4470E+14	2.4855E+10
I-132		3.7317E-03	3.6153E-13	1.6494E+12	7.7520E+09
I-133		1.5847E-02	1.3989E-11	6.3342E+13	3.2851E+10
I-134		2.0965E-03	7.8588E-14	3.5319E+11	4.3717E+09
I-135		8.6345E-03	2.4587E-12	1.0968E+13	1.7909E+10
Xe-133		4.3193E+01	2.3076E-07	1.0448E+18	8.9520E+13
Xe-135		1.0356E+00	4.0552E-10	1.8090E+15	2.1472E+12
Xe-133m		6.1580E-01	1.3737E-09	6.2199E+15	1.2764E+12
Xe-135m		1.2925E-01	1.4198E-12	6.3337E+12	2.7350E+11
Xe-138		6.7832E-02	7.0196E-13	3.0632E+12	1.4386E+11
H-3		6.8302E-01	7.0599E-08	1.4096E+19	1.4155E+12

Control Room Transport Group Inventory:

Time (h) =	0.0167	Atmosphere	Sump
Noble gases (atoms)	9.0770E+19	0.0000E+00	
Elemental I (atoms)	2.5269E+13	0.0000E+00	
Organic I (atoms)	7.8152E+11	0.0000E+00	
Aerosols (kg)	1.0794E-10	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)	1.8201E-12	
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)	2.0903E-12	
Total I (Ci)		4.2303E-02	

Environment to Control Room Transport Group Inventory:

	Pathway
Time (h) =	0.0167
Noble gases (atoms)	0.0000E+00
Elemental I (atoms)	0.0000E+00
Organic I (atoms)	0.0000E+00
Aerosols (kg)	0.0000E+00

Control Room to Environment Transport Group Inventory:

	Pathway
Time (h) =	0.0167
Noble gases (atoms)	0.0000E+00
Elemental I (atoms)	0.0000E+00
Organic I (atoms)	0.0000E+00
Aerosols (kg)	0.0000E+00

EAB - Site Boundary Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.5289E-02	5.0614E-01	6.2314E-02	
Accumulated dose (rem)	7.1746E-02	8.0072E-01	9.8680E-02	

LPZ - Low Population Zone Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0662E-02	1.1915E-01	1.4670E-02	
Accumulated dose (rem)	1.6890E-02	1.8850E-01	2.3231E-02	

Control Room Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		3.3439E-02	6.9024E+00	2.6557E-01
Accumulated dose (rem)		3.3544E-02	6.9218E+00	2.6633E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	2.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) =	2.0000	Atmosphere	Sump
Noble gases (atoms)		1.1820E-29	0.0000E+00
Elemental I (atoms)		3.2261E-36	0.0000E+00
Organic I (atoms)		9.9775E-38	0.0000E+00
Aerosols (kg)		1.3778E-59	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)			1.3386E-60
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			1.5170E-60
Total I (Ci)			4.7204E-51

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	2.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	2.0366E+23
Elemental I (atoms)		0.0000E+00	5.6699E+16
Organic I (atoms)		0.0000E+00	1.7536E+15
Aerosols (kg)		0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) =	2.0000	Ci	kg	Atoms	Bq
Kr-85		4.1200E+03	1.0501E-02	7.4400E+22	1.5244E+14
Kr-85m		2.1335E+02	2.5925E-08	1.8367E+17	7.8939E+12
Kr-87		1.1971E+02	4.2262E-09	2.9253E+16	4.4292E+12
Kr-88		3.8150E+02	3.0425E-08	2.0821E+17	1.4116E+13
I-131		1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132		3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133		1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134		1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135		8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133		4.2482E+04	2.2695E-04	1.0276E+21	1.5718E+15
Xe-135		1.0145E+03	3.9728E-07	1.7722E+18	3.7538E+13
Xe-133m		6.0536E+02	1.3504E-06	6.1145E+18	2.2398E+13
Xe-135m		1.0823E+02	1.1889E-09	5.3034E+15	4.0044E+12
Xe-138		5.5948E+01	5.7898E-10	2.5266E+15	2.0701E+12
H-3		6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

Time (h) =	2.0000	Total Release	Release Rate/s
Noble gases (atoms)		8.9305E+22	1.2403E+19
Elemental I (atoms)		2.4844E+16	3.4506E+12
Organic I (atoms)		7.6838E+14	1.0672E+11
Aerosols (kg)		1.0613E-07	1.4740E-11
Dose Effective (Ci) I-131 (Thyroid)			1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.6821E+01
Total I (Ci)			4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	2.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	2.0366E+23

Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.4783E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	1.9449E+20	0.0000E+00
Elemental I (atoms)	5.3757E+13	0.0000E+00
Organic I (atoms)	1.6626E+12	0.0000E+00
Aerosols (kg)	2.2962E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
Kr-85	2.7248E+00	6.9452E-06	4.9206E+19	1.5611E+15
Kr-85m	1.0484E-01	1.2739E-11	9.0255E+13	7.2856E+13
Kr-87	2.7792E-02	9.8116E-13	6.7916E+12	3.2378E+13
Kr-88	1.5791E-01	1.2593E-11	8.6179E+13	1.2307E+14
I-131	7.7484E-03	6.2500E-11	2.8731E+14	4.4588E+12
I-132	1.3357E-03	1.2940E-13	5.9036E+11	1.1217E+12
I-133	9.6523E-03	8.5206E-12	3.8581E+13	5.7613E+12
I-134	2.8434E-04	1.0659E-14	4.7902E+10	4.6758E+11
I-135	4.5635E-03	1.2995E-12	5.7966E+12	2.9778E+12
Xe-133	2.7805E+01	1.4855E-07	6.7261E+17	1.6036E+16
Xe-135	5.8206E-01	2.2793E-10	1.0167E+15	3.6572E+14
Xe-133m	3.9037E-01	8.7081E-10	3.9429E+15	2.2730E+14
Xe-135m	1.1886E-03	1.3057E-14	5.8244E+10	1.3777E+13
Xe-138	1.2712E-04	1.3155E-15	5.7406E+09	6.6347E+12
H-3	4.4444E-01	4.5938E-08	9.1725E+18	2.5463E+14

Control Room Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump
Noble gases (atoms)	5.9056E+19	0.0000E+00
Elemental I (atoms)	1.6118E+13	0.0000E+00
Organic I (atoms)	4.9850E+11	0.0000E+00
Aerosols (kg)	6.8837E-11	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		1.1595E-12
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.3141E-12
Total I (Ci)		2.3584E-02

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.4783E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported

Noble gases (atoms)	1.9449E+20	0.0000E+00
Elemental I (atoms)	5.3757E+13	0.0000E+00
Organic I (atoms)	1.6626E+12	0.0000E+00
Aerosols (kg)	2.2962E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)		7.1746E-02	8.0072E-01	9.8680E-02

LPZ - Low Population Zone Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		1.1440E-55	1.5854E-54	1.6771E-55
Accumulated dose (rem)		1.6890E-02	1.8850E-01	2.3231E-02

Control Room Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		8.5714E-03	2.1264E+00	8.0074E-02
Accumulated dose (rem)		4.2115E-02	9.0482E+00	3.4640E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	8.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) =	8.0000	Atmosphere	Sump
Noble gases (atoms)		5.4033-186	0.0000E+00
Elemental I (atoms)		1.4027-192	0.0000E+00
Organic I (atoms)		4.3382-194	0.0000E+00
Aerosols (kg)		5.9876-216	0.0000E+00
Dose Effective (Ci/cc)	I-131 (Thyroid)		5.7830-217
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		6.3863-217
Total I (Ci)			1.6604-207

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	8.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	2.0366E+23
Elemental I (atoms)		0.0000E+00	5.6699E+16
Organic I (atoms)		0.0000E+00	1.7536E+15
Aerosols (kg)		0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) =	8.0000	Ci	kg	Atoms	Bq
Kr-85		4.1200E+03	1.0501E-02	7.4400E+22	1.5244E+14
Kr-85m		2.1335E+02	2.5925E-08	1.8367E+17	7.8939E+12
Kr-87		1.1971E+02	4.2262E-09	2.9253E+16	4.4292E+12
Kr-88		3.8150E+02	3.0425E-08	2.0821E+17	1.4116E+13
I-131		1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132		3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133		1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134		1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135		8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133		4.2482E+04	2.2695E-04	1.0276E+21	1.5718E+15
Xe-135		1.0145E+03	3.9728E-07	1.7722E+18	3.7538E+13
Xe-133m		6.0536E+02	1.3504E-06	6.1145E+18	2.2398E+13
Xe-135m		1.0823E+02	1.1889E-09	5.3034E+15	4.0044E+12
Xe-138		5.5948E+01	5.7898E-10	2.5266E+15	2.0701E+12
H-3		6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total Release	Release Rate/s
Time (h) = 8.0000		
Noble gases (atoms)	8.9305E+22	3.1009E+18
Elemental I (atoms)	2.4844E+16	8.6265E+11
Organic I (atoms)	7.6838E+14	2.6680E+10
Aerosols (kg)	1.0613E-07	3.6850E-12
Dose Effective (Ci) I-131 (Thyroid)		1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		1.6821E+01
Total I (Ci)		4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

	Pipe Walls	Transported
Time (h) = 8.0000		
Noble gases (atoms)	0.0000E+00	2.0366E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 8.0000		
Noble gases (atoms)	0.0000E+00	2.4783E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 8.0000		
Noble gases (atoms)	2.5278E+20	0.0000E+00
Elemental I (atoms)	6.9492E+13	0.0000E+00
Organic I (atoms)	2.1492E+12	0.0000E+00
Aerosols (kg)	2.9681E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

	Ci	kg	Atoms	Decay
Time (h) = 8.0000				
Kr-85	3.4922E-02	8.9011E-08	6.3063E+17	2.0368E+15
Kr-85m	5.3104E-04	6.4529E-14	4.5718E+11	8.8061E+13
Kr-87	1.3532E-05	4.7774E-16	3.3069E+09	3.5183E+13
Kr-88	4.6796E-04	3.7320E-14	2.5539E+11	1.4390E+14
I-131	9.7192E-05	7.8397E-13	3.6039E+12	5.8052E+12
I-132	2.8067E-06	2.7191E-16	1.2405E+09	1.2883E+12
I-133	1.0129E-04	8.9416E-14	4.0487E+11	7.3763E+12
I-134	3.1720E-08	1.1891E-18	5.3438E+06	4.9164E+11
I-135	3.1176E-05	8.8775E-15	3.9601E+10	3.6781E+12
Xe-133	3.4495E-01	1.8429E-09	8.3444E+15	2.0857E+16
Xe-135	4.7370E-03	1.8549E-12	8.2745E+12	4.5818E+14
Xe-133m	4.6229E-03	1.0312E-11	4.6694E+13	2.9430E+14
Xe-135m	5.5564E-06	6.1038E-17	2.7228E+08	1.3901E+13
H-3	5.6961E-03	5.8876E-10	1.1756E+17	3.3222E+14

Control Room Transport Group Inventory:

	Atmosphere	Sump
Time (h) = 8.0000		
Noble gases (atoms)	7.5659E+17	0.0000E+00
Elemental I (atoms)	1.9641E+11	0.0000E+00
Organic I (atoms)	6.0745E+09	0.0000E+00
Aerosols (kg)	8.3841E-13	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		1.4040E-14
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.5504E-14

Total I (Ci) 2.3250E-04

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.4783E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	2.5278E+20	0.0000E+00
Elemental I (atoms)	6.9492E+13	0.0000E+00
Organic I (atoms)	2.1492E+12	0.0000E+00
Aerosols (kg)	2.9681E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	7.1746E-02	8.0072E-01	9.8680E-02

LPZ - Low Population Zone Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.8659-212	3.5232-211	5.0517-212
Accumulated dose (rem)	1.6890E-02	1.8850E-01	2.3231E-02

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.6232E-05	2.6146E-02	9.6659E-04
Accumulated dose (rem)	4.2202E-02	9.0743E+00	3.4737E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	0.0000E+00	0.0000E+00	
Elemental I (atoms)	0.0000E+00	0.0000E+00	
Organic I (atoms)	0.0000E+00	0.0000E+00	
Aerosols (kg)	0.0000E+00	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			0.0000E+00
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			0.0000E+00
Total I (Ci)			0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 24.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	2.0366E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) = 24.0000	Ci	kg	Atoms	Bq
Kr-85	4.1200E+03	1.0501E-02	7.4400E+22	1.5244E+14

Kr-85m	2.1335E+02	2.5925E-08	1.8367E+17	7.8939E+12
Kr-87	1.1971E+02	4.2262E-09	2.9253E+16	4.4292E+12
Kr-88	3.8150E+02	3.0425E-08	2.0821E+17	1.4116E+13
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133	4.2482E+04	2.2695E-04	1.0276E+21	1.5718E+15
Xe-135	1.0145E+03	3.9728E-07	1.7722E+18	3.7538E+13
Xe-133m	6.0536E+02	1.3504E-06	6.1145E+18	2.2398E+13
Xe-135m	1.0823E+02	1.1889E-09	5.3034E+15	4.0044E+12
Xe-138	5.5948E+01	5.7898E-10	2.5266E+15	2.0701E+12
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total Release	Release Rate/s	
Time (h) = 24.0000			
Noble gases (atoms)	8.9305E+22	1.0336E+18	
Elemental I (atoms)	2.4844E+16	2.8755E+11	
Organic I (atoms)	7.6838E+14	8.8933E+09	
Aerosols (kg)	1.0613E-07	1.2283E-12	
Dose Effective (Ci) I-131 (Thyroid)			1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.6821E+01
Total I (Ci)			4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 24.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	2.0366E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.4783E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	2.5354E+20	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
Kr-85	3.1415E-07	8.0071E-13	5.6729E+12	2.0429E+15
Kr-85m	4.0189E-10	4.8835E-20	3.4599E+05	8.8138E+13
Kr-88	8.4790E-11	6.7620E-21	4.6275E+04	1.4396E+14
I-131	8.2556E-10	6.6591E-18	3.0612E+07	5.8222E+12
I-133	5.3468E-10	4.7199E-19	2.1372E+06	7.3933E+12
I-135	5.2389E-11	1.4918E-20	6.6546E+04	3.6829E+12
Xe-133	2.8449E-06	1.5199E-14	6.8818E+10	2.0917E+16
Xe-135	1.2665E-08	4.9593E-18	2.2123E+07	4.5893E+14

Xe-133m	3.3683E-08	7.5137E-17	3.4022E+08	2.9509E+14
H-3	5.1240E-08	5.2963E-15	1.0575E+12	3.3322E+14

Control Room Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump
Noble gases (atoms)	6.7996E+12	0.0000E+00
Elemental I (atoms)	1.5916E+06	0.0000E+00
Organic I (atoms)	4.9224E+04	0.0000E+00
Aerosols (kg)	6.7888E-18	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		1.1187E-19
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.1880E-19
Total I (Ci)		1.4128E-09

Environment to Control Room Transport Group Inventory:

	Pathway
Time (h) = 24.0000	Filtered Transported
Noble gases (atoms)	0.0000E+00 2.4783E+20
Elemental I (atoms)	0.0000E+00 6.8996E+13
Organic I (atoms)	0.0000E+00 2.1339E+12
Aerosols (kg)	0.0000E+00 2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway
Time (h) = 24.0000	Filtered Transported
Noble gases (atoms)	2.5354E+20 0.0000E+00
Elemental I (atoms)	6.9686E+13 0.0000E+00
Organic I (atoms)	2.1552E+12 0.0000E+00
Aerosols (kg)	2.9764E-10 0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	7.1746E-02	8.0072E-01	9.8680E-02

LPZ - Low Population Zone Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6890E-02	1.8850E-01	2.3231E-02

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.9274E-10	1.3095E-07	4.8287E-09
Accumulated dose (rem)	4.2202E-02	9.0743E+00	3.4737E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump
Noble gases (atoms)	0.0000E+00	0.0000E+00
Elemental I (atoms)	0.0000E+00	0.0000E+00
Organic I (atoms)	0.0000E+00	0.0000E+00
Aerosols (kg)	0.0000E+00	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		0.0000E+00
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		0.0000E+00
Total I (Ci)		0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 96.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	2.0366E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) = 96.0000	Ci	kg	Atoms	Bq
Kr-85	4.1200E+03	1.0501E-02	7.4400E+22	1.5244E+14
Kr-85m	2.1335E+02	2.5925E-08	1.8367E+17	7.8939E+12
Kr-87	1.1971E+02	4.2262E-09	2.9253E+16	4.4292E+12
Kr-88	3.8150E+02	3.0425E-08	2.0821E+17	1.4116E+13
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133	4.2482E+04	2.2695E-04	1.0276E+21	1.5718E+15
Xe-135	1.0145E+03	3.9728E-07	1.7722E+18	3.7538E+13
Xe-133m	6.0536E+02	1.3504E-06	6.1145E+18	2.2398E+13
Xe-135m	1.0823E+02	1.1889E-09	5.3034E+15	4.0044E+12
Xe-138	5.5948E+01	5.7898E-10	2.5266E+15	2.0701E+12
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

Time (h) = 96.0000	Total Release	Release Rate/s
Noble gases (atoms)	8.9305E+22	2.5840E+17
Elemental I (atoms)	2.4844E+16	7.1888E+10
Organic I (atoms)	7.6838E+14	2.2233E+09
Aerosols (kg)	1.0613E-07	3.0708E-13
Dose Effective (Ci) I-131 (Thyroid)		1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		1.6821E+01
Total I (Ci)		4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 96.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	2.0366E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

Time (h) = 96.0000	Pathway	Filtered	Transported
Noble gases (atoms)		0.0000E+00	2.4783E+20
Elemental I (atoms)		0.0000E+00	6.8996E+13
Organic I (atoms)		0.0000E+00	2.1339E+12
Aerosols (kg)		0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

Time (h) = 96.0000	Pathway	Filtered	Transported
Noble gases (atoms)		2.5354E+20	0.0000E+00
Elemental I (atoms)		6.9686E+13	0.0000E+00
Organic I (atoms)		2.1552E+12	0.0000E+00
Aerosols (kg)		2.9764E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
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Control Room Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	1.3310E-10	0.0000E+00	
Elemental I (atoms)	2.2711E-17	0.0000E+00	
Organic I (atoms)	7.0239E-19	0.0000E+00	
Aerosols (kg)	9.6780E-41	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.5489E-42
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.5607E-42
Total I (Ci)			1.3480E-32

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.4783E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	2.5354E+20	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	7.1746E-02	8.0072E-01	9.8680E-02

LPZ - Low Population Zone Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6890E-02	1.8850E-01	2.3231E-02

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.3496E-33	1.2133E-30	4.5844E-32
Accumulated dose (rem)	4.2202E-02	9.0743E+00	3.4737E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	0.0000E+00	0.0000E+00	
Elemental I (atoms)	0.0000E+00	0.0000E+00	
Organic I (atoms)	0.0000E+00	0.0000E+00	
Aerosols (kg)	0.0000E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		0.0000E+00
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		0.0000E+00
Total I (Ci)			0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 720.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	2.0366E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) = 720.0000	Ci	kg	Atoms	Bq
Kr-85	4.1200E+03	1.0501E-02	7.4400E+22	1.5244E+14
Kr-85m	2.1335E+02	2.5925E-08	1.8367E+17	7.8939E+12
Kr-87	1.1971E+02	4.2262E-09	2.9253E+16	4.4292E+12
Kr-88	3.8150E+02	3.0425E-08	2.0821E+17	1.4116E+13
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133	4.2482E+04	2.2695E-04	1.0276E+21	1.5718E+15
Xe-135	1.0145E+03	3.9728E-07	1.7722E+18	3.7538E+13
Xe-133m	6.0536E+02	1.3504E-06	6.1145E+18	2.2398E+13
Xe-135m	1.0823E+02	1.1889E-09	5.3034E+15	4.0044E+12
Xe-138	5.5948E+01	5.7898E-10	2.5266E+15	2.0701E+12
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total	Release	
Time (h) = 720.0000	Release	Rate/s	
Noble gases (atoms)	8.9305E+22	3.4454E+16	
Elemental I (atoms)	2.4844E+16	9.5850E+09	
Organic I (atoms)	7.6838E+14	2.9644E+08	
Aerosols (kg)	1.0613E-07	4.0944E-14	
Dose Effective (Ci) I-131 (Thyroid)			1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.6821E+01
Total I (Ci)			4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 720.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	2.0366E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.4783E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	2.5354E+20	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 720.0000 Ci kg Atoms Decay

Control Room Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	2.1304-207	0.0000E+00	
Elemental I (atoms)	3.8756-215	0.0000E+00	
Organic I (atoms)	1.1986-216	0.0000E+00	
Aerosols (kg)	1.6513-238	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.6316-240
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.6316-240
Total I (Ci)			2.1550-230

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.4783E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	2.5354E+20	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

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I-131 Summary
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Time (hr)	Waste Processing Syst I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
0.000	3.8686E-01	6.4833E-03	1.7989E-05
0.017	7.4588E+00	4.3405E+00	1.1993E-02
0.417	2.8145E-10	1.1797E+01	2.4605E-02
0.717	4.2849E-18	1.1797E+01	1.9767E-02
1.017	6.5235E-26	1.1797E+01	1.5880E-02
1.317	9.9317E-34	1.1797E+01	1.2758E-02
1.617	1.5120E-41	1.1797E+01	1.0249E-02
1.917	2.3020E-49	1.1797E+01	8.2342E-03
2.000	1.5509E-51	1.1797E+01	7.7484E-03
2.300	2.3611E-59	1.1797E+01	6.2249E-03
2.600	3.5947E-67	1.1797E+01	5.0010E-03
2.900	5.4727E-75	1.1797E+01	4.0177E-03
3.200	8.3319E-83	1.1797E+01	3.2277E-03
3.500	1.2685E-90	1.1797E+01	2.5931E-03
3.800	1.9312E-98	1.1797E+01	2.0832E-03
4.100	2.9402-106	1.1797E+01	1.6736E-03
4.400	4.4763-114	1.1797E+01	1.3446E-03
4.700	6.8149-122	1.1797E+01	1.0802E-03
5.000	1.0375-129	1.1797E+01	8.6780E-04
5.300	1.5796-137	1.1797E+01	6.9718E-04
5.600	2.4048-145	1.1797E+01	5.6010E-04
5.900	3.6612-153	1.1797E+01	4.4997E-04
6.200	5.5741-161	1.1797E+01	3.6150E-04

6.500	8.4862-169	1.1797E+01	2.9042E-04
6.800	1.2920-176	1.1797E+01	2.3332E-04
7.100	1.9670-184	1.1797E+01	1.8744E-04
7.400	2.9946-192	1.1797E+01	1.5059E-04
7.700	4.5592-200	1.1797E+01	1.2098E-04
8.000	6.9411-208	1.1797E+01	9.7192E-05
8.300	1.0567-215	1.1797E+01	7.8082E-05
8.600	1.6088-223	1.1797E+01	6.2730E-05
8.900	2.4494-231	1.1797E+01	5.0396E-05
9.200	3.7291-239	1.1797E+01	4.0487E-05
9.500	5.6773-247	1.1797E+01	3.2526E-05
9.800	8.6434-255	1.1797E+01	2.6131E-05
10.100	1.3159-262	1.1797E+01	2.0993E-05
10.400	2.0034-270	1.1797E+01	1.6866E-05
24.000	0.0000E+00	1.1797E+01	8.2556E-10
96.000	0.0000E+00	1.1797E+01	1.2525E-32
720.000	0.0000E+00	1.1797E+01	2.1550-230

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Cumulative Dose Summary

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Time (hr)	EAB - Site Boundary		LPZ - Low Population		Control Room	
	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.017	2.9458E-01	3.6366E-02	6.9350E-02	8.5612E-03	1.9447E-02	7.5857E-04
0.417	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	2.1680E+00	8.4175E-02
0.717	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	3.5371E+00	1.3696E-01
1.017	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	4.6348E+00	1.7909E-01
1.317	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	5.5147E+00	2.1275E-01
1.617	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	6.2201E+00	2.3965E-01
1.917	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	6.7857E+00	2.6116E-01
2.000	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	6.9218E+00	2.6633E-01
2.300	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	7.3483E+00	2.8249E-01
2.600	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	7.6902E+00	2.9543E-01
2.900	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	7.9644E+00	3.0578E-01
3.200	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.1842E+00	3.1406E-01
3.500	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.3605E+00	3.2069E-01
3.800	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.5019E+00	3.2600E-01
4.100	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.6152E+00	3.3025E-01
4.400	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.7061E+00	3.3365E-01
4.700	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.7790E+00	3.3638E-01
5.000	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.8375E+00	3.3856E-01
5.300	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.8844E+00	3.4031E-01
5.600	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.9220E+00	3.4171E-01
5.900	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.9521E+00	3.4283E-01
6.200	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.9763E+00	3.4373E-01
6.500	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	8.9957E+00	3.4445E-01
6.800	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0112E+00	3.4503E-01
7.100	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0237E+00	3.4549E-01
7.400	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0337E+00	3.4587E-01
7.700	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0418E+00	3.4616E-01
8.000	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0482E+00	3.4640E-01
8.300	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0534E+00	3.4659E-01
8.600	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0575E+00	3.4675E-01
8.900	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0608E+00	3.4687E-01
9.200	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0635E+00	3.4697E-01
9.500	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0656E+00	3.4705E-01
9.800	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0674E+00	3.4711E-01
10.100	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0687E+00	3.4716E-01
10.400	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0698E+00	3.4720E-01
24.000	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0743E+00	3.4737E-01
96.000	8.0072E-01	9.8680E-02	1.8850E-01	2.3231E-02	9.0743E+00	3.4737E-01

720.000 8.0072E-01 9.8680E-02 1.8850E-01 2.3231E-02 9.0743E+00 3.4737E-01

#####

Worst Two-Hour Doses

#####

EAB - Site Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	7.1746E-02	8.0072E-01	9.8680E-02

ATTACHMENT H – RADTRAD NUCLEAR INVENTORY FILE WASTEPROC-NG3.NIF

Nuclide Inventory Name:
CCNPP Waste Processing Incident
Power Level:
2.754E+03
Nuclides:
15
Nuclide 001:
Kr-85
1
0.3382974720E+09
0.8500E+02
1.86E+04
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 002:
Kr-85m
1
0.1612800000E+05
0.8500E+02
9.78E+02
Kr-85 0.2100E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 003:
Kr-87
1
0.4578000000E+04
0.8700E+02
5.65E+02
Rb-87 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 004:
Kr-88
1
0.1022400000E+05
0.8800E+02
1.76E+03
Rb-88 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 005:
I-131
2
0.6946560000E+06
0.1310E+03
1.18E+01
Xe-131m 0.1100E-01
none 0.0000E+00
none 0.0000E+00
Nuclide 006:
I-132
2
0.8280000000E+04
0.1320E+03
3.69E+00
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 007:
I-133
2
0.7488000000E+05

0.1330E+03
1.56E+01
Xe-133m 0.2900E-01
Xe-133 0.9700E+00
none 0.0000E+00
Nuclide 008:
I-134
2
0.3156000000E+04
0.1340E+03
2.09E+00
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 009:
I-135
2
0.2379600000E+05
0.1350E+03
8.51E+00
Xe-135m 0.1500E+00
Xe-135 0.8500E+00
none 0.0000E+00
Nuclide 010:
Xe-133
1
0.4531680000E+06
0.1330E+03
1.92E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 011:
Xe-135
1
0.3272400000E+05
0.1350E+03
4.60E+03
Cs-135 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 012:
Xe-133m
1
0.1892200000E+06
0.1330E+03
2.74E+03
Xe-133 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 013:
Xe-135m
1
0.9180000000E+03
0.1350E+03
6.01E+02
Xe-135 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 014:
Xe-138
1
0.8460000000E+03
0.1380E+03

3.17E+02
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 015:
H-3
1
3.8663136E+08
3.01605
6.72E+02
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
End of Nuclear Inventory File

ATTACHMENT I – RADTRAD OUTPUT FILE WASTEPROC-NG3.O0

```
#####
RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:37:04
#####
```

```
#####
File information
#####
```

```
Plant file          = D:\RADTRAD\Defaults\WasteProc-NG3.psf
Inventory file      = d:\radtrad\defaults\wasteproc-ng3.nif
Release file       = d:\radtrad\defaults\wasteproc.rft
Dose Conversion file = d:\radtrad\defaults\wasteproc15.inp
```

```
#####      #####      #####      # #      # #####      # #      #####
# #      # #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      # #      #
#####      #####      #####      # #      # #      #####      # #      #
# #      # #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      # #      #
# #      # #      # #      # #      # #      # #      # #      #
```

Radtrad 3.03 4/15/2001

Nuclide Inventory File:

d:\radtrad\defaults\wasteproc-ng3.nif

Plant Power Level:

2.7540E+03

Compartments:

3

Compartment 1:

Waste Processing System

3

5.0140E+04

0

0

0

0

0

Compartment 2:

Environment

2

0.0000E+00

0

0

0

0

0

Compartment 3:

Control Room

1

2.8919E+05

0

0

0

0

0

Pathways:

```

3
Pathway 1:
Waste Processing System to Environment
1
2
1
Pathway 2:
Environment to Control Room
2
3
2
Pathway 3:
Control Room to Environment
3
2
2
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
1
1 1.0000E+00
d:\radtrad\defaults\wasteproc15.inp
d:\radtrad\defaults\wasteproc.rft
0.0000E+00
1
9.5000E-01 4.8500E-02 1.5000E-03 1.0000E+00
Overlying Pool:
0
0.0000E+00
0
0
0
0
0
Compartments:
3
Compartment 1:
1
1
0
0
0
0
0
0
0
0
0
Compartment 2:
1
1
0
0
0
0
0
0
0
0
0
Compartment 3:
1
1
0
0
0

```

```

0
0
0
0
Pathways:
3
Pathway 1:
0
0
1
1
0.0000E+00    1.0000E+00    5.0138E+04
1
1
0.0000E+00    1.0000E+00    5.0138E+04
1
1
0.0000E+00    1.0000E+00    5.0138E+04
0
0
0
0
0
0
0
0
0
0
Pathway 2:
0
0
0
0
0
1
1
0.0000E+00    3.5000E+03    0.0000E+00    0.0000E+00    0.0000E+00
0
0
0
0
0
0
0
Pathway 3:
0
0
0
0
0
1
1
0.0000E+00    3.5000E+03    1.0000E+02    1.0000E+02    1.0000E+02
0
0
0
0
0
0
0
Dose Locations:
3
Location 1:
EAB - Site Boundary
2
1
2
0.0000E+00    1.4400E-04
2.0000E+00    0.0000E+00

```

1
 4
 0.0000E+00 3.5000E-04
 8.0000E+00 1.8000E-04
 2.4000E+01 2.3000E-04
 7.2000E+02 0.0000E+00
 0

Location 2:

LPZ - Low Population Zone

2
 1
 4
 0.0000E+00 3.3900E-05
 2.0000E+00 2.2000E-06
 2.4000E+01 5.4000E-07
 7.2000E+02 0.0000E+00
 1
 4
 0.0000E+00 3.5000E-04
 8.0000E+00 1.8000E-04
 2.4000E+01 2.3000E-04
 7.2000E+02 0.0000E+00
 0

Location 3:

Control Room

3
 0
 1
 2
 0.0000E+00 3.5000E-04
 7.2000E+02 0.0000E+00
 1
 4
 0.0000E+00 1.0000E+00
 2.4000E+01 6.0000E-01
 9.6000E+01 4.0000E-01
 7.2000E+02 0.0000E+00

Effective Volume Location:

1
 6
 0.0000E+00 1.6800E-03
 2.0000E+00 1.3400E-03
 8.0000E+00 5.1400E-04
 2.4000E+01 3.8400E-04
 9.6000E+01 3.1200E-04
 7.2000E+02 0.0000E+00

Simulation Parameters:

0

Output Filename:

D:\RADTRAD\Defaults\WasteProc-NG3.o0

1
 1
 1
 0
 0

End of Scenario File

```
#####  
RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:37:04  
#####
```

```
#####  
Plant Description  
#####
```

Number of Nuclides = 15

Inventory Power = 2.7540E+03 MWth
Plant Power Level = 2.7540E+03 MWth

Number of compartments = 3

Compartment information

Compartment number 1 (Source term fraction = 1.0000E+00
)

Name: Waste Processing System

Compartment volume = 5.0140E+04 (Cubic feet)

Compartment type is Normal

Pathways into and out of compartment 1

Exit Pathway Number 1: Waste Processing System to Environment

Compartment number 2

Name: Environment

Compartment type is Environment

Pathways into and out of compartment 2

Inlet Pathway Number 1: Waste Processing System to Environment

Inlet Pathway Number 3: Control Room to Environment

Exit Pathway Number 2: Environment to Control Room

Compartment number 3

Name: Control Room

Compartment volume = 2.8919E+05 (Cubic feet)

Compartment type is Control Room

Pathways into and out of compartment 3

Inlet Pathway Number 2: Environment to Control Room

Exit Pathway Number 3: Control Room to Environment

Total number of pathways = 3

 RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:37:04
 #####

 Scenario Description
 #####

Radioactive Decay is enabled
 Calculation of Daughters is enabled

Release Fractions and Timings

	GAP	EARLY IN-VESSEL	LATE RELEASE	RELEASE MASS
	0.016666 hr	0.0000 hrs	0.0000 hrs	(gm)
NOBLES	1.0000E+00	0.0000E+00	0.0000E+00	4.851E+01
IODINE	1.0000E+00	0.0000E+00	0.0000E+00	1.118E-04
CESIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
TELLURIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
STRONTIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
BARIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
RUTHENIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
CERIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
LANTHANUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00

Inventory Power = 1. MWt

Nuclide Name	Group	Specific Inventory (Ci/MWt)	half life (s)	Whole Body DCF (Sv-m3/Bq-s)	Inhaled Thyroid (Sv/Bq)	Inhaled Effective (Sv/Bq)
Kr-85	1	1.860E+04	3.383E+08	1.190E-16	0.000E+00	0.000E+00
Kr-85m	1	9.780E+02	1.613E+04	7.480E-15	0.000E+00	0.000E+00
Kr-87	1	5.650E+02	4.578E+03	4.120E-14	0.000E+00	0.000E+00
Kr-88	1	1.760E+03	1.022E+04	1.020E-13	0.000E+00	0.000E+00
I-131	2	1.180E+01	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	3.690E+00	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	1.560E+01	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	2.090E+00	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	8.510E+00	2.380E+04	8.294E-14	8.460E-09	3.320E-10
Xe-133	1	1.920E+05	4.532E+05	1.560E-15	0.000E+00	0.000E+00
Xe-135	1	4.600E+03	3.272E+04	1.190E-14	0.000E+00	0.000E+00
Xe-133m	1	2.740E+03	1.892E+05	1.370E-15	0.000E+00	0.000E+00
Xe-135m	1	6.010E+02	9.180E+02	2.040E-14	0.000E+00	0.000E+00
Xe-138	1	3.170E+02	8.460E+02	5.770E-14	0.000E+00	0.000E+00
H-3	1	6.720E+02	3.866E+08	3.310E-19	1.730E-11	1.730E-11

Nuclide	Daughter	Fraction	Daughter	Fraction	Daughter	Fraction
Kr-85m	Kr-85	0.21	none	0.00	none	0.00
Kr-87	Rb-87	1.00	none	0.00	none	0.00
Kr-88	Rb-88	1.00	none	0.00	none	0.00
I-131	Xe-131m	0.01	none	0.00	none	0.00
I-133	Xe-133m	0.03	Xe-133	0.97	none	0.00
I-135	Xe-135m	0.15	Xe-135	0.85	none	0.00
Xe-135	Cs-135	1.00	none	0.00	none	0.00
Xe-133m	Xe-133	1.00	none	0.00	none	0.00
Xe-135m	Xe-135	1.00	none	0.00	none	0.00

Iodine fractions

Aerosol = 9.5000E-01
 Elemental = 4.8500E-02
 Organic = 1.5000E-03

COMPARTMENT DATA

Compartment number 1: Waste Processing System

Compartment number 2: Environment

Compartment number 3: Control Room

PATHWAY DATA

Pathway number 1: Waste Processing System to Environment

Piping: Removal Data

Time (hr)	Flow Rate (cfm)	Aerosol	DF Elemental	Organic
0.0000E+00	5.0138E+04	1.0000E+00	1.0000E+00	1.0000E+00

Pathway number 2: Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.5000E+03	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Control Room to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.5000E+03	1.0000E+02	1.0000E+02	1.0000E+02

LOCATION DATA

Location EAB - Site Boundary is in compartment 2

Location X/Q Data

Time (hr)	X/Q ($s \cdot m^{-3}$)
0.0000E+00	1.4400E-04
2.0000E+00	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate ($m^3 \cdot sec^{-1}$)
0.0000E+00	3.5000E-04
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location LPZ - Low Population Zone is in compartment 2

Location X/Q Data

Time (hr)	X/Q ($s \cdot m^{-3}$)
0.0000E+00	3.3900E-05
2.0000E+00	2.2000E-06
2.4000E+01	5.4000E-07
7.2000E+02	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate ($m^3 \cdot sec^{-1}$)
0.0000E+00	3.5000E-04
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location Control Room is in compartment 3

Location X/Q Data

Time (hr)	X/Q ($s * m^{-3}$)
0.0000E+00	1.6800E-03
2.0000E+00	1.3400E-03
8.0000E+00	5.1400E-04
2.4000E+01	3.8400E-04
9.6000E+01	3.1200E-04
7.2000E+02	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate ($m^3 * sec^{-1}$)
0.0000E+00	3.5000E-04
7.2000E+02	0.0000E+00

Location Occupancy Factor Data

Time (hr)	Occupancy Factor
0.0000E+00	1.0000E+00
2.4000E+01	6.0000E-01
9.6000E+01	4.0000E-01
7.2000E+02	0.0000E+00

```
#####
RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 16:37:04
#####
```

```
#####
# # # ##### # # #####
# # # # # # # # #
# # # # # # # # #
# # # # # # # # #
# # # # # # # # #
#####
```

```
#####
Dose, Detailed model and Detailed Inventory Output
#####
```

EAB - Site Boundary Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)		1.1814E-01	2.9458E-01	1.2805E-01
Accumulated dose (rem)		1.1814E-01	2.9458E-01	1.2805E-01

LPZ - Low Population Zone Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)		2.7813E-02	6.9350E-02	3.0146E-02
Accumulated dose (rem)		2.7813E-02	6.9350E-02	3.0146E-02

Control Room Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)		4.6624E-04	1.9447E-02	1.1204E-03
Accumulated dose (rem)		4.6624E-04	1.9447E-02	1.1204E-03

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	0.0167	Ci	kg	Atoms	Decay
Kr-85		1.1758E+04	2.9969E-02	2.1233E+23	2.4495E+16
Kr-85m		6.1664E+02	7.4930E-08	5.3087E+17	1.2862E+15
Kr-87		3.5393E+02	1.2495E-08	8.6491E+16	7.4050E+14
Kr-88		1.1081E+03	8.8367E-08	6.0472E+17	2.3128E+15
I-131		7.4588E+00	6.0164E-08	2.7658E+17	1.5539E+13
I-132		2.3209E+00	2.2485E-10	1.0258E+15	4.8466E+12
I-133		9.8559E+00	8.7004E-09	3.9395E+16	2.0538E+13
I-134		1.3039E+00	4.8877E-11	2.1966E+14	2.7332E+12
I-135		5.3701E+00	1.5291E-09	6.8213E+15	1.1197E+13
Xe-133		1.2136E+05	6.4836E-04	2.9357E+21	2.5284E+17
Xe-135		2.9046E+03	1.1374E-06	5.0738E+18	6.0539E+15
Xe-133m		1.7317E+03	3.8629E-06	1.7491E+19	3.6080E+15
Xe-135m		3.6313E+02	3.9890E-09	1.7794E+16	7.7275E+14
Xe-138		1.9078E+02	1.9742E-09	8.6153E+15	4.0676E+14
H-3		4.2480E+02	4.3908E-05	8.7671E+21	8.8498E+14

Waste Processing System Transport Group Inventory:

Time (h) =	0.0167	Atmosphere	Sump
Noble gases (atoms)		2.2405E+23	0.0000E+00
Elemental I (atoms)		1.5716E+16	0.0000E+00
Organic I (atoms)		4.8606E+14	0.0000E+00

Aerosols (kg)	6.7134E-08	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			6.5290E-09
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			7.4982E-09
Total I (Ci)			2.6310E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	0.0167	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00		1.3283E+23
Elemental I (atoms)	0.0000E+00		9.3186E+15
Organic I (atoms)	0.0000E+00		2.8821E+14
Aerosols (kg)	0.0000E+00		3.9807E-08

Environment Integral Nuclide Release:

Time (h) =	0.0167	Ci	kg	Atoms	Bq
Kr-85		6.8422E+03	1.7440E-02	1.2356E+23	2.5316E+14
Kr-85m		3.5884E+02	4.3604E-08	3.0893E+17	1.3277E+13
Kr-87		2.0597E+02	7.2715E-09	5.0334E+16	7.6209E+12
Kr-88		6.4482E+02	5.1424E-08	3.5191E+17	2.3858E+13
I-131		4.3405E+00	3.5011E-08	1.6095E+17	1.6060E+11
I-132		1.3506E+00	1.3085E-10	5.9696E+14	4.9973E+10
I-133		5.7354E+00	5.0630E-09	2.2925E+16	2.1221E+11
I-134		7.5882E-01	2.8445E-11	1.2783E+14	2.8076E+10
I-135		3.1250E+00	8.8985E-10	3.9695E+15	1.1563E+11
Xe-133		7.0622E+04	3.7729E-04	1.7084E+21	2.6130E+15
Xe-135		1.6903E+03	6.6189E-07	2.9526E+18	6.2541E+13
Xe-133m		1.0077E+03	2.2479E-06	1.0178E+19	3.7285E+13
Xe-135m		2.1137E+02	2.3219E-09	1.0357E+16	7.8206E+12
Xe-138		1.1105E+02	1.1492E-09	5.0149E+15	4.1088E+12
H-3		2.4720E+02	2.5551E-05	5.1018E+21	9.1464E+12

Environment Transport Group Inventory:

Time (h) =	0.0167	Total Release	Release Rate/s
Noble gases (atoms)		1.3038E+23	2.1731E+21
Elemental I (atoms)		9.1455E+15	1.5243E+14
Organic I (atoms)		2.8285E+14	4.7143E+12
Aerosols (kg)		3.9067E-08	6.5114E-10
Dose Effective (Ci) I-131 (Thyroid)			5.3944E+00
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			6.1952E+00
Total I (Ci)			1.5310E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	0.0167	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00		1.3283E+23
Elemental I (atoms)	0.0000E+00		9.3186E+15
Organic I (atoms)	0.0000E+00		2.8821E+14
Aerosols (kg)	0.0000E+00		3.9807E-08

Environment to Control Room Transport Group Inventory:

Time (h) =	0.0167	Pathway Filtered	Transported
Noble gases (atoms)		0.0000E+00	3.6182E+20
Elemental I (atoms)		0.0000E+00	2.5383E+13
Organic I (atoms)		0.0000E+00	7.8505E+11
Aerosols (kg)		0.0000E+00	1.0843E-10

Control Room to Environment Transport Group Inventory:

Pathway

Time (h) =	0.0167	Filtered	Transported
Noble gases (atoms)	1.4845E+18	0.0000E+00	
Elemental I (atoms)	1.0414E+11	0.0000E+00	
Organic I (atoms)	3.2209E+09	0.0000E+00	
Aerosols (kg)	4.4487E-13	0.0000E+00	

Control Room Compartment Nuclide Inventory:

Time (h) =	0.0167	Ci	kg	Atoms	Decay
Kr-85		1.8905E+01	4.8186E-05	3.4139E+20	3.9180E+13
Kr-85m		9.9148E-01	1.2048E-10	8.5357E+14	2.0573E+12
Kr-87		5.6907E-01	2.0090E-11	1.3907E+14	1.1844E+12
Kr-88		1.7816E+00	1.4208E-10	9.7232E+14	3.6993E+12
I-131		1.1993E-02	9.6736E-11	4.4470E+14	2.4855E+10
I-132		3.7317E-03	3.6153E-13	1.6494E+12	7.7520E+09
I-133		1.5847E-02	1.3989E-11	6.3342E+13	3.2851E+10
I-134		2.0965E-03	7.8588E-14	3.5319E+11	4.3717E+09
I-135		8.6345E-03	2.4587E-12	1.0968E+13	1.7909E+10
Xe-133		1.9513E+02	1.0425E-06	4.7202E+18	4.0442E+14
Xe-135		4.6703E+00	1.8288E-09	8.1580E+15	9.6832E+12
Xe-133m		2.7843E+00	6.2111E-09	2.8123E+16	5.7710E+12
Xe-135m		5.8386E-01	6.4137E-12	2.8611E+13	1.2359E+12
Xe-138		3.0674E-01	3.1743E-12	1.3852E+13	6.5053E+11
H-3		6.8302E-01	7.0599E-08	1.4096E+19	1.4155E+12

Control Room Transport Group Inventory:

Time (h) =	0.0167	Atmosphere	Sump
Noble gases (atoms)	3.6025E+20	0.0000E+00	
Elemental I (atoms)	2.5269E+13	0.0000E+00	
Organic I (atoms)	7.8152E+11	0.0000E+00	
Aerosols (kg)	1.0794E-10	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)	1.8201E-12	
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)	2.0903E-12	
Total I (Ci)		4.2303E-02	

Environment to Control Room Transport Group Inventory:

	Pathway
Time (h) =	0.0167
Noble gases (atoms)	0.0000E+00
Elemental I (atoms)	0.0000E+00
Organic I (atoms)	0.0000E+00
Aerosols (kg)	0.0000E+00

Control Room to Environment Transport Group Inventory:

	Pathway
Time (h) =	0.0167
Noble gases (atoms)	1.4845E+18
Elemental I (atoms)	1.0414E+11
Organic I (atoms)	3.2209E+09
Aerosols (kg)	4.4487E-13

EAB - Site Boundary Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.0223E-01	5.0614E-01	2.1926E-01	
Accumulated dose (rem)	3.2038E-01	8.0072E-01	3.4731E-01	

LPZ - Low Population Zone Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.7609E-02	1.1915E-01	5.1617E-02	
Accumulated dose (rem)	7.5422E-02	1.8850E-01	8.1763E-02	

Control Room Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		1.4933E-01	6.9024E+00	3.8146E-01
Accumulated dose (rem)		1.4979E-01	6.9218E+00	3.8258E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	2.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) =	2.0000	Atmosphere	Sump
Noble gases (atoms)		4.6911E-29	0.0000E+00
Elemental I (atoms)		3.2261E-36	0.0000E+00
Organic I (atoms)		9.9775E-38	0.0000E+00
Aerosols (kg)		1.3778E-59	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)			1.3386E-60
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			1.5170E-60
Total I (Ci)			4.7204E-51

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	2.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	8.0830E+23
Elemental I (atoms)		0.0000E+00	5.6699E+16
Organic I (atoms)		0.0000E+00	1.7536E+15
Aerosols (kg)		0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) =	2.0000	Ci	kg	Atoms	Bq
Kr-85		1.8600E+04	4.7408E-02	3.3588E+23	6.8820E+14
Kr-85m		9.6600E+02	1.1738E-07	8.3163E+17	3.5742E+13
Kr-87		5.4108E+02	1.9102E-08	1.3223E+17	2.0020E+13
Kr-88		1.7261E+03	1.3766E-07	9.4202E+17	6.3865E+13
I-131		1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132		3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133		1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134		1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135		8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133		1.9192E+05	1.0253E-03	4.6425E+21	7.1009E+15
Xe-135		4.5753E+03	1.7916E-06	7.9921E+18	1.6928E+14
Xe-133m		2.7371E+03	6.1057E-06	2.7646E+19	1.0127E+14
Xe-135m		4.8812E+02	5.3620E-09	2.3919E+16	1.8060E+13
Xe-138		2.5300E+02	2.6182E-09	1.1425E+16	9.3611E+12
H-3		6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total	Release
Time (h) =	2.0000	Rate/s
Noble gases (atoms)	3.5443E+23	4.9227E+19
Elemental I (atoms)	2.4844E+16	3.4506E+12
Organic I (atoms)	7.6838E+14	1.0672E+11
Aerosols (kg)	1.0613E-07	1.4740E-11
Dose Effective (Ci) I-131 (Thyroid)		1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		1.6821E+01
Total I (Ci)		4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	2.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	8.0830E+23

Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.8357E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	7.7188E+20	0.0000E+00
Elemental I (atoms)	5.3757E+13	0.0000E+00
Organic I (atoms)	1.6626E+12	0.0000E+00
Aerosols (kg)	2.2962E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
Kr-85	1.2301E+01	3.1355E-05	2.2214E+20	7.0477E+15
Kr-85m	4.7468E-01	5.7680E-11	4.0866E+14	3.2988E+14
Kr-87	1.2562E-01	4.4348E-12	3.0698E+13	1.4635E+14
Kr-88	7.1445E-01	5.6977E-11	3.8991E+14	5.5681E+14
I-131	7.7484E-03	6.2500E-11	2.8731E+14	4.4588E+12
I-132	1.3357E-03	1.2940E-13	5.9036E+11	1.1217E+12
I-133	9.6523E-03	8.5206E-12	3.8581E+13	5.7613E+12
I-134	2.8434E-04	1.0659E-14	4.7902E+10	4.6758E+11
I-135	4.5635E-03	1.2995E-12	5.7966E+12	2.9778E+12
Xe-133	1.2561E+02	6.7108E-07	3.0386E+18	7.2446E+16
Xe-135	2.6225E+00	1.0269E-09	4.5811E+15	1.6488E+15
Xe-133m	1.7650E+00	3.9372E-09	1.7828E+16	1.0277E+15
Xe-135m	2.5365E-03	2.7864E-14	1.2430E+11	6.1152E+13
Xe-138	5.7485E-04	5.9488E-15	2.5960E+10	3.0003E+13
H-3	4.4444E-01	4.5938E-08	9.1725E+18	2.5463E+14

Control Room Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump
Noble gases (atoms)	2.3438E+20	0.0000E+00
Elemental I (atoms)	1.6118E+13	0.0000E+00
Organic I (atoms)	4.9850E+11	0.0000E+00
Aerosols (kg)	6.8837E-11	0.0000E+00
Dose Effective (Ci/cc)	I-131 (Thyroid)	1.1595E-12
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)	1.3141E-12
Total I (Ci)		2.3584E-02

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.8357E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported

Noble gases (atoms)	7.7188E+20	0.0000E+00
Elemental I (atoms)	5.3757E+13	0.0000E+00
Organic I (atoms)	1.6626E+12	0.0000E+00
Aerosols (kg)	2.2962E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)		3.2038E-01	8.0072E-01	3.4731E-01

LPZ - Low Population Zone Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		5.1112E-55	1.5854E-54	5.6443E-55
Accumulated dose (rem)		7.5422E-02	1.8850E-01	8.1763E-02

Control Room Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		3.8309E-02	2.1264E+00	1.0981E-01
Accumulated dose (rem)		1.8810E-01	9.0482E+00	4.9239E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	8.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) =	8.0000	Atmosphere	Sump
Noble gases (atoms)		2.1443-185	0.0000E+00
Elemental I (atoms)		1.4027-192	0.0000E+00
Organic I (atoms)		4.3382-194	0.0000E+00
Aerosols (kg)		5.9876-216	0.0000E+00
Dose Effective (Ci/cc)	I-131 (Thyroid)		5.7830-217
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		6.3863-217
Total I (Ci)			1.6604-207

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	8.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	8.0830E+23
Elemental I (atoms)		0.0000E+00	5.6699E+16
Organic I (atoms)		0.0000E+00	1.7536E+15
Aerosols (kg)		0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) =	8.0000	Ci	kg	Atoms	Bq
Kr-85		1.8600E+04	4.7408E-02	3.3588E+23	6.8820E+14
Kr-85m		9.6600E+02	1.1738E-07	8.3163E+17	3.5742E+13
Kr-87		5.4108E+02	1.9102E-08	1.3223E+17	2.0020E+13
Kr-88		1.7261E+03	1.3766E-07	9.4202E+17	6.3865E+13
I-131		1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132		3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133		1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134		1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135		8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133		1.9192E+05	1.0253E-03	4.6425E+21	7.1009E+15
Xe-135		4.5753E+03	1.7916E-06	7.9921E+18	1.6928E+14
Xe-133m		2.7371E+03	6.1057E-06	2.7646E+19	1.0127E+14
Xe-135m		4.8812E+02	5.3620E-09	2.3919E+16	1.8060E+13
Xe-138		2.5300E+02	2.6182E-09	1.1425E+16	9.3611E+12
H-3		6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total Release	Release Rate/s	
Time (h) = 8.0000			
Noble gases (atoms)	3.5443E+23	1.2307E+19	
Elemental I (atoms)	2.4844E+16	8.6265E+11	
Organic I (atoms)	7.6838E+14	2.6680E+10	
Aerosols (kg)	1.0613E-07	3.6850E-12	
Dose Effective (Ci) I-131 (Thyroid)			1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.6821E+01
Total I (Ci)			4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

	Pipe Walls	Transported
Time (h) = 8.0000		
Noble gases (atoms)	0.0000E+00	8.0830E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 8.0000		
Noble gases (atoms)	0.0000E+00	9.8357E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 8.0000		
Noble gases (atoms)	1.0032E+21	0.0000E+00
Elemental I (atoms)	6.9492E+13	0.0000E+00
Organic I (atoms)	2.1492E+12	0.0000E+00
Aerosols (kg)	2.9681E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 8.0000	Ci	kg	Atoms	Decay
Kr-85	1.5766E-01	4.0185E-07	2.8470E+18	9.1954E+15
Kr-85m	2.4044E-03	2.9217E-13	2.0700E+12	3.9872E+14
Kr-87	6.1166E-05	2.1594E-15	1.4947E+10	1.5903E+14
Kr-88	2.1172E-03	1.6885E-13	1.1555E+12	6.5108E+14
I-131	9.7192E-05	7.8397E-13	3.6039E+12	5.8052E+12
I-132	2.8067E-06	2.7191E-16	1.2405E+09	1.2883E+12
I-133	1.0129E-04	8.9416E-14	4.0487E+11	7.3763E+12
I-134	3.1720E-08	1.1891E-18	5.3438E+06	4.9164E+11
I-135	3.1176E-05	8.8775E-15	3.9601E+10	3.6781E+12
Xe-133	1.5584E+00	8.3254E-09	3.7697E+16	9.4222E+16
Xe-135	2.1288E-02	8.3360E-12	3.7186E+13	2.0652E+15
Xe-133m	2.0901E-02	4.6625E-11	2.1111E+14	1.3306E+15
Xe-135m	5.5564E-06	6.1038E-17	2.7228E+08	6.1326E+13
H-3	5.6961E-03	5.8876E-10	1.1756E+17	3.3222E+14

Control Room Transport Group Inventory:

	Atmosphere	Sump
Time (h) = 8.0000		
Noble gases (atoms)	3.0025E+18	0.0000E+00
Elemental I (atoms)	1.9641E+11	0.0000E+00
Organic I (atoms)	6.0745E+09	0.0000E+00
Aerosols (kg)	8.3841E-13	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		1.4040E-14
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.5504E-14

Total I (Ci) 2.3250E-04

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.8357E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	1.0032E+21	0.0000E+00
Elemental I (atoms)	6.9492E+13	0.0000E+00
Organic I (atoms)	2.1492E+12	0.0000E+00
Aerosols (kg)	2.9681E-10	0.0000E+00

EAB - Site Boundary Doses:

	Whole Body	Thyroid	TEDE
Time (h) = 24.0000			
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.2038E-01	8.0072E-01	3.4731E-01

LPZ - Low Population Zone Doses:

	Whole Body	Thyroid	TEDE
Time (h) = 24.0000			
Delta dose (rem)	1.7300E-21	3.5232E-21	1.8486E-21
Accumulated dose (rem)	7.5422E-02	1.8850E-01	8.1763E-02

Control Room Doses:

	Whole Body	Thyroid	TEDE
Time (h) = 24.0000			
Delta dose (rem)	3.8602E-04	2.6146E-02	1.2664E-03
Accumulated dose (rem)	1.8849E-01	9.0743E+00	4.9365E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	0.0000E+00	0.0000E+00	
Elemental I (atoms)	0.0000E+00	0.0000E+00	
Organic I (atoms)	0.0000E+00	0.0000E+00	
Aerosols (kg)	0.0000E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		0.0000E+00
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		0.0000E+00
Total I (Ci)			0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 24.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	8.0830E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) = 24.0000	Ci	kg	Atoms	Bq
Kr-85	1.8600E+04	4.7408E-02	3.3588E+23	6.8820E+14

Kr-85m	9.6600E+02	1.1738E-07	8.3163E+17	3.5742E+13
Kr-87	5.4108E+02	1.9102E-08	1.3223E+17	2.0020E+13
Kr-88	1.7261E+03	1.3766E-07	9.4202E+17	6.3865E+13
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133	1.9192E+05	1.0253E-03	4.6425E+21	7.1009E+15
Xe-135	4.5753E+03	1.7916E-06	7.9921E+18	1.6928E+14
Xe-133m	2.7371E+03	6.1057E-06	2.7646E+19	1.0127E+14
Xe-135m	4.8812E+02	5.3620E-09	2.3919E+16	1.8060E+13
Xe-138	2.5300E+02	2.6182E-09	1.1425E+16	9.3611E+12
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total Release	Release Rate/s	
Time (h) = 24.0000			
Noble gases (atoms)	3.5443E+23	4.1022E+18	
Elemental I (atoms)	2.4844E+16	2.8755E+11	
Organic I (atoms)	7.6838E+14	8.8933E+09	
Aerosols (kg)	1.0613E-07	1.2283E-12	
Dose Effective (Ci) I-131 (Thyroid)			1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.6821E+01
Total I (Ci)			4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

	Pipe Walls	Transported
Time (h) = 24.0000		
Noble gases (atoms)	0.0000E+00	8.0830E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 24.0000		
Noble gases (atoms)	0.0000E+00	9.8357E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 24.0000		
Noble gases (atoms)	1.0062E+21	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

	Ci	kg	Atoms	Decay
Time (h) = 24.0000				
Kr-85	1.4182E-06	3.6149E-12	2.5611E+13	9.2230E+15
Kr-85m	1.8197E-09	2.2111E-19	1.5666E+06	3.9907E+14
Kr-88	3.8363E-10	3.0594E-20	2.0937E+05	6.5136E+14
I-131	8.2556E-10	6.6591E-18	3.0612E+07	5.8222E+12
I-133	5.3468E-10	4.7199E-19	2.1372E+06	7.3933E+12
I-135	5.2389E-11	1.4918E-20	6.6546E+04	3.6829E+12
Xe-133	1.2852E-05	6.8660E-14	3.1089E+11	9.4494E+16
Xe-135	5.6623E-08	2.2173E-17	9.8908E+07	2.0686E+15

Xe-133m	1.5227E-07	3.3968E-16	1.5380E+09	1.3342E+15
H-3	5.1240E-08	5.2963E-15	1.0575E+12	3.3322E+14

Control Room Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	2.6981E+13	0.0000E+00	
Elemental I (atoms)	1.5916E+06	0.0000E+00	
Organic I (atoms)	4.9224E+04	0.0000E+00	
Aerosols (kg)	6.7888E-18	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.1187E-19
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.1880E-19
Total I (Ci)			1.4128E-09

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.8357E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	1.0062E+21	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.2038E-01	8.0072E-01	3.4731E-01

LPZ - Low Population Zone Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	7.5422E-02	1.8850E-01	8.1763E-02

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.7634E-09	1.3095E-07	6.1994E-09
Accumulated dose (rem)	1.8849E-01	9.0743E+00	4.9365E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	0.0000E+00	0.0000E+00	
Elemental I (atoms)	0.0000E+00	0.0000E+00	
Organic I (atoms)	0.0000E+00	0.0000E+00	
Aerosols (kg)	0.0000E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		0.0000E+00
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		0.0000E+00
Total I (Ci)			0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 96.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	8.0830E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) = 96.0000	Ci	kg	Atoms	Bq
Kr-85	1.8600E+04	4.7408E-02	3.3588E+23	6.8820E+14
Kr-85m	9.6600E+02	1.1738E-07	8.3163E+17	3.5742E+13
Kr-87	5.4108E+02	1.9102E-08	1.3223E+17	2.0020E+13
Kr-88	1.7261E+03	1.3766E-07	9.4202E+17	6.3865E+13
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133	1.9192E+05	1.0253E-03	4.6425E+21	7.1009E+15
Xe-135	4.5753E+03	1.7916E-06	7.9921E+18	1.6928E+14
Xe-133m	2.7371E+03	6.1057E-06	2.7646E+19	1.0127E+14
Xe-135m	4.8812E+02	5.3620E-09	2.3919E+16	1.8060E+13
Xe-138	2.5300E+02	2.6182E-09	1.1425E+16	9.3611E+12
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

Time (h) = 96.0000	Total Release	Release Rate/s
Noble gases (atoms)	3.5443E+23	1.0256E+18
Elemental I (atoms)	2.4844E+16	7.1888E+10
Organic I (atoms)	7.6838E+14	2.2233E+09
Aerosols (kg)	1.0613E-07	3.0708E-13
Dose Effective (Ci) I-131 (Thyroid)		1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		1.6821E+01
Total I (Ci)		4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 96.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	8.0830E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

Time (h) = 96.0000	Pathway	Transported
Noble gases (atoms)	Filtered	9.8357E+20
Elemental I (atoms)		6.8996E+13
Organic I (atoms)		2.1339E+12
Aerosols (kg)		2.9473E-10

Control Room to Environment Transport Group Inventory:

Time (h) = 96.0000	Pathway	Transported
Noble gases (atoms)	Filtered	0.0000E+00
Elemental I (atoms)		0.0000E+00
Organic I (atoms)		0.0000E+00
Aerosols (kg)		0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
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Control Room Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	5.2789E-10	0.0000E+00	
Elemental I (atoms)	2.2711E-17	0.0000E+00	
Organic I (atoms)	7.0239E-19	0.0000E+00	
Aerosols (kg)	9.6780E-41	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.5489E-42
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.5607E-42
Total I (Ci)			1.3480E-32

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.8357E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	1.0062E+21	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.2038E-01	8.0072E-01	3.4731E-01

LPZ - Low Population Zone Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	7.5422E-02	1.8850E-01	8.1763E-02

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5082E-32	1.2133E-30	5.7576E-32
Accumulated dose (rem)	1.8849E-01	9.0743E+00	4.9365E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	0.0000E+00	0.0000E+00	
Elemental I (atoms)	0.0000E+00	0.0000E+00	
Organic I (atoms)	0.0000E+00	0.0000E+00	
Aerosols (kg)	0.0000E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		0.0000E+00
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		0.0000E+00
Total I (Ci)			0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 720.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	8.0830E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment Integral Nuclide Release:

Time (h) = 720.0000	Ci	kg	Atoms	Bq
Kr-85	1.8600E+04	4.7408E-02	3.3588E+23	6.8820E+14
Kr-85m	9.6600E+02	1.1738E-07	8.3163E+17	3.5742E+13
Kr-87	5.4108E+02	1.9102E-08	1.3223E+17	2.0020E+13
Kr-88	1.7261E+03	1.3766E-07	9.4202E+17	6.3865E+13
I-131	1.1797E+01	9.5153E-08	4.3742E+17	4.3647E+11
I-132	3.6025E+00	3.4901E-10	1.5922E+15	1.3329E+11
I-133	1.5558E+01	1.3734E-08	6.2188E+16	5.7566E+11
I-134	1.9633E+00	7.3598E-11	3.3076E+14	7.2644E+10
I-135	8.4390E+00	2.4030E-09	1.0719E+16	3.1224E+11
Xe-133	1.9192E+05	1.0253E-03	4.6425E+21	7.1009E+15
Xe-135	4.5753E+03	1.7916E-06	7.9921E+18	1.6928E+14
Xe-133m	2.7371E+03	6.1057E-06	2.7646E+19	1.0127E+14
Xe-135m	4.8812E+02	5.3620E-09	2.3919E+16	1.8060E+13
Xe-138	2.5300E+02	2.6182E-09	1.1425E+16	9.3611E+12
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total	Release	
Time (h) = 720.0000	Release	Rate/s	
Noble gases (atoms)	3.5443E+23	1.3674E+17	
Elemental I (atoms)	2.4844E+16	9.5850E+09	
Organic I (atoms)	7.6838E+14	2.9644E+08	
Aerosols (kg)	1.0613E-07	4.0944E-14	
Dose Effective (Ci) I-131 (Thyroid)			1.4654E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.6821E+01
Total I (Ci)			4.1360E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 720.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	8.0830E+23
Elemental I (atoms)	0.0000E+00	5.6699E+16
Organic I (atoms)	0.0000E+00	1.7536E+15
Aerosols (kg)	0.0000E+00	2.4220E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.8357E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	1.0062E+21	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay
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Control Room Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	8.4409-207	0.0000E+00	
Elemental I (atoms)	3.8756-215	0.0000E+00	
Organic I (atoms)	1.1986-216	0.0000E+00	
Aerosols (kg)	1.6513-238	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.6316-240
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.6316-240
Total I (Ci)			2.1550-230

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.8357E+20
Elemental I (atoms)	0.0000E+00	6.8996E+13
Organic I (atoms)	0.0000E+00	2.1339E+12
Aerosols (kg)	0.0000E+00	2.9473E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	1.0062E+21	0.0000E+00
Elemental I (atoms)	6.9686E+13	0.0000E+00
Organic I (atoms)	2.1552E+12	0.0000E+00
Aerosols (kg)	2.9764E-10	0.0000E+00

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 I-131 Summary
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Time (hr)	Waste Processing Syst I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
0.000	3.8686E-01	6.4833E-03	1.7989E-05
0.017	7.4588E+00	4.3405E+00	1.1993E-02
0.417	2.8145E-10	1.1797E+01	2.4605E-02
0.717	4.2849E-18	1.1797E+01	1.9767E-02
1.017	6.5235E-26	1.1797E+01	1.5880E-02
1.317	9.9317E-34	1.1797E+01	1.2758E-02
1.617	1.5120E-41	1.1797E+01	1.0249E-02
1.917	2.3020E-49	1.1797E+01	8.2342E-03
2.000	1.5509E-51	1.1797E+01	7.7484E-03
2.300	2.3611E-59	1.1797E+01	6.2249E-03
2.600	3.5947E-67	1.1797E+01	5.0010E-03
2.900	5.4727E-75	1.1797E+01	4.0177E-03
3.200	8.3319E-83	1.1797E+01	3.2277E-03
3.500	1.2685E-90	1.1797E+01	2.5931E-03
3.800	1.9312E-98	1.1797E+01	2.0832E-03
4.100	2.9402-106	1.1797E+01	1.6736E-03
4.400	4.4763-114	1.1797E+01	1.3446E-03
4.700	6.8149-122	1.1797E+01	1.0802E-03
5.000	1.0375-129	1.1797E+01	8.6780E-04
5.300	1.5796-137	1.1797E+01	6.9718E-04
5.600	2.4048-145	1.1797E+01	5.6010E-04
5.900	3.6612-153	1.1797E+01	4.4997E-04
6.200	5.5741-161	1.1797E+01	3.6150E-04

6.500	8.4862-169	1.1797E+01	2.9042E-04
6.800	1.2920-176	1.1797E+01	2.3332E-04
7.100	1.9670-184	1.1797E+01	1.8744E-04
7.400	2.9946-192	1.1797E+01	1.5059E-04
7.700	4.5592-200	1.1797E+01	1.2098E-04
8.000	6.9411-208	1.1797E+01	9.7192E-05
8.300	1.0567-215	1.1797E+01	7.8082E-05
8.600	1.6088-223	1.1797E+01	6.2730E-05
8.900	2.4494-231	1.1797E+01	5.0396E-05
9.200	3.7291-239	1.1797E+01	4.0487E-05
9.500	5.6773-247	1.1797E+01	3.2526E-05
9.800	8.6434-255	1.1797E+01	2.6131E-05
10.100	1.3159-262	1.1797E+01	2.0993E-05
10.400	2.0034-270	1.1797E+01	1.6866E-05
24.000	0.0000E+00	1.1797E+01	8.2556E-10
96.000	0.0000E+00	1.1797E+01	1.2525E-32
720.000	0.0000E+00	1.1797E+01	2.1550-230

#####

Cumulative Dose Summary

#####

Time (hr)	EAB - Site Boundary		LPZ - Low Population		Control Room	
	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.017	2.9458E-01	1.2805E-01	6.9350E-02	3.0146E-02	1.9447E-02	1.1204E-03
0.417	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	2.1680E+00	1.2317E-01
0.717	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	3.5371E+00	1.9931E-01
1.017	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	4.6348E+00	2.5953E-01
1.317	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	5.5147E+00	3.0729E-01
1.617	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	6.2201E+00	3.4521E-01
1.917	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	6.7857E+00	3.7536E-01
2.000	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	6.9218E+00	3.8258E-01
2.300	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	7.3483E+00	4.0508E-01
2.600	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	7.6902E+00	4.2300E-01
2.900	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	7.9644E+00	4.3727E-01
3.200	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.1842E+00	4.4874E-01
3.500	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.3605E+00	4.5661E-01
3.800	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.5019E+00	4.6494E-01
4.100	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.6152E+00	4.7071E-01
4.400	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.7061E+00	4.7532E-01
4.700	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.7790E+00	4.7899E-01
5.000	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.8375E+00	4.8193E-01
5.300	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.8844E+00	4.8428E-01
5.600	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.9220E+00	4.8615E-01
5.900	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.9521E+00	4.8765E-01
6.200	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.9763E+00	4.8885E-01
6.500	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	8.9957E+00	4.8981E-01
6.800	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0112E+00	4.9058E-01
7.100	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0237E+00	4.9119E-01
7.400	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0337E+00	4.9168E-01
7.700	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0418E+00	4.9207E-01
8.000	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0482E+00	4.9239E-01
8.300	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0534E+00	4.9264E-01
8.600	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0575E+00	4.9284E-01
8.900	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0608E+00	4.9300E-01
9.200	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0635E+00	4.9313E-01
9.500	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0656E+00	4.9323E-01
9.800	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0674E+00	4.9332E-01
10.100	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0687E+00	4.9338E-01
10.400	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0698E+00	4.9344E-01
24.000	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0743E+00	4.9365E-01
96.000	8.0072E-01	3.4731E-01	1.8850E-01	8.1763E-02	9.0743E+00	4.9365E-01

720.000 8.0072E-01 3.4731E-01 1.8850E-01 8.1763E-02 9.0743E+00 4.9365E-01

#####

Worst Two-Hour Doses

#####

EAB - Site Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	3.2038E-01	8.0072E-01	3.4731E-01

ATTACHMENT J – RADTRAD NUCLEAR INVENTORY FILE WASTEPROC-NG6.NIF

Nuclide Inventory Name:
CCNPP Waste Processing Incident
Power Level:
2.754E+03
Nuclides:
15
Nuclide 001:
Kr-85
1
0.3382974720E+09
0.8500E+02
9.80E+03
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 002:
Kr-85m
1
0.1612800000E+05
0.8500E+02
1.71E+02
Kr-85 0.2100E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 003:
Kr-87
1
0.4578000000E+04
0.8700E+02
9.89E+01
Rb-87 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 004:
Kr-88
1
0.1022400000E+05
0.8800E+02
3.08E+02
Rb-88 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 005:
I-131
2
0.6946560000E+06
0.1310E+03
1.06E+01
Xe-131m 0.1100E-01
none 0.0000E+00
none 0.0000E+00
Nuclide 006:
I-132
2
0.8280000000E+04
0.1320E+03
3.09E+00
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 007:
I-133
2

0.7488000000E+05
0.1330E+03
1.30E+01
Xe-133m 0.2900E-01
Xe-133 0.9700E+00
none 0.0000E+00
Nuclide 008:
I-134
2
0.3156000000E+04
0.1340E+03
1.74E+00
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 009:
I-135
2
0.2379600000E+05
0.1350E+03
7.11E+00
Xe-135m 0.1500E+00
Xe-135 0.8500E+00
none 0.0000E+00
Nuclide 010:
Xe-133
1
0.4531680000E+06
0.1330E+03
4.67E+04
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 011:
Xe-135
1
0.3272400000E+05
0.1350E+03
8.05E+02
Cs-135 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 012:
Xe-133m
1
0.1892200000E+06
0.1330E+03
4.98E+02
Xe-133 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 013:
Xe-135m
1
0.9180000000E+03
0.1350E+03
1.05E+02
Xe-135 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 014:
Xe-138
1
0.8460000000E+03

0.1380E+03
5.56E+01
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 015:
H-3
1
3.8663136E+08
3.01605
6.72E+02
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
End of Nuclear Inventory File

ATTACHMENT K – RADTRAD OUTPUT FILE WASTEPROC-NG6D.O0


```
#####
RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 17:01:41
#####
```

```
#####
File information
#####
```

```
Plant file           = D:\RADTRAD\Defaults\WasteProc-NG6d.psf
Inventory file       = D:\RADTRAD\Defaults\wasteproc-ng6.nif
Release file        = d:\radtrad\defaults\wasteproc.rft
Dose Conversion file = d:\radtrad\defaults\wasteproc15.inp
```

```
#####      #####      #####      # #      # #####      #      # #####
#      # #      #      #      # ##      # #      #      #      #
#      # #      #      #      # # #      # #      #      #      #
#####      #####      #####      # #      # #####      #      #
#      #      #      #      #      # #      #      #      #
#      #      #      #      #      ##      #      #      #
#      #      #      #      #      #      #      #      #
#      #####      #      #      #      #      #####      #
```

Radtrad 3.03 4/15/2001

Nuclide Inventory File:

D:\RADTRAD\Defaults\wasteproc-ng6.nif

Plant Power Level:

2.7540E+03

Compartments:

3

Compartment 1:

Waste Processing System

3

5.0140E+04

0

0

0

0

0

Compartment 2:

Environment

2

0.0000E+00

0

0

0

0

0

Compartment 3:

Control Room

1

2.8919E+05

0

0

0

0

0

Pathways:

```
3
Pathway 1:
Waste Processing System to Environment
1
2
1
Pathway 2:
Environment to Control Room
2
3
2
Pathway 3:
Control Room to Environment
3
2
2
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
1
1 1.0000E+00
d:\radtrad\defaults\wasteproc15.inp
d:\radtrad\defaults\wasteproc.rft
0.0000E+00
1
9.5000E-01 4.8500E-02 1.5000E-03 1.0000E+00
Overlying Pool:
0
0.0000E+00
0
0
0
0
0
Compartments:
3
Compartment 1:
1
1
0
0
0
0
0
0
0
0
0
Compartment 2:
1
1
0
0
0
0
0
0
0
0
0
Compartment 3:
1
1
0
0
0
```

```

0
0
0
0
Pathways:
3
Pathway 1:
0
0
1
1
0.0000E+00    1.0000E+00    5.0138E+04
1
1
0.0000E+00    1.0000E+00    5.0138E+04
1
1
0.0000E+00    1.0000E+00    5.0138E+04
0
0
0
0
0
0
0
Pathway 2:
0
0
0
0
0
1
1
0.0000E+00    3.5000E+03    0.0000E+00    0.0000E+00    0.0000E+00
0
0
0
0
0
0
Pathway 3:
0
0
0
0
0
1
1
0.0000E+00    3.5000E+03    1.0000E+02    1.0000E+02    1.0000E+02
0
0
0
0
0
0
Dose Locations:
3
Location 1:
EAB - Site Boundary
2
1
2
0.0000E+00    1.4400E-04
2.0000E+00    0.0000E+00

```

1
4
0.0000E+00 3.5000E-04
8.0000E+00 1.8000E-04
2.4000E+01 2.3000E-04
7.2000E+02 0.0000E+00
0

Location 2:

LPZ - Low Population Zone

2
1
4
0.0000E+00 3.3900E-05
2.0000E+00 2.2000E-06
2.4000E+01 5.4000E-07
7.2000E+02 0.0000E+00

1
4
0.0000E+00 3.5000E-04
8.0000E+00 1.8000E-04
2.4000E+01 2.3000E-04
7.2000E+02 0.0000E+00
0

Location 3:

Control Room

3
0
1
2
0.0000E+00 3.5000E-04
7.2000E+02 0.0000E+00
1
4
0.0000E+00 1.0000E+00
2.4000E+01 6.0000E-01
9.6000E+01 4.0000E-01
7.2000E+02 0.0000E+00

Effective Volume Location:

1
6
0.0000E+00 1.6800E-03
2.0000E+00 1.3400E-03
8.0000E+00 5.1400E-04
2.4000E+01 3.8400E-04
9.6000E+01 3.1200E-04
7.2000E+02 0.0000E+00

Simulation Parameters:

1
0.0000E+00 0.0000E+00

Output Filename:

D:\RADTRAD\Defaults\WasteProc-NG6d.o0

1
1
1
0
0

End of Scenario File

RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 17:01:41
#####

Plant Description
#####

Number of Nuclides = 15

Inventory Power = 2.7540E+03 MWth
Plant Power Level = 2.7540E+03 MWth

Number of compartments = 3

Compartment information

Compartment number 1 (Source term fraction = 1.0000E+00
)

Name: Waste Processing System

Compartment volume = 5.0140E+04 (Cubic feet)

Compartment type is Normal

Pathways into and out of compartment 1

Exit Pathway Number 1: Waste Processing System to Environment

Compartment number 2

Name: Environment

Compartment type is Environment

Pathways into and out of compartment 2

Inlet Pathway Number 1: Waste Processing System to Environment

Inlet Pathway Number 3: Control Room to Environment

Exit Pathway Number 2: Environment to Control Room

Compartment number 3

Name: Control Room

Compartment volume = 2.8919E+05 (Cubic feet)

Compartment type is Control Room

Pathways into and out of compartment 3

Inlet Pathway Number 2: Environment to Control Room

Exit Pathway Number 3: Control Room to Environment

Total number of pathways = 3

 RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 17:01:41
 #####

 Scenario Description
 #####

Radioactive Decay is enabled
 Calculation of Daughters is enabled

Release Fractions and Timings

	GAP	EARLY IN-VESSEL	LATE RELEASE	RELEASE MASS
	0.016666 hr	0.0000 hrs	0.0000 hrs	(gm)
NOBLES	1.0000E+00	0.0000E+00	0.0000E+00	2.530E+01
IODINE	1.0000E+00	0.0000E+00	0.0000E+00	9.937E-05
CESIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
TELLURIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
STRONTIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
BARIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
RUTHENIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
CERIUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
LANTHANUM	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00

Inventory Power = 1. MWt

Nuclide Name	Group	Specific Inventory (Ci/MWt)	half life (s)	Whole Body DCF (Sv-m3/Bq-s)	Inhaled Thyroid (Sv/Bq)	Inhaled Effective (Sv/Bq)
Kr-85	1	9.800E+03	3.383E+08	1.190E-16	0.000E+00	0.000E+00
Kr-85m	1	1.710E+02	1.613E+04	7.480E-15	0.000E+00	0.000E+00
Kr-87	1	9.890E+01	4.578E+03	4.120E-14	0.000E+00	0.000E+00
Kr-88	1	3.080E+02	1.022E+04	1.020E-13	0.000E+00	0.000E+00
I-131	2	1.060E+01	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	3.090E+00	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	1.300E+01	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	1.740E+00	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	7.110E+00	2.380E+04	8.294E-14	8.460E-09	3.320E-10
Xe-133	1	4.670E+04	4.532E+05	1.560E-15	0.000E+00	0.000E+00
Xe-135	1	8.050E+02	3.272E+04	1.190E-14	0.000E+00	0.000E+00
Xe-133m	1	4.980E+02	1.892E+05	1.370E-15	0.000E+00	0.000E+00
Xe-135m	1	1.050E+02	9.180E+02	2.040E-14	0.000E+00	0.000E+00
Xe-138	1	5.560E+01	8.460E+02	5.770E-14	0.000E+00	0.000E+00
H-3	1	6.720E+02	3.866E+08	3.310E-19	1.730E-11	1.730E-11

Nuclide	Daughter	Fraction	Daughter	Fraction	Daughter	Fraction
Kr-85m	Kr-85	0.21	none	0.00	none	0.00
Kr-87	Rb-87	1.00	none	0.00	none	0.00
Kr-88	Rb-88	1.00	none	0.00	none	0.00
I-131	Xe-131m	0.01	none	0.00	none	0.00
I-133	Xe-133m	0.03	Xe-133	0.97	none	0.00
I-135	Xe-135m	0.15	Xe-135	0.85	none	0.00
Xe-135	Cs-135	1.00	none	0.00	none	0.00
Xe-133m	Xe-133	1.00	none	0.00	none	0.00
Xe-135m	Xe-135	1.00	none	0.00	none	0.00

Iodine fractions

Aerosol = 9.5000E-01
 Elemental = 4.8500E-02
 Organic = 1.5000E-03

COMPARTMENT DATA

Compartment number 1: Waste Processing System

Compartment number 2: Environment

Compartment number 3: Control Room

PATHWAY DATA

Pathway number 1: Waste Processing System to Environment

Piping: Removal Data

Time (hr)	Flow Rate (cfm)	Aerosol	DF Elemental	Organic
0.0000E+00	5.0138E+04	1.0000E+00	1.0000E+00	1.0000E+00

Pathway number 2: Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.5000E+03	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Control Room to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.5000E+03	1.0000E+02	1.0000E+02	1.0000E+02

LOCATION DATA

Location EAB - Site Boundary is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m ⁻³)
0.0000E+00	1.4400E-04
2.0000E+00	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m ³ * sec ⁻¹)
0.0000E+00	3.5000E-04
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location LPZ - Low Population Zone is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m ⁻³)
0.0000E+00	3.3900E-05
2.0000E+00	2.2000E-06
2.4000E+01	5.4000E-07
7.2000E+02	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m ³ * sec ⁻¹)
0.0000E+00	3.5000E-04
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location Control Room is in compartment 3

Location X/Q Data

Time (hr)	X/Q (s * m ⁻³)
0.0000E+00	1.6800E-03
2.0000E+00	1.3400E-03
8.0000E+00	5.1400E-04
2.4000E+01	3.8400E-04
9.6000E+01	3.1200E-04
7.2000E+02	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m ³ * sec ⁻¹)
0.0000E+00	3.5000E-04
7.2000E+02	0.0000E+00

Location Occupancy Factor Data

Time (hr)	Occupancy Factor
0.0000E+00	1.0000E+00
2.4000E+01	6.0000E-01
9.6000E+01	4.0000E-01
7.2000E+02	0.0000E+00

USER SPECIFIED TIME STEP DATA - SUPPLEMENTAL TIME STEPS

Time	Time step
0.0000E+00	0.0000E+00

 RADTRAD Version 3.03 (Spring 2001) run on 9/28/2005 at 17:01:41
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 Dose, Detailed model and Detailed Inventory Output
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EAB - Site Boundary Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)		2.5108E-02	2.6099E-01	3.3967E-02
Accumulated dose (rem)		2.5108E-02	2.6099E-01	3.3967E-02

LPZ - Low Population Zone Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)		5.9109E-03	6.1441E-02	7.9964E-03
Accumulated dose (rem)		5.9109E-03	6.1441E-02	7.9964E-03

Control Room Doses:

Time (h) =	0.0167	Whole Body	Thyroid	TEDE
Delta dose (rem)		9.9088E-05	1.7229E-02	6.8389E-04
Accumulated dose (rem)		9.9088E-05	1.7229E-02	6.8389E-04

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	0.0167	Ci	kg	Atoms	Decay
Kr-85		6.1950E+03	1.5790E-02	1.1187E+23	1.2906E+16
Kr-85m		1.0782E+02	1.3101E-08	9.2821E+16	2.2489E+14
Kr-87		6.1953E+01	2.1872E-09	1.5140E+16	1.2962E+14
Kr-88		1.9391E+02	1.5464E-08	1.0583E+17	4.0474E+14
I-131		6.7003E+00	5.4046E-08	2.4845E+17	1.3959E+13
I-132		1.9435E+00	1.8829E-10	8.5901E+14	4.0585E+12
I-133		8.2133E+00	7.2504E-09	3.2829E+16	1.7115E+13
I-134		1.0855E+00	4.0692E-11	1.8287E+14	2.2755E+12
I-135		4.4867E+00	1.2776E-09	5.6991E+15	9.3548E+12
Xe-133		2.9518E+04	1.5770E-04	7.1405E+20	6.1498E+16
Xe-135		5.0832E+02	1.9905E-07	8.8792E+17	1.0594E+15
Xe-133m		3.1474E+02	7.0209E-07	3.1790E+18	6.5576E+14
Xe-135m		6.3465E+01	6.9717E-10	3.1100E+15	1.3501E+14
Xe-138		3.3461E+01	3.4627E-10	1.5111E+15	7.1343E+13
H-3		4.2480E+02	4.3908E-05	8.7671E+21	8.8498E+14

Waste Processing System Transport Group Inventory:

Time (h) =	0.0167	Atmosphere	Sump
Noble gases (atoms)		1.2136E+23	0.0000E+00
Elemental I (atoms)		1.3969E+16	0.0000E+00
Organic I (atoms)		4.3203E+14	0.0000E+00

Aerosols (kg)	5.9662E-08	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			5.7824E-09
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			6.5907E-09
Total I (Ci)			2.2429E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	0.0167	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00		7.1945E+22
Elemental I (atoms)	0.0000E+00		8.2828E+15
Organic I (atoms)	0.0000E+00		2.5617E+14
Aerosols (kg)	0.0000E+00		3.5376E-08

Environment Integral Nuclide Release:

Time (h) =	0.0167	Ci	kg	Atoms	Bq
Kr-85		3.6050E+03	9.1886E-03	6.5100E+22	1.3339E+14
Kr-85m		6.2743E+01	7.6241E-09	5.4016E+16	2.3215E+12
Kr-87		3.6054E+01	1.2728E-09	8.8106E+15	1.3340E+12
Kr-88		1.1284E+02	8.9992E-09	6.1585E+16	4.1752E+12
I-131		3.8991E+00	3.1450E-08	1.4458E+17	1.4427E+11
I-132		1.1310E+00	1.0957E-10	4.9989E+14	4.1848E+10
I-133		4.7795E+00	4.2192E-09	1.9104E+16	1.7684E+11
I-134		6.3174E-01	2.3681E-11	1.0643E+14	2.3374E+10
I-135		2.6109E+00	7.4346E-10	3.3165E+15	9.6604E+10
Xe-133		1.7177E+04	9.1769E-05	4.1552E+20	6.3556E+14
Xe-135		2.9580E+02	1.1583E-07	5.1671E+17	1.0945E+13
Xe-133m		1.8315E+02	4.0856E-07	1.8499E+18	6.7767E+12
Xe-135m		3.6941E+01	4.0580E-10	1.8102E+15	1.3668E+12
Xe-138		1.9477E+01	2.0156E-10	8.7958E+14	7.2066E+11
H-3		2.4720E+02	2.5551E-05	5.1018E+21	9.1464E+12

Environment Transport Group Inventory:

Time (h) =	0.0167	Total Release	Release Rate/s
Noble gases (atoms)		7.0620E+22	1.1770E+21
Elemental I (atoms)		8.1289E+15	1.3549E+14
Organic I (atoms)		2.5141E+14	4.1903E+12
Aerosols (kg)		3.4719E-08	5.7867E-10
Dose Effective (Ci) I-131 (Thyroid)			4.7776E+00
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			5.4454E+00
Total I (Ci)			1.3052E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	0.0167	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00		7.1945E+22
Elemental I (atoms)	0.0000E+00		8.2828E+15
Organic I (atoms)	0.0000E+00		2.5617E+14
Aerosols (kg)	0.0000E+00		3.5376E-08

Environment to Control Room Transport Group Inventory:

Time (h) =	0.0167	Pathway	Transported
Noble gases (atoms)		Filtered	1.9597E+20
Elemental I (atoms)			2.2562E+13
Organic I (atoms)			6.9779E+11
Aerosols (kg)			9.6363E-11

Control Room to Environment Transport Group Inventory:

Pathway

Time (h) =	0.0167	Filtered	Transported
Noble gases (atoms)		8.0405E+17	0.0000E+00
Elemental I (atoms)		9.2567E+10	0.0000E+00
Organic I (atoms)		2.8629E+09	0.0000E+00
Aerosols (kg)		3.9536E-13	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) =	0.0167	Ci	kg	Atoms	Decay
Kr-85		9.9607E+00	2.5388E-05	1.7987E+20	2.0643E+13
Kr-85m		1.7336E-01	2.1065E-11	1.4924E+14	3.5971E+11
Kr-87		9.9613E-02	3.5167E-12	2.4343E+13	2.0732E+11
Kr-88		3.1178E-01	2.4864E-11	1.7016E+14	6.4738E+11
I-131		1.0773E-02	8.6899E-11	3.9948E+14	2.2328E+10
I-132		3.1249E-03	3.0274E-13	1.3812E+12	6.4915E+09
I-133		1.3206E-02	1.1658E-11	5.2785E+11	2.7376E+10
I-134		1.7454E-03	6.5427E-14	2.9404E+11	3.6396E+09
I-135		7.2140E-03	2.0542E-12	9.1634E+12	1.4963E+10
Xe-133		4.7462E+01	2.5356E-07	1.1481E+18	9.8367E+13
Xe-135		8.1731E-01	3.2004E-10	1.4277E+15	1.6946E+12
Xe-133m		5.0606E-01	1.1289E-09	5.1114E+15	1.0489E+12
Xe-135m		1.0204E-01	1.1210E-12	5.0004E+12	2.1592E+11
Xe-138		5.3801E-02	5.5676E-13	2.4296E+12	1.1410E+11
H-3		6.8302E-01	7.0599E-08	1.4096E+19	1.4155E+12

Control Room Transport Group Inventory:

Time (h) =	0.0167	Atmosphere	Sump
Noble gases (atoms)		1.9512E+20	0.0000E+00
Elemental I (atoms)		2.2460E+13	0.0000E+00
Organic I (atoms)		6.9465E+11	0.0000E+00
Aerosols (kg)		9.5930E-11	0.0000E+00
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.6120E-12
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.8373E-12
Total I (Ci)			3.6063E-02

Environment to Control Room Transport Group Inventory:

	Pathway
Time (h) =	0.0167
Noble gases (atoms)	Filtered
Elemental I (atoms)	Transported
Organic I (atoms)	
Aerosols (kg)	

Control Room to Environment Transport Group Inventory:

	Pathway
Time (h) =	0.0167
Noble gases (atoms)	Filtered
Elemental I (atoms)	Transported
Organic I (atoms)	
Aerosols (kg)	

EAB - Site Boundary Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		4.3008E-02	4.4842E-01	5.8228E-02
Accumulated dose (rem)		6.8116E-02	7.0941E-01	9.2195E-02

LPZ - Low Population Zone Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		1.0125E-02	1.0557E-01	1.3708E-02
Accumulated dose (rem)		1.6036E-02	1.6701E-01	2.1704E-02

Control Room Doses:

Time (h) =	2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		3.2327E-02	6.1172E+00	2.3993E-01
Accumulated dose (rem)		3.2426E-02	6.1344E+00	2.4062E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	2.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) =	2.0000	Atmosphere	Sump
Noble gases (atoms)		2.5411E-29	0.0000E+00
Elemental I (atoms)		2.8697E-36	0.0000E+00
Organic I (atoms)		8.8755E-38	0.0000E+00
Aerosols (kg)		1.2254E-59	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)			1.1865E-60
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			1.3353E-60
Total I (Ci)			4.0375E-51

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	2.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	4.3781E+23
Elemental I (atoms)		0.0000E+00	5.0396E+16
Organic I (atoms)		0.0000E+00	1.5586E+15
Aerosols (kg)		0.0000E+00	2.1525E-07

Environment Integral Nuclide Release:

Time (h) =	2.0000	Ci	kg	Atoms	Bq
Kr-85		9.8000E+03	2.4979E-02	1.7697E+23	3.6260E+14
Kr-85m		1.6890E+02	2.0524E-08	1.4541E+17	6.2493E+12
Kr-87		9.4713E+01	3.3437E-09	2.3145E+16	3.5044E+12
Kr-88		3.0207E+02	2.4090E-08	1.6485E+17	1.1176E+13
I-131		1.0597E+01	8.5477E-08	3.9294E+17	3.9209E+11
I-132		3.0167E+00	2.9226E-10	1.3333E+15	1.1162E+11
I-133		1.2965E+01	1.1445E-08	5.1824E+16	4.7972E+11
I-134		1.6346E+00	6.1273E-11	2.7537E+14	6.0479E+10
I-135		7.0507E+00	2.0077E-09	8.9560E+15	2.6088E+11
Xe-133		4.6680E+04	2.4938E-04	1.1292E+21	1.7271E+15
Xe-135		8.0070E+02	3.1354E-07	1.3987E+18	2.9626E+13
Xe-133m		4.9748E+02	1.1097E-06	5.0248E+18	1.8407E+13
Xe-135m		8.5455E+01	9.3873E-10	4.1875E+15	3.1618E+12
Xe-138		4.4375E+01	4.5922E-10	2.0040E+15	1.6419E+12
H-3		6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total	Release
Time (h) =	2.0000	Rate/s
Noble gases (atoms)	1.9198E+23	2.6663E+19
Elemental I (atoms)	2.2083E+16	3.0671E+12
Organic I (atoms)	6.8299E+14	9.4860E+10
Aerosols (kg)	9.4319E-08	1.3100E-11
Dose Effective (Ci) I-131 (Thyroid)		1.2979E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		1.4786E+01
Total I (Ci)		3.5264E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	2.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	4.3781E+23

Elemental I (atoms)	0.0000E+00	5.0396E+16
Organic I (atoms)	0.0000E+00	1.5586E+15
Aerosols (kg)	0.0000E+00	2.1525E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	4.1809E+20	0.0000E+00
Elemental I (atoms)	4.7796E+13	0.0000E+00
Organic I (atoms)	1.4782E+12	0.0000E+00
Aerosols (kg)	2.0412E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
Kr-85	6.4814E+00	1.6520E-05	1.1704E+20	3.7133E+15
Kr-85m	8.2996E-02	1.0085E-11	7.1452E+13	5.7678E+13
Kr-87	2.1989E-02	7.7629E-13	5.3735E+12	2.5617E+13
Kr-88	1.2503E-01	9.9710E-12	6.8235E+13	9.7441E+13
I-131	6.9604E-03	5.6144E-11	2.5810E+14	4.0053E+12
I-132	1.1185E-03	1.0836E-13	4.9437E+11	9.3932E+11
I-133	8.0436E-03	7.1005E-12	3.2151E+13	4.8011E+12
I-134	2.3672E-04	8.8737E-15	3.9880E+10	3.8928E+11
I-135	3.8127E-03	1.0857E-12	4.8430E+12	2.4879E+12
Xe-133	3.0552E+01	1.6322E-07	7.3905E+17	1.7621E+16
Xe-135	4.5940E-01	1.7990E-10	8.0249E+14	2.8864E+14
Xe-133m	3.2080E-01	7.1561E-10	3.2402E+15	1.8679E+14
Xe-135m	9.7542E-04	1.0715E-14	4.7798E+10	1.0891E+13
Xe-138	1.0082E-04	1.0434E-15	4.5532E+09	5.2624E+12
H-3	4.4444E-01	4.5938E-08	9.1725E+18	2.5463E+14

Control Room Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump
Noble gases (atoms)	1.2696E+20	0.0000E+00
Elemental I (atoms)	1.4338E+13	0.0000E+00
Organic I (atoms)	4.4344E+11	0.0000E+00
Aerosols (kg)	6.1225E-11	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		1.0278E-12
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.1567E-12
Total I (Ci)		2.0172E-02

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported

Noble gases (atoms)	4.1809E+20	0.0000E+00
Elemental I (atoms)	4.7796E+13	0.0000E+00
Organic I (atoms)	1.4782E+12	0.0000E+00
Aerosols (kg)	2.0412E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)		6.8116E-02	7.0941E-01	9.2195E-02

LPZ - Low Population Zone Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		1.1320E-55	1.4058E-54	1.6091E-55
Accumulated dose (rem)		1.6036E-02	1.6701E-01	2.1704E-02

Control Room Doses:

Time (h) =	8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)		8.6099E-03	1.8863E+00	7.2640E-02
Accumulated dose (rem)		4.1036E-02	8.0207E+00	3.1326E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) =	8.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) =	8.0000	Atmosphere	Sump
Noble gases (atoms)		1.1618-185	0.0000E+00
Elemental I (atoms)		1.2500-192	0.0000E+00
Organic I (atoms)		3.8661-194	0.0000E+00
Aerosols (kg)		5.3354-216	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)			5.1369-217
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			5.6398-217
Total I (Ci)			1.4293-207

Waste Processing System to Environment Transport Group Inventory:

Time (h) =	8.0000	Pipe Walls	Transported
Noble gases (atoms)		0.0000E+00	4.3781E+23
Elemental I (atoms)		0.0000E+00	5.0396E+16
Organic I (atoms)		0.0000E+00	1.5586E+15
Aerosols (kg)		0.0000E+00	2.1525E-07

Environment Integral Nuclide Release:

Time (h) =	8.0000	Ci	kg	Atoms	Bq
Kr-85		9.8000E+03	2.4979E-02	1.7697E+23	3.6260E+14
Kr-85m		1.6890E+02	2.0524E-08	1.4541E+17	6.2493E+12
Kr-87		9.4713E+01	3.3437E-09	2.3145E+16	3.5044E+12
Kr-88		3.0207E+02	2.4090E-08	1.6485E+17	1.1176E+13
I-131		1.0597E+01	8.5477E-08	3.9294E+17	3.9209E+11
I-132		3.0167E+00	2.9226E-10	1.3333E+15	1.1162E+11
I-133		1.2965E+01	1.1445E-08	5.1824E+16	4.7972E+11
I-134		1.6346E+00	6.1273E-11	2.7537E+14	6.0479E+10
I-135		7.0507E+00	2.0077E-09	8.9560E+15	2.6088E+11
Xe-133		4.6680E+04	2.4938E-04	1.1292E+21	1.7271E+15
Xe-135		8.0070E+02	3.1354E-07	1.3987E+18	2.9626E+13
Xe-133m		4.9748E+02	1.1097E-06	5.0248E+18	1.8407E+13
Xe-135m		8.5455E+01	9.3873E-10	4.1875E+15	3.1618E+12
Xe-138		4.4375E+01	4.5922E-10	2.0040E+15	1.6419E+12
H-3		6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total Release	Release Rate/s
Time (h) = 8.0000		
Noble gases (atoms)	1.9198E+23	6.6658E+18
Elemental I (atoms)	2.2083E+16	7.6679E+11
Organic I (atoms)	6.8299E+14	2.3715E+10
Aerosols (kg)	9.4319E-08	3.2750E-12
Dose Effective (Ci) I-131 (Thyroid)		1.2979E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		1.4786E+01
Total I (Ci)		3.5264E+01

Waste Processing System to Environment Transport Group Inventory:

	Pipe Walls	Transported
Time (h) = 8.0000		
Noble gases (atoms)	0.0000E+00	4.3781E+23
Elemental I (atoms)	0.0000E+00	5.0396E+16
Organic I (atoms)	0.0000E+00	1.5586E+15
Aerosols (kg)	0.0000E+00	2.1525E-07

Environment to Control Room Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 8.0000		
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

	Pathway Filtered	Transported
Time (h) = 8.0000		
Noble gases (atoms)	5.4342E+20	0.0000E+00
Elemental I (atoms)	6.1798E+13	0.0000E+00
Organic I (atoms)	1.9113E+12	0.0000E+00
Aerosols (kg)	2.6391E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

	Ci	kg	Atoms	Decay
Time (h) = 8.0000				
Kr-85	8.3067E-02	2.1173E-07	1.5001E+18	4.8449E+15
Kr-85m	4.2041E-04	5.1086E-14	3.6193E+11	6.9715E+13
Kr-87	1.0707E-05	3.7799E-16	2.6164E+09	2.7837E+13
Kr-88	3.7052E-04	2.9549E-14	2.0221E+11	1.1394E+14
I-131	8.7308E-05	7.0424E-13	3.2374E+12	5.2149E+12
I-132	2.3503E-06	2.2770E-16	1.0388E+09	1.0788E+12
I-133	8.4410E-05	7.4514E-14	3.3739E+11	6.1469E+12
I-134	2.6408E-08	9.8993E-19	4.4489E+06	4.0931E+11
I-135	2.6048E-05	7.4170E-15	3.3086E+10	3.0730E+12
Xe-133	3.7898E-01	2.0247E-09	9.1676E+15	2.2917E+16
Xe-135	3.7395E-03	1.4643E-12	6.5321E+12	3.6162E+14
Xe-133m	3.7990E-03	8.4746E-12	3.8372E+13	2.4185E+14
Xe-135m	4.6423E-06	5.0996E-17	2.2749E+08	1.0994E+13
H-3	5.6961E-03	5.8876E-10	1.1756E+17	3.3222E+14

Control Room Transport Group Inventory:

	Atmosphere	Sump
Time (h) = 8.0000		
Noble gases (atoms)	1.6268E+18	0.0000E+00
Elemental I (atoms)	1.7503E+11	0.0000E+00
Organic I (atoms)	5.4134E+09	0.0000E+00
Aerosols (kg)	7.4708E-13	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		1.2471E-14
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.3692E-14

Total I (Ci) 2.0014E-04

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	5.4342E+20	0.0000E+00
Elemental I (atoms)	6.1798E+13	0.0000E+00
Organic I (atoms)	1.9113E+12	0.0000E+00
Aerosols (kg)	2.6391E-10	0.0000E+00

EAB - Site Boundary Doses:

	Whole Body	Thyroid	TEDE
Time (h) = 24.0000			
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.8116E-02	7.0941E-01	9.2195E-02

LPZ - Low Population Zone Doses:

	Whole Body	Thyroid	TEDE
Time (h) = 24.0000			
Delta dose (rem)	4.0621-212	3.1307-211	5.1263-212
Accumulated dose (rem)	1.6036E-02	1.6701E-01	2.1704E-02

Control Room Doses:

	Whole Body	Thyroid	TEDE
Time (h) = 24.0000			
Delta dose (rem)	9.1216E-05	2.3242E-02	8.8164E-04
Accumulated dose (rem)	4.1127E-02	8.0440E+00	3.1414E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump
Noble gases (atoms)	0.0000E+00	0.0000E+00
Elemental I (atoms)	0.0000E+00	0.0000E+00
Organic I (atoms)	0.0000E+00	0.0000E+00
Aerosols (kg)	0.0000E+00	0.0000E+00
Dose Effective (Ci/cc)	I-131 (Thyroid)	0.0000E+00
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)	0.0000E+00
Total I (Ci)		0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 24.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	4.3781E+23
Elemental I (atoms)	0.0000E+00	5.0396E+16
Organic I (atoms)	0.0000E+00	1.5586E+15
Aerosols (kg)	0.0000E+00	2.1525E-07

Environment Integral Nuclide Release:

Time (h) = 24.0000	Ci	kg	Atoms	Bq
Kr-85	9.8000E+03	2.4979E-02	1.7697E+23	3.6260E+14

Kr-85m	1.6890E+02	2.0524E-08	1.4541E+17	6.2493E+12
Kr-87	9.4713E+01	3.3437E-09	2.3145E+16	3.5044E+12
Kr-88	3.0207E+02	2.4090E-08	1.6485E+17	1.1176E+13
I-131	1.0597E+01	8.5477E-08	3.9294E+17	3.9209E+11
I-132	3.0167E+00	2.9226E-10	1.3333E+15	1.1162E+11
I-133	1.2965E+01	1.1445E-08	5.1824E+16	4.7972E+11
I-134	1.6346E+00	6.1273E-11	2.7537E+14	6.0479E+10
I-135	7.0507E+00	2.0077E-09	8.9560E+15	2.6088E+11
Xe-133	4.6680E+04	2.4938E-04	1.1292E+21	1.7271E+15
Xe-135	8.0070E+02	3.1354E-07	1.3987E+18	2.9626E+13
Xe-133m	4.9748E+02	1.1097E-06	5.0248E+18	1.8407E+13
Xe-135m	8.5455E+01	9.3873E-10	4.1875E+15	3.1618E+12
Xe-138	4.4375E+01	4.5922E-10	2.0040E+15	1.6419E+12
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total Release	Release Rate/s	
Time (h) = 24.0000			
Noble gases (atoms)	1.9198E+23	2.2219E+18	
Elemental I (atoms)	2.2083E+16	2.5560E+11	
Organic I (atoms)	6.8299E+14	7.9050E+09	
Aerosols (kg)	9.4319E-08	1.0917E-12	
Dose Effective (Ci) I-131 (Thyroid)			1.2979E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.4786E+01
Total I (Ci)			3.5264E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 24.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	4.3781E+23
Elemental I (atoms)	0.0000E+00	5.0396E+16
Organic I (atoms)	0.0000E+00	1.5586E+15
Aerosols (kg)	0.0000E+00	2.1525E-07

Environment to Control Room Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	5.4504E+20	0.0000E+00
Elemental I (atoms)	6.1972E+13	0.0000E+00
Organic I (atoms)	1.9166E+12	0.0000E+00
Aerosols (kg)	2.6465E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
Kr-85	7.4724E-07	1.9046E-12	1.3494E+13	4.8594E+15
Kr-85m	3.1816E-10	3.8661E-20	2.7391E+05	6.9776E+13
Kr-88	6.7135E-11	5.3540E-21	3.6639E+04	1.1399E+14
I-131	7.4161E-10	5.9819E-18	2.7499E+07	5.2301E+12
I-133	4.4557E-10	3.9333E-19	1.7810E+06	6.1611E+12
I-135	4.3771E-11	1.2464E-20	5.5598E+04	3.0770E+12
Xe-133	3.1247E-06	1.6693E-14	7.5586E+10	2.2983E+16
Xe-135	1.0002E-08	3.9165E-18	1.7471E+07	3.6221E+14

Xe-133m	2.7680E-08	6.1747E-17	2.7958E+08	2.4250E+14
H-3	5.1240E-08	5.2963E-15	1.0575E+12	3.3322E+14

Control Room Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump
Noble gases (atoms)	1.4627E+13	0.0000E+00
Elemental I (atoms)	1.4228E+06	0.0000E+00
Organic I (atoms)	4.4004E+04	0.0000E+00
Aerosols (kg)	6.0684E-18	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		9.9773E-20
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		1.0555E-19
Total I (Ci)		1.2311E-09

Environment to Control Room Transport Group Inventory:

Time (h) = 24.0000	Pathway	Transported
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

Time (h) = 24.0000	Pathway	Transported
Noble gases (atoms)	5.4504E+20	0.0000E+00
Elemental I (atoms)	6.1972E+13	0.0000E+00
Organic I (atoms)	1.9166E+12	0.0000E+00
Aerosols (kg)	2.6465E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.8116E-02	7.0941E-01	9.2195E-02

LPZ - Low Population Zone Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6036E-02	1.6701E-01	2.1704E-02

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.2972E-10	1.1686E-07	4.4322E-09
Accumulated dose (rem)	4.1127E-02	8.0440E+00	3.1414E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump
Noble gases (atoms)	0.0000E+00	0.0000E+00
Elemental I (atoms)	0.0000E+00	0.0000E+00
Organic I (atoms)	0.0000E+00	0.0000E+00
Aerosols (kg)	0.0000E+00	0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)		0.0000E+00
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)		0.0000E+00
Total I (Ci)		0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 96.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	4.3781E+23
Elemental I (atoms)	0.0000E+00	5.0396E+16
Organic I (atoms)	0.0000E+00	1.5586E+15
Aerosols (kg)	0.0000E+00	2.1525E-07

Environment Integral Nuclide Release:

Time (h) = 96.0000	Ci	kg	Atoms	Bq
Kr-85	9.8000E+03	2.4979E-02	1.7697E+23	3.6260E+14
Kr-85m	1.6890E+02	2.0524E-08	1.4541E+17	6.2493E+12
Kr-87	9.4713E+01	3.3437E-09	2.3145E+16	3.5044E+12
Kr-88	3.0207E+02	2.4090E-08	1.6485E+17	1.1176E+13
I-131	1.0597E+01	8.5477E-08	3.9294E+17	3.9209E+11
I-132	3.0167E+00	2.9226E-10	1.3333E+15	1.1162E+11
I-133	1.2965E+01	1.1445E-08	5.1824E+16	4.7972E+11
I-134	1.6346E+00	6.1273E-11	2.7537E+14	6.0479E+10
I-135	7.0507E+00	2.0077E-09	8.9560E+15	2.6088E+11
Xe-133	4.6680E+04	2.4938E-04	1.1292E+21	1.7271E+15
Xe-135	8.0070E+02	3.1354E-07	1.3987E+18	2.9626E+13
Xe-133m	4.9748E+02	1.1097E-06	5.0248E+18	1.8407E+13
Xe-135m	8.5455E+01	9.3873E-10	4.1875E+15	3.1618E+12
Xe-138	4.4375E+01	4.5922E-10	2.0040E+15	1.6419E+12
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

Time (h) = 96.0000	Total Release	Release Rate/s
Noble gases (atoms)	1.9198E+23	5.5548E+17
Elemental I (atoms)	2.2083E+16	6.3899E+10
Organic I (atoms)	6.8299E+14	1.9763E+09
Aerosols (kg)	9.4319E-08	2.7291E-13
Dose Effective (Ci) I-131 (Thyroid)		1.2979E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)		1.4786E+01
Total I (Ci)		3.5264E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 96.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	4.3781E+23
Elemental I (atoms)	0.0000E+00	5.0396E+16
Organic I (atoms)	0.0000E+00	1.5586E+15
Aerosols (kg)	0.0000E+00	2.1525E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	5.4504E+20	0.0000E+00
Elemental I (atoms)	6.1972E+13	0.0000E+00
Organic I (atoms)	1.9166E+12	0.0000E+00
Aerosols (kg)	2.6465E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
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Control Room Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	2.8679E-10	0.0000E+00	
Elemental I (atoms)	2.0389E-17	0.0000E+00	
Organic I (atoms)	6.3059E-19	0.0000E+00	
Aerosols (kg)	8.6886E-41	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			1.3901E-42
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			1.3999E-42
Total I (Ci)			1.2047E-32

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	5.4504E+20	0.0000E+00
Elemental I (atoms)	6.1972E+13	0.0000E+00
Organic I (atoms)	1.9166E+12	0.0000E+00
Aerosols (kg)	2.6465E-10	0.0000E+00

EAB - Site Boundary Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.8116E-02	7.0941E-01	9.2195E-02

LPZ - Low Population Zone Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6036E-02	1.6701E-01	2.1704E-02

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.7197E-33	1.0895E-30	4.2441E-32
Accumulated dose (rem)	4.1127E-02	8.0440E+00	3.1414E-01

Waste Processing System Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay
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Waste Processing System Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	0.0000E+00	0.0000E+00	
Elemental I (atoms)	0.0000E+00	0.0000E+00	
Organic I (atoms)	0.0000E+00	0.0000E+00	
Aerosols (kg)	0.0000E+00	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			0.0000E+00
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			0.0000E+00
Total I (Ci)			0.0000E+00

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 720.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	4.3781E+23
Elemental I (atoms)	0.0000E+00	5.0396E+16
Organic I (atoms)	0.0000E+00	1.5586E+15
Aerosols (kg)	0.0000E+00	2.1525E-07

Environment Integral Nuclide Release:

Time (h) = 720.0000	Ci	kg	Atoms	Bq
Kr-85	9.8000E+03	2.4979E-02	1.7697E+23	3.6260E+14
Kr-85m	1.6890E+02	2.0524E-08	1.4541E+17	6.2493E+12
Kr-87	9.4713E+01	3.3437E-09	2.3145E+16	3.5044E+12
Kr-88	3.0207E+02	2.4090E-08	1.6485E+17	1.1176E+13
I-131	1.0597E+01	8.5477E-08	3.9294E+17	3.9209E+11
I-132	3.0167E+00	2.9226E-10	1.3333E+15	1.1162E+11
I-133	1.2965E+01	1.1445E-08	5.1824E+16	4.7972E+11
I-134	1.6346E+00	6.1273E-11	2.7537E+14	6.0479E+10
I-135	7.0507E+00	2.0077E-09	8.9560E+15	2.6088E+11
Xe-133	4.6680E+04	2.4938E-04	1.1292E+21	1.7271E+15
Xe-135	8.0070E+02	3.1354E-07	1.3987E+18	2.9626E+13
Xe-133m	4.9748E+02	1.1097E-06	5.0248E+18	1.8407E+13
Xe-135m	8.5455E+01	9.3873E-10	4.1875E+15	3.1618E+12
Xe-138	4.4375E+01	4.5922E-10	2.0040E+15	1.6419E+12
H-3	6.7200E+02	6.9459E-05	1.3869E+22	2.4864E+13

Environment Transport Group Inventory:

	Total	Release	
Time (h) = 720.0000	Release	Rate/s	
Noble gases (atoms)	1.9198E+23	7.4065E+16	
Elemental I (atoms)	2.2083E+16	8.5199E+09	
Organic I (atoms)	6.8299E+14	2.6350E+08	
Aerosols (kg)	9.4319E-08	3.6389E-14	
Dose Effective (Ci) I-131 (Thyroid)			1.2979E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.4786E+01
Total I (Ci)			3.5264E+01

Waste Processing System to Environment Transport Group Inventory:

Time (h) = 720.0000	Pipe Walls	Transported
Noble gases (atoms)	0.0000E+00	4.3781E+23
Elemental I (atoms)	0.0000E+00	5.0396E+16
Organic I (atoms)	0.0000E+00	1.5586E+15
Aerosols (kg)	0.0000E+00	2.1525E-07

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	5.4504E+20	0.0000E+00
Elemental I (atoms)	6.1972E+13	0.0000E+00
Organic I (atoms)	1.9166E+12	0.0000E+00
Aerosols (kg)	2.6465E-10	0.0000E+00

Control Room Compartment Nuclide Inventory:

Time (h) = 720.0000 Ci kg Atoms Decay

Control Room Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	4.6052-207	0.0000E+00	
Elemental I (atoms)	3.4815-215	0.0000E+00	
Organic I (atoms)	1.0767-216	0.0000E+00	
Aerosols (kg)	1.4834-238	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.3640-240
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.3640-240
Total I (Ci)			1.9359-230

Environment to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.3274E+20
Elemental I (atoms)	0.0000E+00	6.1326E+13
Organic I (atoms)	0.0000E+00	1.8967E+12
Aerosols (kg)	0.0000E+00	2.6193E-10

Control Room to Environment Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	5.4504E+20	0.0000E+00
Elemental I (atoms)	6.1972E+13	0.0000E+00
Organic I (atoms)	1.9166E+12	0.0000E+00
Aerosols (kg)	2.6465E-10	0.0000E+00

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 I-131 Summary
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Time (hr)	Waste Processing Syst I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
0.000	3.4752E-01	5.8240E-03	1.6160E-05
0.017	6.7003E+00	3.8991E+00	1.0773E-02
0.417	2.5282E-10	1.0597E+01	2.2103E-02
0.717	3.8491E-18	1.0597E+01	1.7757E-02
1.017	5.8601E-26	1.0597E+01	1.4265E-02
1.317	8.9217E-34	1.0597E+01	1.1461E-02
1.617	1.3583E-41	1.0597E+01	9.2072E-03
1.917	2.0679E-49	1.0597E+01	7.3969E-03
2.000	1.3931E-51	1.0597E+01	6.9604E-03
2.300	2.1210E-59	1.0597E+01	5.5919E-03
2.600	3.2291E-67	1.0597E+01	4.4924E-03
2.900	4.9161E-75	1.0597E+01	3.6091E-03
3.200	7.4846E-83	1.0597E+01	2.8995E-03
3.500	1.1395E-90	1.0597E+01	2.3294E-03
3.800	1.7348E-98	1.0597E+01	1.8714E-03
4.100	2.6412-106	1.0597E+01	1.5034E-03
4.400	4.0210-114	1.0597E+01	1.2078E-03
4.700	6.1218-122	1.0597E+01	9.7034E-04
5.000	9.3202-130	1.0597E+01	7.7955E-04
5.300	1.4190-137	1.0597E+01	6.2628E-04
5.600	2.1603-145	1.0597E+01	5.0314E-04
5.900	3.2889-153	1.0597E+01	4.0421E-04
6.200	5.0072-161	1.0597E+01	3.2474E-04

6.500	7.6232-169	1.0597E+01	2.6089E-04
6.800	1.1606-176	1.0597E+01	2.0959E-04
7.100	1.7669-184	1.0597E+01	1.6838E-04
7.400	2.6901-192	1.0597E+01	1.3527E-04
7.700	4.0955-200	1.0597E+01	1.0868E-04
8.000	6.2352-208	1.0597E+01	8.7308E-05
8.300	9.4928-216	1.0597E+01	7.0142E-05
8.600	1.4452-223	1.0597E+01	5.6350E-05
8.900	2.2003-231	1.0597E+01	4.5271E-05
9.200	3.3498-239	1.0597E+01	3.6370E-05
9.500	5.1000-247	1.0597E+01	2.9219E-05
9.800	7.7644-255	1.0597E+01	2.3474E-05
10.100	1.1821-262	1.0597E+01	1.8858E-05
10.400	1.7997-270	1.0597E+01	1.5150E-05
24.000	0.0000E+00	1.0597E+01	7.4161E-10
96.000	0.0000E+00	1.0597E+01	1.1252E-32
720.000	0.0000E+00	1.0597E+01	1.9359-230

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Cumulative Dose Summary

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Time (hr)	EAB - Site Boundary		LPZ - Low Population		Control Room	
	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.017	2.6099E-01	3.3967E-02	6.1441E-02	7.9964E-03	1.7229E-02	6.8389E-04
0.417	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	1.9209E+00	7.5939E-02
0.717	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	3.1342E+00	1.2361E-01
1.017	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	4.1069E+00	1.6169E-01
1.317	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	4.8869E+00	1.9213E-01
1.617	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	5.5123E+00	2.1647E-01
1.917	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	6.0137E+00	2.3594E-01
2.000	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	6.1344E+00	2.4062E-01
2.300	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	6.5126E+00	2.5526E-01
2.600	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	6.8158E+00	2.6698E-01
2.900	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.0590E+00	2.7637E-01
3.200	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.2540E+00	2.8388E-01
3.500	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.4104E+00	2.8989E-01
3.800	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.5358E+00	2.9471E-01
4.100	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.6364E+00	2.9857E-01
4.400	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.7170E+00	3.0166E-01
4.700	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.7817E+00	3.0414E-01
5.000	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.8336E+00	3.0612E-01
5.300	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.8752E+00	3.0771E-01
5.600	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.9086E+00	3.0899E-01
5.900	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.9354E+00	3.1001E-01
6.200	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.9569E+00	3.1083E-01
6.500	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.9741E+00	3.1148E-01
6.800	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.9879E+00	3.1201E-01
7.100	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	7.9990E+00	3.1243E-01
7.400	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0079E+00	3.1277E-01
7.700	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0150E+00	3.1304E-01
8.000	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0207E+00	3.1326E-01
8.300	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0253E+00	3.1343E-01
8.600	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0290E+00	3.1357E-01
8.900	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0320E+00	3.1368E-01
9.200	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0343E+00	3.1377E-01
9.500	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0362E+00	3.1385E-01
9.800	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0378E+00	3.1390E-01
10.100	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0390E+00	3.1395E-01
10.400	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0400E+00	3.1399E-01
24.000	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0440E+00	3.1414E-01
96.000	7.0941E-01	9.2195E-02	1.6701E-01	2.1704E-02	8.0440E+00	3.1414E-01

720.000 7.0941E-01 9.2195E-02 1.6701E-01 2.1704E-02 8.0440E+00 3.1414E-01

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Worst Two-Hour Doses

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EAB - Site Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	6.8116E-02	7.0941E-01	9.2195E-02