006 – PM 1077 Rev 0 LOCA.

ATTACHMENT 1
Design Analysis Major Revision Cover Sheet

Design Analysis (Major Revision)			Last Page No. [8] 223
Analysis No.: [1]	PM-1077	Revision: [2]	0
Title: [3]	Post-LOCA EAB, LPZ, and CR Doses Using Alternative Source Term (AST)		
EC/ECR No.: [4]	PB 07-00027	Revision: [5]	0
Station(s): [7]	Peach Bottom	Component(s): [14]	
Unit No.: [6]	2 & 3	N/A	
Discipline: [9]	SEAQ		
Descrip. Code/Keyword: [10]	AST		
Safety/QA Class: [11]	SR		
System Code: [12]	912		
Structure: [13]	N/A		

CONTROLLED DOCUMENT REFERENCES [15]

Document No.:	From/To	Document No.:	From/To
PM-1059, Rev. 2	From		
PM-764, Rev. 1	From		
PM-1055, Rev. 0	From		
PM-1056, Rev. 0	From		
PM-1061, Rev. 0	From		
For remaining References see Section 9.0	From		

Is this Design Analysis Safeguards Information? [16] Yes ☐ No ☒ **If yes, see SY-AA-101-106**

Does this Design Analysis contain Unverified Assumptions? [17] Yes ☐ No ☒ **If yes, ATI/AR#:**

This Design Analysis SUPERCEDES: [18] PM-1060, Rev. 3 in its entirety.

Description of Revision (list affected pages for partials): [19] **Complete Revision**

Preparer: [20]	Gopal J. Patel (NUCORE)		05/06/2007
	Tom Mscisz (EXELON)		05/06/2007
	Print Name	Sign Name	Date
Method of Review: [21]	Detailed Review ☒	Alternate Calculations (attached) ☐	Testing ☐
Reviewer: [22]	Mark Drucker (NUCORE)		05/07/2007
	Print Name	Sign Name	Date
Review Notes: [23]	Independent review ☐	Peer review ☐	
(For External Analyses Only) External Approver: [24]	Gopal J. Patel		05/07/2007
	Print Name	Sign Name	Date
Exelon Reviewer: [25]	Jessica DeLaRosa (EXELON)		6/7/07
	Print Name	Sign Name	Date
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Exelon Approver: [27]	R.A. BROWER		6/26/07
	Print Name	Sign Name	Date

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ATTACHMENT 2
Owners Acceptance Review Checklist for External Design Analysis
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DESIGN ANALYSIS NO. PM-1077 **REV:** 0

		Yes	No	N/A
1.	Do assumptions have sufficient rationale?	☒	☐	☐
2.	Are assumptions compatible with the way the plant is operated and with the licensing basis?	☒	☐	☐
3.	Do the design inputs have sufficient rationale?	☒	☐	☐
4.	Are design inputs correct and reasonable?	☒	☐	☐
5.	Are design inputs compatible with the way the plant is operated and with the licensing basis?	☒	☐	☐
6.	Are Engineering Judgments clearly documented and justified?	☒	☐	☐
7.	Are Engineering Judgments compatible with the way the plant is operated and with the licensing basis?	☒	☐	☐
8.	Do the results and conclusions satisfy the purpose and objective of the Design Analysis?	☒	☐	☐
9.	Are the results and conclusions compatible with the way the plant is operated and with the licensing basis?	☒	☐	☐
10.	Does the Design Analysis include the applicable design basis documentation?	☒	☐	☐
11.	Have any limitations on the use of the results been identified and transmitted to the appropriate organizations?	☒	☐	☐
12.	Are there any unverified assumptions?	☐	☒	☐
13.	Do all unverified assumptions have a tracking and closure mechanism in place?	☐	☐	☒
14.	Have all affected design analyses been documented on the Affected Documents List (ADL) for the associated Configuration Change?	☒	☐	☐
15.	Do the sources of inputs **and** analysis methodology used meet current technical requirements and regulatory commitments? (If the input sources **or** analysis methodology are based on an out-of-date methodology or code, additional reconciliation may be required if the site has since committed to a more recent code)	☒	☐	☐
16.	Have vendor supporting technical documents and references (including GE DRFs) been reviewed when necessary?	☒	☐	☐

EXELON REVIEWER: Jessica DeLaRosa /J. DeLaRosa/ **DATE:** 6/18/07
Print / Sign

REVISION HISTORY

Revision	Revision Description
0	Original Issue

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1	0	51	0
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1.0 PURPOSE

The purpose of this calculation is to evaluate the post-LOCA Exclusion Area Boundary (EAB), Low Population Zone (LPZ), and Control Room (CR) doses for the Peach Bottom Atomic Power Station (PBAPS) using a conservative set of assumptions, as-built design inputs, the Alternative Source Term (AST), the guidance in Regulatory Guide (RG) 1.183, and Total Effective Dose Equivalent (TEDE) dose criteria.

This calculation is performed in a reasonably conservative manner in which the following design basis post-LOCA release paths are analyzed:

1. Containment Leakage.
2. Engineered Safety Feature (ESF) Leakage.
3. Main Steam Isolation Valve (MSIV) Bypass Leakage.

The evaluation includes the following conservatisms:

1. The maximum primary containment leakage rate into the Reactor Building is modeled as 0.7 weight percent per day, which is greater than the 0.5 w%/day limit specified in Technical Specification Section 5.5.12 (Ref. 9.4.7).
2. The reactor building (RB) drawdown time is assumed to be 3 minutes instead of the 2 minutes (120 seconds) currently allowed by PBAPS Technical Specification Surveillance Requirement 3.6.1.4.3 (Ref. 9.4.2) (Figure 2)
3. The containment & ESF leakages are assumed to release directly to the environment at ground level during the drawdown time and through the main stack following the drawdown time without mixing in the RB volume (Figure 2)
4. The MSIV leakage model includes the following conservatisms:
   - Each MSIV release path consists of two well-mixed volume nodes consistent with AEB 98-03. This is believed to eliminate the potential variation of settling aerosol velocities in multiple volume nodes resulting from the different pressure/temperature boundary conditions and remove the in-series configuration of the aerosol and elemental iodine removal efficiencies in the multiple volume nodes, which is believed to underestimate the resulting dose.
   - The aerosol & elemental iodine removal is not credited in any MSIV steam lines 96 hrs after the onset of a LOCA
   - Aerosol & elemental iodine removal is not credited in the MSIV failed line between the reactor pressure vessel (RPV) nozzle and outboard MSIV for the entire duration of a LOCA, and
   - The total MSIV leakage is distributed among two worst-case steam lines instead of four lines for the purposes of this analysis.
5. The main CR emergency ventilation (MCREV) system initiation is delayed for 30 minutes after onset of a LOCA for all release paths, and a maximum CR unfiltered inleakage of 18,500 cfm is assumed during the initial 0-30 minutes of the LOCA based on the result of a parametric study plotted in Figure 1.

2.0 METHODOLOGY

The design basis loss of coolant accident is analyzed using a conservative set of assumptions and as-built design input parameters compatible for the AST and TEDE dose criteria. The numeric values of the critical design inputs are conservatively selected to assure an appropriate prudent safety margin against unpredicted events in the course of an accident and compensate for uncertainties in facility parameters, accident progression, radioactive material transport, and atmospheric dispersion.

2.1 Post-LOCA Containment Leakage

2.1.1 Source Term

The post-LOCA containment leakage model is shown in Figure 2. The BWR core inventory fractions listed in Regulatory Guide 1.183, Table 1 are released into the containment at the release timing shown in RG 1.183, Table 4 (Ref. 9.1, Sections 3.2 & 3.3). Since the post-LOCA minimum suppression chamber water pH is greater than 7.0 (Ref. 9.12), the chemical form of radioiodine released into the containment is assumed to be 95% cesium iodide (CsI), 4.85 percent elemental iodine, and 0.15 percent organic iodide (Ref. 9.1, Section A.2). With the exception of elemental and organic iodine and noble gases, the remaining fission products are assumed to be in aerosol form (Ref. 9.1, Sections 3.5 & A.2). The plant-specific isotopic fission product core activities (in units of curies) are obtained from Reference 9.6, Attachment A, and listed in Table 1. These isotopic activities are converted into Ci/MW_t in Table 2 using the core thermal power level of 3514.9 MW_t and listed as Design Input (DI) 5.3.1.3. The RADTRAD Nuclide Inventory File (NIF) PBS_def.TXT is developed based on this plant-specific core inventory and used for the containment, ESF, and MSIV leakage paths. The source term design inputs are shown in Sections 5.3.1.1 through 5.3.1.7.

2.1.2 Activity Transport In Primary Containment

The radioactivity released from the fuel is assumed to mix instantaneously and homogeneously throughout the free air volume of the primary containment (drywell) as discussed below. The radioactivity release into the containment is assumed to terminate at the end of the early in-vessel phase, which occurs at 2 hrs after the onset of a LOCA (Ref. 9.1, Table 4). The design inputs for the transport in the primary containment are shown in Sections 5.3.2.1 through 5.3.2.7. The reduction in containment leakage activity by dilution in the RB and removal by the standby gas treatment (SGT) filtration is not credited. The analysis dilutes the radioactivity released from the core into the drywell air volume during the first 2 hours of the LOCA, and then into the combined drywell plus suppression chamber air volume after 2 hours, at which time the containment volume is expected to become well mixed following the restoration of core cooling because the thermal-hydraulic conditions in the primary containment are expected to be quite active due to a very high flow established between drywell and wetwell as a result of steaming and condensing phenomenon (Ref. 9.5, Table 2). The mixing over the remaining course of the accident (after 2 hours) has been accepted by the Staff in the previous AST license amendments for Dresden 2 & 3, Fermi 2, Vermont Yankee, and Quad Cities 1 & 2.

2.1.3 Reduction In Airborne Activity Inside Containment

The gravitational deposition of aerosols from the containment atmosphere is credited by using the RADTRAD "POWERS MODEL" with 10 percentile uncertainty distribution resulting in the lowest removal rate of the aerosols from the containment. Iodine removal by suppression pool scrubbing is not credited because the bulk core activity is released to containment well after the initial mass and energy release. Although containment sprays are not credited, the removal of the elemental iodine by wall

deposition on wetted surfaces inside containment is modeled in accordance with SRP 6.5.2. The Decontamination Factor (DF) of elemental iodine is based on the Standard Review Plan (SRP) 6.5.2 guidance and is limited to a DF of 200 (see Section 7.8) (Ref. 9.9, page 6.5.2-12). The RADTRAD code calculates the elemental and organic iodine atoms in the drywell atmosphere. The following procedure is established to calculate the cutoff time of the elemental iodine removal by wall deposition inside the drywell:

1. The isotopic elemental iodine atoms are calculated using the atoms/curie relationship established in Table 8.
2. The initial isotopic elemental iodine activity in the drywell is determined based on the RG 1.183 (Section 3.2 Table 1 and Section 3.5), which is 4.85% of the total 30% iodine released in the drywell (Ref. 9.1, Table 1) (see Table 9).
3. The initial isotopic elemental iodine atoms in the drywell are totaled and then divided by the Decontamination Factor of 200 to determine the elemental iodine atoms expected to be in the drywell when the DF of 200 is reached, which is 3.355E+20 atoms (Table 9).
4. The containment leakage case is analyzed in RADTRAD Run PB3DCL00.o0 (Attachment D) using an elemental iodine removal rate of 3.36 hr^{-1} for the first 2.0 hours of the accident, and then an elemental iodine removal rate of 1.86 hr^{-1} for the remainder of the accident as calculated in Section 7.8. This RADTRAD run provides the elemental iodine atoms in the drywell at different time intervals. RADTRAD output PB3DCL00.o0 indicates the drywell elemental iodine atoms reach to a value of 3.355E+20 by 3.85 hrs.

This means that an elemental iodine DF of 200 is reached in the drywell by 3.85 hrs. Elemental iodine wall removal is not credited in the analysis beyond this time.

2.1.4 Activity Transport To Environment

The RB drawdown time of 3 minutes is conservatively used instead of the maximum drawdown time of 2 minutes allowed by PBAPS technical specification LCO Surveillance Requirement 3.6.1.4.3 (Ref. 9.4.2). The post-LOCA main CR emergency ventilation (MCREV) system initiation time is conservatively delayed for 30 minutes. The use of a very large CR unfiltered inleakage during this 30 minutes delay produces a non-conservative CR dose for the RB with a drawdown time. Therefore, a parametric study was performed to determine the CR unfiltered inleakage during the isolation delay, which maximizes the CR dose. The result of the parametric study is plotted in Figure 1 and indicates that a CR unfiltered inleakage of 18,500 cfm results in a maximum CR dose due to the containment leakage pathway. This CR unfiltered inleakage rate is used in the analysis for the first 30 minutes. The reduction in the containment leakage is not credited in the analysis. The containment leakage during and following the reactor building drawdown is assumed to be directly released to the atmosphere via the reactor building (RB) stack and off-gas stack, respectively, without being filtered through the SGTS charcoal and HEPA filters as shown Figure 2.

2.1.5 Dual Containment

Leakages from the primary containment and ESF are postulated to directly release to the environment without mixing in the RB free air volume. Leakage from the primary containment is assumed to be released directly to the environment as a ground-level release before drawdown time and as an elevated release through the main stack after drawdown time. The MSIV leakage that bypasses the RB is discussed in Section 2.3.

2.1.6 Containment Purging

A Technical Specification requirement to limit the PBAPS Units 2 & 3 annual containment purge time is proposed in the AST License Amendment Request, which eliminates the need to consider containment purge during a LOCA. Therefore, the release from containment purging is not analyzed per RG 1.183, Section A.7.

2.2 Post-LOCA ESF Leakage

The post-LOCA ESF leakage release model is shown in Figure 2. The ESF systems that recirculate suppression pool water outside of the primary containment are assumed to leak during their intended operation. This release source includes leakage through valve packing glands, pump shaft seals, flanged connections, and other similar components. The radiological consequences from the postulated leakage are analyzed and combined with the radiological consequences from other fission product release paths to determine the total calculated radiological consequences from the LOCA (see Section 8.1 of this calc). The ESF components are located in the RB.

2.2.1 Source Term

With the exception of noble gases, all the fission products released from the fuel to the containment (as defined in Sections 5.3.1.3 & 5.3.1.5) are assumed to instantaneously and homogeneously mix in the suppression pool water at the time of release from the core. The total ESF leakage from all components in the ESF systems is assumed to be 10 gpm, which is equal to 2 times the expected leakage of 5 gpm (Ref. 9.1, Section A.5.2) and assumed to start immediately after the onset of a LOCA. With the exception of iodine, all remaining fission products in the recirculating liquid are assumed to be retained in the liquid phase. Since the post-LOCA temperature of torus water recirculated through the ESF system is less than 212°F (Ref. 9.17, Attachment 1), 10% of the iodine activity in the ESF leaked liquid is assumed to become airborne. The design inputs for the ESF leakage are shown in Sections 5.4.1 through 5.4.9. The reduction in ESF leakage activity by dilution in the RB volume and removal by the SGT filtration are not credited.

2.2.2 Chemical Form

The radioiodine that is postulated to be available for release to the environment due to ESF leakage is assumed to be 97% elemental and 3% organic (Ref. 9.1, Section A.5.6).

2.3 Post-LOCA MSIV Leakage

The MSIV leakage is postulated to release to the environment through the MSIV failed steam line and one of the three remaining intact steam lines. Each release path consists of two well-mixed volume nodes consistent with the AEB 98-03 (Ref. 9.5, Appendix A) two segment nodalization – piping between the Reactor Pressure Vessel (RPV) nozzle to outboard MSIV and that between the outboard MSIV to Turbine Stop Valve (TSV). The well-mixed two volume nodes eliminate the potential variation of aerosol settling velocities in the multiple volume nodes resulting from the different temperature/pressure boundary conditions and remove the in-series configuration of the aerosol and elemental iodine removal efficiencies in the multiple volume nodes, which is believed to underestimate the resulting dose.

The post-LOCA MSIV Leakage model is shown in Figures 3 & 4. The four main steam lines, which penetrate the primary containment, are automatically isolated by the MSIVs in the event of a LOCA. There are two MSIVs on each steam line, one inside containment and one outside containment. The MSIVs are functionally part of the primary containment boundary and design leakage through these valves provides a leakage path for fission products that bypass the secondary containment and enter the environment as a ground-level release. Following the initial blowdown of the reactor pressure vessel, the steaming in the RPV carries fission products to the containment. When core cooling is restored, the fuel damage is terminated. The steam and the ESF flow carry any remaining fission products from the vessel, through the break, to the primary containment and provides new steam flow for rapid drywell-suppression air space mixing. The main steam isolation valves (MSIVs) are postulated to leak at a total design leak rate of 360 scfh at 49.1 psig. The radiological consequences from postulated MSIV leakage are analyzed and combined with the radiological consequences postulated for other fission product release paths to determine the total calculated radiological consequences from the LOCA (see Section 8.1 of this calc). The following assumptions are used for evaluating the consequences of MSIV leakage.

2.3.1 Source Term

For the purpose of this analysis, the activity available for release via MSIV leakage is assumed to be that time dependent activity released into the drywell.

A total of 360 scfh MSIV leakage is assumed to occur as follows (see Section 2.3.2 for additional information regarding steam line selection):

(1) 205 scfh through the shortest steam line. This line is modeled as having the failed inboard MSIV. Conservatively, the deposition of aerosol and removal of elemental iodine activities are not credited in the steam line between the RPV nozzle and the outboard MSIV. The deposition of aerosols and removal of elemental iodine are conservatively credited only in the horizontal pipe between the outboard MSIV and turbine stop valve (TSV) for 0-24 hrs only.

(2) 155 scfh through shortest of the three intact steam lines. The deposition of aerosol and removal of elemental iodine activities are conservatively credited only in the horizontal pipe segments between the RPV nozzle and TSV for 0-24 hrs only.

(3) 0 scfh through second shortest intact steam line.

(4) 0 scfh through the fourth (intact) steam line.

Since the shortest steam line is allotted the maximum allowed leakage, it is assured that leakage through any other line is bounded.

The aerosol deposition removal efficiencies for the main steam lines are determined based on the methodology in Appendix A of AEB-98-03 (Ref. 9.5) using only the horizontal pipe projected area (Diameter x Length) as shown in Tables 3 through 6 using the information in Sections 7.3 & 7.4. The natural removal efficiency for elemental iodine in each steam line volume is assumed to be 50% as recommended in the AEB 98-03, Appendix B, page B-3. The post-LOCA time dependent MSIV leakage rates through the MSIV failed line and intact line are calculated in Section 7.2 and listed in Table 7.

2.3.2 Determination of MSIV Leak Rates In Various Steam Line Volumes

The main steam piping layouts in the drywell through main steam tunnel to the TSV are shown in the piping isometric drawings in References 9.15 & 9.16 with the piping parameters. The review of these isometric drawings indicates that the Unit 2 steam header A and the Unit 3 steam header D share the same shortest horizontal pipe length between the outboard MSIV and TSV, which provides the minimum horizontal pipe surface area and consequently results in the least aerosol deposition (see Table 3). Therefore, the selection of the two shortest steam headers in either unit is limited to those that result in the least aerosol removal efficiency, which in turn can be determined by the horizontal pipe volumes. The main steam piping volumes and horizontal pipe surface are calculated in Section 7.3 and listed in Tables 3, 3A, & 4. The rate constant (λ_s) for different piping segments in the MSIV leakage release paths are calculated in Table 5 using 40 percentile aerosol settling velocity (Ref. 9.5, Appendix A, Table A-1) and applicable horizontal settling areas and volumes from Table 4. The aerosol removal efficiencies due to gravitational depositions on the horizontal pipe surfaces are calculated using the mass balance equation for the well mixed volumes in Section 7.4 and listed in Table 6.

The total MSIV leakage from all main steam lines is proposed to increased from 46 scfh measured at 25 psig to 360 scfh measured at 49.1 psig, allowing a maximum of 205 scfh from any one of the 4 main steam lines. The total MSIV leak of 360 scfh is converted using the ideal gas law to determine the actual leakage (cfh) using the post-LOCA peak temperature and pressure in Section 7.2. Since the actual MSIV leak rate is reduced at the accident condition due to the combined effects of compression (due to the high pressure) and expansion (due to the high temperature), the increase in the MSIV leak rates to the environment from the TSVs are conservatively calculated in Section 7.2 using the Ideal Gas Law and drywell post-LOCA peak pressure and temperature and listed in Table 7. The MSIV leak rates in Table 7 are used in the analysis with aerosol removal efficiencies calculated in Table 6 based on the horizontal pipe surface areas calculated in Section 7.3. To account for the assumed mixing between the wetwell and drywell after 2 hours and the resulting activity dilution, the flow rate through the MSIVs is reduced by the ratio of the drywell volume to the total volume at two hours (Section 7.2).

2.3.3 Recirculation Line Rupture Vs Main Steam Line Rupture

Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 defines LOCAs as those postulated accidents that result from a loss of coolant inventory at rates that exceed the capability of the reactor coolant makeup system. Leaks up to a double-ended rupture of the largest pipe of the reactor coolant system are included. The LOCA, as with all design basis accidents (DBAs), is a conservative surrogate accident that is intended to challenge selective aspects of the facility design. With regard to radiological consequences, a large-break LOCA is assumed as the design basis case for evaluating the performance of release mitigation systems and the containment response. Therefore, a recirculation line rupture is considered as the initiating event rather than a main steam line rupture.

Per UFSAR Section 6.2 (Ref. 9.27.c), the DBA for the safety related system design is a LOCA. This LOCA leads to a specific combination of dynamic, quasi-static, and static loads in time. The thermal transient due to other postulated events including the steam line break inside the drywell does not impose maximum challenge to drywell pressure boundary and fuel integrity. The LOCA results in the maximum core damage and fission product release as shown in the RG 1.183 (Ref. 9.1, Table 1). Therefore, a recirculation line rupture is considered to be the limiting event with respect to radiological consequences.

RG 1.183 (Ref. 9.1, Appendix A, Section 6.5) allows reduction in MSIV releases that is due to holdup and deposition in main steam piping downstream of the MSIVs and in the main condenser, including the

treatment of air ejector effluent by offgas systems, if the components and piping systems used in the release path are capable of performing their safety function during and following a safe shutdown earthquake (SSE). Although postulating a main steam line break in one steam line inside the drywell would maximize the dose contribution from the MSIV leakage, the steam line break is not a credible event during a LOCA, since the ASME Category 1 main steam piping is designed to withstand the SSE. However, such a break is also assumed for the purpose of this analysis.

2.4 Control Room Model

The CR shielding information is used in a reasonably conservative manner to calculate the CR doses.

The post-LOCA control room RADTRAD nodalization is shown in Figure 5. The post-LOCA radioactive releases that contribute to the CR TEDE dose are as follows:

- Post-LOCA Containment Leakage
- Post-LOCA ESF Leakage
- Post-LOCA MSIV Leakage

The radioactivity from the above sources is assumed to be released into the environment and transported to the CR air intake, where it may leak into the CR envelope or be filtered by the CR intake filtration system prior to being distributed in the CR envelope. The four major radioactive sources (Ref. 9.1, Section 4.2.1) which contribute to the CR TEDE dose are:

- Post-LOCA airborne activity inside the CR
- Post-LOCA airborne cloud external to CR
- Post-LOCA containment shine to CR
- Post-LOCA Main Control Room Emergency Ventilation (MCREV) filter shine

2.4.1 Post-LOCA Airborne Activity Inside CR

The post-LOCA radioactive releases from various sources are shown in Figures 2, 3, & 4. The activities released from the various sources are diluted by atmospheric dispersion and carried to the CR air intake. The atmospheric dispersion factors are shown in Sections 5.6.7 & 5.6.8 for the containment/ESF and MSIV leakages, respectively. The containment and ESF leakages have the same release point (Main Stack) and χ/Qs. The MCREV system supply fans and associated HVAC ducts are located in the Radwaste building (Refs. 9.28.b & 9.30). The radwaste and control room air supplies share the same air intake louvers (Ref. 9.29.c). Therefore, the CR air intake X/Qs are used for both the CR airborne activity and unfiltered inleakage. The RADTRAD models are developed for each release path using appropriate design inputs from Sections 5.3 through 5.6. The CR dose model is developed using the design input parameters in Section 5.6. The CR airborne TEDE dose contributions from the above post-LOCA airborne sources are calculated and tabulated in Section 8.1.

2.4.2 Post-LOCA Airborne Cloud External to CR

The post-LOCA radioactive plume contains the radioactive sources from the containment, ESF, and MSIV leakages. The PBAPS combined CR is located at the center of the plant in the turbine building at EL 165'-0" between Columns 18 & 23 and Rows J & M (Ref. 9.28.b). The gamma radiation external radioactive plume shine to the CR personnel is attenuated by the 2'-6" minimum concrete ceiling thickness (Ref. 9.25.g). The RADTRAD3.03 code calculates the whole body gamma dose based on the

semi-infinite cloud immersion at the site boundary (Ref. 9.2, Section 2.3.1 and Ref. 9.1, Section 4.1.4). Since the containment and ESF leakages contribute insignificant whole body dose to the CR operator (PB3D185CL.o0 & PB10G185ES.o0), they are not considered important sources for the external cloud dose. Therefore only MSIV leakage path is evaluated to determine the external cloud dose to the CR operator. The χ/Qs for the LPZ receptor modeled in RADTRAD file PB360MS205.psf are modified by replacing them with the χ/Qs for the CR air intake location. The resulting LPZ whole body dose is the semi-infinite gamma dose at the CR air intake. The total whole body gamma dose is 29.30 rem, which is obtained from RADTRAD run PB360MS2051.o0. Since this is a semi-infinite dose at the CR air intake, it is conservative to assign this dose to the CR roof. The gamma attenuation factor is calculated in Section 7.6 to be 0.000395 for a 1 Mev gamma emission. This attenuation factor includes the buildup due to multiple scattering. The resulting gamma dose from the external cloud shine would be 1.16E-02 rem (= 29.30 rem x 0.000395), which is added to the dose contributions from other post-LOCA sources in Section 8.1.

2.4.3 Post-LOCA Containment Shine to CR

The CR location with respect to the reactor building (RB) is shown in Reference 9.28.b. The post-LOCA airborne activity in the containment (drywell) is released into the reactor building (RB) via containment leakage through the penetrations and openings. The major drywell penetrations including the personnel airlock, equipment & CRD removal hatches, and large bore main steam and feedwater piping are located between elevations 135'-0" and 165'-0" (Ref. 9.26). The RB concrete shielding surrounding the penetration area varies from 3'-0" at EL 135'-0" (Refs. 9.25.a & 9.25.c) to 3'-6" at EL 165'-0" (Refs. 9.25.d & 9.25.f). The direct shine dose through the RB penetrations is insignificant due to the large distances between the penetrations and CR panels and the associated concrete shielding (Ref. 9.25). The post-LOCA containment and ESF leakage activities are assumed to be uniformly distributed inside the RB. The airborne activity confined in the space above the operating floor of the RB (Refs. 9.25.d & 9.28.e) contributes direct shine dose to the CR operator. The containment and ESF leakages in Sections 2.1 & 2.2 are conservatively modeled to postulate the activities from the leakages directly released to the environment without mixing in the RB. Actually, the activity from these leakages is released to, and mixed in, the RB volume and then released to the environment via the SGT system at a rate of 10,500 cfm (Ref. 9.4.3). The RADTRAD runs PB3D185CL.psf and PB10G185ES.psf are revised to model the containment & ESF leakages released to the RB and then released to the environment via the SGT system at a rate of 10,500 cfm to calculate the post-LOCA activity in the RB. The post-LOCA containment leakage & ESF leakage time dependent isotopic activities inside the RB are obtained from the RADTRAD runs PB3D185CLSH.o0 and PB10G185ESSH.o0 and listed in Tables 20 & 21, respectively, and then combined in Table 22 for time periods from 0 to 96 hrs (the activities at time periods from 96 to 720 hours are conservatively modeled with the activities at 96 hours.).

The RB concrete shielding on the operating floor at EL 234'-0" and the CR concrete shielding are shown in References 9.25.h through 9.25.k and References 9.25.o & 9.25.p, respectively. The shielding configuration is shown in Figures 6 & 7. The concrete block wall/steel shielding on the RB operating floor and multiple concrete floor shadow shielding are conservatively not credited in the analysis. The containment shine dose is calculated for the Unit 2 CR, which is equally applicable to Unit 3 due to the symmetrical shielding geometry (Refs. 9.25.h through 9.25.k and References 9.25.o & 9.25.p). The shielding geometry information including the source volume, line of sight distance, and intercepting concrete thickness are calculated in Section 7.9. The resulting time dependent CR containment shine dose is calculated in Section 7.10 based on the dose rates and integrated dose listed in Table 23. The post-LOCA containment shine dose is listed in Section 8.1.

2.4.4 Post-LOCA MCREV Filter Shine

The PBAPS combined CR is located at the center of the plant in turbine building at EL 165'-0" between Columns 18 & 23 and Rows J & M (Ref. 9.28.b). The MCREV charcoal filter is located in the radwaste building at EL 165'-0", northwest of the CR panels (Ref. 9.28.b) between Columns 23 & 21.4 and Rows H & G (Ref. 9.30). The charcoal trays are located approximately 4'-3" (10'-0" – (3'-0" + 2'-9") = 4'-3") west of Row H (Refs. 9.24 & 9.30.c). The concrete wall between the MCREV charcoal filter and CR panel is 3'-0" (Refs. 9.25.d & 9.25.e). The charcoal bed dimension is 2'6" x 6'-6" x 2'-0" (approximately) (Ref. 9.24). The charcoal bed is conservatively modeled as a rectangular source of 2'-0" x 2'-0" x 4'-0" at approximately 24'-0" from the concrete wall at Row J. In actuality, the separation distance is approximately 28'-6", representing the distance between Row H & J = 24'- 3" (Ref. 9.25.e) + 4'-3" (Distance between Row H & charcoal bed). The post-LOCA CR doses listed in Section 8.1 indicate that the MSIV leakage contribute the maximum dose to the CR operator. Therefore, the MSIV leakage path is used to assess iodine and aerosol activity buildup on the CR charcoal filter in the following section and the resulting CR filter shine dose is adjusted for the containment & ESF leakage dose contributions in Section 7.12.

The RADTRAD3.03 code calculates the cumulative elemental and organic iodine atoms and the aerosol mass released to the environment from the main steam lines due to MSIV leakage at various time steps. The activity released to the environment is atmospherically dispersed to the control room HVAC intake louvers, where it is drawn into the MCREV System. Section 7.12 and Tables 10 through 19 calculate the total elemental and organic iodine atoms and aerosol mass drawn into, and retained on, the MCREV charcoal and HEPA filters. Section 7.12 conservatively neglects decay of the isotopes deposited on the MCREV filters.

2.4.4.1 Post-LOCA Iodine Activity On CR Charcoal Filter – MSIV Leakage

The iodine atom/curie relationship is established using the containment leakage run PB3D185CL.o0 file as shown in Table 8, which is a typical relationship for all release paths. The total number of atoms accumulated on the charcoal filter is established in Section 7.12 based on the charcoal filter efficiency and MCREV intake flow rate. The MCREV charcoal filter efficiency is conservatively assumed to be 99% instead of 89% to maximize the filter shine dose. Knowing the iodine atom/curie relationship (Table 8), the total number of elemental and organic iodine atoms on the charcoal filter due to the MSIV leakage is calculated in Tables 10 through 13 and 16). The review of Table 16 indicates the accumulation of iodine is insignificant. This is as expected, because most of the elemental iodine is removed by elemental deposition in the main steam piping before it is released to the environment and it is further reduced by air dilution before it migrates to the CR air intake.

2.4.4.2 Post-LOCA Aerosol Activity On CR HEPA Filter – MSIV Leakage

The aerosol mass/curie relationship is established using the containment leakage run PB3D185CL.o0 file as shown in Table 17, which is a typical relationship for all release paths. The total aerosol mass deposited on the MCREV HEPA filter due to the MSIV leakage is calculated in Table 18 based on the HEPA filter efficiency and MCREV intake flow rate. Knowing the aerosol mass/curie relationship (Table 17), and the total mass of aerosols on the HEPA filter (Table 15), the isotopic aerosol activities deposited on the MCREV filter due to the MSIV leakage is calculated in Table 18. The isotopic aerosol activity in Table 18 is insignificant. This is as expected, because most of the aerosols deposit out in the main steam piping horizontal surface before being released to the environment (see Table 6 for the aerosol removal efficiencies due to gravitational deposition). The total post-LOCA iodine and aerosol activity accumulated on the MCREV charcoal and HEPA filters are listed in Table 19.

2.4.4.3 Shielding Analysis - MCREV Charcoal Filter

The MicroShield computer code (Ref. 9.23) is used to calculate the post-LOCA MCREV charcoal filter shine dose CR operator. The post-LOCA iodine and aerosol activity in Table 19 is uniformly distributed on the charcoal bed of 2'-0 x 2'-0" x 4'-0" with a 3'-0" concrete wall (Ref. 9.25.e) located at 24'-0" from the charcoal bed with a dose point located 1'0" from the concrete wall at the center of the source in the CR. This MicroShield direct dose model is very conservative with respect to the locations of MCREV charcoal filter, filter dimensions, and CR operator normal occupancy in vicinity of the CR panels (see drawing M-4 (Ref. 9.28.b)). The CR direct dose rate from the MCREV filter shine is calculated to be 4.012E-03 mrem/hr (MicroShield Run PBFLTSH.MS5). The CR filter shine dose is calculated in Section 7.12.

3.0 ACCEPTANCE CRITERIA

The following NRC regulatory requirement and guidance documents are applicable to this PBAPS Alternative Source Term LOCA Calculation:

- Regulatory Guide 1.183 (Ref. 9.1)
- 10CFR50.67 (Ref. 9.3)
- Standard Review Plan section 15.0.1 (Ref. 9.22)

Dose Acceptance Criteria are:

Regulatory Dose Limits

Dose Type	Control Room (rem)	EAB and LPZ (rem)
TEDE Dose	5	25

4.0 ASSUMPTIONS

The following assumptions used in evaluating the offsite and control room doses resulting from a Loss of Coolant Accident (LOCA) are based on the requirements in Regulatory Guide 1.183 (Ref. 9.1). These assumptions become the design inputs in Sections 5.3 through 5.7 and are incorporated in the analyses.

4.1 Source Term Assumptions

Acceptable assumptions regarding core inventory and the release of radionuclides from the fuel are provided in Sections 3.1 through 3.4 of Reference 9.1 as follows:

4.2 Equilibrium Core Inventory

The assumed inventory of fission products in the reactor core and available for release to the containment is based on the maximum power level of 3,528 MWt, which includes 0.4% margin for instrument uncertainty relative to the rated thermal power of 3,514 MWt after the 1.62% Caldon power uprate and 100 days into cycle to ensure that all short-lived isotopes are at equilibrium levels (Ref. 9.6, Attachment A, Sections 2.0, 4.4, and 5.4). The equilibrium core inventory is described in Design Input 5.3.1.3 and obtained from Table 2.

4.3 Release Fractions and Timing

The core inventory release fractions, by radionuclide groups, for the gap release and early in-vessel damage for a Design Basis Accident (DBA) LOCA are listed in Design Input 5.3.1.6. These fractions are applied to the equilibrium core inventory (Ref. 9.1, Tables 1 & 4). The release fractions are acceptable for use given that the peak fuel burnup meets the 62,000 MWD/MTU requirement specified in Regulatory Guide 1.183 (Ref. 9.1, Note 10). The maximum fuel burnup of 37,700 MWD/MTU used to calculate the core inventory is less than 62,000 MWD/MTU.

4.4 Radionuclide Composition

The elements in each radionuclide group to be considered in design basis analyses are shown in Design Input 5.3.1.4 (Ref. 9.1, Section 3.4).

4.5 Chemical Form

The long-term suppression pool water pH is greater than 7 during a LOCA (Ref. 9.12, page 11). Consequently, the chemical forms of radioiodine released to the containment can be assumed to be 95% cesium iodide (CsI), 4.85 percent elemental iodine, and 0.15 percent organic iodide (Ref. 9.1, Sections 3.5 and A.2). These are shown in Design Input 5.3.1.7. With the exception of elemental and organic iodine and noble gases, fission products are assumed to be in particulate form (Ref. 9.1, Sections 3.5 and A.2).

4.6 Assumptions for Activity Transport in Primary Containment

4.6.1 The radioactivity released from the fuel is assumed to mix instantaneously and homogeneously throughout the free air volume of the primary containment. The radioactivity released from the fuel doesn't mix with the suppression pool air space until after two hours.

4.6.2 Reduction in airborne radioactivity in the containment by natural deposition within the containment is credited using the RADTRAD3.03 Powers model for aerosol removal coefficient with a 10-percentile probability (Ref. 9.1, Section A.3.2; & Ref. 9.2, Section 2.2.2.1.2).

4.6.3 The primary containment and the MSIVs are assumed to leak at the allowable Technical Specification peak pressure leak rate for the first 38 hours, and then reduced to 50% of the Technical Specification peak pressure leak rate (Ref. 9.1, Section A.3.7; & Ref. 9.4.7).

4.6.4 A requirement for an annual limit for purge of the PBAPS Units 2 & 3 containment to relieve containment pressure or to reduce containment hydrogen concentration is a part of the License Amendment Request for the AST. Therefore, the release from containment purging is not analyzed during the LOCA.

4.7 Offsite Dose Consequences

The following assumptions are used in determining the TEDE for a maximum exposed individual at EAB and LPZ locations:

4.7.1 The offsite dose is determined as a TEDE, which is the sum of the committed effective dose equivalent (CEDE) from inhalation and the deep dose equivalent (DDE) from external exposure from all radionuclides that are significant with regard to dose consequences and the released radioactivity (Ref. 9.1, Section 4.1.1; and Refs. 9.7 & 9.8). The RADTRAD3.03 computer code (Ref. 9.2) performs this summation to calculate the TEDE.

4.7.2 The offsite dose analysis uses the Committed Effective Dose Equivalent (CEDE) Dose Conversion Factors (DCFs) for inhalation exposure (Ref. 9.1, Section 4.1.2; and Ref. 9.7).

4.7.3 Since RADTRAD3.03 calculates Deep Dose Equivalent (DDE) using whole body submergence in semi-infinite cloud with appropriate credit for attenuation by body tissue, the DDE can be assumed nominally equivalent to the Effective Dose Equivalent (EDE) from external exposure. Therefore, the offsite dose analysis uses EDE in lieu of DDE Dose Conversion Factors in determining external exposure (Ref. 9.1, Section 4.1.4; and Ref. 9.8).

4.7.4 The maximum EAB TEDE for any two-hour period following the start of the radioactivity release is determined and used in determining compliance with the dose acceptance criteria in 10 CFR 50.67 (Ref. 9.1, Section 4.1.5 & Section 4.4; and Ref. 9.3).

EAB Dose Acceptance Criteria: 25 Rem TEDE (Ref. 9.3, paragraph 50.67(b)(2)(i))

4.7.5 TEDE is determined for the most limiting receptor at the outer boundary of the low population zone (LPZ) and is used in determining compliance with the dose criteria in 10 CFR 50.67 (Ref. 9.1, Sections 4.1.6 and 4.4; and Ref. 9.3).

LPZ Dose Acceptance Criteria: 25 Rem TEDE (Ref. 9.3, paragraph 50.67(b)(2)(ii))

4.7.6 No correction is made for depletion of the effluent plume by deposition on the ground (Ref. 9.1, Section 4.1.7).

4.7.7 The breathing rates used for persons at offsite locations are given in Reference 9.1, Sections 4.1.3 & 4.1.5. These rates are incorporated in Design Inputs 5.7.3 & 5.7.6.

4.8 Control Room Dose Consequences

The following guidance is used in determining the TEDE for maximum exposed individuals located in the control room:

4.8.1 The CR TEDE analysis considers the following sources of radiation that will cause exposure to control room personnel (Ref. 9.1, Section 4.2.1). See applicable Design Inputs 5.6.1 through 5.6.10.

- Contamination of the control room atmosphere by the intake or infiltration of the radioactive material contained in the post-accident radioactive plume released from the facility (via CR air intake),
- Contamination of the control room atmosphere by the intake or infiltration of airborne radioactive material from areas and structures adjacent to the control room envelope (via CR unfiltered inleakage),
- Radiation shine from the external radioactive plume released from the facility (external airborne cloud),
- Radiation containment shine from radioactive material in the reactor containment, and
- Radiation shine from radioactive material in systems and components inside or external to the control room envelope, e.g., radioactive material buildup in recirculation filters (CR filter shine dose).

4.8.2 The radioactivity releases and radiation levels used for the control room dose are determined using the same source term, transport, and release assumptions used for determining the exclusion area boundary (EAB) and the low population zone (LPZ) TEDE values (Ref. 9.1, Section 4.2.2).

4.8.3 The occupancy and breathing rate of the maximum exposed individual present in the control room are incorporated in Design Inputs 5.6.9 & 5.6.10 (Ref. 9.1, Section 4.2.6).

4.8.4 10 CFR 50.67 (Ref. 9.3) establishes the following radiological criterion for the control room. This criterion is stated for evaluating reactor accidents of exceedingly low probability of occurrence and low risk of public exposure to radiation, e.g., a large-break LOCA (Ref. 9.1, Section 4.4).

CR Dose Acceptance Criteria: 5 Rem TEDE (Ref. 9.3, paragraph 50.67(b)(2)(iii))

4.8.5 Credit for engineered safety features that mitigate airborne activity within the control room is taken for control room isolation/pressurization and intake filtration (Ref. 9.1, Section 4.2.4). The control room design is often optimized for the DBA LOCA and the protection afforded for other accident sequences may not be as advantageous. In most designs, control room isolation is actuated by engineered safety feature (ESF) signals or radiation monitors (RMs). In some cases, the ESF signal is effective only for selected accidents, placing reliance on the RMs. Several aspects of RMs can delay the isolation, including the delay for activity to build up to concentrations equivalent to the alarm setpoint and the effects of different radionuclide accident isotopic mixes on monitor response. The MCREV system is conservatively assumed to be initiated at 30 minutes (Design Input 5.6.2) after a LOCA (refer to Figure 5).

4.8.6 The CR unfiltered inleakage is conservatively assumed to be 18,500 cfm during normal mode of CR HVAC operation (Design Input 5.6.4) based on the parametric study performed to determine the unfiltered inleakage to maximize CR dose as shown in Figure 1. The modeled unfiltered inleakage rates include ingress/egress inleakage of 10 cfm. The atmospheric dispersion factors generated for the CR intake are representative for control room inleakage.

4.8.7 No credits for KI pills or respirators are taken (Ref. 9.1, Section 4.2.5).

5.0 DESIGN INPUTS

5.1 General Considerations

5.1.1 Applicability of Prior Licensing Basis

The implementation of an AST is a significant change to the design basis of the facility and assumptions and design inputs used in the analyses. The characteristics of the AST and the revised TEDE dose calculation methodology may be incompatible with many of the analysis assumptions and methods currently used in the facility's design basis analyses. The Peach Bottom Atomic Power Station specific design inputs and assumptions used in the TID-14844 analyses were assessed for their validity to represent the as-built condition of the plant and evaluated for their compatibility to meet the AST and TEDE methodology. The analysis in this calculation ensures that assumptions, design inputs, and methods are compatible with the requirements of the AST and the TEDE criteria.

5.1.2 Credit for Engineered Safety Features

Credit is taken only for those accident mitigation features that are classified as safety-related, are required to be operable by technical specifications, are powered by emergency power sources, and are either automatically actuated or, in limited cases, have actuation requirements explicitly addressed in emergency operating procedures. The single active component failures modeled in this calculation are the MSIV in one main steam line failing to close and the operation of the MCREV system failing to start by safety related CR intake monitors, which are required to be operable by TS surveillance (Ref. 9.4.6).

5.1.3 Assignment of Numeric Input Values

The numeric values that are chosen as inputs to analyses required by 10 CFR 50.67 are compatible to AST and TEDE dose criteria and selected with the objective of maximizing the postulated dose. As a conservative alternative, the limiting value applicable to each portion of the analysis is used in the evaluation of that portion. The use of containment, ESF, and MSIV leakage values higher than actually measured, 30 minutes delay in the CR Emergency Ventilation Mode initiation time, no aerosol & elemental iodine removal after 96 hrs, no MSIV leakage reduction, no aerosol & elemental iodine removal in the failed MSIV line between the RPV nozzle and outboard MSIV for entire duration of a LOCA, total MSIV leakage distribution among two lines instead of four lines, and use of ground release χ/Qs for the containment & ESF leakages during the drawdown time demonstrate the inherent conservatisms in the plant design and post-accident response.

5.1.4 Meteorology Considerations

Atmospheric dispersion factors (χ/Qs) for the onsite release points such as the Main stack for containment and ESF leakage release path and the TB/RB exhaust vent for the MSIV leakage release path are developed (Ref. 9.11) using PBAPS plant specific meteorology and the NRC sponsored computer code ARCON96. The EAB and LPZ χ/Qs are developed using the PBAPS plant specific meteorology and the NRC sponsored computer code PAVAN (Ref. 9.11).

5.2 Accident-Specific Design Inputs/Assumptions

The design inputs/assumptions utilized in the EAB, LPZ, and CR habitability analyses are listed in the following sections. The design inputs are compatible with the requirements of the AST and TEDE dose criteria and the assumptions are consistent with those identified in Section 3 of Appendix A of RG 1.183 (Ref. 9.1). The design inputs and assumptions in the following sections represent the as-built design of the plant.

Design Input Parameter	Value Assigned	Reference
5.3 Containment Leakage Model Parameters		
5.3.1 Source Term		
5.3.1.1 Thermal Power Level	3,528 MWt (includes 0.4% margin relative to rated thermal power of 3,514 MWt)	9.6, Attachment A, Section 2.0
5.3.1.2 Extended Cycle Fuel Burnup	37.7 GWD/MTU	Table 2

5.3.1.3 Isotopic Core Inventory (Ci/MWt) (Table 2)

Isotope	Ci/MW_t	Isotope	Ci/MW_t	Isotope	Ci/MW_t
CO-58*	1.529E+02	RU-103	4.202E+04	CS-136	2.027E+03
CO-60*	1.830E+02	RU-105	2.908E+04	CS-137	4.538E+03
KR-85	3.946E+02	RU-106	1.730E+04	BA-139	5.084E+04
KR-85M	8.313E+03	RH-105	2.752E+04	BA-140	4.896E+04
KR-87	1.633E+04	SB-127	2.896E+03	LA-140	5.019E+04
KR-88	2.303E+04	SB-129	8.638E+03	LA-141	4.640E+04
RB-86	6.518E+01	TE-127	2.873E+03	LA-142	4.532E+04
SR-89	2.798E+04	TE-127M	3.855E+02	CE-141	4.492E+04
SR-90	3.178E+03	TE-129	8.501E+03	CE-143	4.427E+04
SR-91	3.801E+04	TE-129M	1.267E+03	CE-144	3.596E+04
SR-92	4.017E+04	TE-131M	3.869E+03	PR-143	4.293E+04
Y-90	3.272E+03	TE-132	3.821E+04	ND-147	1.838E+04
Y-91	3.448E+04	I-131	2.687E+04	NP-239	5.397E+05
Y-92	4.029E+04	I-132	3.881E+04	PU-238	1.796E+02
Y-93	4.526E+04	I-133	5.556E+04	PU-239	1.200E+01
ZR-95	4.489E+04	I-134	6.165E+04	PU-240	1.288E+01
ZR-97	4.657E+04	I-135	5.192E+04	PU-241	6.182E+03
NB-95	4.512E+04	XE-133	5.491E+04	AM-241	9.528E+00
MO-99	5.078E+04	XE-135	2.228E+04	CM-242	2.388E+03
TC-99M	4.447E+04	CS-134	7.280E+03	CM-244	2.602E+02

* CO-58 & CO-60 activities are obtained from RADTRAD User's Manual, Table 1.4.3.2-3 (Ref. 9.2)

5.3.1.4 Radionuclide Composition

Group	Elements	
Noble Gases	Xe, Kr	9.1, Section 3.4, Table 5
Halogens	I, Br	
Alkali Metals	Cs, Rb	
Tellurium Group	Te, Sb, Se	
Barium, Strontium	Ba, Sr	
Noble Metals	Ru, Rh, Pd, Mo, Tc, Co	
Lanthanides	La, Zr, Nd, Eu, Nb, Pm, Pr, Sm, Y, Cm, Am	
Cerium	Ce, Pu, Np	

Design Input Parameter	Value Assigned	Reference
5.3.1.5 Timing of Release Phase (Ref. 9.1, Section 3.3, Table 4)		
Phase	**Onset**	**Duration**
Gap Release	2 min	0.5 hr
Early In-Vessel Release	0.5 hr	1.5 hr
5.3.1.6 Release Fraction (Ref. 9.1, Section 3.2, Table 1)		
BWR Core Inventory Fraction Released Into Containment		
Group	**Gap Release Phase**	**Early In-Vessel Release Phase**
Noble Gases	0.05	0.95
Halogens	0.05	0.25
Alkali Metals	0.05	0.20
Tellurium Metals	0.00	0.05
Ba, Sr	0.00	0.02
Noble Metals	0.00	0.0025
Cerium Group	0.00	0.0005
Lanthanides	0.00	0.0002
5.3.1.7 Iodine Chemical Form Released to the Containment		
Aerosol (CsI)	95%	9.1, Sections 3.5 & A.2
Elemental	4.85%	
Organic	0.15%	
5.3.1.8 Post-LOCA Drywell Pressure	49.1 psig	9.4.7
5.3.1.9 Post-LOCA Drywell Temperature	280^0F	9.17, Section 8.3.4
5.3.2 Activity Transport in Primary Containment		
5.3.2.1 Minimum Drywell Air Volume	159,000 ft^3	9.27.b
5.3.2.2 Minimum Suppression Chamber Free Air Volume	127,700 ft^3	9.27.b
5.3.2.3 Drywell plus Suppression Chamber Free Air Volume	286,700 ft^3 (159,000 ft^3 + 127,700 ft^3)	
5.3.2.4 Containment Elemental Iodine Removal Model	Standard Review Plan 6.5.2	9.9, Page 6.5.2-10
5.3.2.5 Drywell Surface Area for Deposition/Plateout Model	33,200 ft^2	Section 7.7
5.3.2.6 Particulate (Aerosol) Deposition/Plateout Model	Powers' 10 percentile model	9.2
5.3.2.7 Containment Leak Rate into Reactor Building	0.5 w%/day (maximum) 0.700 w%/day for 2 min to 38 hrs 0.350 w%/day for > 38 hrs	9.4.7 2 min for gap release per Section 5.3.1.5) & 9.17, Section 2.1.2.3
5.3.2.8 Containment Drawdown Time	≤ 120 seconds 3 minutes	9.4.2 Assumed
5.3.2.9 SGT System Flow Rate	10,500 cfm	9.4.3
5.3.2.10 Reactor Building Volume	2,500,000 ft^3	9.33, Section 2.6

Design Input Parameter	Value Assigned	Reference
5.4 ESF Leakage Model Parameters		
5.4.1 Minimum Suppression Pool Water Volume	122,900 ft^3	9.4.8 & 9.27.b
5.4.2 Sump Water Activity (Ref. 9.1, Sections A.5.1, A.5.3 & Tables 1 & 4)		
Group	Gap Release Phase	Early In-Vessel Release Phase
Timing Duration (Hrs)	2 min – 0.50 Hr (conservatively earlier than actual end time of 0.52 hours)	0.50 – 2.0 Hr
Halogen	0.05	0.25
5.4.3 ESF Leakage Rate	10 gal/min (= 2 × 5 gal/min allowable leakage rate)	Assumed to establish a new design basis & 9.1, Section A.5.2
5.4.4 ESF Leakage Initiation Time and Duration	0 to 30 days	Assumed
5.4.5 Suppression Pool Scrubbing	not credited	9.1, Section A.3.5
5.4.6 Long-Term Suppression Pool Water pH	8.0	9.12, page 11 & 9.1, Section A.2
5.4.7 ESF Leakage Maximum Temperature	< 212^0F	9.17, Attachment 1
5.4.8 Fraction of Iodine in ESF Leakage that becomes Airborne	0.10	Assumed based on torus water Temperature < 212^0F and 9.1, Section A.5.5
5.4.9 Chemical Form of Iodine in ESF Leakage		
Elemental	97%	9.1, Section A.5.6
Organic	3%	
5.5 MSIV Leakage Model Parameters (See Section 7.2.2)		
5.5.1 Total MSIV Leak Rate Through All Four Lines	360 scfh for < 38 hrs @ 49.1 psig 180 scfh for > 38 hrs @ 49.1 psig	9.17, Section 2.1.2.3 (time to 50% of assumed Total MSIV Leakage)
5.5.2 MSIV Leak Rate Through One Line With MSIV Failed	205 scfh for < 38 hrs @ 49.1 psig 102.5 scfh for >38 hrs @ 49.1 psig	9.17, Section 2.1.2.3 (time to 50% of assumed MSIV Failed Line Leakage)
5.5.3 MSIV Leak Rate Through Three Intact Lines		
First Intact Line	155 scfh for < 38 hrs @ 49.1 psig 77.5 scfh for > 38 hrs @ 49.1 psig	9.17, Section 2.1.2.3 (time to 50% of assumed Intact Line Leakage)
Second Intact Line	0 scfh for < 30 days	Assumed – remainder of unallocated leakage
Third Intact Line	0 scfh for < 30 days	Assumed – remainder of unallocated leakage
5.5.4 Natural Removal Efficiency For Elemental Iodine In Each Steam Line Volume	50 percent	9.5, Appendix B, page B-3
5.6 Control Room Model Parameters		
5.6.1 CR Envelope Pressure Boundary Free Volume	176,000 ft^3	9.10, page 7

Design Input Parameter	Value Assigned	Reference
5.6.2 MCREV Filtration System Actuation Time Following a LOCA	30 minutes	Assumed
5.6.3 CR Emergency Ventilation Mode Air Intake Rate	3,000 cfm ± 10% 2,700 cfm	9.4.6 Conservatively Modeled
5.6.4 CR Unfiltered Inleakage during Normal Operation (< 0.5 hr)	18,500 cfm (includes ingress/egress inleakage of 10 cfm)	Assumed Based on Parametric Study (Figure 1)
5.6.5 CR Unfiltered Inleakage during Emergency Ventilation Mode (> 0.5 hr)	369 cfm by tracer gas testing 500 cfm (includes ingress/egress inleakage of 10 cfm)	9.32, Table 16 Assumed
5.6.6 CR Emergency Ventilation Mode Intake Charcoal and HEPA Filter Efficiencies		
Elemental Iodine	89%	Section 7.11
Organic Iodide	89%	
Particulate Aerosols	98%	
5.6.7 CR χ/Qs For Containment & ESF Leakage Release Via Off-Gas Stack Release		
Time	**X/Q (sec/m^3)**	
0-2	2.72E-06	9.11, Table 4-1 24-96 hrs χ/Q value is conservatively used for 2-24 hrs χ/Q values
2-8	1.46E-08	
8-24	1.46E-08	
24-96	1.46E-08	
96-720	4.21E-09	
5.6.8 CR X/Qs For MSIV Leakage Release Via Unit 2 TB/RB Exhaust Vent		
Time	**X/Q (sec/m^3)**	
0-2	1.18E-03	9.11, Table 4-1 for Unit 2 RB Stack χ/Q values, which are conservative for Unit 3
2-8	9.08E-04	
8-24	4.14E-04	
24-96	2.90E-04	
96-720	2.26E-04	
5.6.9 CR Occupancy Factors		
Time (Hr)	**%**	
0-24	100	9.1, Section 4.2.6
24-96	60	
96-720	40	
5.6.10 CR Breathing Rate	3.5E-04 m^3/sec	9.1, Section 4.2.6
5.7 Offsite Dose Receptor Release Model Parameters		
5.7.1 EAB X/Qs For Containment & ESF Leakage Release Via Off-Gas Stack Release		
Time (hrs)	**X/Q (sec/m^3)**	
0-0.5	5.30E-05	9.11, Table 4-1
0.5-2	8.89E-06	
2-720	8.89E-06	9.1, Section 4.1.5 (0.5-2 hr χ/Q value conservatively modeled after 2 hours)

Design Input Parameter	Value Assigned	Reference
5.7.2 EAB X/Q For MSIV Leakage Release		
Time (hrs)	**X/Q (sec/m^3)**	
0-2	4.25E-04	9.11, Table 4-1
2-720	4.25E-04	9.1, Section 4.1.5 (0-2 hr χ/Q value conservatively modeled after 2 hours)
5.7.3 EAB Breathing Rate	3.5E-04 m^3/sec	9.1, Sections 4.1.3 & 4.1.5
5.7.4 LPZ X/Qs For Containment & ESF Leakage Release Via Off-Gas Stack Release		
Time (hrs)	**X/Q (sec/m^3)**	
0-0.5	1.75E-05	9.11, Table 4-1
0.5-2	8.87E-06	
2-8	3.94E-06	
8-24	2.62E-06	
24-96	1.09E-06	
96-720	3.06E-07	
5.7.5 LPZ X/Qs For MSIV Leakage Release Via Unit 2 TB/RB Exhaust Vent		
Time (hrs)	**X/Q (sec/m^3)**	
0-2	4.81E-05	9.11, Table 4-1
2-8	2.08E-05	
8-24	1.37E-05	
24-96	5.49E-06	
96-720	1.49E-06	
5.7.6 LPZ Breathing Rates		
Time (hrs)	**BR (m^3/sec)**	
0-8	3.5E-04	9.1, Sections 4.1.3 & 4.4
8-24	1.8E-04	
24-720	2.3E-04	

6.0 COMPUTER CODES & COMPLIANCE WITH REGULATORY REQUIREMENTS

6.1 Computer Codes

All computer codes used in this calculation have been approved for use with appropriate Verification and Validation (V&V) documentation. Computer codes used in this analysis include:

- **RADTRAD** 3.03 (Ref. 9.2): This is an NRC-sponsored code approved for use in determining control room and offsite doses from releases due to reactor accidents. This code was used by EXELON in various AST license amendments, which are approved by the NRC. Therefore, the code is considered validated to be used for the PBAPS AST analysis.

- **MicroShield** 5.05 (Ref. 9.23): A commercially available and accepted code used to determine dose rates at various source-receptor combinations. Several runs were made at various times during the LOCA since the source strength varies over time.

6.2 Compliance With Regulatory Requirements

As discussed in Section 4.0, Assumptions, the analysis in this calculation complies with line-by-line requirements in Regulatory Guide 1.183.

The assumed inventory of fission products in the reactor core and available for release to the containment is based on the maximum power level of 3,528 MWt, which includes 0.4% margin for instrument uncertainty relative to the rated thermal power of 3,514 MWt after the 1.62% Caldon power uprate (Ref. 9.6, Attachment A, Sections 2.0 & 5.4). The modeled uncertainty is less than the 2% uncertainty recommended in Regulatory Guide 1.183 (Ref. 9.1, Section 3.1 and Footnote 8).

7.0 CALCULATIONS

7.1 Peach Bottom Plant Specific Nuclide Inventory File (NIF) For RADTRAD3.03 Input

The RADTRAD nuclide inventory file Bwr_def_NIF establishes the power dependent radionuclide activity in Ci/MW_t for the reactor core source term. Since these core radionuclide activities are dependent on the core thermal power level, reload design, and burnup, PBAPS nuclide inventory file PBS_def.txt is compiled based on the fission products in the reactor core obtained from Reference 9.6.

7.2 Determination of MSIV Leak Rates

7.2.1 Proposed Case

The total leakage from all main steam lines is proposed to increase from 46 scfh measured at 25 psig to 360 scfh measured at 49.1 psig, allowing a maximum of 205 scfh @ 49.1 psig from any one of the 4 main steam lines.

The total containment leakage is 0.7 w%/day to 38 hours, and reduced in half to 0.35 w%/day after 36 hours. The total containment leakage does not include the leakage through the MSIVs.

7.2.2 MSIV Leakage During 0-2 hrs

Note: The RADTRAD runs model MSIV leakage beginning at 2 minutes, which is coincident with the start of the gap release per Section 5.3.1.5.

Drywell volume = 159,000 ft^3 (Ref. 9.27.b)

Total MSIV leakage measured @ 49.1 psig = 360 scfh (assumed)

Per the ideal gas law, PV= nRT or PV/T = nR. Given that nR is a constant for the air leakage, PV/T at post-LOCA conditions is equal to PV/T at STP conditions.
P @LOCA = Drywell peak pressure = 49.1 psig (Ref. 9.4)
T @LOCA = Drywell peak temperature = 280°F (Ref. 9.17, Section 8.3.4) = 280^0F + 460 = 740^0R
P @STP = Standard pressure = 14.7 psia
T @STP = Standard temperature = 68^0F = 68^0F + 460 = 528^0R
V @STP = MSIV leakage based @ 49.1 psig = 360 scfh

V @LOCA = (PV/T @STP) x (T/P @LOCA)
0-2 hrs MSIV leakage @ drywell peak pressure of 49.1 psig and temperature of 280^0F
= 360 scfh x [14.7 psia / (49.1 psig + 14.7 psia)] x [740^0R / 528^0R]
= 360 scfh x 0.230 x 1.402 = 116.09 cfh
= (116.09 ft^3/hr x 24 hr/day) x 100% / 1.59E+05 ft^3 = **1.752 %/day**
= (116.09 ft^3/hr) / (60 min/hr) = 1.935 cfm

The 0-2 hrs 360 scfh MSIV leakage is released via two of the four Main Steam (MS) lines. A maximum allowable leak rate of 205 scfh is postulated from the shortest MS line with its inboard MSIV failed. The remaining leak rate of 155 scfh is postulated from the shortest of the three intact MS lines (i.e., the second shortest of the four MS lines). No leakage is postulated from the remaining two intact MS Lines.

0-2 hrs allowable leakage from the MS line with a failed MSIV (at maximum 205 scfh leak rate)
= (205 scfh / 360 scfh total) x 116.09 cfh = 66.11 cfh = 1.102 cfm
0-2 hrs allowable leakage from the shortest intact MS line (at maximum 155 scfh leak rate)
= (155 scfh / 360 scfh total) x 116.09 cfh = 49.98 cfh = 0.833 cfm

7.2.3 MSIV Leakage During 2-38 hrs

Two hours after a LOCA the drywell and suppression chamber volumes are expected to reach an equilibrium condition and the post-LOCA activity is expected to be homogeneously distributed between these volumes. The homogeneous mixing in the primary containment will decrease the activity concentration and therefore decrease the activity release rate through the MSIVs. To model the effect of this mixing, the MSIV flow rate used in the RADTRAD model is decreased by calculating a new leak rate based on the combined volumes of the drywell and suppression chamber.

Drywell + Suppression Chamber free air volume = 286,700 ft^3 (Design Input 5.3.2.3)

2-38 hrs MSIV leakage @ drywell peak pressure of 49.1 psig = 116.09 cfh (Section 7.2.2)

= (116.09 cfh x 24 hr/day) x 100% / 2.867E+05 ft^3 = **0.972 %/day**

Corresponding MSIV leak rate = 116.09 cfh x (1.59E+05 ft^3 / 2.867E+05 ft^3) = 64.38 cfh
2-38 hrs allowable leakage from the MS Line with a failed MSIV (at maximum 205 scfh leak rate)
= (205 scfh / 360 scfh total) x 64.38 cfh = 36.66 cfh = 0.611 cfm
2-38 hrs allowable leakage from the shortest intact MS Line (at maximum 155 scfh leak rate)
= (155 scfh / 360 scfh total) x 64.38 cfh = 27.72 cfh = 0.462 cfm

7.2.4 MSIV Leakage During 38-720 hrs

The total MSIV leakage is reduced by 0.50 due to the reduction in the drywell pressure (Ref. 9.17, Section 2.1.2.3)
Total MSIV Leakage = 0.50 x 360 scfh = 180 scfh
MSIV leakage in failed steam line = 0.50 x 205 scfh = 102.5 scfh
MSIV leakage in intact steam line = 0.50 x 155 scfh = 77.5 scfh

Corresponding MSIV leak rate = 116.09 / 2 (Section 7.2.3) = 58.05 cfh

38-720 hrs MSIV leakage = (58.05 cfh x 24 hr/day) x 100% / 2.867E+05 ft^3 = **0.486 %/day**

Corresponding MSIV leak rate = 58.05 cfh x (1.59E+05 ft^3 / 2.867E+05 ft^3) = 32.19 cfh
38-720 hrs allowable leakage from the MS Line with a failed MSIV (at maximum 102.5 scfh leak rate)
= (102.5 scfh / 180 scfh total) x 32.19 cfh = 18.33 cfh = 0.306 cfm
38-720 hrs allowable leakage from the shortest intact MS Line (at maximum 77.5 scfh leak rate)
= (77.5 scfh / 180 scfh total) x 32.19 cfh = 13.86 cfh = 0.231 cfm

7.2.5 MSIV Leakage To Environment

7.2.5.1 MSIV Leakage into the pipe spool between outboard MSIV & TSV and environment from MSIV failed line (MS Line 1)

0-38 hrs

It is assumed that the post-LOCA activity released in the steam line (SL) with the failed inboard MSIV is instantaneously and homogeneously distributed in the single volume of SL between the RPV nozzle and outboard MSIV (Volume $V_1 = V_{11} + V_{12}$) (well mixed volume), where Volume V_{11} is the SL volume between the RPV nozzle and the failed inboard MSIV, and Volume V_{12} is the SL volume between the failed inboard MSIV and the outboard MSIV. Volume V_{13} defines the SL volume from the outboard MSIV to the Turbine Stop Valve (TSV).

It is conservatively assumed that the MSIV leakage past the outboard MSIV (i.e., from volume V_1 between the RPV and the outboard MSIV to volume V_{13} between the outboard MSIV and the TSV) expands to the atmospheric condition as follows:

Upstream of outboard MSIV in MSIV failed line (Section 7.2.2):
V1 = 66.11 cfh P1 = 49.1 psig + 14.7 = 63.8 psia T1 = (280^0F + 460) = 740^0R

Downstream of outboard MSIV in MSIV failed line (Atmospheric Condition):
V2 = TBD P2 = 14.7 psia T2 = (68^0F + 460) = 528^0R

MSIV Leakage into the pipe spool between outboard MSIV & TSV and environment from MSIV failed line (MS Line 1):
V2 = (PV/T @1) x (T/P @2)
= (63.8 psia x 66.11 cfh / 740^0R) x (528^0R / 14.7 psia)
≈ 205 cfh = 3.417 cfm

This is as expected, given that the 66.11 cfh leakage rate is equivalent to 205 scfh upstream of the outboard MSIV, and therefore it is equivalent to 205 cfh downstream of the outboard MSIV in the presence of standard pressure and temperature atmospheric conditions.

38-720 hrs

[18.33 cfh (Section 7.2.4) / 36.66 scfh (Section 7.2.3)] x 205 cfh ≈ 102.5 cfh = 1.708 cfm

The steam trapped between the MSIVs in the intact line at the onset of a LOCA will be at 995 psia and 551^0F (Ref. 9.20). The trapped steam is relatively clean because the core gap release starts at 2 minutes after onset of a LOCA (Ref. 9.1, Table 4). The steam line is insulated with 3-1/2" thick insulation (Ref. 9.15). The steam line spools between the MSIVs in the intact line will be at a pressure of 995 psia that is considerably higher than the steam upstream of the inboard MSIV at 63.8 psia (49.1 psig + 14.7 = 63.8 psia) and the atmospheric pressure of 14.7 psia downstream of the outboard MSIV. This extremely high positive pressure gradient across the MSIVs will prevent the MSIV leakage from migrating through the pipe spool between the MSIVs in the intact line. To the contrary, the cleaner steam content in the pipe spool will leak out until a negative pressure gradient is established across the inboard MSIV due to condensation of the steam in the spool. The time required to establish the negative pressure gradient is considerably long during which there would not be any MSIV leakage across the spools between the MSIVs in the intact steam lines. Therefore, to promote the MSIV leakage, it is conservatively assumed

that the steam in the spool condenses immediately and thereby facilitates the MSIV leakage path through the intact spool between the MSIVs to the atmosphere.

7.2.5.2 MSIV Leakage into the pipe spool between outboard MSIV & TSV and environment from MSIV shortest intact line (MS Line 2)

0-38 hrs

Upstream of inboard MSIV in the shortest intact MS Line (Section 7.2.2):
V1 = 49.98 cfh P1 = 49.1 psig + 14.7 = 63.8 psia T1 = (280^0F + 460) = 740^0R

Downstream of inboard MSIV in intact line (assumed Atmospheric Condition):
V2 = TBD P2 = 14.7 psia T2 = (68^0F + 460) = 528^0R

MSIV Leakage into the intact pipe spools between the inboard & outboard MSIVs and between the outboard MSIV and TSV (and environment) from the intact line:
V2 = (PV/T @1) x (T/P @2)
= (63.8 psia x 49.98 cfh / 740^0R) x (528^0R / 14.7 psia)
≈ 155 cfh = 2.583 cfm

This is as expected, given that the pressure and temperature conditions in the intact pipe spools between the inboard & outboard MSIVs and between the outboard MSIV and TSV are assumed to be the same as the standard pressure and temperature atmospheric conditions present in the environment.

38-720 hrs

[13.86 cfh (Section 7.2.4) / 27.72 scfh (Section 7,2.3)] x 155 cfh ≈ 77.5 cfh = 1.292 cfm

7.2.6 **MSIV Leak Rate Measured @ 25 psig Test Pressure**

The measured MSIV leak rates at a test pressure of 25 psig (Ref. 9.4.1) are determined using the laminar (viscous) flow extrapolation method and extrapolation factor formula for laminar flow described in ORNL-NSIC-5, page 10.52, as documented in Reference 9.21 as follows:

$L_e/L_t = (P_e - (1/P_e)) / (P_t - (1/P_t))$

Where:
L_e/L_t = Extrapolation Factor (to be determined)
P_e = Extrapolation Pressure (in atmosphere)
P_t = Test Pressure (in atmosphere)

Converting pressure to atmosphere
P_e = (49.1 psig + 14.7 psia) / (14.7 psia) = 4.34 atm
P_t = (25 psig + 14.7 psia) / (14.7 psia) = 2.7 atm

Solving for the extrapolation factor
$L_e/L_t = (4.34 - (1/4.34)) / (2.7 - (1/2.7)) = 4.11 / 2.33 = 1.764$

Measured maximum MSIV leakage per line = (205 scfh at 49.1 psig) / 1.764 = 116 cfh at 25 psig
Measured total MSIV leakage for all steam lines = (360 scfh at 49.1 psig) / 1.764 = 204 cfh at 25 psig

7.3 Main Steam Line Volumes & Surface Area for Plateout of Activity

The MSIV leakage release through the MSIV failed line neglects the aerosol deposition in the piping between the RPV nozzle and outboard MSIV due to the assumption of the inboard MSIV failure. The horizontal length of piping between the outboard MSIV and TSV becomes very critical in determining the aerosol deposition in the MSIV failed line, which contributes a major dose. The dimensions associated with the PBAPS Units 2 & 3 main steam piping in References 9.15, 9.16 and 9.31 are documented in this section. Per the summary at the end of this section, the Unit 2 steam headers A and B are conservatively selected for the modeling of the MSIV failed line and the one MSIV intact line, respectively, to maximize the resulting dose.

MAIN STEAM

Pipe outer diameter (O.D.) = 26'' = 2' – 2" (Refs. 9.15.a through 9.15.d)
Wall thickness = 1.138" (Refs. 9.15.a through 9.15.d)
Pipe inner diameter (I.D.) = 26 – 2 x 1.138 = 23.724'' = 1.977'
Pipe Flow Area = $(\pi/4)$ x (Pipe I.D.)^2 = (3.14 / 4) x (1.977 ft)^2 = 3.068 ft^2

The above piping parameters are typical for all steam headers located inside the drywell at the PBAPS Units 2 & 3. Although the pipe wall thickness beyond the outboard MSIVs are thinner than those upstream of the inboard MSIVs in the drywell, the pipe wall thickness of 1.138" is conservatively used for all main steam piping to minimize the aerosol deposition area.

The variations in the main steam piping length in the following sections are expected to be less than a foot due to dimensional differences in the piping isometric drawings. The smaller length of pipe is conservatively used.

PBAPS UNIT 2

7.3.1 Unit 2 Steam Headers:

7.3.1.1 Piping from RPV Nozzle A to Turbine Stop Valve SV-1:

7.3.1.1.1 Piping from RPV Nozzle A to Inboard MSIV AO-80A (Line DBN-26-A) (Ref. 9.15.a):

Nozzle elevation (Center Line) = 203'- 1-1/2''
Straight pipe = 3'-9'' – 2'-2'' = 1'-7'' = 1.58' (2'-2" is a typical subtraction to address the pipe wall)
Volume = 3.068 ft^2 x 1.58 = 4.85 ft^3
Length of short radius elbow = Rθ
Where R = radius of elbow = 26" and
θ = Angle subtended by elbow in radian = 90 degree/57.29 degree/radian
Length of short radius elbow = 26" x 90/57.29 = 40.84" = 3.4' (typical short radius elbow length)
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3 (typical short radius elbow volume)
Vertical Pipe = 203'-1-1/2'' – 167'-11-1/4'' = 35'-2-1/4'' – 2'-2'' = 33'-0-1/4'' = 33.02'
V = 3.068 ft^2 x 33.02 ft = 101.31 ft^3
Bend Pipe EL 167'-11-1/4'' to 156'-8-3/8'' @ 30^0
Elevation difference = 167'-11-1/4'' - 156'-8-3/8" = 11.24 ft
Length of pipe = 11.24 ft/cosine 30^0 = 12.98 ft.

Volume, V = 3.068 ft^2 x 12.98 ft = 39.82 ft^3
Elbow V = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Bend angel = 72.21^0
Bend Pipe, (23'-8'' radius) = (23'-8" x 72.21 degree/57.29 degree/radian) –3'-3"
= 29.83' – 3'-3" = 26.58'
V = 3.068 ft^2 x 26.58 ft = 81.55 ft^3
Bend = 3'-3'' V = 3.068 ft^2 x 3.25 ft = 9.97 ft^3
Elevation difference = 156'-7-3/8'' - 138'-4-5/8'' = 18'-2-3/4"
Vertical pipe = 18'-2-3/4" – 3'-3" – 2'-2" = 12'-9-3/4'' = 12.81 ft
Volume = 3.068 ft^2 x 12.81 ft = 39.30 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe to Valve AO-80A = 2'-9 1/2''+ 4'-7" - 2'-2'' = 5'-2-1/2" = 5.21 ft
V = 3.068 ft^2 x 5.21 ft = 15.98 ft^3

Total Volume of Steam Header From RPV Nozzle A To Inboard MSIV AO-80A $2VA_{T1}$
= 4.85 ft^3 + 10.43 ft^3 + 101.31 ft^3 + 39.82 ft^3 + 10.43 ft^3 + 81.55 ft^3 + 9.97 ft^3 + 39.30 ft^3 + 10.43 ft^3 + 15.98 ft^3 = 324.07 ft^3

Total horizontal pipe length = 1.58' + 26.58' + 5.21' = 33.37'
Total horizontal pipe surface area $2SA_{H1}$ = D x L = 1.977 ft x 33.37 ft = 65.97 ft^2
Total horizontal pipe volume $2VA_{H1}$ = 4.85 ft^3 + 81.55 ft^3 + 15.98 ft^3 = 102.38 ft^3

7.3.1.1.2 Piping from Inboard MSIV AO-80A to Outboard MSIV AO-86A (Line 1DB-26-A) (Ref. 9.16.d):

Straight Pipe Valve AO-80A to AO-86A
= 16'-5 1/8''+ 2'-7''+ 4'-7''= 23'-7-1/8'' = 23.59 ft
Total volume $2VA_{T2}$ = 3.068 ft^2 x 23.59 ft = 72.37 ft^3 = $2VA_{H2}$

Total horizontal pipe surface area = D x L (Horizontal Length)
Total horizontal pipe surface area $2SA_{H2}$ = 1.977 ft x 23.59 ft = 46.64 ft^2

7.3.1.1.3 Piping from Outboard MSIV AO-86A to Turbine Stop Valve SV-1 (Line 1DB-26-A) (Ref. 9.16.d):

Length of pipe = 3'-3" – 2'-2' = 1'-1" = 1.083 ft
V = 3.068 ft^2 x 1.083 ft = 3.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe, Elev. 138'- 3-1/16" to 153'-10''
Elevation difference = 153'-10" – 138'- 3-1/16" = 15'-6-15/16"
Length vertical pipe = 15'- 6-15/16" - 4'- 4'' = 11'-2-15/16" = 11.24 ft
V = 3.068 ft^2 x 11.24 ft = 34.48 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 55'- 4'' – 4'- 4'' = 51'-0''
V = 3.068 ft^2 x 51.0 ft = 156.47 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 39'-8-1/4''+ 38'-6-1/2''+ 38'-6-1/2''+ 38'-6-1/2''+ 4'-0 1/4''- 4'-4''
= 159'-4" - 4'-4" = 155'-0''
V = 3.068 ft^2 x155.0 ft = 475.54 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3

Straight Pipe, L = 22'+ 30'-9'' - 4'-4'' = 52'-9" – 4'-4" = 48'-5''= 48.42 ft
V = 3.068 ft^2 x 48.42 ft = 148.55 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 4'-0 1/4''+ 16'-7 1/4" – 4'-0" - 2'-2'' = 16'-7-1/2" – 2'2"
= 14'-5 1/2'' = 14.46 ft
V = 3.068 ft^2 x 14.46 ft = 44.36 ft^3

Total Volume of Steam Header from Outboard MSIV AO-86A To Turbine Stop Valve SV-1 $2VA_{T3}$ = 3.32 ft^3 + 10.43 ft^3 + 34.48 ft^3 + 10.43 ft^3 + 156.47 ft^3 + 10.43 ft^3 + 475.54 ft^3 + 10.43 ft^3 + 148.55 ft^3 + 10.43 ft^3 + 44.36 ft^3 = 914.87 ft^3

Total horizontal pipe length
= (3'-3" – 2'-2") + (55'-4" – 2'-2")+ 159'-4" + 52'-9" + 16'-7-1/2" = 282.96'
Total horizontal pipe surface area $2SA_{H3}$ = D x L = 1.977 ft x 282.96 ft = 559.41 ft^2
Total horizontal volume = Total volume – Total vertical volume
Total vertical volume = 34.48 ft^3 + 10.43 ft^3 = 44.91 ft^3
Total horizontal pipe volume $2VA_{H3}$ = 914.87 ft^3 – 44.91 ft^3 = 869.96 ft^3

7.3.1.2 Piping from RPV Nozzle D to Turbine Stop Valve SV-4:

7.3.1.2.1 Piping from RPV Nozzle D to Inboard MSIV AO-80D (Line DBN-26-D) (Ref. 9.15.a):

Nozzle elevation (Center Line) = 203'- 1-1/2''
Straight pipe = 3'-7''-2'-2'' = 1'-5'' = 1.42 ft
Volume = 3.068 ft^2 x 1.42 = 4.36 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe = 203'-1-1/2'' – 167'-11-1/4'' = 35'-2-1/4'' – 2'-2'' = 33'-0 1/4'' = 33.02 ft
V = 3.068 ft^2 x 33.02 ft = 101.31 ft^3
Bend Pipe EL 167'-11-1/4'' to 156'-8-3/8'' @ 30^0
Elevation difference = 167'-11-1/4'' - 156'-8-3/8" = 11.24 ft
Length of pipe = 11.24 ft/cosine 30^0 = 12.98 ft.
Volume, V = 3.068 ft^2 x 12.98 ft = 39.82 ft^3
Elbow V =3.068 ft^2 x 3.4 ft = 10.43 ft^3
Bend angel = 72.21^0
Bend Pipe, (23'-8'' radius) = (23'-8" x 72.21 degree/57.29 degree/radian) – 3'-1''
= 29.83' – 3'-1" = 26.75'
V = 3.068 ft^2 x 26.75 ft = 82.07 ft^3
Bend Length = 3'-1'' = 3.083 ft
V = 3.068 ft^2 x 3.083 ft = 9.46 ft^3
Elevation difference = 156'-7-3/8" – 138'-2-3/8" = 18'-5"
Vertical pipe length = 18'-5'' – 3'-1" – 2'-2'' = 13'-2'' = 13.17 ft
Volume = 3.068 ft^2 x 13.17 ft = 40.41 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe to Valve AO-80D = 2'-9 1/2''+ 4'-7" - 2'-0'' = 5'-4-1/2" = 5.38 ft
V = 3.068 ft^2 x 5.38 ft = 16.51 ft^3

Total Volume of Steam Header from RPV Nozzle D To Inboard MSIV AO-80D $2VD_{T1}$
= 4.36 ft^3 + 10.43 ft^3 + 101.31 ft^3 + 39.82 ft^3 + 10.43 ft^3 + 82.07 ft^3 + 9.46 ft^3 + 40.41 ft^3 + 10.43 ft^3 + 16.51 ft^3 = 325.23 ft^3

Total horizontal pipe length = 1.42' + 26.75' + 5.38' = 33.55'
Total horizontal pipe surface area $2SD_{H1}$ = D x L = 1.977 ft x 33.55 ft = 66.33 ft^2
Total horizontal pipe volume $2VD_{H1}$ = 4.36 ft^3 + 82.07 ft^3 + 16.51 ft^3 = 102.94 ft^3

7.3.1.2.2 Piping from Inboard MSIV AO-80D to Outboard MSIV AO-86D (Line 1DB-26-D) (Ref. 9.16.a):

Straight Pipe Valve AO-80D to AO-86D
= 16'-5 1/8''+ 2'-7''+ 4'-7''= 23'-7-1/8'' = 23.59 ft
Total volume $2VA_{T2}$ = 3.068 ft^2 x 23.59 ft = 72.37 ft^3 = $2VA_{H2}$

Total horizontal pipe surface area = D x L (Horizontal Length)
Total horizontal pipe surface area $2SA_{H2}$ = 1.977 ft x 23.59 ft = 46.64 ft^2

7.3.1.2.3 Piping from Outboard MSIV AO-86D to Turbine Stop Valve SV-4 (Line 1DB-26-D) (Ref. 9.16.a):

Length of pipe = 3'-3" – 2'-2' = 1'-1" = 1.083 ft
V = 3.068 ft^2 x 1.083 ft = 3.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe, Elev. 138'-1-13/16" to 153'-10''
Elevation difference = 153'-10" – 138'-1-13/16" = 15'-8-3/16"
Length vertical pipe = 15'-8-3/16" - 4'-4'' = 11'-4-3/16" = 11.33 ft
V = 3.068 ft^2 x 11.33 ft = 34.76 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight pipe length = 43'-9'' – 4'-4'' = 39'-5'' = 39.42
V = 3.068 ft^2 x 39.42 ft = 120.94 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight pipe length = 17'-8-1/4''+ 38'-6-1/2''+ 38'-6-1/2''+ 38'-6-1/2''+ 16'-0-1/4''- 4'-4''
= 149'-4" – 4'4' = 145'
V = 3.068 ft^2 x 145.0 ft = 444.86 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 33'-7''+ 50'-3''- 4'-4'' = 83'-10" – 4'4" = 79'-6''
V = 3.068 ft^2 x 79.5 ft = 243.91 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 16'-0 1/4''+ 16'-7 1/4''- 4'-0" - 2'-2'' = 28'-7-1/2" –2'2"
= 26'-5 1/2'' = 26.46 ft
V = 3.068 ft^2 x 26.46 = 81.18 ft^3

Total Volume of Steam Header from Outboard MSIV AO-86D To Turbine Stop Valve SV-4 $2VD_{T3}$ = 3.32 ft^3 + 10.43 ft^3 + 34.76 ft^3 + 10.43 ft^3 + 120.94 ft^3 +10.43 ft^3 + 444.86 ft^3 + 10.43 ft^3 + 243.91 ft^3 +10.43 ft^3 + 81.18 ft^3 = 981.12 ft^3

Total Horizontal Pipe Length
= (3'-3" – 2'-2") + (43'-9" – 2'-2") + 149'-4" + 83'-10" + 28'-7-1/2" = 304.46'

Total horizontal pipe surface area $2SD_{T3}$ = D x L = 1.977 ft x 304.46 ft = 601.92 ft^2
Total horizontal volume = Total volume – Total vertical volume
Total vertical volume = 34.76 ft^3 + 10.43 ft^3 = 45.19 ft^3
Total horizontal pipe volume $2VD_{H3}$ = 981.12 ft^3 – 45.19 ft^3 = 935.93 ft^3

7.3.1.3 Piping from RPV Nozzle B to Turbine Stop Valve SV-2:

7.3.1.3.1 Piping from RPV Nozzle B to Inboard MSV AO-80B (Line DNB-26-B) (Ref. 9.15.b)

Nozzle elevation (Center Line) = 203'- 1-1/2''
Straight pipe = 3'-11 7/16''- 2'-2'' = 1'-9-7/16'' = 1.79 ft
Volume = 3.068 ft^2 x 1.79 ft = 5.49 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe = 203'-1-1/2'' – 168'-1-1/4'' = 35'-0-1/4''- 2'-2'' = 32'-10 1/4''
V = 3.068 ft^2 x 32.85 ft = 100.78 ft^3
Bend Pipe, EL. 168'-1-1/4'' to 156'-8-1/4'' @ 12^0
Elevation difference = 168'-1-1/4'' - 156'-8-1/4" = 11'-5" = 11.42'
Length of pipe = 11.42 ft/cosine 12^0 = 11.68 ft.
Volume = 3.068 ft^2 x11.68 ft = 35.83 ft^3
Elbow V = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Bend Pipe = ($180^0 - 108^0 - 20^0 22'$) = 51.63^0, Radius = 19'-5''
L = 19'-5" x 51.63 degree/57.29 degree/radian) – 2'-2'' = 17.50' - 2'-2'' = 15.33'
V = 3.068 ft^2 x 15.33 ft = 47.03 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical pipe, Elev. 156'-7-3/8'' to 138'-3-1/16'' = 18'-4-5/16'' – 4'-4'' = 14'-0-5/16''= 14.02'
Volume = 3.068 ft^2 x 14.02 ft = 43.01 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe to Valve AO-80B = 4'-4-1/2''+ 4'-7" - 2'-2''= 6'-9-1/2''= 6.79'
V = 3.068 ft^2 x 6.79' = 20.83 ft^3

Total Volume of Steam Header From RPV Nozzle B To Inboard MSIV AO-80B $2VB_{T1}$
= 5.49 ft^3 + 10.43 ft^3 + 100.78 ft^3 + 35.83 ft^3 + 10.43 ft^3 + 47.03 ft^3 + 10.43 ft^3 + 43.01 ft^3 + 10.43 ft^3 + 10.43 ft^3 + 20.83 ft^3 = 305.12 ft^3

Total horizontal pipe length = 1.79' + 15.33' + 6.79' = 23.91'
Total horizontal pipe surface area $2VB_{H1}$ = D x L = 1.977 ft x 23.91 ft = 47.27 ft^2
Total horizontal pipe volume $2VD_{H1}$ = 5.49 ft^3 + 47.03 ft^3 + 20.83 ft^3 = 73.35 ft^3

7.3.1.3.2 Piping from Inboard MSIV AO-80B to Outboard MSIV AO-86B (Line 1DB-26-B) (Ref. 9.16.c):

Straight Pipe Valve AO-80B to AO-86B
= 14'-4-3/8''+ 2'-7''+ 4'-7''= 21'-6-3/8" = 21.53'
Total volume $2VB_{T2}$ = 3.068 ft^2 x 21.53 ft = 66.05 ft^3 = $2VB_{H2}$
Total horizontal pipe surface area $2SB_{H2}$ = D x L = 1.977 ft x 21.53 ft = 42.57 ft^2

7.3.1.3.3 Piping from Outboard MSIV AO-86B to Turbine Stop Valve SV-2 (Line 1DB-26-B) (Ref. 9.16.c):

Length of pipe = 3'-3" – 2'-2" = 1.083'
V = 3.068 ft^2 x 1.083 ft = 3.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe, Elev. 138'-3-1/16'' to 153'-10''

Elevation difference = 153'-10" – 138'-3-1/16" = 15'-6 15/16''- 4'-4'' = 11'-2 15/16'' = 11.25'
V = 3.068 ft^2 x 11.25 ft = 34.52 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 51'-6'' – 4'-4'' = 47'-2''
V = 3.068 ft^2 x 47.167 = 144.71 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 32'-4-1/4''+ 38'-6-1/2''+ 38'-6-1/2''+ 38'-6-1/2''+ 8'-0-1/4''- 4'-4''
= 156'-0" – 4'-4" = 151'-8'' = 151.67'
V = 3.068 ft^2 x 151.67 ft = 465.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 25'-10''+ 37'-3''- 4'-4'' = 63'-1" – 4'-4" = 58'-9'' = 58.75'
V = 3.068 ft^2 x 58.75' = 180.25 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 8'-0-1/4''+ 16'-7 1/4'' – 4'-0" – 2'-2''
= 20'-7-1/2" – 2'-2" = 18'-5 1/2''= 18.46'
V = 3.068 ft^2 x 18.46' = 56.64 ft^3

Total volume $2VB_{T3}$ = 3.32 ft^3 + 10.43 ft^3 + 34.52 ft^3 + 10.43 ft^3 + 144.71 ft^3 + 10.43 ft^3 + 465.32 ft^3 + 10.43 ft^3 + 180.25 ft^3 + 10.43 ft^3 + 56.64 ft^3 = 936.91 ft^3

Total horizontal pipe length
= (3'-3" – 2'-2") + (51'-6" – 2'-2") + 156'-0" + 63'-1" + 20'-7-1/2" = 290.13'

Total horizontal pipe surface area $2SB_{H3}$ = D x L = 1.977 ft x 290.13 ft = 573.59 ft^2
Total horizontal volume = Total volume – Total vertical volume
Vertical volume = 34.52 ft^3 + 10.43 ft^3 = 44.95 ft^3
Total horizontal volume $2VB_{H3}$ = 936.91 ft^3 – 44.95 ft^3 = 891.96 ft^3

7.3.1.4 Piping from RPV Nozzle C to Turbine Stop Valve SV-3:

7.3.1.4.1 Piping from RPV Nozzle C to Inboard MSIV AO-80C (Line DNB-26-C) (Ref. 9.15.b):

Nozzle elevation (Center Line) = 203'- 1-1/2''
Straight pipe = 3'-11-7/16''- 2'-2'' = 1'-9- 7/16''= 1.79'
Volume = 3.068 ft^2 x 1.79 ft = 5.49 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe = 203'-1-1/2'' – 168'-1-1/4'' = 35'-0-1/4''- 2'-2'' = 32'-10 1/4'' = 32.85'
V = 3.068 ft^2 x 32.85 ft = 100.78 ft^3
Bend Pipe EL 168'-1 1/4'' to 156'-8 1/4'' @ 12^0
Elevation difference = 168'-1-1/4'' - 156'-8-1/4" = 11'-5" = 11.42'
Length of pipe = 11.42 ft/cosine 12^0 = 11.68'
Volume = 3.068 ft^2 x11.68 ft = 35.83 ft^3
Elbow V = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Bend Pipe = ($252^0 – 180^0 – 20^022'$) = 51.63^0, Radius = 19'-5''
L = 19'-5" x 51.63 degree/57.29 degree/radian) – 26" = 17.50' - 2'-2'' = 15.33'
V = 3.068 ft^2 x 15.33 ft = 47.03 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical pipe, Elev. 156'-7-3/8'' to 138'-3-1/16'' = 18'-4 5/16'' – 4'-4'' = 14'-0 5/16''= 14.02'
Volume = 3.068 ft^2 x 14.02 ft = 43.01 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3

Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe to Valve AO-80B = 4'-4-1/2''+ 4'-7" - 2'-2''= 6'-9-1/2''= 6.79'
V = 3.068 ft^2 x 6.79' = 20.83 ft^3

Total Volume of Steam Header From RPV Nozzle C To Inboard MSIV AO-80C $2VC_{T1}$
= 5.49 ft^3 + 10.43 ft^3 + 100.78 ft^3 + 35.83 ft^3 + 10.43 ft^3 + 47.03 ft^3 + 10.43 ft^3 + 43.01 ft^3 + 10.43 ft^3 + 10.43 ft^3 + 20.83 ft^3 = 305.12 ft^3

Total horizontal pipe length = 1.79' + 15.33' + 6.79' = 23.91'
Total horizontal pipe surface area $2SC_{H1}$ = D x L = 1.977 ft x 23.91 ft = 47.27 ft^2
Total horizontal pipe volume $2VC_{H1}$ = 5.49 ft^3 + 47.03 ft^3 + 20.83 ft^3 = 73.35 ft^3

7.3.1.4.2. Piping from Inboard MSIV AO-80C to Outboard MSIV AO-86C (Line 1DB-26-C) (Ref. 9.16.b):

Straight Pipe Valve AO-80B to AO-86B
= 14'-4-3/8''+ 2'-7''+ 4'-7''= 21'-6-3/8" = 21.53'
Total volume $2VB_{T2}$ = 3.068 ft^2 x 21.53 ft = 66.05 ft^3 = $2VB_{H2}$
Total horizontal pipe surface area $2SB_{H2}$ = D x L = 1.977 ft x 21.53 ft = 42.57 ft^2

7.3.1.4.3 Piping from Outboard MSIV AO-86C to Turbine Stop Valve SV-3 (Lines 1DB-26-C) (Ref. 9.16.b):

Straight Pipe = 3'-3''- 2'-2''= 1'-1'' = 1.083'
Volume = 3.068 ft^2 x 1.083' = 3.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe, Elev. 138'-3-1/16'' to 153'-10''
Elevation difference = 153'-10" – 138'-3-1/16" =15'-6 15/16''-4'-4'' = 11'-2-15/16''= 11.25'
V = 3.068 ft^2 x 11.25 ft = 34.52 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 47'-8''- 4'-4'' = 43'-4''=43.33
V = 3.068 ft^2 x 43.33 ft = 132.94 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 25'-0-1/4''+ 38'-6-1/2''+ 38'-6-1/2''+ 38'-6-1/2''+ 12'-0-1/4''- 4'-4''
= 152'-8" – 4'-4" = 148'-4''
V = 3.068 ft^2 x 148.33 ft = 455.08 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 29'-8''+ 43'-9''- 4'-4'' = 73'-5" – 4'-4" = 69'-1''= 69.083
V = 3.068 ft^2 x 69.083' = 211.95 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 12'-0-1/4''+16'-7-1/4'' – 4'-0" - 2'-2'' = 24'-7-1/2" – 2'-2"
= 22'-5 1/2''= 22.46'
V = 3.068 ft^2 x 22.46 = 68.91 ft^3

Total volume $2VC_{T3}$ = 3.32 ft^3 + 10.43 ft^3 + 34.52 ft^3 + 10.43 ft^3 + 132.94 ft^3 + 10.43 ft^3 + 455.08 ft^3 + 10.43 ft^3 + 211.95 ft^3 + 10.43 ft^3 + 68.91 ft^3 = 958.87 ft^3

Total horizontal pipe length
= (3'-3" – 2'-2") + (47'-8" – 2'2") + 152'-8" + 73'-5" + 24'-7-1/2" = 297.29'

Total horizontal pipe surface area $2SC_{H3}$ = D x L = 1.977 ft x 297.29 ft = 587.74 ft^2
Horizontal volume = Total volume – Total vertical volume
Vertical volume = 34.52 ft^3 + 10.43 ft^3 = 44.95 ft^3
Total horizontal volume $2VC_{H3}$ = 958.87 ft^3 – 44.95 ft^3 = 913.92 ft^3

PBAPS UNIT 3

MAIN STEAM

7.3.2 Unit 3 Steam Headers:

7.3.2 Piping from RPV Nozzle A to Turbine Stop Valve SV-1:

7.3.2.1.1 Piping from RPV Nozzle A to Inboard MSIV AO-80A (Line DBN-26-A) (Ref. 9.15.c):

The steam piping from Unit 3 RPV Nozzle A to Inboard MSIV AO-80A is completely identical to the steam piping from Unit 2 RPV Nozzle A to Inboard MSIV AO-80A (Refs. 9.15.a & 9.15.c) except for the straight pipe to valve AO-80A. Therefore, the total steam header volume is same as that in Section 7.3.1.1.1 with the following exception.

Straight pipe to valve AO-80A = 2'-9 1/2''+ 5'-7 1/2'' - 2'-2''= 6'-3'' = 6.25 ft
V = 3.068 ft^2 x 6.25 ft = 19.18 ft^3

Total Volume of Steam Header From RPV Nozzle A To Inboard MSIV AO-80A $3VA_{T1}$
= 324.07 ft^3 - 15.98 ft^3 (Section 7.3.1.1.1) + 19.18 ft^3 = 327.27 ft^3

Total horizontal pipe length = (1.58' + 26.58') (Section 7.3.1.1.1) + 6.25' = 34.41'
Total horizontal pipe surface area $3SA_{H1}$ = D x L = 1.977 ft x 34.41 ft = 68.03 ft^2
Total horizontal pipe volume $3VA_{H1}$ = (4.85 ft^3 + 81.55 ft^3) (Section 7.3.1.1.1) + 19.18 ft^3 = 105.58 ft^3

7.3.2.1.2 Piping from Inboard MSIV AO-80A to Outboard MSIV AO-86A (Line 1DB-26-A) (Ref. 9.31):

Straight pipe between Valves AO-80A to AO-86A
(Outboard MSIV AO-86A is modeled with the same 4'-7" length of the inboard MSIVs)
= 16'-5 1/8''+ 2'-7''+ 4'-7''= 23'-7-1/8'' = 23.59 ft
Total volume $3VA_{T2}$ = 3.068 ft^2 x 23.59 ft = 72.37 ft^3 = $3VA_{H2}$

Total horizontal pipe surface area = D x L (Horizontal Length)
Total horizontal pipe surface area $3SA_{H2}$ = 1.977 ft x 23.59 ft = 46.64 ft^2

7.3.2.1.3 Piping from Outboard MSIV AO-86A to Turbine Stop Valve SV-1 (Line 1DB-26-A) (Ref. 9.16.e):

Length of pipe = 3'-3" – 2'-2' = 1'-1" = 1.083 ft
V = 3.068 ft^2 x 1.083 ft = 3.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe, Elev. 138'- 2" to 153'-10''
Elevation difference = 153'-10" – 138'- 2" = 15'-8"
Length vertical pipe = 15'- 8" - 4'- 4'' = 11'-4" = 11.33 ft
V = 3.068 ft^2 x 11.33 ft = 34.76 ft^3

Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 43'-10" – 4'- 4'' = 39'-6''
V = 3.068 ft^2 x 39.5 ft = 121.19 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = (17'-8-1/4" + 143'-7" – 11'-11-1/4") - 4'-4'' = 149'-4" – 4'-4" = 145'
V = 3.068 ft^2 x 145.00 ft = 444.86 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 83'-9" - 4'-4'' = 79'-5" = 79.42 ft
V = 3.068 ft^2 x 79.42 ft = 243.66 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 28'-7-1/2" - 2'-2'' = 26'-5-1/2" = 26.46'
V = 3.068 ft^2 x 26.46 ft = 81.18 ft^3

Total Volume of Steam Header from Outboard MSIV AO-86A To Turbine Stop Valve SV-1 $3VA_{T3}$ = 3.32 ft^3 + 10.43 ft^3 + 34.76 ft^3 + 10.43 ft^3 + 121.19 ft^3 + 10.43 ft^3 + 444.86 ft^3 + 10.43 ft^3 + 243.66 ft^3 + 10.43 ft^3 + 81.18 ft^3 = 981.12 ft^3

Total horizontal pipe length
= (3'-3" – 2'-2") + (43'-10" – 2'-2") + 149'-4" + 83'-9" + 28'-7-1/2" = 304.46'
Total horizontal pipe surface area $3SA_{H3}$ = D x L = 1.977 ft x 304.46' ft = 601.92 ft^2
Total horizontal volume = Total volume – Total vertical volume
Vertical volume = 34.76 ft^3 + 10.43 ft^3 = 45.19 ft^3
Total horizontal volume $3VA_{H3}$ = 981.12 ft^3 – 45.19 ft^3 = 935.93 ft^3

7.3.2.2 Piping from RPV Nozzle D to Turbine Stop Valve SV-4:

7.3.2.2.1 Piping from RPV Nozzle D to Inboard MSIV AO-80D (Line DBN-26-D) (Ref. 9.15.c):

The steam piping from Unit 3 RPV Nozzle D to Inboard MSIV AO-80D is completely identical to the steam piping from Unit 2 RPV Nozzle D to Inboard MSIV AO-80D (Refs. 9.15.a & 9.15.c) except for the straight pipe to valve AO-80D. Therefore, the total steam header volume is same as that in Section 7.3.1.2.1 with the following exception.

Straight pipe to valve AO-80D = 2'-9 1/2''+ 5'-7 1/2'' - 2'-0" = 6'-5" = 6.42 ft
V = 3.068 ft^2 x 6.42 ft = 19.70 ft^3

Total Volume of Steam Header From RPV Nozzle D To Inboard MSIV AO-80D $3VA_{T1}$
= 325.23 ft^3 - 16.51 ft^3 (Section 7.3.1.2.1) + 19.70 ft^3 = 328.42 ft^3

Total horizontal pipe length = (1.42' + 26.75') (Section 7.3.1.2.1) + 6.42' = 34.59'
Total horizontal pipe surface area $3SD_{H1}$ = D x L = 1.977 ft x 34.59 ft = 68.38 ft^2
Total horizontal pipe volume $3VD_{H1}$ = (4.36 ft^3 + 82.07 ft^3) (Section 7.3.1.2.1) + 19.70 ft^3 = 106.13 ft^3

7.3.2.2.2 Piping from Inboard MSIV AO-80D to Outboard MSIV AO-86D (Line 1DB-26-D) (Ref. 9.31):

Straight pipe between Valves AO-80D to AO-86D
(Outboard MSIV AO-86D is modeled with the same 4'-7" length of the inboard MSIVs)
= 16'-5 1/8''+ 2'-7''+ 4'-7''= 23'-7-1/8'' = 23.59 ft
Total volume $3VD_{T2}$ = 3.068 ft^2 x 23.59 ft = 72.37 ft^3 = $3VD_{H2}$

Total horizontal pipe surface area = D x L (Horizontal Length)
Total horizontal pipe surface area $3SA_{H2}$ = 1.977 ft x 23.59 ft = 46.64 ft^2

7.3.2.2.3 Piping from Outboard MSIV AO-86D to Turbine Stop Valve SV-4 (Line 1DB-26-D) (Ref. 9.16.h):

Length of pipe = 3'-3" – 2'-2' = 1'-1" = 1.083 ft
V = 3.068 ft^2 x 1.083 ft = 3.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe, Elev. 138'- 2" to 153'-10''
Elevation difference = 153'-10" – 138'- 2" = 15'-8"
Length vertical pipe = 15'- 8" - 4'- 4'' = 11'-4" = 11.33 ft
V = 3.068 ft^2 x 11.33 ft = 34.76 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 55'-4" – 4'- 4'' = 51'-0''
V = 3.068 ft^2 x 51 ft = 156.47 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 39'-8-1/4" + 119'-7-3/4" - 4'-4'' = 159'-4" - 4'-4" = 155'-0"
V = 3.068 ft^2 x 155 ft = 475.54 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 52'-9" - 4'-4'' = 48'-5" = 48.42 ft
V = 3.068 ft^2 x 48.42 ft = 148.55 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 16'-7-1/2" - 2'-2'' = 14'-5-1/2" = 14.46'
V = 3.068 ft^2 x 14.46 ft = 44.36 ft^3

Total Volume of Steam Header from Outboard MSIV AO-86D To Turbine Stop Valve SV-4 $3VD_{T3}$ = 3.32 ft^3 + 10.43 ft^3 + 34.76 ft^3 + 10.43 ft^3 + 156.47 ft^3 + 10.43 ft^3 + 475.54 ft^3 + 10.43 ft^3 + 148.55 ft^3 + 10.43 ft^3 + 44.36 ft^3 = 915.15 ft^3

Total horizontal pipe length
= (3'-3" – 2'-2") + (55'-4" – 2'-2") + 150'-4" + 52'-9" + 16'-7-1/2" = 282.96'

Total horizontal pipe surface area $3SD_{H3}$ = D x L = 1.977 ft x 282.96 ft = 559.41 ft^2
Total horizontal volume = Total volume – Total vertical volume
Total vertical volume = 34.76 ft^3 + 10.43 ft^3 = 45.19 ft^3
Total horizontal volume $3VD_{H3}$ = 915.15 ft^3 – 45.19 ft^3 = 869.96 ft^3

7.3.2.3 Piping from RPV Nozzle B to Turbine Stop Valve SV-2:

7.3.2.3.1 Piping from RPV Nozzle B to Inboard MSV AO-80B (Line DNB-26-B) (Ref. 9.15.d)

Nozzle elevation (Center Line) = 203'- 1-1/2''
Straight pipe = 3'-11 7/16''- 2'-2'' = 1'-9-7/16''
Volume = 3.068 ft^2 x 1.79 = 5.49 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe = 203'-1-1/2'' – 168'-1-1/4'' = 35'-0-1/4''- 2'-2'' = 32'-10 1/4''
V = 3.068 ft^2 x 32.85 ft = 100.78 ft^3
Bend Pipe, EL. 168'-1-1/4'' to 156'-8-1/4'' @ 12^0

Elevation difference = 168'-1-1/4'' - 156'-8-1/4" = 11'-5" = 11.42'
Length of pipe = 11.42 ft/cosine 12^0 = 11.68 ft
Volume = 3.068 ft^2 x 11.68 ft = 35.83 ft^3
Elbow V = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Bend Pipe = ($180^0 - 108^0 - 20^0 22'$) = 51.63^0, Radius = 19'-5''
L = 19'-5" x 51.63 degree/57.29 degree/radian) – 2'-2" = 17.50' - 2'-2'' = 15.33'
V = 3.068 ft^2 x 15.33 ft = 47.03 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical pipe, Elev. 156'-7-3/8'' to 138'-3-1/16'' = 18'-4 5/16'' – 4'-4'' = 14'-0-5/16''= 14.02'
Volume = 3.068 ft^2 x 14.02 ft = 43.01 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Length of spool between two elbows = 5'-2" – 4'-4" = 10" = 0.83'
Volume of spool = 3.068 ft^2 x 0.83 ft = 2.56 ft^2
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight pipe to valve AO-80B = 6'-2" + 2'-4" + 12-1/2" - 2'-2''= 7'-4-1/2" = 7.38 ft
V = 3.068 ft^2 x 7.38 ft = 22.64 ft^3

Total Volume of Steam Header From RPV Nozzle B To Inboard MSIV AO-80B $3VB_{T1}$
= 5.49 ft^3 + 10.43 ft^3 + 100.78 ft^3 + 35.83 ft^3 + 10.43 ft^3 + 47.03 ft^3 + 10.43 ft^3 + 43.01 ft^3 + 10.43 ft^3 + 2.56 ft^3 + 10.43 ft^3 + 22.64 ft^3 = 309.49 ft^3

Total horizontal pipe length = 1.79' + 15.33' + 0.83' + 7.38' = 25.33'
Total horizontal pipe surface area $3SB_{H1}$ = D x L = 1.977 ft x 25.33 ft = 50.08 ft^2
Total horizontal pipe volume $3VB_{H1}$ = 5.49 ft^3 + 47.03 ft^3 + 2.56 ft^3 + 22.64 ft^3 = 77.72 ft^3

7.3.2.3.2 Piping from Inboard MSV AO-80B to Outboard MSIV AO-86B (Lines DB-26-B) (Ref. 9.31)

Straight pipe between valves AO-80B & AO-86B
(Outboard MSIV AO-86B is modeled with the same 4'-7" length of the inboard MSIVs)
= 14'-4 3/8''+ 2'-7''+ 4'-7'' = 21'-6-3/8" = 21.53 ft
Total volume $3VB_{T2}$ = 3.068 ft^2 x 21.53 = 66.05 ft^3 = $3VB_{H2}$
Total horizontal pipe surface area $3SB_{H2}$ = D x L = 1.977 ft x 21.53 ft = 42.57 ft^2

7.3.2.3.3 Piping from Outboard MSIV AO-86B to Turbine Stop Valve MSV-2 (Line DB-26-B) (Ref. 9.16.f)

Length of pipe = 3'-3" – 2'-2' = 1'-1" = 1.083 ft
V = 3.068 ft^2 x 1.083 ft = 3.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe, Elev. 138'- 2" to 153'-10''
Elevation difference = 153'-10" – 138'- 2" = 15'-8"
Length vertical pipe = 15'- 8" - 4'- 4'' = 11'-4" = 11.33 ft
V = 3.068 ft^2 x 11.33 ft = 34.76 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 47'-8" – 4'- 4'' = 43'-4'' = 43.33'
V = 3.068 ft^2 x 43.33 ft = 132.94 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 25'-0-1/4" + 143'-7" – 15'-11-1/4" - 4'-4'' = 152'-8" – 4-4" = 148'-4" = 148.33'
V = 3.068 ft^2 x 148.33 ft = 455.08 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3

Straight Pipe, L = 73'-5" - 4'-4'' = 69'-1" = 69.083 ft
V = 3.068 ft^2 x 69.083 ft = 211.95 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 24'-7-1/2" - 2'-2'' = 22'-5-1/2" = 22.46'
V = 3.068 ft^2 x 22.46 ft = 68.91 ft^3

Total Volume of Steam Header from Outboard MSIV AO-86B To Turbine Stop Valve SV-2 $3VB_{T3}$ = 3.32 ft^3 + 10.43 ft^3 + 34.76 ft^3 + 10.43 ft^3 + 132.94 ft^3 + 10.43 ft^3 + 455.08 ft^3 + 10.43 ft^3 + 211.95 ft^3 + 10.43 ft^3 + 68.91 ft^3 = 959.11 ft^3

Total horizontal pipe length
= (3'-3" – 2'-2") + (47'-8" – 2'-2") + 152'-8" + 73'-5" + 24'-7'1/2 = 297.29'

Total horizontal pipe surface area $3SB_{H3}$ = D x L = 1.977 ft x 297.29 ft = 587.74 ft^2
Total horizontal volume = Total volume – Total vertical volume
Total vertical volume = 34.76 ft^3 + 10.43 ft^3 = 45.19 ft^3
Total horizontal volume $3VB_{H3}$ = 959.11 ft^3 – 45.19 ft^3 = 913.92 ft^3

7.3.2.4 Piping from RPV Nozzle C to Turbine Stop Valve SV-3:

7.3.2.4.1 Piping from RPV Nozzle C to Inboard MSIV AO-80C (Line DNB-26-C) (Ref. 9.15.d):

Nozzle elevation (Center Line) = 203'- 1-1/2''
Straight pipe = 3'-11-7/16''- 2'-2'' = 1'-9- 7/16''= 1.79'
Volume = 3.068 ft^2 x 1.79 = 5.49 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe = 203'-1-1/2'' – 168'-1-1/4'' = 35'-0-1/4''- 2'-2'' = 32'-10 1/4'' = 32.85'
V = 3.068 ft^2 x 32.85' = 100.78 ft^3
Bend Pipe EL 168'-1 1/4'' to 156'-8 1/4'' @ 12^0
Elevation difference = 168'-1-1/4'' - 156'-8-1/4" = 11'-5" = 11.42'
Length of pipe = 11.42 ft/cosine 12^0 = 11.68 ft
Volume = 3.068 ft^2 x11.68 ft = 35.83 ft^3
Elbow V = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Bend Pipe = ($252^0 – 180^0 – 20^022'$) = 51.63^0, Radius = 19'-5''
L = 19'-5" x 51.63 degree/57.29 degree/radian) – 26" = 17.50' - 2'-2'' = 15.33'
V = 3.068 ft^2 x 15.33 ft = 47.03 ft^3
Vertical pipe, Elev. 156'-7-3/8'' to 138'-3-1/16'' = 18'-4 5/16'' – 4'-4'' = 14'-0 5/16''= 14.02'
Volume = 3.068 ft^2 x 14.02' = 43.01 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe to Valve AO-80B = 3'-2" + 2'-1" + 6'-0" + 12-1/2" - 2'-2''= 10'-1-1/2" = 10.13 ft
V = 3.068 ft^2 x 10.13 ft = 21.35 ft^3

Total Volume of Steam Header From RPV Nozzle C To Inboard MSIV AO-80C $3VC_{T1}$
= 5.49 ft^3 + 10.43 ft^3 + 100.78 ft^3 + 35.83 ft^3 + 10.43 ft^3 + 47.03 ft^3 + 10.43 ft^3 + 43.01 ft^3 + 10.43 ft^3 + 31.08 ft^3 = 304.94 ft^3

Total Horizontal Pipe Length = 1.79' + 15.33' + 10.13' = 27.25'
Horizontal pipe surface area $3SC_{H1}$ = D x L = 1.977 ft x 27.25 ft = 53.87 ft^2
Total horizontal pipe volume $3VC_{H1}$ = 5.49 ft^3 + 47.03 ft^3 + 31.08 ft^3 = 83.60 ft^3

7.3.2.4.2. Piping from Inboard MSIV AO-80C to Outboard MSIV AO-86C (Line 1DB-26-C) (Ref. 9.31):

Straight pipe between valves AO-80C & AO-86C
(Outboard MSIV AO-86C is modeled with the same 4'-7" length of the inboard MSIVs)
= 14'-4 3/8''+ 2'-7''+ 4'-7''
= 21'-6-3/8" = 21.53 ft
Total volume $3VC_{T2}$ = 3.068 ft^2 x 21.53 = 66.05 ft^3 = $3VC_{H2}$
Total horizontal pipe surface area $3SC_{H2}$ = D x L = 1.977 ft x 21.53 ft = 42.57 ft^2

7.3.2.4.3 Piping from Outboard MSIV AO-86C to Turbine Stop Valve SV-3 (Lines 1DB-26-C) (Ref. 9.16.g):

Length of pipe = 3'-3" – 2'-2' = 1'-1" = 1.083 ft
V = 3.068 ft^2 x 1.083 ft = 3.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Vertical Pipe, Elev. 138'- 2" to 153'-10''
Elevation difference = 153'-10" – 138'-2" = 15'-8"
Length vertical pipe = 15'-8" - 4'- 4'' = 11'-4" = 11.33 ft
V = 3.068 ft^2 x 11.33 ft = 34.76 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 51'-6" – 4'- 4'' = 47'-2'' = 47.17'
V = 3.068 ft^2 x 47.17 ft = 144.72 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 32'-4-1/4" + 143'-7" – 19'-11-1/4" - 4'-4'' = 156' – 4-4" = 151'8" = 151.67'
V = 3.068 ft^2 x 151.67 ft = 465.32 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 63'-1" - 4'-4'' = 58'-9" = 58.75 ft
V = 3.068 ft^2 x 58.75 ft = 180.25 ft^3
Elbow Volume = 3.068 ft^2 x 3.4 ft = 10.43 ft^3
Straight Pipe, L = 20'-7-1/2" - 2'-2'' = 18'-5-1/2" = 18.46'
V = 3.068 ft^2 x 18.46 ft = 56.64 ft^3

Total Volume of Steam Header from Outboard MSIV AO-86C To Turbine Stop Valve SV-3 $3VC_{T3}$ = 3.32 ft^3 + 10.43 ft^3 + 34.76 ft^3 + 10.43 ft^3 + 144.72 ft^3 + 10.43 ft^3 + 465.32 ft^3 + 10.43 ft^3 + 180.25 ft^3 + 10.43 ft^3 + 56.64 ft^3 = 937.16 ft^3

Total horizontal pipe length
= (3'-3" – 2'2") + (51'-6" – 2'-2") + 156' + 63'-1" + 20'-7-1/2" = 290.13'

Total horizontal pipe surface area $3SC_{H3}$ = D x L = 1.977 ft x 290.13 ft = 573.59 ft^2
Total horizontal volume = Total volume – Total vertical volume
Total vertical volume = 34.76 ft^3 + 10.43 ft^3 = 45.19 ft^3
Total horizontal volume $3VC_{H3}$ = 937.16 ft^3 – 45.19 ft^3 = 891.97 ft^3

Summary:

The Units 2 & 3 piping total inside volume, horizontal piping volume, and horizontal piping surface area information from the above sections are listed in Tables 3 & 3A. The equation in Section 7.4 indicates that a larger horizontal pipe volume results in a higher aerosol removal efficiency. The horizontal pipe

volumes beyond the outboard MSIVs are same for the two shortest steam headers – Unit 2 Header A & Unit 3 Header D (Table 3). Therefore, the selection of the two shortest steam headers in either unit is limited to those that result in the least aerosol removal efficiency, which in turn can be determined by the horizontal pipe volumes. The horizontal pipe volumes for the piping between the RPV nozzle to the outboard MSIV for Unit 2 Headers A & B are 174.75 ft^3 (102.38 ft^3 + 72.37 ft^3 = 174.75 ft^3) and 139.40 ft^3 (73.35 ft^3 + 66.05 ft^3 = 139.40 ft^3), respectively. The horizontal pipe volumes for the piping between the RPV nozzle to the outboard MSIV for Unit 3 Headers D & C are 178.50 ft^3 (106.13 ft^3 + 72.37 ft^3 = 178.50 ft^3) and 149.65 ft^3 (83.60 ft^3 + 66.05 ft^3 = 149.65 ft^3), respectively. This means that for the given same volume downstream of the outboard MSIV, the Unit 2 Headers A & B remove less aerosols from the MSIV leakage. Therefore, Unit 2 Headers A & B are used in the analysis for the MSIV failed steam line and intact steam line, respectively, and in Tables 4 through 6.

7.4. Aerosol Deposition On Horizontal Pipe Surface

The PBAPS main steam piping from the reactor pressure vessel (RPV) nozzle to the TSV is ASME Class 1 seismically analyzed to assure the piping wall integrity during and after a seismic (safe shutdown earthquake [SSE]) event (Ref. 9.27.a). RG 1.183, Appendix A, Section 6.5 requires that the components and piping systems used in the release path are capable of performing their safety function during and following a SSE. The main steam lines credited in the MSIV leakage path are qualified to withstand the SSE, therefore, these lines are credited for the aerosol deposition in the following section:

The Brockmann model for aerosol deposition (Ref. 9.2, Section 2.2.6.1) is based on the plug flow model. The staff concluded that the plug flow model for aerosol deposition in the main steam piping under-predicts the dose (Ref 9.5, Table 5 and Appendix A). The aerosol settling velocity in the well-mixed flow model depends on the variables having a large range of uncertainty (see Equation 5 of Appendix A of Ref. 9.5). Therefore, the following aerosol deposition model is used, which is accepted by the Staff in Reference 9.5, Appendix A). The Staff performed a Monte Carlo analysis to determine the distribution of aerosol settling velocities for the main steam line during the in-vessel release phase. The results of the Monte Carlo analysis for settling velocity in the main steam line are given in the following Table:

Percentile	Settling Velocity u_s (m/sec)	Removal Rate Constant (hr^{-1})
60^{th} (average)	0.00148	11.43
50^{th} (median)	0.00117	9.04
40^{th}	0.00081	6.26
10^{th}	0.00021	1.62

The Staff concluded that use of a 10^{th} percentile settling velocity with a well-mixed model is overly conservative and not appropriate (Ref. 9.5, page 11). Instead, the Staff believes it is acceptable to utilize median values (i.e., 50^{th} percentile settling velocity) (Ref. 9.5, page 11). This analysis is conservative relative to the Staff's recommendation, in that it models a 40^{th} percentile settling velocity for aerosol deposition in the MSIV leakage.

The derivation of staff's well-mixed model begins with a mass balance as follows (Ref. 9.5, Page A-2):

$$V * \frac{dC}{dt} = Q * C_{in} - Q * C - \lambda_s * V * C \qquad (1)$$

Where V = volume of well-mixed region

C = concentration of nuclides in volume
Q = volumetric flow rate into volume
λ_s = rate constant for settling
And

$$\lambda_s = \frac{u_s * A}{V}$$

Where u_s = settling velocity
A = settling area

The aerosol settling velocities in the different control volumes are calculated in Table 5 using the above equation based on the horizontal pipe projected areas and well mixed horizontal volumes obtained from Table 4 and Sections 7.3.1 & 7.3.2.

Under steady-state condition, the derivative in the above equation (1) becomes zero. Equation (1) can be simplified as follows:

$$C \equiv C_{in} * \frac{1}{1 + \frac{\lambda_s * V}{Q}}$$

RADTRAD allows input of filter efficiency for each flow path. Noting that C is also the concentration of nuclides leaving the volume, the above equation can be used to determine an equivalent filter efficiency as follows:

$$\eta_{filt} = 1 - \frac{C}{C_{in}} = 1 - \frac{1}{1 + \frac{\lambda_s * V}{Q}} \qquad (2)$$

The aerosol removal efficiencies are calculated in Table 6 using Equation (2). The rate constant for settling velocity λ_s is calculated in Table 5 using the horizontal settling surface area and volume from Table 4. The aerosol removal efficiencies are calculated in Table 6 using the well-mixed pipe volumes from Table 3A and the volumetric full flow rates of 205 & 155 scfh in the MSIV failed and intact steam lines, respectively.

7.5 ESF Leak Rates

Note: The RADTRAD runs model ESF leakage beginning at 2 minutes, which is coincident with the start of the gap release per Section 5.3.1.5.

The design basis ESF leakage is 5.0 gpm, which is doubled and converted into cfm as follows:

5.0 gallon/min × 2 × 1/7.4805 ft^3/gallon = 1.337 cfm
10% of ESF leakage becomes airborne = 0.10 × 1.337 = 0.1337 cfm

7.6 External Cloud Gamma Dose Attenuation Factor

The gamma attenuation for concrete shielding for an external cloud dose is conservatively calculated for an average gamma energy of 1.0 Mev.

The gamma radiation external radioactive plume shine to the CR personnel is attenuated by at least 2'-6" of concrete shielding (as discussed in Section 2.4.3). Gamma dose attenuation for 2'-6" concrete shielding is calculated as follows:
Mass attenuation coefficient for concrete at 1 Mev $\mu/\rho = 0.0635$ cm^2/g (Ref. 9.14, Table 3.7)
Density of concrete $\rho = 2.3$ g/cm^3 (typical value)
Linear attenuation coefficient μ in concrete = μ/ρ x ρ = 0.0635 cm^2/g x 2.3 g/cm^3 = 0.146 cm^{-1}
Shielding thickness r = 30 inch x 2.54 cm/inch = 76.2 cm
μr in concrete shielding = 0.146 cm^{-1} x 76.2 cm = 11.13 mean free paths
Exposure buildup factor for isotropic point source at disintegration energy of 1 Mev and 11.13 mean free paths of the 1 Mev gammas

$B_p(\mu r) = A_1 e^{-\alpha_1 \mu r} + A_2 e^{-\alpha_2 \mu r}$ (Ref. 9.14, page 428)

Where A_1, A_2, α_1, and α_2 are functions of energy, and
$A_1 + A_2 = 1$

Values of these parameters are obtained from Table 10.3 of Reference 9.14 for 1 Mev gamma in concrete shielding as follows:
$A_1 = 25.507$ $-\alpha_1 = 0.07230$ $\alpha_2 = -0.01843$ $A_2 = 1 - A_1 = 1 - 25.507 = -24.507$ $\mu r = 11.13$

Substituting these values in the above equation yields:

$B_p(\mu r) = [(25.507) \times \exp(0.07230 \times 11.13)] + [(-24.507) \times \exp(0.01843 \times 11.13)]$

$B_p(\mu r) = 57.03 - 30.08 = 26.95$

Direct Shield Attenuation $I/I_0 = B_p(\mu r)\ e^{-\mu r}$
Where
I = shielded gamma dose rate
I_0 = unshielded gamma dose rate
$B_p(\mu r)$ = Exposure buildup factor

Substituting the values of parameters into the above attenuation Equation (1) yields a direct shield attenuation factor of

$I/I_0 = B_p(\mu r)\ e^{-\mu r} = 26.95\ e^{-(11.13)} = 26.95 \times 1.467E\text{-}05 = 3.95E\text{-}04$

7.7 Drywell Wetted Surface Area

The drywell wetted surface area is not readily available. The Hope Creek Generating Station (HCGS) is BWR/4, Mark I containment and it is a sister plant of PBAGS sharing the same Containment Data Specification 22A6209 (Ref. 9.18). Therefore, having the same original licensed power level and size of reactor and drywell, the HCGS drywell surface area information can be conservatively used to determine the PBAPS drywell wetted surface area. The use of a smaller wetted surface is conservative because it results in a smaller elemental removal coefficient as shown in Section 7.8 and it takes a longer time to reach an elemental iodine decontamination factor (DF) of 200, which allows the elemental iodine to remain airborne in the drywell atmosphere for release to the atmosphere via containment and MSIV leakage.

Total drywell surface area = 152,261 ft^2 excluding the RPV surface area (Ref. 9.19, page 15)

The surface areas below the drywell spray ring are subject to be wetted in the spray solution, which are listed as follows based on areas presented in Ref. 9.19 (page 15):

Estimated 25% of drywell lining surface	= 4,463 ft^2 (17,850 ft^2 /4 = 4, 463 ft^2)
Downcomer (to water level)	= 3,168 ft^2
Vent header & line	= 9,727 ft^2
Suppression chamber (to water level)	= 15,408 ft^2
Estimated 50% of major equipment	= 5,306 ft^2 (10,612 ft^2 /2 = 5,306 ft^2)
Estimated 50% of structures	= 6,181 ft^2 (12,361 ft^2 /2 = 6,181 ft^2)
Total estimated wetted drywell surface area	= 44,253 ft^2
75% of total estimated wetted drywell surface area	≈ 33,200 ft^2 (0.75 x 44,253 ft^2)

The above calculated wetted surface is compared with the actual calculated wetted surface areas of other Exelon fleet plants as follows:

Parameter	Dresden Units 2 & 3 A	Quad Cities Units 1 & 2 B	Peach Bottom Units 2 & 3 C
Thermal Power Level (MW_t)	3016	3016	3528
Total Drywell Volume (ft^3)	278,000	269,000	286,700
Wetted Surface Area (ft^2)	32,250	32,430	33,200

A From Reference 9.34, Section 5.3
B From Reference 9.35, Section 5.3
C From Section 5.3

The comparison in the above table shows that the calculated PBAPS wetted surface area is conservative for the relatively larger drywell at the PBAPS.

The drywell wetted surface area of 33,200 ft^2 is used in Section 7.8 to calculate the elemental iodine removal coefficient by wall deposition.

7.8 Containment Elemental Iodine Removal Coefficient

Natural deposition on containment surfaces (plateout) of the elemental iodine released to containment is calculated using the methodology outlined in NUREG-0800, Standard Review Plan 6.5.2 (Ref. 9.9, page 6.5.2-10) as follows:

The equation for the elemental iodine removal by adsorption on wetted surface area is:

$\lambda_w = K_w \times A/V$

Where:

λ_w = first order removal coefficient by wall deposition
K_w = mass transfer coefficient = 4.9 m/hr (Ref. 9.9, page 6.5.2-10)
A = wetted surface area = 33,200 ft^2 (Section 7.7)
V = drywell net free air volume = 1.59E+05 ft^3 for < 2.0 hrs and 2.867E+05 ft^3 for > 2.0 hrs

Elemental iodine removal coefficient for < 2.0 hrs
$\lambda_w = K_w \times A/V$ = 4.9 m/hr x (3.2808 ft/m) (33,200 ft^2) / (1.59E+05 ft^3) = 3.36 hr^{-1}

Elemental iodine removal coefficient for > 2.0 hrs
$\lambda_w = K_w \times A/V$ = 4.9 m/hr x (3.2808 ft/m) (33,200 ft^2) / (2.867E+05 ft^3) = 1.86 hr^{-1}

Maximum DF of elemental iodine = 200

The containment leakage case is analyzed in RADTRAD Run PB3DCL00.o0 using the above calculated elemental iodine removal coefficients along with the information in Tables 8 & 9 to determine the cutoff time for terminating elemental iodine removal from the containment atmosphere, which is 3.85 hrs (PB3DCL00.o0). The cutoff time of 3.85 hrs is used in the containment and MSIV leakage path releases to the atmosphere.

7.9 Containment Shine Shielding Geometry Parameters

Reactor Building Shielding Parameters:

7.9.1 Source Volume:

Length = Distance between columns 8 & 18 = 6 x 25'-11" = 155.5' (Refs. 9.25.h & 9.25.i)
Width = Distance rows B & J
= 24'-3'' + 24'-0" + 24'-0" + 3'-9" + 45'-3" – 0'-9" = 120.5' (Refs. 9.25.h & 9.25.i)
Top elevation of RB = 290'-0" (Ref. 9.28.e)
Top elevation of operating floor = 234'-0" (Ref. 9.28.e)
Height = 290'-0" – 234'-0" = 56'-0"
Source Volume = 155.5' x 120.5' x 56' = 1,049,314 ft^3 = 1.05E+06 ft^3

RB volume = 2.50E+06 ft^3 (Ref. 9.33, Section 2.6)
Gamma dose rate reduction factor based on RB volume = 1.05E+06 ft^3 / 2.50E+06 ft^3 = 0.42

7.9.2 Line-of-Sight Distance:

The CR is assumed to be occupied at the Unit 2 CR panels as shown in Figure 7.
Panel 45^0 slant distance = 37'-11-3/8" + 3'-8-5/8" (Ref. 9.25.p) = 41'-8" = 41.67'
CR operator location slant distance = 1'-0" from the CR panel = 40.67'
Pivot point location = 1'4" from centerline of the plant (Ref. 9.25.p)
North-south CR operator distance from pivot point = 40.67' x Cosine 45^0 = 40.67' x 0.707 = 28.75'
East-west CR operator distance from pivot point = 40.67' x Sin 45^0 = 40.67' x 0.707 = 28.75'
North-south centerline distance of the plant from Column 18
= 9'-2-1/4" + 38'-6-1/2" + 19'-3-1/4" ((Ref. 9.25.p) = 67.0'
North-south pivot point distance from Column 18 = 67.0' + 1'-4" = 68'-4" = 68.33'

North-south CR operator distance from Column 18 = 68.33' – 28.75' = 39.58'

East-west distance between Row J & M
= 0'-9" + 12'-0" + 7'-3" + 18'-9" + 18'-9" (Ref. 9.25.p) = 57.5'
East-west CR operator distance from Row J
= East-west distance between Rows J & M – East-west Distance between Row M and pivot point – East-west distance from pivot point to CR operator
= 57.5' – 9'-8-1/2" (Ref. 9.25.p) – 28.75' = 19.04'
Horizontal diagonal distance between CR operator and junction of Column 18 & Row J
$= [(39.58')^2 + (19.04')^2]^{1/2} = 43.92'$

Elevation CR floor = 165.0' (Ref. 9.25.p)
Elevation CR operator (at 6' man height, which is closer to RB elevation) = 165.0' + 6' = 171.0'

The post-LOCA source in the RB closer to the RB operating floor is intercepted by a larger concrete shadow shielding of the floors and walls below the RB operating floor (Ref. 9.28.e). Therefore, the source farther above the operating floor is more likely to contribute to the CR direct shine dose (Figure 6). Therefore, the line-of-sight distance is calculated based on the centerline of the RB source (i.e., at the RB midheight).

Vertical distance between CR operator and centerline of source
= (234'-0" –171.0') + (290'-0" – 234'-0") / 2 = 91.0'
Line-of-sight distance between source centerline (at RB midheight at junction of Column 18 & Row J) and CR operator
$= [(43.92')^2 + (91.0')^2]^{1/2} = 101.04' \equiv 101.0'$
Angel of interception $\theta = \tan^{-1} 91.0'/43.92 = \tan^{-1} 2.072 = 64.23^0$

7.9.3 Concrete Shielding

Top elevation of CR roof varies from 192'-6" @ Row M to 191'-10-1/4" @ Row J (Ref. 9.25.g, Section B)
Elevation difference = 192'-6" – 191'-10-1/4" = 7.75" = 0.6458'
East-west distance between Row J & M =57.5' (Section 7.9.2)
Elevation gradient = 0.6458' / 57.5' = 0.01123'/ft
East-west CR operator distance from Row J = 19.04' (Section 7.9.2)
The elevation gradient at CR operator location = 19.04 ft x 0.01123'/ft = 0.214'
Top elevation of CR roof @ operator location
= 191'-10-1/4" + 0.214' = 192.07' ≡ 192'
Vertical distance between CR roof and centerline of source
= 234'-0" – 192'-0" + (290'-0" – 234'-0") / 2 = 70.0'
CR roof intercept distance from source centerline = 70.0' / Sin 64.23^0 = 70.0' / 0.901 = 77.69'
CR roof thickness = 2.5' (Ref. 9.25.g, Section B)
CR roof shielding @ intercepting point = 2.5' / Sin 64.23^0 = 2.5' / 0.901= 2.775'
Slant distance between the bottom CR roof and CR operator
= 101.0' – (77.69' + 2.775') = 20.535'

7.10 CR Containment Shine Dose

The shielding geometry parameters (source volume, line of sight distance, and intercepting concrete shielding) are calculated in Section 7.9 and shown in Figures 6 & 7. The shielding information along with the time dependent post-LOCA containment isotopic activities in Table 22 are input to the MicroShield computer code (Ref. 9.23) to calculate the time dependent containment shine gamma dose rates (Table 23) and integrated dose.

Containment shine dose due to Post-LOCA activity in RB = 67.04 mrem (Table 23) = 0.06704 rem
Containment shine dose due to 42% of Post-LOCA activity above operating floor in RB (Section 7.9.1) = 0.06704 rem x 0.42 = 0.028 rem, which is listed in Section 8.1.

7.11 CR Charcoal Filters Efficiencies

Technical Specification 5.5.7, Ventilation Filter Testing Program (VFTP), requires routine testing of safety related filtration systems.

In-place test of the HEPA filters show a penetration and system bypass < 1.0% when tested in accordance with Regulatory Guide 1.52, Revision 2, Section 5c, and ASME N510-1989 at the specified system flow rate in TS 5.5.7.a (Ref. 9.4.6). Note that the TS 5.5.7.a acceptance criteria takes exception to the RG 1.52 value of <0.05% . This is compensated by a reduction in filtration efficiency as described below.

HEPA filter efficiency = 99% - 1% (bypass) = 98% credited in the analysis

In-place test of the charcoal adsorber shows a penetration and system bypass < 1.0% when tested in accordance with Regulatory Guide 1.52, Revision 2, Section 5d, and ASME N510-1989 at the specified system flow rate in TS 5.5.7.b (Ref. 9.4.6). Note that the TS 5.5.7.b acceptance criteria takes exception to the RG 1.52 value of <0.05% . This is compensated by a reduction in filtration efficiency as described below.

Laboratory test of a sample of the charcoal adsorber, when obtained as described in Regulatory Guide 1.52, Revision 2, Section 6b, shows the methyl iodide penetration less than 5% when tested in accordance with the laboratory testing criteria of ASTM D3803-1989 at a temperature of 30 degrees C [86 degrees F], face velocity, and the relative humidity specified in TS 5.5.7.c (Ref. 9.4.6)

Testing methyl iodide penetration (%) = (100% - η)/safety factor = (100% - η)/2 (Ref. 9.13)
Where η = MCREF charcoal filter efficiency to be credited in the analysis
MCFREF Charcoal Filter

5% = (100% - η)/2
10% = (100% - η)
η = 100% - 10% = 90%

Crediting 1% system bypass
η = 90% - 1% = 89% credited in the analysis

7.12 Post-LOCA MCREV Filter Shine Dose

The post-LOCA MCREV filter shine dose to CR operator is discussed in detail in Section 2.4.4. The MicroShield model is discussed in Section 2.4.4.3 and resulting direct gamma dose rate from the MSIV leakage is calculated to be 4.037E-03 mRem/hr (PBFLTSH.MS5). The post-LOCA 30-day CR filter shine dose is calculated as follows:

CR Filter Shine Dose Rate = 4.037E-03 mRem/hr (MicroShield Run PBFLTSH.MS5)
CR Operator Exposure Time = 1 × (24 hr) + 0.60 (96 hr – 24 hr) + 0.40 (720 hr – 96 hr)
= 24 hr + 0.60 (72 hr) + 0.40 (624 hr) = 316.8 hr
CR Filter Shine Dose From MSIV leakage
= 4.037E-03 mRem/hr × 1/1000 Rem/mRem × 316.8 hr = 1.28E-03 Rem
Ratio of containment + ESF leakage dose to MSIV leakage dose
= (0.207 + 0.0460) / 4.36 = 0.06 (Section 8.1)
The MSIV leakage CR filter shine dose is increased by a factor 1.50 to include the filter shine dose contribution from the containment and ESF leakage as follows:
Total CR Filter Shine Dose = 1.50 x 1.28E-03 Rem = 1.92E-03 Rem, which is listed in Section 8.1.

8.0 RESULTS SUMMARY & CONCLUSIONS

8.1 Results Summary

The results of AST analyses for the proposed licensing basis are summarized in the following table:

Post-LOCA Activity Release Path	Post-LOCA TEDE Dose (Rem) Receptor Location		
	Control Room	EAB	LPZ
Containment Leakage	2.07E-01	2.60E+00 (occurs @ 1 hr)	2.82E+00
ESF Leakage	4.60E-02	5.66E-01 (occurs @ 2 hr)	3.31E+00
MSIV Leakage	4.36E+00	3.48E+00 (occurs @ 4.6 hr)	9.94E-01
Containment Shine	2.80E-02	Negligible	Negligible
External Cloud	1.16E-02	Negligible	Negligible
CR Filter Shine	1.92E-03	Negligible	Negligible
Total	**4.66E+00**	**6.65E+00**	**7.13E+00**
Allowable TEDE Limit	**5.00E+00**	**2.50E+01**	**2.50E+01**
	RADTRAD Computer Run No.		
Containment Leakage	PB3D185CL.o0	PB3D185CL.o0	PB3D185CL.o0
ESF Leakage	PB10G185ES.o0	PB10G185ES.o0	PB10G185ES.o0
MSIV Leakage	PB360MS205.o0	PB360MS205.o0	PB360MS205.o0

8.2 Conclusions

The Section 8.1 results of this analysis, using conservative as-built design inputs and assumptions that reflect the proposed AST implementation indicate that the EAB, LPZ, and CR doses are within their allowable TEDE limits.

9.0 REFERENCES

9.1 U.S. NRC Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000.

9.2 S.L. Humphreys et al., "RADTRAD: A Simplified Model for Radionuclide Transport and Removal and Dose Estimation," Version 3.03, NUREG/CR-6604, USNRC, April 1998.

9.3 10CFR50.67, "Accident Source Term"

9.4 PBAPS Units 2 & 3 Technical Specifications.

9.4.1 Specification SR 3.6.1.3.14, Primary Containment Isolation Valves (PCIVs)

9.4.2 Specification SR 3.6.4.1.3, Secondary Containment

9.4.3 Specification SR 3.6.4.1.4, Secondary Containment

9.4.4 Specification LCO 3.6.4.3, Standby Gas Treatment (SGT) System

9.4.5 Specification 5.5.2, Primary Coolant Sources Outside Containment

9.4.6 Specification 5.5.7, Ventilation Filter Testing Program (VFTP)

9.4.7 Specification 5.5.12, Primary Containment Leakage Rate Testing Program

9.4.8 Specification B 3.6.2.2, Suppression Pool Water Level

9.5 AEB 98-03, Assessment of Radiological Consequences for the Perry Pilot Plant Application Using The Revised (NUREG-1465) Source Term.

9.6 PBAPS Design Analysis PM-1059, Rev. 2, "Re-analysis of Fuel Handling Accident (FHA) Using Alternative Source Terms".

9.7 EPA-520/1-88-020, Federal Guidance Report 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion and Ingestion."

9.8 EPA-402-R-93-081, Federal Guidance Report 12, "External Exposure to Radionuclides in Air, Water and Soil."

9.9 NUREG-0800, Standard Review Plan, "Containment Spray as a Fission Product Cleanup System," SRP 6.5.2, Revision 2, 1988.

9.10 PBAPS Design Analysis PM-764, Rev. 1, "Control Room Habitability for Power Rerate".

9.11 PBAPS Design Analysis PM-1055, Rev. 0, "Calculation of Alternative Source Term (AST) Onsite and Offsite χ/Q Values".

9.12 PBAPS Design Analysis PM-1056, Rev. 0, "Suppression Pool pH Calculation for Alternative Source Terms".

9.13 USNRC, "Laboratory Testing of Nuclear-Grade Activated Charcoal," NRC Generic Letter 99-02, June 3, 1999

9.14 Introduction To Nuclear Engineering By John Lamarsh, Third Printing, December 1977, Addison-Wesley Publishing Company.

9.15 PBAPS Units 2 & 3 Main Steam Line Isometric Drawings:

a. P-1-1, Rev. 5 – Main Steam From RPV Nozzle. A & D To Penetration No. 7A & D – Unit 2

b. P-1-2, Rev. 5 – Main Steam From RPV Nozzle. B & C To Penetration No. 7B & C, -10 & -11 – Unit 2

c. P-1-8, Rev. 3 – Main Steam From RPV Nozzle. A & D To Penetration No. 7A & D – Unit 3

d. P-1-9, Rev. 3 – Main Steam From RPV Nozzle. B & C To Penetration No. 7B & C, -10 & -11 – Unit 3

9.16 PBAPS Units 2 & 3 Main Steam Line Isometric Drawings:

a. ISO. 2-1-1, Rev.7 – System # 1 Main Steam – Unit 2

b. ISO. 2-1-2, Rev.7 – System # 1 Main Steam – Unit 2

c. ISO. 2-1-3, Rev.5 – System # 1 Main Steam – Unit 2

d. ISO. 2-1-4, Rev.7 – System # 1 Main Steam – Unit 2

e. ISO. 3-1-1, Rev.1 – System # 1 Main Steam – Unit 3

f. ISO. 3-1-2, Rev.5 – System # 1 Main Steam – Unit 3

g. ISO. 3-1-3, Rev.6 – System # 1 Main Steam – Unit 3

h. ISO. 3-1-4, Rev.7 – System # 1 Main Steam – Unit 3

9.17 PBAPS Calculation No. PM-1061, Rev 0, Determination of Reduced Primary Containment Leakage Rate for AST Implementation

9.18 General Electric Specification No. 22A6209, Rev 1, Containment Data

9.19 Hope Creek Calculation No. 12-102(Q), Rev 0, Surface Area Inside Drywell

9.20 GE Letter No. G92-PBPR-030, From G.V. Kumar (GE) To Tom Shannon (PECO), Subject: Peach Bottom Piping Power Rerate SWEC Data Request

9.21 Dresden Calculation No. DRE-97-0078, Rev 3, Assessment of Control Room Habitability With 95% SBGTS Filter Efficiency

9.22 NUREG-0800, Standard Review Plan, "Radiological Consequence Analyses Using Alternative Source Terms," SRP 15.0.1, Rev. 0, July 2000

9.23 MicroShield Computer Code, V&V Version 5.05, Grove Engineering

9.24 Filter Arrangement Drawing No. 6280-SK-M-630, Rev 2, Control Room Fresh Air Cleanup Filter Plenum

9.25 PBAPS Structural Drawings:

a. S-45, Rev 35, Reactor Building Area – 8, Plan At ELEV 135'-0"

b. S-56, Rev 30, Reactor & Radwaste Building Area – 10, Plan At EL 135'-0"

c. S-406, Rev 30, Reactor Building Area – 16, Plan At ELEV 135'-0"

d. S-76, Rev 28, Reactor Building Area – 8, Plan At ELEV 165'-0"

e. S-78, Rev 22, Reactor & Radwaste Building Area – 10, Plan At EL 165'-0"

f. S-410, Rev 30, Reactor Building Area – 16, Plan At ELEV 165'-0"

g. S-105, Rev 13, Turbine Building Areas 3 & 10 - Elevations, Sections & Details

h. S-101, Rev 15, Reactor Building Area – 7, Plan At ELEV 234'-0"

i. S-102, Rev 27, Reactor Building Area – 8, Plan At ELEV 234'-0"

j. S-417, Rev 10, Reactor Building Area – 15, Plan At ELEV 234'-0"

k. S-418, Rev 17, Reactor Building Area – 16, Plan At ELEV 234'-0"

l. S-246, Rev 6, Typical Concrete Masonry Wall Details & Sections

m. S-97, Rev 26, Reactor Building Area – 8, Plan At ELEV 195'-0"

n. S-414, Rev 23, Reactor Building Area – 16, Plan At ELEV 195'-0"

o. S-40, Rev 26, Turbine Building Area – 3, Plan At ELEV 135'-0"

p. S-71, Rev 29, Turbine Building Area – 3, Plan At ELEV 165'-0"

9.26 PBAPS Biological Shield Wall Drawings:

a. S-213, Rev 9, Reactor Building Areas 7, 8, 15, & 16 Biological Shield Wall Development Between EL 135'-0" & 165'-0"

b. S-214, Rev 3, Reactor Building Areas 7, 8, 15, & 16 Biological Shield Wall Development Between EL 165'-0" & 234'-0"

9.27 PBAPS UFSAR Sections & Tables:

a. Section 4.11, Main Steam Lines, Feedwater Piping, and Drains

b. Table 5.2.1, Principal Design Parameters and Characteristics of Primary Containment

c. Section 6.2, Safety Design Basis

d. Table 14.9.1, Activity, Mass Loading, and Heat Loading At Various Locations For TID Release Assumptions

e. Table 14.9.2, Standby Gas Treatment System Performance

f. Table 14.9.3, Doses For Various Equipment Or Locations Based On TID-14844 Fission Product Release Assumptions

g. Table 14.9.4, Gamma Ray Energy Spectrum Of Fission Products In The Secondary Containment

h. Table 14.9.5, Biological Dose Rate At The Center Of The Control Room Floor Following A Loss-of-Coolant-Accident

i. Table 14.9.6, Integrated Dose In The Control Room

j. Table 14.9.7, Design Basis Accident Radiological Doses

k. Table 14.9.8, Sensitivity of Doses To Variation of Assumptions – Loss-Of-Coolant-Accident

l. Section 14.9.1.1, Source Term Assumptions

m. Section 14.9.1.5, Control Room

n. Section 14.9.2.1, Loss-of-Coolant-Accident

9.28 PBAPS General Arrangement Drawings:

a. M-1, Rev 17, Plan At EL 91'-6"

b. M-4, Rev 25, Plan At EL 165'0"

c. M-5, Rev 13, Plan At EL 195'0"

d. M-6, Rev 12, Plan At EL 234'0"

e. M-7, Rev 13, Sections A-A, B-B & C-C

9.29 PBAPS Equipment Location Drawings:

a. M-18, Rev 11, Reactor and Radwaste Building Unit 2 Plan At EL 234'-0"

b. M-32, Rev 5, Reactor Building Unit 3 Plan At EL 234'-0"

c. M-19, Rev 9, Reactor and Radwaste Building Unit 2 Section C – C

d. M-33, Rev 6, Reactor and Radwaste Building Unit 3 Section C – C

9.30 PBAPS Heating & Air Conditioning Drawings:

a. M-425, Rev 13, Radwaste Building Fan RM EL 165'-0" & 181'-0" Plans

b. M-426, Rev 12, Radwaste Building Fan RM EL 165'-0" Sections

c. M-447, Rev 8, Radwaste Building Fan RM EL 165'-0" Sections & Details

9.31 PBAPS Piping & Mechanical Drawings:

a. M-206, Rev 4, Misc. Drywell Penetration Assembly, Sheet 1

9.32 NCS Corporation Report, Control Room Envelope Inleakage Testing At Peach Bottom Atomic Power Station, 2004.

9.33 PBAPS Design Analysis 11187-1014, Rev 3, Control Room Habitability

9.34 Dresden Calculation No. DRE05-0048, Rev 1, Dresden Units 2 & 3 Post-LOCA EAB, LPZ, and CR Dose – AST Analysis

9.35 Quad Cities Calculation No. QDC-0000-N-1481, Rev 1, Quad Cities Units 1 & 2 Post-LOCA EAB, LPZ, and CR Dose – AST Analysis

10.0 TABLES

Table 1
Peach Bottom Units 2 & 3 Core Isotopic Activity (Ci)

Isotope	Ci	Isotope	Ci	Isotope	Ci
CO-58*		RU-103	1.477E+08	CS-136	7.123E+06
CO-60*		RU-105	1.022E+08	CS-137	1.595E+07
KR-85	1.387E+06	RU-106	6.081E+07	BA-139	1.787E+08
KR-85M	2.922E+07	RH-105	9.673E+07	BA-140	1.721E+08
KR-87	5.739E+07	SB-127	1.018E+07	LA-140	1.764E+08
KR-88	8.096E+07	SB-129	3.036E+07	LA-141	1.631E+08
RB-86	2.291E+05	TE-127	1.010E+07	LA-142	1.593E+08
SR-89	9.836E+07	TE-127M	1.355E+06	CE-141	1.579E+08
SR-90	1.117E+07	TE-129	2.988E+07	CE-143	1.556E+08
SR-91	1.336E+08	TE-129M	4.453E+06	CE-144	1.264E+08
SR-92	1.412E+08	TE-131M	1.360E+07	PR-143	1.509E+08
Y-90	1.150E+07	TE-132	1.343E+08	ND-147	6.459E+07
Y-91	1.212E+08	I-131	9.444E+07	NP-239	1.897E+09
Y-92	1.416E+08	I-132	1.364E+08	PU-238	6.312E+05
Y-93	1.591E+08	I-133	1.953E+08	PU-239	4.218E+04
ZR-95	1.578E+08	I-134	2.167E+08	PU-240	4.526E+04
ZR-97	1.637E+08	I-135	1.825E+08	PU-241	2.173E+07
NB-95	1.586E+08	XE-133	1.930E+08	AM-241	3.349E+04
MO-99	1.785E+08	XE-135	7.832E+07	CM-242	8.393E+06
TC-99M	1.563E+08	CS-134	2.559E+07	CM-244	9.147E+05

Core Isotopic Activity From Reference 9.6, Attachment A, Table 2
Values are applicable to both Units 2 and 3 (Ref. 9.6, Attachment A, Introduction).
Values are based on a core power level of 3514.9 MWt (Ref. 9.6, Attachment A, Introduction).
* Co-58 and Co-60 are not addressed in Ref. 9.6, Attachment A

Table 2

Peach Bottom Units 2 & 3 Core Isotopic Activity (Ci/MW_t)

Isotope	Ci	Ci/MW_t	Isotope	Ci	Ci/MW_t	Isotope	Ci	Ci/MW_t
CO-58*		1.529E+02	RU-103	1.477E+08	4.202E+04	CS-136	7.123E+06	2.027E+03
CO-60*		1.830E+02	RU-105	1.022E+08	2.908E+04	CS-137	1.595E+07	4.538E+03
KR-85	1.387E+06	3.946E+02	RU-106	6.081E+07	1.730E+04	BA-139	1.787E+08	5.084E+04
KR-85M	2.922E+07	8.313E+03	RH-105	9.673E+07	2.752E+04	BA-140	1.721E+08	4.896E+04
KR-87	5.739E+07	1.633E+04	SB-127	1.018E+07	2.896E+03	LA-140	1.764E+08	5.019E+04
KR-88	8.096E+07	2.303E+04	SB-129	3.036E+07	8.638E+03	LA-141	1.631E+08	4.640E+04
RB-86	2.291E+05	6.518E+01	TE-127	1.010E+07	2.873E+03	LA-142	1.593E+08	4.532E+04
SR-89	9.836E+07	2.798E+04	TE-127M	1.355E+06	3.855E+02	CE-141	1.579E+08	4.492E+04
SR-90	1.117E+07	3.178E+03	TE-129	2.988E+07	8.501E+03	CE-143	1.556E+08	4.427E+04
SR-91	1.336E+08	3.801E+04	TE-129M	4.453E+06	1.267E+03	CE-144	1.264E+08	3.596E+04
SR-92	1.412E+08	4.017E+04	TE-131M	1.360E+07	3.869E+03	PR-143	1.509E+08	4.293E+04
Y-90	1.150E+07	3.272E+03	TE-132	1.343E+08	3.821E+04	ND-147	6.459E+07	1.838E+04
Y-91	1.212E+08	3.448E+04	I-131	9.444E+07	2.687E+04	NP-239	1.897E+09	5.397E+05
Y-92	1.416E+08	4.029E+04	I-132	1.364E+08	3.881E+04	PU-238	6.312E+05	1.796E+02
Y-93	1.591E+08	4.526E+04	I-133	1.953E+08	5.556E+04	PU-239	4.218E+04	1.200E+01
ZR-95	1.578E+08	4.489E+04	I-134	2.167E+08	6.165E+04	PU-240	4.526E+04	1.288E+01
ZR-97	1.637E+08	4.657E+04	I-135	1.825E+08	5.192E+04	PU-241	2.173E+07	6.182E+03
NB-95	1.586E+08	4.512E+04	XE-133	1.930E+08	5.491E+04	AM-241	3.349E+04	9.528E+00
MO-99	1.785E+08	5.078E+04	XE-135	7.832E+07	2.228E+04	CM-242	8.393E+06	2.388E+03
TC-99M	1.563E+08	4.447E+04	CS-134	2.559E+07	7.280E+03	CM-244	9.147E+05	2.602E+02

Core Isotopic Activity From Table 1

Ci/MW_t = Ci/3514.9 (Ref. 9.6, Attachment A, Introduction)

* CO-58 & CO-60 activities are obtained from RADTRAD User's Manual, Table 1.4.3.2-3 (Ref. 9.2)

Table 2A
Average Assembly Burnup for 711 EFPD Cycle

Batch No.	Number of Fuel Assembly A	Average Burnup		Total per Batch (MWD/MTU) A x ΣB
		Cycle (MWD/MTU) B	Total (MWD/MTU) C= ΣB	
1	208	22800.49 18256.15 12116.92	53173.56	1.11E+07
2	280	22800.49 18256.15 0	41056.64	1.15E+07
3	276	22800.49	22800.49	6.29E+06
Total Fuel Assemblies	764	**Total Core Burnup**		2.88E+07
Average Assembly Burnup (MWD/MTU)				3.77E+04

A & B From Reference 9.6, Attachment 1, Section 7.0

Table 3
PBAPS Units 2 & 3 Main Steam Horizontal Piping Volume & Surface Area

Peach Bottom Unit ID	Main Steam Piping Horizontal Pipe Inside Volume (ft^3)				Main Steam Piping Horizontal Pipe Inside Surface Area (ft^2)			
	Header A	Header B	Header C	Header D	Header A	Header B	Header C	Header D
Piping Between RPV Nozzle & Inboard MSIV								
Unit 2	102.38	73.35	73.35	102.94	65.97	47.27	47.27	66.33
Unit 3	105.58	77.72	83.60	106.13	68.03	50.08	53.87	68.38
Piping Between Inboard and Outboard MSIVs								
Unit 2	72.37	66.05	66.05	72.37	46.64	42.57	42.57	46.64
Unit 3	72.37	66.05	66.05	72.37	46.64	42.57	42.57	46.64
Piping Between Outboard MSIV and Turbine Stop valve								
Unit 2	869.96	891.96	913.92	935.93	559.41	573.59	587.74	601.92
Unit 3	935.93	913.92	891.97	869.96	601.92	587.74	573.59	559.41

Main Steam Horizontal Pipe Volume & Surface Area Information From Section 7.3

Table 3A
PBAPS Units 2 & 3 Main Steam Piping Volume

Peach Bottom Unit ID	Main Steam Piping Inside Volume (ft^3)			
	Header A	Header B	Header C	Header D
Piping Between RPV Nozzle & Inboard MSIV				
Unit 2	324.07	305.12	305.12	325.23
Unit 3	327.27	309.49	304.94	328.42
Piping Between Inboard and Outboard MSIVs				
Unit 2	72.37	66.05	66.05	72.37
Unit 3	72.37	66.05	66.05	72.37
Piping Between Outboard MSIV and Turbine Stop Valve				
Unit 2	914.87	936.91	958.87	981.12
Unit 3	981.12	959.11	937.16	915.15

Main Steam Header Volume From Section 7.3

Table 4
Main Steam Piping Parameters Used In MSIV Leakage Release Path Model

Main Steam Header ID	Main Steam Piping Between			
	RPV Nozzle & Outboard MSIV		Outboard MSIV & Turbine Stop Valve	
	Horizontal		Horizontal	
	Inside Volume (ft^3)	Surface Area (ft^2)	Inside Volume (ft^3)	Surface Area (ft^2)
MSIV Failed Line Unit 2 Steam Header A (First Shortest Line)	N/A		869.96	559.41
MSIV Intact Line Unit 2 Steam Header B (Second Shortest Line)	139.40	89.84	891.96	573.59

Main Steam Header Volume and Surface Area Information From Table 3

Table 5
Rate Constant for MSIV Leakage Release Path

Peach Bottom Unit 2 Steam Header	Settling Velocity μ_s (ft/hr) A	Horizontal Settling Area (ft^2) B	Horizontal Pipe Volume (ft^3) C	Rate Constant for Settling λ_s (hr^{-1}) D
MSIV Failed Line - Header A Outboard MSIV To Turbine Stop Valve	9.564	559.41	869.96	6.15
MSIV Intact Line - Header B RPV Nozzle To Outboard MSIV	9.564	89.84	139.40	6.16
MSIV Intact Line - Header B Outboard MSIV To Turbine Stop Valve	9.564	573.59	891.96	6.15

B = 40 Percentile Settling Velocity = 0.00081 m/sec (Ref. 9.5, Appendix A, Table A-1) x 3.28 ft/m x 3600 sec/hr = 9.564 ft/hr

B & C From Table 4

$D = \lambda_s = (A \times B)/C$

Table 6
Aerosol Removal Efficiency Due To Gravitational Deposition On Horizontal Pipe Surface (360 scfh)

Post-LOCA Time Interval (hr)	Settling Rate Constant λ_s (hr^{-1})	Well Mixed Volume (ft^3)	Volumetric Flow Rate (ft^3/hr)	Aerosol Removal Efficiency MSIV Failed Line (%)	Post-LOCA Time Interval (hr)	Settling Rate Constant λ_s (hr^{-1})	Well Mixed Volume (ft^3)	Volumetric Flow Rate (ft^3/hr)	Aerosol Removal Efficiency Intact Line (%)
0-38	0	396.44	205.00	0.00	0-38	6.16	371.17	155.00	93.65
38-96	0	396.44	102.50	0.00	38-96	6.16	371.17	77.50	96.72
96-720	0	396.44	102.50	0.00	96-720	6.16	371.17	77.50	0.00
Post-LOCA Time Interval (hr)	**Settling Rate Constant λ_s □ (hr^{-1})**	**Well Mixed Volume (ft^3)**	**Volumetric Flow Rate (ft^3/hr)**	**Aerosol Removal Efficiency MSIV Failed Line (%)**	**Post-LOCA Time Interval (hr)**	**Settling Rate Constant λ_s □ (hr^{-1})**	**Well Mixed Volume (ft^3)**	**Volumetric Flow Rate (ft^3/hr)**	**Aerosol Removal Efficiency Intact Line (%)**
0-38	6.15	914.87	205.00	96.48	0-38	6.15	936.91	155.00	97.38
38-96	6.15	914.87	102.50	98.21	38-96	6.15	936.91	77.50	98.67
96-720	6.15	914.87	102.50	0.00	96-720	6.15	936.91	77.50	0.00

MSIV Failed Line Well Mixed Volume V1 = V11 + V12 = 324.07 ft3 + 72.37 ft3 = 396.44 ft3 for Unit 2 Header A (Table 3A)
MSIV Intact Line Well Mixed Volume V2 = V21 + V22 = 305.12 ft3 + 66.05 ft3 = 371.17 ft3 for Unit 2 Header B (Table 3A)
MSIV Failed Line Well Mixed Volume V13 = 914.87 ft3 for Unit 2 Header A (Table 3A)
MSIV Intact Line Well Mixed Volume V23 = 936.91 ft3 for Unit 2 Header B (Table 3A)

Table 7
MSIV Leak Rate In Different Control Volume (Total = 360 scfh & Max = 205 scfh)

Post-LOCA Time Interval (hr)	MSIV Leak Rate In Various Control Volumes (cfh)/(cfm)					
	Drywell To MSIV Failed Volume V_1	Volume V_1 To Volume V_{13}	Volume V_{13} To Atmosphere	Drywell To Intact Line Volume V_2	Intact Line Volume V_2 To Volume V_{23}	Volume V_{23} To Atmosphere
0-2	66.11	205.00	205.00	49.98	155.00	155.00
	1.102	3.417	3.417	0.833	2.583	2.583
2-38	36.66	205.00	205.00	27.72	155.00	155.00
	0.611	3.417	3.417	0.462	2.583	2.583
38-720	18.33	102.50	102.50	13.86	77.50	77.50
	0.306	1.708	1.708	0.231	1.292	1.292

MSIV Leak Rate Information From Section 7.2

Table 8
Conversion of Iodine Activity Into Iodine Atoms

Isotope	Drywell Region @ 0.5 hr		Iodine Atoms Per Curie	Isotopic Iodine Fraction
	Activity (Curie) A	Atoms B	Ci = Bi/Ai	Di = Bi/ΣB
I-131	3.906E+06	1.448E+23	3.708E+16	7.659E-01
I-132	5.258E+06	2.324E+21	4.420E+14	1.229E-02
I-133	7.957E+06	3.180E+22	3.997E+15	1.682E-01
I-134	6.046E+06	1.019E+21	1.685E+14	5.386E-03
I-135	7.174E+06	9.113E+21	1.270E+15	4.819E-02
Total		1.891E+23		1.000E+00

A & B From RADTRAD Run PB3D185CL.o0 output file @ 0.5 hr from Drywell Compartment Nuclide Inventory

Table 9
Elemental Iodine Activity @ DF of 200

Isotope	Iodine Core Inventory (Ci) A	Elemental Iodine Activity Released In Drywell (Ci) B=Ax0.3x0.0485	Iodine Atoms Per Curie C	Iodine Atoms D=BxC
I-131	9.444E+07	1.374E+06	3.708E+16	5.095E+22
I-132	1.364E+08	1.985E+06	4.420E+14	8.772E+20
I-133	1.953E+08	2.842E+06	3.997E+15	1.136E+22
I-134	2.167E+08	3.153E+06	1.685E+14	5.312E+20
I-135	1.825E+08	2.655E+06	1.270E+15	3.373E+21
Total Elemental Iodine Atoms Released in Drywell				6.709E+22
Total Iodine Elemental Atoms @ DF of 200				3.355E+20

A From Table 1
B From Reference 9.1, Section 3.2, Table 1 and Section 3.5
C From Table 8

Table 10
Post-LOCA Elemental Iodine Inventory Transported to the Environment
Due to Post-LOCA MSIV Leakage

Time (hrs)	Failed MS Line Cumulative Elem. Iodine Transported to Environment (atoms) [A]	Intact MS Line Cumulative Elem. Iodine Transported to Environment (atoms) [B]	Total Cumulative Elem. Iodine Transported to Environment (atoms) [A+B]	Time Interval (hrs)	MSIV Elem. Iodine Transported to Environment (atoms)
0.5	9.2926E+14	2.1270E+14	1.1420E+15		
2	1.2811E+17	3.0721E+16	1.5883E+17	0.50 to 2	1.5769E+17
8	2.4107E+18	7.0840E+17	3.1191E+18	2 to 8	2.9603E+18
24	4.1705E+18	1.4933E+18	5.6638E+18	8 to 24	2.5447E+18
96	5.3434E+18	2.2397E+18	7.5831E+18	24 to 96	1.9193E+18
720	1.0292E+19	5.8864E+18	1.6178E+19	96 to 720	8.5953E+18

A & B From RADTRAD Run PB360MS205.o0 output file

Table 11
Post-LOCA Total Elemental Iodide Inventory On CR Charcoal Filter @ 720 Hrs
Due to Post-LOCA MSIV Leakage

Time Interval (hrs)	MSIV Elem. Iodine Transported to Environment (atoms) [A]	X/Q MSIV to CR (sec/m3) [B]	Time Conversion (min/sec) [C]	Volume Conversion (m3/ft3) [D]	HVAC inflow rate (ft3/min) [E]	Charcoal Filter Efficiency (fraction) [F]	Filter Inventory Elem. Iodine (atoms) [A*B*C*D*E*F]
0.50 to 2	1.5769E+17	1.18E-03	0.01667	0.02832	2700	0.99	2.348E+14
2 to 8	2.9603E+18	9.08E-04	0.01667	0.02832	2700	0.99	3.391E+15
8 to 24	2.5447E+18	4.14E-04	0.01667	0.02832	2700	0.99	1.329E+15
24 to 96	1.9193E+18	2.90E-04	0.01667	0.02832	2700	0.99	7.022E+14
96 to 720	8.5953E+18	2.26E-04	0.01667	0.02832	2700	0.99	2.451E+15
Total Elemental Atom							8.108E+15

A From Table 10
B From Design Input 5.6.8
E From Design Input 5.6.3
F conservatively assumed per Section 2.4.4.1

Table 12
Post-LOCA Organic Iodine Inventory Transported to the Environment
Due to Post-LOCA MSIV Leakage

Time (hrs)	Failed MS Line Cumulative Org. Iodine Transported to Environment (atoms) [A]	Intact MS Line Cumulative Org. Iodine Transported to Environment (atoms) [B]	Total Cumulative Org. Iodine Transported to Environment (atoms) [A+B]	Time Interval (hrs)	MSIV Org. Iodine Transported to Environment (atoms)
0.5	7.8648E+13	3.5979E+13	1.1463E+14		
2	1.9975E+16	9.5166E+15	2.9492E+16	0.50 to 2	2.9377E+16
8	1.1546E+18	6.4760E+17	1.8022E+18	2 to 8	1.7727E+18
24	6.9649E+18	4.6722E+18	1.1637E+19	8 to 24	9.8349E+18
96	2.0275E+19	1.4700E+19	3.4975E+19	24 to 96	2.3338E+19
720	4.9188E+19	3.6599E+19	8.5787E+19	96 to 720	5.0812E+19

A & B From RADTRAD Run PB360MS205.o0 output file

Table 13
Post-LOCA Total Organic Iodide Inventory On CR Charcoal Filter @ 720 Hrs
Due to Post-LOCA MSIV Leakage

Time Interval (hrs)	MSIV Organic Iodide Transported to Environment (atoms) [A]	X/Q MSIV to CR (sec/m3) [B]	Time Conversion (min/sec) [C]	Volume Conversion (m3/ft3) [D]	HVAC inflow rate (ft3/min) [E]	Charcoal Filter Efficiency (fraction) [F]	Filter Inventory Organic Iodide (atoms) [A*B*C*D*E*F]
0.50 to 2	2.9377E+16	1.18E-03	0.01667	0.02832	2700	0.99	4.374E+13
2 to 8	1.7727E+18	9.08E-04	0.01667	0.02832	2700	0.99	2.031E+15
8 to 24	9.8349E+18	4.14E-04	0.01667	0.02832	2700	0.99	5.137E+15
24 to 96	2.3338E+19	2.90E-04	0.01667	0.02832	2700	0.99	8.539E+15
96 to 720	5.0812E+19	2.26E-04	0.01667	0.02832	2700	0.99	1.449E+16
Total Organic Atom							3.024E+16
Total (Elemental + Organic) Atom							3.835E+16

A From Table 12
B From Design Input 5.6.8
E From Design Input 5.6.3
F conservatively assumed per Section 2.4.4.1

Table 14
Post-LOCA Aerosol Inventory Transported to the Environment
Due to Post-LOCA MSIV Leakage

Time (hrs)	Failed MS Line Cumulative Aerosols Transported to Environment (kg) [A]	Intact MS Line Cumulative Aerosols Transported to Environment (kg) [B]	Total Cumulative Aerosols Transported to Environment (kg) [A+B]	Time Interval (hrs)	MSIV Aerosols Transported to Environment (kg)
0.5	7.6670E-08	1.6580E-09	7.8328E-08		
2	1.6482E-05	3.7182E-07	1.6854E-05	0.50 to 2	1.6775E-05
8	5.1536E-04	1.4196E-05	5.2956E-04	2 to 8	5.1270E-04
24	8.9412E-04	3.0939E-05	9.2506E-04	8 to 24	3.9550E-04
96	9.0598E-04	3.2307E-05	9.3829E-04	24 to 96	1.3228E-05
720	9.0601E-04	3.2352E-05	9.3836E-04	96 to 720	7.5000E-08

A & B From RADTRAD Run PB360MS205.o0 output file

Table 15
Post-LOCA Total Aerosol Inventory On CR HEPA Filter @ 720 Hrs
Due to Post-LOCA MSIV Leakage

Time Interval (hrs)	MSIV Aerosols Transported to Environment (kg) [A]	X/Q MSIV to CR (sec/m3) [B]	Time Conversion (min/sec) [C]	Volume Conversion (m3/ft3) [D]	HVAC inflow rate (ft3/min) [E]	HEPA Filter Efficiency (fraction) [F]	Filter Inventory Aerosols Mass (kg) [A*B*C*D*E*F]
0.50 to 2	1.6775E-05	1.18E-03	0.01667	0.02832	2700	0.99	2.497E-08
2 to 8	5.1270E-04	9.08E-04	0.01667	0.02832	2700	0.99	5.873E-07
8 to 24	3.9550E-04	4.14E-04	0.01667	0.02832	2700	0.99	2.066E-07
24 to 96	1.3228E-05	2.90E-04	0.01667	0.02832	2700	0.99	4.840E-09
96 to 720	7.5000E-08	2.26E-04	0.01667	0.02832	2700	0.99	2.139E-11
Total Mass							8.238E-07

A From Table 14
B From Design Input 5.6.8
E From Design Input 5.6.3
F conservatively assumed per Section 2.4.4.1

Table 16
Post-LOCA MSIV Leakage Iodine Activity Deposited on CR Charcoal Filter

Isotope	Iodine Atoms Per Curie A	Fraction Of Iodine B	Elemental & Organic Iodine Atoms On CR Charcoal 720 Hrs C	Iodine Atoms on CR Charcoal Filter At 720 Hrs Di =Bi * C	Iodine Activity CR Charcoal Filter At 720 Hrs Ci Ei = Di / Ai
I-131	3.708E+16	7.659E-01	3.835E+16	2.937E+16	7.921E-01
I-132	4.420E+14	1.229E-02		4.713E+14	1.066E+00
I-133	3.997E+15	1.682E-01		6.449E+15	1.614E+00
I-134	1.685E+14	5.386E-03		2.065E+14	1.226E+00
I-135	1.270E+15	4.819E-02		1.848E+15	1.455E+00
Total Iodine CR Charcoal Filter Atoms/Activity				3.835E+16	6.153E+00

A & B From Table 8
C From Tables 11 and 13 (elemental plus organic iodine atom inventories)

Table 17
Relationship of Aerosol Mass and Activity

Isotope	DW Region @ 2.0 hrs		Aerosol Mass Per Ci (kg/Ci)	Isotopic Aerosol Fraction
	Activity (Curie)	Mass (kg)		
	A	B	Ci = Bi /Ai	Di = Bi/ΣB
Co-58	1.062E+03	3.339E-05	3.145E-08	8.551E-07
Co-60	1.272E+03	1.125E-03	8.847E-07	2.881E-05
Rb-86	4.169E+04	5.124E-04	1.229E-08	1.312E-05
Sr-89	1.554E+06	5.348E-02	3.442E-08	1.370E-03
Sr-90	1.767E+05	1.295E+00	7.331E-06	3.317E-02
Sr-91	1.826E+06	5.037E-04	2.759E-10	1.290E-05
Sr-92	1.339E+06	1.065E-04	7.956E-11	2.728E-06
Y-90	3.117E+03	5.729E-06	1.838E-09	1.467E-07
Y-91	1.942E+04	7.920E-04	4.078E-08	2.029E-05
Y-92	2.051E+05	2.131E-05	1.039E-10	5.459E-07
Y-93	2.193E+04	6.574E-06	2.997E-10	1.684E-07
Zr-95	2.493E+04	1.161E-03	4.655E-08	2.972E-05
Zr-97	2.385E+04	1.248E-05	5.231E-10	3.195E-07
Nb-95	2.508E+04	6.414E-04	2.557E-08	1.643E-05
Mo-99	3.455E+05	7.204E-04	2.085E-09	1.845E-05
Tc-99m	3.087E+05	5.870E-05	1.902E-10	1.504E-06
Ru-103	2.916E+05	9.034E-03	3.098E-08	2.314E-04
Ru-105	1.479E+05	2.200E-05	1.488E-10	5.634E-07
Ru-106	1.202E+05	3.593E-02	2.989E-07	9.202E-04
Rh-105	1.905E+05	2.257E-04	1.185E-09	5.782E-06
Sb-127	3.965E+05	1.485E-03	3.745E-09	3.803E-05
Sb-129	8.709E+05	1.549E-04	1.778E-10	3.967E-06
Te-127	3.966E+05	1.503E-04	3.789E-10	3.849E-06
Te-127m	5.358E+04	5.681E-03	1.060E-07	1.455E-04
Te-129	9.735E+05	4.649E-05	4.775E-11	1.191E-06
Te-129m	1.762E+05	5.848E-03	3.319E-08	1.498E-04

Table 17 (Cont'd)
Relationship of Aerosol Mass and Activity

Isotope	DW Region @ 2.0 hrs		Aerosol Mass Per Ci (kg/Ci)	Isotopic Aerosol Fraction
	Activity (Curie) A	Mass (kg) B	Ci = Bi /Ai	Di = Bi/ΣB
Te-131m	5.134E+05	6.438E-04	1.254E-09	1.649E-05
Te-132	5.217E+06	1.718E-02	3.294E-09	4.401E-04
Cs-134	4.671E+06	3.610E+00	7.729E-07	9.247E-02
Cs-136	1.295E+06	1.767E-02	1.364E-08	4.525E-04
Cs-137	2.912E+06	3.348E+01	1.150E-05	8.574E-01
Ba-139	1.034E+06	6.320E-05	6.113E-11	1.619E-06
Ba-140	2.709E+06	3.701E-02	1.366E-08	9.479E-04
La-140	5.948E+04	1.070E-04	1.799E-09	2.741E-06
La-141	1.813E+04	3.205E-06	1.768E-10	8.209E-08
La-142	1.025E+04	7.161E-07	6.985E-11	1.834E-08
Ce-141	6.239E+04	2.190E-03	3.510E-08	5.609E-05
Ce-143	5.899E+04	8.883E-05	1.506E-09	2.275E-06
Ce-144	4.996E+04	1.567E-02	3.135E-07	4.012E-04
Pr-143	2.392E+04	3.552E-04	1.485E-08	9.097E-06
Nd-147	1.016E+04	1.256E-04	1.236E-08	3.218E-06
Np-239	7.319E+05	3.155E-03	4.311E-09	8.080E-05
Pu-238	2.496E+02	1.458E-02	5.841E-05	3.734E-04
Pu-239	1.668E+01	2.684E-01	1.609E-02	6.874E-03
Pu-240	1.790E+01	7.855E-02	4.389E-03	2.012E-03
Pu-241	8.591E+03	8.340E-02	9.707E-06	2.136E-03
Am-241	5.298E+00	1.544E-03	2.914E-04	3.954E-05
Cm-242	1.327E+03	4.004E-04	3.017E-07	1.026E-05
Cm-244	1.446E+02	1.788E-03	1.236E-05	4.579E-05
Total		3.904E+01		1.000E+00

A & B From RADTRAD Run PB3D185CL.o0 output file @ 2.0 hr from Drywell Compartment Nuclide Inventory

Table 18
Post-LOCA Total Aerosol Isotopic Activity On CR HEPA Filter @ 720 Hrs
Post-LOCA MSIV Leakage

Isotope	Aerosol Mass Per Ci (kg/Ci) A_i	Fraction of Aerosol B_i	Total CR Filter Aerosol Mass At 720 Hr (kg) C	Aerosol Isotopic	
				Aerosol Mass On CR Filter At 720 Hr (kg) Di =Bi * C	Aerosol Activity On CR Filter At 720 Hr (Ci) Ei = Di / Ai
Co-58	3.145E-08	8.551E-07	8.238E-07	7.044E-13	2.240E-05
Co-60	8.847E-07	2.881E-05		2.373E-11	2.683E-05
Rb-86	1.229E-08	1.312E-05		1.081E-11	8.797E-04
Sr-89	3.442E-08	1.370E-03		1.128E-09	3.278E-02
Sr-90	7.331E-06	3.317E-02		2.733E-08	3.727E-03
Sr-91	2.759E-10	1.290E-05		1.063E-11	3.853E-02
Sr-92	7.956E-11	2.728E-06		2.247E-12	2.825E-02
Y-90	1.838E-09	1.467E-07		1.209E-13	6.577E-05
Y-91	4.078E-08	2.029E-05		1.671E-11	4.098E-04
Y-92	1.039E-10	5.459E-07		4.497E-13	4.327E-03
Y-93	2.997E-10	1.684E-07		1.387E-13	4.628E-04
Zr-95	4.655E-08	2.972E-05		2.449E-11	5.260E-04
Zr-97	5.231E-10	3.195E-07		2.632E-13	5.032E-04
Nb-95	2.557E-08	1.643E-05		1.353E-11	5.292E-04
Mo-99	2.085E-09	1.845E-05		1.520E-11	7.290E-03
Tc-99m	1.902E-10	1.504E-06		1.239E-12	6.512E-03
Ru-103	3.098E-08	2.314E-04		1.906E-10	6.151E-03
Ru-105	1.488E-10	5.634E-07		4.641E-13	3.120E-03
Ru-106	2.989E-07	9.202E-04		7.580E-10	2.536E-03
Rh-105	1.185E-09	5.782E-06		4.763E-12	4.020E-03
Sb-127	3.745E-09	3.803E-05		3.132E-11	8.365E-03
Sb-129	1.778E-10	3.967E-06		3.268E-12	1.838E-02
Te-127	3.789E-10	3.849E-06		3.171E-12	8.369E-03
Te-127m	1.060E-07	1.455E-04		1.199E-10	1.131E-03
Te-129	4.775E-11	1.191E-06		9.808E-13	2.054E-02
Te-129m	3.319E-08	1.498E-04		1.234E-10	3.717E-03

Table 18 (Cont'd)
Post-LOCA Total Aerosol Isotopic Activity On CR HEPA Filter @ 720 Hrs
Post-LOCA MSIV Leakage

Isotope	Aerosol Mass Per Ci (kg/Ci) A_i	Fraction of Aerosol B_i	Total CR Filter Aerosol Mass At 720 Hr (kg) C	Aerosol Isotopic	
				Aerosol Mass On CR Filter At 720 Hr (kg) Di =Bi * C	Aerosol Activity On CR Filter At 720 Hr (Ci) Ei = Di / Ai
Te-131m	1.254E-09	1.649E-05	8.238E-07	1.358E-11	1.083E-02
Te-132	3.294E-09	4.401E-04		3.625E-10	1.101E-01
Cs-134	7.729E-07	9.247E-02		7.617E-08	9.855E-02
Cs-136	1.364E-08	4.525E-04		3.728E-10	2.732E-02
Cs-137	1.150E-05	8.574E-01		7.063E-07	6.144E-02
Ba-139	6.113E-11	1.619E-06		1.333E-12	2.181E-02
Ba-140	1.366E-08	9.479E-04		7.808E-10	5.716E-02
La-140	1.799E-09	2.741E-06		2.258E-12	1.255E-03
La-141	1.768E-10	8.209E-08		6.763E-14	3.824E-04
La-142	6.985E-11	1.834E-08		1.511E-14	2.163E-04
Ce-141	3.510E-08	5.609E-05		4.620E-11	1.316E-03
Ce-143	1.506E-09	2.275E-06		1.874E-12	1.245E-03
Ce-144	3.135E-07	4.012E-04		3.305E-10	1.054E-03
Pr-143	1.485E-08	9.097E-06		7.494E-12	5.047E-04
Nd-147	1.236E-08	3.218E-06		2.651E-12	2.145E-04
Np-239	4.311E-09	8.080E-05		6.656E-11	1.544E-02
Pu-238	5.841E-05	3.734E-04		3.076E-10	5.266E-06
Pu-239	1.609E-02	6.874E-03		5.663E-09	3.520E-07
Pu-240	4.389E-03	2.012E-03		1.657E-09	3.777E-07
Pu-241	9.707E-06	2.136E-03		1.760E-09	1.813E-04
Am-241	2.914E-04	3.954E-05		3.257E-11	1.118E-07
Cm-242	3.017E-07	1.026E-05		8.448E-12	2.800E-05
Cm-244	1.236E-05	4.579E-05		3.772E-11	3.052E-06

A_i & B_i From Table 17
C From Table 15 kilogram inventory

Table 19
Post-LOCA Activity On MCREV Charcoal & HEPA Filters

Isotope	Activity On MCREV Filter (Ci) A	Isotope	Activity On MCREV Filter (Ci) A
Co-58	2.240E-05	Te-132	1.101E-01
Co-60	2.683E-05	I-131	7.921E-01
Rb-86	8.797E-04	I-132	1.066E+00
Sr-89	3.278E-02	I-133	1.614E+00
Sr-90	3.727E-03	I-134	1.226E+00
Sr-91	3.853E-02	I-135	1.455E+00
Sr-92	2.825E-02	Cs-134	9.855E-02
Y-90	6.577E-05	Cs-136	2.732E-02
Y-91	4.098E-04	Cs-137	6.144E-02
Y-92	4.327E-03	Ba-139	2.181E-02
Y-93	4.628E-04	Ba-140	5.716E-02
Zr-95	5.260E-04	La-140	1.255E-03
Zr-97	5.032E-04	La-141	3.824E-04
Nb-95	5.292E-04	La-142	2.163E-04
Mo-99	7.290E-03	Ce-141	1.316E-03
Tc-99m	6.512E-03	Ce-143	1.245E-03
Ru-103	6.151E-03	Ce-144	1.054E-03
Ru-105	3.120E-03	Pr-143	5.047E-04
Ru-106	2.536E-03	Nd-147	2.145E-04
Rh-105	4.020E-03	Np-239	1.544E-02
Sb-127	8.365E-03	Pu-238	5.266E-06
Sb-129	1.838E-02	Pu-239	3.520E-07
Te-127	8.369E-03	Pu-240	3.777E-07
Te-127m	1.131E-03	Pu-241	1.813E-04
Te-129	2.054E-02	Am-241	1.118E-07
Te-129m	3.717E-03	Cm-242	2.800E-05
Te-131m	1.083E-02	Cm-244	3.052E-06

Aerosol Activity From Table 18 and Iodine Activity From Table 16

Table 20
Post-LOCA Reactor Building Isotopic Inventory - Containment Leakage

Isotope	Post-LOCA Reactor Building Isotopic Inventory (Ci) Containment Leakage								
	1.0 hr	2.0 hr	4.0 hrs	8.0 hrs	16 hrs	24 hrs	36 hrs	72 hrs	96 hrs
Co-58	2.933E-02	2.198E-01	3.251E-01	1.415E-01	1.974E-02	2.637E-03	1.287E-04	3.232E-08	1.620E-09
Co-60	3.512E-02	2.633E-01	3.898E-01	1.699E-01	2.378E-02	3.186E-03	1.562E-04	3.979E-08	2.014E-09
Kr-85	4.462E+01	2.846E+02	8.089E+02	1.315E+03	1.560E+03	1.585E+03	1.576E+03	7.768E+02	7.700E+02
Kr-85m	8.052E+02	4.399E+03	9.176E+03	8.032E+03	2.764E+03	8.145E+02	1.266E+02	2.377E-01	5.750E-03
Kr-87	1.071E+03	3.959E+03	3.783E+03	6.947E+02	1.053E+01	1.366E-01	1.961E-04	0.000E+00	0.000E+00
Kr-88	2.040E+03	1.019E+04	1.778E+04	1.089E+04	1.833E+03	2.643E+02	1.406E+01	1.059E-03	3.001E-06
Rb-86	2.808E+00	1.058E+01	1.393E+01	5.953E+00	8.199E-01	1.085E-01	5.218E-03	1.212E-06	5.733E-08
Sr-89	4.294E+01	3.217E+02	4.757E+02	2.069E+02	2.883E+01	3.845E+00	1.873E-01	4.676E-05	2.335E-06
Sr-90	4.879E+00	3.658E+01	5.415E+01	2.361E+01	3.304E+00	4.428E-01	2.171E-02	5.533E-06	2.801E-07
Sr-91	5.425E+01	3.781E+02	4.837E+02	1.575E+02	1.230E+01	9.193E-01	1.878E-02	3.462E-07	3.042E-09
Sr-92	4.776E+01	2.772E+02	2.461E+02	3.857E+01	6.974E-01	1.208E-02	2.751E-05	0.000E+00	0.000E+00
Y-90	6.982E-02	7.695E-01	2.185E+00	1.910E+00	5.198E-01	1.008E-01	7.002E-03	3.003E-06	1.817E-07
Y-91	5.335E-01	4.048E+00	6.183E+00	2.841E+00	4.236E-01	5.861E-02	2.932E-03	7.459E-07	3.733E-08
Y-92	4.157E+00	6.091E+01	1.551E+02	6.518E+01	3.364E+00	1.210E-01	6.705E-04	1.674E-10	0.000E+00
Y-93	6.488E-01	4.542E+00	5.861E+00	1.942E+00	1.569E-01	1.215E-02	2.614E-04	5.631E-09	5.491E-11
Zr-95	6.889E-01	5.163E+00	7.635E+00	3.323E+00	4.634E-01	6.187E-02	3.017E-03	7.567E-07	3.789E-08
Zr-97	6.863E-01	4.938E+00	6.735E+00	2.492E+00	2.512E-01	2.425E-02	7.268E-04	4.231E-08	8.005E-10
Nb-95	6.928E-01	5.194E+00	7.688E+00	3.352E+00	4.690E-01	6.284E-02	3.081E-03	7.843E-07	3.967E-08
Mo-99	9.644E+00	7.155E+01	1.037E+02	4.336E+01	5.579E+00	6.874E-01	2.971E-02	5.189E-06	2.042E-07
Tc-99m	8.539E+00	6.398E+01	9.430E+01	4.039E+01	5.410E+00	6.882E-01	3.026E-02	5.319E-06	2.093E-07
Ru-103	8.059E+00	6.037E+01	8.924E+01	3.880E+01	5.397E+00	7.190E-01	3.495E-02	8.674E-06	4.315E-07
Ru-105	4.774E+00	3.062E+01	3.317E+01	7.746E+00	3.109E-01	1.195E-02	9.001E-05	8.314E-11	0.000E+00
Ru-106	3.320E+00	2.489E+01	3.684E+01	1.606E+01	2.246E+00	3.007E-01	1.473E-02	3.744E-06	1.892E-07
Rh-105	5.280E+00	3.946E+01	5.766E+01	2.406E+01	2.966E+00	3.432E-01	1.336E-02	1.683E-06	5.321E-08
Sb-127	1.103E+01	8.210E+01	1.197E+02	5.066E+01	6.676E+00	8.425E-01	3.776E-02	7.346E-06	3.106E-07
Sb-129	2.824E+01	1.803E+02	1.937E+02	4.445E+01	1.723E+00	6.397E-02	4.574E-04	3.615E-10	0.000E+00
Te-127	1.100E+01	8.217E+01	1.208E+02	5.181E+01	7.019E+00	9.105E-01	4.197E-02	8.653E-06	3.803E-07
Te-127m	1.480E+00	1.110E+01	1.643E+01	7.165E+00	1.003E+00	1.345E-01	6.596E-03	1.680E-06	8.488E-08
Te-129	3.024E+01	2.050E+02	2.393E+02	6.368E+01	5.015E+00	4.667E-01	1.893E-02	4.520E-06	2.241E-07
Te-129m	4.865E+00	3.648E+01	5.399E+01	2.351E+01	3.272E+00	4.357E-01	2.115E-02	5.226E-06	2.592E-07

Table 20 (Cont'd)
Post-LOCA Reactor Building Isotopic Inventory - Containment Leakage

Isotope	Post-LOCA Reactor Building Isotopic Inventory (Ci) Containment Leakage								
	1.0 hr	2.0 hr	4.0 hrs	8.0 hrs	16 hrs	24 hrs	36 hrs	72 hrs	96 hrs
Te-131m	1.451E+01	1.063E+02	1.503E+02	5.974E+01	6.948E+00	7.740E-01	2.876E-02	3.191E-06	9.278E-08
Te-132	1.454E+02	1.080E+03	1.571E+03	6.612E+02	8.618E+01	1.076E+01	4.743E-01	8.787E-05	3.596E-06
I-131	1.230E+03	4.951E+03	6.583E+03	2.827E+03	4.300E+02	1.013E+02	5.204E+01	2.154E+01	1.959E+01
I-132	1.493E+03	5.345E+03	4.866E+03	1.118E+03	1.057E+02	1.322E+01	5.781E-01	1.139E-04	4.938E-06
I-133	2.467E+03	9.642E+03	1.208E+04	4.604E+03	5.518E+02	1.025E+02	3.686E+01	5.231E+00	2.331E+00
I-134	1.284E+03	2.353E+03	6.480E+02	1.194E+01	3.345E-03	1.452E-06	0.000E+00	0.000E+00	0.000E+00
I-135	2.147E+03	7.809E+03	8.478E+03	2.428E+03	1.642E+02	1.720E+01	2.622E+00	2.833E-02	2.267E-03
Xe-133	6.199E+03	3.942E+04	1.110E+05	1.766E+05	2.004E+05	1.948E+05	1.814E+05	7.334E+04	6.372E+04
Xe-135	2.599E+03	1.631E+04	4.171E+04	5.034E+04	3.218E+04	1.771E+04	7.054E+03	2.235E+02	3.554E+01
Cs-134	3.141E+02	1.186E+03	1.565E+03	6.729E+02	9.381E+01	1.256E+01	6.154E-01	1.509E-04	7.402E-06
Cs-136	8.726E+01	3.287E+02	4.320E+02	1.841E+02	2.523E+01	3.321E+00	1.585E-01	3.594E-05	1.674E-06
Cs-137	1.958E+02	7.392E+02	9.756E+02	4.196E+02	5.851E+01	7.838E+00	3.841E-01	9.427E-05	4.630E-06
Ba-139	4.721E+01	2.141E+02	1.159E+02	6.761E+00	1.693E-02	4.061E-05	4.768E-09	0.000E+00	0.000E+00
Ba-140	7.500E+01	5.610E+02	8.267E+02	3.572E+02	4.909E+01	6.460E+00	3.083E-01	7.241E-05	3.472E-06
La-140	1.249E+00	1.533E+01	4.781E+01	4.326E+01	1.167E+01	2.208E+00	1.469E-01	5.512E-05	3.061E-06
La-141	5.972E-01	3.753E+00	3.905E+00	8.409E-01	2.870E-02	9.380E-04	5.540E-06	0.000E+00	0.000E+00
La-142	4.439E-01	2.123E+00	1.279E+00	9.230E-02	3.540E-04	1.300E-06	2.893E-10	0.000E+00	0.000E+00
Ce-141	1.724E+00	1.292E+01	1.910E+01	8.303E+00	1.154E+00	1.536E-01	7.451E-03	1.839E-06	9.115E-08
Ce-143	1.664E+00	1.222E+01	1.734E+01	6.951E+00	8.222E-01	9.315E-02	3.550E-03	4.247E-07	1.299E-08
Ce-144	1.380E+00	1.035E+01	1.531E+01	6.674E+00	9.332E-01	1.250E-01	6.120E-03	1.554E-06	7.848E-08
Pr-143	6.600E-01	4.958E+00	7.379E+00	3.252E+00	4.625E-01	6.264E-02	3.096E-03	7.774E-07	3.823E-08
Nd-147	2.815E-01	2.105E+00	3.099E+00	1.337E+00	1.832E-01	2.404E-02	1.142E-03	2.648E-07	1.259E-08
Np-239	2.046E+01	1.516E+02	2.189E+02	9.088E+01	1.153E+01	1.401E+00	5.928E-02	9.716E-06	3.665E-07
Pu-238	6.894E-03	5.168E-02	7.651E-02	3.336E-02	4.669E-03	6.257E-04	3.068E-05	7.821E-09	3.960E-10
Pu-239	4.607E-04	3.454E-03	5.115E-03	2.232E-03	3.126E-04	4.193E-05	2.058E-06	5.261E-10	2.667E-11
Pu-240	4.944E-04	3.707E-03	5.487E-03	2.393E-03	3.348E-04	4.486E-05	2.200E-06	5.607E-10	2.839E-11
Pu-241	2.373E-01	1.779E+00	2.633E+00	1.148E+00	1.607E-01	2.153E-02	1.056E-03	2.690E-07	1.362E-08
Am-241	1.463E-04	1.097E-03	1.625E-03	7.095E-04	9.951E-05	1.337E-05	6.578E-07	1.694E-10	8.636E-12
Cm-242	3.666E-02	2.748E-01	4.066E-01	1.772E-01	2.476E-02	3.313E-03	1.621E-04	4.105E-08	2.070E-09
Cm-244	3.995E-03	2.995E-02	4.434E-02	1.933E-02	2.705E-03	3.625E-04	1.777E-05	4.529E-09	2.293E-10

Post-LOCA Reactor Building Isotopic Inventory From RADTRAD Run PB3D185CLSH.o0

Table 21

Post-LOCA Reactor Building Isotopic Inventory - ESF Leakage

Isotope	Post-LOCA Reactor Building Isotopic Inventory (Ci) ESF Leakage								
	1.0 hr	2.0 hr	4.0 hrs	8.0 hrs	16 hrs	24 hrs	36 hrs	72 hrs	96 hrs
I-131	3.327E+02	1.454E+03	3.747E+03	5.894E+03	6.789E+03	6.731E+03	6.461E+03	5.665E+03	5.189E+03
I-132	3.967E+02	1.457E+03	2.224E+03	1.080E+03	1.154E+02	1.057E+01	2.847E-01	5.517E-06	3.980E-09
I-133	6.676E+02	2.831E+03	6.877E+03	9.603E+03	8.720E+03	6.816E+03	4.579E+03	1.377E+03	6.177E+02
I-134	3.474E+02	6.908E+02	3.689E+02	2.491E+01	5.287E-02	9.658E-05	7.333E-09	0.000E+00	0.000E+00
I-135	5.808E+02	2.293E+03	4.827E+03	5.063E+03	2.594E+03	1.144E+03	3.257E+02	7.455E+00	6.008E-01
Xe-133	2.360E+00	1.949E+01	1.165E+02	3.956E+02	8.656E+02	1.172E+03	1.449E+03	1.642E+03	1.550E+03
Xe-135	2.501E+01	1.924E+02	9.972E+02	2.547E+03	3.174E+03	2.452E+03	1.298E+03	1.148E+02	1.979E+01

Post-LOCA Reactor Building Isotopic Inventory From RADTRAD Run PB10G185ESSH.o0

Table 22
Post-LOCA Reactor Building Isotopic Inventory - Containment + ESF Leakages

Isotope	Post-LOCA Reactor Building Isotopic Inventory (Ci) Containment + ESF Leakage								
	1.0 hr	2.0 hr	4.0 hrs	8.0 hrs	16 hrs	24 hrs	36 hrs	72 hrs	96 hrs
Co-58	2.933E-02	2.198E-01	3.251E-01	1.415E-01	1.974E-02	2.637E-03	1.287E-04	3.232E-08	1.620E-09
Co-60	3.512E-02	2.633E-01	3.898E-01	1.699E-01	2.378E-02	3.186E-03	1.562E-04	3.979E-08	2.014E-09
Kr-85	4.462E+01	2.846E+02	8.089E+02	1.315E+03	1.560E+03	1.585E+03	1.576E+03	7.768E+02	7.700E+02
Kr-85m	8.052E+02	4.399E+03	9.176E+03	8.032E+03	2.764E+03	8.145E+02	1.266E+02	2.377E-01	5.750E-03
Kr-87	1.071E+03	3.959E+03	3.783E+03	6.947E+02	1.053E+01	1.366E-01	1.961E-04	0.000E+00	0.000E+00
Kr-88	2.040E+03	1.019E+04	1.778E+04	1.089E+04	1.833E+03	2.643E+02	1.406E+01	1.059E-03	3.001E-06
Rb-86	2.808E+00	1.058E+01	1.393E+01	5.953E+00	8.199E-01	1.085E-01	5.218E-03	1.212E-06	5.733E-08
Sr-89	4.294E+01	3.217E+02	4.757E+02	2.069E+02	2.883E+01	3.845E+00	1.873E-01	4.676E-05	2.335E-06
Sr-90	4.879E+00	3.658E+01	5.415E+01	2.361E+01	3.304E+00	4.428E-01	2.171E-02	5.533E-06	2.801E-07
Sr-91	5.425E+01	3.781E+02	4.837E+02	1.575E+02	1.230E+01	9.193E-01	1.878E-02	3.462E-07	3.042E-09
Sr-92	4.776E+01	2.772E+02	2.461E+02	3.857E+01	6.974E-01	1.208E-02	2.751E-05	0.000E+00	0.000E+00
Y-90	6.982E-02	7.695E-01	2.185E+00	1.910E+00	5.198E-01	1.008E-01	7.002E-03	3.003E-06	1.817E-07
Y-91	5.335E-01	4.048E+00	6.183E+00	2.841E+00	4.236E-01	5.861E-02	2.932E-03	7.459E-07	3.733E-08
Y-92	4.157E+00	6.091E+01	1.551E+02	6.518E+01	3.364E+00	1.210E-01	6.705E-04	1.674E-10	0.000E+00
Y-93	6.488E-01	4.542E+00	5.861E+00	1.942E+00	1.569E-01	1.215E-02	2.614E-04	5.631E-09	5.491E-11
Zr-95	6.889E-01	5.163E+00	7.635E+00	3.323E+00	4.634E-01	6.187E-02	3.017E-03	7.567E-07	3.789E-08
Zr-97	6.863E-01	4.938E+00	6.735E+00	2.492E+00	2.512E-01	2.425E-02	7.268E-04	4.231E-08	8.005E-10
Nb-95	6.928E-01	5.194E+00	7.688E+00	3.352E+00	4.690E-01	6.284E-02	3.081E-03	7.843E-07	3.967E-08
Mo-99	9.644E+00	7.155E+01	1.037E+02	4.336E+01	5.579E+00	6.874E-01	2.971E-02	5.189E-06	2.042E-07
Tc-99m	8.539E+00	6.398E+01	9.430E+01	4.039E+01	5.410E+00	6.882E-01	3.026E-02	5.319E-06	2.093E-07
Ru-103	8.059E+00	6.037E+01	8.924E+01	3.880E+01	5.397E+00	7.190E-01	3.495E-02	8.674E-06	4.315E-07
Ru-105	4.774E+00	3.062E+01	3.317E+01	7.746E+00	3.109E-01	1.195E-02	9.001E-05	8.314E-11	0.000E+00
Ru-106	3.320E+00	2.489E+01	3.684E+01	1.606E+01	2.246E+00	3.007E-01	1.473E-02	3.744E-06	1.892E-07
Rh-105	5.280E+00	3.946E+01	5.766E+01	2.406E+01	2.966E+00	3.432E-01	1.336E-02	1.683E-06	5.321E-08
Sb-127	1.103E+01	8.210E+01	1.197E+02	5.066E+01	6.676E+00	8.425E-01	3.776E-02	7.346E-06	3.106E-07
Sb-129	2.824E+01	1.803E+02	1.937E+02	4.445E+01	1.723E+00	6.397E-02	4.574E-04	3.615E-10	0.000E+00
Te-127	1.100E+01	8.217E+01	1.208E+02	5.181E+01	7.019E+00	9.105E-01	4.197E-02	8.653E-06	3.803E-07
Te-127m	1.480E+00	1.110E+01	1.643E+01	7.165E+00	1.003E+00	1.345E-01	6.596E-03	1.680E-06	8.488E-08
Te-129	3.024E+01	2.050E+02	2.393E+02	6.368E+01	5.015E+00	4.667E-01	1.893E-02	4.520E-06	2.241E-07
Te-129m	4.865E+00	3.648E+01	5.399E+01	2.351E+01	3.272E+00	4.357E-01	2.115E-02	5.226E-06	2.592E-07

Table 22 (Cont'd)
Post-LOCA Reactor Building Isotopic Inventory - Containment + ESF Leakages

Isotope	Post-LOCA Reactor Building Isotopic Inventory (Ci) Containment + ESF Leakage								
	1.0 hr	2.0 hr	4.0 hrs	8.0 hrs	16 hrs	24 hrs	36 hrs	72 hrs	96 hrs
Te-131m	1.451E+01	1.063E+02	1.503E+02	5.974E+01	6.948E+00	7.740E-01	2.876E-02	3.191E-06	9.278E-08
Te-132	1.454E+02	1.080E+03	1.571E+03	6.612E+02	8.618E+01	1.076E+01	4.743E-01	8.787E-05	3.596E-06
I-131	1.562E+03	6.404E+03	1.033E+04	8.721E+03	7.219E+03	6.832E+03	6.513E+03	5.687E+03	5.209E+03
I-132	1.890E+03	6.802E+03	7.090E+03	2.198E+03	2.211E+02	2.379E+01	8.629E-01	1.194E-04	4.942E-06
I-133	3.135E+03	1.247E+04	1.895E+04	1.421E+04	9.272E+03	6.918E+03	4.616E+03	1.382E+03	6.201E+02
I-134	1.631E+03	3.043E+03	1.017E+03	3.685E+01	5.621E-02	9.803E-05	7.333E-09	0.000E+00	0.000E+00
I-135	2.727E+03	1.010E+04	1.331E+04	7.491E+03	2.758E+03	1.161E+03	3.284E+02	7.483E+00	6.031E-01
Xe-133	6.202E+03	3.944E+04	1.111E+05	1.770E+05	2.013E+05	1.960E+05	1.814E+05	7.499E+04	6.527E+04
Xe-135	2.624E+03	1.650E+04	4.270E+04	5.289E+04	3.535E+04	2.017E+04	7.054E+03	3.383E+02	5.533E+01
Cs-134	3.141E+02	1.186E+03	1.565E+03	6.729E+02	9.381E+01	1.256E+01	6.154E-01	1.509E-04	7.402E-06
Cs-136	8.726E+01	3.287E+02	4.320E+02	1.841E+02	2.523E+01	3.321E+00	1.585E-01	3.594E-05	1.674E-06
Cs-137	1.958E+02	7.392E+02	9.756E+02	4.196E+02	5.851E+01	7.838E+00	3.841E-01	9.427E-05	4.630E-06
Ba-139	4.721E+01	2.141E+02	1.159E+02	6.761E+00	1.693E-02	4.061E-05	4.768E-09	0.000E+00	0.000E+00
Ba-140	7.500E+01	5.610E+02	8.267E+02	3.572E+02	4.909E+01	6.460E+00	3.083E-01	7.241E-05	3.472E-06
La-140	1.249E+00	1.533E+01	4.781E+01	4.326E+01	1.167E+01	2.208E+00	1.469E-01	5.512E-05	3.061E-06
La-141	5.972E-01	3.753E+00	3.905E+00	8.409E-01	2.870E-02	9.380E-04	5.540E-06	0.000E+00	0.000E+00
La-142	4.439E-01	2.123E+00	1.279E+00	9.230E-02	3.540E-04	1.300E-06	2.893E-10	0.000E+00	0.000E+00
Ce-141	1.724E+00	1.292E+01	1.910E+01	8.303E+00	1.154E+00	1.536E-01	7.451E-03	1.839E-06	9.115E-08
Ce-143	1.664E+00	1.222E+01	1.734E+01	6.951E+00	8.222E-01	9.315E-02	3.550E-03	4.247E-07	1.299E-08
Ce-144	1.380E+00	1.035E+01	1.531E+01	6.674E+00	9.332E-01	1.250E-01	6.120E-03	1.554E-06	7.848E-08
Pr-143	6.600E-01	4.958E+00	7.379E+00	3.252E+00	4.625E-01	6.264E-02	3.096E-03	7.774E-07	3.823E-08
Nd-147	2.815E-01	2.105E+00	3.099E+00	1.337E+00	1.832E-01	2.404E-02	1.142E-03	2.648E-07	1.259E-08
Np-239	2.046E+01	1.516E+02	2.189E+02	9.088E+01	1.153E+01	1.401E+00	5.928E-02	9.716E-06	3.665E-07
Pu-238	6.894E-03	5.168E-02	7.651E-02	3.336E-02	4.669E-03	6.257E-04	3.068E-05	7.821E-09	3.960E-10
Pu-239	4.607E-04	3.454E-03	5.115E-03	2.232E-03	3.126E-04	4.193E-05	2.058E-06	5.261E-10	2.667E-11
Pu-240	4.944E-04	3.707E-03	5.487E-03	2.393E-03	3.348E-04	4.486E-05	2.200E-06	5.607E-10	2.839E-11
Pu-241	2.373E-01	1.779E+00	2.633E+00	1.148E+00	1.607E-01	2.153E-02	1.056E-03	2.690E-07	1.362E-08
Am-241	1.463E-04	1.097E-03	1.625E-03	7.095E-04	9.951E-05	1.337E-05	6.578E-07	1.694E-10	8.636E-12
Cm-242	3.666E-02	2.748E-01	4.066E-01	1.772E-01	2.476E-02	3.313E-03	1.621E-04	4.105E-08	2.070E-09
Cm-244	3.995E-03	2.995E-02	4.434E-02	1.933E-02	2.705E-03	3.625E-04	1.777E-05	4.529E-09	2.293E-10

Containment Leakage Activity From Table 20 & ESF Leakage Activity From Table 21

Table 23
Post-LOCA Containment Shine Integrated Gamma Dose

Post-LOCA Period t (hr)	Control Room Gamma Dose Rate (mrem/hr)	Control Room				MicroShield Run No.
		Integrated Gamma Dose (mrem)	Occupancy Factor (unitless)	Integrated Gamma Dose (mrem)	Cumulative Gamma Dose (mrem)	
1	1.252E+00	1.252E+00	1.0	1.252E+00	1.252E+00	PB1.MS5
2	5.165E+00	3.209E+00	1.0	3.209E+00	4.461E+00	PB2.MS5
4	7.341E+00	1.251E+01	1.0	1.251E+01	1.697E+01	PB4.MS5
8	3.751E+00	2.218E+01	1.0	2.218E+01	3.915E+01	PB8.MS5
16	8.330E-01	1.834E+01	1.0	1.834E+01	5.749E+01	PB16.MS5
24	2.127E-01	4.183E+00	1.0	4.183E+00	6.167E+01	PB24.MS5
36	5.365E-02	1.598E+00	0.6	9.589E-01	6.263E+01	PB36.MS5
72	6.170E-03	1.077E+00	0.6	6.461E-01	6.327E+01	PB72.MS5
96	2.867E-03	7.760E+00	0.6	4.656E+00	6.633E+01	PB96.MS5
720	2.867E-03	1.789E+00	0.4	7.156E-01	6.704E+01	PB96.MS5
720-hrs Cumulative Gamma Dose					**6.704E+01**	

11.0 FIGURES

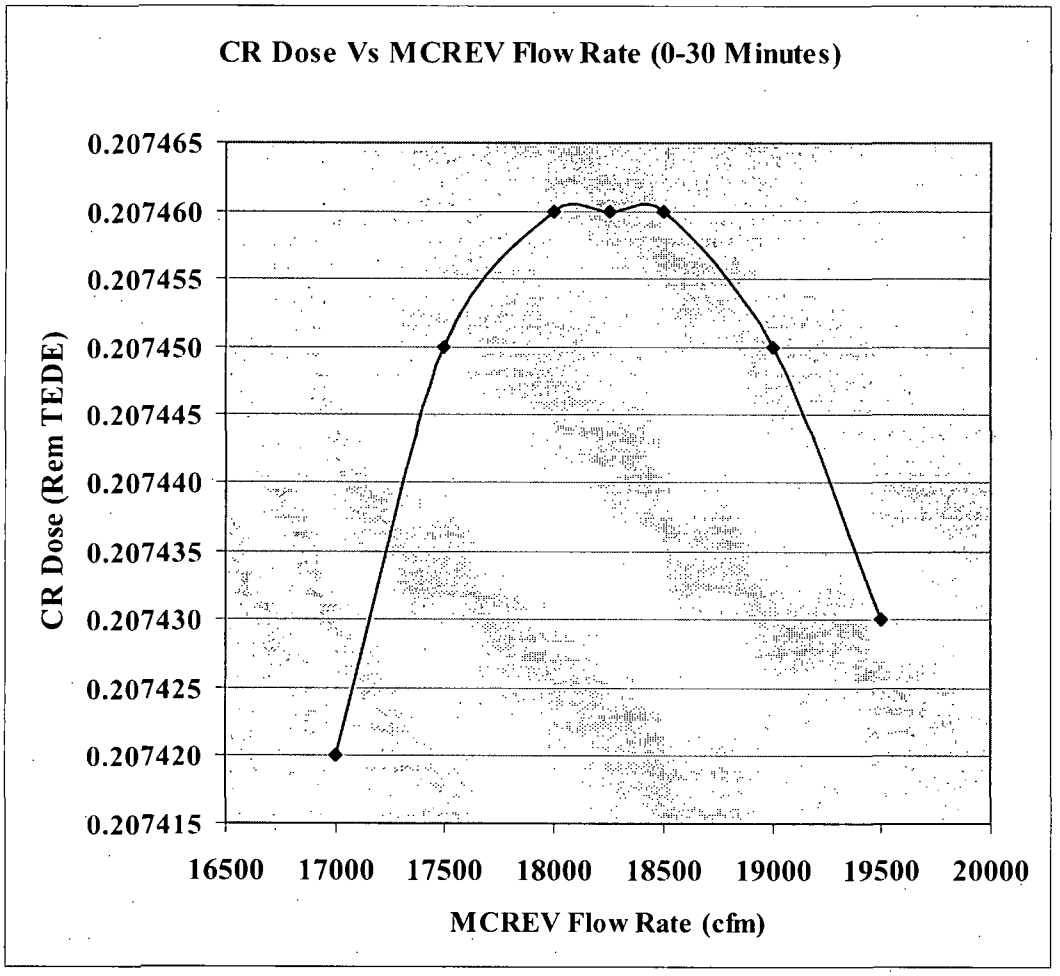


Figure 1: CR Dose Vs MCREV Flow Rate Before Pressurization

MCREV Flow Rate (cfm)	Control Room Dose (TEDE)	RADTRAD Computer Run No.
17000	0.20742	PB3D170CL.o0
17500	0.20745	PB3D175CL.o0
18000	0.20746	PB3D180CL.o0
18250	0.20746	PB3D1825CL.o0
18500	0.20746	PB3D185CL.o0
19000	0.20745	PB3D190CL.o0
19500	0.20743	PB3D195CL.o0

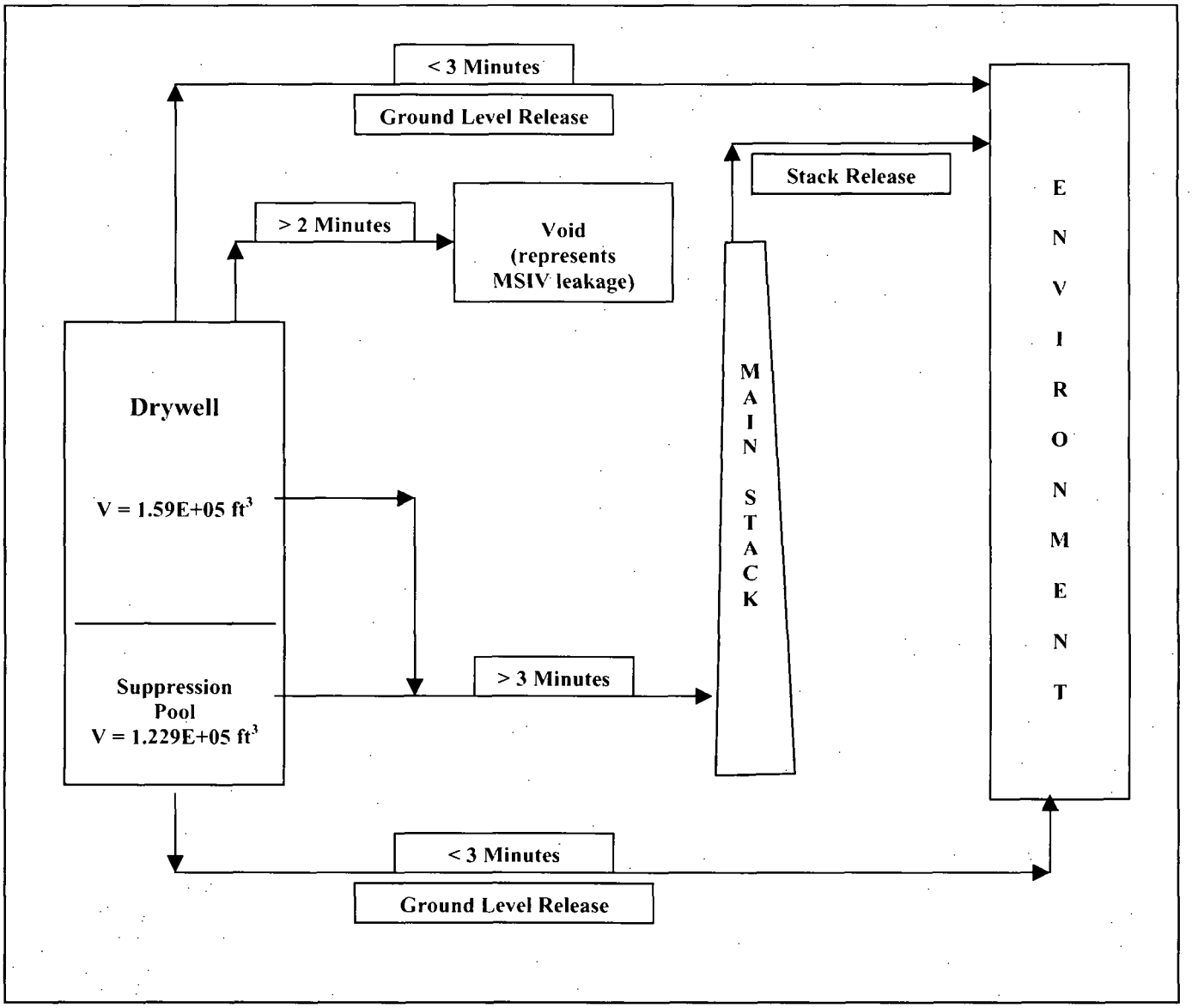


Figure 2: PBAPS Containment & ESF Leakage RADTRAD Nodalization

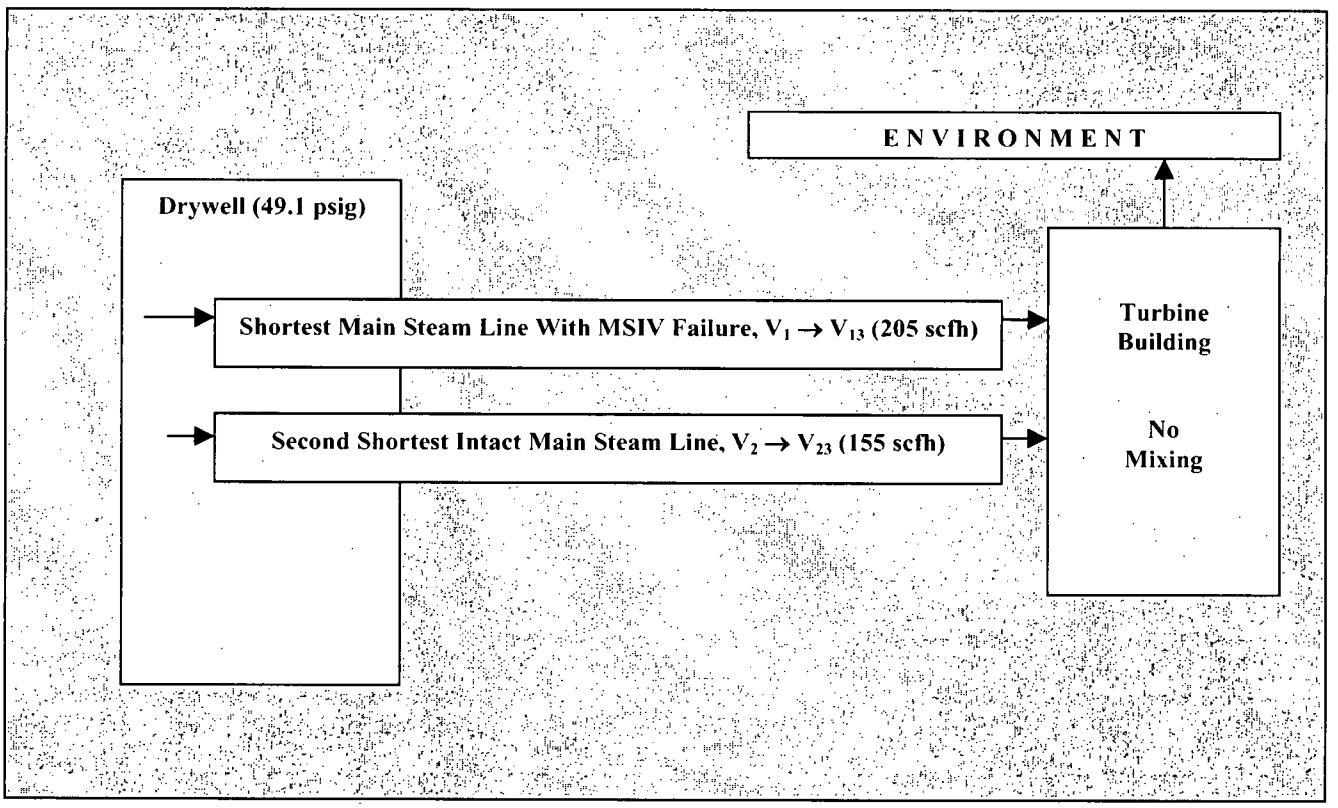


Figure 3: PBAPS MSIV Leakage Path Volumetric Distribution

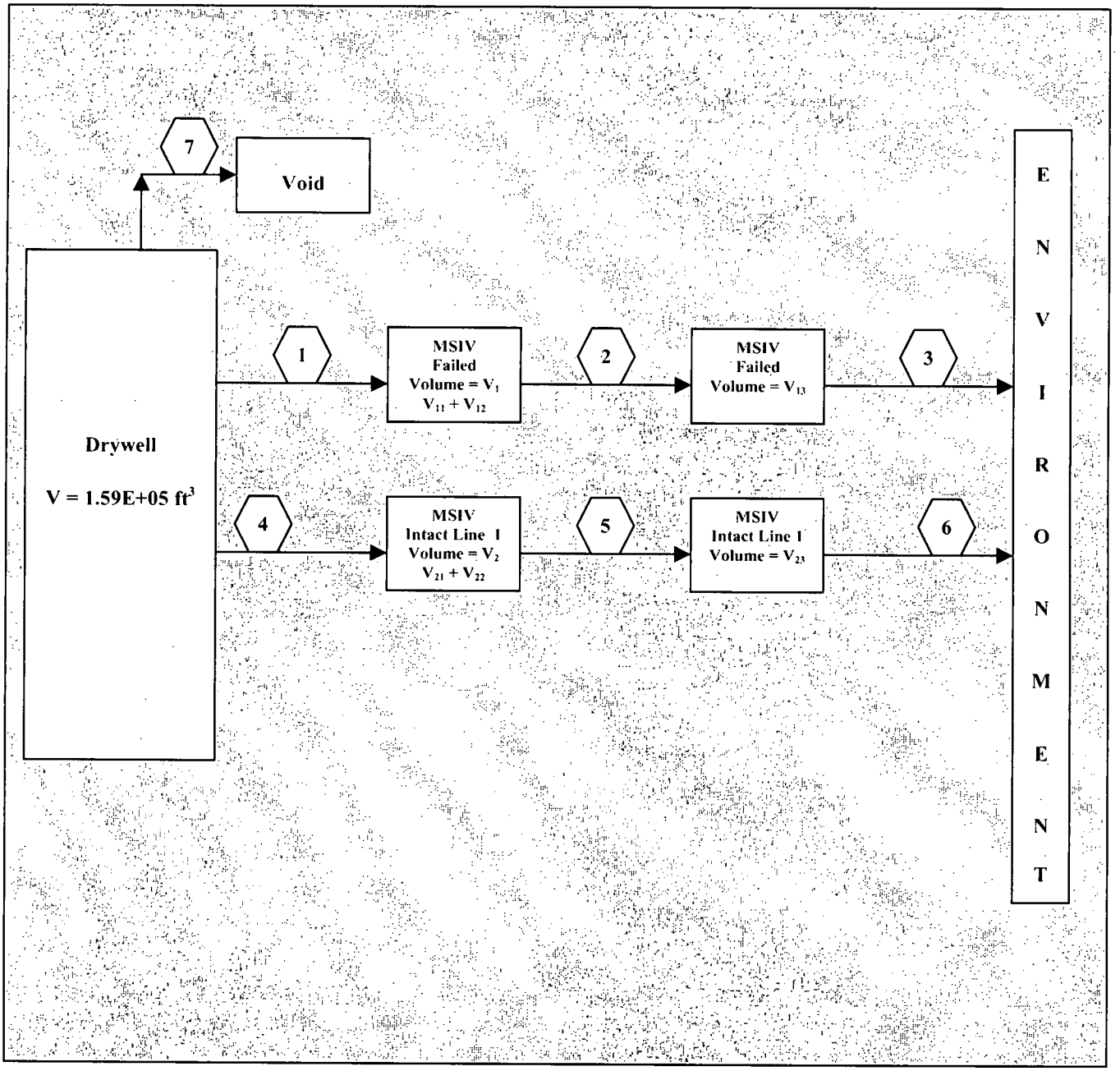


Figure 4: PBAPS MSIV Leakage RADTRAD Nodalization

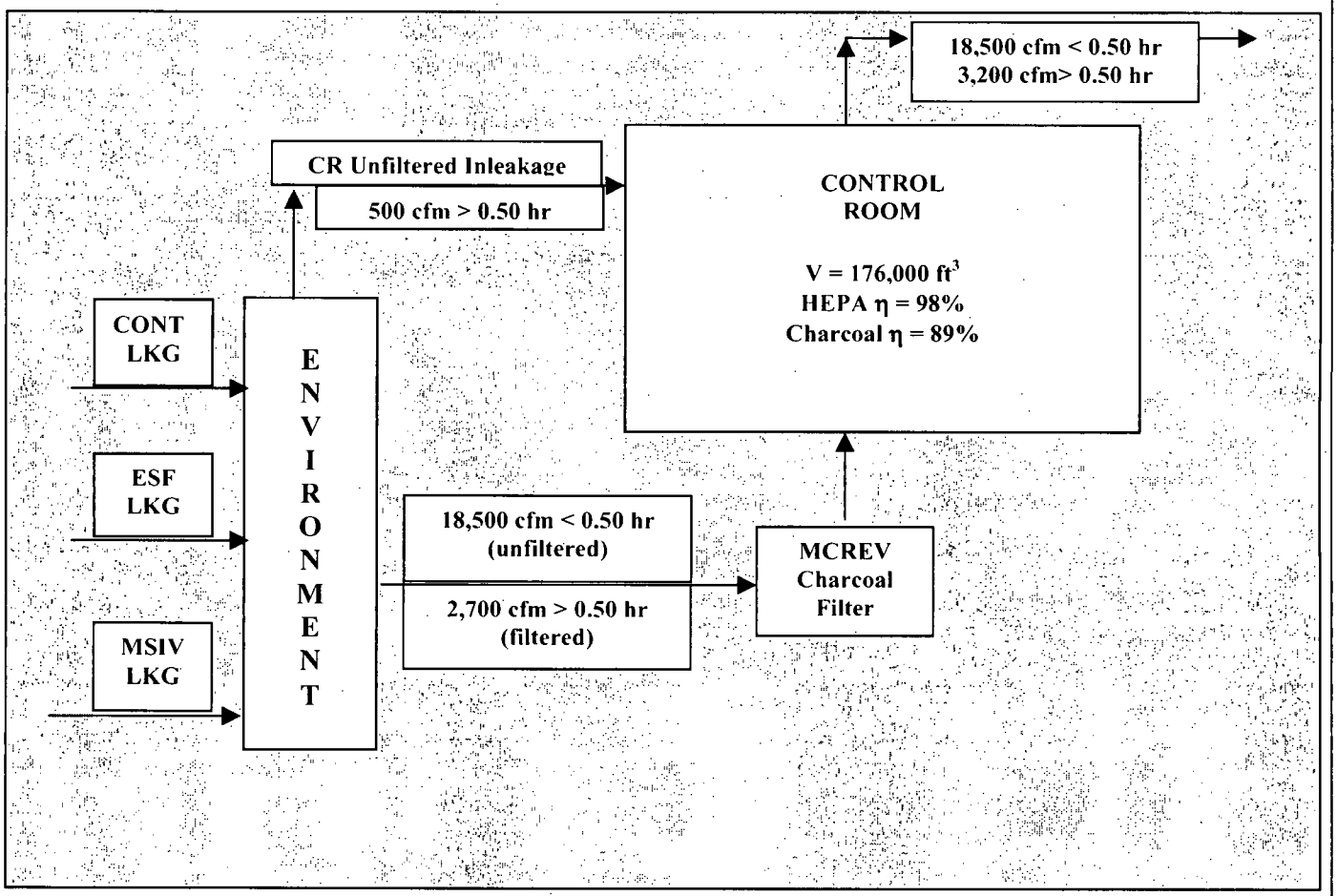
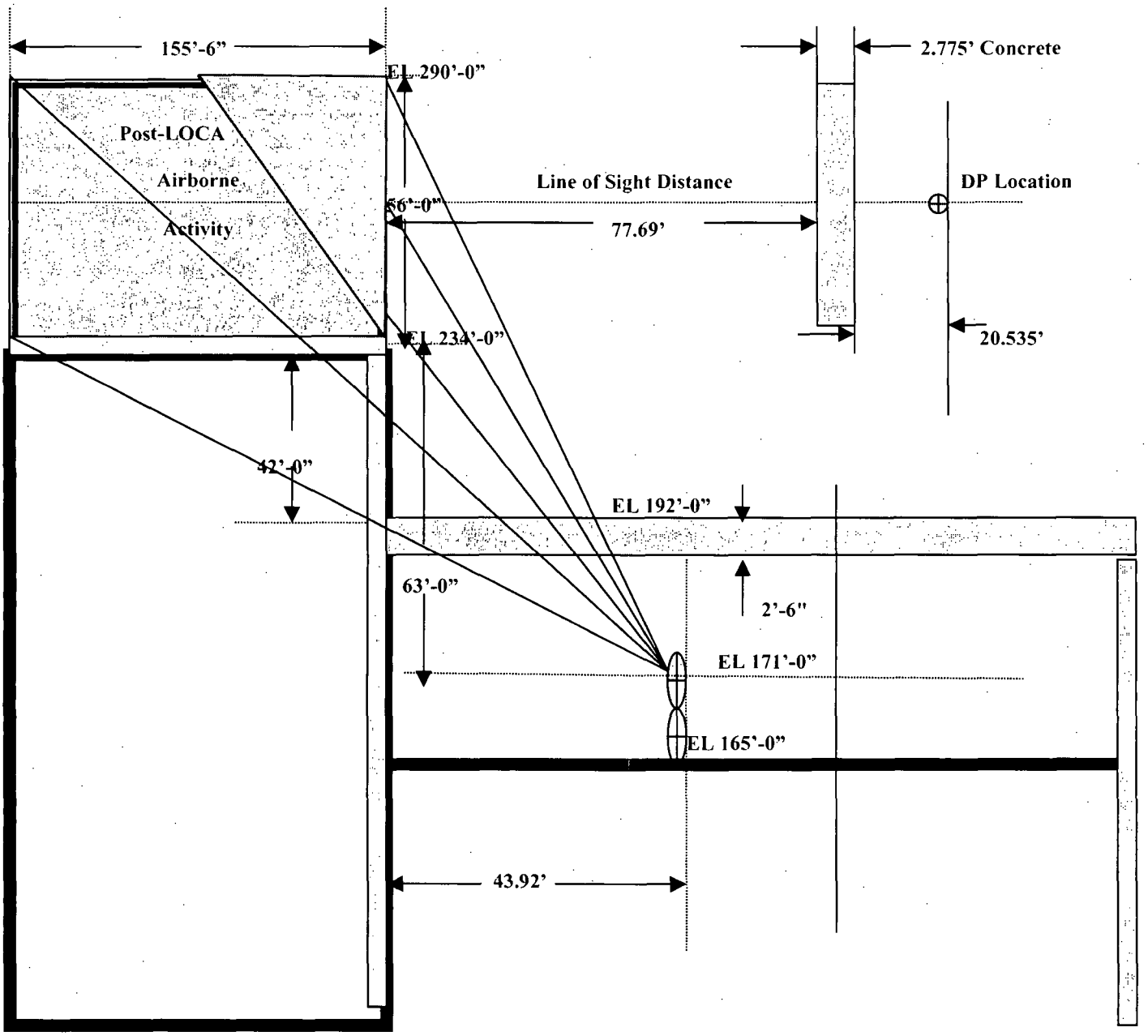


Figure 5 – PBAPS Control Room Response RADTRAD Nodalization



DP = Dose Point

Figure 6: Elevation View of Containment Shine Shielding Geometry Looking @ West

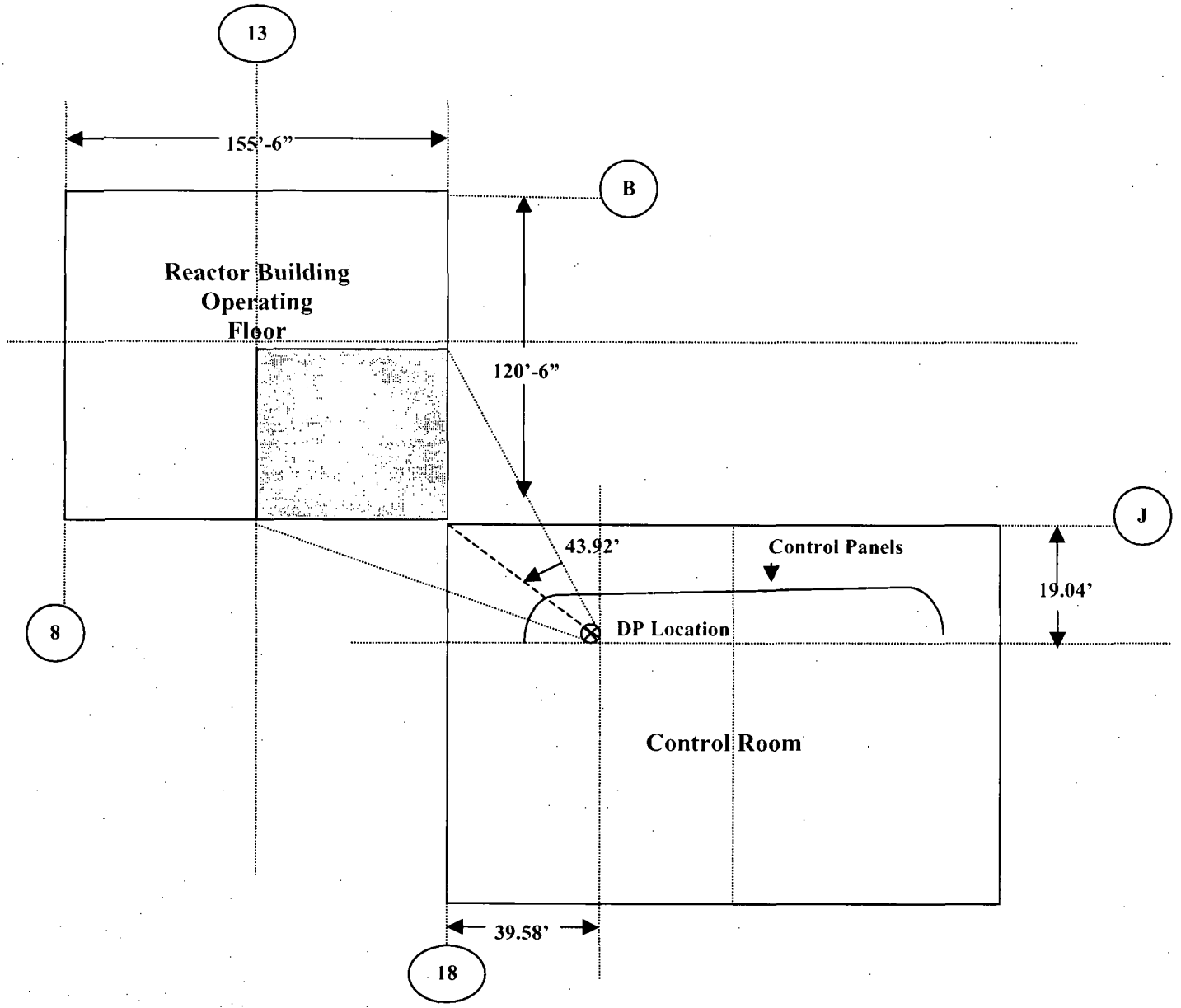


Figure 7: Plan View of Containment Shine Shielding Geometry

12.0 AFFECTED DOCUMENTS

Upon approval of the AST Licensing Amendment Request (LAR), the following documents will be either revised or deleted:

UFSAR Information To Be Revised (Ref. 9.27):
Section 14.9.1.1, Source Term Assumptions
Section 14.9.1.5, Control Room
Section 14.9.2.1, Loss-of-Coolant-Accident
Table 14.9.6, Integrated Dose In Control Room
Table 14.9.7, Design Basis Radiological Doses

UFSAR Information To Be Deleted (Ref. 9.27):
Table 14.9.1, Activity, Mass Loading, and Heat Loading At Various Locations For TID Release Assumptions
Table 14.9.2, Standby Gas Treatment System Performance
Table 14.9.3, Doses For Various Equipment Or Locations Based On TID-14844 Fission Product Release Assumptions
Table 14.9.4, Gamma Ray Energy Spectrum Of Fission Product In The Secondary Containment
Table 14.9.5, Biological Dose Rate At The Center of Control Room Floor Following A Loss-Of-Coolant-Accident
Table 14.9.8, Sensitivity of Doses To variation of Assumptions – Loss-Of-Coolant-Accident

Design Bases To Be Implemented:

1. The design basis ESF leakage of 5.0 gpm will need to be implemented as a procedure limit.
2. The requirement for the containment purge during a LOCA will need to be deleted.

Document To Be Superseded

Calculation No. PM-1060, Rev 3, Site Boundary and Control Room Doses following a Loss of Coolant Accident using Alternative Source Terms.

13.0 ATTACHMENTS

Diskettes with PDF electronic file - Calculation No: PM-1077, Rev 0

Attachment A – Selected pages of RADTRAD Output File PB3D185CL.o0
Attachment B – Selected pages of RADTRAD Output File PB10G185ES.o0
Attachment C – Selected pages of RADTRAD Output File PB360MS205.o0
Attachment D – Selected pages of RADTRAD Output File PB3DCL00.o0
Attachment E – Nuclide Inventory File PBS_DEF.txt

Attachment A – Selected pages of RADTRAD Output File PB3D185CL.o0

```
##########################################################################
    RADTRAD Version 3.03 (Spring 2001) run on  4/04/2007  at 12:26:09
 ##########################################################################

 ##########################################################################
                     File information
 ##########################################################################

 Plant file           = D:\D DRIVE\Radtrad 3.03\Input\PB\300 SCFH\PB3D185CL.psf
 Inventory file       = d:\d drive\radtrad 3.03\defaults\pbs_def.txt
 Release file         = d:\d drive\radtrad 3.03\defaults\bwr_dba.rft
 Dose Conversion file = d:\d drive\radtrad 3.03\defaults\fgr11&12.inp


     #####    ####   #####    #  #     #  #####   #    #  #####
     #    #  #       #        #  ##    #  #    #  #    #    #
     #    #  #       #        #  # #   #  #    #  #    #    #
     #####    ####   ####     #  #  #  #  #####   #    #    #
     #            #  #        #  #   # #  #       #    #    #
     #            #  #        #  #    ##  #       #    #    #
     #         ####   #        #  #     #  #        ####     #

 Radtrad 3.03 4/15/2001
 PBAPS Unit 2 & 3  Containment Leakage AST Analysis - Drawdown Time = 3 minutes, No SGTS ,
CR unfiltered inleakage = 500 cfm, MCREF Started @ 30 Minutes, MSIV Leakage = 360 scfh,
and MCREV Air Intake = 18,500 cfm Before Pressurization
 Nuclide Inventory File:
 d:\d drive\radtrad 3.03\defaults\pbs_def.txt
 Plant Power Level:
  3.5280E+03
 Compartments:
   4
 Compartment 1:
 Drywell
   3
  1.5900E+05
   1
   0
   0
   1
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  1.7600E+05
   0
   0
   0
   0
```

```
  0
Compartment 4:
Void
  3
 1.0000E+05
  0
  0
  0
  0
  0
Pathways:
  5
Pathway 1:
Drywell Leakage to  Environment
  1
  2
  4
Pathway 2:
Filtered Intake to Control Room
  2
  3
  2
Pathway 3:
Unfiltered Inleakage to Control Room
  2
  3
  2
Pathway 4:
Control Room Exhaust to Environment
  3
  2
  2
Pathway 5:
Drywell to Void
  1
  4
  4
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
d:\d drive\radtrad 3.03\defaults\fgr11&12.inp
d:\d drive\radtrad 3.03\defaults\bwr_dba.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:
  4
Compartment 1:
  1
```

```
  1
  1
  0.0000E+00
  0
  1
  0.0000E+00
  3
  0.0000E+00   3.3600E+00
  2.0000E+00   1.8600E+00
  3.8500E+00   0.0000E+00
  1
  0.0000E+00
  0
  0
  0
  3
  3
  1.0000E+01
  1
  1
  0.0000E+00   0.0000E+00
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 4:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Pathways:
  5
Pathway 1:
  0
  0
  0
  0
  0
  0
  0
```

```
  0
  0
  0
  1
  5
  0.0000E+00   0.0000E+00
  3.3300E-02   7.0000E-01
  5.0000E-02   7.0000E-01
  3.8000E+01   3.5000E-01
  7.2000E+02   0.0000E+00
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   2.7000E+03   9.8000E+01   8.9000E+01   8.9000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   5.0000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   3.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
```

```
  0
  0
  0
  0
Pathway 5:
  0
  0
  0
  0
  0
  0
  0
  0
  0
  0
  1
  5
  0.0000E+00   0.0000E+00
  3.3300E-02   1.7520E+00
  2.0000E+00   9.7200E-01
  3.8000E+01   4.8600E-01
  7.2000E+02   0.0000E+00
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  4
  0.0000E+00   4.2500E-04
  5.0000E-02   5.3000E-05
  5.0000E-01   8.8900E-06
  7.2000E+02   0.0000E+00
  1
  2
  0.0000E+00   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  8
  0.0000E+00   4.8100E-05
  5.0000E-02   1.7500E-05
  5.0000E-01   8.8700E-06
  2.0000E+00   3.9400E-06
  8.0000E+00   2.6200E-06
  2.4000E+01   1.0900E-06
  9.6000E+01   3.0600E-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
  7
  0.0000E+00   1.1800E-03
  5.0000E-02   2.7200E-06
  2.0000E+00   1.4600E-08
  8.0000E+00   1.4600E-08
  2.4000E+01   1.4600E-08
  9.6000E+01   4.2100E-09
  7.2000E+02   0.0000E+00
Simulation Parameters:
  7
  0.0000E+00   1.0000E-02
  2.0000E+00   1.0000E-01
  4.0000E+00   1.0000E+00
  8.0000E+00   2.0000E+00
  2.4000E+01   4.0000E+00
  9.6000E+01   8.0000E+00
  7.2000E+02   0.0000E+00
Output Filename:
D:\D DRIVE\Radtrad 3.03\PB\PB3D185.CL.o0
  1
  1
  1
  0
  0
End of Scenario File
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/04/2007  at 12:26:09
##########################################################################

##########################################################################
                     Plant Description
##########################################################################

Number of Nuclides =  60

Inventory Power =   1.0000E+00 MWth
Plant Power Level =   3.5280E+03 MWth

Number of compartments    =   4

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: Drywell
Compartment volume =   1.5900E+05 (Cubic feet)
Compartment type is Normal
Removal devices within compartment:
     Spray(s)
     Deposition
Pathways into and out of compartment  1
   Exit Pathway Number    1: Drywell Leakage to  Environment
   Exit Pathway Number    5: Drywell to Void

Compartment number  2
Name: Environment
Compartment type is Environment
Pathways into and out of compartment  2
   Inlet Pathway Number   1: Drywell Leakage to  Environment
   Inlet Pathway Number   4: Control Room Exhaust to Environment
   Exit Pathway Number    2: Filtered Intake to Control Room
   Exit Pathway Number    3: Unfiltered Inleakage to Control Room

Compartment number  3
Name: Control Room
Compartment volume =   1.7600E+05 (Cubic feet)
Compartment type is Control Room
Pathways into and out of compartment  3
   Inlet Pathway Number   2: Filtered Intake to Control Room
   Inlet Pathway Number   3: Unfiltered Inleakage to Control Room
   Exit Pathway Number    4: Control Room Exhaust to Environment

Compartment number  4
Name: Void
Compartment volume =   1.0000E+05 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  4
   Inlet Pathway Number   5: Drywell to Void

Total number of pathways =   5
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/04/2007  at 12:26:09
##########################################################################

##########################################################################
                    Scenario Description
##########################################################################

Radioactive Decay is enabled
Calculation of Daughters is enabled

Release Fractions and Timings
                GAP         EARLY IN-VESSEL  LATE RELEASE     RELEASE MASS
             0.500000 hr      1.5000 hrs       0.0000 hrs          (gm)
NOBLES       5.0000E-02       9.5000E-01       0.0000E+00        4.626E+03
IODINE       5.0000E-02       2.5000E-01       0.0000E+00        3.034E+02
CESIUM       5.0000E-02       2.0000E-01       0.0000E+00        5.100E+04
TELLURIUM    0.0000E+00       5.0000E-02       0.0000E+00        4.013E+01
STRONTIUM    0.0000E+00       2.0000E-02       0.0000E+00        1.713E+03
BARIUM       0.0000E+00       2.0000E-02       0.0000E+00        4.741E+01
RUTHENIUM    0.0000E+00       2.5000E-03       0.0000E+00        5.990E+01
CERIUM       0.0000E+00       5.0000E-04       0.0000E+00        5.915E+02
LANTHANUM    0.0000E+00       2.0000E-04       0.0000E+00        8.733E+00

Inventory Power =      3528. MWt

Nuclide  Group  Specific     half      Whole Body   Inhaled     Inhaled
 Name           Inventory    life        DCF       Thyroid     Effective
                (Ci/MWt)     (s)     (Sv-m3/Bq-s)  (Sv/Bq)     (Sv/Bq)
 Co-58     7   1.529E+02  6.117E+06   4.760E-14   8.720E-10   2.940E-09
 Co-60     7   1.830E+02  1.663E+08   1.260E-13   1.620E-08   5.910E-08
 Kr-85     1   3.946E+02  3.383E+08   1.190E-16   0.000E+00   0.000E+00
 Kr-85m    1   8.313E+03  1.613E+04   7.480E-15   0.000E+00   0.000E+00
 Kr-87     1   1.633E+04  4.578E+03   4.120E-14   0.000E+00   0.000E+00
 Kr-88     1   2.303E+04  1.022E+04   1.020E-13   0.000E+00   0.000E+00
 Rb-86     3   6.518E+01  1.612E+06   4.810E-15   1.330E-09   1.790E-09
 Sr-89     5   2.798E+04  4.363E+06   7.730E-17   7.960E-12   1.120E-08
 Sr-90     5   3.178E+03  9.190E+08   7.530E-18   2.690E-10   3.510E-07
 Sr-91     5   3.801E+04  3.420E+04   4.924E-14   9.930E-12   4.547E-10
 Sr-92     5   4.017E+04  9.756E+03   6.790E-14   3.920E-12   2.180E-10
 Y-90      9   3.272E+03  2.304E+05   1.900E-16   5.170E-13   2.280E-09
 Y-91      9   3.448E+04  5.055E+06   2.600E-16   8.500E-12   1.320E-08
 Y-92      9   4.029E+04  1.274E+04   1.300E-14   1.050E-12   2.110E-10
 Y-93      9   4.526E+04  3.636E+04   4.800E-15   9.260E-13   5.820E-10
 Zr-95     9   4.489E+04  5.528E+06   3.600E-14   1.440E-09   6.390E-09
 Zr-97     9   4.657E+04  6.084E+04   4.432E-14   2.315E-11   1.171E-09
 Nb-95     9   4.512E+04  3.037E+06   3.740E-14   3.580E-10   1.570E-09
 Mo-99     7   5.078E+04  2.376E+05   7.280E-15   1.520E-11   1.070E-09
 Tc-99m    7   4.447E+04  2.167E+04   5.890E-15   5.010E-11   8.800E-12
 Ru-103    7   4.202E+04  3.394E+06   2.251E-14   2.570E-10   2.421E-09
 Ru-105    7   2.908E+04  1.598E+04   3.810E-14   4.150E-12   1.230E-10
 Ru-106    7   1.730E+04  3.181E+07   1.040E-14   1.720E-09   1.290E-07
 Rh-105    7   2.752E+04  1.273E+05   3.720E-15   2.880E-12   2.580E-10
 Sb-127    4   2.896E+03  3.326E+05   3.330E-14   6.150E-11   1.630E-09
 Sb-129    4   8.638E+03  1.555E+04   7.140E-14   9.720E-12   1.740E-10
 Te-127    4   2.873E+03  3.366E+04   2.420E-16   1.840E-12   8.600E-11
 Te-127m   4   3.855E+02  9.418E+06   1.470E-16   9.660E-11   5.810E-09
 Te-129    4   8.501E+03  4.176E+03   2.750E-15   5.090E-13   2.090E-11
 Te-129m   4   1.267E+03  2.903E+06   3.337E-15   1.563E-10   6.484E-09
 Te-131m   4   3.869E+03  1.080E+05   7.463E-14   3.669E-08   1.758E-09
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Te-132	4	3.821E+04	2.815E+05	1.030E-14	6.280E-08	2.550E-09
I-131	2	2.687E+04	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	3.881E+04	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	5.556E+04	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	6.165E+04	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	5.192E+04	2.380E+04	8.294E-14	8.460E-09	3.320E-10
Xe-133	1	5.491E+04	4.532E+05	1.560E-15	0.000E+00	0.000E+00
Xe-135	1	2.228E+04	3.272E+04	1.190E-14	0.000E+00	0.000E+00
Cs-134	3	7.280E+03	6.507E+07	7.570E-14	1.110E-08	1.250E-08
Cs-136	3	2.027E+03	1.132E+06	1.060E-13	1.730E-09	1.980E-09
Cs-137	3	4.538E+03	9.467E+08	2.725E-14	7.930E-09	8.630E-09
Ba-139	6	5.084E+04	4.962E+03	2.170E-15	2.400E-12	4.640E-11
Ba-140	6	4.896E+04	1.101E+06	8.580E-15	2.560E-10	1.010E-09
La-140	9	5.019E+04	1.450E+05	1.170E-13	6.870E-11	1.310E-09
La-141	9	4.640E+04	1.415E+04	2.390E-15	9.400E-12	1.570E-10
La-142	9	4.532E+04	5.550E+03	1.440E-13	8.740E-12	6.840E-11
Ce-141	8	4.492E+04	2.808E+06	3.430E-15	2.550E-11	2.420E-09
Ce-143	8	4.427E+04	1.188E+05	1.290E-14	6.230E-12	9.160E-10
Ce-144	8	3.596E+04	2.456E+07	2.773E-15	2.920E-10	1.010E-07
Pr-143	9	4.293E+04	1.172E+06	2.100E-17	1.680E-18	2.190E-09
Nd-147	9	1.838E+04	9.487E+05	6.190E-15	1.820E-11	1.850E-09
Np-239	8	5.397E+05	2.035E+05	7.690E-15	7.620E-12	6.780E-10
Pu-238	8	1.796E+02	2.769E+09	4.880E-18	3.860E-10	7.790E-05
Pu-239	8	1.200E+01	7.594E+11	4.240E-18	3.750E-10	8.330E-05
Pu-240	8	1.288E+01	2.063E+11	4.750E-18	3.760E-10	8.330E-05
Pu-241	8	6.182E+03	4.544E+08	7.250E-20	9.150E-12	1.340E-06
Am-241	9	9.528E+00	1.364E+10	8.180E-16	1.600E-09	1.200E-04
Cm-242	9	2.388E+03	1.407E+07	5.690E-18	9.410E-10	4.670E-06
Cm-244	9	2.602E+02	5.715E+08	4.910E-18	1.010E-09	6.700E-05

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
Sr-90	Y-90	1.00	none	0.00	none	0.00
Sr-91	Y-91m	0.58	Y-91	0.42	none	0.00
Sr-92	Y-92	1.00	none	0.00	none	0.00
Y-93	Zr-93	1.00	none	0.00	none	0.00
Zr-95	Nb-95m	0.01	Nb-95	0.99	none	0.00
Zr-97	Nb-97m	0.95	Nb-97	0.05	none	0.00
Mo-99	Tc-99m	0.88	Tc-99	0.12	none	0.00
Tc-99m	Tc-99	1.00	none	0.00	none	0.00
Ru-103	Rh-103m	1.00	none	0.00	none	0.00
Ru-105	Rh-105	1.00	none	0.00	none	0.00
Ru-106	Rh-106	1.00	none	0.00	none	0.00
Sb-127	Te-127m	0.18	Te-127	0.82	none	0.00
Sb-129	Te-129m	0.22	Te-129	0.77	none	0.00
Te-127m	Te-127	0.98	none	0.00	none	0.00
Te-129	I-129	1.00	none	0.00	none	0.00
Te-129m	Te-129	0.65	I-129	0.35	none	0.00
Te-131m	Te-131	0.22	I-131	0.78	none	0.00
Te-132	I-132	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
Cs-137	Ba-137m	0.95	none	0.00	none	0.00
Ba-140	La-140	1.00	none	0.00	none	0.00
La-141	Ce-141	1.00	none	0.00	none	0.00
Ce-143	Pr-143	1.00	none	0.00	none	0.00
Ce-144	Pr-144m	0.02	Pr-144	0.98	none	0.00

Nd-147	Pm-147	1.00	none	0.00	none	0.00
Np-239	Pu-239	1.00	none	0.00	none	0.00
Pu-238	U-234	1.00	none	0.00	none	0.00
Pu-239	U-235	1.00	none	0.00	none	0.00
Pu-240	U-236	1.00	none	0.00	none	0.00
Pu-241	U-237	0.00	Am-241	1.00	none	0.00
Am-241	Np-237	1.00	none	0.00	none	0.00
Cm-242	Pu-238	1.00	none	0.00	none	0.00
Cm-244	Pu-240	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: Drywell

Sprays: Elemental Removal Data

Time (hr)	Removal Coef. (hr^-1)
0.0000E+00	3.3600E+00
2.0000E+00	1.8600E+00
3.8500E+00	0.0000E+00

Natural Deposition (Powers' model): Aerosol data

Reactor type: 3

Percentile = 10 (%)

Natural Deposition: Elemental Removal Data

Time (hr)	Removal Coef. (hr^-1)
0.0000E+00	0.0000E+00

Compartment number 2: Environment

Compartment number 3: Control Room

Compartment number 4: Void

PATHWAY DATA

Pathway number 1: Drywell Leakage to Environment

Convection Data

Time (hr)	Flow Rate (% / day)
0.0000E+00	0.0000E+00
3.3300E-02	7.0000E-01
5.0000E-02	7.0000E-01
3.8000E+01	3.5000E-01
7.2000E+02	0.0000E+00

Pathway number 2: Filtered Intake to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	2.7000E+03	9.8000E+01	8.9000E+01	8.9000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Unfiltered Inleakage to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	5.0000E+02	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 4: Control Room Exhaust to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	3.2000E+03	1.0000E+02	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 5: Drywell to Void

Convection Data

Time (hr)	Flow Rate (% / day)
0.0000E+00	0.0000E+00
3.3300E-02	1.7520E+00
2.0000E+00	9.7200E-01
3.8000E+01	4.8600E-01
7.2000E+02	0.0000E+00

LOCATION DATA

Location Exclusion Area Boundary is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	4.2500E-04
5.0000E-02	5.3000E-05
5.0000E-01	8.8900E-06
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 Low Population Zone is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	4.8100E-05
5.0000E-02	1.7500E-05
5.0000E-01	8.8700E-06
2.0000E+00	3.9400E-06
8.0000E+00	2.6200E-06
2.4000E+01	1.0900E-06
9.6000E+01	3.0600E-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           1.1800E-03
        5.0000E-02           2.7200E-06
        2.0000E+00           1.4600E-08
        8.0000E+00           1.4600E-08
        2.4000E+01           1.4600E-08
        9.6000E+01           4.2100E-09
        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       1.0000E-02
       2.0000E+00       1.0000E-01
       4.0000E+00       1.0000E+00
       8.0000E+00       2.0000E+00
       2.4000E+01       4.0000E+00
       9.6000E+01       8.0000E+00
       7.2000E+02       0.0000E+00
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/04/2007  at 12:26:09
##########################################################################


     ####   #    #  #####  #####   #    #  #####
    #    #  #    #    #    #    #  #    #    #
    #    #  #    #    #    #    #  #    #    #
    #    #  #    #    #    #####   #    #    #
    #    #  #    #    #    #       #    #    #
    #    #  #    #    #    #       #    #    #
     ####    ####     #    #        ####     #


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

Exclusion Area Boundary Doses:

Time (h) =    0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   0.0000E+00  0.0000E+00  0.0000E+00

Low Population Zone Doses:

Time (h) =    0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   0.0000E+00  0.0000E+00  0.0000E+00

Control Room Doses:

Time (h) =    0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   0.0000E+00  0.0000E+00  0.0000E+00

Drywell Compartment Nuclide Inventory:

Time (h) =    0.0333       Ci           kg          Atoms      Decay

Drywell Transport Group Inventory:
Time (h) =    0.0333    Atmosphere     Sump
Noble gases (atoms)     1.0005E+23  0.0000E+00
Elemental I (atoms)     7.0670E+20  4.0287E+19
Organic I (atoms)       2.3102E+19  0.0000E+00
Aerosols (kg)           6.7461E-01  0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)          9.7521E-05
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)    1.2462E-04
Total I (Ci)                                    2.6966E+06

                        Deposition Recirculating
Time (h) =    0.0333     Surfaces     Filter
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)           7.9473E-03  0.0000E+00
```

Drywell Leakage to Environment Transport Group Inventory:
Time (h) = 0.0333 Leakage Transport

Noble gases (atoms)	0.0000E+00
Elemental I (atoms)	0.0000E+00
Organic I (atoms)	0.0000E+00
Aerosols (kg)	0.0000E+00

Drywell to Void Transport Group Inventory:
Time (h) = 0.0333 Leakage Transport

Noble gases (atoms)	0.0000E+00
Elemental I (atoms)	0.0000E+00
Organic I (atoms)	0.0000E+00
Aerosols (kg)	0.0000E+00

Exclusion Area Boundary Doses:

Time (h) = 0.0500	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.5285E-03	4.3296E-01	2.1281E-02
Accumulated dose (rem)	2.5285E-03	4.3296E-01	2.1281E-02

Low Population Zone Doses:

Time (h) = 0.0500	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.8617E-04	4.9001E-02	2.4085E-03
Accumulated dose (rem)	2.8617E-04	4.9001E-02	2.4085E-03

Control Room Doses:

Time (h) = 0.0500	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.7123E-05	5.8049E-02	2.5313E-03
Accumulated dose (rem)	1.7123E-05	5.8049E-02	2.5313E-03

Drywell Compartment Nuclide Inventory:

Time (h) = 0.0500	Ci	kg	Atoms	Decay
Kr-85	6.9607E+03	1.7742E-02	1.2570E+23	2.7216E+16
Kr-85m	1.4551E+05	1.7681E-05	1.2527E+20	5.7054E+17
Kr-87	2.8031E+05	9.8961E-06	6.8501E+19	1.1069E+18
Kr-88	4.0132E+05	3.2005E-05	2.1902E+20	1.5761E+18
Rb-86	1.1296E+03	1.3883E-05	9.7218E+19	4.4384E+15
I-131	4.6423E+05	3.7446E-03	1.7214E+22	1.8255E+18
I-132	6.6471E+05	6.4396E-05	2.9379E+20	2.6226E+18
I-133	9.5847E+05	8.4610E-04	3.8311E+21	3.7711E+18
I-134	1.0240E+06	3.8386E-05	1.7251E+20	4.0850E+18
I-135	8.9248E+05	2.5413E-04	1.1337E+21	3.5160E+18
Xe-133	9.6859E+05	5.1746E-03	2.3430E+22	3.7871E+18
Xe-135	3.9445E+05	1.5446E-04	6.8902E+20	1.5393E+18
Cs-134	1.2618E+05	9.7525E-02	4.3829E+23	4.9575E+17
Cs-136	3.5129E+04	4.7931E-04	2.1224E+21	1.3802E+17
Cs-137	7.8655E+04	9.0427E-01	3.9749E+24	3.0903E+17

Drywell Transport Group Inventory:

Time (h) = 0.0500	Atmosphere	Sump	
Noble gases (atoms)	1.5023E+23	0.0000E+00	
Elemental I (atoms)	1.0320E+21	8.9161E+19	
Organic I (atoms)	3.4675E+19	0.0000E+00	
Aerosols (kg)	1.0070E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.4539E-04
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.8571E-04

Total I (Ci) 4.0039E+06

Time (h) = 0.0500	Deposition Surfaces	Recirculating Filter
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)	1.7847E-02	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 0.0500	Leakage Transport
Noble gases (atoms)	6.0955E+17
Elemental I (atoms)	4.2425E+15
Organic I (atoms)	1.4073E+14
Aerosols (kg)	4.0970E-06

Drywell to Void Transport Group Inventory:

Time (h) = 0.0500	Leakage Transport
Noble gases (atoms)	1.5256E+18
Elemental I (atoms)	1.0618E+16
Organic I (atoms)	3.5223E+14
Aerosols (kg)	1.0254E-05

Exclusion Area Boundary Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.6277E-02	8.5397E+00	4.1750E-01
Accumulated dose (rem)	4.8805E-02	8.9727E+00	4.3878E-01

Low Population Zone Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5280E-02	2.8197E+00	1.3785E-01
Accumulated dose (rem)	1.5566E-02	2.8687E+00	1.4026E-01

Control Room Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.6913E-04	1.3233E+00	5.7719E-02
Accumulated dose (rem)	3.8625E-04	1.3813E+00	6.0250E-02

Drywell Compartment Nuclide Inventory:

Time (h) = 0.5000	Ci	kg	Atoms	Decay
Kr-85	6.9591E+04	1.7738E-01	1.2567E+24	2.3633E+18
Kr-85m	1.3569E+06	1.6488E-04	1.1682E+21	4.7304E+19
Kr-87	2.1929E+06	7.7417E-05	5.3588E+20	8.1797E+19
Kr-88	3.5949E+06	2.8669E-04	1.9619E+21	1.2725E+20
Rb-86	9.6805E+03	1.1897E-04	8.3310E+20	3.4772E+17
I-131	3.9059E+06	3.1506E-02	1.4483E+23	1.4110E+20
I-132	5.2581E+06	5.0940E-04	2.3240E+21	1.9456E+20
I-133	7.9564E+06	7.0236E-03	3.1802E+22	2.8893E+20
I-134	6.0455E+06	2.2662E-04	1.0185E+21	2.5155E+20
I-135	7.1739E+06	2.0428E-03	9.1124E+21	2.6379E+20
Xe-133	9.6813E+06	5.1722E-02	2.3419E+23	3.2881E+20
Xe-135	4.0483E+06	1.5853E-03	7.0716E+21	1.3618E+20
Cs-134	1.0820E+06	8.3630E-01	3.7585E+24	3.8856E+19
Cs-136	3.0095E+05	4.1062E-03	1.8183E+22	1.0811E+19
Cs-137	6.7450E+05	7.7545E+00	3.4087E+25	2.4221E+19

Drywell Transport Group Inventory:

Time (h) = 0.5000	Atmosphere	Sump	
Noble gases (atoms)	1.5016E+24	0.0000E+00	
Elemental I (atoms)	5.3808E+21	5.7512E+21	
Organic I (atoms)	3.4350E+20	0.0000E+00	
Aerosols (kg)	8.6351E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.2161E-03
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.5374E-03
Total I (Ci)			3.0340E+07

Time (h) = 0.5000	Deposition Surfaces	Recirculating Filter
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)	1.6108E+00	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 0.5000	Leakage Transport
Noble gases (atoms)	1.0903E+20
Elemental I (atoms)	4.9574E+17
Organic I (atoms)	2.5023E+16
Aerosols (kg)	6.6332E-04

Drywell to Void Transport Group Inventory:

Time (h) = 0.5000	Leakage Transport
Noble gases (atoms)	2.7287E+20
Elemental I (atoms)	1.2408E+18
Organic I (atoms)	6.2629E+16
Aerosols (kg)	1.6602E-03

Exclusion Area Boundary Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5461E-01	2.6729E+01	1.7031E+00
Accumulated dose (rem)	2.0342E-01	3.5702E+01	2.1419E+00

Low Population Zone Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5426E-01	2.6669E+01	1.6992E+00
Accumulated dose (rem)	1.6983E-01	2.9538E+01	1.8395E+00

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.3246E-04	1.7884E+00	8.6424E-02
Accumulated dose (rem)	1.1187E-03	3.1697E+00	1.4667E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
Co-58	1.0616E+03	3.3385E-05	3.4663E+20	1.1439E+17
Co-60	1.2715E+03	1.1249E-03	1.1290E+22	1.3699E+17
Kr-85	1.3911E+06	3.5456E+00	2.5120E+25	1.4920E+20
Kr-85m	2.1505E+07	2.6132E-03	1.8514E+22	2.5135E+21
Kr-87	1.9352E+07	6.8319E-04	4.7290E+21	2.8594E+21
Kr-88	4.9828E+07	3.9738E-03	2.7194E+22	6.1311E+21

Rb-86	4.1694E+04	5.1241E-04	3.5882E+21	5.6883E+18
Sr-89	1.5536E+06	5.3476E-02	3.6184E+23	1.6742E+20
Sr-90	1.7666E+05	1.2951E+00	8.6658E+24	1.9032E+19
Sr-91	1.8260E+06	5.0373E-04	3.3336E+21	2.0440E+20
Sr-92	1.3388E+06	1.0651E-04	6.9722E+20	1.6546E+20
Y-90	3.1171E+03	5.7293E-06	3.8336E+19	2.8811E+17
Y-91	1.9424E+04	7.9203E-04	5.2415E+21	2.0834E+18
Y-92	2.0508E+05	2.1313E-05	1.3951E+20	1.6686E+19
Y-93	2.1933E+04	6.5739E-06	4.2569E+19	2.4494E+18
Zr-95	2.4931E+04	1.1605E-03	7.3566E+21	2.6865E+18
Zr-97	2.3849E+04	1.2475E-05	7.7452E+19	2.6249E+18
Nb-95	2.5081E+04	6.4140E-04	4.0659E+21	2.7020E+18
Mo-99	3.4551E+05	7.2040E-04	4.3822E+21	3.7426E+19
Tc-99m	3.0866E+05	5.8700E-05	3.5707E+20	3.3254E+19
Ru-103	2.9155E+05	9.0336E-03	5.2817E+22	3.1421E+19
Ru-105	1.4787E+05	2.1998E-05	1.2617E+20	1.7305E+19
Ru-106	1.2019E+05	3.5925E-02	2.0410E+23	1.2949E+19
Rh-105	1.9054E+05	2.2574E-04	1.2947E+21	2.0562E+19
Sb-127	3.9647E+05	1.4846E-03	7.0398E+21	4.2879E+19
Sb-129	8.7091E+05	1.5487E-04	7.2299E+20	1.0216E+20
Te-127	3.9663E+05	1.5029E-04	7.1265E+20	4.2791E+19
Te-127m	5.3583E+04	5.6806E-03	2.6937E+22	5.7723E+18
Te-129	9.7354E+05	4.6487E-05	2.1702E+20	1.1080E+20
Te-129m	1.7616E+05	5.8476E-03	2.7299E+22	1.8977E+19
Te-131m	5.1340E+05	6.4384E-04	2.9597E+21	5.5979E+19
Te-132	5.2168E+06	1.7183E-02	7.8395E+22	5.6461E+20
I-131	2.0062E+07	1.6182E-01	7.4390E+23	2.6535E+21
I-132	2.4051E+07	2.3300E-03	1.0630E+22	3.3576E+21
I-133	3.9067E+07	3.4487E-02	1.5615E+23	5.2692E+21
I-134	9.5316E+06	3.5730E-04	1.6058E+21	2.2505E+21
I-135	3.1641E+07	9.0097E-03	4.0191E+22	4.4744E+21
Xe-133	1.9287E+08	1.0304E+00	4.6655E+24	2.0713E+22
Xe-135	8.1440E+07	3.1891E-02	1.4226E+23	8.7445E+21
Cs-134	4.6709E+06	3.6101E+00	1.6224E+25	6.3662E+20
Cs-136	1.2949E+06	1.7668E-02	7.8235E+22	1.7674E+20
Cs-137	2.9118E+06	3.3476E+01	1.4715E+26	3.9685E+20
Ba-139	1.0337E+06	6.3195E-05	2.7379E+20	1.4710E+20
Ba-140	2.7093E+06	3.7008E-02	1.5919E+23	2.9222E+20
La-140	5.9482E+04	1.0702E-04	4.6033E+20	5.2508E+18
La-141	1.8126E+04	3.2051E-06	1.3689E+19	2.1446E+18
La-142	1.0251E+04	7.1607E-07	3.0368E+18	1.4140E+18
Ce-141	6.2393E+04	2.1897E-03	9.3524E+21	6.7229E+18
Ce-143	5.8991E+04	8.8832E-05	3.7410E+20	6.4252E+18
Ce-144	4.9964E+04	1.5665E-02	6.5512E+22	5.3829E+18
Pr-143	2.3918E+04	3.5518E-04	1.4958E+21	2.5747E+18
Nd-147	1.0164E+04	1.2563E-04	5.1468E+20	1.0964E+18
Np-239	7.3185E+05	3.1547E-03	7.9489E+21	7.9348E+19
Pu-238	2.4960E+02	1.4579E-02	3.6891E+22	2.6889E+16
Pu-239	1.6681E+01	2.6838E-01	6.7624E+23	1.7970E+15
Pu-240	1.7899E+01	7.8552E-02	1.9711E+23	1.9283E+15
Pu-241	8.5911E+03	8.3398E-02	2.0840E+23	9.2553E+17
Am-241	5.2984E+00	1.5437E-03	3.8575E+21	5.7074E+14
Cm-242	1.3270E+03	4.0038E-04	9.9634E+20	1.4297E+17
Cm-244	1.4464E+02	1.7878E-03	4.4125E+21	1.5582E+16

Drywell Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump
Noble gases (atoms)	2.9978E+25	0.0000E+00
Elemental I (atoms)	1.0734E+22	5.5064E+22
Organic I (atoms)	2.0091E+21	0.0000E+00
Aerosols (kg)	3.9247E+01	0.0000E+00

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Dose Effective (Ci/cc) I-131 (Thyroid)          6.1375E-03
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)    7.5884E-03
Total I (Ci)                                    1.2435E+08

                       Deposition Recirculating
Time (h) =   2.0000     Surfaces     Filter
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)          1.4454E+01  0.0000E+00

Drywell Leakage to  Environment Transport Group Inventory:
Time (h) =   2.0000  Leakage Transport

Noble gases (atoms)      6.9995E+21
Elemental I (atoms)      4.7763E+18
Organic I (atoms)        5.4263E+17
Aerosols (kg)            1.1530E-02

Drywell to Void Transport Group Inventory:
Time (h) =   2.0000  Leakage Transport

Noble gases (atoms)      1.7519E+22
Elemental I (atoms)      1.1954E+19
Organic I (atoms)        1.3581E+18
Aerosols (kg)            2.8857E-02

Exclusion Area Boundary Doses:

Time (h) =   3.8500    Whole Body   Thyroid       TEDE
Delta dose (rem)        1.7163E-01  2.3595E+01  1.6022E+00
Accumulated dose (rem)  3.7505E-01  5.9297E+01  3.7441E+00

Low Population Zone Doses:

Time (h) =   3.8500    Whole Body   Thyroid       TEDE
Delta dose (rem)        7.6067E-02  1.0457E+01  7.1010E-01
Accumulated dose (rem)  2.4590E-01  3.9995E+01  2.5496E+00

Control Room Doses:

Time (h) =   3.8500    Whole Body   Thyroid       TEDE
Delta dose (rem)        5.3289E-04  9.4692E-01  5.2659E-02
Accumulated dose (rem)  1.6516E-03  4.1166E+00  1.9933E-01

Drywell Compartment Nuclide Inventory:

Time (h) =   3.8500       Ci           kg          Atoms       Decay
Co-58                  1.6298E+02  5.1253E-06  5.3216E+19  2.2670E+17
Co-60                  1.9535E+02  1.7282E-04  1.7346E+21  2.7155E+17
Kr-85                  1.3893E+06  3.5411E+00  2.5089E+25  4.9175E+20
Kr-85m                 1.6131E+07  1.9602E-03  1.3888E+22  7.1189E+21
Kr-87                  7.0506E+06  2.4891E-04  1.7230E+21  5.8615E+21
Kr-88                  3.1683E+07  2.5267E-03  1.7291E+22  1.6006E+22
Rb-86                  6.3875E+03  7.8502E-05  5.4971E+20  1.0096E+19
Sr-89                  2.3844E+05  8.2073E-03  5.5534E+22  3.3177E+20
Sr-90                  2.7142E+04  1.9898E-01  1.3314E+24  3.7727E+19
Sr-91                  2.4513E+05  6.7621E-05  4.4750E+20  3.8877E+20
Sr-92                  1.2815E+05  1.0196E-05  6.6738E+19  2.8627E+20
Y-90                   1.0081E+03  1.8529E-06  1.2398E+19  7.3713E+17
Y-91                   3.0821E+03  1.2568E-04  8.3171E+20  4.1616E+18
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Y-92	7.1506E+04	7.4313E-06	4.8644E+19	4.9288E+19
Y-93	2.9679E+03	8.8958E-07	5.7604E+18	4.6700E+18
Zr-95	3.8272E+03	1.7815E-04	1.1293E+21	5.3241E+18
Zr-97	3.3964E+03	1.7766E-06	1.1030E+19	5.0825E+18
Nb-95	3.8533E+03	9.8542E-05	6.2467E+20	5.3561E+18
Mo-99	5.2063E+04	1.0855E-04	6.6032E+20	7.3741E+19
Tc-99m	4.7247E+04	8.9853E-06	5.4657E+19	6.5701E+19
Ru-103	4.4733E+04	1.3860E-03	8.1037E+21	6.2260E+19
Ru-105	1.7020E+04	2.5320E-06	1.4522E+19	3.1478E+19
Ru-106	1.8463E+04	5.5188E-03	3.1353E+22	2.5668E+19
Rh-105	2.8935E+04	3.4280E-05	1.9661E+20	4.0640E+19
Sb-127	6.0073E+04	2.2495E-04	1.0667E+21	8.4631E+19
Sb-129	9.9440E+04	1.7683E-05	8.2551E+19	1.8541E+20
Te-127	6.0545E+04	2.2942E-05	1.0879E+20	8.4524E+19
Te-127m	8.2338E+03	8.7291E-04	4.1392E+21	1.1443E+19
Te-129	1.2140E+05	5.7969E-06	2.7062E+19	2.0465E+20
Te-129m	2.7063E+04	8.9834E-04	4.1938E+21	3.7618E+19
Te-131m	7.5578E+04	9.4779E-05	4.3571E+20	1.0950E+20
Te-132	7.8847E+05	2.5971E-03	1.1849E+22	1.1135E+21
I-131	3.0705E+06	2.4767E-02	1.1386E+23	4.7680E+21
I-132	2.4675E+06	2.3905E-04	1.0906E+21	5.5532E+21
I-133	5.6585E+06	4.9951E-03	2.2617E+22	9.3079E+21
I-134	3.4008E+05	1.2748E-05	5.7292E+19	2.8942E+21
I-135	4.0147E+06	1.1432E-03	5.0996E+21	7.5998E+21
Xe-133	1.9083E+08	1.0195E+00	4.6161E+24	6.7991E+22
Xe-135	7.2025E+07	2.8204E-02	1.2581E+23	2.7675E+22
Cs-134	7.1758E+05	5.5462E-01	2.4925E+24	1.1309E+21
Cs-136	1.9814E+05	2.7035E-03	1.1971E+22	3.1358E+20
Cs-137	4.4737E+05	5.1432E+00	2.2608E+25	7.0500E+20
Ba-139	6.2639E+04	3.8295E-06	1.6591E+19	2.2818E+20
Ba-140	4.1451E+05	5.6621E-03	2.4356E+22	5.7851E+20
La-140	2.1881E+04	3.9367E-05	1.6934E+20	1.4423E+19
La-141	2.0096E+03	3.5534E-07	1.5177E+18	3.8605E+18
La-142	6.8551E+02	4.7888E-08	2.0309E+17	2.2418E+18
Ce-141	9.5742E+03	3.3602E-04	1.4351E+21	1.3323E+19
Ce-143	8.7180E+03	1.3128E-05	5.5285E+19	1.2583E+19
Ce-144	7.6750E+03	2.4063E-03	1.0063E+22	1.0670E+19
Pr-143	3.6952E+03	5.4875E-05	2.3109E+20	5.1102E+18
Nd-147	1.5539E+03	1.9208E-05	7.8691E+19	2.1701E+18
Np-239	1.0992E+05	4.7381E-04	1.1939E+21	1.5618E+20
Pu-238	3.8348E+01	2.2400E-03	5.6679E+21	5.3303E+16
Pu-239	2.5636E+00	4.1244E-02	1.0392E+23	3.5624E+15
Pu-240	2.7501E+00	1.2069E-02	3.0283E+22	3.8226E+15
Pu-241	1.3199E+03	1.2813E-02	3.2018E+22	1.8347E+18
Am-241	8.1448E-01	2.3731E-04	5.9299E+20	1.1315E+15
Cm-242	2.0381E+02	6.1494E-05	1.5303E+20	2.8338E+17
Cm-244	2.2222E+01	2.7468E-04	6.7793E+20	3.0889E+16

Drywell Transport Group Inventory:

Time (h) = 3.8500	Atmosphere	Sump	
Noble gases (atoms)	2.9863E+25	0.0000E+00	
Elemental I (atoms)	3.3400E+20	6.5379E+22	
Organic I (atoms)	1.9517E+21	0.0000E+00	
Aerosols (kg)	6.0289E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		9.2032E-04
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.1131E-03
Total I (Ci)			1.5551E+07

Time (h) = 3.8500	Deposition Surfaces	Recirculating Filter
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)	4.7646E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:
Time (h) = 3.8500 Leakage Transport

Noble gases (atoms)	2.3145E+22
Elemental I (atoms)	6.3939E+18
Organic I (atoms)	1.6115E+18
Aerosols (kg)	2.1098E-02

Drywell to Void Transport Group Inventory:
Time (h) = 3.8500 Leakage Transport

Noble gases (atoms)	3.9939E+22
Elemental I (atoms)	1.4201E+19
Organic I (atoms)	2.8423E+18
Aerosols (kg)	4.2143E-02

Exclusion Area Boundary Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4108E-01	4.8486E+00	4.3244E-01
Accumulated dose (rem)	5.1613E-01	6.4146E+01	4.1765E+00

Low Population Zone Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.2524E-02	2.1489E+00	1.9166E-01
Accumulated dose (rem)	3.0842E-01	4.2144E+01	2.7413E+00

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.3840E-05	1.4214E-01	7.9796E-03
Accumulated dose (rem)	1.7154E-03	4.2588E+00	2.0731E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 8.0000	Ci	kg	Atoms	Decay
Co-58	7.8739E+00	2.4762E-07	2.5711E+18	2.4966E+17
Co-60	9.4536E+00	8.3632E-06	8.3941E+19	2.9908E+17
Kr-85	1.3853E+06	3.5310E+00	2.5017E+25	1.2586E+21
Kr-85m	8.4637E+06	1.0285E-03	7.2865E+21	1.3690E+22
Kr-87	7.3211E+05	2.5846E-05	1.7891E+20	7.4035E+21
Kr-88	1.1473E+07	9.1498E-04	6.2615E+21	2.7003E+22
Rb-86	3.0715E+02	3.7748E-06	2.6433E+19	1.0995E+19
Sr-89	1.1512E+04	3.9625E-04	2.6812E+21	3.6535E+20
Sr-90	1.3135E+03	9.6294E-03	6.4433E+22	4.1552E+19
Sr-91	8.7637E+03	2.4176E-06	1.5999E+19	4.2063E+20
Sr-92	2.1456E+03	1.7070E-07	1.1174E+18	3.0018E+20
Y-90	1.0441E+02	1.9190E-07	1.2840E+18	9.2235E+17
Y-91	1.5765E+02	6.4285E-06	4.2542E+19	4.6030E+18
Y-92	3.5345E+03	3.6732E-07	2.4044E+18	6.0011E+19
Y-93	1.0804E+02	3.2382E-08	2.0968E+17	5.0576E+18
Zr-95	1.8487E+02	8.6056E-06	5.4551E+19	5.8632E+18
Zr-97	1.3864E+02	7.2524E-08	4.5026E+17	5.5397E+18
Nb-95	1.8647E+02	4.7687E-06	3.0229E+19	5.8992E+18
Mo-99	2.4122E+03	5.0294E-06	3.0593E+19	8.0992E+19
Tc-99m	2.2454E+03	4.2703E-07	2.5976E+18	7.2297E+19

Ru-103	2.1583E+03	6.6873E-05	3.9099E+20	6.8559E+19
Ru-105	4.3092E+02	6.4106E-08	3.6767E+17	3.3509E+19
Ru-106	8.9325E+02	2.6699E-04	1.5169E+21	2.8270E+19
Rh-105	1.3381E+03	1.5853E-06	9.0924E+18	4.4672E+19
Sb-127	2.8182E+03	1.0553E-05	5.0040E+19	9.3026E+19
Sb-129	2.4728E+03	4.3973E-07	2.0528E+18	1.9722E+20
Te-127	2.8814E+03	1.0918E-06	5.1771E+18	9.2991E+19
Te-127m	3.9860E+02	4.2258E-05	2.0038E+20	1.2604E+19
Te-129	3.5393E+03	1.6900E-07	7.8896E+17	2.1929E+20
Te-129m	1.3078E+03	4.3412E-05	2.0266E+20	4.1432E+19
Te-131m	3.3232E+03	4.1675E-06	1.9158E+19	1.1988E+20
Te-132	3.6780E+04	1.2115E-04	5.5271E+20	1.2235E+21
I-131	1.9241E+05	1.5520E-03	7.1346E+21	5.2191E+21
I-132	7.6445E+04	7.4060E-06	3.3788E+19	5.8474E+21
I-133	3.1335E+05	2.7661E-04	1.2525E+21	1.0111E+22
I-134	8.1271E+02	3.0465E-08	1.3691E+17	2.9194E+21
I-135	1.6521E+05	4.7044E-05	2.0986E+20	8.1252E+21
Xe-133	1.8601E+08	9.9374E-01	4.4996E+24	1.7214E+23
Xe-135	5.2538E+07	2.0573E-02	9.1774E+22	6.1847E+22
Cs-134	3.4722E+04	2.6837E-02	1.2061E+23	1.2320E+21
Cs-136	9.5017E+03	1.2964E-04	5.7407E+20	3.4144E+20
Cs-137	2.1650E+04	2.4891E-01	1.0941E+24	7.6806E+20
Ba-139	3.7608E+02	2.2992E-08	9.9613E+16	2.3372E+20
Ba-140	1.9873E+04	2.7145E-04	1.1677E+21	6.3678E+20
La-140	2.3635E+03	4.2522E-06	1.8291E+19	1.8527E+19
La-141	4.6776E+01	8.2711E-09	3.5326E+16	4.0956E+18
La-142	5.1343E+00	3.5866E-10	1.5211E+15	2.3050E+18
Ce-141	4.6190E+02	1.6211E-05	6.9236E+19	1.4671E+19
Ce-143	3.8669E+02	5.8229E-07	2.4522E+18	1.3783E+19
Ce-144	3.7128E+02	1.1641E-04	4.8682E+20	1.1752E+19
Pr-143	1.8081E+02	2.6851E-06	1.1308E+19	5.6326E+18
Nd-147	7.4387E+01	9.1951E-07	3.7669E+18	2.3885E+18
Np-239	5.0556E+03	2.1792E-05	5.4910E+19	1.7146E+20
Pu-238	1.8559E+00	1.0841E-04	2.7430E+20	5.8708E+16
Pu-239	1.2414E-01	1.9972E-03	5.0323E+21	3.9238E+15
Pu-240	1.3309E-01	5.8407E-04	1.4656E+21	4.2102E+15
Pu-241	6.3876E+01	6.2008E-04	1.5495E+21	2.0207E+18
Am-241	3.9466E-02	1.1499E-05	2.8733E+19	1.2464E+15
Cm-242	9.8562E+00	2.9738E-06	7.4004E+18	3.1210E+17
Cm-244	1.0754E+00	1.3293E-05	3.2808E+19	3.4021E+16

Drywell Transport Group Inventory:

Time (h) = 8.0000	Atmosphere	Sump	
Noble gases (atoms)	2.9622E+25	0.0000E+00	
Elemental I (atoms)	3.1672E+20	6.5379E+22	
Organic I (atoms)	1.8507E+21	0.0000E+00	
Aerosols (kg)	2.9168E-01	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		5.5483E-05
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		6.5005E-05
Total I (Ci)			7.4823E+05

Time (h) = 8.0000	Deposition Surfaces	Recirculating Filter
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)	5.3378E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 8.0000 Leakage Transport

Noble gases (atoms) 5.9146E+22
Elemental I (atoms) 6.7875E+18
Organic I (atoms) 3.9114E+18
Aerosols (kg) 2.3038E-02

Drywell to Void Transport Group Inventory:
Time (h) = 8.0000 Leakage Transport

Noble gases (atoms) 8.9928E+22
Elemental I (atoms) 1.4747E+19
Organic I (atoms) 6.0359E+18
Aerosols (kg) 4.4838E-02

Exclusion Area Boundary Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5158E-01	1.2512E+00	2.0153E-01
Accumulated dose (rem)	6.6770E-01	6.5397E+01	4.3780E+00

Low Population Zone Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.4671E-02	1.8963E-01	5.2242E-02
Accumulated dose (rem)	3.5309E-01	4.2334E+01	2.7935E+00

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2822E-05	2.0333E-03	1.1999E-04
Accumulated dose (rem)	1.7283E-03	4.2608E+00	2.0743E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
Co-58	2.3395E-03	7.3573E-11	7.6391E+14	2.5150E+17
Co-60	2.8265E-03	2.5005E-09	2.5097E+16	3.0129E+17
Kr-85	1.3699E+06	3.4916E+00	2.4738E+25	4.1938E+21
Kr-85m	7.0407E+05	8.5554E-05	6.0614E+20	2.0340E+22
Kr-87	1.1809E+02	4.1689E-09	2.8857E+16	7.5822E+21
Kr-88	2.2851E+05	1.8223E-05	1.2471E+20	3.3122E+22
Rb-86	8.9609E-02	1.1013E-09	7.7117E+15	1.1066E+19
Sr-89	3.4114E+00	1.1742E-07	7.9455E+17	3.6804E+20
Sr-90	3.9281E-01	2.8797E-06	1.9269E+19	4.1859E+19
Sr-91	8.1555E-01	2.2498E-10	1.4889E+15	4.2244E+20
Sr-92	1.0715E-02	8.5249E-13	5.5802E+12	3.0052E+20
Y-90	8.9006E-02	1.6359E-10	1.0947E+15	9.5191E+17
Y-91	5.1883E-02	2.1156E-09	1.4001E+16	4.6404E+18
Y-92	1.0616E-01	1.1033E-11	7.2217E+13	6.0706E+19
Y-93	1.0776E-02	3.2298E-12	2.0915E+13	5.0800E+18
Zr-95	5.4890E-02	2.5551E-09	1.6197E+16	5.9063E+18
Zr-97	2.1511E-02	1.1252E-11	6.9859E+13	5.5698E+18
Nb-95	5.5751E-02	1.4257E-09	9.0378E+15	5.9427E+18
Mo-99	6.0980E-01	1.2714E-09	7.7341E+15	8.1545E+19
Tc-99m	6.1051E-01	1.1611E-10	7.0626E+14	7.2810E+19
Ru-103	6.3790E-01	1.9765E-08	1.1556E+17	6.9062E+19
Ru-105	1.0601E-02	1.5771E-12	9.0454E+12	3.3587E+19
Ru-106	2.6680E-01	7.9748E-08	4.5307E+17	2.8478E+19
Rh-105	3.0450E-01	3.6076E-10	2.0691E+15	4.4976E+19
Sb-127	7.4748E-01	2.7990E-09	1.3272E+16	9.3674E+19
Sb-129	5.6757E-02	1.0093E-11	4.7117E+13	1.9767E+20
Te-127	8.0774E-01	3.0606E-10	1.4513E+15	9.3655E+19

Te-127m	1.1931E-01	1.2648E-08	5.9977E+16	1.2697E+19
Te-129	4.1400E-01	1.9768E-11	9.2285E+13	2.1996E+20
Te-129m	3.8657E-01	1.2832E-08	5.9904E+16	4.1736E+19
Te-131m	6.8670E-01	8.6117E-10	3.9588E+15	1.2062E+20
Te-132	9.5451E+00	3.1441E-08	1.4344E+17	1.2320E+21
I-131	4.5162E+04	3.6428E-04	1.6746E+21	5.3520E+21
I-132	3.7545E+02	3.6373E-08	1.6594E+17	5.8698E+21
I-133	4.5699E+04	4.0341E-05	1.8266E+20	1.0291E+22
I-134	6.4758E-04	2.4275E-14	1.0910E+11	2.9195E+21
I-135	7.6705E+03	2.1842E-06	9.7432E+18	8.1921E+21
Xe-133	1.6844E+08	8.9988E-01	4.0746E+24	5.4944E+23
Xe-135	1.5352E+07	6.0117E-03	2.6817E+22	1.2626E+23
Cs-134	1.0378E+01	8.0209E-06	3.6047E+19	1.2401E+21
Cs-136	2.7431E+00	3.7428E-08	1.6573E+17	3.4365E+20
Cs-137	6.4745E+00	7.4435E-05	3.2720E+20	7.7311E+20
Ba-139	3.6027E-05	2.2025E-15	9.5424E+09	2.3376E+20
Ba-140	5.7314E+00	7.8289E-08	3.3676E+17	6.4140E+20
La-140	1.9496E+00	3.5075E-09	1.5088E+16	1.9196E+19
La-141	8.3218E-04	1.4715E-13	6.2848E+11	4.1038E+18
La-142	1.1536E-06	8.0583E-17	3.4175E+08	2.3056E+18
Ce-141	1.3625E-01	4.7818E-09	2.0423E+16	1.4779E+19
Ce-143	8.2636E-02	1.2444E-10	5.2404E+14	1.3870E+19
Ce-144	1.1085E-01	3.4756E-08	1.4535E+17	1.1838E+19
Pr-143	5.5552E-02	8.2497E-10	3.4742E+15	5.6750E+18
Nd-147	2.1330E-02	2.6366E-10	1.0801E+15	2.4058E+18
Np-239	1.2426E+00	5.3561E-09	1.3496E+16	1.7261E+20
Pu-238	5.5506E-04	3.2423E-08	8.2039E+16	5.9141E+16
Pu-239	3.7197E-05	5.9844E-07	1.5079E+18	3.9528E+15
Pu-240	3.9802E-05	1.7467E-07	4.3830E+17	4.2412E+15
Pu-241	1.9101E-02	1.8543E-07	4.6335E+17	2.0356E+18
Am-241	1.1859E-05	3.4551E-09	8.6337E+15	1.2556E+15
Cm-242	2.9393E-03	8.8684E-10	2.2069E+15	3.1440E+17
Cm-244	3.2160E-04	3.9751E-09	9.8110E+15	3.4272E+16

Drywell Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	2.8840E+25	0.0000E+00	
Elemental I (atoms)	2.7260E+20	6.5379E+22	
Organic I (atoms)	1.5929E+21	0.0000E+00	
Aerosols (kg)	8.7157E-05	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.1770E-05
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.2889E-05
Total I (Ci)			9.8907E+04

Time (h) = 24.0000	Deposition Surfaces	Recirculating Filter
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)	5.3669E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 24.0000	Leakage Transport
Noble gases (atoms)	1.9554E+23
Elemental I (atoms)	8.1570E+18
Organic I (atoms)	1.1914E+19
Aerosols (kg)	2.3194E-02

Drywell to Void Transport Group Inventory:

Time (h) = 24.0000	Leakage Transport

Noble gases (atoms) 2.7932E+23
Elemental I (atoms) 1.6649E+19
Organic I (atoms) 1.7148E+19
Aerosols (kg) 4.5054E-02

Exclusion Area Boundary Doses:

Time (h) = 38.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.1132E-02	6.8864E-01	7.2301E-02
Accumulated dose (rem)	7.1883E-01	6.6085E+01	4.4504E+00

Low Population Zone Doses:

Time (h) = 38.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.2693E-03	5.5485E-02	7.9749E-03
Accumulated dose (rem)	3.5936E-01	4.2389E+01	2.8015E+00

Control Room Doses:

Time (h) = 38.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.5369E-06	1.6910E-04	7.7345E-06
Accumulated dose (rem)	1.7308E-03	4.2610E+00	2.0744E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 38.0000	Ci	kg	Atoms	Decay
Co-58	5.6805E-04	1.7864E-11	1.8549E+14	2.5150E+17
Co-60	6.9011E-04	6.1051E-10	6.1276E+15	3.0129E+17
Kr-85	1.3565E+06	3.4574E+00	2.4495E+25	6.7350E+21
Kr-85m	7.9921E+04	9.7115E-06	6.8804E+19	2.0874E+22
Kr-87	5.6738E-02	2.0031E-12	1.3865E+13	7.5822E+21
Kr-88	7.4252E+03	5.9216E-07	4.0523E+18	3.3242E+22
Rb-86	2.1414E-02	2.6317E-10	1.8429E+15	1.1066E+19
Sr-89	8.2644E-01	2.8447E-08	1.9248E+17	3.6804E+20
Sr-90	9.5921E-02	7.0320E-07	4.7053E+18	4.1859E+19
Sr-91	7.1710E-02	1.9782E-11	1.3091E+14	4.2244E+20
Sr-92	7.2882E-05	5.7984E-15	3.7955E+10	3.0052E+20
Y-90	3.2246E-02	5.9269E-11	3.9658E+14	9.5201E+17
Y-91	1.2944E-02	5.2780E-10	3.4928E+15	4.6405E+18
Y-92	2.0179E-03	2.0971E-13	1.3727E+12	6.0706E+19
Y-93	1.0068E-03	3.0176E-13	1.9540E+12	5.0800E+18
Zr-95	1.3320E-02	6.2003E-10	3.9304E+15	5.9064E+18
Zr-97	2.9583E-03	1.5475E-12	9.6073E+12	5.5698E+18
Nb-95	1.3610E-02	3.4806E-10	2.2064E+15	5.9427E+18
Mo-99	1.2855E-01	2.6804E-10	1.6305E+15	8.1545E+19
Tc-99m	1.3108E-01	2.4929E-11	1.5164E+14	7.2811E+19
Ru-103	1.5418E-01	4.7773E-09	2.7932E+16	6.9063E+19
Ru-105	2.9102E-04	4.3294E-14	2.4831E+11	3.3587E+19
Ru-106	6.5083E-02	1.9453E-08	1.1052E+17	2.8478E+19
Rh-105	5.6757E-02	6.7244E-11	3.8567E+14	4.4977E+19
Sb-127	1.6434E-01	6.1538E-10	2.9180E+15	9.3675E+19
Sb-129	1.4662E-03	2.6074E-13	1.2172E+12	1.9767E+20
Te-127	1.8336E-01	6.9478E-11	3.2945E+14	9.3655E+19
Te-127m	2.9143E-02	3.0896E-09	1.4650E+16	1.2697E+19
Te-129	8.2732E-02	3.9505E-12	1.8442E+13	2.1996E+20
Te-129m	9.3287E-02	3.0966E-09	1.4456E+16	4.1737E+19
Te-131m	1.2135E-01	1.5218E-10	6.9958E+14	1.2062E+20
Te-132	2.0589E+00	6.7819E-09	3.0940E+16	1.2320E+21
I-131	4.2501E+04	3.4282E-04	1.5760E+21	5.4337E+21
I-132	8.7844E+00	8.5103E-10	3.8826E+15	5.8700E+21

I-133	2.8363E+04	2.5038E-05	1.1337E+20	1.0359E+22
I-134	9.9871E-09	3.7437E-19	1.6825E+06	2.9195E+21
I-135	1.7487E+03	4.9793E-07	2.2212E+18	8.1995E+21
Xe-133	1.5443E+08	8.2505E-01	3.7357E+24	8.5020E+23
Xe-135	5.2297E+06	2.0479E-03	9.1351E+21	1.4378E+23
Cs-134	2.5329E+00	1.9577E-06	8.7981E+18	1.2402E+21
Cs-136	6.4952E-01	8.8622E-09	3.9242E+16	3.4365E+20
Cs-137	1.5810E+00	1.8177E-05	7.9899E+19	7.7311E+20
Ba-139	7.7047E-09	4.7103E-19	2.0407E+06	2.3376E+20
Ba-140	1.3559E+00	1.8521E-08	7.9670E+16	6.4141E+20
La-140	6.7151E-01	1.2081E-09	5.1968E+15	1.9198E+19
La-141	1.7203E-05	3.0419E-15	1.2992E+10	4.1038E+18
La-142	5.2013E-10	3.6334E-20	1.5409E+05	2.3056E+18
Ce-141	3.2863E-02	1.1533E-09	4.9259E+15	1.4779E+19
Ce-143	1.5039E-02	2.2646E-11	9.5369E+13	1.3870E+19
Ce-144	2.7033E-02	8.4755E-09	3.5445E+16	1.1838E+19
Pr-143	1.3681E-02	2.0317E-10	8.5561E+14	5.6750E+18
Nd-147	5.0204E-03	6.2058E-11	2.5423E+14	2.4058E+18
Np-239	2.5557E-01	1.1016E-09	2.7758E+15	1.7261E+20
Pu-238	1.3556E-04	7.9181E-09	2.0035E+16	5.9142E+16
Pu-239	9.0964E-06	1.4635E-07	3.6875E+17	3.9528E+15
Pu-240	9.7199E-06	4.2656E-08	1.0703E+17	4.2413E+15
Pu-241	4.6643E-03	4.5278E-08	1.1314E+17	2.0356E+18
Am-241	2.9078E-06	8.4723E-10	2.1171E+15	1.2556E+15
Cm-242	7.1600E-04	2.1603E-10	5.3759E+14	3.1441E+17
Cm-244	7.8531E-05	9.7068E-10	2.3957E+15	3.4272E+16

Drywell Transport Group Inventory:

Time (h) = 38.0000	Atmosphere	Sump	
Noble gases (atoms)	2.8240E+25	0.0000E+00	
Elemental I (atoms)	2.4713E+20	6.5379E+22	
Organic I (atoms)	1.4441E+21	0.0000E+00	
Aerosols (kg)	2.1273E-05	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.0499E-05
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.1156E-05
Total I (Ci)			7.2622E+04

Time (h) = 38.0000	Deposition Surfaces	Recirculating Filter
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)	5.3669E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 38.0000	Leakage Transport
Noble gases (atoms)	3.1211E+23
Elemental I (atoms)	9.2190E+18
Organic I (atoms)	1.8119E+19
Aerosols (kg)	2.3194E-02

Drywell to Void Transport Group Inventory:

Time (h) = 38.0000	Leakage Transport
Noble gases (atoms)	4.4119E+23
Elemental I (atoms)	1.8123E+19
Organic I (atoms)	2.5765E+19
Aerosols (kg)	4.5054E-02

Exclusion Area Boundary Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.1376E-02	1.1423E+00	9.6281E-02
Accumulated dose (rem)	7.8021E-01	6.7228E+01	4.5466E+00

Low Population Zone Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.5253E-03	9.2036E-02	1.0338E-02
Accumulated dose (rem)	3.6689E-01	4.2481E+01	2.8118E+00

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.1191E-06	2.8613E-04	1.1863E-05
Accumulated dose (rem)	1.7339E-03	4.2613E+00	2.0745E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
Co-58	1.6460E-06	5.1765E-14	5.3747E+11	2.5150E+17
Co-60	2.0458E-06	1.8098E-12	1.8165E+13	3.0129E+17
Kr-85	1.3288E+06	3.3868E+00	2.3995E+25	1.7105E+22
Kr-85m	9.9225E+00	1.2057E-09	8.5424E+15	2.0943E+22
Kr-88	5.1777E-03	4.1292E-13	2.8258E+12	3.3246E+22
Rb-86	5.8080E-05	7.1379E-13	4.9983E+12	1.1066E+19
Sr-89	2.3721E-03	8.1648E-11	5.5247E+14	3.6804E+20
Sr-90	2.8455E-04	2.0861E-09	1.3958E+16	4.1859E+19
Sr-91	3.0905E-06	8.5256E-16	5.6420E+09	4.2244E+20
Y-90	1.8450E-04	3.3912E-13	2.2691E+12	9.5206E+17
Y-91	3.7903E-05	1.5455E-12	1.0228E+13	4.6405E+18
Y-92	7.8845E-11	8.1940E-21	5.3636E+04	6.0706E+19
Y-93	5.5791E-08	1.6722E-17	1.0828E+08	5.0801E+18
Zr-95	3.8499E-05	1.7921E-12	1.1360E+13	5.9064E+18
Zr-97	8.1327E-07	4.2542E-16	2.6412E+09	5.5698E+18
Nb-95	4.0300E-05	1.0306E-12	6.5331E+12	5.9427E+18
Mo-99	2.0743E-04	4.3248E-13	2.6308E+12	8.1545E+19
Tc-99m	2.1266E-04	4.0443E-14	2.4601E+11	7.2811E+19
Ru-103	4.3836E-04	1.3583E-11	7.9413E+13	6.9063E+19
Ru-105	1.0089E-10	1.5010E-20	8.6086E+04	3.3587E+19
Ru-106	1.9222E-04	5.7456E-11	3.2642E+14	2.8478E+19
Rh-105	5.4062E-05	6.4050E-14	3.6735E+11	4.4977E+19
Sb-127	3.1557E-04	1.1817E-12	5.6034E+12	9.3675E+19
Sb-129	3.9529E-10	7.0294E-20	3.2816E+05	1.9767E+20
Te-127	3.8640E-04	1.4641E-13	6.9428E+11	9.3655E+19
Te-127m	8.6234E-05	9.1421E-12	4.3350E+13	1.2697E+19
Te-129	2.2770E-04	1.0873E-14	5.0758E+10	2.1996E+20
Te-129m	2.6333E-04	8.7411E-12	4.0806E+13	4.1737E+19
Te-131m	9.4268E-05	1.1822E-13	5.4346E+11	1.2062E+20
Te-132	3.6533E-03	1.2034E-11	5.4900E+13	1.2320E+21
I-131	3.3810E+04	2.7272E-04	1.2537E+21	5.7271E+21
I-132	6.3155E-03	6.1184E-13	2.7914E+12	5.8700E+21
I-133	4.0223E+03	3.5507E-06	1.6078E+19	1.0455E+22
I-135	3.9122E+00	1.1140E-09	4.9694E+15	8.2017E+21
Xe-133	1.0997E+08	5.8751E-01	2.6602E+24	1.8617E+24
Xe-135	6.1548E+04	2.4101E-05	1.0751E+20	1.5277E+23
Cs-134	7.4984E-03	5.7955E-09	2.6046E+16	1.2402E+21
Cs-136	1.6958E-03	2.3138E-11	1.0246E+14	3.4365E+20
Cs-137	4.6902E-03	5.3922E-08	2.3703E+17	7.7312E+20
Ba-140	3.5273E-03	4.8182E-11	2.0726E+14	6.4141E+20
La-140	3.1095E-03	5.5944E-12	2.4065E+13	1.9199E+19

Ce-141	9.2605E-05	3.2501E-12	1.3881E+13	1.4779E+19
Ce-143	1.3196E-05	1.9871E-14	8.3684E+10	1.3870E+19
Ce-144	7.9734E-05	2.4999E-11	1.0455E+14	1.1838E+19
Pr-143	3.8839E-05	5.7678E-13	2.4290E+12	5.6750E+18
Nd-147	1.2788E-05	1.5807E-13	6.4758E+11	2.4058E+18
Np-239	3.7231E-04	1.6049E-12	4.0438E+12	1.7261E+20
Pu-238	4.0228E-07	2.3498E-11	5.9458E+13	5.9142E+16
Pu-239	2.7092E-08	4.3587E-10	1.0983E+15	3.9529E+15
Pu-240	2.8839E-08	1.2656E-10	3.1757E+14	4.2413E+15
Pu-241	1.3834E-05	1.3430E-10	3.3559E+14	2.0357E+18
Am-241	8.7743E-09	2.5565E-12	6.3882E+12	1.2556E+15
Cm-242	2.1026E-06	6.3441E-13	1.5787E+12	3.1441E+17
Cm-244	2.3294E-07	2.8793E-12	7.1063E+12	3.4272E+16

Drywell Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	2.6655E+25	0.0000E+00	
Elemental I (atoms)	1.8555E+20	6.5379E+22	
Organic I (atoms)	1.0842E+21	0.0000E+00	
Aerosols (kg)	6.3015E-08	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		7.6581E-06
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		7.7483E-06
Total I (Ci)			3.7836E+04

Time (h) = 96.0000	Deposition Surfaces	Recirculating Filter
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)	5.3669E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 96.0000	Leakage Transport
Noble gases (atoms)	5.4406E+23
Elemental I (atoms)	1.1026E+19
Organic I (atoms)	2.8679E+19
Aerosols (kg)	2.3194E-02

Drywell to Void Transport Group Inventory:

Time (h) = 96.0000	Leakage Transport
Noble gases (atoms)	7.6327E+23
Elemental I (atoms)	2.0633E+19
Organic I (atoms)	4.0427E+19
Aerosols (kg)	4.5054E-02

Exclusion Area Boundary Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.3847E-01	3.8634E+00	2.5611E-01
Accumulated dose (rem)	9.1868E-01	7.1091E+01	4.8027E+00

Low Population Zone Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.7663E-03	8.7387E-02	7.4272E-03
Accumulated dose (rem)	3.7165E-01	4.2569E+01	2.8192E+00

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.3407E-06	1.8431E-04	6.9530E-06
Accumulated dose (rem)	1.7352E-03	4.2614E+00	2.0746E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay
Kr-85	1.0643E+06	2.7127E+00	1.9219E+25	1.1613E+23
I-131	2.8918E+03	2.3326E-05	1.0723E+20	6.7720E+21
I-133	3.0142E-06	2.6609E-15	1.2048E+10	1.0471E+22
Xe-133	2.8487E+06	1.5219E-02	6.8910E+22	4.2984E+24

Drywell Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	1.9288E+25	0.0000E+00	
Elemental I (atoms)	1.5669E+19	6.5379E+22	
Organic I (atoms)	9.1561E+19	0.0000E+00	
Aerosols (kg)	3.9953E-35	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		6.4228E-07
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		6.4228E-07
Total I (Ci)			2.8918E+03

Time (h) = 720.0000	Deposition Surfaces	Recirculating Filter
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)	5.3669E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 720.0000	Leakage Transport
Noble gases (atoms)	2.5670E+24
Elemental I (atoms)	1.7248E+19
Organic I (atoms)	6.5034E+19
Aerosols (kg)	2.3194E-02

Drywell to Void Transport Group Inventory:

Time (h) = 720.0000	Leakage Transport
Noble gases (atoms)	3.5723E+24
Elemental I (atoms)	2.9272E+19
Organic I (atoms)	9.0909E+19
Aerosols (kg)	4.5054E-02

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##
I-131 Summary
##

Time (hr)	Drywell I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
0.000	5.2653E+03	0.0000E+00	0.0000E+00
0.033	3.1132E+05	0.0000E+00	0.0000E+00
0.050	4.6423E+05	1.8896E+00	1.8542E-02
0.300	2.5234E+06	1.1330E+02	5.3843E-03
0.500	3.9059E+06	3.0184E+02	4.1787E-03
0.750	7.0714E+06	7.0339E+02	3.4347E-03
1.000	1.0025E+07	1.3279E+03	3.0083E-03
1.250	1.2787E+07	2.1607E+03	2.8138E-03

1.500	1.5372E+07	3.1883E+03	2.7873E-03
1.750	1.7794E+07	4.3985E+03	2.8806E-03
2.000	2.0062E+07	5.7795E+03	3.0580E-03
2.400	1.3333E+07	7.7003E+03	1.9797E-03
2.700	9.8230E+06	8.7053E+03	1.4289E-03
3.000	7.2430E+06	9.4460E+03	1.0314E-03
3.300	5.3452E+06	9.9924E+03	7.4448E-04
3.600	3.9485E+06	1.0396E+04	5.3742E-04
3.850	3.0705E+06	1.0650E+04	4.0963E-04
4.200	2.1663E+06	1.0915E+04	2.8011E-04
4.500	1.6099E+06	1.1079E+04	2.0225E-04
4.800	1.1998E+06	1.1201E+04	1.4604E-04
5.100	9.3120E+05	1.1292E+04	1.0547E-04
5.400	7.8033E+05	1.1367E+04	7.6200E-05
5.700	6.5523E+05	1.1430E+04	5.5082E-05
6.000	5.5151E+05	1.1482E+04	3.9842E-05
6.300	4.6551E+05	1.1527E+04	2.8841E-05
6.600	3.9419E+05	1.1564E+04	2.0897E-05
6.900	3.3506E+05	1.1596E+04	1.5157E-05
7.200	2.8602E+05	1.1623E+04	1.1009E-05
7.500	2.4536E+05	1.1646E+04	8.0089E-06
7.800	2.1163E+05	1.1666E+04	5.8381E-06
8.000	1.9241E+05	1.1678E+04	4.7349E-06
8.300	1.6772E+05	1.1694E+04	3.4667E-06
8.600	1.4975E+05	1.1708E+04	2.5474E-06
8.900	1.3446E+05	1.1720E+04	1.8808E-06
9.200	1.2146E+05	1.1731E+04	1.3967E-06
9.500	1.1040E+05	1.1741E+04	1.0446E-06
9.800	1.0098E+05	1.1751E+04	7.8824E-07
10.100	9.2970E+04	1.1759E+04	6.0113E-07
10.400	8.6151E+04	1.1767E+04	4.6428E-07
24.000	4.5162E+04	1.1972E+04	6.6367E-08
38.000	4.2501E+04	1.2151E+04	6.2439E-08
96.000	3.3810E+04	1.2471E+04	2.4829E-08
720.000	2.8918E+03	1.3614E+04	6.1236E-10

Time (hr)	Void I-131 (Curies)
0.000	0.0000E+00
0.033	0.0000E+00
0.050	4.7294E+00
0.300	2.8348E+02
0.500	7.5501E+02
0.750	1.7590E+03
1.000	3.3199E+03
1.250	5.4004E+03
1.500	7.9666E+03
1.750	1.0987E+04
2.000	1.4432E+04
2.400	1.7078E+04
2.700	1.8455E+04
3.000	1.9463E+04
3.300	2.0201E+04
3.600	2.0740E+04
3.850	2.1075E+04
4.200	2.1416E+04
4.500	2.1621E+04
4.800	2.1767E+04
5.100	2.1871E+04
5.400	2.1951E+04
5.700	2.2015E+04

6.000	2.2065E+04
6.300	2.2103E+04
6.600	2.2132E+04
6.900	2.2152E+04
7.200	2.2167E+04
7.500	2.2175E+04
7.800	2.2179E+04
8.000	2.2180E+04
8.300	2.2178E+04
8.600	2.2174E+04
8.900	2.2168E+04
9.200	2.2160E+04
9.500	2.2150E+04
9.800	2.2140E+04
10.100	2.2128E+04
10.400	2.2115E+04
24.000	2.1352E+04
38.000	2.0557E+04
96.000	1.7110E+04
720.000	2.2278E+03

##
Cumulative Dose Summary
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	Exclusion Area Bounda		Low Population Zone		Control Room	
Time (hr)	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
0.033	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.050	4.3296E-01	2.1281E-02	4.9001E-02	2.4085E-03	5.8049E-02	2.5313E-03
0.300	3.6099E+00	1.7696E-01	1.0980E+00	5.3814E-02	1.0322E+00	4.5006E-02
0.500	8.9727E+00	4.3878E-01	2.8687E+00	1.4026E-01	1.3813E+00	6.0250E-02
0.750	1.0912E+01	5.4634E-01	4.8035E+00	2.4759E-01	1.7463E+00	7.6263E-02
1.000	1.3957E+01	7.3200E-01	7.8417E+00	4.3282E-01	2.0552E+00	9.0129E-02
1.250	1.8028E+01	9.8954E-01	1.1904E+01	6.8978E-01	2.3352E+00	1.0325E-01
1.500	2.3053E+01	1.3135E+00	1.6917E+01	1.0131E+00	2.6057E+00	1.1661E-01
1.750	2.8965E+01	1.6991E+00	2.2816E+01	1.3978E+00	2.8806E+00	1.3093E-01
2.000	3.5702E+01	2.1419E+00	2.9538E+01	1.8395E+00	3.1697E+00	1.4667E-01
2.400	4.5054E+01	2.7621E+00	3.3683E+01	2.1144E+00	3.5570E+00	1.6818E-01
2.700	4.9928E+01	3.0898E+00	3.5843E+01	2.2596E+00	3.7542E+00	1.7914E-01
3.000	5.3508E+01	3.3341E+00	3.7430E+01	2.3679E+00	3.8960E+00	1.8703E-01
3.300	5.6141E+01	3.5172E+00	3.8596E+01	2.4490E+00	3.9980E+00	1.9271E-01
3.600	5.8078E+01	3.6551E+00	3.9455E+01	2.5102E+00	4.0714E+00	1.9681E-01
3.850	5.9297E+01	3.7441E+00	3.9995E+01	2.5496E+00	4.1166E+00	1.9933E-01
4.200	6.0560E+01	3.8395E+00	4.0555E+01	2.5919E+00	4.1623E+00	2.0189E-01
4.500	6.1339E+01	3.9011E+00	4.0900E+01	2.6192E+00	4.1897E+00	2.0342E-01
4.800	6.1917E+01	3.9492E+00	4.1157E+01	2.6405E+00	4.2094E+00	2.0453E-01
5.100	6.2350E+01	3.9873E+00	4.1348E+01	2.6574E+00	4.2236E+00	2.0533E-01
5.400	6.2701E+01	4.0195E+00	4.1504E+01	2.6717E+00	4.2338E+00	2.0590E-01
5.700	6.2995E+01	4.0476E+00	4.1634E+01	2.6841E+00	4.2412E+00	2.0632E-01
6.000	6.3241E+01	4.0720E+00	4.1743E+01	2.6949E+00	4.2465E+00	2.0662E-01
6.300	6.3448E+01	4.0934E+00	4.1835E+01	2.7044E+00	4.2503E+00	2.0683E-01
6.600	6.3622E+01	4.1123E+00	4.1912E+01	2.7128E+00	4.2531E+00	2.0699E-01
6.900	6.3769E+01	4.1290E+00	4.1977E+01	2.7202E+00	4.2551E+00	2.0710E-01
7.200	6.3894E+01	4.1439E+00	4.2033E+01	2.7268E+00	4.2566E+00	2.0719E-01
7.500	6.4001E+01	4.1572E+00	4.2080E+01	2.7327E+00	4.2576E+00	2.0725E-01
7.800	6.4092E+01	4.1692E+00	4.2120E+01	2.7380E+00	4.2584E+00	2.0729E-01
8.000	6.4146E+01	4.1765E+00	4.2144E+01	2.7413E+00	4.2588E+00	2.0731E-01
8.300	6.4217E+01	4.1867E+00	4.2155E+01	2.7437E+00	4.2592E+00	2.0734E-01
8.600	6.4280E+01	4.1960E+00	4.2164E+01	2.7460E+00	4.2596E+00	2.0736E-01

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   8.900 6.4335E+01 4.2046E+00 4.2173E+01 2.7481E+00 4.2598E+00 2.0737E-01
   9.200 6.4386E+01 4.2126E+00 4.2180E+01 2.7501E+00 4.2600E+00 2.0738E-01
   9.500 6.4431E+01 4.2201E+00 4.2187E+01 2.7519E+00 4.2601E+00 2.0739E-01
   9.800 6.4472E+01 4.2270E+00 4.2193E+01 2.7537E+00 4.2602E+00 2.0740E-01
  10.100 6.4509E+01 4.2335E+00 4.2199E+01 2.7554E+00 4.2603E+00 2.0740E-01
  10.400 6.4544E+01 4.2396E+00 4.2204E+01 2.7569E+00 4.2603E+00 2.0741E-01
  24.000 6.5397E+01 4.3780E+00 4.2334E+01 2.7935E+00 4.2608E+00 2.0743E-01
  38.000 6.6085E+01 4.4504E+00 4.2389E+01 2.8015E+00 4.2610E+00 2.0744E-01
  96.000 6.7228E+01 4.5466E+00 4.2481E+01 2.8118E+00 4.2613E+00 2.0745E-01
 720.000 7.1091E+01 4.8027E+00 4.2569E+01 2.8192E+00 4.2614E+00 2.0746E-01

########################################################################
                        Worst Two-Hour Doses
########################################################################

Exclusion Area Boundary
   Time    Whole Body     Thyroid         TEDE
   (hr)      (rem)         (rem)          (rem)
    1.0   2.3921E-01   3.9551E+01   2.6022E+00
```

Attachment B – Selected pages of RADTRAD Output File PB10G185ES.o0

```
#########################################################################
    RADTRAD Version 3.03 (Spring 2001) run on  4/04/2007  at 14:08:23
 #########################################################################

 #########################################################################
                      File information
 #########################################################################

 Plant file           = D:\D DRIVE\Radtrad 3.03\Input\PB\300 SCFH\PB10G185ES.psf
 Inventory file       = d:\d drive\radtrad 3.03\defaults\pbs_def.txt
 Release file         = d:\d drive\radtrad 3.03\defaults\bwr_i.rft
 Dose Conversion file = d:\d drive\radtrad 3.03\defaults\fgr11&12.inp

     #####    ####   #####    #  #     #  #####   #    #  #####
     #    #  #       #        #  ##    #  #    #  #    #    #
     #    #  #       #        #  # #   #  #    #  #    #    #
     #####    ####   ####     #  #  #  #  #####   #    #    #
     #            #  #        #  #   # #  #       #    #    #
     #            #  #        #  #    ##  #       #    #    #
     #        ####   #        #  #     #  #        ####     #

 Radtrad 3.03 4/15/2001
 PBAPS Units 2 & 3 ECCS Leakage AST Analysis - ECCS Leakage = 10 gpm, NO SGTS Filtration,
CR Unfiltered Inleakage = 500 cfm, and MCREV Air Intake = 18,500 cfm Before Pressurization
 Nuclide Inventory File:
 d:\d drive\radtrad 3.03\defaults\pbs_def.txt
 Plant Power Level:
  3.5280E+03
 Compartments:
   3
 Compartment 1:
 Torus
   3
  1.2290E+05
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  1.7600E+05
   0
   0
   0
   0
   0
 Pathways:
```

```
  4
Pathway 1:
ESF Leakage to Environment
  1
  2
  2
Pathway 2:
Filtered Intake to Control Room
  2
  3
  2
Pathway 3:
Unfiltered Inleakage to Control Room
  2
  3
  2
Pathway 4:
Control Room Exhaust to Environment
  3
  2
  2
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
d:\d drive\radtrad 3.03\defaults\fgr11&12.inp
d:\d drive\radtrad 3.03\defaults\bwr_i.rft
  0.0000E+00
  1
  0.0000E+00   9.7000E-01   3.0000E-02   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
```

```
  0
  0
Compartment 3:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   1.3370E-01   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-02   1.3370E-01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   2.7000E+03   9.8000E+01   8.9000E+01   8.9000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   5.0000E+02   0.0000E+00   0.0000E+00   0.0000E+00
```

```
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   3.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  4
  0.0000E+00   4.2500E-04
  5.0000E-02   5.3000E-05
  5.0000E-01   8.8900E-06
  7.2000E+02   0.0000E+00
  1
  2
  0.0000E+00   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  8
  0.0000E+00   4.8100E-05
  5.0000E-02   1.7500E-05
  5.0000E-01   8.8700E-06
  2.0000E+00   3.9400E-06
  8.0000E+00   2.6200E-06
  2.4000E+01   1.0900E-06
  9.6000E+01   3.0600E-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
  7
  0.0000E+00   1.1800E-03
  5.0000E-02   2.7200E-06
  2.0000E+00   1.4600E-08
  8.0000E+00   1.4600E-08
  2.4000E+01   1.4600E-08
  9.6000E+01   4.2100E-09
  7.2000E+02   0.0000E+00
Simulation Parameters:
  7
  0.0000E+00   1.0000E-02
  2.0000E+00   1.0000E-01
  4.0000E+00   1.0000E+00
  8.0000E+00   2.0000E+00
  2.4000E+01   4.0000E+00
  9.6000E+01   8.0000E+00
  7.2000E+02   0.0000E+00
Output Filename:
D:\D DRIVE\Radtrad 3.03\Input\PB\PB10G185ES.o0
  1
  1
  1
  0
  0
End of Scenario File
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/04/2007  at 14:08:23
##########################################################################

##########################################################################
                     Plant Description
##########################################################################

Number of Nuclides =  60

Inventory Power =   1.0000E+00 MWth
Plant Power Level =   3.5280E+03 MWth

Number of compartments    =   3

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: Torus
Compartment volume =   1.2290E+05 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  1
   Exit Pathway Number    1: ESF Leakage to Environment

Compartment number  2
Name: Environment
Compartment type is Environment
Pathways into and out of compartment  2
   Inlet Pathway Number   1: ESF Leakage to Environment
   Inlet Pathway Number   4: Control Room Exhaust to Environment
   Exit Pathway Number    2: Filtered Intake to Control Room
   Exit Pathway Number    3: Unfiltered Inleakage to Control Room

Compartment number  3
Name: Control Room
Compartment volume =   1.7600E+05 (Cubic feet)
Compartment type is Control Room
Pathways into and out of compartment  3
   Inlet Pathway Number   2: Filtered Intake to Control Room
   Inlet Pathway Number   3: Unfiltered Inleakage to Control Room
   Exit Pathway Number    4: Control Room Exhaust to Environment

Total number of pathways =   4
```

```
##############################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/04/2007  at 14:08:23
##############################################################################

##############################################################################
                    Scenario Description
##############################################################################

Radioactive Decay is enabled
Calculation of Daughters is enabled

Release Fractions and Timings
              GAP        EARLY IN-VESSEL  LATE RELEASE    RELEASE MASS
           0.500000 hr     1.5000 hrs       0.0000 hrs        (gm)
NOBLES     0.0000E+00      0.0000E+00       0.0000E+00       0.000E+00
IODINE     5.0000E-02      2.5000E-01       0.0000E+00       3.034E+02
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 =      3528. MWt

Nuclide  Group  Specific     half      Whole Body   Inhaled     Inhaled
 Name           Inventory    life        DCF       Thyroid     Effective
                (Ci/MWt)     (s)     (Sv-m3/Bq-s)  (Sv/Bq)     (Sv/Bq)
 I-131     2   2.687E+04  6.947E+05   1.820E-14   2.920E-07   8.890E-09
 I-132     2   3.881E+04  8.280E+03   1.120E-13   1.740E-09   1.030E-10
 I-133     2   5.556E+04  7.488E+04   2.940E-14   4.860E-08   1.580E-09
 I-134     2   6.165E+04  3.156E+03   1.300E-13   2.880E-10   3.550E-11
 I-135     2   5.192E+04  2.380E+04   8.294E-14   8.460E-09   3.320E-10

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
 Sr-90     Y-90        1.00       none      0.00       none      0.00
 Sr-91     Y-91m       0.58       Y-91      0.42       none      0.00
 Sr-92     Y-92        1.00       none      0.00       none      0.00
 Y-93      Zr-93       1.00       none      0.00       none      0.00
 Zr-95     Nb-95m      0.01       Nb-95     0.99       none      0.00
 Zr-97     Nb-97m      0.95       Nb-97     0.05       none      0.00
 Mo-99     Tc-99m      0.88       Tc-99     0.12       none      0.00
 Tc-99m    Tc-99       1.00       none      0.00       none      0.00
 Ru-103    Rh-103m     1.00       none      0.00       none      0.00
 Ru-105    Rh-105      1.00       none      0.00       none      0.00
 Ru-106    Rh-106      1.00       none      0.00       none      0.00
 Sb-127    Te-127m     0.18       Te-127    0.82       none      0.00
 Sb-129    Te-129m     0.22       Te-129    0.77       none      0.00
 Te-127m   Te-127      0.98       none      0.00       none      0.00
 Te-129    I-129       1.00       none      0.00       none      0.00
 Te-129m   Te-129      0.65       I-129     0.35       none      0.00
 Te-131m   Te-131      0.22       I-131     0.78       none      0.00
 Te-132    I-132       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
Cs-137	Ba-137m	0.95	none	0.00	none	0.00
Ba-140	La-140	1.00	none	0.00	none	0.00
La-141	Ce-141	1.00	none	0.00	none	0.00
Ce-143	Pr-143	1.00	none	0.00	none	0.00
Ce-144	Pr-144m	0.02	Pr-144	0.98	none	0.00
Nd-147	Pm-147	1.00	none	0.00	none	0.00
Np-239	Pu-239	1.00	none	0.00	none	0.00
Pu-238	U-234	1.00	none	0.00	none	0.00
Pu-239	U-235	1.00	none	0.00	none	0.00
Pu-240	U-236	1.00	none	0.00	none	0.00
Pu-241	U-237	0.00	Am-241	1.00	none	0.00
Am-241	Np-237	1.00	none	0.00	none	0.00
Cm-242	Pu-238	1.00	none	0.00	none	0.00
Cm-244	Pu-240	1.00	none	0.00	none	0.00

Iodine fractions

Aerosol	=	0.0000E+00
Elemental	=	9.7000E-01
Organic	=	3.0000E-02

COMPARTMENT DATA

Compartment number 1: Torus

Compartment number 2: Environment

Compartment number 3: Control Room

PATHWAY DATA

Pathway number 1: ESF Leakage to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	1.3370E-01	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-02	1.3370E-01	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 2: Filtered Intake to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	2.7000E+03	9.8000E+01	8.9000E+01	8.9000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Unfiltered Inleakage to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

```
   5.0000E-01    5.0000E+02   0.0000E+00   0.0000E+00   0.0000E+00
   7.2000E+02    0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00

Pathway number  4: Control Room Exhaust to Environment

     Pathway Filter: Removal Data

      Time (hr)      Flow Rate          Filter Efficiencies (%)
                      (cfm)         Aerosol     Elemental    Organic
     0.0000E+00    1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
     3.3300E-02    1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
     5.0000E-01    3.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
     7.2000E+02    0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00

LOCATION DATA
     Location Exclusion Area Boundary     is in compartment   2

     Location X/Q Data
      Time (hr)          X/Q (s * m^-3)
       0.0000E+00           4.2500E-04
       5.0000E-02           5.3000E-05
       5.0000E-01           8.8900E-06
       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 Low Population Zone     is in compartment   2

     Location X/Q Data
      Time (hr)          X/Q (s * m^-3)
       0.0000E+00           4.8100E-05
       5.0000E-02           1.7500E-05
       5.0000E-01           8.8700E-06
       2.0000E+00           3.9400E-06
       8.0000E+00           2.6200E-06
       2.4000E+01           1.0900E-06
       9.6000E+01           3.0600E-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           1.1800E-03
       5.0000E-02           2.7200E-06
       2.0000E+00           1.4600E-08
       8.0000E+00           1.4600E-08
       2.4000E+01           1.4600E-08
       9.6000E+01           4.2100E-09
       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	1.0000E-02
2.0000E+00	1.0000E-01
4.0000E+00	1.0000E+00
8.0000E+00	2.0000E+00
2.4000E+01	4.0000E+00
9.6000E+01	8.0000E+00
7.2000E+02	0.0000E+00

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/04/2007  at 14:08:23
##########################################################################


     ####   #    #  #####  #####   #    #  #####
    #    #  #    #    #    #    #  #    #    #
    #    #  #    #    #    #    #  #    #    #
    #    #  #    #    #    #####   #    #    #
    #    #  #    #    #    #       #    #    #
    #    #  #    #    #    #       #    #    #
     ####    ####     #    #        ####     #


##########################################################################
                                Dose Output
##########################################################################

Exclusion Area Boundary Doses:

Time (h) =   0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)        0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)  0.0000E+00  0.0000E+00  0.0000E+00

Low Population Zone Doses:

Time (h) =   0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)        0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)  0.0000E+00  0.0000E+00  0.0000E+00

Control Room Doses:

Time (h) =   0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)        0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)  0.0000E+00  0.0000E+00  0.0000E+00

Exclusion Area Boundary Doses:

Time (h) =   0.0500    Whole Body   Thyroid       TEDE
Delta dose (rem)        4.6620E-04  9.7533E-02  3.5497E-03
Accumulated dose (rem)  4.6620E-04  9.7533E-02  3.5497E-03

Low Population Zone Doses:

Time (h) =   0.0500    Whole Body   Thyroid       TEDE
Delta dose (rem)        5.2763E-05  1.1038E-02  4.0175E-04
Accumulated dose (rem)  5.2763E-05  1.1038E-02  4.0175E-04

Control Room Doses:

Time (h) =   0.0500    Whole Body   Thyroid       TEDE
Delta dose (rem)        3.1548E-06  1.3066E-02  4.1624E-04
Accumulated dose (rem)  3.1548E-06  1.3066E-02  4.1624E-04

Exclusion Area Boundary Doses:

Time (h) =   0.5000    Whole Body   Thyroid       TEDE
Delta dose (rem)        9.2737E-03  2.1534E+00  7.7254E-02
Accumulated dose (rem)  9.7399E-03  2.2510E+00  8.0804E-02
```

Low Population Zone Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.0621E-03	7.1104E-01	2.5509E-02
Accumulated dose (rem)	3.1148E-03	7.2208E-01	2.5910E-02

Control Room Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.8629E-05	3.0356E-01	9.6562E-03
Accumulated dose (rem)	7.1784E-05	3.1662E-01	1.0072E-02

Exclusion Area Boundary Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.4085E-02	7.5326E+00	2.6095E-01
Accumulated dose (rem)	3.3825E-02	9.7836E+00	3.4175E-01

Low Population Zone Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.4031E-02	7.5157E+00	2.6036E-01
Accumulated dose (rem)	2.7146E-02	8.2378E+00	2.8627E-01

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.7933E-05	5.3398E-01	1.6881E-02
Accumulated dose (rem)	1.5972E-04	8.5061E-01	2.6953E-02

Exclusion Area Boundary Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.8361E-02	4.9117E+01	1.6212E+00
Accumulated dose (rem)	1.2219E-01	5.8901E+01	1.9629E+00

Low Population Zone Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.9161E-02	2.1768E+01	7.1849E-01
Accumulated dose (rem)	6.6307E-02	3.0006E+01	1.0048E+00

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.8501E-05	4.1430E-01	1.3020E-02
Accumulated dose (rem)	2.0822E-04	1.2649E+00	3.9973E-02

Exclusion Area Boundary Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	9.5559E-02	1.1619E+02	3.6869E+00
Accumulated dose (rem)	2.1774E-01	1.7509E+02	5.6498E+00

Low Population Zone Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.8162E-02	1.7611E+01	5.7248E-01
Accumulated dose (rem)	9.4469E-02	4.7617E+01	1.5772E+00

Control Room Doses:

```
Time (h) =  24.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         2.3041E-06  4.8054E-02  1.4876E-03
Accumulated dose (rem)   2.1052E-04  1.3130E+00  4.1461E-02

Exclusion Area Boundary Doses:

Time (h) =  96.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         1.2433E-01  3.8962E+02  1.2044E+01
Accumulated dose (rem)   3.4208E-01  5.6471E+02  1.7694E+01

Low Population Zone Doses:

Time (h) =  96.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         1.5244E-02  3.1393E+01  9.7565E-01
Accumulated dose (rem)   1.0971E-01  7.9010E+01  2.5529E+00

Control Room Doses:

Time (h) =  96.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         1.7505E-06  9.5627E-02  2.9273E-03
Accumulated dose (rem)   2.1227E-04  1.4086E+00  4.4388E-02

Exclusion Area Boundary Doses:

Time (h) = 720.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         2.0081E-01  1.0835E+03  3.3195E+01
Accumulated dose (rem)   5.4289E-01  1.6483E+03  5.0889E+01

Low Population Zone Doses:

Time (h) = 720.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         6.9121E-03  2.4509E+01  7.5322E-01
Accumulated dose (rem)   1.1663E-01  1.0352E+02  3.3061E+00

Control Room Doses:

Time (h) = 720.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         5.1177E-07  5.1647E-02  1.5732E-03
Accumulated dose (rem)   2.1278E-04  1.4602E+00  4.5961E-02

   1018

########################################################################
                            I-131 Summary
########################################################################

                  Torus                Environment          Control Room
Time (hr)     I-131 (Curies)        I-131 (Curies)       I-131 (Curies)
   0.000       5.2665E+03            0.0000E+00           0.0000E+00
   0.033       3.1564E+05            0.0000E+00           0.0000E+00
   0.050       4.7391E+05            4.3032E-01           4.2227E-03
   0.300       2.8410E+06            2.7482E+01           1.2533E-03
   0.500       4.7318E+06            7.6913E+01           1.0557E-03
   0.750       8.6676E+06            1.8625E+02           9.0219E-04
   1.000       1.2597E+07            3.5975E+02           8.4283E-04
   1.250       1.6519E+07            5.9732E+02           8.5502E-04
   1.500       2.0435E+07            8.9883E+02           9.2152E-04
   1.750       2.4344E+07            1.2642E+03           1.0293E-03
   2.000       2.8246E+07            1.6933E+03           1.1682E-03
   2.400       2.8205E+07            2.4301E+03           7.5732E-04
```

2.700	2.8174E+07	2.9820E+03	5.4794E-04
3.000	2.8143E+07	3.5333E+03	3.9716E-04
3.300	2.8112E+07	4.0840E+03	2.8858E-04
3.600	2.8081E+07	4.6340E+03	2.1038E-04
3.900	2.8050E+07	5.1835E+03	1.5407E-04
4.200	2.8020E+07	5.7324E+03	1.1352E-04
4.500	2.7989E+07	6.2807E+03	8.4312E-05
4.800	2.7958E+07	6.8283E+03	6.3278E-05
5.100	2.7928E+07	7.3754E+03	4.8129E-05
5.400	2.7897E+07	7.9219E+03	3.7216E-05
5.700	2.7866E+07	8.4678E+03	2.9356E-05
6.000	2.7836E+07	9.0130E+03	2.3692E-05
6.300	2.7805E+07	9.5577E+03	1.9611E-05
6.600	2.7775E+07	1.0102E+04	1.6670E-05
6.900	2.7744E+07	1.0645E+04	1.4548E-05
7.200	2.7714E+07	1.1188E+04	1.3018E-05
7.500	2.7684E+07	1.1730E+04	1.1913E-05
7.800	2.7653E+07	1.2272E+04	1.1115E-05
8.000	2.7633E+07	1.2633E+04	1.0710E-05
8.300	2.7603E+07	1.3174E+04	1.0244E-05
8.600	2.7572E+07	1.3714E+04	9.9054E-06
8.900	2.7542E+07	1.4253E+04	9.6589E-06
9.200	2.7512E+07	1.4792E+04	9.4787E-06
9.500	2.7482E+07	1.5331E+04	9.3462E-06
9.800	2.7452E+07	1.5868E+04	9.2479E-06
10.100	2.7422E+07	1.6405E+04	9.1745E-06
10.400	2.7391E+07	1.6942E+04	9.1188E-06
24.000	2.6062E+07	4.0627E+04	8.5642E-06
96.000	2.0028E+07	1.4812E+05	6.5814E-06
720.000	2.0440E+06	4.6850E+05	1.9368E-07

##
Cumulative Dose Summary
##

	Exclusion Area Bounda		Low Population Zone		Control Room	
Time (hr)	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
0.033	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.050	9.7533E-02	3.5497E-03	1.1038E-02	4.0175E-04	1.3066E-02	4.1624E-04
0.300	8.6050E-01	3.1088E-02	2.6296E-01	9.4947E-03	2.3329E-01	7.4254E-03
0.500	2.2510E+00	8.0804E-02	7.2208E-01	2.5910E-02	3.1662E-01	1.0072E-02
0.750	2.7654E+00	9.9031E-02	1.2353E+00	4.4096E-02	4.0932E-01	1.3013E-02
1.000	3.5792E+00	1.2763E-01	2.0473E+00	7.2627E-02	4.9178E-01	1.5624E-02
1.250	4.6901E+00	1.6637E-01	3.1558E+00	1.1128E-01	5.7190E-01	1.8158E-02
1.500	6.0960E+00	2.1507E-01	4.5584E+00	1.5988E-01	6.5562E-01	2.0802E-02
1.750	7.7945E+00	2.7358E-01	6.2532E+00	2.1825E-01	7.4740E-01	2.3699E-02
2.000	9.7836E+00	3.4175E-01	8.2378E+00	2.8627E-01	8.5061E-01	2.6953E-02
2.400	1.3189E+01	4.5781E-01	9.7471E+00	3.3771E-01	9.9308E-01	3.1441E-02
2.700	1.5730E+01	5.4380E-01	1.0873E+01	3.7582E-01	1.0657E+00	3.3726E-02
3.000	1.8259E+01	6.2896E-01	1.1994E+01	4.1356E-01	1.1181E+00	3.5373E-02
3.300	2.0776E+01	7.1336E-01	1.3110E+01	4.5097E-01	1.1560E+00	3.6563E-02
3.600	2.3283E+01	7.9705E-01	1.4221E+01	4.8806E-01	1.1835E+00	3.7426E-02
3.900	2.5779E+01	8.8008E-01	1.5327E+01	5.2486E-01	1.2035E+00	3.8054E-02
4.200	2.8265E+01	9.6249E-01	1.6428E+01	5.6138E-01	1.2182E+00	3.8513E-02
4.500	3.0740E+01	1.0443E+00	1.7525E+01	5.9764E-01	1.2290E+00	3.8851E-02
4.800	3.3204E+01	1.1256E+00	1.8618E+01	6.3365E-01	1.2370E+00	3.9102E-02
5.100	3.5659E+01	1.2063E+00	1.9706E+01	6.6943E-01	1.2431E+00	3.9292E-02
5.400	3.8104E+01	1.2865E+00	2.0789E+01	7.0498E-01	1.2477E+00	3.9436E-02
5.700	4.0539E+01	1.3662E+00	2.1868E+01	7.4031E-01	1.2513E+00	3.9549E-02

```
   6.000 4.2965E+01 1.4455E+00 2.2943E+01 7.7544E-01 1.2542E+00 3.9638E-02
   6.300 4.5381E+01 1.5243E+00 2.4014E+01 8.1036E-01 1.2565E+00 3.9711E-02
   6.600 4.7788E+01 1.6026E+00 2.5081E+01 8.4509E-01 1.2584E+00 3.9771E-02
   6.900 5.0185E+01 1.6806E+00 2.6144E+01 8.7963E-01 1.2601E+00 3.9824E-02
   7.200 5.2574E+01 1.7581E+00 2.7202E+01 9.1399E-01 1.2616E+00 3.9870E-02
   7.500 5.4954E+01 1.8352E+00 2.8257E+01 9.4817E-01 1.2629E+00 3.9911E-02
   7.800 5.7325E+01 1.9120E+00 2.9308E+01 9.8218E-01 1.2641E+00 3.9949E-02
   8.000 5.8901E+01 1.9629E+00 3.0006E+01 1.0048E+00 1.2649E+00 3.9973E-02
   8.300 6.1258E+01 2.0390E+00 3.0363E+01 1.0167E+00 1.2660E+00 4.0008E-02
   8.600 6.3606E+01 2.1148E+00 3.0719E+01 1.0286E+00 1.2671E+00 4.0041E-02
   8.900 6.5946E+01 2.1902E+00 3.1074E+01 1.0404E+00 1.2681E+00 4.0073E-02
   9.200 6.8277E+01 2.2652E+00 3.1427E+01 1.0522E+00 1.2691E+00 4.0105E-02
   9.500 7.0601E+01 2.3399E+00 3.1780E+01 1.0639E+00 1.2701E+00 4.0135E-02
   9.800 7.2917E+01 2.4143E+00 3.2131E+01 1.0755E+00 1.2711E+00 4.0166E-02
  10.100 7.5224E+01 2.4883E+00 3.2480E+01 1.0871E+00 1.2721E+00 4.0196E-02
  10.400 7.7524E+01 2.5620E+00 3.2829E+01 1.0986E+00 1.2730E+00 4.0225E-02
  24.000 1.7509E+02 5.6498E+00 4.7617E+01 1.5772E+00 1.3130E+00 4.1461E-02
  96.000 5.6471E+02 1.7694E+01 7.9010E+01 2.5529E+00 1.4086E+00 4.4388E-02
 720.000 1.6483E+03 5.0889E+01 1.0352E+02 3.3061E+00 1.4602E+00 4.5961E-02

########################################################################
                        Worst Two-Hour Doses
########################################################################

Exclusion Area Boundary
   Time    Whole Body     Thyroid        TEDE
   (hr)      (rem)         (rem)         (rem)
    2.0   3.8956E-02   1.6824E+01   5.6580E-01
```

Attachment C – Selected pages of RADTRAD Output File PB360MS205.o0

```
##########################################################################
    RADTRAD Version 3.03 (Spring 2001) run on  4/17/2007  at 11:06:56
 ##########################################################################

 ##########################################################################
                     File information
 ##########################################################################

 Plant file           = D:\D DRIVE\Radtrad 3.03\Input\PB\360 SCFH\PB360MS205.psf
 Inventory file       = d:\d drive\radtrad 3.03\defaults\pbs_def.txt
 Release file         = d:\d drive\radtrad 3.03\defaults\bwr_dba.rft
 Dose Conversion file = d:\d drive\radtrad 3.03\defaults\fgr11&12.inp

    #####    ####   #####    #  #     #  #####   #    #  #####
     #    #  #       #        #  ##    #  #    #  #    #    #
     #    #  #       #        #  # #   #  #    #  #    #    #
     #####    ####   ####     #  #  #  #  #####   #    #    #
     #            #  #        #  #   # #  #       #    #    #
     #            #  #        #  #    ##  #       #    #    #
     #        ####   #        #  #     #  #        ####     #

 Radtrad 3.03 4/15/2001
 PBAPS Units 2 & 3 MSIV Leakage AST Analysis - Total MSIV Leakage = 360 scfh & Maximum =
205 scfh, 40% Aerosol Settling Velocity, MCREV Started @ 30 Minute, CR Unfiltered
Inleakage = 500 cfm, and MCREV Charcoal Filtered Efficiency @ 89%, No Aerosol & Elemen
 Nuclide Inventory File:
 d:\d drive\radtrad 3.03\defaults\pbs_def.txt
 Plant Power Level:
  3.5280E+03
 Compartments:
   8
 Compartment 1:
 Drywell
   3
  1.5900E+05
   1
   0
   0
   1
   0
 Compartment 2:
 MSIV Failed Volume V1
   3
  3.9644E+02
   0
   0
   0
   0
   0
 Compartment 3:
 MSIV Failed Volume V13
   3
  9.1487E+02
   0
   0
   0
   0
   0
```

```
Compartment 4:
Intact Volume V2
  3
 3.7117E+02
  0
  0
  0
  0
  0
Compartment 5:
Intact Volume V23
  3
 9.3691E+02
  0
  0
  0
  0
  0
Compartment 6:
Void
  3
 1.0000E+05
  0
  0
  0
  0
  0
Compartment 7:
Environment
  2
 0.0000E+00
  0
  0
  0
  0
  0
Compartment 8:
Control Room
  1
 1.7600E+05
  0
  0
  0
  0
  0
Pathways:
 10
Pathway 1:
Drywell to MSIV Failed Volume V1
  1
  2
  2
Pathway 2:
MSIV Failed Volume V1 to MSIV Failed Volume V13
  2
  3
  2
Pathway 3:
MSIV Failed Volume V13 to Environment
  3
  7
```

```
  2
Pathway 4:
Drywell to Intact Volume V2
  1
  4
  2
Pathway 5:
Intact Volume V2 to Intact Volume V23
  4
  5
  2
Pathway 6:
Drywell to Void
  1
  6
  4
Pathway 7:
Filtered Intake to Control Room
  7
  8
  2
Pathway 8:
Unfiltered Inleakage to Control Room
  7
  8
  2
Pathway 9:
Control Room Exhaust to Environment
  8
  7
  2
Pathway 10:
Intact Volume V23 to  Environment
  5
  7
  2
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
d:\d drive\radtrad 3.03\defaults\fgr11&12.inp
d:\d drive\radtrad 3.03\defaults\bwr_dba.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:
  8
Compartment 1:
  0
  1
```

```
  1
  0.0000E+00
  0
  1
  0.0000E+00
  3
  0.0000E+00   3.3600E+00
  2.0000E+00   1.8600E+00
  3.8500E+00   0.0000E+00
  1
  0.0000E+00
  0
  0
  0
  3
  3
  1.0000E+01
  1
  1
  0.0000E+00   0.0000E+00
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 4:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 5:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 6:
```

```
   0
   1
   0
   0
   0
   0
   0
   0
   0
Compartment 7:
   1
   1
   0
   0
   0
   0
   0
   0
   0
Compartment 8:
   0
   1
   0
   0
   0
   0
   0
   0
   0
Pathways:
 10
Pathway 1:
   0
   0
   0
   0
   0
   1
   5
   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
   3.3300E-02   1.1020E+00   0.0000E+00   0.0000E+00   0.0000E+00
   2.0000E+00   6.1100E-01   0.0000E+00   0.0000E+00   0.0000E+00
   3.8000E+01   3.0600E-01   0.0000E+00   0.0000E+00   0.0000E+00
   7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
   0
   0
   0
   0
   0
   0
Pathway 2:
   0
   0
   0
   0
   0
   1
   5
   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
   3.3300E-02   3.4170E+00   0.0000E+00   0.0000E+00   0.0000E+00
   2.0000E+00   3.4170E+00   0.0000E+00   0.0000E+00   0.0000E+00
```

```
  3.8000E+01   1.7080E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  6
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   3.4170E+00   9.6480E+01   5.0000E+01   0.0000E+00
  2.0000E+00   3.4170E+00   9.6480E+01   5.0000E+01   0.0000E+00
  3.8000E+01   1.7080E+00   9.8210E+01   5.0000E+01   0.0000E+00
  9.6000E+01   1.7080E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  5
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   8.3300E-01   0.0000E+00   0.0000E+00   0.0000E+00
  2.0000E+00   4.6200E-01   0.0000E+00   0.0000E+00   0.0000E+00
  3.8000E+01   2.3100E-01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 5:
  0
  0
  0
  0
  0
  1
  6
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   2.5830E+00   9.3650E+01   5.0000E+01   0.0000E+00
  2.0000E+00   2.5830E+00   9.3650E+01   5.0000E+01   0.0000E+00
  3.8000E+01   1.2920E+00   9.6720E+01   5.0000E+01   0.0000E+00
  9.6000E+01   1.2920E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
```

```
  0
  0
  0
  0
  0
  0
Pathway 6:
  0
  0
  0
  0
  0
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   0.0000E+00
  3.3300E-02   7.0000E-01
  3.8000E+01   3.5000E-01
  7.2000E+02   0.0000E+00
  0
Pathway 7:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   2.7000E+03   9.8000E+01   8.9000E+01   8.9000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 8:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   5.0000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 9:
```

```
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   3.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 10:
  0
  0
  0
  0
  0
  1
  6
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   2.5830E+00   9.7380E+01   5.0000E+01   0.0000E+00
  2.0000E+00   2.5830E+00   9.7380E+01   5.0000E+01   0.0000E+00
  3.8000E+01   1.2920E+00   9.8670E+01   5.0000E-01   0.0000E+00
  9.6000E+01   1.2920E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  7
  1
  2
  0.0000E+00   4.2500E-04
  7.2000E+02   0.0000E+00
  1
  2
  0.0000E+00   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  7
  1
  6
  0.0000E+00   4.8100E-05
  2.0000E+00   2.0800E-05
  8.0000E+00   1.3700E-05
  2.4000E+01   5.4900E-06
  9.6000E+01   1.4900E-06
```

```
  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
  8
  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   1.1800E-03
  2.0000E+00   9.0800E-04
  8.0000E+00   4.1400E-04
  2.4000E+01   2.9000E-04
  9.6000E+01   2.2600E-04
  7.2000E+02   0.0000E+00
Simulation Parameters:
  6
  0.0000E+00   1.0000E-01
  2.0000E+00   5.0000E-01
  8.0000E+00   1.0000E+00
  2.4000E+01   2.0000E+00
  9.6000E+01   8.0000E+00
  7.2000E+02   0.0000E+00
Output Filename:
D:\D DRIVE\Radtrad 3.03\Inpu\PB\PB360MS205.o0
  1
  1
  1
  0
  0
End of Scenario File
```

```
##############################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/17/2007  at 11:06:56
##############################################################################

##############################################################################
                     Plant Description
##############################################################################

Number of Nuclides =  60

Inventory Power =   1.0000E+00 MWth
Plant Power Level =   3.5280E+03 MWth

Number of compartments    =   8

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: Drywell
Compartment volume =   1.5900E+05 (Cubic feet)
Compartment type is Normal
Removal devices within compartment:
     Spray(s)
     Deposition
Pathways into and out of compartment  1
   Exit Pathway Number    1: Drywell to MSIV Failed Volume V1
   Exit Pathway Number    4: Drywell to Intact Volume V2
   Exit Pathway Number    6: Drywell to Void

Compartment number  2
Name: MSIV Failed Volume V1
Compartment volume =   3.9644E+02 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  2
   Inlet Pathway Number   1: Drywell to MSIV Failed Volume V1
   Exit Pathway Number    2: MSIV Failed Volume V1 to MSIV Failed Volume V13

Compartment number  3
Name: MSIV Failed Volume V13
Compartment volume =   9.1487E+02 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  3
   Inlet Pathway Number   2: MSIV Failed Volume V1 to MSIV Failed Volume V13
   Exit Pathway Number    3: MSIV Failed Volume V13 to Environment

Compartment number  4
Name: Intact Volume V2
Compartment volume =   3.7117E+02 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  4
   Inlet Pathway Number   4: Drywell to Intact Volume V2
   Exit Pathway Number    5: Intact Volume V2 to Intact Volume V23

Compartment number  5
Name: Intact Volume V23
Compartment volume =   9.3691E+02 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  5
   Inlet Pathway Number   5: Intact Volume V2 to Intact Volume V23
```

```
   Exit Pathway Number   10: Intact Volume V23 to  Environment

Compartment number  6
Name: Void
Compartment volume =   1.0000E+05 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  6
   Inlet Pathway Number   6: Drywell to Void

Compartment number  7
Name: Environment
Compartment type is Environment
Pathways into and out of compartment  7
   Inlet Pathway Number   3: MSIV Failed Volume V13 to Environment
   Inlet Pathway Number   9: Control Room Exhaust to Environment
   Inlet Pathway Number  10: Intact Volume V23 to  Environment
   Exit Pathway Number    7: Filtered Intake to Control Room
   Exit Pathway Number    8: Unfiltered Inleakage to Control Room

Compartment number  8
Name: Control Room
Compartment volume =   1.7600E+05 (Cubic feet)
Compartment type is Control Room
Pathways into and out of compartment  8
   Inlet Pathway Number   7: Filtered Intake to Control Room
   Inlet Pathway Number   8: Unfiltered Inleakage to Control Room
   Exit Pathway Number    9: Control Room Exhaust to Environment

Total number of pathways =  10
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/17/2007  at 11:06:56
##########################################################################

##########################################################################
                    Scenario Description
##########################################################################

Radioactive Decay is enabled
Calculation of Daughters is enabled

Release Fractions and Timings
                GAP          EARLY IN-VESSEL   LATE RELEASE     RELEASE MASS
             0.500000 hr       1.5000 hrs        0.0000 hrs         (gm)
NOBLES       5.0000E-02        9.5000E-01        0.0000E+00       4.626E+03
IODINE       5.0000E-02        2.5000E-01        0.0000E+00       3.034E+02
CESIUM       5.0000E-02        2.0000E-01        0.0000E+00       5.100E+04
TELLURIUM    0.0000E+00        5.0000E-02        0.0000E+00       4.013E+01
STRONTIUM    0.0000E+00        2.0000E-02        0.0000E+00       1.713E+03
BARIUM       0.0000E+00        2.0000E-02        0.0000E+00       4.741E+01
RUTHENIUM    0.0000E+00        2.5000E-03        0.0000E+00       5.990E+01
CERIUM       0.0000E+00        5.0000E-04        0.0000E+00       5.915E+02
LANTHANUM    0.0000E+00        2.0000E-04        0.0000E+00       8.733E+00

Inventory Power =      3528. MWt

Nuclide  Group  Specific      half      Whole Body    Inhaled      Inhaled
 Name           Inventory     life        DCF        Thyroid     Effective
                (Ci/MWt)      (s)     (Sv-m3/Bq-s)   (Sv/Bq)      (Sv/Bq)
 Co-58     7   1.529E+02  6.117E+06   4.760E-14   8.720E-10   2.940E-09
 Co-60     7   1.830E+02  1.663E+08   1.260E-13   1.620E-08   5.910E-08
 Kr-85     1   3.946E+02  3.383E+08   1.190E-16   0.000E+00   0.000E+00
 Kr-85m    1   8.313E+03  1.613E+04   7.480E-15   0.000E+00   0.000E+00
 Kr-87     1   1.633E+04  4.578E+03   4.120E-14   0.000E+00   0.000E+00
 Kr-88     1   2.303E+04  1.022E+04   1.020E-13   0.000E+00   0.000E+00
 Rb-86     3   6.518E+01  1.612E+06   4.810E-15   1.330E-09   1.790E-09
 Sr-89     5   2.798E+04  4.363E+06   7.730E-17   7.960E-12   1.120E-08
 Sr-90     5   3.178E+03  9.190E+08   7.530E-18   2.690E-10   3.510E-07
 Sr-91     5   3.801E+04  3.420E+04   4.924E-14   9.930E-12   4.547E-10
 Sr-92     5   4.017E+04  9.756E+03   6.790E-14   3.920E-12   2.180E-10
 Y-90      9   3.272E+03  2.304E+05   1.900E-16   5.170E-13   2.280E-09
 Y-91      9   3.448E+04  5.055E+06   2.600E-16   8.500E-12   1.320E-08
 Y-92      9   4.029E+04  1.274E+04   1.300E-14   1.050E-12   2.110E-10
 Y-93      9   4.526E+04  3.636E+04   4.800E-15   9.260E-13   5.820E-10
 Zr-95     9   4.489E+04  5.528E+06   3.600E-14   1.440E-09   6.390E-09
 Zr-97     9   4.657E+04  6.084E+04   4.432E-14   2.315E-11   1.171E-09
 Nb-95     9   4.512E+04  3.037E+06   3.740E-14   3.580E-10   1.570E-09
 Mo-99     7   5.078E+04  2.376E+05   7.280E-15   1.520E-11   1.070E-09
 Tc-99m    7   4.447E+04  2.167E+04   5.890E-15   5.010E-11   8.800E-12
 Ru-103    7   4.202E+04  3.394E+06   2.251E-14   2.570E-10   2.421E-09
 Ru-105    7   2.908E+04  1.598E+04   3.810E-14   4.150E-12   1.230E-10
 Ru-106    7   1.730E+04  3.181E+07   1.040E-14   1.720E-09   1.290E-07
 Rh-105    7   2.752E+04  1.273E+05   3.720E-15   2.880E-12   2.580E-10
 Sb-127    4   2.896E+03  3.326E+05   3.330E-14   6.150E-11   1.630E-09
 Sb-129    4   8.638E+03  1.555E+04   7.140E-14   9.720E-12   1.740E-10
 Te-127    4   2.873E+03  3.366E+04   2.420E-16   1.840E-12   8.600E-11
 Te-127m   4   3.855E+02  9.418E+06   1.470E-16   9.660E-11   5.810E-09
 Te-129    4   8.501E+03  4.176E+03   2.750E-15   5.090E-13   2.090E-11
 Te-129m   4   1.267E+03  2.903E+06   3.337E-15   1.563E-10   6.484E-09
 Te-131m   4   3.869E+03  1.080E+05   7.463E-14   3.669E-08   1.758E-09
```

Te-132	4	3.821E+04	2.815E+05	1.030E-14	6.280E-08	2.550E-09
I-131	2	2.687E+04	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	3.881E+04	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	5.556E+04	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	6.165E+04	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	5.192E+04	2.380E+04	8.294E-14	8.460E-09	3.320E-10
Xe-133	1	5.491E+04	4.532E+05	1.560E-15	0.000E+00	0.000E+00
Xe-135	1	2.228E+04	3.272E+04	1.190E-14	0.000E+00	0.000E+00
Cs-134	3	7.280E+03	6.507E+07	7.570E-14	1.110E-08	1.250E-08
Cs-136	3	2.027E+03	1.132E+06	1.060E-13	1.730E-09	1.980E-09
Cs-137	3	4.538E+03	9.467E+08	2.725E-14	7.930E-09	8.630E-09
Ba-139	6	5.084E+04	4.962E+03	2.170E-15	2.400E-12	4.640E-11
Ba-140	6	4.896E+04	1.101E+06	8.580E-15	2.560E-10	1.010E-09
La-140	9	5.019E+04	1.450E+05	1.170E-13	6.870E-11	1.310E-09
La-141	9	4.640E+04	1.415E+04	2.390E-15	9.400E-12	1.570E-10
La-142	9	4.532E+04	5.550E+03	1.440E-13	8.740E-12	6.840E-11
Ce-141	8	4.492E+04	2.808E+06	3.430E-15	2.550E-11	2.420E-09
Ce-143	8	4.427E+04	1.188E+05	1.290E-14	6.230E-12	9.160E-10
Ce-144	8	3.596E+04	2.456E+07	2.773E-15	2.920E-10	1.010E-07
Pr-143	9	4.293E+04	1.172E+06	2.100E-17	1.680E-18	2.190E-09
Nd-147	9	1.838E+04	9.487E+05	6.190E-15	1.820E-11	1.850E-09
Np-239	8	5.397E+05	2.035E+05	7.690E-15	7.620E-12	6.780E-10
Pu-238	8	1.796E+02	2.769E+09	4.880E-18	3.860E-10	7.790E-05
Pu-239	8	1.200E+01	7.594E+11	4.240E-18	3.750E-10	8.330E-05
Pu-240	8	1.288E+01	2.063E+11	4.750E-18	3.760E-10	8.330E-05
Pu-241	8	6.182E+03	4.544E+08	7.250E-20	9.150E-12	1.340E-06
Am-241	9	9.528E+00	1.364E+10	8.180E-16	1.600E-09	1.200E-04
Cm-242	9	2.388E+03	1.407E+07	5.690E-18	9.410E-10	4.670E-06
Cm-244	9	2.602E+02	5.715E+08	4.910E-18	1.010E-09	6.700E-05

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
Sr-90	Y-90	1.00	none	0.00	none	0.00
Sr-91	Y-91m	0.58	Y-91	0.42	none	0.00
Sr-92	Y-92	1.00	none	0.00	none	0.00
Y-93	Zr-93	1.00	none	0.00	none	0.00
Zr-95	Nb-95m	0.01	Nb-95	0.99	none	0.00
Zr-97	Nb-97m	0.95	Nb-97	0.05	none	0.00
Mo-99	Tc-99m	0.88	Tc-99	0.12	none	0.00
Tc-99m	Tc-99	1.00	none	0.00	none	0.00
Ru-103	Rh-103m	1.00	none	0.00	none	0.00
Ru-105	Rh-105	1.00	none	0.00	none	0.00
Ru-106	Rh-106	1.00	none	0.00	none	0.00
Sb-127	Te-127m	0.18	Te-127	0.82	none	0.00
Sb-129	Te-129m	0.22	Te-129	0.77	none	0.00
Te-127m	Te-127	0.98	none	0.00	none	0.00
Te-129	I-129	1.00	none	0.00	none	0.00
Te-129m	Te-129	0.65	I-129	0.35	none	0.00
Te-131m	Te-131	0.22	I-131	0.78	none	0.00
Te-132	I-132	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
Cs-137	Ba-137m	0.95	none	0.00	none	0.00
Ba-140	La-140	1.00	none	0.00	none	0.00
La-141	Ce-141	1.00	none	0.00	none	0.00
Ce-143	Pr-143	1.00	none	0.00	none	0.00
Ce-144	Pr-144m	0.02	Pr-144	0.98	none	0.00

Nd-147	Pm-147	1.00	none	0.00	none	0.00
Np-239	Pu-239	1.00	none	0.00	none	0.00
Pu-238	U-234	1.00	none	0.00	none	0.00
Pu-239	U-235	1.00	none	0.00	none	0.00
Pu-240	U-236	1.00	none	0.00	none	0.00
Pu-241	U-237	0.00	Am-241	1.00	none	0.00
Am-241	Np-237	1.00	none	0.00	none	0.00
Cm-242	Pu-238	1.00	none	0.00	none	0.00
Cm-244	Pu-240	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: Drywell

Sprays: Elemental Removal Data

Time (hr)	Removal Coef. (hr^-1)
0.0000E+00	3.3600E+00
2.0000E+00	1.8600E+00
3.8500E+00	0.0000E+00

Natural Deposition (Powers' model): Aerosol data
Reactor type: 3
Percentile = 10 (%)

Natural Deposition: Elemental Removal Data

Time (hr)	Removal Coef. (hr^-1)
0.0000E+00	0.0000E+00

Compartment number 2: MSIV Failed Volume V1

Compartment number 3: MSIV Failed Volume V13

Compartment number 4: Intact Volume V2

Compartment number 5: Intact Volume V23

Compartment number 6: Void

Compartment number 7: Environment

Compartment number 8: Control Room

PATHWAY DATA

Pathway number 1: Drywell to MSIV Failed Volume V1

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	1.1020E+00	0.0000E+00	0.0000E+00	0.0000E+00
2.0000E+00	6.1100E-01	0.0000E+00	0.0000E+00	0.0000E+00
3.8000E+01	3.0600E-01	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 2: MSIV Failed Volume V1 to MSIV Failed Volume V13

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	3.4170E+00	0.0000E+00	0.0000E+00	0.0000E+00
2.0000E+00	3.4170E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.8000E+01	1.7080E+00	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: MSIV Failed Volume V13 to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	3.4170E+00	9.6480E+01	5.0000E+01	0.0000E+00
2.0000E+00	3.4170E+00	9.6480E+01	5.0000E+01	0.0000E+00
3.8000E+01	1.7080E+00	9.8210E+01	5.0000E+01	0.0000E+00
9.6000E+01	1.7080E+00	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 4: Drywell to Intact Volume V2

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	8.3300E-01	0.0000E+00	0.0000E+00	0.0000E+00
2.0000E+00	4.6200E-01	0.0000E+00	0.0000E+00	0.0000E+00
3.8000E+01	2.3100E-01	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 5: Intact Volume V2 to Intact Volume V23

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	2.5830E+00	9.3650E+01	5.0000E+01	0.0000E+00
2.0000E+00	2.5830E+00	9.3650E+01	5.0000E+01	0.0000E+00
3.8000E+01	1.2920E+00	9.6720E+01	5.0000E+01	0.0000E+00
9.6000E+01	1.2920E+00	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 6: Drywell to Void

Convection Data

Time (hr)	Flow Rate (% / day)
0.0000E+00	0.0000E+00
3.3300E-02	7.0000E-01
3.8000E+01	3.5000E-01
7.2000E+02	0.0000E+00

Pathway number 7: Filtered Intake to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	2.7000E+03	9.8000E+01	8.9000E+01	8.9000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 8: Unfiltered Inleakage to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	5.0000E+02	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 9: Control Room Exhaust to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	3.2000E+03	1.0000E+02	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 10: Intact Volume V23 to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	2.5830E+00	9.7380E+01	5.0000E+01	0.0000E+00
2.0000E+00	2.5830E+00	9.7380E+01	5.0000E+01	0.0000E+00
3.8000E+01	1.2920E+00	9.8670E+01	5.0000E-01	0.0000E+00
9.6000E+01	1.2920E+00	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

LOCATION DATA

Location Exclusion Area Boundary is in compartment 7

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	4.2500E-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 Low Population Zone is in compartment 7

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	4.8100E-05
2.0000E+00	2.0800E-05

```
        8.0000E+00          1.3700E-05
        2.4000E+01          5.4900E-06
        9.6000E+01          1.4900E-06
        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   8

      Location X/Q Data
       Time (hr)          X/Q (s * m^-3)
        0.0000E+00          1.1800E-03
        2.0000E+00          9.0800E-04
        8.0000E+00          4.1400E-04
        2.4000E+01          2.9000E-04
        9.6000E+01          2.2600E-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       1.0000E-01
       2.0000E+00       5.0000E-01
       8.0000E+00       1.0000E+00
       2.4000E+01       2.0000E+00
       9.6000E+01       8.0000E+00
       7.2000E+02       0.0000E+00
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/17/2007  at 11:06:56
##########################################################################


     ####    #     #  #####  #####    #     #  #####
    #    #   #     #    #    #    #   #     #    #
    #    #   #     #    #    #    #   #     #    #
    #    #   #     #    #    #####    #     #    #
    #    #   #     #    #    #        #     #    #
    #    #   #     #    #    #        #     #    #
     ####     ####      #    #         ####      #


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

Exclusion Area Boundary Doses:

Time (h) =    0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   0.0000E+00  0.0000E+00  0.0000E+00

Low Population Zone Doses:

Time (h) =    0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   0.0000E+00  0.0000E+00  0.0000E+00

Control Room Doses:

Time (h) =    0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   0.0000E+00  0.0000E+00  0.0000E+00

Environment Integral Nuclide Release:

Time (h) =    0.0333       Ci           kg          Atoms          Bq

Environment Transport Group Inventory:

                          Total      Release
Time (h) =    0.0333     Release     Rate/s
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) I-131 (Thyroid)            0.0000E+00
Dose Effective (Ci) I-131 (ICRP2 Thyroid)      0.0000E+00
Total I  (Ci)                                  0.0000E+00

MSIV Failed Volume V13 to Environment Transport Group Inventory:

                          Pathway
Time (h) =    0.0333     Filtered   Transported
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
```

Filtered Intake to Control Room Transport Group Inventory:

Time (h) = 0.0333	Pathway Filtered	Transported
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

Unfiltered Inleakage to Control Room Transport Group Inventory:

Time (h) = 0.0333	Pathway Filtered	Transported
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

Control Room Exhaust to Environment Transport Group Inventory:

Time (h) = 0.0333	Pathway Filtered	Transported
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

Intact Volume V23 to Environment Transport Group Inventory:

Time (h) = 0.0333	Pathway Filtered	Transported
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

Exclusion Area Boundary Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.4830E-04	1.3673E-02	8.7650E-04
Accumulated dose (rem)	3.4830E-04	1.3673E-02	8.7650E-04

Low Population Zone Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.9419E-05	1.5474E-03	9.9199E-05
Accumulated dose (rem)	3.9419E-05	1.5474E-03	9.9199E-05

Control Room Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.0855E-05	1.6432E-02	6.5480E-04
Accumulated dose (rem)	2.0855E-05	1.6432E-02	6.5480E-04

Environment Integral Nuclide Release:

Time (h) = 0.5000	Ci	kg	Atoms	Bq
Kr-85	2.3113E-02	5.8911E-08	4.1737E+17	8.5517E+08
Kr-85m	4.5463E-01	5.5244E-11	3.9140E+14	1.6821E+10
Kr-87	7.5167E-01	2.6537E-11	1.8369E+14	2.7812E+10

Kr-88	1.2107E+00	9.6551E-11	6.6073E+14	4.4795E+10
Rb-86	8.7664E-05	1.0774E-12	7.5444E+12	3.2436E+06
I-131	6.0161E-02	4.8527E-10	2.2308E+15	2.2260E+09
I-132	7.7879E-02	7.5449E-12	3.4421E+13	2.8815E+09
I-133	1.2277E-01	1.0838E-10	4.9073E+14	4.5426E+09
I-134	9.7712E-02	3.6628E-12	1.6461E+13	3.6153E+09
I-135	1.1117E-01	3.1654E-11	1.4121E+14	4.1131E+09
Xe-133	3.2136E+00	1.7168E-08	7.7737E+16	1.1890E+11
Xe-135	1.3195E+00	5.1669E-10	2.3049E+15	4.8821E+10
Cs-134	9.7978E-03	7.5727E-09	3.4033E+16	3.6252E+08
Cs-136	2.7254E-03	3.7186E-11	1.6466E+14	1.0084E+08
Cs-137	6.1076E-03	7.0217E-08	3.0865E+17	2.2598E+08

Environment Transport Group Inventory:

Time (h) = 0.5000	Total Release	Release Rate/s	
Noble gases (atoms)	4.9865E+17	2.7703E+14	
Elemental I (atoms)	1.1383E+15	6.3237E+11	
Organic I (atoms)	1.1415E+14	6.3415E+10	
Aerosols (kg)	7.8191E-08	4.3439E-11	
Dose Effective (Ci) I-131 (Thyroid)			8.4377E-02
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.0670E-01
Total I (Ci)			4.6969E-01

MSIV Failed Volume V13 to Environment Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	3.4290E+17
Elemental I (atoms)	9.2926E+14	9.2926E+14
Organic I (atoms)	0.0000E+00	7.8648E+13
Aerosols (kg)	2.1014E-06	7.6670E-08

Filtered Intake to Control Room Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.1383E+15
Elemental I (atoms)	0.0000E+00	1.1753E+13
Organic I (atoms)	0.0000E+00	1.1786E+12
Aerosols (kg)	0.0000E+00	8.0558E-10

Unfiltered Inleakage to Control Room Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
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

Control Room Exhaust to Environment Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	2.0896E+15	0.0000E+00
Elemental I (atoms)	4.9328E+12	0.0000E+00
Organic I (atoms)	4.7918E+11	0.0000E+00
Aerosols (kg)	3.3030E-10	0.0000E+00

Intact Volume V23 to Environment Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.5685E+17
Elemental I (atoms)	2.1270E+14	2.1270E+14
Organic I (atoms)	0.0000E+00	3.5979E+13
Aerosols (kg)	6.1625E-08	1.6580E-09

Exclusion Area Boundary Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.3486E-01	2.6968E+00	2.5977E-01
Accumulated dose (rem)	1.3521E-01	2.7105E+00	2.6064E-01

Low Population Zone Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5263E-02	3.0521E-01	2.9400E-02
Accumulated dose (rem)	1.5302E-02	3.0676E-01	2.9499E-02

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.1914E-03	5.8587E-01	3.0062E-02
Accumulated dose (rem)	5.2122E-03	6.0230E-01	3.0717E-02

Environment Integral Nuclide Release:

Time (h) = 2.0000	Ci	kg	Atoms	Bq
Co-58	2.3700E-04	7.4533E-12	7.7388E+13	8.7690E+06
Co-60	2.8385E-04	2.5111E-10	2.5203E+15	1.0502E+07
Kr-85	1.3926E+01	3.5495E-05	2.5148E+20	5.1526E+11
Kr-85m	2.2575E+02	2.7432E-08	1.9435E+17	8.3529E+12
Kr-87	2.3118E+02	8.1613E-09	5.6493E+16	8.5535E+12
Kr-88	5.3812E+02	4.2915E-08	2.9368E+17	1.9910E+13
Rb-86	1.8369E-02	2.2575E-10	1.5808E+15	6.7964E+08
Sr-89	3.4686E-01	1.1939E-08	8.0786E+16	1.2834E+10
Sr-90	3.9436E-02	2.8910E-07	1.9345E+18	1.4591E+09
Sr-91	4.1574E-01	1.1469E-10	7.5898E+14	1.5383E+10
Sr-92	3.2075E-01	2.5519E-11	1.6704E+14	1.1868E+10
Y-90	8.1030E-04	1.4894E-12	9.9656E+12	2.9981E+07
Y-91	4.3615E-03	1.7785E-10	1.1770E+15	1.6138E+08
Y-92	6.6243E-02	6.8843E-12	4.5063E+13	2.4510E+09
Y-93	4.9876E-03	1.4950E-12	9.6804E+12	1.8454E+08
Zr-95	5.5661E-03	2.5909E-10	1.6424E+15	2.0594E+08
Zr-97	5.3829E-03	2.8158E-12	1.7482E+13	1.9917E+08
Nb-95	5.5988E-03	1.4318E-10	9.0764E+14	2.0716E+08
Mo-99	7.7347E-02	1.6127E-10	9.8099E+14	2.8618E+09
Tc-99m	6.8990E-02	1.3120E-11	7.9810E+13	2.5526E+09
Ru-103	6.5095E-02	2.0170E-09	1.1793E+16	2.4085E+09
Ru-105	3.4447E-02	5.1245E-12	2.9391E+13	1.2745E+09
Ru-106	2.6831E-02	8.0198E-09	4.5563E+16	9.9274E+08
Rh-105	4.2578E-02	5.0445E-11	2.8932E+14	1.5754E+09
Sb-127	8.8682E-02	3.3208E-10	1.5747E+15	3.2812E+09
Sb-129	2.0312E-01	3.6121E-11	1.6863E+14	7.5156E+09
Te-127	8.8655E-02	3.3593E-11	1.5929E+14	3.2802E+09
Te-127m	1.1961E-02	1.2681E-09	6.0129E+15	4.4256E+08
Te-129	2.2741E-01	1.0859E-11	5.0693E+13	8.4142E+09
Te-129m	3.9323E-02	1.3053E-09	6.0937E+15	1.4550E+09
Te-131m	1.1532E-01	1.4462E-10	6.6482E+14	4.2668E+09

Te-132	1.1673E+00	3.8450E-09	1.7542E+16	4.3191E+10
I-131	1.1905E+01	9.6030E-08	4.4145E+17	4.4049E+11
I-132	1.2674E+01	1.2278E-09	5.6017E+15	4.6893E+11
I-133	2.3448E+01	2.0699E-08	9.3724E+16	8.6758E+11
I-134	7.8625E+00	2.9473E-10	1.3246E+15	2.9091E+11
I-135	1.9510E+01	5.5555E-09	2.4782E+16	7.2187E+11
Xe-133	1.9298E+03	1.0310E-05	4.6681E+19	7.1402E+13
Xe-135	7.9195E+02	3.1012E-07	1.3834E+18	2.9302E+13
Cs-134	2.0567E+00	1.5896E-06	7.1439E+18	7.6097E+10
Cs-136	5.7063E-01	7.7858E-09	3.4476E+16	2.1113E+10
Cs-137	1.2821E+00	1.4740E-05	6.4793E+19	4.7438E+10
Ba-139	2.6627E-01	1.6279E-11	7.0526E+13	9.8519E+09
Ba-140	6.0516E-01	8.2663E-09	3.5558E+16	2.2391E+10
La-140	1.6068E-02	2.8909E-11	1.2435E+14	5.9453E+08
La-141	4.2464E-03	7.5087E-13	3.2070E+12	1.5712E+08
La-142	2.5986E-03	1.8153E-13	7.6984E+11	9.6147E+07
Ce-141	1.3927E-02	4.8878E-10	2.0876E+15	5.1530E+08
Ce-143	1.3243E-02	1.9942E-11	8.3982E+13	4.9000E+08
Ce-144	1.1154E-02	3.4970E-09	1.4625E+16	4.1269E+08
Pr-143	5.3439E-03	7.9358E-11	3.3420E+14	1.9772E+08
Nd-147	2.2704E-03	2.8065E-11	1.1497E+14	8.4005E+07
Np-239	1.6391E-01	7.0654E-10	1.7803E+15	6.0647E+09
Pu-238	5.5717E-05	3.2546E-09	8.2351E+15	2.0615E+06
Pu-239	3.7236E-06	5.9908E-08	1.5095E+17	1.3777E+05
Pu-240	3.9957E-06	1.7535E-08	4.4000E+16	1.4784E+05
Pu-241	1.9178E-03	1.8617E-08	4.6521E+16	7.0958E+07
Am-241	1.1828E-06	3.4461E-10	8.6113E+14	4.3763E+04
Cm-242	2.9624E-04	8.9381E-11	2.2242E+14	1.0961E+07
Cm-244	3.2288E-05	3.9910E-10	9.8501E+14	1.1947E+06

Environment Transport Group Inventory:

Time (h) = 2.0000	Total Release	Release Rate/s	
Noble gases (atoms)	3.0009E+20	4.1679E+16	
Elemental I (atoms)	1.5855E+17	2.2021E+13	
Organic I (atoms)	2.9439E+16	4.0888E+12	
Aerosols (kg)	1.6853E-05	2.3407E-09	
Dose Effective (Ci) I-131 (Thyroid)			1.6456E+01
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			2.0387E+01
Total I (Ci)			7.5400E+01

MSIV Failed Volume V13 to Environment Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.0372E+20
Elemental I (atoms)	1.2811E+17	1.2811E+17
Organic I (atoms)	0.0000E+00	1.9975E+16
Aerosols (kg)	4.5175E-04	1.6482E-05

Filtered Intake to Control Room Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	4.5568E+17
Elemental I (atoms)	2.1102E+14	3.7834E+13
Organic I (atoms)	3.9313E+13	6.0374E+12
Aerosols (kg)	2.4719E-08	1.3100E-09

Unfiltered Inleakage to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.3434E+16
Elemental I (atoms)	0.0000E+00	4.3908E+13
Organic I (atoms)	0.0000E+00	8.1799E+12
Aerosols (kg)	0.0000E+00	4.6709E-09

Control Room Exhaust to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	1.5648E+17	0.0000E+00
Elemental I (atoms)	3.4378E+13	0.0000E+00
Organic I (atoms)	5.1151E+12	0.0000E+00
Aerosols (kg)	2.3802E-09	0.0000E+00

Intact Volume V23 to Environment Transport Group Inventory:

	Pathway	
Time (h) = 2.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.6436E+19
Elemental I (atoms)	3.0721E+16	3.0721E+16
Organic I (atoms)	0.0000E+00	9.5166E+15
Aerosols (kg)	1.3820E-05	3.7182E-07

Exclusion Area Boundary Doses:

Time (h) = 3.8500	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0858E+00	1.8799E+01	2.0446E+00
Accumulated dose (rem)	1.2210E+00	2.1509E+01	2.3053E+00

Low Population Zone Doses:

Time (h) = 3.8500	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.3140E-02	9.2004E-01	1.0007E-01
Accumulated dose (rem)	6.8442E-02	1.2268E+00	1.2956E-01

Control Room Doses:

Time (h) = 3.8500	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.1655E-02	4.8413E+00	2.9419E-01
Accumulated dose (rem)	6.6867E-02	5.4436E+00	3.2490E-01

Environment Integral Nuclide Release:

Time (h) = 3.8500	Ci	kg	Atoms	Bq
Co-58	2.9018E-03	9.1256E-11	9.4752E+14	1.0737E+08
Co-60	3.4771E-03	3.0761E-09	3.0874E+16	1.2865E+08
Kr-85	1.7442E+02	4.4456E-04	3.1497E+21	6.4535E+12
Kr-85m	2.3012E+03	2.7963E-07	1.9811E+18	8.5144E+13
Kr-87	1.4543E+03	5.1343E-08	3.5539E+17	5.3810E+13
Kr-88	4.8878E+03	3.8980E-07	2.6676E+18	1.8085E+14
Rb-86	1.5001E-01	1.8437E-09	1.2910E+16	5.5505E+09
Sr-89	4.2460E+00	1.4615E-07	9.8892E+17	1.5710E+11
Sr-90	4.8309E-01	3.5416E-06	2.3698E+19	1.7874E+10
Sr-91	4.6388E+00	1.2797E-09	8.4686E+15	1.7164E+11
Sr-92	2.8543E+00	2.2708E-10	1.4864E+15	1.0561E+11
Y-90	1.5390E-02	2.8287E-11	1.8927E+14	5.6942E+08
Y-91	5.4447E-02	2.2201E-09	1.4692E+16	2.0145E+09
Y-92	1.2138E+00	1.2615E-10	8.2575E+14	4.4912E+10

Y-93	5.5958E-02	1.6772E-11	1.0861E+14	2.0705E+09
Zr-95	6.8146E-02	3.1721E-09	2.0108E+16	2.5214E+09
Zr-97	6.2556E-02	3.2723E-11	2.0316E+14	2.3146E+09
Nb-95	6.8586E-02	1.7540E-09	1.1119E+16	2.5377E+09
Mo-99	9.3476E-01	1.9490E-09	1.1856E+16	3.4586E+10
Tc-99m	8.4331E-01	1.6038E-10	9.7558E+14	3.1202E+10
Ru-103	7.9668E-01	2.4685E-08	1.4433E+17	2.9477E+10
Ru-105	3.4628E-01	5.1515E-11	2.9546E+14	1.2813E+10
Ru-106	3.2865E-01	9.8234E-08	5.5810E+17	1.2160E+10
Rh-105	5.1795E-01	6.1365E-10	3.5195E+15	1.9164E+10
Sb-127	1.0759E+00	4.0288E-09	1.9104E+16	3.9808E+10
Sb-129	2.0310E+00	3.6116E-10	1.6860E+15	7.5146E+10
Te-127	1.0812E+00	4.0970E-10	1.9427E+15	4.0006E+10
Te-127m	1.4654E-01	1.5536E-08	7.3668E+16	5.4221E+09
Te-129	2.4095E+00	1.1505E-10	5.3711E+14	8.9152E+10
Te-129m	4.8173E-01	1.5991E-08	7.4650E+16	1.7824E+10
Te-131m	1.3713E+00	1.7197E-09	7.9054E+15	5.0737E+10
Te-132	1.4137E+01	4.6566E-08	2.1245E+17	5.2308E+11
I-131	9.5021E+01	7.6646E-07	3.5234E+18	3.5158E+12
I-132	8.2390E+01	7.9819E-09	3.6415E+16	3.0484E+12
I-133	1.8008E+02	1.5896E-07	7.1977E+17	6.6628E+12
I-134	2.5735E+01	9.6470E-10	4.3355E+15	9.5220E+11
I-135	1.3681E+02	3.8958E-08	1.7378E+17	5.0621E+12
Xe-133	2.4040E+04	1.2843E-04	5.8154E+20	8.8949E+14
Xe-135	9.4122E+03	3.6857E-06	1.6441E+19	3.4825E+14
Cs-134	1.6830E+01	1.3008E-05	5.8458E+19	6.2269E+11
Cs-136	4.6563E+00	6.3531E-08	2.8132E+17	1.7228E+11
Cs-137	1.0492E+01	1.2062E-04	5.3022E+20	3.8820E+11
Ba-139	1.7783E+00	1.0872E-10	4.7102E+14	6.5798E+10
Ba-140	7.3917E+00	1.0097E-07	4.3432E+17	2.7349E+11
La-140	3.2840E-01	5.9083E-10	2.5415E+15	1.2151E+10
La-141	4.1631E-02	7.3613E-12	3.1440E+13	1.5403E+09
La-142	1.8428E-02	1.2873E-12	5.4593E+12	6.8182E+08
Ce-141	1.7048E-01	5.9832E-09	2.5554E+16	6.3078E+09
Ce-143	1.5790E-01	2.3777E-10	1.0013E+15	5.8423E+09
Ce-144	1.3662E-01	4.2834E-08	1.7913E+17	5.0549E+09
Pr-143	6.5677E-02	9.7532E-10	4.1073E+15	2.4300E+09
Nd-147	2.7719E-02	3.4264E-10	1.4037E+15	1.0256E+09
Np-239	1.9764E+00	8.5194E-09	2.1467E+16	7.3128E+10
Pu-238	6.8255E-04	3.9869E-08	1.0088E+17	2.5254E+07
Pu-239	4.5624E-05	7.3402E-07	1.8495E+18	1.6881E+06
Pu-240	4.8948E-05	2.1481E-07	5.3901E+17	1.8111E+06
Pu-241	2.3493E-02	2.2806E-07	5.6988E+17	8.6925E+08
Am-241	1.4494E-05	4.2231E-09	1.0553E+16	5.3629E+05
Cm-242	3.6281E-03	1.0947E-09	2.7241E+15	1.3424E+08
Cm-244	3.9553E-04	4.8890E-09	1.2067E+16	1.4635E+07

Environment Transport Group Inventory:

Time (h) = 3.8500	Total Release	Release Rate/s	
Noble gases (atoms)	3.7527E+21	2.7075E+17	
Elemental I (atoms)	9.8109E+17	7.0786E+13	
Organic I (atoms)	2.8617E+17	2.0647E+13	
Aerosols (kg)	1.3969E-04	1.0079E-08	
Dose Effective (Ci) I-131 (Thyroid)			1.2947E+02
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.5794E+02
Total I (Ci)			5.2004E+02

MSIV Failed Volume V13 to Environment Transport Group Inventory:

	Pathway	
Time (h) = 3.8500	Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.5000E+21
Elemental I (atoms)	7.8235E+17	7.8235E+17
Organic I (atoms)	0.0000E+00	1.9057E+17
Aerosols (kg)	3.7391E-03	1.3642E-04

Filtered Intake to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 3.8500	Filtered	Transported
Noble gases (atoms)	0.0000E+00	4.4510E+18
Elemental I (atoms)	1.0593E+15	1.4267E+14
Organic I (atoms)	3.0406E+14	3.8759E+13
Aerosols (kg)	1.6400E-07	4.1525E-09

Unfiltered Inleakage to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 3.8500	Filtered	Transported
Noble gases (atoms)	0.0000E+00	8.2330E+17
Elemental I (atoms)	0.0000E+00	2.2041E+14
Organic I (atoms)	0.0000E+00	6.3267E+13
Aerosols (kg)	0.0000E+00	3.0990E-08

Control Room Exhaust to Environment Transport Group Inventory:

	Pathway	
Time (h) = 3.8500	Filtered	Transported
Noble gases (atoms)	2.7709E+18	0.0000E+00
Elemental I (atoms)	2.2219E+14	0.0000E+00
Organic I (atoms)	5.5788E+13	0.0000E+00
Aerosols (kg)	2.0384E-08	0.0000E+00

Intact Volume V23 to Environment Transport Group Inventory:

	Pathway	
Time (h) = 3.8500	Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2532E+21
Elemental I (atoms)	2.0023E+17	2.0023E+17
Organic I (atoms)	0.0000E+00	9.6015E+16
Aerosols (kg)	1.2157E-04	3.2709E-06

Exclusion Area Boundary Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.8863E+00	5.9650E+01	6.9825E+00
Accumulated dose (rem)	5.1073E+00	8.1160E+01	9.2878E+00

Low Population Zone Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.9020E-01	2.9194E+00	3.4173E-01
Accumulated dose (rem)	2.5864E-01	4.1462E+00	4.7130E-01

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.2645E-01	2.3302E+01	1.4861E+00
Accumulated dose (rem)	3.9331E-01	2.8746E+01	1.8110E+00

Environment Integral Nuclide Release:

Time (h) = 8.0000	Ci	kg	Atoms	Bq
Co-58	1.2118E-02	3.8110E-10	3.9570E+15	4.4837E+08
Co-60	1.4534E-02	1.2857E-08	1.2905E+17	5.3774E+08
Kr-85	1.2402E+03	3.1610E-03	2.2395E+22	4.5886E+13
Kr-85m	1.0967E+04	1.3326E-06	9.4414E+18	4.0577E+14
Kr-87	3.2370E+03	1.1428E-07	7.9103E+17	1.1977E+14
Kr-88	1.8951E+04	1.5114E-06	1.0343E+19	7.0120E+14
Rb-86	5.6454E-01	6.9382E-09	4.8584E+16	2.0888E+10
Sr-89	1.7725E+01	6.1012E-07	4.1284E+18	6.5584E+11
Sr-90	2.0193E+00	1.4803E-05	9.9053E+19	7.4713E+10
Sr-91	1.6610E+01	4.5822E-09	3.0324E+16	6.1459E+11
Sr-92	7.3182E+00	5.8222E-10	3.8111E+15	2.7077E+11
Y-90	1.0855E-01	1.9951E-10	1.3350E+15	4.0162E+09
Y-91	2.3486E-01	9.5767E-09	6.3376E+16	8.6897E+09
Y-92	5.8847E+00	6.1157E-10	4.0032E+15	2.1774E+11
Y-93	2.0215E-01	6.0592E-11	3.9236E+14	7.4797E+09
Zr-95	2.8456E-01	1.3246E-08	8.3966E+16	1.0529E+10
Zr-97	2.3934E-01	1.2520E-10	7.7727E+14	8.8554E+09
Nb-95	2.8667E-01	7.3312E-09	4.6473E+16	1.0607E+10
Mo-99	3.8183E+00	7.9611E-09	4.8427E+16	1.4128E+11
Tc-99m	3.4978E+00	6.6520E-10	4.0464E+15	1.2942E+11
Ru-103	3.3246E+00	1.0301E-07	6.0229E+17	1.2301E+11
Ru-105	1.0552E+00	1.5697E-10	9.0029E+14	3.9041E+10
Ru-106	1.3735E+00	4.1054E-07	2.3324E+18	5.0819E+10
Rh-105	2.1220E+00	2.5141E-09	1.4419E+16	7.8514E+10
Sb-127	4.4237E+00	1.6565E-08	7.8548E+16	1.6368E+11
Sb-129	6.1394E+00	1.0918E-09	5.0967E+15	2.2716E+11
Te-127	4.4814E+00	1.6981E-09	8.0521E+15	1.6581E+11
Te-127m	6.1264E-01	6.4949E-08	3.0798E+17	2.2668E+10
Te-129	7.8125E+00	3.7305E-10	1.7415E+15	2.8906E+11
Te-129m	2.0125E+00	6.6805E-08	3.1187E+17	7.4463E+10
Te-131m	5.4505E+00	6.8353E-09	3.1422E+16	2.0167E+11
Te-132	5.7954E+01	1.9089E-07	8.7090E+17	2.1443E+12
I-131	3.6579E+02	2.9505E-06	1.3564E+19	1.3534E+13
I-132	2.2310E+02	2.1614E-08	9.8607E+16	8.2548E+12
I-133	6.4933E+02	5.7320E-07	2.5954E+18	2.4025E+13
I-134	3.4337E+01	1.2871E-09	5.7846E+15	1.2705E+12
I-135	4.2542E+02	1.2114E-07	5.4038E+17	1.5741E+13
Xe-133	1.6861E+05	9.0081E-04	4.0788E+21	6.2387E+15
Xe-135	5.6435E+04	2.2099E-05	9.8580E+19	2.0881E+15
Cs-134	6.3543E+01	4.9112E-05	2.2072E+20	2.3511E+12
Cs-136	1.7498E+01	2.3874E-07	1.0572E+18	6.4741E+11
Cs-137	3.9617E+01	4.5546E-04	2.0021E+21	1.4658E+12
Ba-139	3.2561E+00	1.9907E-10	8.6245E+14	1.2048E+11
Ba-140	3.0743E+01	4.1993E-07	1.8064E+18	1.1375E+12
La-140	2.4193E+00	4.3526E-09	1.8723E+16	8.9514E+10
La-141	1.2226E-01	2.1618E-11	9.2331E+13	4.5235E+09
La-142	3.5911E-02	2.5086E-12	1.0639E+13	1.3287E+09
Ce-141	7.1149E-01	2.4970E-08	1.0665E+17	2.6325E+10
Ce-143	6.3047E-01	9.4938E-10	3.9981E+15	2.3327E+10
Ce-144	5.7092E-01	1.7900E-07	7.4859E+17	2.1124E+10
Pr-143	2.7615E-01	4.1009E-09	1.7270E+16	1.0218E+10
Nd-147	1.1519E-01	1.4239E-09	5.8333E+15	4.2621E+09
Np-239	8.0423E+00	3.4666E-08	8.7350E+16	2.9757E+11
Pu-238	2.8530E-03	1.6665E-07	4.2168E+17	1.0556E+08
Pu-239	1.9076E-04	3.0691E-06	7.7332E+18	7.0582E+06
Pu-240	2.0460E-04	8.9789E-07	2.2530E+18	7.5701E+06
Pu-241	9.8198E-02	9.5326E-07	2.3820E+18	3.6333E+09
Am-241	6.0623E-05	1.7663E-08	4.4137E+16	2.2431E+06

Cm-242	1.5159E-02	4.5739E-09	1.1382E+16	5.6089E+08
Cm-244	1.6533E-03	2.0435E-08	5.0436E+16	6.1171E+07

Environment Transport Group Inventory:

Time (h) = 8.0000	Total Release	Release Rate/s	
Noble gases (atoms)	2.6593E+22	9.2337E+17	
Elemental I (atoms)	3.1150E+18	1.0816E+14	
Organic I (atoms)	1.7999E+18	6.2498E+13	
Aerosols (kg)	5.2955E-04	1.8387E-08	
Dose Effective (Ci) I-131 (Thyroid)			4.8755E+02
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			5.8337E+02
Total I (Ci)			1.6980E+03

MSIV Failed Volume V13 to Environment Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.7057E+22
Elemental I (atoms)	2.4107E+18	2.4107E+18
Organic I (atoms)	0.0000E+00	1.1546E+18
Aerosols (kg)	1.4125E-02	5.1536E-04

Filtered Intake to Control Room Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	3.0881E+19
Elemental I (atoms)	3.2594E+15	4.1460E+14
Organic I (atoms)	1.8647E+15	2.3165E+14
Aerosols (kg)	6.0606E-07	1.3174E-08

Unfiltered Inleakage to Control Room Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.7178E+18
Elemental I (atoms)	0.0000E+00	6.7819E+14
Organic I (atoms)	0.0000E+00	3.8800E+14
Aerosols (kg)	0.0000E+00	1.1452E-07

Control Room Exhaust to Environment Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	2.8146E+19	0.0000E+00
Elemental I (atoms)	9.3967E+14	0.0000E+00
Organic I (atoms)	4.7925E+14	0.0000E+00
Aerosols (kg)	1.0889E-07	0.0000E+00

Intact Volume V23 to Environment Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5397E+21
Elemental I (atoms)	7.0840E+17	7.0840E+17
Organic I (atoms)	0.0000E+00	6.4760E+17
Aerosols (kg)	5.2762E-04	1.4196E-05

Exclusion Area Boundary Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.5070E+00	9.7550E+01	1.2800E+01
Accumulated dose (rem)	1.3614E+01	1.7871E+02	2.2088E+01

Low Population Zone Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.7423E-01	1.6172E+00	3.4540E-01
Accumulated dose (rem)	5.3287E-01	5.7634E+00	8.1670E-01

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.3601E-01	2.4827E+01	1.5115E+00
Accumulated dose (rem)	8.2932E-01	5.3572E+01	3.3225E+00

Environment Integral Nuclide Release:

Time (h) = 24.0000	Ci	kg	Atoms	Bq
Co-58	2.1692E-02	6.8218E-10	7.0831E+15	8.0260E+08
Co-60	2.6049E-02	2.3044E-08	2.3129E+17	9.6380E+08
Kr-85	9.1206E+03	2.3247E-02	1.6470E+23	3.3746E+14
Kr-85m	2.6826E+04	3.2597E-06	2.3095E+19	9.9256E+14
Kr-87	3.6112E+03	1.2749E-07	8.8248E+17	1.3361E+14
Kr-88	3.2862E+04	2.6207E-06	1.7935E+19	1.2159E+15
Rb-86	9.8048E-01	1.2050E-08	8.4380E+16	3.6278E+10
Sr-89	3.1712E+01	1.0916E-06	7.3860E+18	1.1734E+12
Sr-90	3.6193E+00	2.6533E-05	1.7754E+20	1.3391E+11
Sr-91	2.4564E+01	6.7763E-09	4.4844E+16	9.0887E+11
Sr-92	8.4763E+00	6.7436E-10	4.4142E+15	3.1362E+11
Y-90	3.0781E-01	5.6576E-10	3.7856E+15	1.1389E+10
Y-91	4.3485E-01	1.7732E-08	1.1734E+17	1.6090E+10
Y-92	8.7695E+00	9.1137E-10	5.9656E+15	3.2447E+11
Y-93	3.0175E-01	9.0445E-11	5.8567E+14	1.1165E+10
Zr-95	5.0930E-01	2.3707E-08	1.5028E+17	1.8844E+10
Zr-97	3.8131E-01	1.9946E-10	1.2383E+15	1.4108E+10
Nb-95	5.1380E-01	1.3140E-08	8.3293E+16	1.9011E+10
Mo-99	6.6228E+00	1.3809E-08	8.3997E+16	2.4504E+11
Tc-99m	6.1635E+00	1.1722E-09	7.1302E+15	2.2805E+11
Ru-103	5.9450E+00	1.8420E-07	1.0770E+18	2.1996E+11
Ru-105	1.3547E+00	2.0154E-10	1.1559E+15	5.0125E+10
Ru-106	2.4612E+00	7.3566E-07	4.1795E+18	9.1064E+10
Rh-105	3.6443E+00	4.3176E-09	2.4763E+16	1.3484E+11
Sb-127	7.7436E+00	2.8997E-08	1.3750E+17	2.8651E+11
Sb-129	7.8373E+00	1.3937E-09	6.5063E+15	2.8998E+11
Te-127	7.9264E+00	3.0034E-09	1.4242E+16	2.9328E+11
Te-127m	1.0983E+00	1.1644E-07	5.5214E+17	4.0638E+10
Te-129	1.0855E+01	5.1831E-10	2.4196E+15	4.0162E+11
Te-129m	3.6010E+00	1.1953E-07	5.5802E+17	1.3324E+11
Te-131m	9.1114E+00	1.1426E-08	5.2527E+16	3.3712E+11
Te-132	1.0102E+02	3.3276E-07	1.5181E+18	3.7379E+12
I-131	8.4255E+02	6.7961E-06	3.1242E+19	3.1174E+13
I-132	3.3649E+02	3.2599E-08	1.4872E+17	1.2450E+13
I-133	1.2924E+03	1.1409E-06	5.1660E+18	4.7820E+13
I-134	3.4598E+01	1.2969E-09	5.8285E+15	1.2801E+12
I-135	6.5753E+02	1.8723E-07	8.3521E+17	2.4329E+13
Xe-133	1.1771E+06	6.2885E-03	2.8474E+22	4.3552E+16
Xe-135	2.2022E+05	8.6236E-05	3.8468E+20	8.1482E+15
Cs-134	1.1088E+02	8.5701E-05	3.8515E+20	4.1027E+12
Cs-136	3.0327E+01	4.1379E-07	1.8323E+18	1.1221E+12

Cs-137	6.9140E+01	7.9487E-04	3.4940E+21	2.5582E+12
Ba-139	3.3856E+00	2.0698E-10	8.9676E+14	1.2527E+11
Ba-140	5.4705E+01	7.4724E-07	3.2143E+18	2.0241E+12
La-140	6.9061E+00	1.2425E-08	5.3446E+16	2.5552E+11
La-141	1.5299E-01	2.7052E-11	1.1554E+14	5.6606E+09
La-142	3.7831E-02	2.6427E-12	1.1208E+13	1.3997E+09
Ce-141	1.2720E+00	4.4641E-08	1.9066E+17	4.7063E+10
Ce-143	1.0602E+00	1.5965E-09	6.7235E+15	3.9229E+10
Ce-144	1.0230E+00	3.2073E-07	1.3413E+18	3.7850E+10
Pr-143	4.9858E-01	7.4041E-09	3.1181E+16	1.8448E+10
Nd-147	2.0474E-01	2.5308E-09	1.0368E+16	7.5754E+09
Np-239	1.3875E+01	5.9810E-08	1.5070E+17	5.1339E+11
Pu-238	5.1138E-03	2.9871E-07	7.5582E+17	1.8921E+08
Pu-239	3.4206E-04	5.5033E-06	1.3867E+19	1.2656E+07
Pu-240	3.6672E-04	1.6094E-06	4.0382E+18	1.3569E+07
Pu-241	1.7601E-01	1.7086E-06	4.2694E+18	6.5122E+09
Am-241	1.0876E-04	3.1689E-08	7.9186E+16	4.0242E+06
Cm-242	2.7156E-02	8.1935E-09	2.0389E+16	1.0048E+09
Cm-244	2.9633E-03	3.6627E-08	9.0400E+16	1.0964E+08

Environment Transport Group Inventory:

Time (h) = 24.0000	Total Release	Release Rate/s	
Noble gases (atoms)	1.9360E+23	2.2408E+18	
Elemental I (atoms)	5.6486E+18	6.5378E+13	
Organic I (atoms)	1.1573E+19	1.3395E+14	
Aerosols (kg)	9.2506E-04	1.0707E-08	
Dose Effective (Ci) I-131 (Thyroid)			1.0787E+03
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.2554E+03
Total I (Ci)			3.1636E+03

MSIV Failed Volume V13 to Environment Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.1581E+23
Elemental I (atoms)	4.1705E+18	4.1705E+18
Organic I (atoms)	0.0000E+00	6.9649E+18
Aerosols (kg)	2.4507E-02	8.9412E-04

Filtered Intake to Control Room Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.1905E+20
Elemental I (atoms)	4.4542E+15	5.6227E+14
Organic I (atoms)	6.4824E+15	8.0237E+14
Aerosols (kg)	8.1054E-07	1.7347E-08

Unfiltered Inleakage to Control Room Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.2045E+19
Elemental I (atoms)	0.0000E+00	9.2680E+14
Organic I (atoms)	0.0000E+00	1.3488E+15
Aerosols (kg)	0.0000E+00	1.5316E-07

Control Room Exhaust to Environment Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	1.3440E+20	0.0000E+00
Elemental I (atoms)	1.4646E+15	0.0000E+00
Organic I (atoms)	2.0425E+15	0.0000E+00
Aerosols (kg)	1.7013E-07	0.0000E+00

Intact Volume V23 to Environment Transport Group Inventory:

Time (h) = 24.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.7915E+22
Elemental I (atoms)	1.4933E+18	1.4933E+18
Organic I (atoms)	0.0000E+00	4.6722E+18
Aerosols (kg)	1.1499E-03	3.0939E-05

Exclusion Area Boundary Doses:

Time (h) = 38.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.3830E+00	4.3013E+01	4.7464E+00
Accumulated dose (rem)	1.6997E+01	2.2172E+02	2.6835E+01

Low Population Zone Doses:

Time (h) = 38.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.3700E-02	3.6513E-01	5.5274E-02
Accumulated dose (rem)	5.7657E-01	6.1285E+00	8.7197E-01

Control Room Doses:

Time (h) = 38.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.2174E-02	4.5233E+00	2.1524E-01
Accumulated dose (rem)	9.0149E-01	5.8095E+01	3.5378E+00

Environment Integral Nuclide Release:

Time (h) = 38.0000	Ci	kg	Atoms	Bq
Co-58	2.2004E-02	6.9200E-10	7.1850E+15	8.1415E+08
Co-60	2.6426E-02	2.3378E-08	2.3464E+17	9.7777E+08
Kr-85	1.6830E+04	4.2896E-02	3.0391E+23	6.2270E+14
Kr-85m	2.8321E+04	3.4414E-06	2.4382E+19	1.0479E+15
Kr-87	3.6113E+03	1.2749E-07	8.8249E+17	1.3362E+14
Kr-88	3.3183E+04	2.6463E-06	1.8110E+19	1.2278E+15
Rb-86	9.9371E-01	1.2213E-08	8.5519E+16	3.6767E+10
Sr-89	3.2167E+01	1.1072E-06	7.4919E+18	1.1902E+12
Sr-90	3.6718E+00	2.6918E-05	1.8011E+20	1.3586E+11
Sr-91	2.4645E+01	6.7987E-09	4.4992E+16	9.1187E+11
Sr-92	8.4769E+00	6.7441E-10	4.4146E+15	3.1365E+11
Y-90	3.2166E-01	5.9122E-10	3.9560E+15	1.1901E+10
Y-91	4.4187E-01	1.8018E-08	1.1924E+17	1.6349E+10
Y-92	8.7770E+00	9.1215E-10	5.9708E+15	3.2475E+11
Y-93	3.0284E-01	9.0771E-11	5.8778E+14	1.1205E+10
Zr-95	5.1662E-01	2.4048E-08	1.5244E+17	1.9115E+10
Zr-97	3.8373E-01	2.0073E-10	1.2462E+15	1.4198E+10
Nb-95	5.2125E-01	1.3330E-08	8.4501E+16	1.9286E+10
Mo-99	6.7006E+00	1.3971E-08	8.4984E+16	2.4792E+11
Tc-99m	6.2420E+00	1.1871E-09	7.2211E+15	2.3096E+11
Ru-103	6.0299E+00	1.8684E-07	1.0924E+18	2.2311E+11
Ru-105	1.3555E+00	2.0165E-10	1.1566E+15	5.0154E+10
Ru-106	2.4968E+00	7.4631E-07	4.2400E+18	9.2383E+10
Rh-105	3.6818E+00	4.3620E-09	2.5018E+16	1.3623E+11

Sb-127	7.8403E+00	2.9359E-08	1.3921E+17	2.9009E+11
Sb-129	7.8415E+00	1.3944E-09	6.5097E+15	2.9014E+11
Te-127	8.0320E+00	3.0435E-09	1.4432E+16	2.9719E+11
Te-127m	1.1143E+00	1.1813E-07	5.6015E+17	4.1228E+10
Te-129	1.0905E+01	5.2071E-10	2.4309E+15	4.0348E+11
Te-129m	3.6524E+00	1.2124E-07	5.6599E+17	1.3514E+11
Te-131m	9.1945E+00	1.1530E-08	5.3006E+16	3.4020E+11
Te-132	1.0225E+02	3.3680E-07	1.5366E+18	3.7833E+12
I-131	1.0754E+03	8.6744E-06	3.9877E+19	3.9790E+13
I-132	3.5078E+02	3.3983E-08	1.5504E+17	1.2979E+13
I-133	1.4831E+03	1.3092E-06	5.9282E+18	5.4876E+13
I-134	3.4598E+01	1.2969E-09	5.8285E+15	1.2801E+12
I-135	6.7791E+02	1.9304E-07	8.6110E+17	2.5083E+13
Xe-133	2.0868E+06	1.1148E-02	5.0479E+22	7.7210E+16
Xe-135	2.7118E+05	1.0619E-04	4.7369E+20	1.0034E+16
Cs-134	1.1243E+02	8.6894E-05	3.9051E+20	4.1598E+12
Cs-136	3.0731E+01	4.1930E-07	1.8567E+18	1.1370E+12
Cs-137	7.0102E+01	8.0594E-04	3.5427E+21	2.5938E+12
Ba-139	3.3856E+00	2.0698E-10	8.9676E+14	1.2527E+11
Ba-140	5.5463E+01	7.5760E-07	3.2588E+18	2.0521E+12
La-140	7.2044E+00	1.2962E-08	5.5755E+16	2.6656E+11
La-141	1.5305E-01	2.7063E-11	1.1559E+14	5.6628E+09
La-142	3.7831E-02	2.6427E-12	1.1208E+13	1.3997E+09
Ce-141	1.2901E+00	4.5277E-08	1.9338E+17	4.7734E+10
Ce-143	1.0703E+00	1.6117E-09	6.7875E+15	3.9602E+10
Ce-144	1.0378E+00	3.2538E-07	1.3607E+18	3.8398E+10
Pr-143	5.0604E-01	7.5148E-09	3.1647E+16	1.8723E+10
Nd-147	2.0756E-01	2.5657E-09	1.0511E+16	7.6796E+09
Np-239	1.4033E+01	6.0488E-08	1.5241E+17	5.1921E+11
Pu-238	5.1880E-03	3.0304E-07	7.6679E+17	1.9195E+08
Pu-239	3.4704E-04	5.5833E-06	1.4068E+19	1.2840E+07
Pu-240	3.7204E-04	1.6327E-06	4.0968E+18	1.3765E+07
Pu-241	1.7856E-01	1.7334E-06	4.3313E+18	6.6067E+09
Am-241	1.1035E-04	3.2152E-08	8.0341E+16	4.0830E+06
Cm-242	2.7548E-02	8.3119E-09	2.0684E+16	1.0193E+09
Cm-244	3.0062E-03	3.7159E-08	9.1711E+16	1.1123E+08

Environment Transport Group Inventory:

Time (h) = 38.0000	Total Release	Release Rate/s	
Noble gases (atoms)	3.5491E+23	2.5944E+18	
Elemental I (atoms)	6.2960E+18	4.6024E+13	
Organic I (atoms)	2.0116E+19	1.4705E+14	
Aerosols (kg)	9.3795E-04	6.8564E-09	
Dose Effective (Ci) I-131 (Thyroid)			1.3440E+03
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.5415E+03
Total I (Ci)			3.6218E+03

MSIV Failed Volume V13 to Environment Transport Group Inventory:

Time (h) = 38.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.0811E+23
Elemental I (atoms)	4.6238E+18	4.6238E+18
Organic I (atoms)	0.0000E+00	1.1880E+19
Aerosols (kg)	2.4825E-02	9.0571E-04

Filtered Intake to Control Room Transport Group Inventory:

Pathway

Time (h) = 38.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.7870E+20
Elemental I (atoms)	4.6685E+15	5.8876E+14
Organic I (atoms)	9.3102E+15	1.1519E+15
Aerosols (kg)	8.1521E-07	1.7443E-08

Unfiltered Inleakage to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 38.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	3.3093E+19
Elemental I (atoms)	0.0000E+00	9.7139E+14
Organic I (atoms)	0.0000E+00	1.9372E+15
Aerosols (kg)	0.0000E+00	1.5405E-07

Control Room Exhaust to Environment Transport Group Inventory:

	Pathway	
Time (h) = 38.0000	Filtered	Transported
Noble gases (atoms)	2.0697E+20	0.0000E+00
Elemental I (atoms)	1.5399E+15	0.0000E+00
Organic I (atoms)	3.0061E+15	0.0000E+00
Aerosols (kg)	1.7146E-07	0.0000E+00

Intact Volume V23 to Environment Transport Group Inventory:

	Pathway	
Time (h) = 38.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.4705E+23
Elemental I (atoms)	1.6916E+18	1.6916E+18
Organic I (atoms)	0.0000E+00	8.3552E+18
Aerosols (kg)	1.1981E-03	3.2235E-05

Exclusion Area Boundary Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.0926E+00	7.0706E+01	6.2541E+00
Accumulated dose (rem)	2.1090E+01	2.9243E+02	3.3089E+01

Low Population Zone Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.2866E-02	6.0020E-01	7.1215E-02
Accumulated dose (rem)	6.2944E-01	6.7287E+00	9.4319E-01

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.6421E-02	7.3537E+00	3.1125E-01
Accumulated dose (rem)	9.8791E-01	6.5449E+01	3.8490E+00

Environment Integral Nuclide Release:

Time (h) = 96.0000	Ci	kg	Atoms	Bq
Co-58	2.2012E-02	6.9225E-10	7.1877E+15	8.1445E+08
Co-60	2.6436E-02	2.3387E-08	2.3473E+17	9.7814E+08
Kr-85	3.2681E+04	8.3298E-02	5.9016E+23	1.2092E+15
Kr-85m	2.8418E+04	3.4532E-06	2.4465E+19	1.0515E+15
Kr-87	3.6113E+03	1.2749E-07	8.8249E+17	1.3362E+14
Kr-88	3.3188E+04	2.6468E-06	1.8113E+19	1.2280E+15
Rb-86	9.9405E-01	1.2217E-08	8.5548E+16	3.6780E+10

Sr-89	3.2179E+01	1.1076E-06	7.4947E+18	1.1906E+12
Sr-90	3.6732E+00	2.6928E-05	1.8018E+20	1.3591E+11
Sr-91	2.4646E+01	6.7988E-09	4.4993E+16	9.1189E+11
Sr-92	8.4769E+00	6.7441E-10	4.4146E+15	3.1365E+11
Y-90	3.2222E-01	5.9225E-10	3.9629E+15	1.1922E+10
Y-91	4.4206E-01	1.8026E-08	1.1929E+17	1.6356E+10
Y-92	8.7770E+00	9.1215E-10	5.9708E+15	3.2475E+11
Y-93	3.0285E-01	9.0774E-11	5.8780E+14	1.1205E+10
Zr-95	5.1681E-01	2.4057E-08	1.5250E+17	1.9122E+10
Zr-97	3.8376E-01	2.0074E-10	1.2463E+15	1.4199E+10
Nb-95	5.2145E-01	1.3335E-08	8.4533E+16	1.9294E+10
Mo-99	6.7023E+00	1.3974E-08	8.5005E+16	2.4798E+11
Tc-99m	6.2437E+00	1.1874E-09	7.2230E+15	2.3102E+11
Ru-103	6.0321E+00	1.8690E-07	1.0928E+18	2.2319E+11
Ru-105	1.3555E+00	2.0165E-10	1.1566E+15	5.0154E+10
Ru-106	2.4978E+00	7.4659E-07	4.2416E+18	9.2418E+10
Rh-105	3.6824E+00	4.3628E-09	2.5022E+16	1.3625E+11
Sb-127	7.8425E+00	2.9367E-08	1.3925E+17	2.9017E+11
Sb-129	7.8415E+00	1.3944E-09	6.5097E+15	2.9014E+11
Te-127	8.0345E+00	3.0444E-09	1.4436E+16	2.9728E+11
Te-127m	1.1147E+00	1.1817E-07	5.6037E+17	4.1244E+10
Te-129	1.0906E+01	5.2077E-10	2.4311E+15	4.0352E+11
Te-129m	3.6538E+00	1.2129E-07	5.6620E+17	1.3519E+11
Te-131m	9.1959E+00	1.1532E-08	5.3014E+16	3.4025E+11
Te-132	1.0228E+02	3.3689E-07	1.5370E+18	3.7843E+12
I-131	1.4907E+03	1.2024E-05	5.5275E+19	5.5154E+13
I-132	3.5208E+02	3.4110E-08	1.5562E+17	1.3027E+13
I-133	1.6173E+03	1.4277E-06	6.4646E+18	5.9842E+13
I-134	3.4598E+01	1.2969E-09	5.8285E+15	1.2801E+12
I-135	6.8089E+02	1.9388E-07	8.6488E+17	2.5193E+13
Xe-133	3.6282E+06	1.9383E-02	8.7766E+22	1.3424E+17
Xe-135	2.8434E+05	1.1134E-04	4.9669E+20	1.0521E+16
Cs-134	1.1247E+02	8.6925E-05	3.9065E+20	4.1613E+12
Cs-136	3.0741E+01	4.1944E-07	1.8573E+18	1.1374E+12
Cs-137	7.0128E+01	8.0623E-04	3.5440E+21	2.5947E+12
Ba-139	3.3856E+00	2.0698E-10	8.9676E+14	1.2527E+11
Ba-140	5.5482E+01	7.5786E-07	3.2600E+18	2.0528E+12
La-140	7.2156E+00	1.2982E-08	5.5841E+16	2.6698E+11
La-141	1.5305E-01	2.7063E-11	1.1559E+14	5.6628E+09
La-142	3.7831E-02	2.6427E-12	1.1208E+13	1.3997E+09
Ce-141	1.2906E+00	4.5294E-08	1.9345E+17	4.7751E+10
Ce-143	1.0705E+00	1.6120E-09	6.7886E+15	3.9609E+10
Ce-144	1.0382E+00	3.2550E-07	1.3612E+18	3.8412E+10
Pr-143	5.0623E-01	7.5177E-09	3.1659E+16	1.8731E+10
Nd-147	2.0763E-01	2.5665E-09	1.0514E+16	7.6823E+09
Np-239	1.4036E+01	6.0502E-08	1.5245E+17	5.1933E+11
Pu-238	5.1899E-03	3.0315E-07	7.6707E+17	1.9203E+08
Pu-239	3.4717E-04	5.5854E-06	1.4074E+19	1.2845E+07
Pu-240	3.7218E-04	1.6333E-06	4.0984E+18	1.3771E+07
Pu-241	1.7863E-01	1.7340E-06	4.3330E+18	6.6091E+09
Am-241	1.1039E-04	3.2164E-08	8.0372E+16	4.0845E+06
Cm-242	2.7559E-02	8.3151E-09	2.0692E+16	1.0197E+09
Cm-244	3.0074E-03	3.7173E-08	9.1745E+16	1.1127E+08

Environment Transport Group Inventory:

Time (h) = 96.0000	Total Release	Release Rate/s
Noble gases (atoms)	6.7846E+23	1.9631E+18
Elemental I (atoms)	7.5578E+18	2.1869E+13
Organic I (atoms)	3.4787E+19	1.0066E+14

Aerosols (kg)	9.3829E-04	2.7150E-09	
Dose Effective (Ci) I-131 (Thyroid)			1.7817E+03
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			1.9929E+03
Total I (Ci)			4.1756E+03

MSIV Failed Volume V13 to Environment Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	3.9249E+23
Elemental I (atoms)	5.3434E+18	5.3434E+18
Organic I (atoms)	0.0000E+00	2.0275E+19
Aerosols (kg)	2.4840E-02	9.0598E-04

Filtered Intake to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.9835E+20
Elemental I (atoms)	5.0854E+15	6.4029E+14
Organic I (atoms)	1.4158E+16	1.7510E+15
Aerosols (kg)	8.1533E-07	1.7445E-08

Unfiltered Inleakage to Control Room Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	5.5248E+19
Elemental I (atoms)	0.0000E+00	1.0581E+15
Organic I (atoms)	0.0000E+00	2.9459E+15
Aerosols (kg)	0.0000E+00	1.5407E-07

Control Room Exhaust to Environment Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	3.5107E+20	0.0000E+00
Elemental I (atoms)	1.6798E+15	0.0000E+00
Organic I (atoms)	4.6430E+15	0.0000E+00
Aerosols (kg)	1.7150E-07	0.0000E+00

Intact Volume V23 to Environment Transport Group Inventory:

	Pathway	
Time (h) = 96.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.8643E+23
Elemental I (atoms)	1.6944E+18	2.2397E+18
Organic I (atoms)	0.0000E+00	1.4700E+19
Aerosols (kg)	1.2034E-03	3.2307E-05

Exclusion Area Boundary Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	9.2434E+00	2.5753E+02	1.7086E+01
Accumulated dose (rem)	3.0333E+01	5.4996E+02	5.0174E+01

Low Population Zone Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.2406E-02	5.9332E-01	5.0474E-02
Accumulated dose (rem)	6.6184E-01	7.3220E+00	9.9366E-01

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	9.9197E-02	1.3659E+01	5.1514E-01
Accumulated dose (rem)	1.0871E+00	7.9108E+01	4.3642E+00

Environment Integral Nuclide Release:

Time (h) = 720.0000	Ci	kg	Atoms	Bq
Co-58	2.2014E-02	6.9230E-10	7.1882E+15	8.1451E+08
Co-60	2.6438E-02	2.3389E-08	2.3475E+17	9.7821E+08
Kr-85	1.8412E+05	4.6929E-01	3.3249E+24	6.8124E+15
Kr-85m	2.8418E+04	3.4532E-06	2.4465E+19	1.0515E+15
Kr-87	3.6113E+03	1.2749E-07	8.8249E+17	1.3362E+14
Kr-88	3.3188E+04	2.6468E-06	1.8113E+19	1.2280E+15
Rb-86	9.9411E-01	1.2218E-08	8.5553E+16	3.6782E+10
Sr-89	3.2181E+01	1.1077E-06	7.4952E+18	1.1907E+12
Sr-90	3.6734E+00	2.6930E-05	1.8020E+20	1.3592E+11
Sr-91	2.4646E+01	6.7988E-09	4.4993E+16	9.1189E+11
Sr-92	8.4769E+00	6.7441E-10	4.4146E+15	3.1365E+11
Y-90	3.2241E-01	5.9260E-10	3.9652E+15	1.1929E+10
Y-91	4.4210E-01	1.8027E-08	1.1930E+17	1.6358E+10
Y-92	8.7770E+00	9.1215E-10	5.9708E+15	3.2475E+11
Y-93	3.0285E-01	9.0774E-11	5.8780E+14	1.1205E+10
Zr-95	5.1685E-01	2.4059E-08	1.5251E+17	1.9123E+10
Zr-97	3.8376E-01	2.0074E-10	1.2463E+15	1.4199E+10
Nb-95	5.2149E-01	1.3336E-08	8.4539E+16	1.9295E+10
Mo-99	6.7025E+00	1.3975E-08	8.5008E+16	2.4799E+11
Tc-99m	6.2439E+00	1.1875E-09	7.2233E+15	2.3103E+11
Ru-103	6.0326E+00	1.8692E-07	1.0929E+18	2.2320E+11
Ru-105	1.3555E+00	2.0165E-10	1.1566E+15	5.0154E+10
Ru-106	2.4980E+00	7.4665E-07	4.2419E+18	9.2425E+10
Rh-105	3.6825E+00	4.3629E-09	2.5023E+16	1.3625E+11
Sb-127	7.8428E+00	2.9368E-08	1.3926E+17	2.9018E+11
Sb-129	7.8415E+00	1.3944E-09	6.5097E+15	2.9014E+11
Te-127	8.0349E+00	3.0445E-09	1.4437E+16	2.9729E+11
Te-127m	1.1148E+00	1.1818E-07	5.6041E+17	4.1247E+10
Te-129	1.0906E+01	5.2078E-10	2.4312E+15	4.0353E+11
Te-129m	3.6540E+00	1.2129E-07	5.6624E+17	1.3520E+11
Te-131m	9.1960E+00	1.1532E-08	5.3015E+16	3.4025E+11
Te-132	1.0228E+02	3.3690E-07	1.5370E+18	3.7844E+12
I-131	3.0833E+03	2.4871E-05	1.1433E+20	1.1408E+14
I-132	3.5209E+02	3.4110E-08	1.5562E+17	1.3027E+13
I-133	1.6411E+03	1.4487E-06	6.5594E+18	6.0719E+13
I-134	3.4598E+01	1.2969E-09	5.8285E+15	1.2801E+12
I-135	6.8089E+02	1.9388E-07	8.6489E+17	2.5193E+13
Xe-133	7.3438E+06	3.9233E-02	1.7765E+23	2.7172E+17
Xe-135	2.8450E+05	1.1141E-04	4.9696E+20	1.0526E+16
Cs-134	1.1247E+02	8.6932E-05	3.9068E+20	4.1616E+12
Cs-136	3.0743E+01	4.1946E-07	1.8574E+18	1.1375E+12
Cs-137	7.0133E+01	8.0629E-04	3.5442E+21	2.5949E+12
Ba-139	3.3856E+00	2.0698E-10	8.9676E+14	1.2527E+11
Ba-140	5.5485E+01	7.5791E-07	3.2602E+18	2.0530E+12
La-140	7.2187E+00	1.2987E-08	5.5865E+16	2.6709E+11
La-141	1.5305E-01	2.7063E-11	1.1559E+14	5.6628E+09
La-142	3.7831E-02	2.6427E-12	1.1208E+13	1.3997E+09
Ce-141	1.2907E+00	4.5297E-08	1.9346E+17	4.7755E+10
Ce-143	1.0705E+00	1.6120E-09	6.7887E+15	3.9609E+10
Ce-144	1.0382E+00	3.2552E-07	1.3613E+18	3.8415E+10
Pr-143	5.0627E-01	7.5183E-09	3.1662E+16	1.8732E+10

Nd-147	2.0764E-01	2.5667E-09	1.0515E+16	7.6827E+09
Np-239	1.4036E+01	6.0504E-08	1.5245E+17	5.1935E+11
Pu-238	5.1903E-03	3.0318E-07	7.6713E+17	1.9204E+08
Pu-239	3.4719E-04	5.5858E-06	1.4075E+19	1.2846E+07
Pu-240	3.7221E-04	1.6334E-06	4.0987E+18	1.3772E+07
Pu-241	1.7864E-01	1.7341E-06	4.3333E+18	6.6096E+09
Am-241	1.1040E-04	3.2166E-08	8.0378E+16	4.0848E+06
Cm-242	2.7561E-02	8.3157E-09	2.0693E+16	1.0197E+09
Cm-244	3.0076E-03	3.7175E-08	9.1752E+16	1.1128E+08

Environment Transport Group Inventory:

Time (h) = 720.0000	Total Release	Release Rate/s	
Noble gases (atoms)	3.5031E+24	1.3515E+18	
Elemental I (atoms)	1.6121E+19	6.2197E+12	
Organic I (atoms)	8.5374E+19	3.2938E+13	
Aerosols (kg)	9.3836E-04	3.6202E-10	
Dose Effective (Ci) I-131 (Thyroid)			3.3783E+03
Dose Effective (Ci) I-131 (ICRP2 Thyroid)			3.5919E+03
Total I (Ci)			5.7920E+03

MSIV Failed Volume V13 to Environment Transport Group Inventory:

Time (h) = 720.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.0013E+24
Elemental I (atoms)	5.3434E+18	1.0292E+19
Organic I (atoms)	0.0000E+00	4.9188E+19
Aerosols (kg)	2.4840E-02	9.0601E-04

Filtered Intake to Control Room Transport Group Inventory:

Time (h) = 720.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.1119E+21
Elemental I (atoms)	7.2883E+15	9.1255E+14
Organic I (atoms)	2.7171E+16	3.3594E+15
Aerosols (kg)	8.1535E-07	1.7445E-08

Unfiltered Inleakage to Control Room Transport Group Inventory:

Time (h) = 720.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.0591E+20
Elemental I (atoms)	0.0000E+00	1.5165E+15
Organic I (atoms)	0.0000E+00	5.6535E+15
Aerosols (kg)	0.0000E+00	1.5407E-07

Control Room Exhaust to Environment Transport Group Inventory:

Time (h) = 720.0000	Pathway Filtered	Transported
Noble gases (atoms)	1.3161E+21	0.0000E+00
Elemental I (atoms)	2.4096E+15	0.0000E+00
Organic I (atoms)	8.9651E+15	0.0000E+00
Aerosols (kg)	1.7150E-07	0.0000E+00

Intact Volume V23 to Environment Transport Group Inventory:

Pathway

Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.5027E+24
Elemental I (atoms)	1.6944E+18	5.8864E+18
Organic I (atoms)	0.0000E+00	3.6559E+19
Aerosols (kg)	1.2034E-03	3.2352E-05

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##
I-131 Summary
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Time (hr)	Drywell I-131 (Curies)	MSIV Failed Volume V1 I-131 (Curies)	MSIV Failed Volume V1 I-131 (Curies)
0.000	5.2653E+03	0.0000E+00	0.0000E+00
0.033	3.1132E+05	0.0000E+00	0.0000E+00
0.400	3.2408E+06	2.6278E+02	1.8252E+01
0.500	3.9058E+06	3.9453E+02	3.4570E+01
0.800	7.7151E+06	1.0180E+03	1.3402E+02
1.100	1.1203E+07	1.9714E+03	3.4657E+02
1.400	1.4417E+07	3.1733E+03	7.0782E+02
1.700	1.7384E+07	4.5577E+03	1.2401E+03
2.000	2.0125E+07	6.0710E+03	1.9551E+03
2.300	1.4811E+07	6.2985E+03	2.7588E+03
2.600	1.0909E+07	6.2015E+03	3.5171E+03
2.900	8.0419E+06	5.9044E+03	4.1943E+03
3.200	5.9330E+06	5.4928E+03	4.7727E+03
3.500	4.3812E+06	5.0249E+03	5.2463E+03
3.800	3.2388E+06	4.5394E+03	5.6168E+03
3.850	3.0801E+06	4.4587E+03	5.6689E+03
4.200	2.1730E+06	3.9066E+03	5.9615E+03
4.500	1.6149E+06	3.4616E+03	6.1197E+03
4.800	1.2035E+06	3.0502E+03	6.2032E+03
5.100	9.3402E+05	2.6761E+03	6.2223E+03
5.400	7.8267E+05	2.3438E+03	6.1872E+03
5.700	6.5717E+05	2.0507E+03	6.1076E+03
6.000	5.5312E+05	1.7927E+03	5.9920E+03
6.300	4.6684E+05	1.5660E+03	5.8477E+03
6.600	3.9530E+05	1.3670E+03	5.6811E+03
6.900	3.3597E+05	1.1926E+03	5.4976E+03
7.200	2.8678E+05	1.0400E+03	5.3017E+03
7.500	2.4598E+05	9.0656E+02	5.0974E+03
7.800	2.1215E+05	7.9006E+02	4.8878E+03
8.000	1.9287E+05	7.2078E+02	4.7466E+03
8.300	1.6810E+05	6.2806E+02	4.5342E+03
8.600	1.5007E+05	5.4738E+02	4.3228E+03
8.900	1.3474E+05	4.7732E+02	4.1141E+03
9.200	1.2169E+05	4.1648E+02	3.9094E+03
9.500	1.1059E+05	3.6367E+02	3.7097E+03
9.800	1.0115E+05	3.1784E+02	3.5158E+03
10.100	9.3114E+04	2.7808E+02	3.3283E+03
10.400	8.6273E+04	2.4360E+02	3.1476E+03
24.000	4.5162E+04	2.0439E+01	2.0637E+02
38.000	4.2501E+04	1.8975E+01	5.0547E+01
96.000	3.3810E+04	1.5123E+01	3.5017E+01
720.000	2.8915E+03	1.2934E+00	2.9941E+00

Time (hr)	Intact Volume V2 I-131 (Curies)	Intact Volume V23 I-131 (Curies)	Void I-131 (Curies)
0.000	0.0000E+00	0.0000E+00	0.0000E+00
0.033	0.0000E+00	0.0000E+00	0.0000E+00

0.400	2.0124E+02	9.2550E-01	1.9740E+02
0.500	3.0314E+02	1.7432E+00	3.0166E+02
0.800	7.8826E+02	6.6747E+00	8.1228E+02
1.100	1.5382E+03	1.7092E+01	1.6409E+03
1.400	2.4955E+03	3.4646E+01	2.7614E+03
1.700	3.6125E+03	6.0404E+01	4.1509E+03
2.000	4.8495E+03	9.5011E+01	5.7883E+03
2.300	5.1228E+03	1.3452E+02	7.2978E+03
2.600	5.1398E+03	1.7308E+02	8.4060E+03
2.900	4.9904E+03	2.0897E+02	9.2193E+03
3.200	4.7377E+03	2.4124E+02	9.8159E+03
3.500	4.4262E+03	2.6942E+02	1.0253E+04
3.800	4.0861E+03	2.9341E+02	1.0573E+04
3.850	4.0282E+03	2.9700E+02	1.0617E+04
4.200	3.6231E+03	3.1902E+02	1.0869E+04
4.500	3.2852E+03	3.3377E+02	1.1022E+04
4.800	2.9639E+03	3.4504E+02	1.1133E+04
5.100	2.6636E+03	3.5317E+02	1.1213E+04
5.400	2.3895E+03	3.5852E+02	1.1276E+04
5.700	2.1411E+03	3.6145E+02	1.1327E+04
6.000	1.9167E+03	3.6229E+02	1.1367E+04
6.300	1.7141E+03	3.6134E+02	1.1400E+04
6.600	1.5318E+03	3.5884E+02	1.1425E+04
6.900	1.3679E+03	3.5505E+02	1.1445E+04
7.200	1.2208E+03	3.5018E+02	1.1460E+04
7.500	1.0890E+03	3.4440E+02	1.1471E+04
7.800	9.7097E+02	3.3788E+02	1.1479E+04
8.000	8.9931E+02	3.3320E+02	1.1483E+04
8.300	8.0142E+02	3.2576E+02	1.1486E+04
8.600	7.1411E+02	3.1794E+02	1.1488E+04
8.900	6.3635E+02	3.0983E+02	1.1488E+04
9.200	5.6712E+02	3.0151E+02	1.1487E+04
9.500	5.0551E+02	2.9308E+02	1.1485E+04
9.800	4.5071E+02	2.8458E+02	1.1482E+04
10.100	4.0199E+02	2.7608E+02	1.1479E+04
10.400	3.5868E+02	2.6762E+02	1.1474E+04
24.000	2.0144E+01	7.0304E+01	1.1135E+04
38.000	1.7780E+01	4.4208E+01	1.0768E+04
96.000	1.4135E+01	3.3229E+01	9.0415E+03
720.000	1.2089E+00	3.0643E+00	1.2555E+03

Time (hr)	Environment I-131 (Curies)	Control Room I-131 (Curies)
0.000	0.0000E+00	0.0000E+00
0.033	0.0000E+00	0.0000E+00
0.400	2.5416E-02	1.6941E-04
0.500	6.0161E-02	3.6418E-04
0.800	3.5927E-01	3.5792E-04
1.100	1.2200E+00	5.2791E-04
1.400	3.0859E+00	9.5722E-04
1.700	6.4675E+00	1.7225E-03
2.000	1.1905E+01	2.8853E-03
2.300	1.9849E+01	3.9107E-03
2.600	3.0299E+01	5.2116E-03
2.900	4.3037E+01	6.6600E-03
3.200	5.7769E+01	8.1486E-03
3.500	7.4179E+01	9.5948E-03
3.800	9.1949E+01	1.0940E-02
3.850	9.5021E+01	1.1152E-02
4.200	1.1724E+02	1.2513E-02
4.500	1.3705E+02	1.3503E-02

4.800	1.5733E+02	1.4324E-02
5.100	1.7787E+02	1.4978E-02
5.400	1.9850E+02	1.5475E-02
5.700	2.1907E+02	1.5828E-02
6.000	2.3948E+02	1.6051E-02
6.300	2.5961E+02	1.6161E-02
6.600	2.7939E+02	1.6172E-02
6.900	2.9878E+02	1.6099E-02
7.200	3.1771E+02	1.5955E-02
7.500	3.3617E+02	1.5754E-02
7.800	3.5412E+02	1.5505E-02
8.000	3.6579E+02	1.5318E-02
8.300	3.8287E+02	1.2846E-02
8.600	3.9942E+02	1.1017E-02
8.900	4.1544E+02	9.6492E-03
9.200	4.3094E+02	8.6153E-03
9.500	4.4592E+02	7.8224E-03
9.800	4.6041E+02	7.2040E-03
10.100	4.7440E+02	6.7127E-03
10.400	4.8793E+02	6.3142E-03
24.000	8.4255E+02	2.5673E-03
38.000	1.0754E+03	1.5816E-03
96.000	1.4907E+03	6.3835E-04
720.000	3.0833E+03	4.5906E-05

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Cumulative Dose Summary
##

	Exclusion Area Bounda		Low Population Zone		Control Room	
Time (hr)	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
0.033	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.400	5.7818E-03	3.6955E-04	6.5436E-04	4.1824E-05	6.1358E-03	2.4393E-04
0.500	1.3673E-02	8.7650E-04	1.5474E-03	9.9199E-05	1.6432E-02	6.5480E-04
0.800	8.1506E-02	5.4604E-03	9.2245E-03	6.1799E-04	5.6952E-02	2.2896E-03
1.100	2.7699E-01	2.0823E-02	3.1349E-02	2.3566E-03	1.0610E-01	4.4013E-03
1.400	7.0157E-01	5.8756E-02	7.9401E-02	6.6498E-03	1.8905E-01	8.3567E-03
1.700	1.4718E+00	1.3361E-01	1.6657E-01	1.5121E-02	3.4031E-01	1.6226E-02
2.000	2.7105E+00	2.6064E-01	3.0676E-01	2.9499E-02	6.0230E-01	3.0717E-02
2.300	4.5189E+00	4.5205E-01	3.9527E-01	3.8867E-02	9.9087E-01	5.3045E-02
2.600	6.8941E+00	7.0693E-01	5.1152E-01	5.1341E-02	1.5140E+00	8.3914E-02
2.900	9.7831E+00	1.0193E+00	6.5290E-01	6.6630E-02	2.1954E+00	1.2489E-01
3.200	1.3117E+01	1.3822E+00	8.1605E-01	8.4387E-02	3.0446E+00	1.7664E-01
3.500	1.6820E+01	1.7879E+00	9.9730E-01	1.0424E-01	4.0606E+00	2.3914E-01
3.800	2.0819E+01	2.2290E+00	1.1930E+00	1.2583E-01	5.2338E+00	3.1187E-01
3.850	2.1509E+01	2.3053E+00	1.2268E+00	1.2956E-01	5.4436E+00	3.2490E-01
4.200	2.6492E+01	2.8598E+00	1.4707E+00	1.5670E-01	7.0168E+00	4.2312E-01
4.500	3.0923E+01	3.3573E+00	1.6875E+00	1.8105E-01	8.4944E+00	5.1588E-01
4.800	3.5444E+01	3.8690E+00	1.9088E+00	2.0610E-01	1.0070E+01	6.1523E-01
5.100	4.0010E+01	4.3901E+00	2.1323E+00	2.3160E-01	1.1725E+01	7.1995E-01
5.400	4.4583E+01	4.9163E+00	2.3561E+00	2.5735E-01	1.3441E+01	8.2884E-01
5.700	4.9130E+01	5.4440E+00	2.5786E+00	2.8318E-01	1.5198E+01	9.4078E-01
6.000	5.3626E+01	5.9700E+00	2.7986E+00	3.0892E-01	1.6983E+01	1.0548E+00
6.300	5.8049E+01	6.4918E+00	3.0151E+00	3.3446E-01	1.8782E+01	1.1699E+00
6.600	6.2384E+01	7.0073E+00	3.2273E+00	3.5969E-01	2.0582E+01	1.2853E+00
6.900	6.6619E+01	7.5147E+00	3.4345E+00	3.8452E-01	2.2373E+01	1.4004E+00
7.200	7.0743E+01	8.0128E+00	3.6364E+00	4.0890E-01	2.4147E+01	1.5146E+00
7.500	7.4751E+01	8.5004E+00	3.8325E+00	4.3276E-01	2.5897E+01	1.6273E+00
7.800	7.8637E+01	8.9768E+00	4.0227E+00	4.5608E-01	2.7618E+01	1.7382E+00

8.000	8.1160E+01	9.2878E+00	4.1462E+00	4.7130E-01	2.8746E+01	1.8110E+00
8.300	8.4840E+01	9.7440E+00	4.2072E+00	4.8306E-01	3.0282E+01	1.9099E+00
8.600	8.8396E+01	1.0188E+01	4.2661E+00	4.9454E-01	3.1581E+01	1.9933E+00
8.900	9.1828E+01	1.0619E+01	4.3230E+00	5.0572E-01	3.2703E+01	2.0651E+00
9.200	9.5139E+01	1.1037E+01	4.3779E+00	5.1661E-01	3.3693E+01	2.1284E+00
9.500	9.8331E+01	1.1443E+01	4.4308E+00	5.2719E-01	3.4582E+01	2.1852E+00
9.800	1.0141E+02	1.1837E+01	4.4818E+00	5.3747E-01	3.5392E+01	2.2370E+00
10.100	1.0437E+02	1.2218E+01	4.5310E+00	5.4746E-01	3.6141E+01	2.2848E+00
10.400	1.0723E+02	1.2587E+01	4.5783E+00	5.5716E-01	3.6840E+01	2.3294E+00
24.000	1.7871E+02	2.2088E+01	5.7634E+00	8.1670E-01	5.3572E+01	3.3225E+00
38.000	2.2172E+02	2.6835E+01	6.1285E+00	8.7197E-01	5.8095E+01	3.5378E+00
96.000	2.9243E+02	3.3089E+01	6.7287E+00	9.4319E-01	6.5449E+01	3.8490E+00
720.000	5.4996E+02	5.0174E+01	7.3220E+00	9.9366E-01	7.9108E+01	4.3642E+00

##
Worst Two-Hour Doses
##

Exclusion Area Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
4.6	1.9190E+00	2.9955E+01	3.4794E+00

Attachment D – Selected pages of RADTRAD Output File PB3DCL00.o0

```
##############################################################################
    RADTRAD Version 3.03 (Spring 2001) run on  4/16/2007  at 12:27:29
 ##############################################################################

 ##############################################################################
                     File information
 ##############################################################################

 Plant file           = D:\D DRIVE\Radtrad 3.03\Input\PB\360 SCFH\PB3DCL00.psf
 Inventory file       = d:\d drive\radtrad 3.03\defaults\pbs_def.txt
 Release file         = d:\d drive\radtrad 3.03\defaults\bwr_dba.rft
 Dose Conversion file = d:\d drive\radtrad 3.03\defaults\fgr11&12.inp

     #####    ####   #####    #  #     #  #####   #    #  #####
     #    #  #       #        #  ##    #  #    #  #    #    #
     #    #  #       #        #  # #   #  #    #  #    #    #
     #####    ####   ####     #  #  #  #  #####   #    #    #
     #            #  #        #  #   # #  #       #    #    #
     #            #  #        #  #    ##  #       #    #    #
     #        ####   #        #  #     #  #        ####     #

 Radtrad 3.03 4/15/2001
 PBAPS Unit 2 & 3  Containment Leakage AST Analysis for Elemental Iodine Removal cutoff
time - Drawdown Time = 6 minutes, No SGTS , CR unfiltered inleakage = 500 cfm, MCREF
Started @ 30 Minutes, MSIV Leakage = 250 scfh, and MCREV Air Intake = 11,000 cfm Bef
 Nuclide Inventory File:
 d:\d drive\radtrad 3.03\defaults\pbs_def.txt
 Plant Power Level:
  3.5280E+03
 Compartments:
   4
 Compartment 1:
 Drywell
   3
  1.5900E+05
   1
   0
   0
   1
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  1.7600E+05
   0
   0
   0
   0
   0
```

```
Compartment 4:
Void
  3
 1.0000E+05
  0
  0
  0
  0
  0
Pathways:
  5
Pathway 1:
Drywell Leakage to  Environment
  1
  2
  4
Pathway 2:
Filtered Intake to Control Room
  2
  3
  2
Pathway 3:
Unfiltered Inleakage to Control Room
  2
  3
  2
Pathway 4:
Control Room Exhaust to Environment
  3
  2
  2
Pathway 5:
Drywell to Void
  1
  4
  4
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
d:\d drive\radtrad 3.03\defaults\fgr11&12.inp
d:\d drive\radtrad 3.03\defaults\bwr_dba.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:
  4
Compartment 1:
  1
  1
```

```
  1
  0.0000E+00
  0
  1
  0.0000E+00
  3
  0.0000E+00   3.3600E+00
  2.0000E+00   1.8600E+00
  7.2000E+02   0.0000E+00
  1
  0.0000E+00
  0
  0
  0
  3
  3
  1.0000E+01
  1
  1
  0.0000E+00   0.0000E+00
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 4:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Pathways:
  5
Pathway 1:
  0
  0
  0
  0
  0
  0
  0
  0
```

```
  0
  0
  1
 10
  0.0000E+00   0.0000E+00
  3.3300E-02   7.0000E-01
  5.0000E-02   7.0000E-01
  3.8000E+00   7.0000E-01
  3.8500E+00   7.0000E-01
  3.9000E+00   7.0000E-01
  3.9500E+00   7.0000E-01
  4.0000E+00   7.0000E-01
  3.8000E+01   3.5000E-01
  7.2000E+02   0.0000E+00
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   2.7000E+03   9.8000E+01   8.9000E+01   8.9000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   5.0000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   1.8500E+04   0.0000E+00   0.0000E+00   0.0000E+00
```

```
  5.0000E-01   3.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 5:
  0
  0
  0
  0
  0
  0
  0
  0
  0
  1
  5
  0.0000E+00   0.0000E+00
  3.3300E-02   1.7520E+00
  2.0000E+00   9.7200E-01
  3.8000E+01   4.8600E-01
  7.2000E+02   0.0000E+00
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  4
  0.0000E+00   4.2500E-04
  1.0000E-01   5.3000E-05
  5.0000E-01   8.8900E-06
  7.2000E+02   0.0000E+00
  1
  2
  0.0000E+00   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  8
  0.0000E+00   4.8100E-05
  1.0000E-01   1.7500E-05
  5.0000E-01   8.8700E-06
  2.0000E+00   3.9400E-06
  8.0000E+00   2.6200E-06
  2.4000E+01   1.0900E-06
  9.6000E+01   3.0600E-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
  7
  0.0000E+00   1.1800E-03
  1.0000E-01   2.7200E-06
  2.0000E+00   1.4600E-08
  8.0000E+00   1.4600E-08
  2.4000E+01   1.4600E-08
  9.6000E+01   4.2100E-09
  7.2000E+02   0.0000E+00
Simulation Parameters:
  7
  0.0000E+00   1.0000E-02
  2.0000E+00   1.0000E-01
  4.0000E+00   1.0000E+00
  8.0000E+00   2.0000E+00
  2.4000E+01   4.0000E+00
  9.6000E+01   8.0000E+00
  7.2000E+02   0.0000E+00
Output Filename:
D:\D DRIVE\Radtrad 3.03\Input\PB\PB3DCL00.o0
  1
  1
  1
  0
  0
End of Scenario File
```

```
##############################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/16/2007  at 12:27:29
##############################################################################

##############################################################################
                     Plant Description
##############################################################################

Number of Nuclides =  60

Inventory Power =   1.0000E+00 MWth
Plant Power Level =   3.5280E+03 MWth

Number of compartments    =   4

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: Drywell
Compartment volume =   1.5900E+05 (Cubic feet)
Compartment type is Normal
Removal devices within compartment:
     Spray(s)
     Deposition
Pathways into and out of compartment  1
   Exit Pathway Number    1: Drywell Leakage to  Environment
   Exit Pathway Number    5: Drywell to Void

Compartment number  2
Name: Environment
Compartment type is Environment
Pathways into and out of compartment  2
   Inlet Pathway Number   1: Drywell Leakage to  Environment
   Inlet Pathway Number   4: Control Room Exhaust to Environment
   Exit Pathway Number    2: Filtered Intake to Control Room
   Exit Pathway Number    3: Unfiltered Inleakage to Control Room

Compartment number  3
Name: Control Room
Compartment volume =   1.7600E+05 (Cubic feet)
Compartment type is Control Room
Pathways into and out of compartment  3
   Inlet Pathway Number   2: Filtered Intake to Control Room
   Inlet Pathway Number   3: Unfiltered Inleakage to Control Room
   Exit Pathway Number    4: Control Room Exhaust to Environment

Compartment number  4
Name: Void
Compartment volume =   1.0000E+05 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  4
   Inlet Pathway Number   5: Drywell to Void

Total number of pathways =   5
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/16/2007  at 12:27:29
##########################################################################

##########################################################################
                     Scenario Description
##########################################################################

Radioactive Decay is enabled
Calculation of Daughters is enabled
```

Release Fractions and Timings

	GAP	EARLY IN-VESSEL	LATE RELEASE	RELEASE MASS
	0.500000 hr	1.5000 hrs	0.0000 hrs	(gm)
NOBLES	5.0000E-02	9.5000E-01	0.0000E+00	4.626E+03
IODINE	5.0000E-02	2.5000E-01	0.0000E+00	3.034E+02
CESIUM	5.0000E-02	2.0000E-01	0.0000E+00	5.100E+04
TELLURIUM	0.0000E+00	5.0000E-02	0.0000E+00	4.013E+01
STRONTIUM	0.0000E+00	2.0000E-02	0.0000E+00	1.713E+03
BARIUM	0.0000E+00	2.0000E-02	0.0000E+00	4.741E+01
RUTHENIUM	0.0000E+00	2.5000E-03	0.0000E+00	5.990E+01
CERIUM	0.0000E+00	5.0000E-04	0.0000E+00	5.915E+02
LANTHANUM	0.0000E+00	2.0000E-04	0.0000E+00	8.733E+00

Inventory Power = 3528. 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)
Co-58	7	1.529E+02	6.117E+06	4.760E-14	8.720E-10	2.940E-09
Co-60	7	1.830E+02	1.663E+08	1.260E-13	1.620E-08	5.910E-08
Kr-85	1	3.946E+02	3.383E+08	1.190E-16	0.000E+00	0.000E+00
Kr-85m	1	8.313E+03	1.613E+04	7.480E-15	0.000E+00	0.000E+00
Kr-87	1	1.633E+04	4.578E+03	4.120E-14	0.000E+00	0.000E+00
Kr-88	1	2.303E+04	1.022E+04	1.020E-13	0.000E+00	0.000E+00
Rb-86	3	6.518E+01	1.612E+06	4.810E-15	1.330E-09	1.790E-09
Sr-89	5	2.798E+04	4.363E+06	7.730E-17	7.960E-12	1.120E-08
Sr-90	5	3.178E+03	9.190E+08	7.530E-18	2.690E-10	3.510E-07
Sr-91	5	3.801E+04	3.420E+04	4.924E-14	9.930E-12	4.547E-10
Sr-92	5	4.017E+04	9.756E+03	6.790E-14	3.920E-12	2.180E-10
Y-90	9	3.272E+03	2.304E+05	1.900E-16	5.170E-13	2.280E-09
Y-91	9	3.448E+04	5.055E+06	2.600E-16	8.500E-12	1.320E-08
Y-92	9	4.029E+04	1.274E+04	1.300E-14	1.050E-12	2.110E-10
Y-93	9	4.526E+04	3.636E+04	4.800E-15	9.260E-13	5.820E-10
Zr-95	9	4.489E+04	5.528E+06	3.600E-14	1.440E-09	6.390E-09
Zr-97	9	4.657E+04	6.084E+04	4.432E-14	2.315E-11	1.171E-09
Nb-95	9	4.512E+04	3.037E+06	3.740E-14	3.580E-10	1.570E-09
Mo-99	7	5.078E+04	2.376E+05	7.280E-15	1.520E-11	1.070E-09
Tc-99m	7	4.447E+04	2.167E+04	5.890E-15	5.010E-11	8.800E-12
Ru-103	7	4.202E+04	3.394E+06	2.251E-14	2.570E-10	2.421E-09
Ru-105	7	2.908E+04	1.598E+04	3.810E-14	4.150E-12	1.230E-10
Ru-106	7	1.730E+04	3.181E+07	1.040E-14	1.720E-09	1.290E-07
Rh-105	7	2.752E+04	1.273E+05	3.720E-15	2.880E-12	2.580E-10
Sb-127	4	2.896E+03	3.326E+05	3.330E-14	6.150E-11	1.630E-09
Sb-129	4	8.638E+03	1.555E+04	7.140E-14	9.720E-12	1.740E-10
Te-127	4	2.873E+03	3.366E+04	2.420E-16	1.840E-12	8.600E-11
Te-127m	4	3.855E+02	9.418E+06	1.470E-16	9.660E-11	5.810E-09
Te-129	4	8.501E+03	4.176E+03	2.750E-15	5.090E-13	2.090E-11
Te-129m	4	1.267E+03	2.903E+06	3.337E-15	1.563E-10	6.484E-09
Te-131m	4	3.869E+03	1.080E+05	7.463E-14	3.669E-08	1.758E-09

Te-132	4	3.821E+04	2.815E+05	1.030E-14	6.280E-08	2.550E-09
I-131	2	2.687E+04	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	3.881E+04	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	5.556E+04	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	6.165E+04	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	5.192E+04	2.380E+04	8.294E-14	8.460E-09	3.320E-10
Xe-133	1	5.491E+04	4.532E+05	1.560E-15	0.000E+00	0.000E+00
Xe-135	1	2.228E+04	3.272E+04	1.190E-14	0.000E+00	0.000E+00
Cs-134	3	7.280E+03	6.507E+07	7.570E-14	1.110E-08	1.250E-08
Cs-136	3	2.027E+03	1.132E+06	1.060E-13	1.730E-09	1.980E-09
Cs-137	3	4.538E+03	9.467E+08	2.725E-14	7.930E-09	8.630E-09
Ba-139	6	5.084E+04	4.962E+03	2.170E-15	2.400E-12	4.640E-11
Ba-140	6	4.896E+04	1.101E+06	8.580E-15	2.560E-10	1.010E-09
La-140	9	5.019E+04	1.450E+05	1.170E-13	6.870E-11	1.310E-09
La-141	9	4.640E+04	1.415E+04	2.390E-15	9.400E-12	1.570E-10
La-142	9	4.532E+04	5.550E+03	1.440E-13	8.740E-12	6.840E-11
Ce-141	8	4.492E+04	2.808E+06	3.430E-15	2.550E-11	2.420E-09
Ce-143	8	4.427E+04	1.188E+05	1.290E-14	6.230E-12	9.160E-10
Ce-144	8	3.596E+04	2.456E+07	2.773E-15	2.920E-10	1.010E-07
Pr-143	9	4.293E+04	1.172E+06	2.100E-17	1.680E-18	2.190E-09
Nd-147	9	1.838E+04	9.487E+05	6.190E-15	1.820E-11	1.850E-09
Np-239	8	5.397E+05	2.035E+05	7.690E-15	7.620E-12	6.780E-10
Pu-238	8	1.796E+02	2.769E+09	4.880E-18	3.860E-10	7.790E-05
Pu-239	8	1.200E+01	7.594E+11	4.240E-18	3.750E-10	8.330E-05
Pu-240	8	1.288E+01	2.063E+11	4.750E-18	3.760E-10	8.330E-05
Pu-241	8	6.182E+03	4.544E+08	7.250E-20	9.150E-12	1.340E-06
Am-241	9	9.528E+00	1.364E+10	8.180E-16	1.600E-09	1.200E-04
Cm-242	9	2.388E+03	1.407E+07	5.690E-18	9.410E-10	4.670E-06
Cm-244	9	2.602E+02	5.715E+08	4.910E-18	1.010E-09	6.700E-05

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
Sr-90	Y-90	1.00	none	0.00	none	0.00
Sr-91	Y-91m	0.58	Y-91	0.42	none	0.00
Sr-92	Y-92	1.00	none	0.00	none	0.00
Y-93	Zr-93	1.00	none	0.00	none	0.00
Zr-95	Nb-95m	0.01	Nb-95	0.99	none	0.00
Zr-97	Nb-97m	0.95	Nb-97	0.05	none	0.00
Mo-99	Tc-99m	0.88	Tc-99	0.12	none	0.00
Tc-99m	Tc-99	1.00	none	0.00	none	0.00
Ru-103	Rh-103m	1.00	none	0.00	none	0.00
Ru-105	Rh-105	1.00	none	0.00	none	0.00
Ru-106	Rh-106	1.00	none	0.00	none	0.00
Sb-127	Te-127m	0.18	Te-127	0.82	none	0.00
Sb-129	Te-129m	0.22	Te-129	0.77	none	0.00
Te-127m	Te-127	0.98	none	0.00	none	0.00
Te-129	I-129	1.00	none	0.00	none	0.00
Te-129m	Te-129	0.65	I-129	0.35	none	0.00
Te-131m	Te-131	0.22	I-131	0.78	none	0.00
Te-132	I-132	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
Cs-137	Ba-137m	0.95	none	0.00	none	0.00
Ba-140	La-140	1.00	none	0.00	none	0.00
La-141	Ce-141	1.00	none	0.00	none	0.00
Ce-143	Pr-143	1.00	none	0.00	none	0.00
Ce-144	Pr-144m	0.02	Pr-144	0.98	none	0.00

Nd-147	Pm-147	1.00	none	0.00	none	0.00
Np-239	Pu-239	1.00	none	0.00	none	0.00
Pu-238	U-234	1.00	none	0.00	none	0.00
Pu-239	U-235	1.00	none	0.00	none	0.00
Pu-240	U-236	1.00	none	0.00	none	0.00
Pu-241	U-237	0.00	Am-241	1.00	none	0.00
Am-241	Np-237	1.00	none	0.00	none	0.00
Cm-242	Pu-238	1.00	none	0.00	none	0.00
Cm-244	Pu-240	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: Drywell

Sprays: Elemental Removal Data

Time (hr)	Removal Coef. (hr^-1)
0.0000E+00	3.3600E+00
2.0000E+00	1.8600E+00
7.2000E+02	0.0000E+00

Natural Deposition (Powers' model): Aerosol data
Reactor type: 3
Percentile = 10 (%)

Natural Deposition: Elemental Removal Data

Time (hr)	Removal Coef. (hr^-1)
0.0000E+00	0.0000E+00

Compartment number 2: Environment

Compartment number 3: Control Room

Compartment number 4: Void

PATHWAY DATA

Pathway number 1: Drywell Leakage to Environment

Convection Data

Time (hr)	Flow Rate (% / day)
0.0000E+00	0.0000E+00
3.3300E-02	7.0000E-01
5.0000E-02	7.0000E-01
3.8000E+00	7.0000E-01
3.8500E+00	7.0000E-01
3.9000E+00	7.0000E-01
3.9500E+00	7.0000E-01
4.0000E+00	7.0000E-01
3.8000E+01	3.5000E-01
7.2000E+02	0.0000E+00

Pathway number 2: Filtered Intake to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%)		
		Aerosol	Elemental	Organic

0.0000E+00	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	2.7000E+03	9.8000E+01	8.9000E+01	8.9000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Unfiltered Inleakage to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	5.0000E+02	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 4: Control Room Exhaust to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	1.8500E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	3.2000E+03	1.0000E+02	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 5: Drywell to Void

Convection Data

Time (hr)	Flow Rate (% / day)
0.0000E+00	0.0000E+00
3.3300E-02	1.7520E+00
2.0000E+00	9.7200E-01
3.8000E+01	4.8600E-01
7.2000E+02	0.0000E+00

LOCATION DATA

Location Exclusion Area Boundary is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	4.2500E-04
1.0000E-01	5.3000E-05
5.0000E-01	8.8900E-06
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 Low Population Zone is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	4.8100E-05
1.0000E-01	1.7500E-05
5.0000E-01	8.8700E-06
2.0000E+00	3.9400E-06
8.0000E+00	2.6200E-06
2.4000E+01	1.0900E-06

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  9.6000E+01          3.0600E-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            1.1800E-03
  1.0000E-01            2.7200E-06
  2.0000E+00            1.4600E-08
  8.0000E+00            1.4600E-08
  2.4000E+01            1.4600E-08
  9.6000E+01            4.2100E-09
  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        1.0000E-02
  2.0000E+00        1.0000E-01
  4.0000E+00        1.0000E+00
  8.0000E+00        2.0000E+00
  2.4000E+01        4.0000E+00
  9.6000E+01        8.0000E+00
  7.2000E+02        0.0000E+00
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  4/16/2007  at 12:27:29
##########################################################################

     ####   #    #  #####  #####   #    #  #####
    #    #  #    #    #    #    #  #    #    #
    #    #  #    #    #    #    #  #    #    #
    #    #  #    #    #    #####   #    #    #
    #    #  #    #    #    #       #    #    #
    #    #  #    #    #    #       #    #    #
     ####    ####     #    #        ####     #

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

Exclusion Area Boundary Doses:

Time (h) =   0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)        0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)  0.0000E+00  0.0000E+00  0.0000E+00

Low Population Zone Doses:

Time (h) =   0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)        0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)  0.0000E+00  0.0000E+00  0.0000E+00

Control Room Doses:

Time (h) =   0.0333    Whole Body   Thyroid       TEDE
Delta dose (rem)        0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)  0.0000E+00  0.0000E+00  0.0000E+00

Drywell Compartment Nuclide Inventory:

Time (h) =   0.0333       Ci           kg          Atoms      Decay

Drywell Transport Group Inventory:
Time (h) =   0.0333    Atmosphere     Sump
Noble gases (atoms)    1.0005E+23  0.0000E+00
Elemental I (atoms)    7.0670E+20  4.0287E+19
Organic I (atoms)      2.3102E+19  0.0000E+00
Aerosols (kg)          6.7461E-01  0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)        9.7521E-05
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)  1.2462E-04
Total I (Ci)                                  2.6966E+06

                       Deposition Recirculating
Time (h) =   0.0333     Surfaces     Filter
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)          7.9473E-03  0.0000E+00

Drywell Leakage to  Environment Transport Group Inventory:
Time (h) =   0.0333  Leakage Transport

Noble gases (atoms)      0.0000E+00
```

```
Elemental I (atoms)       0.0000E+00
Organic I (atoms)         0.0000E+00
Aerosols (kg)             0.0000E+00

Drywell to Void Transport Group Inventory:
Time (h) =    0.0333  Leakage Transport

Noble gases (atoms)       0.0000E+00
Elemental I (atoms)       0.0000E+00
Organic I (atoms)         0.0000E+00
Aerosols (kg)             0.0000E+00

Exclusion Area Boundary Doses:

Time (h) =    0.0500    Whole Body   Thyroid       TEDE
Delta dose (rem)         2.5285E-03  4.3296E-01  2.1281E-02
Accumulated dose (rem)   2.5285E-03  4.3296E-01  2.1281E-02

Low Population Zone Doses:

Time (h) =    0.0500    Whole Body   Thyroid       TEDE
Delta dose (rem)         2.8617E-04  4.9001E-02  2.4085E-03
Accumulated dose (rem)   2.8617E-04  4.9001E-02  2.4085E-03

Control Room Doses:

Time (h) =    0.0500    Whole Body   Thyroid       TEDE
Delta dose (rem)         1.7123E-05  5.8049E-02  2.5313E-03
Accumulated dose (rem)   1.7123E-05  5.8049E-02  2.5313E-03

Drywell Compartment Nuclide Inventory:

Time (h) =    0.0500       Ci           kg          Atoms       Decay
Kr-85                   6.9607E+03  1.7742E-02  1.2570E+23  2.7216E+16
Kr-85m                  1.4551E+05  1.7681E-05  1.2527E+20  5.7054E+17
Kr-87                   2.8031E+05  9.8961E-06  6.8501E+19  1.1069E+18
Kr-88                   4.0132E+05  3.2005E-05  2.1902E+20  1.5761E+18
Rb-86                   1.1296E+03  1.3883E-05  9.7218E+19  4.4384E+15
I-131                   4.6423E+05  3.7446E-03  1.7214E+22  1.8255E+18
I-132                   6.6471E+05  6.4396E-05  2.9379E+20  2.6226E+18
I-133                   9.5847E+05  8.4610E-04  3.8311E+21  3.7711E+18
I-134                   1.0240E+06  3.8386E-05  1.7251E+20  4.0850E+18
I-135                   8.9248E+05  2.5413E-04  1.1337E+21  3.5160E+18
Xe-133                  9.6859E+05  5.1746E-03  2.3430E+22  3.7871E+18
Xe-135                  3.9445E+05  1.5446E-04  6.8902E+20  1.5393E+18
Cs-134                  1.2618E+05  9.7525E-02  4.3829E+23  4.9575E+17
Cs-136                  3.5129E+04  4.7931E-04  2.1224E+21  1.3802E+17
Cs-137                  7.8655E+04  9.0427E-01  3.9749E+24  3.0903E+17

Drywell Transport Group Inventory:
Time (h) =    0.0500    Atmosphere     Sump
Noble gases (atoms)     1.5023E+23  0.0000E+00
Elemental I (atoms)     1.0320E+21  8.9161E+19
Organic I (atoms)       3.4675E+19  0.0000E+00
Aerosols (kg)           1.0070E+00  0.0000E+00
Dose Effective (Ci/cc) I-131 (Thyroid)          1.4539E-04
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)    1.8571E-04
Total I (Ci)                                    4.0039E+06

                        Deposition Recirculating
Time (h) =    0.0500     Surfaces     Filter
```

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)	1.7847E-02	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:
Time (h) = 0.0500 Leakage Transport

Noble gases (atoms)	6.0955E+17
Elemental I (atoms)	4.2425E+15
Organic I (atoms)	1.4073E+14
Aerosols (kg)	4.0970E-06

Drywell to Void Transport Group Inventory:
Time (h) = 0.0500 Leakage Transport

Noble gases (atoms)	1.5256E+18
Elemental I (atoms)	1.0618E+16
Organic I (atoms)	3.5223E+14
Aerosols (kg)	1.0254E-05

Exclusion Area Boundary Doses:

Time (h) = 0.1000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.3300E-02	2.2995E+00	1.1295E-01
Accumulated dose (rem)	1.5828E-02	2.7324E+00	1.3423E-01

Low Population Zone Doses:

Time (h) = 0.1000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5052E-03	2.6024E-01	1.2783E-02
Accumulated dose (rem)	1.7914E-03	3.0925E-01	1.5192E-02

Control Room Doses:

Time (h) = 0.1000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.2879E-04	1.1277E+00	4.9188E-02
Accumulated dose (rem)	3.4592E-04	1.1857E+00	5.1719E-02

Drywell Compartment Nuclide Inventory:

Time (h) = 0.1000	Ci	kg	Atoms	Decay
Kr-85	1.3921E+04	3.5482E-02	2.5139E+23	1.0139E+17
Kr-85m	2.8877E+05	3.5089E-05	2.4860E+20	2.1145E+18
Kr-87	5.4554E+05	1.9259E-05	1.3331E+20	4.0495E+18
Kr-88	7.9287E+05	6.3231E-05	4.3271E+20	5.8239E+18
Rb-86	2.2199E+03	2.7283E-05	1.9105E+20	1.6339E+16
I-131	9.0969E+05	7.3377E-03	3.3732E+22	6.7072E+18
I-132	1.2929E+06	1.2526E-04	5.7146E+20	9.5892E+18
I-133	1.8754E+06	1.6555E-03	7.4960E+21	1.3842E+19
I-134	1.9292E+06	7.2317E-05	3.2500E+20	1.4624E+19
I-135	1.7400E+06	4.9547E-04	2.2102E+21	1.2875E+19
Xe-133	1.9371E+06	1.0349E-02	4.6858E+22	1.4108E+19
Xe-135	7.9162E+05	3.0999E-04	1.3828E+21	5.7475E+18
Cs-134	2.4798E+05	1.9167E-01	8.6138E+23	1.8251E+18
Cs-136	6.9032E+04	9.4189E-04	4.1707E+21	5.0811E+17
Cs-137	1.5458E+05	1.7772E+00	7.8120E+24	1.1377E+18

Drywell Transport Group Inventory:

Time (h) = 0.1000	Atmosphere	Sump
Noble gases (atoms)	3.0044E+23	0.0000E+00

Elemental I (atoms)	1.9024E+21	3.3776E+20	
Organic I (atoms)	6.9273E+19	0.0000E+00	
Aerosols (kg)	1.9791E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.8470E-04
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		3.6320E-04
Total I (Ci)			7.7472E+06

Time (h) = 0.1000	Deposition Surfaces	Recirculating Filter
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)	7.0562E-02	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:
Time (h) = 0.1000 Leakage Transport

Noble gases (atoms)	3.8957E+18
Elemental I (atoms)	2.5822E+16
Organic I (atoms)	8.9887E+14
Aerosols (kg)	2.5912E-05

Drywell to Void Transport Group Inventory:
Time (h) = 0.1000 Leakage Transport

Noble gases (atoms)	9.7504E+18
Elemental I (atoms)	6.4630E+16
Organic I (atoms)	2.2497E+15
Aerosols (kg)	6.4855E-05

Exclusion Area Boundary Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.4618E-02	8.2530E+00	4.0341E-01
Accumulated dose (rem)	6.0446E-02	1.0985E+01	5.3764E-01

Low Population Zone Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4733E-02	2.7250E+00	1.3320E-01
Accumulated dose (rem)	1.6524E-02	3.0343E+00	1.4839E-01

Control Room Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.6939E-03	6.1105E+00	2.6653E-01
Accumulated dose (rem)	2.0398E-03	7.2963E+00	3.1825E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 0.5000	Ci	kg	Atoms	Decay
Kr-85	6.9591E+04	1.7738E-01	1.2567E+24	2.3633E+18
Kr-85m	1.3569E+06	1.6488E-04	1.1682E+21	4.7304E+19
Kr-87	2.1929E+06	7.7417E-05	5.3588E+20	8.1797E+19
Kr-88	3.5949E+06	2.8669E-04	1.9619E+21	1.2725E+20
Rb-86	9.6805E+03	1.1897E-04	8.3310E+20	3.4772E+17
I-131	3.9059E+06	3.1506E-02	1.4483E+23	1.4110E+20
I-132	5.2581E+06	5.0940E-04	2.3240E+21	1.9456E+20
I-133	7.9564E+06	7.0236E-03	3.1802E+22	2.8893E+20
I-134	6.0455E+06	2.2662E-04	1.0185E+21	2.5155E+20
I-135	7.1739E+06	2.0428E-03	9.1124E+21	2.6379E+20

Xe-133	9.6813E+06	5.1722E-02	2.3419E+23	3.2881E+20
Xe-135	4.0483E+06	1.5853E-03	7.0716E+21	1.3618E+20
Cs-134	1.0820E+06	8.3630E-01	3.7585E+24	3.8856E+19
Cs-136	3.0095E+05	4.1062E-03	1.8183E+22	1.0811E+19
Cs-137	6.7450E+05	7.7545E+00	3.4087E+25	2.4221E+19

Drywell Transport Group Inventory:

Time (h) = 0.5000	Atmosphere	Sump	
Noble gases (atoms)	1.5016E+24	0.0000E+00	
Elemental I (atoms)	5.3808E+21	5.7512E+21	
Organic I (atoms)	3.4350E+20	0.0000E+00	
Aerosols (kg)	8.6351E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.2161E-03
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.5374E-03
Total I (Ci)			3.0340E+07

Time (h) = 0.5000	Deposition Surfaces	Recirculating Filter
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)	1.6108E+00	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 0.5000	Leakage Transport
Noble gases (atoms)	1.0903E+20
Elemental I (atoms)	4.9574E+17
Organic I (atoms)	2.5023E+16
Aerosols (kg)	6.6332E-04

Drywell to Void Transport Group Inventory:

Time (h) = 0.5000	Leakage Transport
Noble gases (atoms)	2.7287E+20
Elemental I (atoms)	1.2408E+18
Organic I (atoms)	6.2629E+16
Aerosols (kg)	1.6602E-03

Exclusion Area Boundary Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5461E-01	2.6729E+01	1.7031E+00
Accumulated dose (rem)	2.1506E-01	3.7715E+01	2.2407E+00

Low Population Zone Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5426E-01	2.6669E+01	1.6992E+00
Accumulated dose (rem)	1.7079E-01	2.9704E+01	1.8476E+00

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.1732E-03	3.8304E+00	1.7545E-01
Accumulated dose (rem)	3.2130E-03	1.1127E+01	4.9370E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
Co-58	1.0616E+03	3.3385E-05	3.4663E+20	1.1439E+17

Co-60	1.2715E+03	1.1249E-03	1.1290E+22	1.3699E+17
Kr-85	1.3911E+06	3.5456E+00	2.5120E+25	1.4920E+20
Kr-85m	2.1505E+07	2.6132E-03	1.8514E+22	2.5135E+21
Kr-87	1.9352E+07	6.8319E-04	4.7290E+21	2.8594E+21
Kr-88	4.9828E+07	3.9738E-03	2.7194E+22	6.1311E+21
Rb-86	4.1694E+04	5.1241E-04	3.5882E+21	5.6883E+18
Sr-89	1.5536E+06	5.3476E-02	3.6184E+23	1.6742E+20
Sr-90	1.7666E+05	1.2951E+00	8.6658E+24	1.9032E+19
Sr-91	1.8260E+06	5.0373E-04	3.3336E+21	2.0440E+20
Sr-92	1.3388E+06	1.0651E-04	6.9722E+20	1.6546E+20
Y-90	3.1171E+03	5.7293E-06	3.8336E+19	2.8811E+17
Y-91	1.9424E+04	7.9203E-04	5.2415E+21	2.0834E+18
Y-92	2.0508E+05	2.1313E-05	1.3951E+20	1.6686E+19
Y-93	2.1933E+04	6.5739E-06	4.2569E+19	2.4494E+18
Zr-95	2.4931E+04	1.1605E-03	7.3566E+21	2.6865E+18
Zr-97	2.3849E+04	1.2475E-05	7.7452E+19	2.6249E+18
Nb-95	2.5081E+04	6.4140E-04	4.0659E+21	2.7020E+18
Mo-99	3.4551E+05	7.2040E-04	4.3822E+21	3.7426E+19
Tc-99m	3.0866E+05	5.8700E-05	3.5707E+20	3.3254E+19
Ru-103	2.9155E+05	9.0336E-03	5.2817E+22	3.1421E+19
Ru-105	1.4787E+05	2.1998E-05	1.2617E+20	1.7305E+19
Ru-106	1.2019E+05	3.5925E-02	2.0410E+23	1.2949E+19
Rh-105	1.9054E+05	2.2574E-04	1.2947E+21	2.0562E+19
Sb-127	3.9647E+05	1.4846E-03	7.0398E+21	4.2879E+19
Sb-129	8.7091E+05	1.5487E-04	7.2299E+20	1.0216E+20
Te-127	3.9663E+05	1.5029E-04	7.1265E+20	4.2791E+19
Te-127m	5.3583E+04	5.6806E-03	2.6937E+22	5.7723E+18
Te-129	9.7354E+05	4.6487E-05	2.1702E+20	1.1080E+20
Te-129m	1.7616E+05	5.8476E-03	2.7299E+22	1.8977E+19
Te-131m	5.1340E+05	6.4384E-04	2.9597E+21	5.5979E+19
Te-132	5.2168E+06	1.7183E-02	7.8395E+22	5.6461E+20
I-131	2.0062E+07	1.6182E-01	7.4390E+23	2.6535E+21
I-132	2.4051E+07	2.3300E-03	1.0630E+22	3.3576E+21
I-133	3.9067E+07	3.4487E-02	1.5615E+23	5.2692E+21
I-134	9.5316E+06	3.5730E-04	1.6058E+21	2.2505E+21
I-135	3.1641E+07	9.0097E-03	4.0191E+22	4.4744E+21
Xe-133	1.9287E+08	1.0304E+00	4.6655E+24	2.0713E+22
Xe-135	8.1440E+07	3.1891E-02	1.4226E+23	8.7445E+21
Cs-134	4.6709E+06	3.6101E+00	1.6224E+25	6.3662E+20
Cs-136	1.2949E+06	1.7668E-02	7.8235E+22	1.7674E+20
Cs-137	2.9118E+06	3.3476E+01	1.4715E+26	3.9685E+20
Ba-139	1.0337E+06	6.3195E-05	2.7379E+20	1.4710E+20
Ba-140	2.7093E+06	3.7008E-02	1.5919E+23	2.9222E+20
La-140	5.9482E+04	1.0702E-04	4.6033E+20	5.2508E+18
La-141	1.8126E+04	3.2051E-06	1.3689E+19	2.1446E+18
La-142	1.0251E+04	7.1607E-07	3.0368E+18	1.4140E+18
Ce-141	6.2393E+04	2.1897E-03	9.3524E+21	6.7229E+18
Ce-143	5.8991E+04	8.8832E-05	3.7410E+20	6.4252E+18
Ce-144	4.9964E+04	1.5665E-02	6.5512E+22	5.3829E+18
Pr-143	2.3918E+04	3.5518E-04	1.4958E+21	2.5747E+18
Nd-147	1.0164E+04	1.2563E-04	5.1468E+20	1.0964E+18
Np-239	7.3185E+05	3.1547E-03	7.9489E+21	7.9348E+19
Pu-238	2.4960E+02	1.4579E-02	3.6891E+22	2.6889E+16
Pu-239	1.6681E+01	2.6838E-01	6.7624E+23	1.7970E+15
Pu-240	1.7899E+01	7.8552E-02	1.9711E+23	1.9283E+15
Pu-241	8.5911E+03	8.3398E-02	2.0840E+23	9.2553E+17
Am-241	5.2984E+00	1.5437E-03	3.8575E+21	5.7074E+14
Cm-242	1.3270E+03	4.0038E-04	9.9634E+20	1.4297E+17
Cm-244	1.4464E+02	1.7878E-03	4.4125E+21	1.5582E+16

Drywell Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump	
Noble gases (atoms)	2.9978E+25	0.0000E+00	
Elemental I (atoms)	1.0734E+22	5.5064E+22	
Organic I (atoms)	2.0091E+21	0.0000E+00	
Aerosols (kg)	3.9247E+01	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		6.1375E-03
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		7.5884E-03
Total I (Ci)			1.2435E+08

Time (h) = 2.0000	Deposition Surfaces	Recirculating Filter
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)	1.4454E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 2.0000	Leakage Transport
Noble gases (atoms)	6.9995E+21
Elemental I (atoms)	4.7763E+18
Organic I (atoms)	5.4263E+17
Aerosols (kg)	1.1530E-02

Drywell to Void Transport Group Inventory:

Time (h) = 2.0000	Leakage Transport
Noble gases (atoms)	1.7519E+22
Elemental I (atoms)	1.1954E+19
Organic I (atoms)	1.3581E+18
Aerosols (kg)	2.8857E-02

Exclusion Area Boundary Doses:

Time (h) = 3.8000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.6880E-01	2.3375E+01	1.5860E+00
Accumulated dose (rem)	3.8386E-01	6.1090E+01	3.8267E+00

Low Population Zone Doses:

Time (h) = 3.8000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.4812E-02	1.0360E+01	7.0292E-01
Accumulated dose (rem)	2.4560E-01	4.0063E+01	2.5506E+00

Control Room Doses:

Time (h) = 3.8000	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.9194E-04	1.3538E+00	7.0329E-02
Accumulated dose (rem)	3.8050E-03	1.2480E+01	5.6403E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 3.8000	Ci	kg	Atoms	Decay
Co-58	1.7144E+02	5.3916E-06	5.5981E+19	2.2561E+17
Co-60	2.0550E+02	1.8180E-04	1.8247E+21	2.7025E+17
Kr-85	1.3894E+06	3.5413E+00	2.5089E+25	4.8250E+20
Kr-85m	1.6257E+07	1.9755E-03	1.3996E+22	7.0110E+21
Kr-87	7.2456E+06	2.5580E-04	1.7706E+21	5.8139E+21
Kr-88	3.2073E+07	2.5578E-03	1.7504E+22	1.5793E+22
Rb-86	6.7197E+03	8.2585E-05	5.7830E+20	1.0054E+19
Sr-89	2.5083E+05	8.6337E-03	5.8420E+22	3.3018E+20

Sr-90	2.8551E+04	2.0931E-01	1.4005E+24	3.7546E+19
Sr-91	2.5880E+05	7.1392E-05	4.7246E+20	3.8713E+20
Sr-92	1.3654E+05	1.0863E-05	7.1107E+19	2.8542E+20
Y-90	1.0456E+03	1.9218E-06	1.2859E+19	7.3051E+17
Y-91	3.2396E+03	1.3210E-04	8.7420E+20	4.1410E+18
Y-92	7.4618E+04	7.7547E-06	5.0761E+19	4.8818E+19
Y-93	3.1328E+03	9.3899E-07	6.0804E+18	4.6502E+18
Zr-95	4.0260E+03	1.8741E-04	1.1880E+21	5.2986E+18
Zr-97	3.5801E+03	1.8727E-06	1.1627E+19	5.0599E+18
Nb-95	4.0534E+03	1.0366E-04	6.5711E+20	5.3304E+18
Mo-99	5.4795E+04	1.1425E-04	6.9497E+20	7.3395E+19
Tc-99m	4.9708E+04	9.4534E-06	5.7505E+19	6.5387E+19
Ru-103	4.7057E+04	1.4581E-03	8.5249E+21	6.1962E+19
Ru-105	1.8044E+04	2.6844E-06	1.5396E+19	3.1365E+19
Ru-106	1.9422E+04	5.8054E-03	3.2982E+22	2.5545E+19
Rh-105	3.0449E+04	3.6075E-05	2.0690E+20	4.0448E+19
Sb-127	6.3217E+04	2.3672E-04	1.1225E+21	8.4230E+19
Sb-129	1.0545E+05	1.8751E-05	8.7537E+19	1.8475E+20
Te-127	6.3701E+04	2.4138E-05	1.1446E+20	8.4122E+19
Te-127m	8.6613E+03	9.1823E-04	4.3541E+21	1.1388E+19
Te-129	1.2852E+05	6.1368E-06	2.8649E+19	2.0384E+20
Te-129m	2.8468E+04	9.4500E-04	4.4116E+21	3.7438E+19
Te-131m	7.9594E+04	9.9816E-05	4.5886E+20	1.0900E+20
Te-132	8.2978E+05	2.7332E-03	1.2469E+22	1.1082E+21
I-131	3.2286E+06	2.6043E-02	1.1972E+23	4.7475E+21
I-132	2.6209E+06	2.5391E-04	1.1584E+21	5.5367E+21
I-133	5.9588E+06	5.2602E-03	2.3818E+22	9.2702E+21
I-134	3.7195E+05	1.3943E-05	6.2661E+19	2.8919E+21
I-135	4.2430E+06	1.2082E-03	5.3895E+21	7.5730E+21
Xe-133	1.9089E+08	1.0198E+00	4.6175E+24	6.6720E+22
Xe-135	7.2289E+07	2.8307E-02	1.2627E+23	2.7194E+22
Cs-134	7.5485E+05	5.8342E-01	2.6220E+24	1.1261E+21
Cs-136	2.0845E+05	2.8442E-03	1.2594E+22	3.1226E+20
Cs-137	4.7060E+05	5.4103E+00	2.3782E+25	7.0202E+20
Ba-139	6.7570E+04	4.1310E-06	1.7897E+19	2.2776E+20
Ba-140	4.3609E+05	5.9568E-03	2.5623E+22	5.7575E+20
La-140	2.2662E+04	4.0771E-05	1.7538E+20	1.4280E+19
La-141	2.1326E+03	3.7710E-07	1.6106E+18	3.8471E+18
La-142	7.3750E+02	5.1520E-08	2.1849E+17	2.2372E+18
Ce-141	1.0072E+04	3.5348E-04	1.5097E+21	1.3259E+19
Ce-143	9.1803E+03	1.3824E-05	5.8217E+19	1.2525E+19
Ce-144	8.0736E+03	2.5313E-03	1.0586E+22	1.0619E+19
Pr-143	3.8865E+03	5.7716E-05	2.4306E+20	5.0856E+18
Nd-147	1.6348E+03	2.0209E-05	8.2789E+19	2.1598E+18
Np-239	1.1570E+05	4.9872E-04	1.2566E+21	1.5545E+20
Pu-238	4.0339E+01	2.3563E-03	5.9622E+21	5.3048E+16
Pu-239	2.6967E+00	4.3386E-02	1.0932E+23	3.5454E+15
Pu-240	2.8929E+00	1.2695E-02	3.1856E+22	3.8042E+15
Pu-241	1.3885E+03	1.3479E-02	3.3680E+22	1.8259E+18
Am-241	8.5677E-01	2.4963E-04	6.2377E+20	1.1261E+15
Cm-242	2.1440E+02	6.4688E-05	1.6098E+20	2.8203E+17
Cm-244	2.3376E+01	2.8894E-04	7.1314E+20	3.0741E+16

Drywell Transport Group Inventory:

Time (h) = 3.8000	Atmosphere	Sump	
Noble gases (atoms)	2.9866E+25	0.0000E+00	
Elemental I (atoms)	3.6682E+20	6.5347E+22	
Organic I (atoms)	1.9531E+21	0.0000E+00	
Aerosols (kg)	6.3420E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		9.6823E-04
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.1716E-03

Total I (Ci) 1.6423E+07

Time (h) = 3.8000	Deposition Surfaces	Recirculating Filter
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)	4.7333E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:
Time (h) = 3.8000 Leakage Transport

Noble gases (atoms)	2.2710E+22
Elemental I (atoms)	6.3888E+18
Organic I (atoms)	1.5830E+18
Aerosols (kg)	2.1007E-02

Drywell to Void Transport Group Inventory:
Time (h) = 3.8000 Leakage Transport

Noble gases (atoms)	3.9334E+22
Elemental I (atoms)	1.4194E+19
Organic I (atoms)	2.8027E+18
Aerosols (kg)	4.2018E-02

Exclusion Area Boundary Doses:

Time (h) = 3.8500	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.8309E-03	2.1954E-01	1.6205E-02
Accumulated dose (rem)	3.8669E-01	6.1310E+01	3.8429E+00

Low Population Zone Doses:

Time (h) = 3.8500	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2546E-03	9.7298E-02	7.1819E-03
Accumulated dose (rem)	2.4685E-01	4.0161E+01	2.5577E+00

Control Room Doses:

Time (h) = 3.8500	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.1002E-06	1.1600E-02	6.0541E-04
Accumulated dose (rem)	3.8091E-03	1.2492E+01	5.6464E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 3.8500	Ci	kg	Atoms	Decay
Co-58	1.6298E+02	5.1253E-06	5.3216E+19	2.2670E+17
Co-60	1.9535E+02	1.7282E-04	1.7346E+21	2.7155E+17
Kr-85	1.3893E+06	3.5411E+00	2.5089E+25	4.9175E+20
Kr-85m	1.6131E+07	1.9602E-03	1.3888E+22	7.1189E+21
Kr-87	7.0506E+06	2.4891E-04	1.7230E+21	5.8615E+21
Kr-88	3.1683E+07	2.5267E-03	1.7291E+22	1.6006E+22
Rb-86	6.3875E+03	7.8502E-05	5.4971E+20	1.0096E+19
Sr-89	2.3844E+05	8.2073E-03	5.5534E+22	3.3177E+20
Sr-90	2.7142E+04	1.9898E-01	1.3314E+24	3.7727E+19
Sr-91	2.4513E+05	6.7621E-05	4.4750E+20	3.8877E+20
Sr-92	1.2815E+05	1.0196E-05	6.6738E+19	2.8627E+20
Y-90	1.0081E+03	1.8529E-06	1.2398E+19	7.3713E+17
Y-91	3.0821E+03	1.2568E-04	8.3171E+20	4.1616E+18
Y-92	7.1506E+04	7.4313E-06	4.8644E+19	4.9288E+19
Y-93	2.9679E+03	8.8958E-07	5.7604E+18	4.6700E+18

Zr-95	3.8272E+03	1.7815E-04	1.1293E+21	5.3241E+18
Zr-97	3.3964E+03	1.7766E-06	1.1030E+19	5.0825E+18
Nb-95	3.8533E+03	9.8542E-05	6.2467E+20	5.3561E+18
Mo-99	5.2063E+04	1.0855E-04	6.6032E+20	7.3741E+19
Tc-99m	4.7247E+04	8.9853E-06	5.4657E+19	6.5701E+19
Ru-103	4.4733E+04	1.3860E-03	8.1037E+21	6.2260E+19
Ru-105	1.7020E+04	2.5320E-06	1.4522E+19	3.1478E+19
Ru-106	1.8463E+04	5.5188E-03	3.1353E+22	2.5668E+19
Rh-105	2.8935E+04	3.4280E-05	1.9661E+20	4.0640E+19
Sb-127	6.0073E+04	2.2495E-04	1.0667E+21	8.4631E+19
Sb-129	9.9440E+04	1.7683E-05	8.2551E+19	1.8541E+20
Te-127	6.0545E+04	2.2942E-05	1.0879E+20	8.4524E+19
Te-127m	8.2338E+03	8.7291E-04	4.1392E+21	1.1443E+19
Te-129	1.2140E+05	5.7969E-06	2.7062E+19	2.0465E+20
Te-129m	2.7063E+04	8.9834E-04	4.1938E+21	3.7618E+19
Te-131m	7.5578E+04	9.4779E-05	4.3571E+20	1.0950E+20
Te-132	7.8847E+05	2.5971E-03	1.1849E+22	1.1135E+21
I-131	3.0705E+06	2.4767E-02	1.1386E+23	4.7680E+21
I-132	2.4675E+06	2.3905E-04	1.0906E+21	5.5532E+21
I-133	5.6585E+06	4.9951E-03	2.2617E+22	9.3079E+21
I-134	3.4008E+05	1.2748E-05	5.7292E+19	2.8942E+21
I-135	4.0147E+06	1.1432E-03	5.0996E+21	7.5998E+21
Xe-133	1.9083E+08	1.0195E+00	4.6161E+24	6.7991E+22
Xe-135	7.2025E+07	2.8204E-02	1.2581E+23	2.7675E+22
Cs-134	7.1758E+05	5.5462E-01	2.4925E+24	1.1309E+21
Cs-136	1.9814E+05	2.7035E-03	1.1971E+22	3.1358E+20
Cs-137	4.4737E+05	5.1432E+00	2.2608E+25	7.0500E+20
Ba-139	6.2639E+04	3.8295E-06	1.6591E+19	2.2818E+20
Ba-140	4.1451E+05	5.6621E-03	2.4356E+22	5.7851E+20
La-140	2.1881E+04	3.9367E-05	1.6934E+20	1.4423E+19
La-141	2.0096E+03	3.5534E-07	1.5177E+18	3.8605E+18
La-142	6.8551E+02	4.7888E-08	2.0309E+17	2.2418E+18
Ce-141	9.5742E+03	3.3602E-04	1.4351E+21	1.3323E+19
Ce-143	8.7180E+03	1.3128E-05	5.5285E+19	1.2583E+19
Ce-144	7.6750E+03	2.4063E-03	1.0063E+22	1.0670E+19
Pr-143	3.6952E+03	5.4875E-05	2.3109E+20	5.1102E+18
Nd-147	1.5539E+03	1.9208E-05	7.8691E+19	2.1701E+18
Np-239	1.0992E+05	4.7381E-04	1.1939E+21	1.5618E+20
Pu-238	3.8348E+01	2.2400E-03	5.6679E+21	5.3303E+16
Pu-239	2.5636E+00	4.1244E-02	1.0392E+23	3.5624E+15
Pu-240	2.7501E+00	1.2069E-02	3.0283E+22	3.8226E+15
Pu-241	1.3199E+03	1.2813E-02	3.2018E+22	1.8347E+18
Am-241	8.1448E-01	2.3731E-04	5.9299E+20	1.1315E+15
Cm-242	2.0381E+02	6.1494E-05	1.5303E+20	2.8338E+17
Cm-244	2.2222E+01	2.7468E-04	6.7793E+20	3.0889E+16

Drywell Transport Group Inventory:

Time (h) = 3.8500	Atmosphere	Sump	
Noble gases (atoms)	2.9863E+25	0.0000E+00	
Elemental I (atoms)	3.3400E+20	6.5379E+22	
Organic I (atoms)	1.9517E+21	0.0000E+00	
Aerosols (kg)	6.0289E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		9.2032E-04
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.1131E-03
Total I (Ci)			1.5551E+07

Time (h) = 3.8500	Deposition Surfaces	Recirculating Filter
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) 4.7646E+01 0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:
Time (h) = 3.8500 Leakage Transport

Noble gases (atoms)	2.3145E+22
Elemental I (atoms)	6.3939E+18
Organic I (atoms)	1.6115E+18
Aerosols (kg)	2.1098E-02

Drywell to Void Transport Group Inventory:
Time (h) = 3.8500 Leakage Transport

Noble gases (atoms)	3.9939E+22
Elemental I (atoms)	1.4201E+19
Organic I (atoms)	2.8423E+18
Aerosols (kg)	4.2143E-02

Exclusion Area Boundary Doses:

Time (h) = 3.9000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.7781E-03	2.0868E-01	1.5490E-02
Accumulated dose (rem)	3.8947E-01	6.1518E+01	3.8584E+00

Low Population Zone Doses:

Time (h) = 3.9000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2312E-03	9.2484E-02	6.8652E-03
Accumulated dose (rem)	2.4809E-01	4.0253E+01	2.5646E+00

Control Room Doses:

Time (h) = 3.9000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.8561E-06	1.0980E-02	5.7317E-04
Accumulated dose (rem)	3.8129E-03	1.2503E+01	5.6521E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 3.9000	Ci	kg	Atoms	Decay
Co-58	1.5493E+02	4.8722E-06	5.0588E+19	2.2773E+17
Co-60	1.8571E+02	1.6429E-04	1.6490E+21	2.7278E+17
Kr-85	1.3893E+06	3.5410E+00	2.5088E+25	5.0101E+20
Kr-85m	1.6007E+07	1.9450E-03	1.3780E+22	7.2259E+21
Kr-87	6.8608E+06	2.4221E-04	1.6766E+21	5.9078E+21
Kr-88	3.1297E+07	2.4959E-03	1.7081E+22	1.6215E+22
Rb-86	6.0717E+03	7.4621E-05	5.2253E+20	1.0137E+19
Sr-89	2.2666E+05	7.8019E-03	5.2791E+22	3.3328E+20
Sr-90	2.5802E+04	1.8915E-01	1.2657E+24	3.7899E+19
Sr-91	2.3218E+05	6.4049E-05	4.2386E+20	3.9031E+20
Sr-92	1.2028E+05	9.5691E-06	6.2637E+19	2.8708E+20
Y-90	9.7179E+02	1.7862E-06	1.1952E+19	7.4351E+17
Y-91	2.9323E+03	1.1957E-04	7.9128E+20	4.1811E+18
Y-92	6.8499E+04	7.1188E-06	4.6598E+19	4.9738E+19
Y-93	2.8117E+03	8.4277E-07	5.4573E+18	4.6887E+18
Zr-95	3.6382E+03	1.6935E-04	1.0735E+21	5.3483E+18
Zr-97	3.2221E+03	1.6855E-06	1.0464E+19	5.1040E+18
Nb-95	3.6631E+03	9.3678E-05	5.9383E+20	5.3805E+18
Mo-99	4.9467E+04	1.0314E-04	6.2739E+20	7.4071E+19
Tc-99m	4.4907E+04	8.5404E-06	5.1951E+19	6.5999E+19
Ru-103	4.2523E+04	1.3176E-03	7.7034E+21	6.2543E+19
Ru-105	1.6054E+04	2.3883E-06	1.3698E+19	3.1586E+19

Ru-106	1.7552E+04	5.2463E-03	2.9806E+22	2.5784E+19
Rh-105	2.7495E+04	3.2575E-05	1.8683E+20	4.0823E+19
Sb-127	5.7086E+04	2.1377E-04	1.0136E+21	8.5011E+19
Sb-129	9.3776E+04	1.6676E-05	7.7849E+19	1.8604E+20
Te-127	5.7545E+04	2.1805E-05	1.0340E+20	8.4907E+19
Te-127m	7.8273E+03	8.2982E-04	3.9349E+21	1.1495E+19
Te-129	1.1468E+05	5.4758E-06	2.5563E+19	2.0540E+20
Te-129m	2.5727E+04	8.5399E-04	3.9867E+21	3.7790E+19
Te-131m	7.1764E+04	8.9997E-05	4.1372E+20	1.0998E+20
Te-132	7.4921E+05	2.4678E-03	1.1259E+22	1.1185E+21
I-131	2.9202E+06	2.3555E-02	1.0828E+23	4.7874E+21
I-132	2.3233E+06	2.2508E-04	1.0269E+21	5.5687E+21
I-133	5.3735E+06	4.7435E-03	2.1478E+22	9.3437E+21
I-134	3.1095E+05	1.1656E-05	5.2384E+19	2.8963E+21
I-135	3.7989E+06	1.0817E-03	4.8255E+21	7.6252E+21
Xe-133	1.9077E+08	1.0192E+00	4.6147E+24	6.9262E+22
Xe-135	7.1760E+07	2.8100E-02	1.2535E+23	2.8153E+22
Cs-134	6.8216E+05	5.2724E-01	2.3695E+24	1.1354E+21
Cs-136	1.8834E+05	2.5697E-03	1.1379E+22	3.1484E+20
Cs-137	4.2528E+05	4.8893E+00	2.1492E+25	7.0783E+20
Ba-139	5.8068E+04	3.5501E-06	1.5381E+19	2.2857E+20
Ba-140	3.9401E+05	5.3819E-03	2.3151E+22	5.8113E+20
La-140	2.1122E+04	3.8002E-05	1.6347E+20	1.4562E+19
La-141	1.8936E+03	3.3483E-07	1.4301E+18	3.8732E+18
La-142	6.3719E+02	4.4512E-08	1.8877E+17	2.2461E+18
Ce-141	9.1013E+03	3.1942E-04	1.3642E+21	1.3384E+19
Ce-143	8.2789E+03	1.2467E-05	5.2501E+19	1.2638E+19
Ce-144	7.2961E+03	2.2875E-03	9.5665E+21	1.0719E+19
Pr-143	3.5133E+03	5.2173E-05	2.1972E+20	5.1336E+18
Nd-147	1.4770E+03	1.8258E-05	7.4797E+19	2.1800E+18
Np-239	1.0443E+05	4.5014E-04	1.1342E+21	1.5688E+20
Pu-238	3.6455E+01	2.1294E-03	5.3881E+21	5.3546E+16
Pu-239	2.4371E+00	3.9208E-02	9.8794E+22	3.5787E+15
Pu-240	2.6143E+00	1.1473E-02	2.8788E+22	3.8400E+15
Pu-241	1.2548E+03	1.2181E-02	3.0437E+22	1.8430E+18
Am-241	7.7429E-01	2.2560E-04	5.6373E+20	1.1367E+15
Cm-242	1.9375E+02	5.8458E-05	1.4547E+20	2.8467E+17
Cm-244	2.1125E+01	2.6112E-04	6.4446E+20	3.1030E+16

Drywell Transport Group Inventory:

Time (h) = 3.9000	Atmosphere	Sump	
Noble gases (atoms)	2.9860E+25	0.0000E+00	
Elemental I (atoms)	3.0412E+20	6.5409E+22	
Organic I (atoms)	1.9503E+21	0.0000E+00	
Aerosols (kg)	5.7312E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		8.7482E-04
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.0576E-03
Total I (Ci)			1.4727E+07

Time (h) = 3.9000	Deposition Surfaces	Recirculating Filter
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)	4.7943E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 3.9000	Leakage Transport
Noble gases (atoms)	2.3581E+22
Elemental I (atoms)	6.3986E+18

Organic I (atoms) 1.6399E+18
Aerosols (kg) 2.1183E-02

Drywell to Void Transport Group Inventory:
Time (h) = 3.9000 Leakage Transport

Noble gases (atoms) 4.0543E+22
Elemental I (atoms) 1.4207E+19
Organic I (atoms) 2.8818E+18
Aerosols (kg) 4.2262E-02

Exclusion Area Boundary Doses:

Time (h) = 3.9500	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.7272E-03	1.9836E-01	1.4811E-02
Accumulated dose (rem)	3.9220E-01	6.1717E+01	3.8732E+00

Low Population Zone Doses:

Time (h) = 3.9500	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2087E-03	8.7911E-02	6.5640E-03
Accumulated dose (rem)	2.4929E-01	4.0341E+01	2.5712E+00

Control Room Doses:

Time (h) = 3.9500	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.6272E-06	1.0393E-02	5.4266E-04
Accumulated dose (rem)	3.8165E-03	1.2513E+01	5.6575E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 3.9500	Ci	kg	Atoms	Decay
Co-58	1.4728E+02	4.6316E-06	4.8090E+19	2.2871E+17
Co-60	1.7654E+02	1.5618E-04	1.5676E+21	2.7396E+17
Kr-85	1.3892E+06	3.5409E+00	2.5087E+25	5.1026E+20
Kr-85m	1.5883E+07	1.9300E-03	1.3674E+22	7.3321E+21
Kr-87	6.6761E+06	2.3569E-04	1.6315E+21	5.9529E+21
Kr-88	3.0917E+07	2.4656E-03	1.6873E+22	1.6422E+22
Rb-86	5.7715E+03	7.0932E-05	4.9670E+20	1.0175E+19
Sr-89	2.1547E+05	7.4165E-03	5.0184E+22	3.3471E+20
Sr-90	2.4528E+04	1.7982E-01	1.2032E+24	3.8062E+19
Sr-91	2.1991E+05	6.0665E-05	4.0147E+20	3.9178E+20
Sr-92	1.1289E+05	8.9811E-06	5.8789E+19	2.8784E+20
Y-90	9.3660E+02	1.7215E-06	1.1519E+19	7.4966E+17
Y-91	2.7898E+03	1.1376E-04	7.5282E+20	4.1996E+18
Y-92	6.5596E+04	6.8170E-06	4.4623E+19	5.0170E+19
Y-93	2.6638E+03	7.9842E-07	5.1701E+18	4.7065E+18
Zr-95	3.4585E+03	1.6099E-04	1.0205E+21	5.3713E+18
Zr-97	3.0568E+03	1.5990E-06	9.9272E+18	5.1244E+18
Nb-95	3.4823E+03	8.9053E-05	5.6452E+20	5.4037E+18
Mo-99	4.7000E+04	9.7996E-05	5.9611E+20	7.4384E+19
Tc-99m	4.2684E+04	8.1175E-06	4.9378E+19	6.6283E+19
Ru-103	4.0422E+04	1.2525E-03	7.3229E+21	6.2812E+19
Ru-105	1.5143E+04	2.2527E-06	1.2920E+19	3.1687E+19
Ru-106	1.6685E+04	4.9873E-03	2.8334E+22	2.5896E+19
Rh-105	2.6127E+04	3.0954E-05	1.7753E+20	4.0997E+19
Sb-127	5.4248E+04	2.0314E-04	9.6324E+20	8.5372E+19
Sb-129	8.8434E+04	1.5726E-05	7.3415E+19	1.8663E+20
Te-127	5.4694E+04	2.0725E-05	9.8272E+19	8.5271E+19
Te-127m	7.4410E+03	7.8886E-04	3.7406E+21	1.1545E+19
Te-129	1.0832E+05	5.1725E-06	2.4147E+19	2.0612E+20

Te-129m	2.4456E+04	8.1182E-04	3.7899E+21	3.7953E+19
Te-131m	6.8142E+04	8.5455E-05	3.9284E+20	1.1043E+20
Te-132	7.1191E+05	2.3450E-03	1.0698E+22	1.1232E+21
I-131	2.7773E+06	2.2403E-02	1.0299E+23	4.8059E+21
I-132	2.1877E+06	2.1195E-04	9.6695E+20	5.5833E+21
I-133	5.1031E+06	4.5048E-03	2.0397E+22	9.3778E+21
I-134	2.8433E+05	1.0658E-05	4.7899E+19	2.8982E+21
I-135	3.5948E+06	1.0236E-03	4.5663E+21	7.6492E+21
Xe-133	1.9071E+08	1.0189E+00	4.6133E+24	7.0532E+22
Xe-135	7.1496E+07	2.7997E-02	1.2489E+23	2.8630E+22
Cs-134	6.4848E+05	5.0121E-01	2.2525E+24	1.1398E+21
Cs-136	1.7902E+05	2.4426E-03	1.0816E+22	3.1603E+20
Cs-137	4.0429E+05	4.6480E+00	2.0431E+25	7.1053E+20
Ba-139	5.3831E+04	3.2910E-06	1.4258E+19	2.2893E+20
Ba-140	3.7451E+05	5.1157E-03	2.2005E+22	5.8363E+20
La-140	2.0385E+04	3.6675E-05	1.5776E+20	1.4695E+19
La-141	1.7843E+03	3.1551E-07	1.3475E+18	3.8851E+18
La-142	5.9227E+02	4.1374E-08	1.7546E+17	2.2501E+18
Ce-141	8.6517E+03	3.0364E-04	1.2968E+21	1.3441E+19
Ce-143	7.8620E+03	1.1839E-05	4.9857E+19	1.2691E+19
Ce-144	6.9358E+03	2.1746E-03	9.0942E+21	1.0765E+19
Pr-143	3.3403E+03	4.9605E-05	2.0890E+20	5.1559E+18
Nd-147	1.4039E+03	1.7354E-05	7.1095E+19	2.1893E+18
Np-239	9.9213E+04	4.2766E-04	1.0776E+21	1.5754E+20
Pu-238	3.4655E+01	2.0243E-03	5.1221E+21	5.3777E+16
Pu-239	2.3168E+00	3.7273E-02	9.3918E+22	3.5941E+15
Pu-240	2.4853E+00	1.0907E-02	2.7367E+22	3.8565E+15
Pu-241	1.1928E+03	1.1579E-02	2.8935E+22	1.8510E+18
Am-241	7.3608E-01	2.1446E-04	5.3591E+20	1.1416E+15
Cm-242	1.8418E+02	5.5572E-05	1.3829E+20	2.8590E+17
Cm-244	2.0082E+01	2.4823E-04	6.1265E+20	3.1163E+16

Drywell Transport Group Inventory:

Time (h) = 3.9500	Atmosphere	Sump	
Noble gases (atoms)	2.9857E+25	0.0000E+00	
Elemental I (atoms)	2.7691E+20	6.5436E+22	
Organic I (atoms)	1.9489E+21	0.0000E+00	
Aerosols (kg)	5.4483E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		8.3160E-04
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.0048E-03
Total I (Ci)			1.3947E+07

Time (h) = 3.9500	Deposition Surfaces	Recirculating Filter
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)	4.8226E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 3.9500	Leakage Transport
Noble gases (atoms)	2.4016E+22
Elemental I (atoms)	6.4028E+18
Organic I (atoms)	1.6684E+18
Aerosols (kg)	2.1265E-02

Drywell to Void Transport Group Inventory:

Time (h) = 3.9500	Leakage Transport
Noble gases (atoms)	4.1148E+22

Elemental I (atoms) 1.4213E+19
Organic I (atoms) 2.9213E+18
Aerosols (kg) 4.2375E-02

Exclusion Area Boundary Doses:

Time (h) = 4.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.6781E-03	1.8856E-01	1.4164E-02
Accumulated dose (rem)	3.9487E-01	6.1905E+01	3.8874E+00

Low Population Zone Doses:

Time (h) = 4.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.1869E-03	8.3568E-02	6.2775E-03
Accumulated dose (rem)	2.5048E-01	4.0425E+01	2.5774E+00

Control Room Doses:

Time (h) = 4.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.4125E-06	9.8377E-03	5.1377E-04
Accumulated dose (rem)	3.8200E-03	1.2523E+01	5.6627E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 4.0000	Ci	kg	Atoms	Decay
Co-58	1.4000E+02	4.4029E-06	4.5715E+19	2.2964E+17
Co-60	1.6783E+02	1.4847E-04	1.4902E+21	2.7508E+17
Kr-85	1.3892E+06	3.5408E+00	2.5086E+25	5.1951E+20
Kr-85m	1.5760E+07	1.9150E-03	1.3568E+22	7.4375E+21
Kr-87	6.4964E+06	2.2935E-04	1.5875E+21	5.9968E+21
Kr-88	3.0541E+07	2.4356E-03	1.6668E+22	1.6627E+22
Rb-86	5.4862E+03	6.7425E-05	4.7214E+20	1.0212E+19
Sr-89	2.0482E+05	7.0502E-03	4.7705E+22	3.3608E+20
Sr-90	2.3317E+04	1.7094E-01	1.1438E+24	3.8217E+19
Sr-91	2.0829E+05	5.7460E-05	3.8026E+20	3.9317E+20
Sr-92	1.0595E+05	8.4293E-06	5.5176E+19	2.8855E+20
Y-90	9.0251E+02	1.6588E-06	1.1100E+19	7.5559E+17
Y-91	2.6542E+03	1.0823E-04	7.1622E+20	4.2173E+18
Y-92	6.2794E+04	6.5258E-06	4.2717E+19	5.0583E+19
Y-93	2.5236E+03	7.5641E-07	4.8980E+18	4.7233E+18
Zr-95	3.2877E+03	1.5304E-04	9.7012E+20	5.3932E+18
Zr-97	2.8999E+03	1.5169E-06	9.4178E+18	5.1437E+18
Nb-95	3.3104E+03	8.4657E-05	5.3665E+20	5.4257E+18
Mo-99	4.4657E+04	9.3109E-05	5.6638E+20	7.4682E+19
Tc-99m	4.0570E+04	7.7155E-06	4.6933E+19	6.6552E+19
Ru-103	3.8425E+04	1.1906E-03	6.9611E+21	6.3068E+19
Ru-105	1.4283E+04	2.1249E-06	1.2187E+19	3.1782E+19
Ru-106	1.5862E+04	4.7411E-03	2.6935E+22	2.6001E+19
Rh-105	2.4827E+04	2.9414E-05	1.6870E+20	4.1163E+19
Sb-127	5.1551E+04	1.9304E-04	9.1535E+20	8.5716E+19
Sb-129	8.3397E+04	1.4830E-05	6.9233E+19	1.8719E+20
Te-127	5.1984E+04	1.9698E-05	9.3403E+19	8.5616E+19
Te-127m	7.0737E+03	7.4992E-04	3.5560E+21	1.1592E+19
Te-129	1.0232E+05	4.8860E-06	2.2809E+19	2.0679E+20
Te-129m	2.3249E+04	7.7174E-04	3.6027E+21	3.8107E+19
Te-131m	6.4704E+04	8.1143E-05	3.7302E+20	1.1086E+20
Te-132	6.7647E+05	2.2282E-03	1.0166E+22	1.1277E+21
I-131	2.6416E+06	2.1308E-02	9.7952E+22	4.8235E+21
I-132	2.0603E+06	1.9960E-04	9.1060E+20	5.5971E+21
I-133	4.8464E+06	4.2782E-03	1.9372E+22	9.4101E+21
I-134	2.5999E+05	9.7461E-06	4.3800E+19	2.9000E+21

I-135	3.4019E+06	9.6868E-04	4.3211E+21	7.6719E+21
Xe-133	1.9065E+08	1.0186E+00	4.6119E+24	7.1802E+22
Xe-135	7.1233E+07	2.7894E-02	1.2443E+23	2.9106E+22
Cs-134	6.1647E+05	4.7647E-01	2.1413E+24	1.1439E+21
Cs-136	1.7016E+05	2.3218E-03	1.0281E+22	3.1716E+20
Cs-137	3.8433E+05	4.4185E+00	1.9423E+25	7.1308E+20
Ba-139	4.9903E+04	3.0509E-06	1.3218E+19	2.2927E+20
Ba-140	3.5598E+05	4.8626E-03	2.0917E+22	5.8600E+20
La-140	1.9668E+04	3.5385E-05	1.5221E+20	1.4824E+19
La-141	1.6813E+03	2.9730E-07	1.2698E+18	3.8964E+18
La-142	5.5051E+02	3.8457E-08	1.6309E+17	2.2538E+18
Ce-141	8.2243E+03	2.8864E-04	1.2328E+21	1.3496E+19
Ce-143	7.4660E+03	1.1243E-05	4.7346E+19	1.2741E+19
Ce-144	6.5934E+03	2.0672E-03	8.6453E+21	1.0809E+19
Pr-143	3.1759E+03	4.7163E-05	1.9862E+20	5.1770E+18
Nd-147	1.3345E+03	1.6495E-05	6.7577E+19	2.1982E+18
Np-239	9.4257E+04	4.0630E-04	1.0238E+21	1.5817E+20
Pu-238	3.2945E+01	1.9244E-03	4.8693E+21	5.3996E+16
Pu-239	2.2024E+00	3.5433E-02	8.9282E+22	3.6088E+15
Pu-240	2.3626E+00	1.0368E-02	2.6016E+22	3.8723E+15
Pu-241	1.1339E+03	1.1008E-02	2.7506E+22	1.8585E+18
Am-241	6.9975E-01	2.0388E-04	5.0946E+20	1.1463E+15
Cm-242	1.7509E+02	5.2828E-05	1.3146E+20	2.8707E+17
Cm-244	1.9091E+01	2.3597E-04	5.8241E+20	3.1290E+16

Drywell Transport Group Inventory:

Time (h) = 4.0000	Atmosphere	Sump	
Noble gases (atoms)	2.9854E+25	0.0000E+00	
Elemental I (atoms)	2.5214E+20	6.5461E+22	
Organic I (atoms)	1.9475E+21	0.0000E+00	
Aerosols (kg)	5.1793E+00	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		7.9055E-04
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		9.5477E-04
Total I (Ci)			1.3210E+07

Time (h) = 4.0000	Deposition Surfaces	Recirculating Filter
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)	4.8495E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 4.0000 Leakage Transport	
Noble gases (atoms)	2.4452E+22
Elemental I (atoms)	6.4067E+18
Organic I (atoms)	1.6968E+18
Aerosols (kg)	2.1342E-02

Drywell to Void Transport Group Inventory:

Time (h) = 4.0000 Leakage Transport	
Noble gases (atoms)	4.1753E+22
Elemental I (atoms)	1.4218E+19
Organic I (atoms)	2.9608E+18
Aerosols (kg)	4.2483E-02

Exclusion Area Boundary Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE

Delta dose (rem)	1.3281E-01	4.2196E+00	3.8685E-01
Accumulated dose (rem)	5.2769E-01	6.6125E+01	4.2743E+00

Low Population Zone Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.8862E-02	1.8701E+00	1.7145E-01
Accumulated dose (rem)	3.0934E-01	4.2295E+01	2.7489E+00

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.9759E-05	1.7254E-01	9.0524E-03
Accumulated dose (rem)	3.8797E-03	1.2696E+01	5.7532E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 8.0000	Ci	kg	Atoms	Decay
Co-58	7.8739E+00	2.4762E-07	2.5711E+18	2.4971E+17
Co-60	9.4536E+00	8.3632E-06	8.3941E+19	2.9914E+17
Kr-85	1.3853E+06	3.5310E+00	2.5017E+25	1.2586E+21
Kr-85m	8.4637E+06	1.0285E-03	7.2865E+21	1.3690E+22
Kr-87	7.3211E+05	2.5846E-05	1.7891E+20	7.4036E+21
Kr-88	1.1473E+07	9.1498E-04	6.2615E+21	2.7003E+22
Rb-86	3.0715E+02	3.7748E-06	2.6433E+19	1.0997E+19
Sr-89	1.1512E+04	3.9625E-04	2.6812E+21	3.6542E+20
Sr-90	1.3135E+03	9.6294E-03	6.4433E+22	4.1560E+19
Sr-91	8.7637E+03	2.4176E-06	1.5999E+19	4.2071E+20
Sr-92	2.1456E+03	1.7070E-07	1.1174E+18	3.0022E+20
Y-90	1.0440E+02	1.9190E-07	1.2840E+18	9.2273E+17
Y-91	1.5765E+02	6.4285E-06	4.2542E+19	4.6039E+18
Y-92	3.5342E+03	3.6729E-07	2.4042E+18	6.0039E+19
Y-93	1.0804E+02	3.2382E-08	2.0968E+17	5.0585E+18
Zr-95	1.8487E+02	8.6056E-06	5.4551E+19	5.8644E+18
Zr-97	1.3864E+02	7.2524E-08	4.5026E+17	5.5407E+18
Nb-95	1.8647E+02	4.7687E-06	3.0229E+19	5.9003E+18
Mo-99	2.4122E+03	5.0294E-06	3.0593E+19	8.1008E+19
Tc-99m	2.2454E+03	4.2702E-07	2.5976E+18	7.2312E+19
Ru-103	2.1583E+03	6.6873E-05	3.9099E+20	6.8573E+19
Ru-105	4.3092E+02	6.4106E-08	3.6767E+17	3.3514E+19
Ru-106	8.9325E+02	2.6699E-04	1.5169E+21	2.8275E+19
Rh-105	1.3381E+03	1.5853E-06	9.0924E+18	4.4681E+19
Sb-127	2.8182E+03	1.0553E-05	5.0040E+19	9.3044E+19
Sb-129	2.4728E+03	4.3973E-07	2.0528E+18	1.9725E+20
Te-127	2.8813E+03	1.0918E-06	5.1771E+18	9.3010E+19
Te-127m	3.9860E+02	4.2258E-05	2.0038E+20	1.2606E+19
Te-129	3.5389E+03	1.6899E-07	7.8888E+17	2.1934E+20
Te-129m	1.3078E+03	4.3412E-05	2.0266E+20	4.1440E+19
Te-131m	3.3232E+03	4.1675E-06	1.9158E+19	1.1990E+20
Te-132	3.6780E+04	1.2115E-04	5.5271E+20	1.2237E+21
I-131	1.8535E+05	1.4951E-03	6.8729E+21	5.2165E+21
I-132	7.4178E+04	7.1863E-06	3.2785E+19	5.8465E+21
I-133	3.0185E+05	2.6646E-04	1.2065E+21	1.0106E+22
I-134	7.8290E+02	2.9348E-08	1.3189E+17	2.9194E+21
I-135	1.5915E+05	4.5319E-05	2.0216E+20	8.1227E+21
Xe-133	1.8601E+08	9.9374E-01	4.4996E+24	1.7214E+23
Xe-135	5.2537E+07	2.0573E-02	9.1772E+22	6.1846E+22
Cs-134	3.4722E+04	2.6837E-02	1.2061E+23	1.2323E+21
Cs-136	9.5017E+03	1.2964E-04	5.7407E+20	3.4150E+20
Cs-137	2.1650E+04	2.4891E-01	1.0941E+24	7.6819E+20
Ba-139	3.7608E+02	2.2992E-08	9.9613E+16	2.3374E+20

Ba-140	1.9873E+04	2.7145E-04	1.1677E+21	6.3691E+20
La-140	2.3635E+03	4.2522E-06	1.8291E+19	1.8536E+19
La-141	4.6776E+01	8.2711E-09	3.5326E+16	4.0961E+18
La-142	5.1343E+00	3.5866E-10	1.5211E+15	2.3052E+18
Ce-141	4.6190E+02	1.6211E-05	6.9236E+19	1.4674E+19
Ce-143	3.8669E+02	5.8229E-07	2.4522E+18	1.3786E+19
Ce-144	3.7128E+02	1.1641E-04	4.8682E+20	1.1754E+19
Pr-143	1.8081E+02	2.6851E-06	1.1308E+19	5.6337E+18
Nd-147	7.4387E+01	9.1951E-07	3.7669E+18	2.3890E+18
Np-239	5.0556E+03	2.1792E-05	5.4910E+19	1.7149E+20
Pu-238	1.8559E+00	1.0841E-04	2.7430E+20	5.8720E+16
Pu-239	1.2414E-01	1.9972E-03	5.0323E+21	3.9246E+15
Pu-240	1.3309E-01	5.8407E-04	1.4656E+21	4.2110E+15
Pu-241	6.3876E+01	6.2008E-04	1.5495E+21	2.0211E+18
Am-241	3.9466E-02	1.1499E-05	2.8733E+19	1.2466E+15
Cm-242	9.8562E+00	2.9738E-06	7.4004E+18	3.1216E+17
Cm-244	1.0754E+00	1.3293E-05	3.2808E+19	3.4028E+16

Drywell Transport Group Inventory:

Time (h) = 8.0000	Atmosphere	Sump	
Noble gases (atoms)	2.9622E+25	0.0000E+00	
Elemental I (atoms)	1.4072E+17	6.5711E+22	
Organic I (atoms)	1.8508E+21	0.0000E+00	
Aerosols (kg)	2.9168E-01	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		5.3449E-05
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		6.2625E-05
Total I (Ci)			7.2132E+05

Time (h) = 8.0000	Deposition Surfaces	Recirculating Filter
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)	5.3378E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 8.0000	Leakage Transport
Noble gases (atoms)	5.9146E+22
Elemental I (atoms)	6.4459E+18
Organic I (atoms)	3.9114E+18
Aerosols (kg)	2.3038E-02

Drywell to Void Transport Group Inventory:

Time (h) = 8.0000	Leakage Transport
Noble gases (atoms)	8.9927E+22
Elemental I (atoms)	1.4273E+19
Organic I (atoms)	6.0359E+18
Aerosols (kg)	4.4838E-02

Exclusion Area Boundary Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5146E-01	1.1191E+00	1.9733E-01
Accumulated dose (rem)	6.7915E-01	6.7244E+01	4.4716E+00

Low Population Zone Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.4638E-02	1.6962E-01	5.1591E-02

Accumulated dose (rem) 3.5398E-01 4.2464E+01 2.8005E+00

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2869E-05	2.6194E-03	1.4670E-04
Accumulated dose (rem)	3.8926E-03	1.2698E+01	5.7547E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
Co-58	2.3395E-03	7.3573E-11	7.6391E+14	2.5154E+17
Co-60	2.8265E-03	2.5005E-09	2.5097E+16	3.0135E+17
Kr-85	1.3699E+06	3.4916E+00	2.4738E+25	4.1938E+21
Kr-85m	7.0407E+05	8.5554E-05	6.0614E+20	2.0340E+22
Kr-87	1.1809E+02	4.1689E-09	2.8857E+16	7.5822E+21
Kr-88	2.2851E+05	1.8223E-05	1.2471E+20	3.3122E+22
Rb-86	8.9609E-02	1.1013E-09	7.7117E+15	1.1068E+19
Sr-89	3.4114E+00	1.1742E-07	7.9455E+17	3.6811E+20
Sr-90	3.9281E-01	2.8797E-06	1.9269E+19	4.1867E+19
Sr-91	8.1555E-01	2.2498E-10	1.4889E+15	4.2251E+20
Sr-92	1.0715E-02	8.5249E-13	5.5802E+12	3.0056E+20
Y-90	8.9006E-02	1.6359E-10	1.0947E+15	9.5230E+17
Y-91	5.1883E-02	2.1156E-09	1.4001E+16	4.6414E+18
Y-92	1.0616E-01	1.1032E-11	7.2215E+13	6.0733E+19
Y-93	1.0776E-02	3.2298E-12	2.0915E+13	5.0809E+18
Zr-95	5.4890E-02	2.5551E-09	1.6197E+16	5.9075E+18
Zr-97	2.1511E-02	1.1252E-11	6.9859E+13	5.5708E+18
Nb-95	5.5751E-02	1.4257E-09	9.0378E+15	5.9438E+18
Mo-99	6.0980E-01	1.2714E-09	7.7341E+15	8.1560E+19
Tc-99m	6.1051E-01	1.1610E-10	7.0626E+14	7.2826E+19
Ru-103	6.3790E-01	1.9765E-08	1.1556E+17	6.9075E+19
Ru-105	1.0601E-02	1.5771E-12	9.0454E+12	3.3592E+19
Ru-106	2.6680E-01	7.9748E-08	4.5307E+17	2.8484E+19
Rh-105	3.0450E-01	3.6076E-10	2.0691E+15	4.4985E+19
Sb-127	7.4748E-01	2.7990E-09	1.3272E+16	9.3692E+19
Sb-129	5.6757E-02	1.0093E-11	4.7117E+13	1.9770E+20
Te-127	8.0773E-01	3.0606E-10	1.4513E+15	9.3674E+19
Te-127m	1.1931E-01	1.2648E-08	5.9977E+16	1.2699E+19
Te-129	4.1400E-01	1.9768E-11	9.2285E+13	2.2000E+20
Te-129m	3.8657E-01	1.2832E-08	5.9904E+16	4.1744E+19
Te-131m	6.8670E-01	8.6117E-10	3.9588E+15	1.2064E+20
Te-132	9.5451E+00	3.1441E-08	1.4344E+17	1.2322E+21
I-131	3.8569E+04	3.1111E-04	1.4302E+21	5.3349E+21
I-132	3.4480E+02	3.3404E-08	1.5240E+17	5.8676E+21
I-133	3.9027E+04	3.4452E-05	1.5599E+20	1.0268E+22
I-134	5.5304E-04	2.0731E-14	9.3168E+10	2.9195E+21
I-135	6.5506E+03	1.8653E-06	8.3207E+18	8.1834E+21
Xe-133	1.6844E+08	8.9988E-01	4.0746E+24	5.4944E+23
Xe-135	1.5350E+07	6.0110E-03	2.6814E+22	1.2625E+23
Cs-134	1.0378E+01	8.0209E-06	3.6047E+19	1.2404E+21
Cs-136	2.7431E+00	3.7428E-08	1.6573E+17	3.4371E+20
Cs-137	6.4745E+00	7.4435E-05	3.2720E+20	7.7324E+20
Ba-139	3.6027E-05	2.2025E-15	9.5424E+09	2.3378E+20
Ba-140	5.7314E+00	7.8289E-08	3.3676E+17	6.4152E+20
La-140	1.9496E+00	3.5075E-09	1.5088E+16	1.9205E+19
La-141	8.3218E-04	1.4715E-13	6.2848E+11	4.1044E+18
La-142	1.1536E-06	8.0583E-17	3.4175E+08	2.3058E+18
Ce-141	1.3625E-01	4.7818E-09	2.0423E+16	1.4782E+19
Ce-143	8.2636E-02	1.2444E-10	5.2404E+14	1.3873E+19
Ce-144	1.1085E-01	3.4756E-08	1.4535E+17	1.1841E+19

Pr-143	5.5552E-02	8.2497E-10	3.4742E+15	5.6761E+18
Nd-147	2.1330E-02	2.6366E-10	1.0801E+15	2.4063E+18
Np-239	1.2426E+00	5.3561E-09	1.3496E+16	1.7265E+20
Pu-238	5.5506E-04	3.2423E-08	8.2039E+16	5.9153E+16
Pu-239	3.7197E-05	5.9844E-07	1.5079E+18	3.9536E+15
Pu-240	3.9802E-05	1.7467E-07	4.3830E+17	4.2420E+15
Pu-241	1.9101E-02	1.8543E-07	4.6335E+17	2.0360E+18
Am-241	1.1859E-05	3.4551E-09	8.6337E+15	1.2558E+15
Cm-242	2.9393E-03	8.8684E-10	2.2069E+15	3.1446E+17
Cm-244	3.2160E-04	3.9751E-09	9.8110E+15	3.4279E+16

Drywell Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	2.8840E+25	0.0000E+00	
Elemental I (atoms)	1.4408E+04	6.5711E+22	
Organic I (atoms)	1.5930E+21	0.0000E+00	
Aerosols (kg)	8.7157E-05	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.0052E-05
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.1007E-05
Total I (Ci)			8.4492E+04

Time (h) = 24.0000	Deposition Surfaces	Recirculating Filter
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)	5.3669E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 24.0000	Leakage Transport
Noble gases (atoms)	1.9554E+23
Elemental I (atoms)	6.4460E+18
Organic I (atoms)	1.1914E+19
Aerosols (kg)	2.3194E-02

Drywell to Void Transport Group Inventory:

Time (h) = 24.0000	Leakage Transport
Noble gases (atoms)	2.7932E+23
Elemental I (atoms)	1.4273E+19
Organic I (atoms)	1.7148E+19
Aerosols (kg)	4.5054E-02

Exclusion Area Boundary Doses:

Time (h) = 38.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.1086E-02	5.8808E-01	6.9165E-02
Accumulated dose (rem)	7.3024E-01	6.7832E+01	4.5408E+00

Low Population Zone Doses:

Time (h) = 38.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.2636E-03	4.7382E-02	7.7203E-03
Accumulated dose (rem)	3.6025E-01	4.2512E+01	2.8082E+00

Control Room Doses:

Time (h) = 38.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.5363E-06	1.4440E-04	6.9752E-06
Accumulated dose (rem)	3.8951E-03	1.2699E+01	5.7547E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 38.0000	Ci	kg	Atoms	Decay
Co-58	5.6805E-04	1.7864E-11	1.8549E+14	2.5155E+17
Co-60	6.9011E-04	6.1051E-10	6.1276E+15	3.0135E+17
Kr-85	1.3565E+06	3.4574E+00	2.4495E+25	6.7350E+21
Kr-85m	7.9921E+04	9.7115E-06	6.8804E+19	2.0874E+22
Kr-87	5.6738E-02	2.0031E-12	1.3865E+13	7.5822E+21
Kr-88	7.4252E+03	5.9216E-07	4.0523E+18	3.3242E+22
Rb-86	2.1414E-02	2.6317E-10	1.8429E+15	1.1068E+19
Sr-89	8.2644E-01	2.8447E-08	1.9248E+17	3.6811E+20
Sr-90	9.5921E-02	7.0320E-07	4.7053E+18	4.1867E+19
Sr-91	7.1710E-02	1.9782E-11	1.3091E+14	4.2251E+20
Sr-92	7.2882E-05	5.7984E-15	3.7955E+10	3.0056E+20
Y-90	3.2246E-02	5.9269E-11	3.9658E+14	9.5239E+17
Y-91	1.2944E-02	5.2780E-10	3.4928E+15	4.6414E+18
Y-92	2.0179E-03	2.0971E-13	1.3727E+12	6.0733E+19
Y-93	1.0068E-03	3.0176E-13	1.9540E+12	5.0809E+18
Zr-95	1.3320E-02	6.2003E-10	3.9304E+15	5.9075E+18
Zr-97	2.9583E-03	1.5475E-12	9.6073E+12	5.5708E+18
Nb-95	1.3610E-02	3.4806E-10	2.2064E+15	5.9439E+18
Mo-99	1.2855E-01	2.6804E-10	1.6305E+15	8.1561E+19
Tc-99m	1.3108E-01	2.4929E-11	1.5164E+14	7.2826E+19
Ru-103	1.5418E-01	4.7773E-09	2.7932E+16	6.9076E+19
Ru-105	2.9102E-04	4.3294E-14	2.4831E+11	3.3592E+19
Ru-106	6.5083E-02	1.9453E-08	1.1052E+17	2.8484E+19
Rh-105	5.6757E-02	6.7244E-11	3.8567E+14	4.4985E+19
Sb-127	1.6434E-01	6.1538E-10	2.9180E+15	9.3693E+19
Sb-129	1.4662E-03	2.6074E-13	1.2172E+12	1.9770E+20
Te-127	1.8336E-01	6.9478E-11	3.2945E+14	9.3674E+19
Te-127m	2.9143E-02	3.0896E-09	1.4650E+16	1.2699E+19
Te-129	8.2732E-02	3.9505E-12	1.8442E+13	2.2000E+20
Te-129m	9.3287E-02	3.0966E-09	1.4456E+16	4.1745E+19
Te-131m	1.2135E-01	1.5218E-10	6.9958E+14	1.2064E+20
Te-132	2.0589E+00	6.7819E-09	3.0940E+16	1.2322E+21
I-131	3.6293E+04	2.9274E-04	1.3458E+21	5.4046E+21
I-132	8.3376E+00	8.0774E-10	3.6851E+15	5.8677E+21
I-133	2.4220E+04	2.1380E-05	9.6808E+19	1.0326E+22
I-134	8.5280E-09	3.1968E-19	1.4367E+06	2.9195E+21
I-135	1.4932E+03	4.2519E-07	1.8967E+18	8.1898E+21
Xe-133	1.5443E+08	8.2504E-01	3.7357E+24	8.5019E+23
Xe-135	5.2287E+06	2.0475E-03	9.1335E+21	1.4377E+23
Cs-134	2.5329E+00	1.9577E-06	8.7981E+18	1.2404E+21
Cs-136	6.4952E-01	8.8622E-09	3.9242E+16	3.4371E+20
Cs-137	1.5810E+00	1.8177E-05	7.9899E+19	7.7325E+20
Ba-139	7.7047E-09	4.7103E-19	2.0407E+06	2.3378E+20
Ba-140	1.3559E+00	1.8521E-08	7.9670E+16	6.4153E+20
La-140	6.7151E-01	1.2081E-09	5.1967E+15	1.9207E+19
La-141	1.7203E-05	3.0419E-15	1.2992E+10	4.1044E+18
La-142	5.2013E-10	3.6334E-20	1.5409E+05	2.3058E+18
Ce-141	3.2863E-02	1.1533E-09	4.9259E+15	1.4782E+19
Ce-143	1.5039E-02	2.2646E-11	9.5369E+13	1.3873E+19
Ce-144	2.7033E-02	8.4755E-09	3.5445E+16	1.1841E+19
Pr-143	1.3681E-02	2.0317E-10	8.5561E+14	5.6761E+18
Nd-147	5.0204E-03	6.2058E-11	2.5423E+14	2.4063E+18
Np-239	2.5557E-01	1.1016E-09	2.7758E+15	1.7265E+20
Pu-238	1.3556E-04	7.9181E-09	2.0035E+16	5.9153E+16
Pu-239	9.0964E-06	1.4635E-07	3.6875E+17	3.9536E+15
Pu-240	9.7199E-06	4.2656E-08	1.0703E+17	4.2421E+15
Pu-241	4.6643E-03	4.5278E-08	1.1314E+17	2.0360E+18

Am-241	2.9078E-06	8.4723E-10	2.1171E+15	1.2558E+15
Cm-242	7.1600E-04	2.1603E-10	5.3759E+14	3.1447E+17
Cm-244	7.8531E-05	9.7068E-10	2.3957E+15	3.4279E+16

Drywell Transport Group Inventory:

Time (h) = 38.0000	Atmosphere	Sump	
Noble gases (atoms)	2.8240E+25	0.0000E+00	
Elemental I (atoms)	6.4117E-08	6.5711E+22	
Organic I (atoms)	1.4441E+21	0.0000E+00	
Aerosols (kg)	2.1273E-05	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		8.9657E-06
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		9.5264E-06
Total I (Ci)			6.2014E+04

Time (h) = 38.0000	Deposition Surfaces	Recirculating Filter
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)	5.3669E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 38.0000	Leakage Transport
Noble gases (atoms)	3.1211E+23
Elemental I (atoms)	6.4460E+18
Organic I (atoms)	1.8120E+19
Aerosols (kg)	2.3194E-02

Drywell to Void Transport Group Inventory:

Time (h) = 38.0000	Leakage Transport
Noble gases (atoms)	4.4119E+23
Elemental I (atoms)	1.4273E+19
Organic I (atoms)	2.5765E+19
Aerosols (kg)	4.5054E-02

Exclusion Area Boundary Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.1330E-02	9.7539E-01	9.1136E-02
Accumulated dose (rem)	7.9157E-01	6.8807E+01	4.6319E+00

Low Population Zone Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.5197E-03	7.8589E-02	9.9212E-03
Accumulated dose (rem)	3.6776E-01	4.2590E+01	2.8181E+00

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.1184E-06	2.4433E-04	1.0585E-05
Accumulated dose (rem)	3.8982E-03	1.2699E+01	5.7548E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay
Co-58	1.6460E-06	5.1765E-14	5.3747E+11	2.5155E+17
Co-60	2.0458E-06	1.8098E-12	1.8165E+13	3.0135E+17
Kr-85	1.3288E+06	3.3868E+00	2.3995E+25	1.7105E+22

Kr-85m	9.9225E+00	1.2057E-09	8.5424E+15	2.0943E+22
Kr-88	5.1777E-03	4.1292E-13	2.8258E+12	3.3246E+22
Rb-86	5.8080E-05	7.1379E-13	4.9983E+12	1.1068E+19
Sr-89	2.3721E-03	8.1648E-11	5.5247E+14	3.6811E+20
Sr-90	2.8455E-04	2.0861E-09	1.3958E+16	4.1867E+19
Sr-91	3.0905E-06	8.5256E-16	5.6420E+09	4.2251E+20
Y-90	1.8450E-04	3.3912E-13	2.2691E+12	9.5244E+17
Y-91	3.7903E-05	1.5455E-12	1.0228E+13	4.6414E+18
Y-92	7.8843E-11	8.1938E-21	5.3635E+04	6.0733E+19
Y-93	5.5791E-08	1.6722E-17	1.0828E+08	5.0809E+18
Zr-95	3.8499E-05	1.7921E-12	1.1360E+13	5.9075E+18
Zr-97	8.1327E-07	4.2542E-16	2.6412E+09	5.5708E+18
Nb-95	4.0300E-05	1.0306E-12	6.5331E+12	5.9439E+18
Mo-99	2.0743E-04	4.3248E-13	2.6308E+12	8.1561E+19
Tc-99m	2.1266E-04	4.0443E-14	2.4601E+11	7.2826E+19
Ru-103	4.3836E-04	1.3583E-11	7.9413E+13	6.9076E+19
Ru-105	1.0089E-10	1.5010E-20	8.6086E+04	3.3592E+19
Ru-106	1.9222E-04	5.7456E-11	3.2642E+14	2.8484E+19
Rh-105	5.4062E-05	6.4050E-14	3.6735E+11	4.4985E+19
Sb-127	3.1557E-04	1.1817E-12	5.6034E+12	9.3693E+19
Sb-129	3.9529E-10	7.0294E-20	3.2816E+05	1.9770E+20
Te-127	3.8640E-04	1.4641E-13	6.9428E+11	9.3675E+19
Te-127m	8.6234E-05	9.1421E-12	4.3350E+13	1.2699E+19
Te-129	2.2770E-04	1.0873E-14	5.0758E+10	2.2000E+20
Te-129m	2.6333E-04	8.7411E-12	4.0806E+13	4.1745E+19
Te-131m	9.4268E-05	1.1822E-13	5.4346E+11	1.2064E+20
Te-132	3.6533E-03	1.2034E-11	5.4900E+13	1.2322E+21
I-131	2.8870E+04	2.3287E-04	1.0705E+21	5.6552E+21
I-132	6.3155E-03	6.1184E-13	2.7914E+12	5.8677E+21
I-133	3.4346E+03	3.0319E-06	1.3728E+19	1.0408E+22
I-135	3.3406E+00	9.5122E-10	4.2432E+15	8.1916E+21
Xe-133	1.0997E+08	5.8750E-01	2.6602E+24	1.8617E+24
Xe-135	6.1531E+04	2.4095E-05	1.0748E+20	1.5276E+23
Cs-134	7.4984E-03	5.7955E-09	2.6046E+16	1.2404E+21
Cs-136	1.6958E-03	2.3138E-11	1.0246E+14	3.4371E+20
Cs-137	4.6902E-03	5.3922E-08	2.3703E+17	7.7325E+20
Ba-140	3.5273E-03	4.8182E-11	2.0726E+14	6.4153E+20
La-140	3.1095E-03	5.5944E-12	2.4065E+13	1.9208E+19
Ce-141	9.2605E-05	3.2501E-12	1.3881E+13	1.4782E+19
Ce-143	1.3196E-05	1.9871E-14	8.3684E+10	1.3873E+19
Ce-144	7.9734E-05	2.4999E-11	1.0455E+14	1.1841E+19
Pr-143	3.8839E-05	5.7678E-13	2.4290E+12	5.6761E+18
Nd-147	1.2788E-05	1.5807E-13	6.4758E+11	2.4063E+18
Np-239	3.7231E-04	1.6049E-12	4.0438E+12	1.7265E+20
Pu-238	4.0228E-07	2.3498E-11	5.9458E+13	5.9153E+16
Pu-239	2.7092E-08	4.3587E-10	1.0983E+15	3.9536E+15
Pu-240	2.8839E-08	1.2656E-10	3.1757E+14	4.2421E+15
Pu-241	1.3834E-05	1.3430E-10	3.3559E+14	2.0360E+18
Am-241	8.7743E-09	2.5565E-12	6.3882E+12	1.2559E+15
Cm-242	2.1026E-06	6.3441E-13	1.5787E+12	3.1447E+17
Cm-244	2.3294E-07	2.8793E-12	7.1063E+12	3.4279E+16

Drywell Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	2.6655E+25	0.0000E+00	
Elemental I (atoms)	6.7734E-55	6.5711E+22	
Organic I (atoms)	1.0842E+21	0.0000E+00	
Aerosols (kg)	6.3015E-08	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		6.5392E-06
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		6.6162E-06
Total I (Ci)			3.2308E+04

Time (h) = 96.0000	Deposition Surfaces	Recirculating Filter
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)	5.3669E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 96.0000	Leakage Transport
Noble gases (atoms)	5.4406E+23
Elemental I (atoms)	6.4460E+18
Organic I (atoms)	2.8680E+19
Aerosols (kg)	2.3194E-02

Drywell to Void Transport Group Inventory:

Time (h) = 96.0000	Leakage Transport
Noble gases (atoms)	7.6327E+23
Elemental I (atoms)	1.4273E+19
Organic I (atoms)	4.0428E+19
Aerosols (kg)	4.5054E-02

Exclusion Area Boundary Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.3837E-01	3.2989E+00	2.3882E-01
Accumulated dose (rem)	9.2993E-01	7.2106E+01	4.8707E+00

Low Population Zone Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.7627E-03	7.4619E-02	7.0348E-03
Accumulated dose (rem)	3.7253E-01	4.2665E+01	2.8252E+00

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.3405E-06	1.5738E-04	6.1327E-06
Accumulated dose (rem)	3.8996E-03	1.2699E+01	5.7549E-01

Drywell Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay
Kr-85	1.0643E+06	2.7127E+00	1.9219E+25	1.1613E+23
I-131	2.4693E+03	1.9918E-05	9.1562E+19	6.5474E+21
I-133	2.5738E-06	2.2720E-15	1.0288E+10	1.0422E+22
Xe-133	2.8487E+06	1.5219E-02	6.8909E+22	4.2983E+24

Drywell Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	1.9288E+25	0.0000E+00	
Elemental I (atoms)	0.0000E+00	6.5711E+22	
Organic I (atoms)	9.1562E+19	0.0000E+00	
Aerosols (kg)	3.9953E-35	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		5.4844E-07
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		5.4844E-07
Total I (Ci)			2.4693E+03

Deposition Recirculating

Time (h) = 720.0000	Surfaces	Filter
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)	5.3669E+01	0.0000E+00

Drywell Leakage to Environment Transport Group Inventory:

Time (h) = 720.0000 Leakage Transport	
Noble gases (atoms)	2.5670E+24
Elemental I (atoms)	6.4460E+18
Organic I (atoms)	6.5035E+19
Aerosols (kg)	2.3194E-02

Drywell to Void Transport Group Inventory:

Time (h) = 720.0000 Leakage Transport	
Noble gases (atoms)	3.5723E+24
Elemental I (atoms)	1.4273E+19
Organic I (atoms)	9.0911E+19
Aerosols (kg)	4.5054E-02

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##
I-131 Summary
##

Time (hr)	Drywell I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
0.000	5.2653E+03	0.0000E+00	0.0000E+00
0.033	3.1132E+05	0.0000E+00	0.0000E+00
0.050	4.6423E+05	1.8896E+00	1.8542E-02
0.100	9.0969E+05	1.1930E+01	1.0374E-01
0.350	2.8890E+06	1.5278E+02	2.3319E-02
0.500	3.9059E+06	3.0184E+02	1.1391E-02
0.750	7.0714E+06	7.0339E+02	8.9204E-03
1.000	1.0025E+07	1.3279E+03	7.1808E-03
1.250	1.2787E+07	2.1607E+03	5.9875E-03
1.500	1.5372E+07	3.1883E+03	5.2012E-03
1.750	1.7794E+07	4.3985E+03	4.7167E-03
2.000	2.0062E+07	5.7795E+03	4.4545E-03
2.400	1.3333E+07	7.7003E+03	2.8811E-03
2.700	9.8230E+06	8.7053E+03	2.0780E-03
3.000	7.2430E+06	9.4460E+03	1.4988E-03
3.300	5.3452E+06	9.9924E+03	1.0811E-03
3.600	3.9485E+06	1.0396E+04	7.7982E-04
3.800	3.2286E+06	1.0604E+04	6.2723E-04
3.850	3.0705E+06	1.0650E+04	5.9400E-04
3.900	2.9202E+06	1.0694E+04	5.6253E-04
3.950	2.7773E+06	1.0736E+04	5.3273E-04
4.000	2.6416E+06	1.0775E+04	5.0451E-04
4.300	1.9576E+06	1.0975E+04	3.6395E-04
4.600	1.4537E+06	1.1123E+04	2.6257E-04
4.900	1.0824E+06	1.1233E+04	1.8944E-04
5.200	8.7118E+05	1.1317E+04	1.3670E-04
5.500	7.2920E+05	1.1387E+04	9.8671E-05
5.800	6.1154E+05	1.1445E+04	7.1249E-05
6.100	5.1403E+05	1.1494E+04	5.1472E-05
6.400	4.3319E+05	1.1536E+04	3.7205E-05
6.700	3.6617E+05	1.1571E+04	2.6910E-05

7.000	3.1061E+05	1.1600E+04	1.9479E-05
7.300	2.6454E+05	1.1625E+04	1.4114E-05
7.600	2.2634E+05	1.1647E+04	1.0238E-05
7.900	1.9466E+05	1.1665E+04	7.4375E-06
8.000	1.8535E+05	1.1670E+04	6.6883E-06
8.300	1.6067E+05	1.1686E+04	4.8705E-06
8.600	1.4271E+05	1.1699E+04	3.5555E-06
8.900	1.2743E+05	1.1711E+04	2.6038E-06
9.200	1.1443E+05	1.1721E+04	1.9144E-06
9.500	1.0338E+05	1.1731E+04	1.4146E-06
9.800	9.3976E+04	1.1739E+04	1.0518E-06
10.100	8.5973E+04	1.1747E+04	7.8805E-07
10.400	7.9162E+04	1.1754E+04	5.9602E-07
24.000	3.8569E+04	1.1933E+04	5.6681E-08
38.000	3.6293E+04	1.2085E+04	5.3318E-08
96.000	2.8870E+04	1.2359E+04	2.1201E-08
720.000	2.4693E+03	1.3334E+04	5.2289E-10

Time (hr)	Void I-131 (Curies)
0.000	0.0000E+00
0.033	0.0000E+00
0.050	4.7294E+00
0.100	2.9856E+01
0.350	3.8224E+02
0.500	7.5501E+02
0.750	1.7590E+03
1.000	3.3199E+03
1.250	5.4004E+03
1.500	7.9666E+03
1.750	1.0987E+04
2.000	1.4432E+04
2.400	1.7078E+04
2.700	1.8455E+04
3.000	1.9463E+04
3.300	2.0201E+04
3.600	2.0740E+04
3.800	2.1015E+04
3.850	2.1075E+04
3.900	2.1131E+04
3.950	2.1185E+04
4.000	2.1237E+04
4.300	2.1491E+04
4.600	2.1674E+04
4.900	2.1804E+04
5.200	2.1897E+04
5.500	2.1971E+04
5.800	2.2029E+04
6.100	2.2074E+04
6.400	2.2108E+04
6.700	2.2133E+04
7.000	2.2150E+04
7.300	2.2162E+04
7.600	2.2168E+04
7.900	2.2170E+04
8.000	2.2170E+04
8.300	2.2167E+04
8.600	2.2162E+04
8.900	2.2155E+04
9.200	2.2146E+04
9.500	2.2136E+04

9.800	2.2124E+04
10.100	2.2112E+04
10.400	2.2098E+04
24.000	2.1300E+04
38.000	2.0472E+04
96.000	1.6982E+04
720.000	2.1545E+03

##

Cumulative Dose Summary

##

	Exclusion Area Bounda		Low Population Zone		Control Room	
Time (hr)	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
0.033	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.050	4.3296E-01	2.1281E-02	4.9001E-02	2.4085E-03	5.8049E-02	2.5313E-03
0.100	2.7324E+00	1.3423E-01	3.0925E-01	1.5192E-02	1.1857E+00	5.1719E-02
0.350	6.7468E+00	3.3079E-01	1.6347E+00	8.0094E-02	6.3463E+00	2.7681E-01
0.500	1.0985E+01	5.3764E-01	3.0343E+00	1.4839E-01	7.2963E+00	3.1825E-01
0.750	1.2925E+01	6.4521E-01	4.9691E+00	2.5572E-01	8.2708E+00	3.6084E-01
1.000	1.5970E+01	8.3086E-01	8.0073E+00	4.4095E-01	9.0418E+00	3.9485E-01
1.250	2.0041E+01	1.0884E+00	1.2069E+01	6.9791E-01	9.6722E+00	4.2324E-01
1.500	2.5065E+01	1.4124E+00	1.7082E+01	1.0212E+00	1.0208E+01	4.4819E-01
1.750	3.0977E+01	1.7980E+00	2.2981E+01	1.4059E+00	1.0685E+01	4.7129E-01
2.000	3.7715E+01	2.2407E+00	2.9704E+01	1.8476E+00	1.1127E+01	4.9370E-01
2.400	4.7066E+01	2.8610E+00	3.3848E+01	2.1225E+00	1.1686E+01	5.2271E-01
2.700	5.1940E+01	3.1887E+00	3.6008E+01	2.2678E+00	1.1970E+01	5.3747E-01
3.000	5.5521E+01	3.4330E+00	3.7595E+01	2.3761E+00	1.2174E+01	5.4809E-01
3.300	5.8154E+01	3.6161E+00	3.8762E+01	2.4572E+00	1.2321E+01	5.5574E-01
3.600	6.0091E+01	3.7539E+00	3.9621E+01	2.5183E+00	1.2427E+01	5.6125E-01
3.800	6.1090E+01	3.8267E+00	4.0063E+01	2.5506E+00	1.2480E+01	5.6403E-01
3.850	6.1310E+01	3.8429E+00	4.0161E+01	2.5577E+00	1.2492E+01	5.6464E-01
3.900	6.1518E+01	3.8584E+00	4.0253E+01	2.5646E+00	1.2503E+01	5.6521E-01
3.950	6.1717E+01	3.8732E+00	4.0341E+01	2.5712E+00	1.2513E+01	5.6575E-01
4.000	6.1905E+01	3.8874E+00	4.0425E+01	2.5774E+00	1.2523E+01	5.6627E-01
4.300	6.2857E+01	3.9606E+00	4.0847E+01	2.6099E+00	1.2572E+01	5.6883E-01
4.600	6.3561E+01	4.0172E+00	4.1158E+01	2.6349E+00	1.2607E+01	5.7067E-01
4.900	6.4082E+01	4.0614E+00	4.1389E+01	2.6546E+00	1.2633E+01	5.7200E-01
5.200	6.4479E+01	4.0971E+00	4.1565E+01	2.6704E+00	1.2651E+01	5.7295E-01
5.500	6.4807E+01	4.1278E+00	4.1711E+01	2.6840E+00	1.2664E+01	5.7364E-01
5.800	6.5081E+01	4.1545E+00	4.1832E+01	2.6958E+00	1.2674E+01	5.7414E-01
6.100	6.5311E+01	4.1778E+00	4.1934E+01	2.7061E+00	1.2680E+01	5.7450E-01
6.400	6.5503E+01	4.1982E+00	4.2019E+01	2.7152E+00	1.2685E+01	5.7476E-01
6.700	6.5665E+01	4.2162E+00	4.2091E+01	2.7232E+00	1.2689E+01	5.7495E-01
7.000	6.5802E+01	4.2322E+00	4.2152E+01	2.7302E+00	1.2691E+01	5.7508E-01
7.300	6.5917E+01	4.2464E+00	4.2203E+01	2.7366E+00	1.2693E+01	5.7518E-01
7.600	6.6016E+01	4.2592E+00	4.2246E+01	2.7422E+00	1.2695E+01	5.7525E-01
7.900	6.6100E+01	4.2707E+00	4.2284E+01	2.7473E+00	1.2696E+01	5.7531E-01
8.000	6.6125E+01	4.2743E+00	4.2295E+01	2.7489E+00	1.2696E+01	5.7532E-01
8.300	6.6194E+01	4.2844E+00	4.2305E+01	2.7513E+00	1.2696E+01	5.7535E-01
8.600	6.6253E+01	4.2936E+00	4.2314E+01	2.7536E+00	1.2697E+01	5.7538E-01
8.900	6.6307E+01	4.3021E+00	4.2322E+01	2.7557E+00	1.2697E+01	5.7540E-01
9.200	6.6354E+01	4.3100E+00	4.2330E+01	2.7577E+00	1.2697E+01	5.7541E-01
9.500	6.6397E+01	4.3174E+00	4.2336E+01	2.7595E+00	1.2698E+01	5.7542E-01
9.800	6.6435E+01	4.3242E+00	4.2342E+01	2.7612E+00	1.2698E+01	5.7543E-01
10.100	6.6470E+01	4.3306E+00	4.2347E+01	2.7629E+00	1.2698E+01	5.7543E-01
10.400	6.6502E+01	4.3367E+00	4.2352E+01	2.7645E+00	1.2698E+01	5.7544E-01
24.000	6.7244E+01	4.4716E+00	4.2464E+01	2.8005E+00	1.2698E+01	5.7547E-01
38.000	6.7832E+01	4.5408E+00	4.2512E+01	2.8082E+00	1.2699E+01	5.7547E-01

```
  96.000 6.8807E+01 4.6319E+00 4.2590E+01 2.8181E+00 1.2699E+01 5.7548E-01
 720.000 7.2106E+01 4.8707E+00 4.2665E+01 2.8252E+00 1.2699E+01 5.7549E-01

########################################################################
                        Worst Two-Hour Doses
########################################################################

Exclusion Area Boundary
   Time    Whole Body     Thyroid         TEDE
   (hr)      (rem)         (rem)          (rem)
    1.0   2.3921E-01   3.9551E+01   2.6022E+00
```

Attachment E – Nuclide Inventory File PBS_DEF.txt

Nuclide Inventory Name: Source Terms per this calculation
Peach Bottom (PBAPS) AST - in Ci/MW
Power Level:
0.1000E+01
Nuclides:
60
Nuclide 001:
Co-58
7
0.6117120000E+07
0.5800E+02
0.1529E+03
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 002:
Co-60
7
0.1663401096E+09
0.6000E+02
0.1830E+03
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 003:
Kr-85
1
0.3382974720E+09
0.8500E+02
0.3946E+03
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 004:
Kr-85m
1
0.1612800000E+05
0.8500E+02
0.8313E+04
Kr-85 0.2100E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 005:
Kr-87
1
0.4578000000E+04
0.8700E+02
0.1633E+05
Rb-87 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 006:
Kr-88
1
0.1022400000E+05
0.8800E+02
0.2303E+05

Rb-88 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 007:
Rb-86
3
0.1612224000E+07
0.8600E+02
0.6518E+02
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 008:
Sr-89
5
0.4363200000E+07
0.8900E+02
0.2798E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 009:
Sr-90
5
0.9189573120E+09
0.9000E+02
0.3178E+04
Y-90 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 010:
Sr-91
5
0.3420000000E+05
0.9100E+02
0.3801E+05
Y-91m 0.5800E+00
Y-91 0.4200E+00
none 0.0000E+00
Nuclide 011:
Sr-92
5
0.9756000000E+04
0.9200E+02
0.4017E+05
Y-92 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 012:
Y-90
9
0.2304000000E+06
0.9000E+02
0.3272E+04
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 013:
Y-91
9

0.5055264000E+07
0.9100E+02
0.3448E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 014:
Y-92
9
0.1274400000E+05
0.9200E+02
0.4029E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 015:
Y-93
9
0.3636000000E+05
0.9300E+02
0.4526E+05
Zr-93 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 016:
Zr-95
9
0.5527872000E+07
0.9500E+02
0.4489E+05
Nb-95m 0.7000E-02
Nb-95 0.9900E+00
none 0.0000E+00
Nuclide 017:
Zr-97
9
0.6084000000E+05
0.9700E+02
0.4657E+05
Nb-97m 0.9500E+00
Nb-97 0.5300E-01
none 0.0000E+00
Nuclide 018:
Nb-95
9
0.3036960000E+07
0.9500E+02
0.4512E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 019:
Mo-99
7
0.2376000000E+06
0.9900E+02
0.5078+05
Tc-99m 0.8800E+00
Tc-99 0.1200E+00
none 0.0000E+00

Nuclide 020:
Tc-99m
7
0.2167200000E+05
0.9900E+02
0.4447E+05
Tc-99 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 021:
Ru-103
7
0.3393792000E+07
0.1030E+03
0.4202E+05
Rh-103m 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 022:
Ru-105
7
0.1598400000E+05
0.1050E+03
0.2908E+05
Rh-105 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 023:
Ru-106
7
0.3181248000E+08
0.1060E+03
0.1730E+05
Rh-106 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 024:
Rh-105
7
0.1272960000E+06
0.1050E+03
0.2752E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 025:
Sb-127
4
0.3326400000E+06
0.1270E+03
0.2896E+04
Te-127m 0.1800E+00
Te-127 0.8200E+00
none 0.0000E+00
Nuclide 026:
Sb-129
4
0.1555200000E+05
0.1290E+03
0.8638E+04

Te-129m 0.2200E+00
Te-129 0.7700E+00
none 0.0000E+00
Nuclide 027:
Te-127
4
0.3366000000E+05
0.1270E+03
0.2873E+04
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 028:
Te-127m
4
0.9417600000E+07
0.1270E+03
0.3855E+03
Te-127 0.9800E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 029:
Te-129
4
0.4176000000E+04
0.1290E+03
0.8501E+04
I-129 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 030:
Te-129m
4
0.2903040000E+07
0.1290E+03
0.1267E+04
Te-129 0.6500E+00
I-129 0.3500E+00
none 0.0000E+00
Nuclide 031:
Te-131m
4
0.1080000000E+06
0.1310E+03
0.3869E+04
Te-131 0.2200E+00
I-131 0.7800E+00
none 0.0000E+00
Nuclide 032:
Te-132
4
0.2815200000E+06
0.1320E+03
0.3821E+05
I-132 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 033:
I-131
2

0.6946560000E+06
0.1310E+03
0.2687E+05
Xe-131m 0.1100E-01
none 0.0000E+00
none 0.0000E+00
Nuclide 034:
I-132
2
0.8280000000E+04
0.1320E+03
0.3881E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 035:
I-133
2
0.7488000000E+05
0.1330E+03
0.5556E+05
Xe-133m 0.2900E-01
Xe-133 0.9700E+00
none 0.0000E+00
Nuclide 036:
I-134
2
0.3156000000E+04
0.1340E+03
0.6165E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 037:
I-135
2
0.2379600000E+05
0.1350E+03
0.5192E+05
Xe-135m 0.1500E+00
Xe-135 0.8500E+00
none 0.0000E+00
Nuclide 038:
Xe-133
1
0.4531680000E+06
0.1330E+03
0.5491E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 039:
Xe-135
1
0.3272400000E+05
0.1350E+03
0.2228E+05
Cs-135 0.1000E+01
none 0.0000E+00
none 0.0000E+00

Nuclide 040:
Cs-134
3
0.6507177120E+08
0.1340E+03
0.7280E+04
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 041:
Cs-136
3
0.1131840000E+07
0.1360E+03
0.2027E+04
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 042:
Cs-137
3
0.9467280000E+09
0.1370E+03
0.4538E+04
Ba-137m 0.9500E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 043:
Ba-139
6
0.4962000000E+04
0.1390E+03
0.5084E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 044:
Ba-140
6
0.1100736000E+07
0.1400E+03
0.4896E+05
La-140 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 045:
La-140
9
0.1449792000E+06
0.1400E+03
0.5019E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 046:
La-141
9
0.1414800000E+05
0.1410E+03
0.4640E+05

Ce-141 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 047:
La-142
9
0.5550000000E+04
0.1420E+03
0.4532E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 048:
Ce-141
8
0.2808086400E+07
0.1410E+03
0.4492E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 049:
Ce-143
8
0.1188000000E+06
0.1430E+03
0.4427E+05
Pr-143 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 050:
Ce-144
8
0.2456352000E+08
0.1440E+03
0.3596E+05
Pr-144m 0.1800E-01
Pr-144 0.9800E+00
none 0.0000E+00
Nuclide 051:
Pr-143
9
0.1171584000E+07
0.1430E+03
0.4293E+05
none 0.0000E+00
none 0.0000E+00
none 0.0000E+00
Nuclide 052:
Nd-147
9
0.9486720000E+06
0.1470E+03
0.1838E+05
Pm-147 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 053:
Np-239
8

0.2034720000E+06
0.2390E+03
0.5397E+06
Pu-239 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 054:
Pu-238
8
0.2768863824E+10
0.2380E+03
0.1796E+03
U-234 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 055:
Pu-239
8
0.7594336440E+12
0.2390E+03
0.1200E+02
U-235 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 056:
Pu-240
8
0.2062920312E+12
0.2400E+03
0.1288E+02
U-236 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 057:
Pu-241
8
0.4544294400E+09
0.2410E+03
0.6182E+04
U-237 0.2400E-04
Am-241 0.1000E+01
none 0.0000E+00
Nuclide 058:
Am-241
9
0.1363919472E+11
0.2410E+03
0.9528E+01
Np-237 0.1000E+01
none 0.0000E+00
none 0.0000E+00
Nuclide 059:
Cm-242
9
0.1406592000E+08
0.2420E+03
0.2388E+04
Pu-238 0.1000E+01
none 0.0000E+00
none 0.0000E+00

Nuclide 060:
Cm-244
9
0.5715081360E+09
0.2440E+03
0.2602E+03
Pu-240 0.1000E+01
none 0.0000E+00
none 0.0000E+00
End of Nuclear Inventory File