NUCLEAR ENGINEERING CALCULATION COVER SHEET
NEPM-QA-0221-1

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>13. Are any results of this calculation described in the Licensing Documents?

☒ Yes, *Refer to NDAP-QA-0730 and NDAP-QA-0731* ☐ No

>14. Is this calculation changing any method of evaluation described in the FSAR and using the results to support or change the FSAR? (Refer to PPL Resource Manual for Definition of FSAR)

☒ Yes, *50.59 screen or evaluation required.* ☐ No

>15. Is this calculation Prepared by an External Organization?

☒ Yes ☐ No

EG771 Qualifications may not be required for individuals from external organizations (see Section 7.4.3).

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STEAM LINE BREAK ACCIDENT CRHE and OFFSITE DOSES - AST

1.0 PURPOSE

This calculation documents the design basis evaluation of the Control Room Habitability Envelope (CRHE) and offsite radiological doses at the exclusion area boundary and the low population zone following a postulated steam line break using the Alternate Source Term (AST) methodology described in USNRC Regulatory Guide 1.183 (Reference 1). The break is assumed to occur in the reactor building steam tunnel and be released to the environment via the reactor building steam tunnel blowout panel. Reactor water and steam iodine specific activities are specified using dose equivalent I-131 (DE I-131) based on the TEDE dose conversion. The doses are calculated using the RADTRAD computer code (Reference 7).

2.0 CONCLUSIONS AND RECOMMENDATIONS

The offsite dose acceptance criterion for the steam line break is provided in Regulatory Guide 1.183, Table 6. The CRHE dose acceptance criterion for the main steam line accident is provided in 10CFR50.67, Accident Source Term, subsection 10CRF50.67(b)(2)(iii).

The offsite dose acceptance criteria at the exclusion area boundary (EAB) and the low population zone (LPZ) are 25 Rem TEDE for a steam line break with fuel damage or pre-accident iodine spike and 2.5 Rem TEDE for a steam line break with maximum equilibrium iodine activity. The CRHE dose acceptance criterion is 5 Rem TEDE.

The reported steam line break doses using AST methodology are:

Dose Summary for Steam Line Break Accident

	Pre-accident Spike 4 μCi/gm DE I-131, TEDE, Rem	Maximum Equilibrium Iodine Activity 0.2 μCi/gm DE I-131, TEDE, Rem
Acceptance Criterion - Offsite	25	2.5
EAB	2.0	0.10
LPZ	0.12	0.006
Acceptance Criterion - CRHE	5.0	5.0
CRHE	0.77	0.04

3.0 INPUT and ASSUMPTIONS

The input data and assumptions used in this analysis are summarized in Table 1.

3.1 Reactor Core and Coolant Source Parameters

1. Core thermal power used for this accident is 4032 MWt (Reference 12). The thermal power is taken as 102% of the 3952 MWt uprate power. The core thermal power is not directly used in this analysis since there is no fuel damage postulated for this event. The core power is used to confirm that the reactor coolant and steam activity concentrations are conservative for extended power uprate conditions.
2. The design basis noble gas source term is 100,000 µCi/s after 30 minutes decay and is shown in Table 2. Short lived isotopes (half lives less than one minute) are excluded due to radiological decay. The concentrations shown have been determined to be conservative for extended power uprate with and without hydrogen water chemistry (Reference 14, Appendix E).
3. A total off gas release rate of 403,000 µCi/sec after 30 minutes delay is used for the noble gas source with a core power of 4032 MWt. The individual noble gas concentrations are then scaled from the 100,000 µCi/sec rate data in Table 2 by applying a factor of 4.03.

   The scaling of the 100,000 µCi/sec is similar to the approach in Regulatory Guide 1.98 for analyzing postulated failures in off gas systems. Regulatory Guide 1.98 assumes a release rate of 100 µCi/MWt after 30 minute delay at the steam jet air ejector. For a given fuel design basis defect fraction, the rate of fission product releases through the defects is proportional to the number of fissions or core power. The observed off gas rate is proportional to the fission product release rate (or alternatively core power) assuming no change in cladding defects. Hence, the observed off gas rate may be directly scaled from one power level to another as prescribed in Regulatory Guide 1.98. The same approach is used for setting SSES's main condenser offgas rate in Improved Technical Specification 3.5.7 (Reference 19).
4. The main steam flow rate is 1.418E+07 lbm/h, which corresponds to the flow used to establish the original GE design basis reactor water and steam activities (Reference 14). Reference 14 shows that the activity concentrations at extended power uprate with the anticipated steam flow (1.654E+07 lbm/h) are bounded by the original design basis concentrations. Because the original activity concentrations have been retained for the SSES design basis (Reference 14), this analysis uses the original steam flow rate of 1.418E+07 lbm/h to determine the noble gas activities released to the environs. The approach is consistent with the design basis and covers existing and power uprate steam flows.
5. The design basis iodine specific activities are shown in Table 3 for the reactor water and main steam. The water concentrations are maximized by the use of a 2% steam carryover (corresponding to normal water chemistry operation) while the steam concentrations are maximized using an 8% steam carryover (corresponding to operation with hydrogen water

5. The design basis iodine specific activities are shown in Table 3 for the reactor water and main steam. The water concentrations are maximized by the use of a 2% steam carryover

chemistry). This approach bounds normal and hydrogen water chemistry operation (Reference 14).

3.2 Accident Scenario Parameters

1. No fuel damage is postulated for the main steam line break. Therefore, the released activity is based on the maximum coolant activity allowed by Improved Technical Specification 3.4.7 (Reference 18). Two activity cases are analyzed consistent with Regulatory Guide 1.183, Appendix D guidance:
    1. Iodine activities based on a pre-accident spike with a concentration of 4 µCi/g DE I-131.
    2. Iodine activities based on the maximum equilibrium value for full power operation with a concentration of 0.2 µCi/g DE I-131.
2. For the design basis accident, the reactor is assumed to be in hot standby prior to the break (Reference 13, Task A.28). This condition maximizes the liquid mass release and hence activity releases.
3. The mass releases for the design basis (hot standby) cases are (Reference 13, Table A.28-3):

Liquid release	84,840 lbm
Steam release from flashed liquid	6,480 lbm
Steam from steam dome	6,650 lbm

From the above, the total amount of coolant as water exiting the vessel is 91,320 lbm. The total mass release is 97970 lbm.

4. The above mass releases are increased by 20% to provide additional margin. Evaluations of steam line break masses for other extended power uprate plants determined that the increases in mass releases were small compared to the pre-uprate main steam line break masses while at power.
5. Main steam line valves are assumed to start to close at 0.5 seconds on a high flow signal and are fully closed at 5.5 seconds (Reference 20). The closure time ensures that the steam, water and radioactivity releases to the environs are over a relatively short duration.
6. All of the radioactivity in the liquid and steam is assumed to be released instantaneously as a ground level release consistent with Regulatory Guide 1.183, Appendix D. No hold-up or dilution is assumed in the reactor or turbine building steam tunnels.
7. The instantaneous release of all the activity within a short period (less than one minute) is modeled as a puff release consistent with the guidance in Regulatory Guide 1.194. This approach is reasonable since the MSIVs rapidly isolate the break and all the activity is immediately assumed to be released into the environment.

modeled as a puff release consistent with the guidance in Regulatory Guide 1.194. This approach is reasonable since the MSIVs rapidly isolate the break and all the activity is

8. The iodine species released from the main steam line are 95% CsI as aerosol, 4.85% as elemental iodine, and 0.15% as organic iodine in accordance with Regulatory Guide 1.183, Appendix D.

3.3 Control Room Habitability Design Parameters

1. No credit is given for filtration of radioiodine from the steam line break. The control room emergency outside air filtration system (CREOAS) does not automatically actuate for this accident. Manual operation is not credited because the accident occurs rapidly with the release moving away from the control room within minutes.
2. The CRHE's nominal air intake flow rate is 5810 cfm. This analysis uses 6391 cfm, the maximum value for which the system is in compliance with Technical Specification 5.5.7 (Reference 17). The use of the maximum flow rate results in the greatest uptake of activity during the accident.
3. Unfiltered inleakage is 500 cfm. This amount bounds the leakages and error bands from the December 2004 CRHE tracer gas tests. Unfiltered ingress/egress leakage through doors of 10 cfm is assumed based on NUREG-0800, chapter 6.4 (Reference 10).
4. The control structure habitability envelope volume is 518,000 cu ft (Reference 16). The control room with volume of 110,000 ft^3 is located within this volume. The CRHE and control room are served by CREOAS.

3.4 Dose Parameters

1. CRHE and offsite breathing rates are 3.5E-04 m^3/s. Both rates are consistent with Regulatory Guide 1.183, section 4.1.
2. Control room occupancy is based on a maximum exposed individual. The individual is assumed present in the control room 100% of the time during this short duration accident. The occupancy is consistent with Regulatory Guide 1.183, section 4.2, and NUREG-0800, chapter 6.4.
3. Doses are calculated in terms of the TEDE as required by Regulatory Guide 1.183, section 4.1. The dose conversion factors for the CEDE are based on Federal Guidance Report 11 and the EDE is based on Federal Guidance Report 12. The dose conversion factors appear in Reference 7, Table 11.4.3.3-2. EDEs for additional nuclides were added and included Kr-83m, Kr-85m, Kr-85, Xe-131m, Xe-133m, Xe-135m and Xe-138. The dose conversion factors were compiled into a RADTRAD.inp file for SSES's AST analyses and are included as Attachment 2.

3.5 Dispersion Parameters

1. Offsite χ/Q values are 8.3E-04 s/m^3 (0 - 2 hr) for the EAB and 4.9E-05 s/m^3 (0 – 8 hr) for the LPZ (Reference 15, Tables 2.3-92 and 2.3-105).
2. The CRHE χ/Q is based on Regulatory Guide 1.194 methods for instantaneous releases with duration less than one minute.

   LPZ (Reference 15, Tables 2.3-92 and 2.3-105).

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Table 1
Steam Line Break Analysis Input and Assumptions Summary

Description	Value	Source
Core Thermal Power Level	4032 MWt	Reference 12
Noble Gas Design Source Term	Table 2 100,000 µCi/s after 30 minutes	Reference 6, Table 11.1-1
Design Offgas Release Rate	403,000 µCi/s after 30 minutes	See section 3.1, item 3
Design Reactor Water and Steam Iodine Specific Activities	Table 3	Reference 6, Table 11.1-2
Design Main Steam Flow	1,418,000 lbm/h	Reference 6, Appendx B
Iodine Carryover Fraction	8%	Reference 6
Pre-accident Iodine Spike	4.0 µCi/gm DE I-131	Reference 18; RG 1.183
Maximum Equilibrium Iodine Activity	0.2 µCi/gm DE I-131	Reference 18, RG1.183
Radioiodine Chemical Species	95% CsI, 4.85% Elemental I2, 0.15% Organic I	RG 1.183
Liquid Release	84,840 lbm	Reference 13, Task A.28
Steam Release from Flashed Liquid	6,480 lbm	Reference 13, Task A.28
Steam Release from the Steam Dome	6,650 lbm	Reference 13, Task A.28
MSIV Closure Time	5.5 seconds	See section 3.2, item 5
Failed Fuel Resulting From MSLB	0	See section 3.2, item 1
Holdup in TB	None	RG 1.183
CRHE Volume	518,000 ft^3	Reference 16
CRHE Isolation and CREOAS Start-up	None	See section 3.3, item 1
CRHE Air Intake Flow	6391 cfm (max)	Reference 17
CRHE Unfiltered Inleakage	500 cfm	See section 3.3, item 3
CRHE Ingress/egress Flow	10 cfm	Reference 6
Operator and Offsite Breathing Rates	3.5E-04 m^3/sec	RG 1.183
Operator Occupancy Factors	1.0, 24 hrs 0.6, 1-4 days 0.4, 4-30 days	Reference 6, RG 1.183
CRHE χ/Q	Puff: 5.2E-04 s/m^3	Table 7
Offsite χ/Q	EAB: 8.3E-04 s/m^3, 0-2 hr LPZ: 4.9E-05 s/m^3, 0-8 hr	Reference 15

Offsite χ/Q	EAB: 8.3E-04 s/m^3, 0-2 hr	Reference 15

4.0 METHOD

The offsite and CRHE doses are calculated using the RADTRAD computer code with the input and assumptions listed in Table 1. The activity released to the environment is provided on Tables 3 and 5. The resulting offsite and CRHE doses are provided in Attachments 5 and 6 for the cases of 4 μCi/gm DE I-131 and 0.2 μCi/gm DE I-131, respectively. A maximum unidentified unfiltered inleakage of 500 cfm plus 10 cfm ingress/egress unfiltered inleakage is used in the analysis.

4.1 Noble Gas Activity

The noble gas activity released to the environment is based on the pre-accident noble gas off gas release rate of 403,000 μCi/sec after 30 minutes delay. The steam's noble gas specific activity (μCi/g) is determined from the off-gas activity source rate accounting for the 30 minute delay. The specific activities are then used to determine the noble gas release to the environment. The noble gas activity in the reactor water is conservatively taken the same as the steam activity since much of the water exiting the break will flash to steam. The activities A_i for the noble gases are given by:

$$A_i = 4.03 \frac{C_i (M_s + M_w)}{F_s} \exp(\lambda_i * 1800\ s)$$

where -

C_i = noble gas nuclide source rate, μCi/s

M_s = mass of steam released, lbm

M_w = mass of liquid released, lbm

F_s = steam flow rate used to establish noble gas equilibrium concentration, lbm/h

λ_i = decay rate for noble gas nuclide i, s^{-1}

4.03 = multiplier accounting for the maximum noble gas source rate of 362,000 μCi/s relative to the design basis rate of 100,000 μCi/s used to specify the noble gas source rates.

The calculated activities A_i available for release during the accident are shown in Table 2.

Table 2
Noble Gas Activity Released from MSLB

Steam mass (dome) M_s, lbm	7980
Liquid mass M_w, lbm	109584
Steam flow rate F_s, lbm/h	1.42E+07
30 minute decay, s	1800
Conversion - s-Ci/hr-uCi	3.60E-03
403,000 uCi/s rate factor	4.03

Isotope	Half Life, sec	Source Rate, C_i @ T = 30 min uCi/sec	Activity Release A_i, Ci
Kr-83m	6.840E+03	2.90E+03	4.19E-01
Kr-85m	1.570E+04	5.60E+03	7.29E-01
Kr-85	3.383E+08	2.00E+01	2.41E-03
Kr-87	4.680E+03	1.50E+04	2.36E+00
Kr-88	9.972E+03	1.80E+04	2.45E+00
Kr-89	1.896E+02	1.80E+02	1.56E+01
Xe-131m	1.036E+06	1.50E+01	1.81E-03
Xe-133m	1.987E+05	2.80E+02	3.39E-02
Xe-133	4.553E+05	8.20E+03	9.89E-01
Xe-135m	9.360E+02	6.90E+03	3.15E+00
Xe-135	3.287E+04	2.20E+04	2.75E+00
Xe-137	2.298E+02	6.70E+02	1.84E+01
Xe-138	8.478E+02	2.10E+04	1.10E+01

Notes:
1. GE "1971" design activity rates for 100,000 uCi/s source rate from Reference 14, Table 11.1-1.

2. Noble gas activties are based on 403,000 uCi/s measured at 30 minutes.
3. Activity releases are immediate with no hold up in the core or main steam system.

4.2 Iodine Activity in Reactor Coolant

The design basis equilibrium halogen activity concentrations in the reactor water and main steam are shown in Table 3.

Table 3
Iodine Specific Activities

Isotope	Reactor Water Specific Activity uCi/gm	Reactor Steam Specific Activity uCi/gm
I-131	1.30E-02	3.40E-04
I-132	1.20E-01	3.90E-03
I-133	8.90E-02	2.40E-03
I-134	2.40E-01	9.70E-03
I-135	1.30E-01	3.70E-03

Notes:
1. Reference 14, Table 11.1-2
2. Values bound normal and hydrogen water chemistry operation.

The iodine activity in the reactor coolant is based on the maximum DE I-131 activity permitted by the technical specifications. Concentration limits (TS_{lim}) of 0.2 µCi/g and 4.0 µCi/g DE I-131 are considered.

The specific activities C_{RC-i} of DE I-131 in the reactor coolant are given by:

$$C_{RC-i} = \frac{TS_{lim} * C_{DB-i} * DCF_{I-131}}{\sum (C_{DB-i} * DCF_i)}$$

where -

TS_{lim} = the technical specification limiting concentrations 0.2 µCi/g and 4.0 µCi/g DE I-131

C_{DB-i} = design basis reactor coolant iodine specific activities in Table 3

DCF_i = total effective dose equivalent (TEDE) dose conversion factors for iodine isotopes.

The DCF_i are derived from the CEDE (from FGR 11, Reference 8) and EDE (from FGR 12, Reference 9) dose conversion factors. A breathing rate of 3.5E-04 m^3/s (Input 3.4, item #1), applicable to control room personnel and workers, is used with the CEDE. The TEDE's DCF_i for the iodine isotopes are given by:

$$DCF_i = DCF_{CEDE,i} * BR + DCF_{EDE,i}$$

Observe that the DCF_i are given on a per Bq basis whereas the reactor water and steam concentrations are specified using µCi. No unit conversions are needed since the DCF_i are used only as weighting factors, which dimensionally cancel out in the normalization process. The calculated DCF_i and specific activities for the reactor coolant are shown in Table 4:

Table 4
Reactor Water Iodine Specific Activities at Technical Specification Limits

DE I-131 Limit TS_lim, uCi/g	4
DE I-131 Limit TS_lim, uCi/g	0.2
Breathing Rate, m^3/s	3.5E-04

Isotope	Design Basis Reactor Water Concentration CD_i (uCi/gm)	CEDE Dose Conversion (Sv/Bq)	EDE Dose Conversion (Sv/Bq-s/m^3)	TEDE Dose Conversion DCF_i (Sv/Bq-s/m^3)	Concentration @ 4 uCi/gm DE I-131 Ci (uCi/gm)	Concentration @ 0.2 uCi/gm DE I-131 Ci (uCi/gm)
I-131	1.30E-02	8.89E-09	1.82E-14	3.13E-12	0.96	0.048
I-132	1.20E-01	1.03E-10	1.12E-13	1.48E-13	8.84	0.442
I-133	8.90E-02	1.58E-09	2.94E-14	5.82E-13	6.56	0.328
I-134	2.40E-01	3.55E-11	1.30E-13	1.42E-13	17.68	0.884
I-135	1.30E-01	3.32E-10	7.98E-14	1.96E-13	9.58	0.479

Notes:
1. Design reactor water specific activities from Table 3.
2. CEDE h_Effective from FGR 11 and EDE h_E from FGR 12.

4.3 *Iodine Activity Released in Steam Line Break*

The iodine releases are based on the reactor coolant activity, carryover to steam, and the coolant and steam masses released from the break. Coolant concentrations are set by the allowable activity limits in accordance with the technical specifications.

The iodine activity A_i released from the steam line break for a coolant to steam carryover fraction of 0.08 is

$$A_i = \sum C_{RC\text{-}i} * (M_w + 0.08*M_s)$$

where -

$C_{RC\text{-}i}$ = iodine specific activity of the reactor coolant

M_w = mass of liquid released from the reactor, lbm

M_s = mass of steam released from the reactor dome, lbm

M_w = mass of liquid released from the reactor, lbm

The calculated iodine activity released is summarized in Table 5. Observe that the 8% carryover to the steam results in much greater concentrations than the steam's design basis activities in Table 3. Because of the large water inventory exiting the break at hot standby, the iodine available for release to the environment is dominated by the reactor water concentrations as shown in Table 5.

Table 5
Iodine Released from Steam Line Break

Steam mass (dome) M_s, lbm	7980
Liquid mass M_w, lbm	109584
Carryover to steam fraction	0.08
Conversion, gm-Ci/(lbm-uCi)	4.54E-04

Iodine Activity Release with Reactor Coolant at 4 uCi/gm DE I-131

Isotope	DE I-131 RC Concentration, uCi/gm	Steam Concentration, uCi/gm	Iodine Activity Release, Ci
I-131	0.96	0.08	4.79E+01
I-132	8.84	0.71	4.42E+02
I-133	6.56	0.52	3.28E+02
I-134	17.68	1.41	8.85E+02
I-135	9.58	0.77	4.79E+02

Iodine Activity Release with Reactor Coolant at 0.2 uCi/gm DE I-131

Isotope	DE I-131 RC Concentration, uCi/gm	Steam Concentration, uCi/gm	Iodine Activity Release, Ci
I-131	0.048	0.00	2.40E+00
I-132	0.442	0.04	2.21E+01
I-133	0.328	0.03	1.64E+01
I-134	0.884	0.07	4.42E+01
I-135	0.479	0.04	2.40E+01

Notes:
1. DE I-131 specific activities from Table 4.
2. Steam concentration is based on DE I-131 concentration with 8% carryover.
3. Steam and liquid masses include 20% margin.

4.4 Effective Relative Concentration at the CRHE Air Intake

The main steam line break is a double ended break in the steam tunnel. The release of steam and activity occurs over a very short time until closure of the MSIVs. The MSIV signal plus closing time is 5.5 seconds. All the activity is assumed released to the atmosphere instantaneously as a ground level release without holdup or dilution in the steam tunnel. The duration is short enough (less than one minute) to consider the release as an instantaneous puff release in accordance with Regulatory Guide 1.194.

SSES does not have an automatic CRHE intake isolation or start-up of the CREOAS for a main steam line break. CRHE intake flow is taken as the normal service flow. No credit is taken for isolation of the CRHE intake or filtration of the radioiodine, especially in view of the short duration of the exposure. Therefore, calculations of the CRHE χ/Qs are amenable to the closed form solution given below. If CRHE isolation or filtration occurs, then numerical methods would be required to determine an appropriate χ/Qs.

The concentration χ (x, u, t) for a puff ground level release with the center of the puff passing directly over the intake air location is

$$\chi(x, u, h, t) = \frac{2Q}{(2\pi)^{3/2}(\sigma_z^2 + \sigma_v^2)^{1/2}(\sigma_x^2 + \sigma_v^2)} * \exp\left\{\frac{-0.5(x-ut)^2}{(\sigma_x^2 + \sigma_v^2)} + \frac{-0.5\,h^2}{(\sigma_z^2 + \sigma_v^2)}\right\}$$

where -

Q = activity release, Ci

x = release point to receptor (air intake) distance, m

u = windspeed, m/s

h = difference in elevation between release point and control room intake, m

σ_x = standard deviation of the puff in the horizontal along the wind direction and cross-wind direction at the CRHE intake location, m

σ_z = standard deviation of the vertical cross wind direction at the intake location, m

σ_v = initial standard deviation of the volumetric expansion of the puff, m

The above diffusion equation follows from Reference 5, Eq 10 and Reference 10, Eq 3.154. The units of χ(x, u, h, t) are Ci/m^3.

The total exposure during passage of the puff is obtained by integrating over the time of the puff's passage. The total exposure X_T is

$$X_T = \int \chi(x, u, h, t)\, dt \qquad \text{for } 0 < t < T$$

puff's passage. The total exposure X_T is

Regulatory Guide 1.194 advises that the integration be carried out to the time T that it takes the trailing edge to pass the CRHE intake.

The puff is a Gaussian distribution. The exposure time is typically the time that it takes about 99.8% of the puff distribution to pass beyond the horizontal distance x_0 to the air intake. Approximately 99.8% of the distribution passes the intake when the center of puff travels downwind of the intake by a distance of three standard deviations in the horizontal direction. The time T at which the puff has passed the intake is then given by:

$$T = \frac{x_0 + 3\,(\sigma_x^2 + \sigma_v^2)^{1/2}}{u}$$

where -

x_0 = horizontal distance in x direction to intake location, m

u = windspeed, m/s

σ_x = standard deviation of the puff in the horizontal along the wind direction at the CRHE control intake location, m

σ_v = initial standard deviation of the volumetric expansion of the puff, m

A simplification is made by considering the entire tail of the puff. The above equation for X_T is integrated over all time (i.e., $T \rightarrow \infty$) instead of up to T[1]. The total exposure X_T then follows directly from Reference 10, Eq 3.158 in that

$$\chi(x, u, h) = \frac{Q}{\pi u (\sigma_z^2 + \sigma_v^2)^{1/2} (\sigma_x^2 + \sigma_v^2)^{1/2}} * \exp\left\{ \frac{-0.5\, h^2}{(\sigma_z^2 + \sigma_v^2)} \right\}$$

Thus, the equation has the same form as the equation for a continuous plum concentration. For example, the above equation can be compared to Reference 10, Eq 3.116 or Reference 4, Eq 1. Observe that σ_z and σ_x are functions of the distance x to the intake.

The χ/Q for the duration of the puff passage T is then taken as

$$\chi/Q = \chi(x, u, h)/Q$$

where Q and $\chi(x, u, h)$ are defined above.

[1] The difference in exposures is negligible since 99.8% of the puff's distribution is considered. The specification of T, however, is beneficial since it can provide insight into the air intake exposure time.

[1] The difference in exposures is negligible since 99.8% of the puff's distribution is considered. The

4.5 Puff Expansion and Initial Standard Deviation

The activity released from the steam line break is assumed uniformly distributed in a puff volume expanded to atmospheric pressure. The size of the puff is set by the fluid mass released during the steam line break.

The volume V of the puff is

$$V = (M_s + M_w) * v_{sp}$$

where –

M_s = mass of steam released, lbm

M_w = mass of liquid released, lbm/s

v_{sp} = specific volume of saturated steam at 14.7 psia, 26.8 ft^3/lbm

The standard deviation of the puff σ_v is obtained by setting the initial ground level concentration $\chi(0, u, 0, 0)$ equal to the puff's concentration after expansion, Q/V. The resulting equation is (Reference 5, p. 19):

$$\sigma_v = \left| \frac{2V}{(2\pi)^{3/2}} \right|^{1/3}$$

where V is the initial volume of the puff after expansion.

In determining the volume, the entire mass of fluid from the break is used consistent with the assumption of instantaneously releasing the entire inventory of noble gas and iodine. The masses from section 3.2, items #3 and #4, are used to maximize the release of water and hence available radioiodine. At power, a greater amount of steam and flashing can be expected than in hot standby. Therefore, the use of entire fluid inventory is reasonable. Calculated results are shown in Table 6.

4.6 Calculation of CRHE Relative Concentration χ/Q

The CRHE χ/Qs associated with a release from each blowout panel are calculated and shown in Tables 6 and 7. χ/Qs are calculated in accordance with Sections 4.4 and 4.5 above.

Table 6 identifies the main steam blowout panel locations, elevations, horizontal distances to CRHE air intake, and relative heights to the intake. The normal standard deviations σ_x and σ_z of the puff are functions of horizontal distance to the intake and are also shown. These values are determined from Regulatory Guide 1.194, Figures 4 and 5.

Table 6
MST Blowout Panel Locations, Distances and Dispersion Coefficients

Release Point	Elevation, ft	Distance, m	Δheight, m	sigma_x, m	sigma_z, m
RB Unit 2 Air Intake	872.0	n/a	n/a	n/a	n/a
TB Unit 1MST blowout panel	717.5	115	47	5.2	2.5
TB Unit 2 MST blowout panel	717.5	41	47	2.1	1.1
RB Unit 1 MST blowout panel	802.5	74	21	3.5	1.8
RB Unit 2 MST blowout panel	802.5	47	21	2.3	1.2

Notes:
1. Δheight is the difference between intake and blowout panel elevations.
2. sigma_x and sigma_z are from Reg Guide 1.194, Figures 4 and 5, for class F stability.
3. Reference drawings: E-105004, Sh. 3; E-105004, Sh. 6; E-105618; E-105670.

The χ/Qs are determined in Table 7 for a windspeed of 1 m/s with class F stability. These conditions are reasonable and in accord with Regulatory Guide 1.194. Several release masses are shown in Table 7 to determine the maximum effective χ/Q. Observe that the 35,000 lbm steam mass, which gives the maximum χ/Q, is comparable to the steam plus flashed liquid released from the steam tunnel design basis break described in FSAR Table 3.6A.

Inspection of Table 7 shows that dispersion is dominated by the initial expansion of the puff rather than normal dispersion for class F stability. Similar conclusions can be drawn for other stability classes.

Table 7 shows that the χ/Qs are relatively insensitive to horizontal distance for the same release elevation because the puff's radius is smaller than the distance to the intake. Hence after expansion, the entire puff travels by the intake. Table 7 also demonstrates the benefit of the air intake's elevation relative to the blowout panels.

Also shown are the times T at which the puff can be assumed to have moved away from the intake. Three minutes is a typical exposure duration.

Table 7
CRHE Effective χ/Qs For Steam Line Breaks

Windspeed, m/s	1.0				
Vapor sp. volume, ft^3/lbm	26.8				
		Puff Mass and Expansion			
	(a)	(b)	(c)	(d)	
Puff mass, lbm	13,130	35,000	97,970	117,564	
Volume, m^3	9,964	26,561	74,349	89,218	
Sigma_puff, m	10.8	15.0	21.1	22.5	
		Effective χ/Qs			
Release Point	χ/Q, s/m^3	χ/Q, s/m^3	χ/Q, s/m^3	χ/Q, s/m^3	Time T, s
TB Unit 1MST blowout panel	2.9E-07	1.1E-05	5.9E-05	7.0E-05	184
TB Unit 2 MST blowout panel	2.2E-07	1.0E-05	6.0E-05	7.0E-05	109
RB Unit 1 MST blowout panel	3.9E-04	5.1E-04	4.3E-04	4.0E-04	143
RB Unit 2 MST blowout panel	4.0E-04	5.2E-04	4.3E-04	4.0E-04	115

Notes:
1. Puff masses based on the following:
   (a) steam mass release at hot standby,
   (b) steam mass release giving the largest χ/Q,
   (c) total steam plus liquid mass release at hot standby,
   (d) 20% margin added to case (c).
2. T is the time for approximately 99.8% of the largest puff to pass the intake.

4.7 Radiological and Transport Model

RADTRAD 3.03 is used for the dose models and calculations. The model consists of steam tunnel, CRHE and environment nodes with four interconnecting pathways.

All the steam activity from the line break is released in 5.5 seconds into the tunnel. The activity is purged from the tunnel to the environment within seconds using an arbitrarily high flow rate pathway. Offsite and CRHE doses are calculated using the parameters described in sections 3.3, 3.4 and 3.5.

The CRHE dose calculation uses the worst case χ/Q from Table 7 with the activities from Tables 2 and 5 corresponding to a hot standby mass release (with 20% margin). The total CRHE unfiltered inleakage is 510 cfm. The air intake is 6391 cfm throughout the accident with CREOAS not credited.

Nuclide release and dose conversion factor files are shown in Attachments 1 and 2. Nuclide inventories are developed from Tables 3 and 5. Two files corresponding to the 4 μCi/gm and 0.2 credited.

µCi/gm DE I-131 cases are shown in Attachments 3 and 4, respectively. The physical and flow models are shown as part of the RADTRAD input in Attachments 5 and 6.

5.0 RESULTS

The reported offsite and CRHE doses based on the results of the RADTRAD calculations are listed in Table 8.

Table 8
Offsite and CRHE Dose Results - Steam Line Break

	Pre-existing Iodine Spike 4 µCi/gm DE I-131 TEDE, Rem	Maximum Equilibrium Activity 0.2 µCi/gm DE I-131 TEDE, Rem
Acceptance Criterion - Offsite	25	2.5
EAB	2.0	0.10
LPZ	0.12	0.006
Acceptance Criterion - CRHE	5.0	5.0
CRHE	0.77	0.04

Notes:
1. RADTRAD output files are in Attachments 5 and 6.
2. CRHE dose includes 30 day exposure in building after puff passage.

The EDE doses included in the TEDE are based on the CRHE volume of 518,000 ft^3 used in RADTRAD. No additional finite cloud reduction for the actual control room volume of 110,000 ft^3 is applied since the EDE contribution is an insignificant contributor to the reported CRHE TEDE dose.

6.0 REFERENCES

1. USNRC Regulatory Guide 1.183, "Alternative Radiological Source Terms For Evaluating Design Basis Accidents At Nuclear Power Reactors", July 2000.
2. USNRC Regulatory Guide 1.5, "Assumptions Used For Evaluating the Potential Radiological Consequences of a Steam Line Break Accident for Boiling Water Reactors", 3/71.
3. USNRC Regulatory Guide 1.98, "Assumptions Used For Evaluating The Potential Radiological Consequences Of A Radioactive Offgas System Failure In A Boiling Water Reactor", March 1976.
4. USNRC Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants", February 1983.
5. USNRC Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants", June 2003.
6. NUREG-0800, USNRC Standard Review Plan Section 6.4, Control Room Habitability System, Revision 2.
7. NUREG/CR-6604, RADTRAD: A Simplified Model for RADionuclide Transport and Removal And Dose Estimation, and Supplement 1, 6/8/99.
8. Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion", 1988.
9. Federal Guidance Report No. 12, "External Exposures to Radionuclides in Air; Water; and Soil Based on the 1987 Federal Radiation Protection Guidance", 1993.
10. USAEC, Meteorology and Atomic Energy 1968.
11. ASME Steam Properties for Industrial Use, Version 1.0.1.
12. EPUMELLLA+ Design Input Request T0200Core Design, Rev. 0.
13. PPL Calculation EC-PUPC-1001, NEDC-32161P, General Electric Power Uprate Engineering Report For Susquehanna Steam Electric Station, Revision 6, 5/24/04.
14. PPL Calculation EC-RADN-1038, Radioactive Material Source Term Evaluation for Normal Conditions with Hydrogen Water Chemistry, Revision 1.
15. PPL Calculation EC-ENVR-1057, Offsite X/Q Values for SSES Based on 1999 – 2003 Meteorological Data, Revision 0, April 4, 2005.
16. PPL Calculation EC-030-502, Control Structure Bldg. Volume, Revision 0, 12/17/93.
17. SSES Improved Technical Specification 5.5.7, "Ventilation Filter Testing Program", Amendments 178 and 186.
18. SSES Improved Technical Specification 3.4.7, "Reactor Coolant System, Specific Activity"; Amendments 178 and 195. Bases for Improved Technical Specifications B 3.4.7.
19. SSES Improved Technical Specification 3.7.5, "Main Condenser Off Gas", Amendments 151 and 178. Bases for Improved Specification B 37.5.

19. SSES Improved Technical Specification 3.7.5, "Main Condenser Off Gas", Amendments 151

20. SSES Improved Technical Specification 3.6.1.3, "Primary Containment Valves (PCIVs)", SR 3.6.1.3.7, Amendments 193 and 168.
21. Reference SSES Drawings:
    E-105004, Sh. 3, Rev 26.
    E-105004, Sh. 6, Rev 22.
    E-105618, Rev 1.
    E-105670, Rev 8.

Attachment 1 RADTRAD Control File Release Fraction and Timing SLB.rft

```
Release Fraction and Timing Name: SSES MSLB - Release Break Activity In 5.5 Secs
 Sources
Duration (h):    Design Basis Accident
 0.1528E-06  0.0000E+00  0.0000E+00  0.0000E+00
Noble Gases:
 1.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00
Iodine:
 1.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00
Cesium:
 0.0000E-00  0.0000E+00  0.0000E+00  0.0000E+00
Tellurium:
 0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00
Strontium:
 0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00
Barium:
 0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00
Ruthenium:
 0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00
Cerium:
 0.0000E+00  0.0000E-00  0.0000E+00  0.0000E+00
Lanthanum:
 0.0000E+00  0.0000E+00  0.0000E-00  0.0000E+00
Non-Radioactive Aerosols (kg):
 0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00
End of Release File
```

Attachment 2 RADTRAD Control File Dose Conversion File SLB_Phase 2.inp

FGR11&12 edited+TID_30.inp Kr83m Xe131m 133m 135m 138 beta-test version 1.10
Implicit daughter halflives (m) less than 90 and less than 0.100 of parent
9 ORGANS DEFINED IN THIS FILE: ICRP-30
GONADS
BREAST
LUNGS
RED MARR
BONE SUR
THYROID
REMAINDER
EFFECTIVE
SKIN(FGR)
16 NUCLIDES DEFINED IN THIS FILE:
I-131 D
I-132 D
I-133 D
I-134 D
I-135 D Including:Xe-135m
Xe-131m
Xe-133m
Xe-133
Xe-135m
Xe-135
Kr-83m
Kr-85m
Kr-87
Kr-88
Kr-85
Xe-138

	CLOUDSHINE	GROUND SHINE 8HR	GROUND SHINE 7DAY	GROUND SHINE RATE	INHALED ACUTE	INHALED CHRONIC	INGESTION
I-131							
GONADS	1.780E-14	1.119E-11	1.789E-10	3.940E-16-1.000E+00	2.530E-11	4.070E-11	
BREAST	2.040E-14	1.082E-11	1.730E-10	3.810E-16-1.000E+00	7.880E-11	1.210E-10	
LUNGS	1.760E-14	1.016E-11	1.626E-10	3.580E-16-1.000E+00	6.570E-10	1.020E-10	
RED MARR	1.680E-14	1.022E-11	1.635E-10	3.600E-16-1.000E+00	6.260E-11	9.440E-11	
BONE SUR	3.450E-14	1.675E-11	2.679E-10	5.900E-16-1.000E+00	5.730E-11	8.720E-11	
THYROID	1.810E-14	1.053E-11	1.685E-10	3.710E-16-1.000E+00	2.920E-07	4.760E-07	
REMAINDER	1.670E-14	9.908E-12	1.585E-10	3.490E-16-1.000E+00	8.030E-11	1.570E-10	
EFFECTIVE	1.820E-14	1.067E-11	1.707E-10	3.760E-16-1.000E+00	8.890E-09	1.440E-08	
SKIN(FGR)	2.980E-14	1.825E-11	2.920E-10	6.430E-16-1.000E+00	0.000E+00	0.000E+00	
I-132							
GONADS	1.090E-13	2.523E-11	2.771E-11	2.320E-15-1.000E+00	9.950E-12	2.330E-11	
BREAST	1.240E-13	2.414E-11	2.652E-11	2.220E-15-1.000E+00	1.410E-11	2.520E-11	
LUNGS	1.090E-13	2.305E-11	2.532E-11	2.120E-15-1.000E+00	2.710E-10	2.640E-11	
RED MARR	1.070E-13	2.360E-11	2.592E-11	2.170E-15-1.000E+00	1.400E-11	2.460E-11	
BONE SUR	1.730E-13	3.327E-11	3.655E-11	3.060E-15-1.000E+00	1.240E-11	2.190E-11	
THYROID	1.120E-13	2.381E-11	2.616E-11	2.190E-15-1.000E+00	1.740E-09	3.670E-09	
REMAINDER	1.050E-13	2.283E-11	2.509E-11	2.100E-15-1.000E+00	3.780E-11	1.650E-10	
EFFECTIVE	1.120E-13	2.403E-11	2.640E-11	2.210E-15-1.000E+00	1.030E-10	1.820E-10	
SKIN(FGR)	1.580E-13	8.199E-11	9.007E-11	7.540E-15-1.000E+00	0.000E+00	0.000E+00	
I-133							
GONADS	2.870E-14	1.585E-11	6.748E-11	6.270E-16-1.000E+00	1.950E-11	3.630E-11	
BREAST	3.280E-14	1.519E-11	6.468E-11	6.010E-16-1.000E+00	2.940E-11	4.680E-11	
LUNGS	2.860E-14	1.446E-11	6.156E-11	5.720E-16-1.000E+00	8.200E-10	4.530E-11	
RED MARR	2.770E-14	1.466E-11	6.242E-11	5.800E-16-1.000E+00	2.720E-11	4.300E-11	
BONE SUR	4.870E-14	2.161E-11	9.202E-11	8.550E-16-1.000E+00	2.520E-11	4.070E-11	
THYROID	2.930E-14	1.502E-11	6.393E-11	5.940E-16-1.000E+00	4.860E-08	9.100E-08	
REMAINDER	2.730E-14	1.418E-11	6.038E-11	5.610E-16-1.000E+00	5.000E-11	1.550E-10	
EFFECTIVE	2.940E-14	1.509E-11	6.425E-11	5.970E-16-1.000E+00	1.580E-09	2.800E-09	
SKIN(FGR)	5.830E-14	1.150E-10	4.897E-10	4.550E-15-1.000E+00	0.000E-00	0.000E+00	
I-134							
GONADS	1.270E-13	1.200E-11	1.202E-11	2.640E-15-1.000E+00	4.250E-12	1.100E-11	
BREAST	1.440E-13	1.145E-11	1.147E-11	2.520E-15-1.000E+00	6.170E-12	1.170E-11	
LUNGS	1.270E-13	1.100E-11	1.102E-11	2.420E-15-1.000E+00	1.430E-10	1.260E-11	
RED MARR	1.250E-13	1.127E-11	1.129E-11	2.480E-15-1.000E+00	6.080E-12	1.090E-11	
SKIN(FGR)	5.830E-14	1.150E-10	4.897E-10	4.550E-15-1.000E+00	0.000E-00	0.000E+00	
I-134							

BONE SUR	1.960E-13	1.568E-11	1.571E-11	3.450E-15-1.000E+00	5.310E-12	9.320E-12
THYROID	1.300E-13	1.127E-11	1.129E-11	2.480E-15-1.000E+00	2.880E-10	6.210E-10
REMAINDER	1.220E-13	1.091E-11	1.093E-11	2.400E-15-1.000E+00	2.270E-11	1.340E-10
EFFECTIVE	1.300E-13	1.150E-11	1.152E-11	2.530E-15-1.000E+00	3.550E-11	6.660E-11
SKIN(FGR)	1.870E-13	4.477E-11	4.485E-11	9.850E-15-1.000E+00	0.000E+00	0.000E+00
I-135						
GONADS	8.078E-14	3.113E-11	5.489E-11	1.599E-15-1.000E+00	1.700E-11	3.610E-11
BREAST	9.143E-14	2.971E-11	5.240E-11	1.526E-15-1.000E+00	2.340E-11	3.850E-11
LUNGS	8.145E-14	2.886E-11	5.089E-11	1.482E-15-1.000E+00	4.410E-10	3.750E-11
RED MARR	8.054E-14	2.965E-11	5.228E-11	1.523E-15-1.000E+00	2.240E-11	3.650E-11
BONE SUR	1.184E-13	3.983E-11	7.024E-11	2.046E-15-1.000E+00	2.010E-11	3.360E-11
THYROID	8.324E-14	2.852E-11	5.030E-11	1.465E-15-1.000E+00	8.460E-09	1.790E-08
REMAINDER	7.861E-14	2.883E-11	5.084E-11	1.481E-15-1.000E+00	4.700E-11	1.540E-10
EFFECTIVE	8.294E-14	2.989E-11	5.271E-11	1.535E-15-1.000E+00	3.320E-10	6.080E-10
SKIN(FGR)	1.156E-13	9.826E-11	1.733E-10	5.047E-15-1.000E+00	0.000E+00	0.000E+00
Xe-131m						
GONADS	4.570E-16	7.872E-13	1.371E-11	2.760E-17-1.000E+00	0.000E+00	0.000E+00
BREAST	6.020E-16	8.471E-13	1.475E-11	2.970E-17-1.000E+00	0.000E+00	0.000E+00
LUNGS	2.670E-16	3.565E-13	6.209E-12	1.250E-17-1.000E+00	0.000E+00	0.000E+00
RED MARR	2.270E-16	2.792E-13	4.863E-12	9.790E-18-1.000E+00	0.000E+00	0.000E+00
BONE SUR	1.060E-15	1.677E-12	2.920E-11	5.880E-17-1.000E+00	0.000E+00	0.000E+00
THYROID	3.910E-16	5.220E-13	9.089E-12	1.830E-17-1.000E+00	0.000E+00	0.000E+00
REMAINDER	2.710E-16	3.993E-13	6.954E-12	1.400E-17-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	3.378E-16	5.876E-13	1.023E-11	2.060E-17-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	4.820E-15	1.266E-12	2.205E-11	4.440E-17-1.000E+00	0.000E+00	0.000E+00
Xe-133m						
GONADS	1.420E-15	1.337E-12	1.188E-11	4.890E-17-1.000E+00	0.000E+00	0.000E+00
BREAST	1.700E-15	1.383E-12	1.230E-11	5.060E-17-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.190E-15	8.609E-13	7.656E-12	3.150E-17-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.100E-15	7.844E-13	6.975E-12	2.870E-17-1.000E+00	0.000E+00	0.000E+00
BONE SUR	3.230E-15	2.599E-12	2.311E-11	9.510E-17-1.000E+00	0.000E+00	0.000E+00
THYROID	1.360E-15	1.028E-12	9.138E-12	3.760E-17-1.000E+00	0.000E+00	0.000E+00
REMAINDER	1.150E-15	8.855E-13	7.874E-12	3.240E-17-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	1.370E-15	1.112E-12	9.892E-12	4.070E-17-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	1.040E-14	1.894E-12	1.684E-11	6.930E-17-1.000E+00	0.000E+00	0.000E+00
Xe-133						
GONADS	1.610E-15	1.465E-12	2.052E-11	5.200E-17-1.000E+00	0.000E+00	0.000E+00
BREAST	1.960E-15	1.505E-12	2.107E-11	5.340E-17-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.320E-15	1.045E-12	1.464E-11	3.710E-17-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.070E-15	8.791E-13	1.231E-11	3.120E-17-1.000E+00	0.000E+00	0.000E+00
BONE SUR	5.130E-15	4.254E-12	5.958E-11	1.510E-16-1.000E+00	0.000E+00	0.000E+00
THYROID	1.510E-15	1.181E-12	1.653E-11	4.190E-17-1.000E+00	0.000E+00	0.000E+00
REMAINDER	1.240E-15	1.042E-12	1.460E-11	3.700E-17-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	1.560E-15	1.299E-12	1.819E-11	4.610E-17-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	4.970E-15	1.953E-12	2.734E-11	6.930E-17-1.000E+00	0.000E+00	0.000E+00
Xe-135m						
GONADS	2.000E-14	5.929E-13	5.929E-13	4.480E-16-1.000E+00	0.000E+00	0.000E+00
BREAST	2.290E-14	5.691E-13	5.691E-13	4.300E-16-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.980E-14	5.347E-13	5.347E-13	4.040E-16-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.910E-14	5.400E-13	5.400E-13	4.080E-16-1.000E+00	0.000E+00	0.000E+00
BONE SUR	3.500E-14	8.246E-13	8.246E-13	6.230E-16-1.000E+00	0.000E+00	0.000E+00
THYROID	2.040E-14	5.612E-13	5.612E-13	4.240E-16-1.000E+00	0.000E+00	0.000E+00
REMAINDER	1.890E-14	5.241E-13	5.241E-13	3.960E-16-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	2.040E-14	5.612E-13	5.612E-13	4.240E-16-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	2.970E-14	1.866E-12	1.866E-12	1.410E-15-1.000E+00	0.000E+00	0.000E+00
Xe-135						
GONADS	1.170E-14	5.455E-12	1.194E-11	2.530E-16-1.000E+00	0.000E+00	0.000E+00
BREAST	1.330E-14	5.325E-12	1.166E-11	2.470E-16-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.130E-14	4.959E-12	1.086E-11	2.300E-16-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.070E-14	4.959E-12	1.086E-11	2.300E-16-1.000E+00	0.000E+00	0.000E+00
BONE SUR	2.570E-14	9.120E-12	1.997E-11	4.230E-16-1.000E+00	0.000E+00	0.000E+00
THYROID	1.180E-14	5.023E-12	1.100E-11	2.330E-16-1.000E+00	0.000E+00	0.000E+00
REMAINDER	1.080E-14	4.829E-12	1.058E-11	2.240E-16-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	1.190E-14	5.217E-12	1.142E-11	2.420E-16-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	3.120E-14	4.506E-11	9.867E-11	2.090E-15-1.000E+00	0.000E+00	0.000E+00
Kr-85m						
BONE SUR	2.570E-14	9.120E-12	1.997E-11	4.230E-16-1.000E+00	0.000E+00	0.000E+00
THYROID	1.180E-14	5.023E-12	1.100E-11	2.330E-16-1.000E+00	0.000E+00	0.000E+00
Kr-85m						

GONADS	1.710E-18	5.572E-15	5.855E-15	6.160E-19-1.000E+00	0.000E+00	0.000E+00
BREAST	5.050E-18	9.498E-15	9.980E-15	1.050E-18-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.640E-19	1.266E-16	1.331E-16	1.400E-20-1.000E+00	0.000E+00	0.000E+00
RED MARR	3.830E-19	5.617E-16	5.902E-16	6.210E-20-1.000E+00	0.000E+00	0.000E+00
BONE SUR	2.250E-18	3.437E-15	3.612E-15	3.800E-19-1.000E+00	0.000E+00	0.000E+00
THYROID	6.430E-19	7.698E-16	8.088E-16	8.510E-20-1.000E+00	0.000E+00	0.000E+00
REMAINDER	5.300E-19	1.393E-15	1.464E-15	1.540E-19-1.000E+00	0.000E+00	0.000E-00
EFFECTIVE	1.500E-18	3.437E-15	3.612E-15	3.800E-19-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	3.560E-17	1.167E-13	1.226E-13	1.290E-17-1.000E+00	0.000E+00	0.000E+00
Kr-85m						
GONADS	7.310E-15	2.594E-12	3.653E-12	1.570E-16-1.000E+00	0.000E+00	0.000E-00
BREAST	8.410E-15	2.527E-12	3.560E-12	1.530E-16-1.000E+00	0.000E+00	0.000E+00
LUNGS	7.040E-15	2.379E-12	3.351E-12	1.440E-16-1.000E+00	0.000E+00	0.000E-00
RED MARR	6.430E-15	2.346E-12	3.304E-12	1.420E-16-1.000E+00	0.000E+00	0.000E+00
BONE SUR	1.880E-14	5.286E-12	7.446E-12	3.200E-16-1.000E+00	0.000E+00	0.000E+00
THYROID	7.330E-15	2.395E-12	3.374E-12	1.450E-16-1.000E+00	0.000E+00	0.000E+00
REMAINDER	6.640E-15	2.313E-12	3.257E-12	1.400E-16-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	7.480E-15	2.511E-12	3.537E-12	1.520E-16-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	2.240E-14	2.247E-11	3.164E-11	1.360E-15-1.000E+00	0.000E+00	0.000E+00
Kr-87						
GONADS	4.000E-14	4.962E-12	5.026E-12	7.610E-16-1.000E+00	0.000E+00	0.000E+00
BREAST	4.500E-14	4.740E-12	4.802E-12	7.270E-16-1.000E+00	0.000E+00	0.000E+00
LUNGS	4.040E-14	4.603E-12	4.663E-12	7.060E-16-1.000E+00	0.000E+00	0.000E+00
RED MARR	4.000E-14	4.708E-12	4.769E-12	7.220E-16-1.000E+00	0.000E+00	0.000E+00
BONE SUR	6.020E-14	6.514E-12	6.598E-12	9.990E-16-1.000E+00	0.000E+00	0.000E-00
THYROID	4.130E-14	4.473E-12	4.531E-12	6.860E-16-1.000E+00	0.000E+00	0.000E-00
REMAINDER	3.910E-14	4.590E-12	4.650E-12	7.040E-16-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	4.120E-14	4.773E-12	4.835E-12	7.320E-16-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	1.370E-13	8.802E-11	8.916E-11	1.350E-14-1.000E+00	0.000E+00	0.000E+00
Kr-88						
GONADS	9.900E-14	2.278E-11	2.655E-11	1.800E-15-1.000E+00	0.000E+00	0.000E+00
BREAST	1.110E-13	2.177E-11	2.537E-11	1.720E-15-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.010E-13	2.139E-11	2.493E-11	1.690E-15-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.000E-13	2.190E-11	2.552E-11	1.730E-15-1.000E+00	0.000E+00	0.000E+00
BONE SUR	1.390E-13	2.886E-11	3.363E-11	2.280E-15-1.000E+00	0.000E+00	0.000E+00
THYROID	1.030E-13	2.012E-11	2.345E-11	1.590E-15-1.000E+00	0.000E+00	0.000E+00
REMAINDER	9.790E-14	2.139E-11	2.493E-11	1.690E-15-1.000E+00	0.000E-00	0.000E+00
EFFECTIVE	1.020E-13	2.202E-11	2.567E-11	1.740E-15-1.000E+00	0.000E-00	0.000E+00
SKIN(FGR)	1.350E-13	5.607E-11	6.534E-11	4.430E-15-1.000E+00	0.000E+00	0.000E+00
Kr-85						
GONADS	1.170E-16	8.121E-14	1.704E-12	2.820E-18-1.000E+00	0.000E+00	0.000E+00
BREAST	1.340E-16	7.891E-14	1.656E-12	2.740E-18-1.000E+00	0.000E+00	0.000E+00
LUNGS	1.140E-16	7.056E-14	1.481E-12	2.450E-18-1.000E+00	0.000E+00	0.000E+00
RED MARR	1.090E-16	6.998E-14	1.469E-12	2.430E-18-1.000E+00	0.000E+00	0.000E+00
BONE SUR	2.200E-16	1.287E-13	2.702E-12	4.470E-18-1.000E+00	0.000E+00	0.000E+00
THYROID	1.180E-16	7.459E-14	1.565E-12	2.590E-18-1.000E+00	0.000E+00	0.000E+00
REMAINDER	1.090E-16	6.941E-14	1.457E-12	2.410E-18-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	1.190E-16	7.603E-14	1.596E-12	2.640E-18-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	1.320E-14	2.304E-11	4.835E-10	8.000E-16-1.000E+00	0.000E+00	0.000E+00
xe-138						
GONADS	5.590E-14	0.000E-14	0.000E-12	1.070E-15-1.000E+00	0.000E+00	0.000E+00
BREAST	6.320E-14	0.000E-14	0.000E-12	1.020E-15-1.000E+00	0.000E+00	0.000E+00
LUNGS	5.660E-14	0.000E-14	0.000E-12	9.970E-16-1.000E+00	0.000E+00	0.000E+00
RED MARR	5.600E-14	0.000E-14	0.000E-12	1.020E-15-1.000E+00	0.000E+00	0.000E+00
BONE SUR	8.460E-14	0.000E-13	0.000E-12	1.410E-15-1.000E+00	0.000E+00	0.000E+00
THYROID	5.770E-14	0.000E-14	0.000E-12	9.550E-16-1.000E+00	0.000E+00	0.000E+00
REMAINDER	5.490E-14	0.000E-14	0.000E-12	9.940E-16-1.000E+00	0.000E+00	0.000E+00
EFFECTIVE	5.770E-14	0.000E-14	0.000E-12	1.030E-15-1.000E+00	0.000E+00	0.000E+00
SKIN(FGR)	1.070E-13	0.000E-11	0.000E-10	7.650E-15-1.000E+00	0.000E+00	0.000E+00

Attachment 3 RADTRAD Control File Inventory File SLB_4mc.nif

```
Nuclide Inventory Name:SSES_SLB_4mc.nif
 SSES SLB
 Power Level:4032
  0.1000E+01
 Nuclides:
  16
 Nuclide 001:
 I-131
   2
  0.6956000000E+06
  0.1310E+03
  0.4790E+02
 Xe-131m  0.1100E-01
 none     0.0000E+00
 none     0.0000E+00
 Nuclide 002:
 I-132
   2
  0.8390000000E+04
  0.1320E+03
  0.4420E+03
 none     0.0000E+00
 none     0.0000E+00
 none     0.0000E+00
 Nuclide 003:
 I-133
   2
  0.7533000000E+05
  0.1330E+03
  0.3280E+03
 Xe-133m  0.2900E-01
 Xe-133   0.9700E+00
 none     0.0000E+00
 Nuclide 004:
 I-134
   2
  0.3150000000E+04
  0.1340E+03
  0.8850E+03
 none     0.0000E+00
 none     0.0000E+00
 none     0.0000E-00
 Nuclide 005:
 I-135
   2
  0.2423100000E+05
  0.1350E+03
  0.4790E+03
 Xe-135m  0.1500E+00
 Xe-135   0.8500E+00
 none     0.0000E+00
 Nuclide 006:
 Xe-131m
   1
  0.1036000000E+07
  0.1310E+03
  0.1810E-02
 none     0.0000E+00
 none     0.0000E+00
 none     0.0000E+00
 Nuclide 007:
 Xe-133m
   1
  0.1987032000E+06
  0.1330E+03
  0.3390E-01
 Nuclide 007:
 Xe-133m
```

```
 Xe-133    0.1000E+01
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 008:
 Xe-133
   1
  0.4553380000E+06
  0.1330E+03
  0.9890E+00
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 009:
 Xe-135m
   1
  0.9360000000E+03
  0.1350E+03
  0.3150E+01
 Xe-135    0.1000E+01
 Cs-135    0.4500E-04
 none      0.0000E+00
 Nuclide 010:
 Xe-135
   1
  0.3286800000E+05
  0.1350E+03
  0.2750E+01
 Cs-135    0.1000E+01
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 011:
 Kr-83m
   1
  0.6840000000E+04
  0.8300E+02
  0.4190E+00
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 012:
 Kr-85m
   1
  0.1569600000E+05
  0.8500E+02
  0.7290E+00
 Kr-85     0.2100E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 013:
 Kr-87
   1
  0.4680000000E+04
  0.8700E+02
  0.2360E+01
 Rb-87     0.1000E+01
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 014:
 Kr-88
   1
  0.9972400000E+04
  0.8800E+02
  0.2450E+01
 Rb-88     0.1000E+01
 none      0.0000E+00
 none      0.0000E+00
  0.9972400000E+04
  0.8800E+02
```

```
Nuclide 015:
 Kr-85
   1
  0.3382974720E+09
  0.8500E+02
  0.2430E-02
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
Nuclide 016:
 Xe-138
   1
  0.8490000000E+03
  0.1380E+03
  0.1100E+02
 Cs-138    0.1000E+01
 none      0.0000E+00
 none      0.0000E+00

 End of Nuclear Inventory File
```

Attachment 4 RADTRAD Control File Inventory File SLB_pt2mc.nif

```
Nuclide Inventory Name:SSES_SLB_pt2mc.nif
SSES SLB
Power Level:4032
 0.1000E+01
Nuclides:
 16
Nuclide 001:
I-131
  2
 0.6956000000E+06
 0.1310E+03
 0.2400E+01
Xe-131m  0.1100E-01
none     0.0000E+00
none     0.0000E+00
Nuclide 002:
I-132
  2
 0.8390000000E+04
 0.1320E+03
 0.2210E+02
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 003:
I-133
  2
 0.7533000000E+05
 0.1330E+03
 0.1640E+02
Xe-133m  0.2900E-01
Xe-133   0.9700E+00
none     0.0000E+00
Nuclide 004:
I-134
  2
 0.3150000000E+04
 0.1340E+03
 0.4420E+02
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 005:
I-135
  2
 0.2423100000E+05
 0.1350E+03
 0.2400E+02
Xe-135m  0.1500E+00
Xe-135   0.8500E+00
none     0.0000E+00
Nuclide 006:
Xe-131m
  1
 0.1036000000E+07
 0.1310E+03
 0.1810E-02
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 007:
Xe-133m
  1
 0.1987032000E+06
 0.1330E+03
 0.1380E-01
Nuclide 007:
Xe-133m  0.1
```

```
Xe-133    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 008:
Xe-133
  1
 0.4553380000E+06
 0.1330E+03
 0.9890E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 009:
Xe-135m
  1
 0.9360000000E+03
 0.1350E+03
 0.3150E+01
Xe-135    0.1000E+01
Cs-135    0.4500E-04
none      0.0000E+00
Nuclide 010:
Xe-135
  1
 0.3286800000E+05
 0.1350E+03
 0.2750E+01
Cs-135    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 011:
Kr-83m
  1
 0.6840000000E+04
 0.8300E+02
 0.4190E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 012:
Kr-85m
  1
 0.1569600000E+05
 0.8500E+02
 0.7290E+00
Kr-85     0.2100E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 013:
Kr-87
  1
 0.4680000000E+04
 0.8700E+02
 0.2360E+01
Rb-87     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 014:
Kr-88
  1
 0.9972400000E+04
 0.8600E+02
 0.2450E+01
Rb-88     0.1000E+01
none      0.0000E+00
none      0.0000E+00
 0.9972400000E+04
 0.8600E+02
none      0.0000E+00
```

```
Nuclide 015:
 Kr-85
   1
  0.3382974720E+09
  0.8500E+02
  0.2430E-02
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
Nuclide 016:
 Xe-138
   1
  0.8490000000E+03
  0.1380E+03
  0.1100E+02
 Cs-138    0.1000E+01
 none      0.0000E+00
 none      0.0000E+00

 End of Nuclear Inventory File
```

Attachment 5 RADTRAD Output RBMSTLF_500cfm_TEDE_4mcDE_1128.out

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  8/13/2005  at 14:22:41
##########################################################################

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

Plant file           = C:\Program Files\radtrad3.03\PPL_AST_MSL\RBMSTLF_500cfm_TEDE_4mcDE_1128.psf
Inventory file       = C:\Program Files\radtrad3.03\PPL_AST_MSL\slb_4mc.nif
Release file         = c:\program files\radtrad3.03\ppl_ast_msl\slb.rft
Dose Conversion file = c:\program files\radtrad3.03\ppl_ast_msl\slb_phase 2.inp
```

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

```
Radtrad 3.03 4/15/2001
SSES MSLB
Nuclide Inventory File:
C:\Program Files\radtrad3.03\PPL_AST_MSL\slb_4mc.nif
Plant Power Level:
 1.0000E+00
Compartments:
  3
Compartment 1:
SSES RB Steam Tunnel
  3
 5.6110E-04
  0
  0
  0
  0
  0
Compartment 2:
Environment
  2
 0.0000E+00
  0
  0
  0
  0
  0
Compartment 3:
SSES CR
  1
 5.1800E+05
  0
  0
  0
  0
  0
Pathways:
  4
Pathway 1:
SSES MSL to Environs
  0
  0
```

```
  1
  2
  2
Pathway 2:
Environment to SSES CR - 6391 cfm Normal Intake
  2
  3
  2
Pathway 3:
Environment to SSES CR -500+10 cfm Unfiltered Inleakage
  2
  3
  2
Pathway 4:
SSES CR to Environment - CR Exhaust
  3
  2
  2
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\radtrad3.03\ppl_ast_msl\slb_phase 2.inp
c:\program files\radtrad3.03\ppl_ast_msl\slb.rft
  0.0000E+00
  1
  9.5000E-01   4.8500E-02   1.5000E-03   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  1
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
  0
Compartment 3:
  1
  0
```

```
  0
  0
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   3.1300E+06   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   0.0000E+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 2:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   6.3910E+03   0.0000E+00   0.0000E+00   0.0000E+00
  6.6600E-02   6.3910E+03   0.0000E+00   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 3:
  0
  0
  0
  0
  0
  1
  3
  0.0000E-00   5.1000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  6.6600E-02   5.1000E+02   0.0000E+00   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 4:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   6.9010E+03   0.0000E+00   0.0000E-00   0.0000E+00
  0
  0
```

```
  5.0000E-01   6.9010E+03   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:
EAB - RB MST Release
  2
  1
  3
  0.0000E+00   8.3000E-04
  2.0000E+00   8.3000E-04
  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 2:
MSLB @ LPZ - RB MST Release
  2
  1
  5
  0.0000E+00   4.9000E-05
  8.0000E+00   3.5000E-05
  2.4000E+01   1.7000E-05
  9.6000E+01   6.1000E-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:
MSLB @ CR - RB MST Release
  3
  0
  1
  2
  0.0000E+00   3.4700E-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
  3
  0.0000E-00   5.2000E-04
  6.6600E-02   0.0000E+00
  7.2000E+02   0.0000E+00
Simulation Parameters:
  4
  0.0000E+00   1.0000E-04
  6.6600E-02   0.0000E+00
  7.2000E+02   0.0000E+00
```

```
  1.0000E-01   1.0000E-02
  7.2000E+02   0.0000E+00
Output Filename:
C:\Program Files\radrad3.o28
  1
  1
  1
  0
  1
End of Scenario File
```

```
##############################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  8/13/2005  at 14:22:41
##############################################################################

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

Number of Nuclides =  16

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

Number of compartments    =   3

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: SSES RB Steam Tunnel
Compartment volume =   5.6110E+04 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  1
   Exit Pathway Number    1: SSES MST to Environs

Compartment number  2
Name: Environment
Compartment type is Environment
Pathways into and out of compartment  2
   Inlet Pathway Number   1: SSES MST to Environs
   Inlet Pathway Number   4: SSES CR to Environment - CR Exhaust
   Exit Pathway Number    2: Environment to SSES CR - 6391 cfm Normal Intake
   Exit Pathway Number    3: Environment to SSES CR -500+10 cfm Unfiltered Inle

Compartment number  3
Name: SSES CR
Compartment volume =   5.1800E+05 (Cubic feet)
Compartment type is Control Room
Pathways into and out of compartment  3
   Inlet Pathway Number   2: Environment to SSES CR - 6391 cfm Normal Intake
   Inlet Pathway Number   3: Environment to SSES CR -500+10 cfm Unfiltered Inle
   Exit Pathway Number    4: SSES CR to Environment - CR Exhaust

Total number of pathways =   4
```

```
**********************************************************************
   RADTRAD Version 3.03 (Spring 2001) run on  8/13/2005  at 14:22:41
**********************************************************************

**********************************************************************
                    Scenario Description
**********************************************************************

Radioactive Decay is enabled
Calculation of Daughters is enabled

Release Fractions and Timings
                GAP          EARLY IN-VESSEL  LATE RELEASE     RELEASE MASS
             0.000000 hr       0.0000 hrs       0.0000 hrs         (gm)
NOBLES       1.0000E+00        0.0000E+00       0.0000E+00        1.322E-05
IODINE       1.0000E+00        0.0000E+00       0.0000E+00        8.936E-04
CESIUM       0.0000E+00        0.0000E+00       0.0000E+00        0.000E+00
TELLURIUM    0.0000E+00        0.0000E+00       0.0000E+00        0.000E+00
STRONTIUM    0.0000E+00        0.0000E+00       0.0000E+00        0.000E+00
BARIUM       0.0000E+00        0.0000E+00       0.0000E+00        0.000E+00
RUTHENIUM    0.0000E+00        0.0000E+00       0.0000E+00        0.000E+00
CERIUM       0.0000E+00        0.0000E+00       0.0000E+00        0.000E+00
LANTHANUM    0.0000E+00        0.0000E+00       0.0000E+00        0.000E+00

Inventory Power =          1. MWt

Nuclide  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   4.790E+01  6.956E+05   1.820E-14  2.920E-07   8.890E-09
 I-132     2   4.420E+02  8.390E+03   1.120E-13  1.740E-09   1.030E-10
 I-133     2   3.280E+02  7.533E+04   2.940E-14  4.860E-08   1.580E-09
 I-134     2   8.850E+02  3.150E+03   1.300E-13  2.880E-10   3.550E-11
 I-135     2   4.790E+02  2.423E+04   8.294E-14  8.460E-09   3.320E-10
 Xe-131m   1   1.810E-03  1.036E+06   3.378E-16  0.000E+00   0.000E+00
 Xe-133m   1   3.390E-02  1.987E+05   1.370E-15  0.000E+00   0.000E+00
 Xe-133    1   9.890E-01  4.553E+05   1.560E-15  0.000E+00   0.000E+00
 Xe-135m   1   3.150E+00  9.360E+02   2.040E-14  0.000E+00   0.000E+00
 Xe-135    1   2.750E+00  3.287E-04   1.190E-14  0.000E+00   0.000E+00
 Kr-83m    1   4.190E-01  6.840E+03   1.500E-18  0.000E+00   0.000E+00
 Kr-85m    1   7.290E-01  1.570E+04   7.480E-15  0.000E+00   0.000E+00
 Kr-87     1   2.360E+00  4.680E+03   4.120E-14  0.000E+00   0.000E+00
 Kr-88     1   2.450E+00  9.972E+03   1.020E-13  0.000E+00   0.000E+00
 Kr-85     1   2.430E-03  3.383E+08   1.190E-16  0.000E+00   0.000E+00
 Xe-138    1   1.100E+01  8.490E+02   5.770E-14  0.000E+00   0.000E+00

Nuclide    Daughter  Fraction   Daughter  Fraction   Daughter  Fraction
 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-133m   Xe-133      1.00       none      0.00       none      0.00
 Xe-135m   Xe-135      1.00       Cs-135    0.00       none      0.00
 Xe-135    Cs-135      1.00       none      0.00       none      0.00
 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
 Xe-138    Cs-138      1.00       none      0.00       none      0.00

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

COMPARTMENT DATA
     Aerosol      =   9.5000E-01
     Elemental    =   4.8500E-02
```

Compartment number 1: SSES RB Steam Tunnel

Compartment number 2: Environment

Compartment number 3: SSES CR

PATHWAY DATA

Pathway number 1: SSES MST to Environs

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.1300E+06	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	0.0000E+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 2: Environment to SSES CR - 6391 cfm Normal Intake

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	6.3910E+03	0.0000E+00	0.0000E+00	0.0000E+00
6.6600E-02	6.3910E+03	0.0000E+00	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Environment to SSES CR -500+10 cfm Unfiltered Inle

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	5.1000E+02	0.0000E+00	0.0000E+00	0.0000E+00
6.6600E-02	5.1000E+02	0.0000E+00	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 4: SSES CR to Environment - CR Exhaust

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	6.9010E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	6.9010E+03	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 EAB - RB MST Release is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	8.3000E-04
2.0000E+00	8.3000E-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
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location MSLB @ LPZ - RB MST Release is in compartment 2

Location X/Q Data

8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04

Location X/Q Data

```
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00          4.9000E-05
  8.0000E+00          3.5000E-05
  2.4000E+01          1.7000E-05
  9.6000E+01          6.1000E-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 MSLB @ CR - RB MST Release     is in compartment   3

Location X/Q Data
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00          5.2000E-04
  6.6600E-02          0.0000E+00
  7.2000E+02          0.0000E+00

Location Breathing Rate Data
 Time (hr)          Breathing Rate (m^3 * sec^-1)
  0.0000E+00                3.4700E-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-04
      1.0000E-02       1.0000E-03
      1.0000E-01       1.0000E-02
      7.2000E+02       0.0000E+00
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  8/13/2005  at 14:22:41
##########################################################################

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

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

Detailed model information at time (H) =     0.0000

EAB - RB MST Release Doses:

Time (h) =    0.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         1.6950E-04  9.6192E-03  4.9378E-04
Accumulated dose (rem)   1.6950E-04  9.6192E-03  4.9378E-04

MSLB @ LPZ - RB MST Release Doses:

Time (h) =    0.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         1.0007E-05  5.6788E-04  2.9151E-05
Accumulated dose (rem)   1.0007E-05  5.6788E-04  2.9151E-05

MSLB @ CR - RB MST Release Doses:

Time (h) =    0.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         4.7212E-13  3.6488E-10  1.2773E-11
Accumulated dose (rem)   4.7212E-13  3.6488E-10  1.2773E-11

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) =    0.0000          Ci          kg          Atoms       Decay
I-131                  4.7888E+01  3.8680E-07  1.7781E+18  9.7466E+08
I-132                  4.4189E+02  4.3378E-08  1.9790E+17  8.9937E+09
I-133                  3.2792E+02  2.9121E-07  1.3186E+18  6.6741E+09
I-134                  8.8477E+02  3.3103E-08  1.4877E+17  1.8008E+10
I-135                  4.7888E+02  1.3885E-07  6.1940E+17  9.7466E+09
Xe-131m                1.8095E-03  2.1768E-11  1.0007E+14  3.6829E+04
Xe-133m                3.3891E-02  7.9391E-11  3.5948E+14  6.8979E+05
Xe-133                 9.8875E-01  5.3076E-09  2.4032E+16  2.0124E+07
Xe-135m                3.1492E+00  3.5273E-11  1.5735E+14  6.4095E+07
Xe-135                 2.7493E+00  1.0813E-09  4.8236E+15  5.5956E+07
Kr-83m                 4.1889E-01  2.1080E-11  1.5295E+14  8.5257E+06
Kr-85m                 7.2881E-01  8.6189E-11  6.1064E+14  1.4834E+07
Kr-87                  2.3594E+00  9.5151E-11  5.8942E+14  4.8021E+07
Kr-88                  2.4494E+00  1.9053E-10  1.3039E+15  4.9852E+07
Kr-85                  2.4294E-03  6.1921E-09  4.3870E+16  4.9446E+04
Xe-138                 1.0997E+01  1.1421E-10  4.9839E+14  2.2383E+08

SSES RB Steam Tunnel Transport Group Inventory:
Time (h) =    0.0000     Atmosphere      Sump
Noble gases (atoms)      7.6498E+16  0.0000E+00
Elemental I (atoms)      1.6784E+17  0.0000E+00
Xe-138                   1.0997E+01  1.1421E-10  4.9839E+14  2.2383E+08
Elemental I (atoms)      1.5704E+17  0.0000E+00
```

Organic I (atoms)	6.0942E+15	0.0000E+00	
Aerosols (kg)	8.4867E-07	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		7.5429E-08
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.2991E-07
Total I (Ci)			2.1813E+03

SSES MST to Environs Transport Group Inventory:

Time (h) = 0.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.9563E+13
Elemental I (atoms)	0.0000E+00	5.0391E+13
Organic I (atoms)	0.0000E+00	1.5585E+12
Aerosols (kg)	0.0000E+00	2.1703E-10

SSES CR Compartment Nuclide Inventory:

Time (h) = 0.0000	Ci	kg	Atoms	Decay
I-131	2.0740E-05	1.6752E-13	7.7011E+11	4.2213E+02
I-132	1.9138E-04	1.8787E-14	8.5712E+10	3.8952E+03
I-133	1.4202E-04	1.2613E-13	5.7109E+11	2.8906E+03
I-134	3.8320E-04	1.4337E-14	6.4434E+10	7.7993E+03
I-135	2.0740E-04	6.0138E-14	2.6827E+11	4.2213E+03
Xe-131m	7.8372E-10	9.4280E-18	4.3341E+07	1.5951E-02
Xe-133m	1.4679E-08	3.4385E-17	1.5569E+08	2.9875E-01
Xe-133	4.2823E-07	2.2987E-15	1.0409E+10	8.7158E+00
Xe-135m	1.3639E-06	1.5277E-17	6.8148E+07	2.7760E+01
Xe-135	1.1907E-06	4.6833E-16	2.0891E+09	2.4235E+01
Kr-83m	1.8143E-07	9.1297E-18	6.6241E+07	3.6925E+00
Kr-85m	3.1565E-07	3.7329E-17	2.6447E+08	6.4245E+00
Kr-87	1.0219E-06	3.6880E-17	2.5528E+08	2.0798E+01
Kr-88	1.0608E-06	8.2520E-17	5.6471E+08	2.1591E+01
Kr-85	1.0522E-09	2.6818E-15	1.9000E+10	2.1415E-02
Xe-138	4.7630E-06	4.9464E-17	2.1585E+08	9.6940E+01

SSES CR Transport Group Inventory:

Time (h) = 0.0000	Atmosphere	Sump	
Noble gases (atoms)	3.3132E+10	0.0000E+00	
Elemental I (atoms)	8.5341E+10	0.0000E+00	
Organic I (atoms)	2.6394E+09	0.0000E+00	
Aerosols (kg)	3.6757E-13	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		3.5387E-15
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		6.0947E-15
Total I (Ci)			9.4475E-04

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 0.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	3.0683E+10
Elemental I (atoms)	0.0000E+00	7.9034E+10
Organic I (atoms)	0.0000E+00	2.4444E+09
Aerosols (kg)	0.0000E+00	3.4040E-13

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 0.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.4485E+09
Elemental I (atoms)	0.0000E+00	6.3069E+09
Organic I (atoms)	0.0000E+00	1.9506E+08
Aerosols (kg)	0.0000E+00	2.7164E-14

SSES CR to Environment - CR Exhaust Transport Group Inventory:

	Pathway	
Organic I (atoms)	0.0000E+00	1.9506E+08
Aerosols (kg)	0.0000E+00	2.7164E-14

Time (h) = 0.0000	Filtered	Transported
Noble gases (atoms)	1.3489E+03	0.0000E+00
Elemental I (atoms)	3.4745E+03	0.0000E+00
Organic I (atoms)	1.0746E+02	0.0000E+00
Aerosols (kg)	1.4965E-20	0.0000E+00

Detailed model information at time (H) = 0.0333

EAB - RB MST Release Doses:

Time (h) = 0.0333	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.6272E-01	3.7614E+01	1.9307E+00
Accumulated dose (rem)	6.6289E-01	3.7624E+01	1.9312E+00

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 0.0333	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.9125E-02	2.2206E+00	1.1398E-01
Accumulated dose (rem)	3.9135E-02	2.2211E+00	1.1401E-01

MSLB @ CR - RB MST Release Doses:

Time (h) = 0.0333	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.8075E-04	6.0795E-01	2.1269E-02
Accumulated dose (rem)	7.8075E-04	6.0795E-01	2.1269E-02

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 0.0333	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 0.0333	Atmosphere	Sump	
Noble gases (atoms)	3.1544E-32	0.0000E+00	
Elemental I (atoms)	7.7529E-32	0.0000E+00	
Organic I (atoms)	2.3978E-33	0.0000E+00	
Aerosols (kg)	3.3391E-55	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.9708E-56
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		5.1040E-56
Total I (Ci)			8.4871E-46

SSES MST to Environs Transport Group Inventory:

	Pathway	
Time (h) = 0.0333	Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6503E+16
Elemental I (atoms)	0.0000E+00	1.9699E+17
Organic I (atoms)	0.0000E+00	6.0923E+15
Aerosols (kg)	0.0000E+00	8.4842E-07

SSES CR Compartment Nuclide Inventory:

Time (h) = 0.0333	Ci	kg	Atoms	Decay
I-131	7.9002E-02	6.3811E-10	2.9334E+15	3.5232E+11
I-132	7.2189E-01	7.0866E-11	3.2330E+14	3.2352E+12
I-133	5.4044E-01	4.7995E-10	2.1732E+15	2.4114E+12
I-134	1.4218E+00	5.3196E-11	2.3907E+14	6.4245E+12
I-135	7.8741E-01	2.2831E-10	1.0185E+15	3.5174E+12
Xe-131m	3.0551E-06	3.6752E-14	1.6895E+11	1.3466E-07
Xe-133m	6.2451E-05	1.4629E-13	6.6240E+11	2.6366E+08
Xe-133	1.7268E-03	9.2693E-12	4.1971E+13	7.4837E+09
Xe-135m	1.4815E-02	1.6593E-13	7.4019E+11	4.4504E+10
Xe-135	6.2427E-03	2.4553E-12	1.0953E+13	2.3957E+10
Kr-83m	6.8280E-04	3.4360E-14	2.4930E+11	3.0634E+09
Kr-85m	1.1961E-03	1.4145E-13	1.0022E+12	5.3482E+09
Kr-87	3.8243E-03	1.3802E-13	9.5538E+11	1.7206E+10
Xe-135m	1.4815E-02	1.6593E-13	7.4019E+11	4.4504E+10
Kr-88	6.2427E-03	2.4553E-12	1.0953E+13	2.3957E+10

Kr-85	4.0083E-06	1.0217E-11	7.2384E+13	1.7875E+07
Xe-138	1.6453E-02	1.7086E-13	7.4563E+11	7.7068E+10

SSES CR Transport Group Inventory:

Time (h) = 0.0333	Atmosphere	Sump	
Noble gases (atoms)	1.3196E+14	0.0000E+00	
Elemental I (atoms)	3.2434E+14	0.0000E+00	
Organic I (atoms)	1.0031E+13	0.0000E+00	
Aerosols (kg)	1.3969E-09	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.3462E-11
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.3129E-11
Total I (Ci)			3.5505E+00

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

	Pathway	
Time (h) = 0.0333	Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2005E+14
Elemental I (atoms)	0.0000E+00	3.0912E+14
Organic I (atoms)	0.0000E+00	9.5605E+12
Aerosols (kg)	0.0000E+00	1.3314E-09

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

	Pathway	
Time (h) = 0.0333	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5803E+12
Elemental I (atoms)	0.0000E+00	2.4668E+13
Organic I (atoms)	0.0000E+00	7.6293E+11
Aerosols (kg)	0.0000E+00	1.0625E-10

SSES CR to Environment - CR Exhaust Transport Group Inventory:

	Pathway	
Time (h) = 0.0333	Filtered	Transported
Noble gases (atoms)	3.4494E-12	0.0000E+00
Elemental I (atoms)	8.6801E+12	0.0000E+00
Organic I (atoms)	2.6846E+11	0.0000E+00
Aerosols (kg)	3.7385E-11	0.0000E+00

Detailed model information at time (H) = 0.0666

EAB - RB MST Release Doses:

Time (h) = 0.0666	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.6289E-01	3.7624E-01	1.9312E+00

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 0.0666	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.9135E-02	2.2211E+00	1.1401E-01

MSLB @ CR - RB MST Release Doses:

Time (h) = 0.0666	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.5476E-04	5.9667E-01	2.0848E-02
Accumulated dose (rem)	1.5355E-03	1.2046E+00	4.2117E-02

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 0.0666	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 0.0666 Atmosphere Sump

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 0.0666 Atmosphere Sump

Noble gases (atoms)	3.2915E-32	0.0000E+00	
Elemental I (atoms)	7.7348E-32	0.0000E+00	
Organic I (atoms)	2.3922E-33	0.0000E+00	
Aerosols (kg)	3.3312E-55	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.9668E-56
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		5.0847E-56
Total I (Ci)			8.3737E-46

SSES MST to Environs Transport Group Inventory:

Time (h) = 0.0666	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6503E+16
Elemental I (atoms)	0.0000E+00	1.9699E+17
Organic I (atoms)	0.0000E+00	6.0923E+15
Aerosols (kg)	0.0000E+00	8.4842E-07

SSES CR Compartment Nuclide Inventory:

Time (h) = 0.0666	Ci	kg	Atoms	Decay
I-131	7.6917E-02	6.2127E-10	2.8560E+15	6.9796E+11
I-132	6.9600E-01	6.8324E-11	3.1171E+14	6.3782E+12
I-133	5.2566E-01	4.6682E-10	2.1137E+15	4.7747E+12
I-134	1.3484E+00	5.0450E-11	2.2673E+14	1.2564E+13
I-135	7.6410E-01	2.2155E-10	9.8832E+14	6.9567E+12
Xe-131m	3.0424E-06	3.6600E-14	1.6825E+11	2.6980E+07
Xe-133m	6.7162E-05	1.5733E-13	7.1237E+11	5.5069E+08
Xe-133	1.7742E-03	9.5240E-12	4.3124E+13	1.5240E+10
Xe-135m	2.2966E-02	2.5723E-13	1.1475E+12	1.2804E+11
Xe-135	7.7532E-03	3.0494E-12	1.3603E+13	5.4899E+10
Kr-83m	6.5683E-04	3.3053E-14	2.3982E+11	6.0328E+09
Kr-85m	1.1586E-03	1.3701E-13	9.7070E+11	1.0568E+10
Kr-87	3.6583E-03	1.3203E-13	9.1391E+11	3.3792E+10
Kr-88	3.8701E-03	3.0104E-13	2.0601E+12	3.5409E+10
Kr-85	3.9031E-06	9.9484E-12	7.0483E+13	3.5413E+07
Xe-138	1.4527E-02	1.5086E-13	6.5835E+11	1.4566E+11

SSES CR Transport Group Inventory:

Time (h) = 0.0666	Atmosphere	Sump	
Noble gases (atoms)	1.3408E+14	0.0000E+00	
Elemental I (atoms)	3.1508E+14	0.0000E+00	
Organic I (atoms)	9.7448E+12	0.0000E+00	
Aerosols (kg)	1.3570E-09	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.3091E-11
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.2436E-11
Total I (Ci)			3.4111E+00

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 0.0666	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2005E+14
Elemental I (atoms)	0.0000E+00	3.0912E+14
Organic I (atoms)	0.0000E+00	9.5605E+12
Aerosols (kg)	0.0000E+00	1.3314E-09

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 0.0666	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5803E-12
Elemental I (atoms)	0.0000E+00	2.4668E+13
Organic I (atoms)	0.0000E+00	7.6293E+11
Aerosols (kg)	0.0000E+00	1.0625E-10

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Noble gases (atoms)	0.0000E+00	9.5803E-12
Elemental I (atoms)	0.0000E+00	2.4668E+13

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 0.0666	Pathway Filtered	Transported
Noble gases (atoms)	6.9884E+12	0.0000E+00
Elemental I (atoms)	1.7190E+13	0.0000E+00
Organic I (atoms)	5.3165E+11	0.0000E+00
Aerosols (kg)	7.4036E-11	0.0000E+00

Detailed model information at time (H) = 0.5000

EAB - RB MST Release Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.6289E-01	3.7624E+01	1.9312E+00

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.9135E-02	2.2211E+00	1.1401E-01

MSLB @ CR - RB MST Release Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.3890E-03	6.4211E+00	2.2272E-01
Accumulated dose (rem)	8.9245E-03	7.6258E+00	2.6484E-01

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 0.5000	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 0.5000	Atmosphere	Sump	
Noble gases (atoms)	5.0373E-32	0.0000E+00	
Elemental I (atoms)	7.5189E-32	0.0000E+00	
Organic I (atoms)	2.3254E-33	0.0000E+00	
Aerosols (kg)	3.2375E-55	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.9171E-56
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		4.8588E-56
Total I (Ci)			7.1046E-46

SSES MST to Environs Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6503E+16
Elemental I (atoms)	0.0000E+00	1.9699E+17
Organic I (atoms)	0.0000E+00	6.0923E+15
Aerosols (kg)	0.0000E+00	8.4842E-07

SSES CR Compartment Nuclide Inventory:

Time (h) = 0.5000	Ci	kg	Atoms	Decay
I-131	5.4312E-02	4.3868E-10	2.0166E+15	4.4343E+12
I-132	4.3269E-01	4.2475E-11	1.9378E+14	3.8241E+13
I-133	3.6645E-01	3.2543E-10	1.4735E+15	3.0156E+13
I-134	6.7649E-01	2.5311E-11	1.1375E+14	6.8596E+13
I-135	5.1679E-01	1.4984E-10	6.6843E+14	4.3331E+13
Xe-131m	2.7732E-06	3.3361E-14	1.5336E+11	1.9456E+08
Xe-133m	1.0534E-04	2.4676E-13	1.1173E+12	5.6527E+09
Xe-133	2.1013E-03	1.1280E-11	5.1074E+13	1.2836E+11
Xe-135m	5.9891E-02	6.7080E-13	2.9924E+12	2.8956E+12
Xe-135	2.1197E-02	8.3368E-12	3.7189E+13	9.2752E+11
Kr-83m	3.9658E-04	1.9957E-14	1.4480E+11	3.5701E+10
Kr-85m	7.6479E-04	8.9443E-14	6.4078E+11	6.5109E+10
Xe-133m	1.0534E-04	2.4676E-13	1.1173E+12	5.6527E+09
Xe-133	2.1013E-03	1.1280E-11	5.1074E+13	1.2836E+11
Xe-135m	5.9891E-02	6.7080E-13	2.9924E+12	2.8956E+12

Kr-87	2.0534E-03	7.4107E-14	5.1297E+11	1.9364E+11
Kr-88	2.4557E-03	1.9102E-13	1.3072E-12	2.1426E+11
Kr-85	2.7608E-06	7.0369E-12	4.9856E+13	2.2517E+08
Xe-138	2.8741E-03	2.9848E-14	1.3025E+11	5.5940E+11

SSES CR Transport Group Inventory:

Time (h) = 0.5000	Atmosphere	Sump	
Noble gases (atoms)	1.4512E+14	0.0000E+00	
Elemental I (atoms)	2.1661E+14	0.0000E+00	
Organic I (atoms)	6.6992E+12	0.0000E+00	
Aerosols (kg)	9.3266E-10	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		9.1029E-12
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.5162E-11
Total I (Ci)			2.0467E+00

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2005E+14
Elemental I (atoms)	0.0000E+00	3.0912E+14
Organic I (atoms)	0.0000E+00	9.5605E+12
Aerosols (kg)	0.0000E+00	1.3314E-09

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5803E+12
Elemental I (atoms)	0.0000E+00	2.4668E+13
Organic I (atoms)	0.0000E+00	7.6293E+11
Aerosols (kg)	0.0000E+00	1.0625E-10

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	5.5912E+13	0.0000E+00
Elemental I (atoms)	1.0822E+14	0.0000E+00
Organic I (atoms)	3.3471E+12	0.0000E+00
Aerosols (kg)	4.6605E-10	0.0000E+00

Detailed model information at time (H) = 2.0000

EAB - RB MST Release Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.6289E-01	3.7624E+01	1.9312E+00

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.9135E-02	2.2211E+00	1.1401E-01

MSLB @ CR - RB MST Release Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.8193E-03	1.0509E+01	3.5695E-01
Accumulated dose (rem)	1.7744E-02	1.8134E+01	6.2179E-01

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
Accumulated dose (rem)	1.7744E-02	1.8134E+01	6.2179E-01	

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump	
Noble gases (atoms)	1.0458E-31	0.0000E+00	
Elemental I (atoms)	6.9688E-32	0.0000E+00	
Organic I (atoms)	2.1553E-33	0.0000E+00	
Aerosols (kg)	2.9985E-55	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.7689E-56
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		4.3161E-56
Total I (Ci)			4.6120E-46

SSES MST to Environs Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6503E+16
Elemental I (atoms)	0.0000E+00	1.9699E+17
Organic I (atoms)	0.0000E+00	6.0923E+15
Aerosols (kg)	0.0000E+00	8.4842E-07

SSES CR Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
I-131	1.6287E-02	1.3155E-10	6.0474E+14	1.0717E+13
I-132	8.3503E-02	8.1971E-12	3.7397E+13	8.0480E+13
I-133	1.0513E-01	9.3360E-11	4.2272E+14	7.1803E+13
I-134	6.2156E-02	2.3256E-12	1.0451E+13	1.1981E+14
I-135	1.3351E-01	3.8711E-11	1.7268E+14	9.9684E+13
Xe-131m	1.4809E-06	1.7815E-14	8.1897E+10	6.1519E+08
Xe-133m	8.9494E-05	2.0964E-13	9.4924E+11	2.6849E+10
Xe-133	1.4847E-03	7.9700E-12	3.6087E+13	5.0411E+11
Xe-135m	2.0989E-02	2.3508E-13	1.0487E+12	1.0862E+13
Xe-135	2.1151E-02	8.3189E-12	3.7109E+13	5.7609E+12
Kr-83m	6.9175E-05	3.4811E-15	2.5257E+10	7.3013E+10
Kr-85m	1.8166E-04	2.1483E-14	1.5220E+11	1.4583E+11
Kr-87	2.7823E-04	1.0041E-14	6.9506E+10	3.7037E+11
Kr-88	5.0867E-04	3.9568E-14	2.7078E+11	4.6036E+11
Kr-85	8.3283E-07	2.1228E-12	1.5039E+13	5.4531E+08
Xe-138	1.0546E-05	1.0952E-16	4.7795E+08	6.6101E+11

SSES CR Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump	
Noble gases (atoms)	9.0834E+13	0.0000E+00	
Elemental I (atoms)	6.0528E+13	0.0000E+00	
Organic I (atoms)	1.8720E+12	0.0000E+00	
Aerosols (kg)	2.6043E-10	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.6050E-12
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		4.0607E-12
Total I (Ci)			4.0058E-01

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2005E+14
Elemental I (atoms)	0.0000E+00	3.0912E+14
Organic I (atoms)	0.0000E+00	9.5605E+12
Aerosols (kg)	0.0000E+00	1.3314E-09

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5803E+12
Elemental I (atoms)	0.0000E+00	2.4668E+13
Organic I (atoms)	0.0000E+00	7.6293E+11
Aerosols (kg)	0.0000E+00	1.0625E-10

Time (h) = 2.0000	Pathway Filtered	Transported

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	2.0239E+14	0.0000E+00
Elemental I (atoms)	2.5471E+14	0.0000E+00
Organic I (atoms)	7.8778E+12	0.0000E+00
Aerosols (kg)	1.0966E-09	0.0000E+00

Detailed model information at time (H) = 8.0000

EAB - RB MST Release Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.6289E-01	3.7624E+01	1.9312E+00

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.9135E-02	2.2211E+00	1.1401E-01

MSLB @ CR - RB MST Release Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.0411E-03	4.2106E+00	1.3919E-01
Accumulated dose (rem)	1.9785E-02	2.2345E+01	7.6098E-01

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 8.0000	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 8.0000	Atmosphere	Sump	
Noble gases (atoms)	2.4536E-31	0.0000E+00	
Elemental I (atoms)	5.7954E-32	0.0000E+00	
Organic I (atoms)	1.7924E-33	0.0000E+00	
Aerosols (kg)	2.4888E-55	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.3516E-56
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		3.2954E-56
Total I (Ci)			2.1719E-46

SSES MST to Environs Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6503E+16
Elemental I (atoms)	0.0000E+00	1.9699E+17
Organic I (atoms)	0.0000E+00	6.0923E+15
Aerosols (kg)	0.0000E+00	8.4842E-07

SSES CR Compartment Nuclide Inventory:

Time (h) = 8.0000	Ci	kg	Atoms	Decay
I-131	1.3170E-04	1.0637E-12	4.8901E+12	1.3386E+13
I-132	1.1582E-04	1.1370E-14	5.1872E+10	9.0566E+13
I-133	7.1202E-04	6.3232E-13	2.8631E+12	8.8443E+13
I-134	4.4297E-06	1.6574E-16	7.4484E+08	1.2499E+14
I-135	5.9464E-04	1.7242E-13	7.6913E+11	1.1923E+14
Xe-131m	3.3071E-08	3.9783E-16	1.8288E+09	9.4263E+08
Xe-133m	2.3418E-06	5.4856E-15	2.4838E+10	4.8524E+10
Xe-133	3.6624E-05	1.9660E-13	8.9017E+11	8.5244E+11
Xe-135m	9.4022E-05	1.0531E-15	4.6977E+09	1.3908E+13
I-135	5.9464E-04	1.7242E-13	7.6913E+11	1.1923E+14
Xe-131m	3.3071E-08	3.9783E-16	1.8288E+09	9.4263E+08

Kr-83m	6.4037E-08	3.2225E-18	2.3381E+07	8.0889E+10
Kr-85m	5.7821E-07	6.8379E-17	4.8445E+08	1.7090E+11
Kr-87	9.3784E-08	3.3847E-18	2.3429E+07	3.9806E+11
Kr-88	9.3650E-07	7.2848E-17	4.9852E+08	5.2454E+11
Kr-85	6.8897E-09	1.7561E-14	1.2442E+11	6.8244E+08

SSES CR Transport Group Inventory:

Time (h) = 8.0000	Atmosphere	Sump	
Noble gases (atoms)	1.7607E+12	0.0000E+00	
Elemental I (atoms)	4.1588E+11	0.0000E+00	
Organic I (atoms)	1.2862E+10	0.0000E+00	
Aerosols (kg)	1.7860E-12	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.8280E-14
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.5616E-14
Total I (Ci)			1.5586E-03

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2005E+14
Elemental I (atoms)	0.0000E+00	3.0912E+14
Organic I (atoms)	0.0000E+00	9.5605E+12
Aerosols (kg)	0.0000E+00	1.3314E-09

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5803E+12
Elemental I (atoms)	0.0000E+00	2.4668E+13
Organic I (atoms)	0.0000E+00	7.6293E+11
Aerosols (kg)	0.0000E+00	1.0625E-10

SSES CR to Environment - CR Exhaust Transport Group Inventory:

	Pathway	
Time (h) = 8.0000	Filtered	Transported
Noble gases (atoms)	3.2234E+14	0.0000E+00
Elemental I (atoms)	3.1220E+14	0.0000E+00
Organic I (atoms)	9.6557E+12	0.0000E+00
Aerosols (kg)	1.3439E-09	0.0000E+00

Detailed model information at time (H) = 24.0000

EAB - RB MST Release Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.6289E-01	3.7624E+01	1.9312E+00

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.9135E-02	2.2211E+00	1.1401E-01

MSLB @ CR - RB MST Release Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.8459E-06	3.0009E-02	9.6468E-04
Accumulated dose (rem)	1.9792E-02	2.2375E+01	7.6194E-01

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
Delta dose (rem)	6.8459E-06	3.0009E-02	9.6468E-04	
Accumulated dose (rem)	1.9792E-02	2.2375E+01	7.6194E-01	

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	3.6413E-31	0.0000E+00	
Elemental I (atoms)	4.3599E-32	0.0000E+00	
Organic I (atoms)	1.3484E-33	0.0000E+00	
Aerosols (kg)	1.8664E-55	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.7315E-56
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.1570E-56
Total I (Ci)			9.1619E-47

SSES MST to Environs Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6503E+16
Elemental I (atoms)	0.0000E+00	1.9699E+17
Organic I (atoms)	0.0000E+00	6.0923E+15
Aerosols (kg)	0.0000E+00	8.4842E-07

SSES CR Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
I-131	3.4693E-10	2.8022E-18	1.2882E+07	1.3408E+13
I-133	1.1692E-09	1.0384E-18	4.7017E+06	8.8557E+13
I-135	3.1934E-10	9.2595E-20	4.1305E+05	1.1931E+14
Xe-131m	2.3724E-13	2.8540E-21	1.3120E+04	9.4882E+08
Xe-133m	1.3413E-11	3.1419E-20	1.4226E+05	4.8957E+10
Xe-133	2.1956E-10	1.1786E-18	5.3367E+06	8.5922E+11
Xe-135	8.2544E-10	3.2465E-19	1.4482E+06	1.0673E+13
Kr-85	1.9234E-14	4.9024E-20	3.4733E+05	6.8359E-08

SSES CR Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	7.2903E+06	0.0000E+00	
Elemental I (atoms)	8.7290E+05	0.0000E+00	
Organic I (atoms)	2.6997E+04	0.0000E+00	
Aerosols (kg)	3.7368E-18	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		3.7551E-20
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		4.6778E-20
Total I (Ci)			1.8383E-09

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2005E+14
Elemental I (atoms)	0.0000E+00	3.0912E+14
Organic I (atoms)	0.0000E+00	9.5605E+12
Aerosols (kg)	0.0000E+00	1.3314E-09

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5803E+12
Elemental I (atoms)	0.0000E+00	2.4668E+13
Organic I (atoms)	0.0000E+00	7.6293E+11
Aerosols (kg)	0.0000E+00	1.0625E-10

SSES CR to Environment - CR Exhaust Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	3.2423E+14	0.0000E+00
Elemental I (atoms)	3.1261E+14	0.0000E+00

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Elemental I (atoms) 3.1261E+14 0.0000E+00

Organic I (atoms)	9.6682E+12	0.0000E-00
Aerosols (kg)	1.3456E-09	0.0000E+00

Detailed model information at time (H) = 96.0000

EAB - RB MST Release Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.6289E-01	3.7624E+01	1.9312E+00

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.9135E-02	2.2211E+00	1.1401E-01

MSLB @ CR - RB MST Release Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.6500E-12	3.7330E-08	1.1718E-09
Accumulated dose (rem)	1.9792E-02	2.2375E+01	7.6194E-01

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	3.7047E-31	0.0000E+00	
Elemental I (atoms)	2.5152E-32	0.0000E+00	
Organic I (atoms)	7.7790E-34	0.0000E+00	
Aerosols (kg)	1.0724E-55	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		8.9873E-57
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		9.3291E-57
Total I (Ci)			1.8772E-47

SSES MST to Environs Transport Group Inventory:

Time (h) = 96.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6503E+16
Elemental I (atoms)	0.0000E+00	1.9699E+17
Organic I (atoms)	0.0000E+00	6.0923E+15
Aerosols (kg)	0.0000E+00	8.4842E-07

SSES CR Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay

SSES CR Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	7.5059E-19	0.0000E+00	
Elemental I (atoms)	5.0959E-20	0.0000E+00	
Organic I (atoms)	1.5761E-21	0.0000E+00	
Aerosols (kg)	2.1727E-43	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.9723E-45
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.0474E-45
Total I (Ci)			3.8032E-35

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 96.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2005E+14
Elemental I (atoms)	0.0000E+00	3.0917E+14

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Elemental I (atoms) [illegible]

Organic I (atoms)	0.0000E+00	9.5605E+12
Aerosols (kg)	0.0000E+00	1.3314E-09

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 96.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5803E+12
Elemental I (atoms)	0.0000E+00	2.4668E+13
Organic I (atoms)	0.0000E+00	7.6293E+11
Aerosols (kg)	0.0000E+00	1.0625E-10

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 96.0000	Pathway Filtered	Transported
Noble gases (atoms)	3.2423E+14	0.0000E+00
Elemental I (atoms)	3.1261E+14	0.0000E+00
Organic I (atoms)	9.6682E+12	0.0000E+00
Aerosols (kg)	1.3456E-09	0.0000E+00

Detailed model information at time (H) = 720.0000

EAB - RB MST Release Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	6.6289E-01	3.7624E+01	1.9312E+00

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.9135E-02	2.2211E+00	1.1401E-01

MSLB @ CR - RB MST Release Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.8256E-38	1.3232E-33	4.0479E-35
Accumulated dose (rem)	1.9792E-02	2.2375E+01	7.6194E-01

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	3.2133E-32	0.0000E+00	
Elemental I (atoms)	2.5699E-33	0.0000E+00	
Organic I (atoms)	7.9480E-35	0.0000E+00	
Aerosols (kg)	1.0950E-56	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		8.9814E-58
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		8.9814E-58
Total I (Ci)			1.4270E-48

SSES MST to Environs Transport Group Inventory:

Time (h) = 720.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6503E+16
Elemental I (atoms)	0.0000E+00	1.9699E+17
Organic I (atoms)	0.0000E+00	6.0923E+15
Aerosols (kg)	0.0000E+00	8.4842E-07

SSES CR Compartment Nuclide Inventory:

Elemental I (atoms)	0.0000E+00	1.9699E+17
Organic I (atoms)	0.0000E+00	6.0923E+15

Time (h) = 720.0000 Ci kg Atoms Decay

SSES CR Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	1.5548-236	0.0000E+00	
Elemental I (atoms)	1.2434-237	0.0000E+00	
Organic I (atoms)	3.8457-239	0.0000E+00	
Aerosols (kg)	5.2982-261	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		4.7073-263
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		4.7073-263
Total I (Ci)			6.9047-253

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 720.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2005E+14
Elemental I (atoms)	0.0000E+00	3.0912E+14
Organic I (atoms)	0.0000E+00	9.5605E+12
Aerosols (kg)	0.0000E+00	1.3314E-09

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 720.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5803E+12
Elemental I (atoms)	0.0000E+00	2.4668E+13
Organic I (atoms)	0.0000E+00	7.6293E+11
Aerosols (kg)	0.0000E+00	1.0625E-10

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 720.0000	Pathway Filtered	Transported
Noble gases (atoms)	3.2423E+14	0.0000E+00
Elemental I (atoms)	3.1261E+14	0.0000E+00
Organic I (atoms)	9.6682E+12	0.0000E+00
Aerosols (kg)	1.3456E-09	0.0000E+00

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I-131 Summary

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Time (hr)	SSES RB Steam Tunnel I-131 (Curies)	Environment I-131 (Curies)	SSES CR I-131 (Curies)
0.000	4.7868E+01	1.2246E-02	2.0740E-05
0.033	1.8884E-47	4.7900E+01	7.9002E-02
0.067	1.8882E-47	4.7900E+01	7.6917E-02
0.330	1.8864E-47	4.7900E+01	6.2255E-02
0.500	1.8853E-47	4.7900E+01	5.4312E-02
0.750	1.8836E-47	4.7900E+01	4.4434E-02
1.000	1.8819E-47	4.7900E+01	3.6353E-02
1.250	1.8802E-47	4.7900E+01	2.9741E-02
1.500	1.8785E-47	4.7900E+01	2.4332E-02
1.750	1.8768E-47	4.7900E+01	1.9907E-02
2.000	1.8752E-47	4.7900E+01	1.6287E-02
2.250	1.8735E-47	4.7900E+01	1.3325E-02
2.500	1.8718E-47	4.7900E+01	1.0901E-02
2.750	1.8701E-47	4.7900E+01	8.9187E-03
3.000	1.8684E-47	4.7900E+01	7.2966E-03
3.250	1.8668E-47	4.7900E+01	5.9696E-03
3.500	1.8651E-47	4.7900E+01	4.8839E-03
3.750	1.8634E-47	4.7900E+01	3.9957E-03
4.000	1.8617E-47	4.7900E+01	3.2689E-03
2.750	1.8701E-47	4.7900E+01	8.9187E-03
3.000	1.8684E-47	4.7900E+01	7.2966E-03

4.250	1.8601E-47	4.7900E+01	2.6745E-03
4.500	1.8584E-47	4.7900E+01	2.1881E-03
4.750	1.8567E-47	4.7900E+01	1.7901E-03
5.000	1.8551E-47	4.7900E+01	1.4646E-03
5.250	1.8534E-47	4.7900E+01	1.1982E-03
5.500	1.8518E-47	4.7900E+01	9.8028E-04
5.750	1.8501E-47	4.7900E+01	8.0200E-04
6.000	1.8484E-47	4.7900E+01	6.5614E-04
6.250	1.8468E-47	4.7900E+01	5.3681E-04
6.500	1.8451E-47	4.7900E+01	4.3918E-04
6.750	1.8435E-47	4.7900E+01	3.5931E-04
7.000	1.8418E-47	4.7900E+01	2.9396E-04
7.250	1.8402E-47	4.7900E+01	2.4050E-04
7.500	1.8385E-47	4.7900E+01	1.9676E-04
7.750	1.8369E-47	4.7900E+01	1.6097E-04
8.000	1.8352E-47	4.7900E+01	1.3170E-04
8.250	1.8336E-47	4.7900E+01	1.0775E-04
8.500	1.8319E-47	4.7900E+01	8.8151E-05
8.750	1.8303E-47	4.7900E+01	7.2119E-05
9.000	1.8287E-47	4.7900E+01	5.9003E-05
9.250	1.8270E-47	4.7900E+01	4.8272E-05
9.500	1.8254E-47	4.7900E+01	3.9493E-05
9.750	1.8237E-47	4.7900E+01	3.2310E-05
10.000	1.8221E-47	4.7900E+01	2.6434E-05
10.250	1.8205E-47	4.7900E+01	2.1627E-05
24.000	1.7329E-47	4.7900E+01	3.4693E-10
96.000	1.3384E-47	4.7900E+01	2.7117E-35
720.000	1.4270E-48	4.7900E+01	6.9047-253

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Cumulative Dose Summary

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	EAB - RB MST Release		MSLB @ LPZ - RB MST R		MSLB @ CR - RB MST Re	
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	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	6.0795E-01	2.1269E-02
0.067	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	1.2046E+00	4.2117E-02
0.330	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	5.3808E+00	1.8733E-01
0.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	7.6258E+00	2.6484E-01
0.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	1.0398E+01	3.5998E-01
1.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	1.2647E+01	4.3669E-01
1.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	1.4472E+01	4.9861E-01
1.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	1.5954E+01	5.4863E-01
1.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	1.7157E+01	5.8907E-01
2.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	1.8134E+01	6.2179E-01
2.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	1.8928E+01	6.4827E-01
2.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	1.9573E+01	6.6972E-01
2.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.0097E+01	6.8711E-01
3.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.0523E+01	7.0120E-01
3.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.0869E+01	7.1263E-01
3.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.1150E+01	7.2189E-01
3.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.1379E+01	7.2942E-01
4.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.1565E+01	7.3552E-01
4.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.1716E+01	7.4048E-01
4.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.1839E+01	7.4450E-01
4.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.1939E+01	7.4777E-01
5.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2020E+01	7.5042E-01
5.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2086E+01	7.5258E-01
5.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2140E+01	7.5433E-01
5.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2184E+01	7.5575E-01
6.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2220E+01	7.5691E-01
6.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2248E+01	7.5785E-01
6.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2272E+01	7.5861E-01
6.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2291E+01	7.5923E-01
5.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2184E+01	7.5575E-01

7.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2307E+01	7.5974E-01
7.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2320E+01	7.6015E-01
7.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2330E+01	7.6048E-01
7.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2338E+01	7.6076E-01
8.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2345E+01	7.6098E-01
8.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2351E+01	7.6116E-01
8.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2355E+01	7.6130E-01
8.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2359E+01	7.6142E-01
9.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2362E+01	7.6152E-01
9.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2364E+01	7.6160E-01
9.500	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2366E+01	7.6166E-01
9.750	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2368E+01	7.6171E-01
10.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2369E+01	7.6176E-01
10.250	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2370E+01	7.6179E-01
24.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2375E+01	7.6194E-01
96.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2375E+01	7.6194E-01
720.000	3.7624E+01	1.9312E+00	2.2211E+00	1.1401E-01	2.2375E+01	7.6194E-01

##
Worst Two-Hour Doses
##

EAB - RB MST Release

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	6.6289E-01	3.7624E+01	1.9312E+00

Attachment 6 RADTRAD Output RBMSTLF_500cfm_TEDE_2ptmcDE_1128.out

```
##############################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  8/13/2005  at 14:35:39
##############################################################################

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

Plant file           = C:\Program Files\radtrad3.03\PPL_AST_MSL\RBMSTLF_500cfm_pt2mcDE_1128.psf
Inventory file       = C:\Program Files\radtrad3.03\PPL_AST_MSL\slb_pt2mc.nif
Release file         = c:\program files\radtrad3.03\ppl_ast_msl\slb.rft
Dose Conversion file = c:\program files\radtrad3.03\ppl_ast_msl\slb_phase 2.inp



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

Radtrad 3.03 4/15/2001
SSES MSLB
Nuclide Inventory File:
C:\Program Files\radtrad3.03\PPL_AST_MSL\slb_pt2mc.nif
Plant Power Level:
 1.0000E+00
Compartments:
  3
Compartment 1:
SSES RB Steam Tunnel
  3
 5.6110E+04
  0
  0
  0
  0
  0
Compartment 2:
Environment
  2
 0.0000E+00
  0
  0
  0
  0
  0
Compartment 3:
SSES CR
  1
 5.1800E+05
  0
  0
  0
  0
  0
Pathways:
  4
Pathway 1:
SSES MSL to Environs
  0
  0
```

```
  1
  2
  2
Pathway 2:
Environment to SSES CR - 6391 cfm Normal Intake
  2
  3
  2
Pathway 3:
Environment to SSES CR -500+10 cfm Unfiltered Inleakage
  2
  3
  2
Pathway 4:
SSES CR to Environment - CR Exhaust
  3
  2
  2
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\radtrad3.03\ppl_ast_msl\slb_phase 2.inp
c:\program files\radtrad3.03\ppl_ast_msl\slb.rft
  0.0000E+00
  1
  9.5000E-01   4.8500E-02   1.5000E-03   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  1
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
  0
Compartment 3:
  1
  0
```

```
  0
  0
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   3.1300E+06   0.0000E+00   0.0000E+00   0.0000E+00
  3.3300E-02   0.0000E+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 2:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   6.3910E+03   0.0000E+00   0.0000E+00   0.0000E+00
  6.6600E-02   6.3910E+03   0.0000E+00   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 3:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   5.1000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  6.6600E-02   5.1000E+02   0.0000E+00   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 4:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   6.9010E-03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
```

```
  5.0000E-01   6.9010E+03   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:
EAB - RB MST Release
  2
  1
  3
  0.0000E+00   8.3000E-04
  2.0000E+00   8.3000E-04
  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 2:
MSLB @ LPZ - RB MST Release
  2
  1
  5
  0.0000E+00   4.9000E-05
  8.0000E+00   3.5000E-05
  2.4000E+01   1.7000E-05
  9.6000E+01   6.1000E-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:
MSLB @ CR - RB MST Release
  3
  0
  1
  2
  0.0000E+00   3.4700E-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
  3
  0.0000E+00   5.2000E-04
  6.6600E-02   0.0000E+00
  7.2000E+02   0.0000E+00
Simulation Parameters:
  4
  0.0000E+00   1.0000E-04
  6.6600E-02   0.0000E+00
  7.2000E+02   0.0000E+00
```

```
  1.0000E-01   1.0000E-02
  7.2000E+02   0.0000E+00
Output Filename:
C:\Program Files\radtrad3.o29
  1
  1
  1
  0
  1
End of Scenario File
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  8/13/2005  at 14:35:39
##########################################################################

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

Number of Nuclides =  16

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

Number of compartments     =   3

Compartment information

Compartment number  1  (Source term fraction =    1.0000E+00
)
Name: SSES RB Steam Tunnel
Compartment volume =    5.6110E+04 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  1
   Exit Pathway Number     1: SSES MST to Environs

Compartment number  2
Name: Environment
Compartment type is Environment
Pathways into and out of compartment  2
   Inlet Pathway Number    1: SSES MST to Environs
   Inlet Pathway Number    4: SSES CR to Environment - CR Exhaust
   Exit Pathway Number     2: Environment to SSES CR - 6391 cfm Normal Intake
   Exit Pathway Number     3: Environment to SSES CR -500+10 cfm Unfiltered Inle

Compartment number  3
Name: SSES CR
Compartment volume =    5.1800E+05 (Cubic feet)
Compartment type is Control Room
Pathways into and out of compartment  3
   Inlet Pathway Number    2: Environment to SSES CR - 6391 cfm Normal Intake
   Inlet Pathway Number    3: Environment to SSES CR -500+10 cfm Unfiltered Inle
   Exit Pathway Number     4: SSES CR to Environment - CR Exhaust

Total number of pathways =    4
```

```
##############################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  8/13/2005  at 14:35:39
##############################################################################

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

Radioactive Decay is enabled
Calculation of Daughters is enabled

Release Fractions and Timings
                GAP          EARLY IN-VESSEL   LATE RELEASE     RELEASE MASS
             0.000000 hr       0.0000 hrs        0.0000 hrs         (gm)
NOBLES       1.0000E+00        0.0000E+00        0.0000E+00       1.322E-05
IODINE       1.0000E+00        0.0000E+00        0.0000E+00       4.473E-05
CESIUM       0.0000E+00        0.0000E+00        0.0000E+00       0.000E+00
TELLURIUM    0.0000E+00        0.0000E+00        0.0000E+00       0.000E+00
STRONTIUM    0.0000E+00        0.0000E+00        0.0000E+00       0.000E+00
BARIUM       0.0000E+00        0.0000E+00        0.0000E+00       0.000E+00
RUTHENIUM    0.0000E+00        0.0000E+00        0.0000E+00       0.000E+00
CERIUM       0.0000E+00        0.0000E+00        0.0000E+00       0.000E+00
LANTHANUM    0.0000E+00        0.0000E+00        0.0000E+00       0.000E+00

Inventory Power =          1. MWt

Nuclide  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   2.400E+00  6.956E+05   1.820E-14   2.920E-07    8.890E-09
 I-132     2   2.210E+01  8.390E+03   1.120E-13   1.740E-09    1.030E-10
 I-133     2   1.640E+01  7.533E+04   2.940E-14   4.860E-08    1.580E-09
 I-134     2   4.420E+01  3.150E+03   1.300E-13   2.880E-10    3.550E-11
 I-135     2   2.400E+01  2.423E+04   8.294E-14   8.460E-09    3.320E-10
 Xe-131m   1   1.810E-03  1.036E+06   3.378E-16   0.000E+00    0.000E+00
 Xe-133m   1   3.390E-02  1.987E+05   1.370E-15   0.000E+00    0.000E+00
 Xe-133    1   9.890E-01  4.553E+05   1.560E-15   0.000E+00    0.000E+00
 Xe-135m   1   3.150E+00  9.360E+02   2.040E-14   0.000E+00    0.000E+00
 Xe-135    1   2.750E+00  3.287E+04   1.190E-14   0.000E+00    0.000E+00
 Kr-83m    1   4.190E-01  6.840E+03   1.500E-18   0.000E+00    0.000E+00
 Kr-85m    1   7.290E-01  1.570E+04   7.480E-15   0.000E+00    0.000E+00
 Kr-87     1   2.360E+00  4.680E+03   4.120E-14   0.000E+00    0.000E+00
 Kr-88     1   2.450E+00  9.972E+03   1.020E-13   0.000E+00    0.000E+00
 Kr-85     1   2.430E-03  3.383E+08   1.190E-16   0.000E+00    0.000E+00
 Xe-138    1   1.100E+01  8.490E+02   5.770E-14   0.000E+00    0.000E+00

Nuclide    Daughter  Fraction  Daughter  Fraction  Daughter  Fraction
 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-133m   Xe-133      1.00      none      0.00      none      0.00
 Xe-135m   Xe-135      1.00      Cs-135    0.00      none      0.00
 Xe-135    Cs-135      1.00      none      0.00      none      0.00
 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
 Xe-138    Cs-138      1.00      none      0.00      none      0.00

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

COMPARTMENT DATA
     Aerosol      =   9.5000E-01
     Elemental    =   4.8500E-02
```

Compartment number 1: SSES RB Steam Tunnel

Compartment number 2: Environment

Compartment number 3: SSES CR

PATHWAY DATA

Pathway number 1: SSES MST to Environs

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E-00	3.1300E-06	0.0000E+00	0.0000E+00	0.0000E+00
3.3300E-02	0.0000E+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 2: Environment to SSES CR - 6391 cfm Normal Intake

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	6.3910E+03	0.0000E+00	0.0000E+00	0.0000E+00
6.6600E-02	6.3910E+03	0.0000E+00	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Environment to SSES CR -500+10 cfm Unfiltered Inle

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	5.1000E+02	0.0000E+00	0.0000E+00	0.0000E+00
6.6600E-02	5.1000E+02	0.0000E+00	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 4: SSES CR to Environment - CR Exhaust

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	6.9010E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	6.9010E+03	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 EAB - RB MST Release is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	8.3000E-04
2.0000E+00	8.3000E-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
8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04
7.2000E+02	0.0000E+00

Location MSLB @ LPZ - RB MST Release is in compartment 2

Location X/Q Data

8.0000E+00	1.8000E-04
2.4000E+01	2.3000E-04

Location X/Q Data

```
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00          4.9000E-05
  8.0000E+00          3.5000E-05
  2.4000E+01          1.7000E-05
  9.6000E+01          6.1000E-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 MSLB @ CR - RB MST Release     is in compartment   3

Location X/Q Data
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00          5.2000E-04
  6.6600E-02          0.0000E+00
  7.2000E+02          0.0000E+00

Location Breathing Rate Data
 Time (hr)          Breathing Rate (m^3 * sec^-1)
  0.0000E+00                  3.4700E-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-04
  1.0000E-02       1.0000E-03
  1.0000E-01       1.0000E-02
  7.2000E+02       0.0000E+00
```

```
##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on  8/13/2005  at 14:35:39
##########################################################################

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

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

Detailed model information at time (H) =     0.0000

EAB - RB MST Release Doses:

Time (h) =   0.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         9.2832E-06  4.8147E-04  2.5514E-05
Accumulated dose (rem)   9.2832E-06  4.8147E-04  2.5514E-05

MSLB @ LPZ - RB MST Release Doses:

Time (h) =   0.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         5.4805E-07  2.8424E-05  1.5062E-06
Accumulated dose (rem)   5.4805E-07  2.8424E-05  1.5062E-06

MSLB @ CR - RB MST Release Doses:

Time (h) =   0.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         2.5857E-14  1.8264E-11  6.4152E-13
Accumulated dose (rem)   2.5857E-14  1.8264E-11  6.4152E-13

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) =   0.0000        Ci          kg          Atoms       Decay
I-131                   2.3994E+00  1.9380E-08  8.9091E+16  4.8835E+07
I-132                   2.2094E+01  2.1689E-09  9.8951E+15  4.4969E+08
I-133                   1.6396E+01  1.4561E-08  6.5929E+16  3.3370E+08
I-134                   4.4189E+01  1.6533E-09  7.4302E+15  8.9937E+08
I-135                   2.3994E+01  6.9571E-09  3.1035E+16  4.8835E+08
Xe-131m                 1.8095E-03  2.1768E-11  1.0007E+14  3.6829E+04
Xe-133m                 3.3891E-02  7.9391E-11  3.5948E+14  6.8979E+05
Xe-133                  9.8875E-01  5.3076E-09  2.4032E+16  2.0124E+07
Xe-135m                 3.1492E+00  3.5272E-11  1.5734E+14  6.4095E+07
Xe-135                  2.7493E+00  1.0813E-09  4.8236E+15  5.5956E+07
Kr-83m                  4.1889E-01  2.1080E-11  1.5295E+14  8.5257E+06
Kr-85m                  7.2881E-01  8.6189E-11  6.1064E+14  1.4834E+07
Kr-87                   2.3594E+00  8.5151E-11  5.8942E+14  4.8021E+07
Kr-88                   2.4494E+00  1.9053E-10  1.3039E+15  4.9852E+07
Kr-85                   2.4294E-03  6.1921E-09  4.3870E+16  4.9446E+04
Xe-138                  1.0997E+01  1.1421E-10  4.9839E+14  2.2383E+08

SSES RB Steam Tunnel Transport Group Inventory:
Time (h) =   0.0000     Atmosphere     Sump
Noble gases (atoms)     7.6498E+16  0.0000E+00
Elemental I (atoms)     7.8660E+15  0.0000E+00
Xe-138                  1.0997E+01  1.1421E-10  4.9839E+14  2.2383E+08
Elemental I (atoms)     9.8040E+15  0.0000E+00
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Organic I (atoms)	3.0507E+14	0.0000E+00	
Aerosols (kg)	4.2484E-08	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		3.7755E-09
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		6.5008E-09
Total I (Ci)			1.0907E+02

SSES MST to Environs Transport Group Inventory:

Time (h) = 0.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.9563E+13
Elemental I (atoms)	0.0000E+00	2.5225E+12
Organic I (atoms)	0.0000E+00	7.8016E+10
Aerosols (kg)	0.0000E+00	1.0865E-11

SSES CR Compartment Nuclide Inventory:

Time (h) = 0.0000	Ci	kg	Atoms	Decay
I-131	1.0392E-06	8.3937E-15	3.8586E+10	2.1151E+01
I-132	9.5692E-06	9.3937E-16	4.2856E+09	1.9476E+02
I-133	7.1011E-06	6.3063E-15	2.8554E+10	1.4453E+02
I-134	1.9138E-05	7.1606E-16	3.2180E+09	3.8952E+02
I-135	1.0392E-05	3.0132E-15	1.3441E+10	2.1151E+02
Xe-131m	7.8372E-10	9.4280E-18	4.3341E+07	1.5951E-02
Xe-133m	1.4679E-08	3.4385E-17	1.5569E+08	2.9875E-01
Xe-133	4.2823E-07	2.2987E-15	1.0409E+10	8.7158E+00
Xe-135m	1.3639E-06	1.5277E-17	6.8147E+07	2.7760E+01
Xe-135	1.1907E-06	4.6833E-16	2.0891E+09	2.4235E+01
Kr-83m	1.8143E-07	9.1297E-18	6.6241E+07	3.6925E+00
Kr-85m	3.1565E-07	3.7329E-17	2.6447E+08	6.4245E+00
Kr-87	1.0219E-06	3.6880E-17	2.5528E+08	2.0798E+01
Kr-88	1.0608E-06	8.2520E-17	5.6471E+08	2.1591E+01
Kr-85	1.0522E-09	2.6818E-15	1.9000E+10	2.1415E-02
Xe-138	4.7630E-06	4.9464E-17	2.1585E+08	9.6940E+01

SSES CR Transport Group Inventory:

Time (h) = 0.0000	Atmosphere	Sump	
Noble gases (atoms)	3.3132E+10	0.0000E+00	
Elemental I (atoms)	4.2721E+09	0.0000E+00	
Organic I (atoms)	1.3213E+08	0.0000E+00	
Aerosols (kg)	1.8400E-14	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.7712E-16
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		3.0498E-16
Total I (Ci)			4.7240E-05

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 0.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	3.0683E+10
Elemental I (atoms)	0.0000E+00	3.9564E+09
Organic I (atoms)	0.0000E+00	1.2236E+08
Aerosols (kg)	0.0000E+00	1.7040E-14

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 0.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	2.4485E+09
Elemental I (atoms)	0.0000E+00	3.1572E+08
Organic I (atoms)	0.0000E+00	9.7646E+06
Aerosols (kg)	0.0000E+00	1.3598E-15

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Organic I (atoms)	0.0000E+00	9.7646E+06	
Aerosols (kg)	0.0000E+00	1.3598E-15	

Time (h) = 0.0000	Filtered	Transported
Noble gases (atoms)	1.3489E+03	0.0000E+00
Elemental I (atoms)	1.7393E+02	0.0000E+00
Organic I (atoms)	5.3794E+00	0.0000E+00
Aerosols (kg)	7.4913E-22	0.0000E+00

Detailed model information at time (H) = 0.0333

EAB - RB MST Release Doses:

Time (h) = 0.0333	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.6295E-02	1.8827E+00	9.9760E-02
Accumulated dose (rem)	3.6304E-02	1.9832E+00	9.9785E-02

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 0.0333	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.1427E-03	1.1115E-01	5.8894E-03
Accumulated dose (rem)	2.1433E-03	1.1118E-01	5.8909E-03

MSLB @ CR - RB MST Release Doses:

Time (h) = 0.0333	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.2672E-05	3.0430E-02	1.0681E-03
Accumulated dose (rem)	4.2672E-05	3.0430E-02	1.0681E-03

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 0.0333	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 0.0333	Atmosphere	Sump	
Noble gases (atoms)	3.0206E-32	0.0000E+00	
Elemental I (atoms)	3.8811E-33	0.0000E+00	
Organic I (atoms)	1.2003E-34	0.0000E+00	
Aerosols (kg)	1.6715E-56	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.4870E-57
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.5541E-57
Total I (Ci)			4.2438E-47

SSES MST to Environs Transport Group Inventory:

	Pathway	
Time (h) = 0.0333	Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6477E+16
Elemental I (atoms)	0.0000E+00	9.8610E+15
Organic I (atoms)	0.0000E+00	3.0498E+14
Aerosols (kg)	0.0000E+00	4.2471E-08

SSES CR Compartment Nuclide Inventory:

Time (h) = 0.0333	Ci	kg	Atoms	Decay
I-131	3.9583E-03	3.1972E-11	1.4698E+14	1.7653E+10
I-132	3.6095E-02	3.5433E-12	1.6165E+13	1.6176E+11
I-133	2.7022E-02	2.3997E-11	1.0866E+14	1.2057E+11
I-134	7.1010E-02	2.6568E-12	1.1940E+13	3.2086E+11
I-135	3.9453E-02	1.1439E-11	5.1030E+13	1.7624E+11
Xe-131m	2.9889E-06	3.5955E-14	1.6529E+11	1.3321E+07
Xe-133m	5.6223E-05	1.3170E-13	5.9634E+11	2.5003E+08
Xe-133	1.6359E-03	8.7812E-12	3.9761E+13	7.2847E+09
Xe-135m	5.2586E-03	5.8899E-14	2.6274E+11	2.3288E+10
Xe-135	4.6227E-03	1.8181E-12	8.1104E+12	2.0417E+10
Kr-83m	6.8280E-04	3.4360E-14	2.4930E+11	3.0634E+09
Kr-85m	1.1961E-03	1.4145E-13	1.0022E+12	5.3482E+09
Kr-87	3.8243E-03	1.3802E-13	9.5538E+11	1.7206E+10
Kr-88	4.9972E-03	2.1175E-13	2.1334E+12	1.3847E+10
Xe-135m	5.2586E-03	5.8899E-14	2.6274E+11	2.3288E+10
Xe-135	4.6227E-03	1.8181E-12	8.1104E+12	2.0417E+10
Kr-88	4.8647E-03	3.1175E-13	2.1334E+12	2.0417E+10

Kr-85	4.0083E-06	1.0217E-11	7.2384E+13	1.7875E+07
Xe-138	1.6453E-02	1.7086E-13	7.4563E+11	7.7068E+10

SSES CR Transport Group Inventory:

Time (h) = 0.0333	Atmosphere	Sump	
Noble gases (atoms)	1.2637E+14	0.0000E+00	
Elemental I (atoms)	1.6236E+13	0.0000E+00	
Organic I (atoms)	5.0215E+11	0.0000E+00	
Aerosols (kg)	6.9928E-11	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		6.7384E-13
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.1574E-12
Total I (Ci)			1.7754E-01

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 0.0333	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2001E+14
Elemental I (atoms)	0.0000E+00	1.5475E+13
Organic I (atoms)	0.0000E+00	4.7860E+11
Aerosols (kg)	0.0000E+00	6.6649E-11

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 0.0333	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5771E+12
Elemental I (atoms)	0.0000E+00	1.2349E+12
Organic I (atoms)	0.0000E+00	3.8192E+10
Aerosols (kg)	0.0000E+00	5.3186E-12

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 0.0333	Pathway Filtered	Transported
Noble gases (atoms)	3.3757E+12	0.0000E+00
Elemental I (atoms)	4.3452E+11	0.0000E+00
Organic I (atoms)	1.3439E+10	0.0000E+00
Aerosols (kg)	1.8715E-12	0.0000E+00

Detailed model information at time (H) = 0.0666

EAB - RB MST Release Doses:

Time (h) = 0.0666	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.6304E-02	1.8832E+00	9.9785E-02

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 0.0666	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.1433E-03	1.1118E-01	5.8909E-03

MSLB @ CR - RB MST Release Doses:

Time (h) = 0.0666	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.1090E-05	2.9865E-02	1.0468E-03
Accumulated dose (rem)	8.3762E-05	6.0296E-02	2.1149E-03

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 0.0666	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 0.0666	Atmosphere	Sump

Noble gases (atoms)		3.0243E-32	0.0000E+00
Elemental I (atoms)		3.8720E-33	0.0000E+00
Organic I (atoms)		1.1975E-34	0.0000E+00
Aerosols (kg)		1.6676E-56	0.0000E+00
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.4850E-57
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.5444E-57
Total I (Ci)			4.1872E-47

SSES MST to Environs Transport Group Inventory:

Time (h) = 0.0666	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6477E+16
Elemental I (atoms)	0.0000E+00	9.8610E+15
Organic I (atoms)	0.0000E+00	3.0498E+14
Aerosols (kg)	0.0000E+00	4.2471E-08

SSES CR Compartment Nuclide Inventory:

Time (h) = 0.0666	Ci	kg	Atoms	Decay
I-131	3.8539E-03	3.1128E-11	1.4310E+14	3.4971E+10
I-132	3.4800E-02	3.4162E-12	1.5585E+13	3.1891E+11
I-133	2.6283E-02	2.3341E-11	1.0569E+14	2.3873E+11
I-134	6.7344E-02	2.5197E-12	1.1324E+13	6.2751E+11
I-135	3.8285E-02	1.1101E-11	4.9519E+13	3.4856E+11
Xe-131m	2.9135E-06	3.5049E-14	1.6112E+11	2.6405E+07
Xe-133m	5.5042E-05	1.2894E-13	5.8381E+11	4.9666E+08
Xe-133	1.5973E-03	8.5741E-12	3.8823E+13	1.4452E+10
Xe-135m	5.1748E-03	5.7960E-14	2.5855E+11	4.6386E+10
Xe-135	4.5852E-03	1.8034E-12	8.0446E+12	4.0825E+10
Kr-83m	6.5683E-04	3.3053E-14	2.3982E+11	6.0328E+09
Kr-85m	1.1586E-03	1.3701E-13	9.7070E+11	1.0568E+10
Kr-87	3.6583E-03	1.3203E-13	9.1391E+11	3.3792E+10
Kr-88	3.8701E-03	3.0104E-13	2.0601E+12	3.5409E+10
Kr-85	3.9031E-06	9.9484E-12	7.0483E+13	3.5413E+07
Xe-138	1.4527E-02	1.5086E-13	6.5835E+11	1.4566E+11

SSES CR Transport Group Inventory:

Time (h) = 0.0666	Atmosphere	Sump		
Noble gases (atoms)	1.2320E+14	0.0000E+00		
Elemental I (atoms)	1.5773E+13	0.0000E+00		
Organic I (atoms)	4.8782E+11	0.0000E+00		
Aerosols (kg)	6.7931E-11	0.0000E+00		
Dose Effective (Ci/cc)	I-131 (Thyroid)		6.5526E-13	
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.1227E-12	
Total I (Ci)			1.7057E-01	

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 0.0666	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2001E+14
Elemental I (atoms)	0.0000E+00	1.5475E+13
Organic I (atoms)	0.0000E+00	4.7860E+11
Aerosols (kg)	0.0000E+00	6.6649E-11

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 0.0666	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5771E+12
Elemental I (atoms)	0.0000E+00	1.2349E+12
Organic I (atoms)	0.0000E+00	3.8192E+10
Aerosols (kg)	0.0000E+00	5.3186E-12

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Noble gases (atoms)	0.0000E+00	9.5771E+12
Elemental I (atoms)	0.0000E+00	1.2349E+12

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 0.0666	Pathway Filtered	Transported
Noble gases (atoms)	6.6969E+12	0.0000E+00
Elemental I (atoms)	8.6052E+11	0.0000E+00
Organic I (atoms)	2.6614E+10	0.0000E+00
Aerosols (kg)	3.7062E-12	0.0000E+00

Detailed model information at time (H) = 0.5000

EAB - RB MST Release Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.6304E-02	1.8832E+00	9.9785E-02

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.1433E-03	1.1118E-01	5.8909E-03

MSLB @ CR - RB MST Release Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.9530E-04	3.2140E-01	1.1173E-02
Accumulated dose (rem)	4.7906E-04	3.8170E-01	1.3288E-02

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 0.5000	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 0.5000	Atmosphere	Sump	
Noble gases (atoms)	3.0812E-32	0.0000E+00	
Elemental I (atoms)	3.7641E-33	0.0000E+00	
Organic I (atoms)	1.1641E-34	0.0000E+00	
Aerosols (kg)	1.6207E-56	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.4601E-57
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.4315E-57
Total I (Ci)			3.5531E-47

SSES MST to Environs Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6477E+16
Elemental I (atoms)	0.0000E+00	9.8610E+15
Organic I (atoms)	0.0000E+00	3.0498E+14
Aerosols (kg)	0.0000E+00	4.2471E-08

SSES CR Compartment Nuclide Inventory:

Time (h) = 0.5000	Ci	kg	Atoms	Decay
I-131	2.7213E-03	2.1980E-11	1.0104E+14	2.2218E+11
I-132	2.1634E-02	2.1238E-12	9.6891E+12	1.9120E+12
I-133	1.8323E-02	1.6272E-11	7.3677E+13	1.5078E+12
I-134	3.3786E-02	1.2641E-12	5.6811E+12	3.4259E+12
I-135	2.5893E-02	7.5079E-12	3.3491E+13	2.1711E+12
Xe-131m	2.0896E-06	2.5137E-14	1.1556E+11	1.6896E+08
Xe-133m	4.1620E-05	9.7494E-14	4.4145E+11	3.2577E+09
Xe-133	1.1695E-03	6.2777E-12	2.8425E+13	9.3361E+10
Xe-135m	3.8970E-03	4.3648E-14	1.9471E+11	3.0486E+11
Xe-135	3.9884E-03	1.5687E-12	6.9976E+12	2.8752E+11
Kr-83m	3.9658E-04	1.9957E-14	1.4480E+11	3.5701E+10
Kr-85m	7.6478E-04	8.9443E-14	6.4078E+11	6.5109E+10
Xe-133m	4.1620E-05	9.7494E-14	4.4145E+11	3.2577E+09
Xe-133	1.1695E-03	6.2777E-12	2.8425E+13	9.3361E+10
Kr-85m	7.6478E-04	8.9443E-14	6.4078E+11	6.5109E+10

Kr-87	2.0534E-03	7.4107E-14	5.1297E+11	1.9364E+11
Kr-88	2.4557E-03	1.9102E-13	1.3072E+12	2.1426E-11
Kr-85	2.7608E-06	7.0369E-12	4.9856E+13	2.2517E-08
Xe-138	2.8741E-03	2.9848E-14	1.3025E+11	5.5940E+11

SSES CR Transport Group Inventory:

Time (h) = 0.5000	Atmosphere	Sump	
Noble gases (atoms)	8.8766E+13	0.0000E+00	
Elemental I (atoms)	1.0844E+13	0.0000E+00	
Organic I (atoms)	3.3537E+11	0.0000E+00	
Aerosols (kg)	4.6690E-11	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		4.5563E-13
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		7.5875E-13
Total I (Ci)			1.0236E-01

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2001E+14
Elemental I (atoms)	0.0000E+00	1.5475E+13
Organic I (atoms)	0.0000E+00	4.7860E+11
Aerosols (kg)	0.0000E+00	6.6649E-11

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5771E+12
Elemental I (atoms)	0.0000E+00	1.2349E+12
Organic I (atoms)	0.0000E+00	3.8192E+10
Aerosols (kg)	0.0000E+00	5.3186E-12

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 0.5000	Pathway Filtered	Transported
Noble gases (atoms)	4.3069E+13	0.0000E+00
Elemental I (atoms)	5.4177E+12	0.0000E+00
Organic I (atoms)	1.6756E+11	0.0000E+00
Aerosols (kg)	2.3331E-11	0.0000E+00

Detailed model information at time (H) = 2.0000

EAB - RB MST Release Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.6304E-02	1.8832E+00	9.9785E-02

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.1433E-03	1.1118E-01	5.8909E-03

MSLB @ CR - RB MST Release Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.6188E-04	5.2601E-01	1.7887E-02
Accumulated dose (rem)	9.4094E-04	9.0770E-01	3.1174E-02

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
Accumulated dose (rem)	9.4094E-04	9.0770E-01	3.1174E-02	

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump	
Noble gases (atoms)	3.2933E-32	0.0000E+00	
Elemental I (atoms)	3.4889E-33	0.0000E+00	
Organic I (atoms)	1.0790E-34	0.0000E+00	
Aerosols (kg)	1.5012E-56	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.3860E-57
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.1601E-57
Total I (Ci)			2.3074E-47

SSES MST to Environs Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6477E+16
Elemental I (atoms)	0.0000E+00	9.8610E+15
Organic I (atoms)	0.0000E+00	3.0498E+14
Aerosols (kg)	0.0000E+00	4.2471E-08

SSES CR Compartment Nuclide Inventory:

Time (h) = 2.0000	Ci	kg	Atoms	Decay
I-131	8.1603E-04	6.5912E-12	3.0300E+13	5.3698E+11
I-132	4.1751E-03	4.0986E-13	1.8699E+12	4.0240E+12
I-133	5.2563E-03	4.6680E-12	2.1136E+13	3.5901E+12
I-134	3.1043E-03	1.1615E-13	5.2198E+11	5.9836E+12
I-135	6.6892E-03	1.9396E-12	8.6521E+12	4.9946E+12
Xe-131m	6.6017E-07	7.9417E-15	3.6508E+10	4.1584E+08
Xe-133m	1.5230E-05	3.5677E-14	1.6154E+11	8.5002E+09
Xe-133	3.9261E-04	2.1075E-12	9.5426E+12	2.3516E+11
Xe-135m	1.0566E-03	1.1834E-14	5.2791E+10	7.3813E+11
Xe-135	1.8540E-03	7.2919E-13	3.2528E+12	8.5582E+11
Kr-83m	6.9175E-05	3.4811E-15	2.5257E+10	7.3013E+10
Kr-85m	1.8166E-04	2.1483E-14	1.5220E+11	1.4583E+11
Kr-87	2.7823E-04	1.0041E-14	6.9506E+10	3.7037E+11
Kr-88	5.0867E-04	3.9568E-14	2.7078E+11	4.6036E+11
Kr-85	8.3283E-07	2.1228E-12	1.5039E+13	5.4531E+08
Xe-138	1.0546E-05	1.0952E-16	4.7795E+08	6.6101E+11

SSES CR Transport Group Inventory:

Time (h) = 2.0000	Atmosphere	Sump	
Noble gases (atoms)	2.8604E+13	0.0000E+00	
Elemental I (atoms)	3.0303E+12	0.0000E+00	
Organic I (atoms)	9.3720E+10	0.0000E+00	
Aerosols (kg)	1.3038E-11	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.3039E-13
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.0323E-13
Total I (Ci)			2.0041E-02

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2001E+14
Elemental I (atoms)	0.0000E+00	1.5475E+13
Organic I (atoms)	0.0000E+00	4.7860E+11
Aerosols (kg)	0.0000E+00	6.6649E-11

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5771E+12
Elemental I (atoms)	0.0000E+00	1.2349E+12
Organic I (atoms)	0.0000E+00	3.8192E+10
Aerosols (kg)	0.0000E+00	5.3186E-12

Time (h) = 2.0000	Pathway Filtered	Transported
Aerosols (kg)	0.0000E+00	5.3186E-12

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 2.0000	Pathway Filtered	Transported
Noble gases (atoms)	1.0680E+14	0.0000E+00
Elemental I (atoms)	1.2751E+13	0.0000E+00
Organic I (atoms)	3.9437E+11	0.0000E+00
Aerosols (kg)	5.4899E-11	0.0000E+00

Detailed model information at time (H) = 8.0000

EAB - RB MST Release Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.6304E-02	1.8832E+00	9.9785E-02

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.1433E-03	1.1118E-01	5.8909E-03

MSLB @ CR - RB MST Release Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0663E-04	2.1077E-01	6.9715E-03
Accumulated dose (rem)	1.0476E-03	1.1185E+00	3.8146E-02

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 8.0000	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 8.0000	Atmosphere	Sump	
Noble gases (atoms)	3.8692E-32	0.0000E+00	
Elemental I (atoms)	2.9017E-33	0.0000E+00	
Organic I (atoms)	8.9743E-35	0.0000E+00	
Aerosols (kg)	1.2461E-56	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.1772E-57
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.6493E-57
Total I (Ci)			1.0870E-47

SSES MST to Environs Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6477E+16
Elemental I (atoms)	0.0000E+00	9.8610E+15
Organic I (atoms)	0.0000E+00	3.0498E+14
Aerosols (kg)	0.0000E+00	4.2471E-08

SSES CR Compartment Nuclide Inventory:

Time (h) = 8.0000	Ci	kg	Atoms	Decay
I-131	6.5987E-06	5.3298E-14	2.4501E+11	6.7072E+11
I-132	5.7912E-06	5.6850E-16	2.5936E+09	4.5283E+12
I-133	3.5601E-05	3.1616E-14	1.4316E+11	4.4222E+12
I-134	2.2124E-07	8.2775E-18	3.7200E+07	6.2423E+12
I-135	2.9794E-05	8.6389E-15	3.8537E+10	5.9738E+12
Xe-131m	6.4289E-09	7.7338E-17	3.5553E+08	5.2842E+08
Xe-133m	1.9950E-07	4.6734E-16	2.1161E+09	1.1328E+10
Xe-133	4.3793E-06	2.3508E-14	1.0644E+11	3.0464E+11
Xe-135m	4.7109E-06	5.2764E-17	2.3537E+08	8.9094E+11
Xe-135	2.4565E-05	8.6526E-15	3.8963E+10	1.2192E+12
I-135	2.9794E-05	8.6389E-15	3.8537E+10	5.9738E+12
Xe-131m	6.4289E-09	7.7338E-17	3.5553E+08	5.2842E+08

Kr-83m	6.4037E-08	3.2225E-18	2.3381E+07	8.0869E+10
Kr-85m	5.7821E-07	6.8379E-17	4.8445E+08	1.7090E+11
Kr-87	9.3784E-08	3.3847E-18	2.3429E+07	3.9806E+11
Kr-88	9.3650E-07	7.2848E-17	4.9852E+08	5.2454E+11
Kr-85	6.8897E-09	1.7561E-14	1.2442E+11	6.8244E+08

SSES CR Transport Group Inventory:

Time (h) = 8.0000	Atmosphere	Sump	
Noble gases (atoms)	2.7766E+11	0.0000E+00	
Elemental I (atoms)	2.0823E+10	0.0000E-00	
Organic I (atoms)	6.4401E+08	0.0000E+00	
Aerosols (kg)	8.9424E-14	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		9.1504E-16
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.2821E-15
Total I (Ci)			7.8006E-05

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2001E+14
Elemental I (atoms)	0.0000E+00	1.5475E+13
Organic I (atoms)	0.0000E+00	4.7860E+11
Aerosols (kg)	0.0000E+00	6.6649E-11

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5771E+12
Elemental I (atoms)	0.0000E+00	1.2349E+12
Organic I (atoms)	0.0000E+00	3.8192E+10
Aerosols (kg)	0.0000E+00	5.3186E-12

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 8.0000	Pathway Filtered	Transported
Noble gases (atoms)	1.3639E+14	0.0000E+00
Elemental I (atoms)	1.5630E+13	0.0000E+00
Organic I (atoms)	4.8339E+11	0.0000E+00
Aerosols (kg)	6.7277E-11	0.0000E+00

Detailed model information at time (H) = 24.0000

EAB - RB MST Release Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.6304E-02	1.8832E+00	9.9785E-02

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.1433E-03	1.1118E-01	5.8909E-03

MSLB @ CR - RB MST Release Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.5301E-07	1.5022E-03	4.8300E-05
Accumulated dose (rem)	1.0479E-03	1.1200E+00	3.8194E-02

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
Delta dose (rem)	3.5301E-07	1.5022E-03	4.8300E-05	
Accumulated dose (rem)	1.0479E-03	1.1200E+00	3.8194E-02	

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	4.3066E-32	0.0000E+00	
Elemental I (atoms)	2.1833E-33	0.0000E+00	
Organic I (atoms)	6.7526E-35	0.0000E+00	
Aerosols (kg)	9.3465E-57	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		8.6694E-58
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		1.0797E-57
Total I (Ci)			4.5944E-48

SSES MST to Environs Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6477E+16
Elemental I (atoms)	0.0000E+00	9.8610E+15
Organic I (atoms)	0.0000E+00	3.0498E+14
Aerosols (kg)	0.0000E+00	4.2471E-08

SSES CR Compartment Nuclide Inventory:

Time (h) = 24.0000	Ci	kg	Atoms	Decay
I-131	1.7383E-11	1.4040E-19	6.4544E+05	6.7181E+11
I-133	5.8462E-11	5.1918E-20	2.3508E+05	4.4278E+12
I-135	1.6001E-11	4.6394E-21	2.0696E+04	5.9781E+12
Xe-133	1.7508E-11	9.3982E-20	4.2554E+05	3.0540E+11
Xe-135	4.4805E-11	1.7622E-20	7.8609E+04	1.2223E+12
Kr-85	1.9234E-14	4.9024E-20	3.4733E+05	6.8359E+08

SSES CR Transport Group Inventory:

Time (h) = 24.0000	Atmosphere	Sump	
Noble gases (atoms)	8.6222E+05	0.0000E+00	
Elemental I (atoms)	4.3712E+04	0.0000E+00	
Organic I (atoms)	1.3519E+03	0.0000E+00	
Aerosols (kg)	1.8713E-19	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		1.8801E-21
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.3416E-21
Total I (Ci)			9.1984E-11

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2001E+14
Elemental I (atoms)	0.0000E+00	1.5475E+13
Organic I (atoms)	0.0000E+00	4.7860E+11
Aerosols (kg)	0.0000E+00	6.6649E-11

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5771E+12
Elemental I (atoms)	0.0000E+00	1.2349E+12
Organic I (atoms)	0.0000E+00	3.8192E+10
Aerosols (kg)	0.0000E+00	5.3186E-12

SSES CR to Environment - CR Exhaust Transport Group Inventory:

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Noble gases (atoms)	1.3667E+14	0.0000E+00
Elemental I (atoms)	1.5650E+13	0.0000E+00
Organic I (atoms)	4.8401E+11	0.0000E+00
Aerosols (kg)	6.7364E-11	0.0000E+00

	Pathway	
Time (h) = 24.0000	Filtered	Transported
Aerosols (kg)	6.7364E-11	0.0000E+00

Detailed model information at time (H) = 96.0000

EAB - RB MST Release Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.6304E-02	1.8832E+00	9.9785E-02

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.1433E-03	1.1118E-01	5.8909E-03

MSLB @ CR - RB MST Release Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8530E-13	1.8690E-09	5.8672E-11
Accumulated dose (rem)	1.0479E-03	1.1200E+00	3.8194E-02

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	4.0459E-32	0.0000E+00	
Elemental I (atoms)	1.2601E-33	0.0000E+00	
Organic I (atoms)	3.8973E-35	0.0000E+00	
Aerosols (kg)	5.3727E-57	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			4.5024E-58
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			4.6733E-58
Total I (Ci)			9.3999E-49

SSES MST to Environs Transport Group Inventory:

Time (h) = 96.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6477E+16
Elemental I (atoms)	0.0000E+00	9.8610E+15
Organic I (atoms)	0.0000E+00	3.0498E+14
Aerosols (kg)	0.0000E+00	4.2471E-08

SSES CR Compartment Nuclide Inventory:

Time (h) = 96.0000	Ci	kg	Atoms	Decay

SSES CR Transport Group Inventory:

Time (h) = 96.0000	Atmosphere	Sump	
Noble gases (atoms)	8.1971E-20	0.0000E+00	
Elemental I (atoms)	2.5531E-21	0.0000E+00	
Organic I (atoms)	7.8960E-23	0.0000E+00	
Aerosols (kg)	1.0885E-44	0.0000E+00	
Dose Effective (Ci/cc) I-131 (Thyroid)			9.8810E-47
Dose Effective (Ci/cc) I-131 (ICRP2 Thyroid)			1.0256E-46
Total I (Ci)			1.9044E-36

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

Time (h) = 96.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2001E+14
Elemental I (atoms)	0.0000E+00	1.5475E+13
Organic I (atoms)	0.0000E+00	4.7860E+11
Aerosols (kg)	0.0000E+00	6.6649E-11

Time (h) = 96.0000	Pathway Filtered	Transported

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

Time (h) = 96.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5771E+12
Elemental I (atoms)	0.0000E+00	1.2349E+12
Organic I (atoms)	0.0000E+00	3.8192E+10
Aerosols (kg)	0.0000E+00	5.3186E-12

SSES CR to Environment - CR Exhaust Transport Group Inventory:

Time (h) = 96.0000	Pathway Filtered	Transported
Noble gases (atoms)	1.3667E+14	0.0000E+00
Elemental I (atoms)	1.5650E+13	0.0000E+00
Organic I (atoms)	4.8401E+11	0.0000E+00
Aerosols (kg)	6.7364E-11	0.0000E+00

Detailed model information at time (H) = 720.0000

EAB - RB MST Release Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.6304E-02	1.8832E+00	9.9785E-02

MSLB @ LPZ - RB MST Release Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.1433E-03	1.1118E-01	5.8909E-03

MSLB @ CR - RB MST Release Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4385E-39	6.6290E-35	2.0279E-36
Accumulated dose (rem)	1.0479E-03	1.1200E+00	3.8194E-02

SSES RB Steam Tunnel Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay

SSES RB Steam Tunnel Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump		
Noble gases (atoms)	1.8190E-32	0.0000E+00		
Elemental I (atoms)	1.2876E-34	0.0000E+00		
Organic I (atoms)	3.9823E-36	0.0000E+00		
Aerosols (kg)	5.4864E-58	0.0000E+00		
Dose Effective (Ci/cc)	I-131 (Thyroid)		4.5001E-59	
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		4.5001E-59	
Total I (Ci)			7.1500E-50	

SSES MST to Environs Transport Group Inventory:

Time (h) = 720.0000	Pathway Filtered	Transported
Noble gases (atoms)	0.0000E+00	7.6477E+16
Elemental I (atoms)	0.0000E+00	9.8610E+15
Organic I (atoms)	0.0000E+00	3.0498E+14
Aerosols (kg)	0.0000E+00	4.2471E-08

SSES CR Compartment Nuclide Inventory:

Time (h) = 720.0000	Ci	kg	Atoms	Decay
Aerosols (kg)	0.0000E+00	4.2471E-08		

SSES CR Transport Group Inventory:

Time (h) = 720.0000	Atmosphere	Sump	
Noble gases (atoms)	8.8013-237	0.0000E+00	
Elemental I (atoms)	6.2302-239	0.0000E-00	
Organic I (atoms)	1.9269-240	0.0000E+00	
Aerosols (kg)	2.6546-262	0.0000E+00	
Dose Effective (Ci/cc)	I-131 (Thyroid)		2.3586-264
Dose Effective (Ci/cc)	I-131 (ICRP2 Thyroid)		2.3586-264
Total I (Ci)			3.4596-254

Environment to SSES CR - 6391 cfm Normal Intake Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	1.2001E+14
Elemental I (atoms)	0.0000E+00	1.5475E+13
Organic I (atoms)	0.0000E+00	4.7860E+11
Aerosols (kg)	0.0000E+00	6.6649E-11

Environment to SSES CR -500+10 cfm Unfiltered Inle Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	0.0000E+00	9.5771E+12
Elemental I (atoms)	0.0000E+00	1.2349E+12
Organic I (atoms)	0.0000E+00	3.8192E+10
Aerosols (kg)	0.0000E+00	5.3186E-12

SSES CR to Environment - CR Exhaust Transport Group Inventory:

	Pathway	
Time (h) = 720.0000	Filtered	Transported
Noble gases (atoms)	1.3667E+14	0.0000E+00
Elemental I (atoms)	1.5650E+13	0.0000E+00
Organic I (atoms)	4.8401E+11	0.0000E+00
Aerosols (kg)	6.7364E-11	0.0000E+00

72185

##
I-131 Summary
##

Time (hr)	SSES RB Steam Tunnel I-131 (Curies)	Environment I-131 (Curies)	SSES CR I-131 (Curies)
0.000	2.3994E+00	6.1360E-04	1.0392E-06
0.033	9.4619E-49	2.4000E+00	3.9583E-03
0.067	9.4607E-49	2.4000E+00	3.8539E-03
0.330	9.4518E-49	2.4000E+00	3.1193E-03
0.500	9.4460E-49	2.4000E+00	2.7213E-03
0.750	9.4376E-49	2.4000E+00	2.2263E-03
1.000	9.4291E-49	2.4000E+00	1.8214E-03
1.250	9.4207E-49	2.4000E+00	1.4902E-03
1.500	9.4122E-49	2.4000E+00	1.2192E-03
1.750	9.4038E-49	2.4000E+00	9.9743E-04
2.000	9.3953E-49	2.4000E+00	8.1603E-04
2.250	9.3869E-49	2.4000E+00	6.6762E-04
2.500	9.3785E-49	2.4000E+00	5.4620E-04
2.750	9.3701E-49	2.4000E+00	4.4686E-04
3.000	9.3617E-49	2.4000E+00	3.6559E-04
3.250	9.3533E-49	2.4000E+00	2.9910E-04
3.500	9.3449E-49	2.4000E+00	2.4471E-04
3.750	9.3365E-49	2.4000E+00	2.0020E-04
4.000	9.3282E-49	2.4000E+00	1.6379E-04
4.250	9.3198E-49	2.4000E-00	1.3400E-04
3.500	9.3449E-49	2.4000E+00	2.4471E-04
3.750	9.3365E-49	2.4000E+00	2.0020E-04
4.000	9.3282E-49	2.4000E+00	1.6963E-04

4.750	9.3031E-49	2.4000E+00	8.9693E-05
5.000	9.2948E-49	2.4000E+00	7.3381E-05
5.250	9.2864E-49	2.4000E-00	6.0035E-05
5.500	9.2781E-49	2.4000E+00	4.9116E-05
5.750	9.2698E-49	2.4000E+00	4.0184E-05
6.000	9.2615E-49	2.4000E+00	3.2876E-05
6.250	9.2532E-49	2.4000E+00	2.6897E-05
6.500	9.2449E-49	2.4000E+00	2.2005E-05
6.750	9.2366E-49	2.4000E+00	1.8003E-05
7.000	9.2283E-49	2.4000E+00	1.4729E-05
7.250	9.2201E-49	2.4000E+00	1.2050E-05
7.500	9.2118E-49	2.4000E+00	9.8585E-06
7.750	9.2035E-49	2.4000E+00	8.0655E-06
8.000	9.1953E-49	2.4000E+00	6.5987E-06
8.250	9.1870E-49	2.4000E+00	5.3986E-06
8.500	9.1788E-49	2.4000E+00	4.4167E-06
8.750	9.1706E-49	2.4000E+00	3.6135E-06
9.000	9.1624E-49	2.4000E+00	2.9563E-06
9.250	9.1541E-49	2.4000E+00	2.4186E-06
9.500	9.1459E-49	2.4000E+00	1.9788E-06
9.750	9.1377E-49	2.4000E+00	1.6189E-06
10.000	9.1295E-49	2.4000E+00	1.3245E-06
10.250	9.1214E-49	2.4000E+00	1.0836E-06
24.000	8.6824E-49	2.4000E+00	1.7383E-11
96.000	6.7060E-49	2.4000E+00	1.3587E-36
720.000	7.1500E-50	2.4000E+00	3.4596-254

##
Cumulative Dose Summary
##

Time	EAB - RB MST Release Thyroid	TEDE	MSLB @ LPZ - RB MST R Thyroid	TEDE	MSLB @ CR - RB MST Re Thyroid	TEDE
(hr)	(rem)	(rem)	(rem)	(rem)	(rem)	(rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.033	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	3.0430E-02	1.0681E-03
0.067	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	6.0296E-02	2.1149E-03
0.330	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	2.6933E-01	9.4011E-03
0.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	3.8170E-01	1.3288E-02
0.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	5.2044E-01	1.8057E-02
1.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	6.3302E-01	2.1901E-02
1.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	7.2439E-01	2.5003E-02
1.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	7.9856E-01	2.7509E-02
1.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	8.5879E-01	2.9535E-02
2.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	9.0770E-01	3.1174E-02
2.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	9.4744E-01	3.2501E-02
2.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	9.7971E-01	3.3576E-02
2.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.0059E+00	3.4446E-02
3.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.0273E+00	3.5152E-02
3.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.0446E+00	3.5724E-02
3.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.0587E+00	3.6189E-02
3.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.0701E+00	3.6565E-02
4.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.0794E+00	3.6871E-02
4.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.0870E+00	3.7119E-02
4.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.0931E+00	3.7321E-02
4.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.0981E+00	3.7484E-02
5.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1022E+00	3.7617E-02
5.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1055E+00	3.7725E-02
5.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1082E+00	3.7813E-02
5.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1104E+00	3.7884E-02
6.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1122E+00	3.7942E-02
6.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1136E+00	3.7989E-02
6.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1148E+00	3.8027E-02
6.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1158E+00	3.8059E-02
7.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1166E+00	3.8084E-02
7.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1172E+00	3.8104E-02
6.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1122E+00	3.7942E-02
6.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1136E+00	3.7989E-02

7.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1177E+00	3.8121E-02
7.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1181E+00	3.8135E-02
8.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1185E+00	3.8146E-02
8.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1188E+00	3.8155E-02
8.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1190E+00	3.8162E-02
8.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1192E+00	3.8168E-02
9.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1193E+00	3.8173E-02
9.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1194E+00	3.8177E-02
9.500	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1195E+00	3.8180E-02
9.750	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1196E+00	3.8183E-02
10.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1197E+00	3.8185E-02
10.250	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1197E+00	3.8187E-02
24.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1200E+00	3.8194E-02
96.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1200E+00	3.8194E-02
720.000	1.8832E+00	9.9785E-02	1.1118E-01	5.8909E-03	1.1200E+00	3.8194E-02

##
Worst Two-Hour Doses
##

EAB - RB MST Release

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	3.6304E-02	1.8832E+00	9.9785E-02