Attachment 4

Additional Information Related to Application of Alternative Radiological Source Term – Dose Calculations

BRAIDWOOD STATION
UNITS 1 AND 2

Docket Nos. STN 50-456 and STN 50-457
License Nos. NPF-72 and NPF-77

and

BYRON STATION
UNITS 1 AND 2

Docket Nos. STN 50-454 and STN 50-455
License Nos. NPF-37 and NPF-66

BYR04-048 & BRW-04-0042-M, "Re-analysis of Steam Generator Tube Rupture (SGTR) Accident Using Alternative Source Terms," Revision 1, dated November 30, 2004

Exelon Nuclear

ATTACHMENT 1
Design Analysis Cover Sheet

CC-AA-309-1001
Revision 1

Last Page No. 28

Analysis No.	BYR04-048 & BRW-04-0042-M	**Revision**	1
EC/ECR No.	Byron: 348720 Braidwood: 348697	**Revision**	0
Title:	Re-analysis of Steam Generator Tube Rupture (SGTR) Accident Using Alternative Source Terms		

		Component(s)	
Station(s)	Byron/Braidwood		
Unit No.:	00 (Common)	N/A	
Discipline	M		
Description Code/ Keyword	R02		
Safety Class	S		
System Code	Varies		
Structure	N/A		

CONTROLLED DOCUMENT REFERENCES

Document No.	**From/To**	**Document No.**	**From/To**
UFSAR	From/To	TODI No. BYR-04-020, BRW-2004-0029	From
BYR04-047 & BRW-04-0041-M, "Re-analysis of Fuel Handling Accident (FHA) Using Alternative Source Terms"	From	TODI No. DIT-BRW-2004-0017	From
BYR04-050 & BRW-04-0044-M, "Calculation of Alternative Source Term Onsite and Offsite Atmospheric Dispersion Coefficients"	From	P&ID M-96-03 BYR & M-96-03 BRW, "Diagram of Control Room HVAC System"	From
VC-400, "Control Room Volume"	From		

Is this Design Analysis Safeguards? Yes ☐ No ☒

Does this Design Analysis Contain Unverified Assumptions? Yes ☐ No ☒ ATI/AR#

Is a Supplemental Review Required? Yes ☐ No ☒ If yes, complete Attachment 3

Preparer	Aleem E. Boatright (Print Name)	Aleem Boatright (Sign Name)	11/17/2004 (Date)
Reviewer	Paul Reichert (Print Name)	Paul Reichert (Sign Name)	11/17/2004 (Date)

Method of Review ☒ Detailed Review ☐ Alternate Calculations ☐ Testing

Review Notes:

Approver	Harold Rothstein (Print Name)	Harold Rothstein (Sign Name)	11/17/2004 (Date)

(For External Analyses Only)

Exelon Reviewer	T.J. Mscisz (Print Name)	T.J. Mscisz (Sign Name)	11/24/04 (Date)
Approver	WAYNE LEWIS (Print Name)	Wayne Lewis (Sign Name)	11/24/04 (Date)

Description of Revision (list affected pages for partials): All pages affected. Revision to incorporate Independent Third Party Review and Technical Verification Team comments.

THIS DESIGN ANALYSIS SUPERCEDES: CN-CRA-00-84, BY-VC-08

Exelon Nuclear

CC-AA-309
Revision 4

OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL DESIGN ANALYSIS

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

EXELON REVIEWER: T.J. Mxisz / [illegible] DATE: 11/2/04

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ATTACHMENTS:

A. SGTR Source Term Derivation [2 pgs.]
B. Release Pathways and Associated Release Rates [4 pgs.]
C. RADTRAD Output Files [69 pgs.]
D. RADTRAD Source Term NIF Inputs [30 pgs.]
E. RADTRAD Release Fraction RFT file Input [3 pgs.]
F. Demonstration that Smaller CR Volume Used in Analysis Bounds Actual B/B CR Volumes [45 pgs.]
G. Computer Disclosure Sheets [2 pgs.]

1. PURPOSE/OBJECTIVE

The objective of this calculation is to determine the radiological consequences of a Steam Generator Tube Rupture (SGTR) accident at the Byron and Braidwood Generating Stations, based on the use of Alternative Source Terms (AST) as defined in Regulatory Guide (RG) 1.183 (Ref. 1).

This re-analysis of the design basis tube rupture accident, using the RG 1.183 methodology, seeks to achieve an increase in existing operating margin that can be distributed to various plant systems. Specific design basis changes that are being sought include:

- An increased allowance in the amount of time required for the Control Room (CR) to be isolated (i.e., Mode 2), to 30 minutes,
- Control Room Intake charcoal adsorber filter credit reduction from 99% to 95%, and
- An increase in the maximum allowable unfiltered inleakage into the Control Room, from 100 cfm to 1000 cfm.

Each of these new design basis assumptions will have the benefit of allowing for relaxation in the current plants licensing basis; in terms of testing, surveillance, and other requirements.

This analysis is performed using governing methodologies, assumptions, and inputs for both the Byron and Braidwood plants, and is therefore conservative and applicable to all four units.

2. METHODOLOGY AND ACCEPTANCE CRITERIA

2.1. General Description

The SGTR accident is postulated as a complete severance of a single Steam Generator (SG) tube. This is conservative because the tube material is Inconel, a highly ductile metal alloy, and the most probable mode of failure would be one or more minor tube leaks of varying sizes and undetermined origin.

The tube rupture results in the release of radioactive material from the Byron and Braidwood (B/B) Containment system. For the 3 intact SGs, primary to secondary coolant leakage continues to transfer activity into the Secondary Coolant side. This makes it available for release into the environment via steaming through the SG Power-Operated Release Valves (PORV). For the SG with the ruptured tube, referred to as the ruptured SG, coolant release will take two forms:

- Break Flow - un-flashed release of RCS coolant directly into the secondary loop, and made available for steaming release to the environment through the PORV.
- Flashed Break Flow - RCS coolant that flashes directly to steam when released from the ruptured tube, and is sent through the PORV to the environment.

Based on the extensive derivation of mass releases from this accident for the recent power uprate calculation effort, and because these releases are unaffected by any of the reference 1 AST assumption, the bounding Unit 2 power uprate calculation releases for this accident are utilized directly.

SGTR accident mitigation can be described in recovery phases. The major phases that this analysis uses to model the dose consequences from this event are shown below, along with the time increments that are associated with the sequence of events:

- Start of event until Reactor trip; 0 - 445 seconds
- Reactor Trip until ruptured SG PORV is opened; 445 - 465 seconds
- Ruptured SG PORV opening until ruptured SG PORV is isolated; 465 - 1700 seconds
- Ruptured SG PORV Isolation until RCS cooldown is initiated; 1700 - 2800 seconds
- RCS cooldown initiation until Break Flow flashing ceases; 2800 - 3000 seconds
- End of Break Flow flashing until RCS depressurization initiation; 3000 - 3500 seconds
- RCS depressurization initiation until all Break Flow ceases; 3500 - 3590 seconds

The calculation of release rates from reference 6 that will be applied to each of these increments is discussed in Section 2.4 below. This sequence of events timing does not exactly match the detailed time increment data of reference 6. So the release rates from that reference, which approximately correspond to times in the sequence of events will be used.

Consistent with RG 1.183 (Ref. 1), two reactor transients that maximize the radioactivity available for release, were modeled. In addition to these two transients, the release of the maximum allowed operational concentration of iodine activity in the secondary coolant system, 0.1 μCi/gm (Ref. 2), is analyzed. This Case simulates the release of secondary coolant activity existing prior to the SGTR accident. The dose consequence of this simulation is added to each of the other modeled cases.

2.1.1. Case 1: Dose Due to Pre-accident Iodine Spike

The first case involves a 60 μCi/gm pre-accident Iodine spike. This 60 μCi/gm spike is consistent with the B/B Technical Specification operational Reactor Coolant System (RCS) activity concentration limit for a postulated spike. In this scenario, it is assumed that all of the spike activity is homogeneously mixed in the primary coolant, prior to accident initiation.

2.1.2. Case 2: Dose Due to Accident Initiated Concurrent Iodine Spike

The second case involves an accident initiated iodine spike that occurs concurrently with the release of fluid from the primary and secondary coolant systems. Regulatory guidance specifies that this spike should result in a release rate from the operating limit defective fuel fraction (~1%) that is 335 times the normal rate, and lasts for an 8-hour duration.

2.1.3. Case 3: Dose Due to Equilibrium Secondary Coolant System Iodine

As discussed, the dose contribution that results from the PORV release of secondary coolant through the SGs. This release of specifically secondary coolant activity, existing prior to the SGTR accident, is analyzed, and the dose is added to each of the other modeled cases.

The doses from either accident scenario should not exceed the acceptance shown in Section 2.8.

2.2. Fuel Damage and Core Source Term

The historical design basis at the Byron and Braidwood generating stations assumes no fuel damage for the postulated steam generator tube rupture event. For this SGTR accident, the source terms are defined by the Tech Spec (Ref. 2) activity release rates from a maximum failed fuel fraction allowed during operation, which are characterized by the equilibrium 1.0 μCi/gm Dose Equivalent (DE) I-131 iodine activity concentration in the primary reactor coolant system. The noble gas inventory in the RCS is based on operation with a conservative worst-case 1% core fuel defects. Because no fuel damage is assumed for this accident, only iodine and noble gas isotopes are modeled to contribute to dose. To identify the worst-case SGTR accident, however, two different cases of iodine spiking are analyzed, per regulatory guidance (Ref. 1).

2.2.1. Case 1: Pre-Accident Iodine Spike Source Terms

The first case is simply identified as a reactor pre-accident, transient induced, iodine spike, which raises the primary coolant iodine concentration to the maximum 60 μCi/gm DE I-131 value permitted by the B/B Tech Specs (Ref. 2) at full power operations, prior to the initiation of the accident. Therefore this case is termed the pre-accident iodine spike case, and the derivation of the isotopic specific activities input to RADTRAD are shown in Attachment A.

2.2.2. Case 2: Concurrent Iodine Spike Source Terms

The second case considers that the postulated SGTR event causes a primary reactor system transient. This transient, in turn, is associated with an iodine spike which increases the iodine release rate from the fuel rods to the primary coolant to a value 335 times greater than the release rate corresponding to the 1.0 μCi/gm DE I-131 equilibrium iodine concentration as given in the Tech Specs (Ref. 2). As specified by AST guidance, this 335 times activity release rate spike is assumed to occur for a duration of 8 hours (Ref. 1). In RADTRAD a Nuclide Inventory File (NIF) (see Attachment D) is designed to input the total isotopic iodine activity that is associated with 8 hours of activity release at the 335 times rate specified. Then this NIF is used in conjunction with a modified Release Fraction and Timing (RFT) file (see Attachment E), which defines the complete release of this activity over an 8-hour period. The actual derivation of isotopic specific activity inputs to the NIF's are shown in Attachment A.

2.2.3. Case 3: Equilibrium Secondary Coolant System Iodine Source Terms

The case 3 source term consists simply of the 0.1 μCi/gm DE I-131 equilibrium secondary coolant activity concentration, as taken from the B/B Tech Specs (Ref. 2). The total activity available for release from both the intact SGs and faulted SG are shown in Attachment A (Ref. 5).

2.3. Activity Removal Mechanisms in Containment

The design basis SGTR at B/B releases activity directly into the primary RCS, therefore no plateout, or other activity deposition, is credited.

2.3.1. Decay Credited

Decay of radioactivity is credited in all compartments, prior to release. This is implemented in RADTRAD using the half-lives in the NIF's. The RADTRAD decay option is used.

2.3.2. Depletion from Leakage Credited

For analyses of doses due to release from the RCS volume, the dose results from leakage. It is reasonable to credit the small amount of depletion from the available RCS activity inventory associated with this leakage. This is calculated inherently by the RADTRAD code.

2.4. Release Rates and Partitioning Factors

As discussed above, a number of modes of release are indicative of this particular accident scenario. Therefore the varying releases associated with the timing and sequence of events of this accident have been derived in reference 6. Attachment A to this analysis shows the unit conversion and derivation of the calculated reference 6 values into usable release rates for input to the RADTRAD code. With reference to the coolant masses used in this analysis, minimum masses are conservative because they maximize the concentration of activity available for release from the Steam Generators. As calculated and shown in reference 6, the initial SG coolant masses are smaller than the coolant mass at break flow termination, therefore these initial masses are implemented in this accident analysis. Sections 4.2 and 6.2 document the use of these values.

Activity that originates in the primary RCS is released to the secondary coolant by means of the primary-to-secondary coolant leak rate. This design basis leak rate value is 0.218 gpm, per intact SG, totaling 0.654 gpm (Ref. 5). For input into RADTRAD this rate was converted from gallons per minute to cubic feet per minute, making it 0.02914 cfm, per intact SG, totaling 0.08743 cfm, as shown in Section 4.2.

The methodology used to model steaming of activity through PORVs, following the postulated SGTR event, is based on an average cumulative release rate through the SG valves. The above discussed partitioning factors are applied to these release rates, which were derived in reference 6 and shown in Attachment A. Reference 6 data gives incremental steam mass release rates in pounds per second. For the time increments used in this accident scenario, release rates were derived by taking the averages of these rates over each specified time increment. Then these mass flow rates were converted to volumetric low rates using a basis of cooled liquid conditions (i.e., 62.4 lbm/ft^3 density), as specified by the applicable guidance of RG 1.183 (Ref. 1). Attachment A details all flow rate values that were used to simulate the SGTR accident as shown in Section 6.

The ruptured steam generator sees two simultaneous release mechanisms. Primary to secondary coolant leakage through the ruptured tube of the faulted SG that flashes conservatively goes directly to the environment, without mixing with any secondary coolant. Therefore, with this release mechanism, no partitioning of iodine is expected to occur in this release. However, leakage that does mix with the volume of coolant in the ruptured SG is released by flashing to the environment,

and the applicable partition factor is applied, as discussed below. Reference 6 shows the releases that were converted to release rates in Attachment A to model these phenomena.

For all post-accident releases through the SG PORVs, the mechanism for release to the environment is steaming of the coolant in the secondary system. Because of this release dynamic, RG 1.183 (Ref. 1) allows for a reduction in the amount of activity released to the environment based on partitioning of nuclides between the liquid and gas states of water. For Iodine, the partitioning factor of 0.01 was taken directly from the suggested guidance of reference 1, and applied as shown in Attachment A. Reviewing the specified AST release fractions of reference 1, it is concluded that the only nuclides to be released from the core source term, other than iodines, are Noble Gas nuclides, and because of the volatility of noble gases, no partitioning is credited for any such isotopes.

In addition to the steam released through the SG PORVs, the steam release through the Condenser until the time of Reactor trip and loss of offsite power must also be accounted for. The total full power steam flow is 16.04E6 lb/hr; therefore the total full power steam flow in the 3 intact SGs is 12.03E6 lb/hr. For steam flow that is released through the Condenser from the 3 intact SGs, an additional 0.01 factor is applied to model partitioning in this pathway.

2.5. Dose Conversion Factors

The revised Dose Conversion Factors (DCFs) from the U.S. Federal Guidance Report 11 & 12 (Ref. 16, 17) are used for this analysis. The RADTRAD code inputs these values directly from its internal database.

2.6. Control Room Dose Model

For this analysis, as performed using the RADTRAD code, the air volumes characterizing the Control Rooms (CR) at the Byron and Braidwood plants are found to be 230,830 ft^3 and 232,872 ft^3, respectively (Ref. 5, 10). These volumes exclude the Upper Cable Spreading Rooms, which do not have return air flow, and do not require occupancy during post-accident conditions (Ref. 5). For conservatism and simplicity, these volumes are conservatively modeled as one characteristic 200,000-ft^3 volume applied universally for AST analysis.

Using this smaller value, associated with the high flow rates discussed below, is conservative because it leads to the CR reaching its maximum activity concentration faster than if the actual, substantially larger, volume were used. This volume is also well above the 70,275 ft^3 Main Control Room shield volume. Therefore, internal cloud shine dose remains conservatively calculated.

As seen in reference 5, Byron and Braidwood plants have a recirculation flow of 43,500 cfm and make-up airflow of 6000 cfm (± 10%), totaling 49,500 cfm of total combined flow to the Control Room volume. However, as per reference 13, there could be a failure scenario where open inlet and outlet dampers on the unused CR make-up train result in an additional 1500 cfm of filtered intake into the CR during Mode 2 operation. Therefore, for conservatism, as stated in reference 13, this 1500 cfm was rounded up to 2000 cfm, and is added to the 49,500 cfm total combined flow during Mode 2. Of this 51,500 cfm, a separate volume designated as the "upper cable spreading room", or upper CSR, receives an un-recirculated intake flow of 1319 cfm at Byron, and 2430 cfm at Braidwood (Ref. 11). Because they are un-recirculated, these flows are subtracted from the 51,500 cfm total combined flow, making the Mode 2 adjusted combined flows to the Byron and Braidwood Control Rooms 50,181 cfm and 49,070 cfm, respectively. To then calculate the Mode 2 adjusted make-up flow to the CR volume, the ratios of these adjusted combined flows to the CR volume, over the total combined flow, are multiplied by the 8000 cfm make-up flow. This

respectively results in Mode 2 make-up flows of 7795 cfm (±10%) and 7623 cfm (±10%) to the Byron and Braidwood Control Rooms.

Following CR Mode 2 isolation, the credited CR filtration is 99% for the HEPA and 95% for the charcoal filters, and the intake flow rate is 8575 cfm, which is the upper 10% bound of the Byron 7795 cfm make-up flow shown above. The charcoal filtration efficiency of 95% reflects a reduction (from the Ref. 5 value of 99%) in the filter credit taken. This intake rate is used because, with the specified intake, inleakage, and recirculation flow rates, filter efficiencies, and CR volume, sensitivity analyses have shown for this analysis that it is conservative to maximize the Mode 2 airflow into the Control Room.

The CR intake is assumed to be unfiltered for the Mode 1 first 30 minutes of the accident, to simulate a newly analyzed allowance for manual CR Mode 2 isolation. During this 30-minute period, it is conservative to assume that the possible 2000 cfm of filtered intake does not flow through the Control Room. This is because this filtered flow would act to "clean" the unfiltered air being brought in by the other unfiltered flows (i.e., normal intake and unfiltered inleakage) during these 30 minutes. Sensitivity analyses using RADTRAD confirmed that such additional filtered intake during Mode 1 would lower the CR dose consequences. Therefore, before CR emergency Mode 2 isolation the adjusted combined flows to the Byron and Braidwood Control Rooms become 48,181 cfm and 47,070 cfm, respectively, and subsequently actual make-up flows become 5840 cfm (±10%) and 5705 cfm (±10%) to Byron and Braidwood, respectively. So, the unfiltered intake flow rate into the CR during this initial 30-minute period is assumed to be 6424 cfm; the upper 10% bound of the Byron 5840 cfm make-up flow shown above.

As the B/B Control Rooms are modeled, a conservatively reduced (by the - 10% lower bound) recirculation train flow rate of 39,150 cfm is used (Ref. 5, 11). This recirculation train is filtered by an 80% aerosol particulate (pre-filter) and 90% elemental and organic iodine (charcoal) filters. No reduction in the efficiency of these filters was sought.

For additional conservatism and to allow for margin in future analyses, an unfiltered inleakage rate allowance of 1000 cfm is modeled for the accident duration.

Any air that enters the CR originates from a source that is characterized by a dispersion factor, calculated using ARCON96, in reference 12. The total dose in the Control Room over the 720-hour period is the result of the released activities that enter through the air intake, either filtered or unfiltered.

2.7. *EAB and LPZ Dose Model*

Between the Byron and Braidwood plants, the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) $^{\chi}/_{Q}$'s have been determined in reference 12, and at worst-case, are respectively located 445m and 1810m from the postulated release locations.

2.8. *Acceptance Criteria*

Radiological doses resulting from a design basis SGTR for a control room operator and a person located at EAB or LPZ are to be less than the regulatory dose limits as given in Table 2.

Table 2. Regulatory Dose Limits

	Dose Type	Control Room (rem)	EAB and LPZ (rem)
Case 1	TEDE Dose	5[a]	25[b]
Case 2	TEDE Dose	5[a]	2.5[b]

Notes:

[a] 10 CFR 50.67 (Ref. 3)

[b] Regulatory Guide 1.183 (Ref. 1)

3. ASSUMPTIONS

1. Core inventory was based on a DBA power level of 3658.3 MWth, which is 102% of the Rated Thermal Power Level of 3586.6 MWth, to account for measurement uncertainty.

2. There is no fuel damage as a result of the postulated steam generator tube rupture accident at Byron and Braidwood Generating stations (Ref. 5).

3. In the case of a postulated iodine activity release rate spike, the spike release is assumed to occur for a period of 8 hours, when the activity available for release from the fuel has been conservatively depleted (Ref. 8).

4. The activity released from the fuel in the case of a pre-accident spike is assumed to be instantaneously and homogeneously mixed with the RCS (Ref. 1).

5. All iodine released from the SGs is assumed to be of the elemental species. This is done for RADTRAD simulation considerations, and is consistent with the RG 1.183 specification of 97% elemental and 3% organic, because elemental and organic iodine are identically treated by the computer model (Ref. 1).

6. The Control Room HVAC emergency Mode 2 at B/B is initiated 30 minutes after the start of this design basis accident.

7. The ruptured SG steam release of 9.42E4 lbm given in reference 6 for the time period 0 to 2 hours will be modeled from time the ruptured SG PORV opens (465 seconds), which is 20 seconds after reactor trip, until the ruptured SG PORV is isolated (1700 seconds). The 2 to 8 hour steam release is used as given in reference 6 for 2 to 8 hours (Ref 6).

8. The intact SG steam release of 5.44E5 lbm given in reference 6 for the time period 0 to 2 hours will be modeled from time of RCS cooldown initiation (2800 seconds) until the RCS cooldown is terminated and RCS depressurization is initiated (3500 seconds). The 2 to 8 hour steam release is used as given in reference 6 for 2 to 8 hours (Ref 6).

9. In addition to PORV steam releases, the full power steam release through the Condenser (16.04E6 lb/hr) until the time of reactor trip and loss of offsite power will be accounted for (Ref. 5).

4. DESIGN INPUT

4.1. χ/Q Calculations (Meteorology)

The CR χ/Q values input to RADTRAD were taken from the ARCON96 results of the B/B Design Analyses BYR04-050 & BRW-04-0044-M, as performed by Washington Group International (Ref. 12). The χ/Q's used are, conservatively, the worst-case combination of values from each Unit of each respective plant; whether it be Byron or Braidwood.

All releases from PORVs to the Environment utilize the χ/Q associated with releases from the PORV/Safety Valve house to either the normal Control Room Fresh Air Intake or the Control Room Turbine Building Emergency Air Intake. Activity released during the initial 30 minutes of the accident goes to the normal CR fresh air intake; after this period, when the CR is assumed to have been isolated, the emergency air intake located in the Turbine Building is used.

All releases from the PORV/Safety Valve house are considered elevated releases due to the high steaming rates, therefore per regulatory guidance, the associated χ/Q's have been reduced by a factor of 5, as justified below.

4.1.1. Justification for Application of Elevated Release Credit

Regulatory guidance of RG 1.194 (Ref. 4), indicates a factor of 5 reduction in the ground level X/Q value calculated with ARCON96 is justified for energetic releases from steam relief valves or atmospheric dump valves, if (1) the release point is uncapped and vertically oriented and (2) the time-dependent vertical velocity exceeds the 95th-percentile wind speed (at the release point height) by a factor of 5.

As a precedent for such a factor of 5 credit applied to a plant similar to Byron and Braidwood, the Virginia Electric and Power Company letter to the NRC of November 20, 2003 (Ref. 14) was reviewed. This letter shows PORV steam exhaust releases are uncapped, vertically oriented, and have vertical velocities about an order of magnitude above the threshold needed to qualify for the factor of 5 reduction, for the bounding choked sonic flow conditions of the saturated steam release.

Like North Anna, the Byron and Braidwood PORVs are uncapped and vertically oriented. The 95th-percentile wind speeds for Byron are 7.61 meters per second at Byron or 6.89 meters per second at Braidwood for the 30 foot tower level, and 11.26 meters per second at Byron and 10.92 meters per second at Braidwood for the 250 foot tower level. These wind speeds are comparable to those provided for North Anna in the referenced letter. The Byron and Braidwood PORV release rates for all steam release accidents are greater than those developed for North Anna in the referenced letter.

Therefore, it is concluded that the factor of 5 reduction is acceptable at Byron and Braidwood for all steam release accidents involving PORV release from the steam generators.

The CR atmospheric relative concentrations used for PORV releases are as follows:

χ/Q =1.77E-03 sec/m^3 (0-0.5 hours) (2-hr limiting CR Fresh Air Intake χ/Q)
χ/Q =8.14E-04 sec/m^3 (0.5-2 hours) (2-hr limiting CR Emergency Air Intake χ/Q)
χ/Q =6.98E-04 sec/m^3 (2-8 hours) (6-hr limiting CR Emergency Air Intake χ/Q)
χ/Q =3.12E-04 sec/m^3 (8-24 hours) (16-hr limiting CR Emergency Air Intake χ/Q)
χ/Q =1.95E-04 sec/m^3 (24-96 hours) (72-hr limiting CR Emergency Air Intake χ/Q)

χ/Q =1.67E-04 sec/m^3 (96-720 hours) (624-hr limiting CR Emergency Air Intake χ/Q)

The EAB and LPZ PAVAN calculated χ/Q values input to RADTRAD were also taken from the results of the B/B Design Analyses BYR04-050 & BRW-04-0044-M (Ref. 12). The EAB and LPZ χ/Q's used are as follows:

EAB χ/Q =5.36E-04 sec/m^3 (0-2 hours) (8-hr EAB χ/Q)

LPZ χ/Q =9.32E-05 sec/m^3 (0-2 hours) (2-hr limiting LPZ χ/Q)
χ/Q =4.50E-05 sec/m^3 (2-8 hours) (8-hr limiting LPZ χ/Q)
χ/Q =3.12E-05 sec/m^3 (8-24 hours) (16-hr limiting LPZ χ/Q)
χ/Q =1.41E-05 sec/m^3 (24-96 hours) (72-hr limiting LPZ χ/Q)
χ/Q =4.54E-06 sec/m^3 (96-720 hours) (624-hr limiting LPZ χ/Q)

4.2. Plant Data

Note: All volumes and volumetric flow rates are shown here in ft^3 and cfm, and the method of conversion described in reference 1 and Section 2.4 of this analysis was used when needed.

- DBA Power Level (Ref. 5) — 3658.3 MWth
- RCS Primary Coolant Volume (Ref. 5) — 8041 ft^3
- Secondary Coolant Volume - Initial (3 Intact SGs Total) (Ref. 6) — 3380 ft^3
- Secondary Coolant Volume at Break Flow Termination (3 Intact SGs Total) (Ref. 6) — 4213 ft^3
- Ruptured SG Coolant Volume - Initial (Ref. 6) — 1126 ft^3
- Ruptured SG Coolant Volume at Break Flow Termination (Ref. 6) — 3268 ft^3
- Containment Volume (Ref. 5) — 2,850,000 ft^3
- Primary to Secondary Coolant Leak Rate (per Intact SG) (Ref. 5) — 0.02914 cfm
- Equilibrium Iodine Release Rates (Ref. 8)
  These values were derived from the 500 times rate, shown in reference 8, and are used to determine the DE I-131 spike specific activities.
  - I-131 — 0.416 Ci/min
  - I-132 — 1.754 Ci/min
  - I-133 — 0.924 Ci/min
  - I-134 — 0.926 Ci/min
  - I-135 — 0.826 Ci/min

4.3. Control Room Data

- Volume of Control Room, ft^3 (Ref. 10,5) — 200,000
- Control Room Normal Intake Flow, scfm (Ref. 5) — 8575

- Control Room Recirculation Flow, scfm (Ref. 5) 39,150
- Maximum Allowable Unfiltered In-leakage, scfm (New Design Commitment, Ref. 5) 1000

4.4. Source Terms

The AST values used in this analysis were derived using guidance outlined in Reg. Guide 1.183. A list of 60 core isotopic nuclides and their curie per megawatt activities was extracted from Attachment A of B/B Design Analyses BYR04-047 & BRW-04-0041-M, Rev. 1 (Ref. 9) for input into the RADTRAD NIF (see Attachment D). The release fractions associated with all of these nuclide groups, as detailed in Regulatory Guide 1.183, were applied to their given groups, and input into the RADTRAD RFT files, as seen in Attachment E. RADTRAD uses these files combined with the power of 3658.3 MWth (Ref. 5) to develop the source terms for this SGTR.

5. REFERENCES

1. USNRC Regulatory Guide 1.183, "Alternative Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors", July 2000.

2. Byron/Braidwood Technical Specifications

3. 10 CFR 50.67, as published in 64 FR (Federal Register) 72001, December 3, 1999.

4. USNRC Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants", June 2003.

5. B/B Transmittal of Design Information (TODI) No. BYR-04-020, BRW-2004-0029, "Transmittal of inputs for use in dose calculations for Alternative Source Term (AST) implementation", Rev. 0.

6. Nuclear Fuel Management Transmittal of Design Information NFM ID# NFM0000121, Sequence No. 1, "Input to SGTR Control Room Dose Calculations for Uprate", 9/6/00.

7. B/B Design Analysis CN-CRA-00-24, "Byron and Braidwood Units 1 & 2 Steam Release for Radiological Dose Calculation for Uprating", Rev. 0, 3/26/00.

8. B/B Design Analysis CN-CRA-00-013, "Byron and Braidwood Uprating - Determination of Iodine Spiking Values", Rev. 0.

9. B/B Design Analyses BYR04-047 & BRW-04-0041-M, "Re-analysis of Fuel Handling Accident (FHA) Using Alternative Source Terms", Rev. 1.

10. B/B Design Analysis VC-400, "Control Room Volume", Rev. 3.

11. B/B P&ID M-96-03 BYR, Rev. T & M-96-03 BRW, Rev. U, "Diagram of Control Room HVAC System".

12. B/B Design Analyses BYR04-050 & BRW-04-0044-M, "Calculation of Alternative Source Term Onsite and Offsite Atmospheric Dispersion Coefficients", Rev. 1.

13. B/B Transmittal of Design Information (TODI) No. DIT-BRW-2004-0017, "Effects of increased filtered intake into the control room", Rev. 0, 6/10/04.

14. Letter from Leslie N. Hartz to USNRC, Serial No. 03-464A, "Virginia Electric and Power Company North Anna Power Station Units 1 and 2 - Proposed Technical Specification Changes Implementation of Alternative Source Term RAI", 11/20/03.

15. NUREG/CR-6604, "RADTRAD: A Simplified Model for RADionuclide Transport and Removal And Dose Estimation", April1998, and Supplements 1, June 1999, and 2, October 2002.

16. U.S. Federal Guidance Report No.11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion", 1988.

17. U.S. Federal Guidance Report No.12, "External Exposure to Radionuclides in Air, Water, and Soil", 1993.

6. CALCULATIONS

6.1. Source Term Calculation

For the RADTRAD calculation, a list of 60 core isotopic nuclides and their activities were extracted from Attachment A of Design Analyses BYR04-047 & BRW-04-0041-M, Rev. 1 (Ref. 9) for input into the RADTRAD NIF (see Attachment D). However, for this analysis only the iodine and noble gas activities, which are conservatively characterized by operation with 1% core fuel defects and the equilibrium and spiked release rates from that fuel, define the source terms, as discussed in Section 2.2 above. The derivation of the specific activity inputs to the RADTRAD NIF for calculational purposes for each case is shown Attachment D. RADTRAD uses these activities, in curies per megawatt, and then applies nuclide release fractions and a specified core power to calculate the source term for a given case. The AST release fraction associated with iodines and noble gases is assumed to be 100%, and for Case 2 only, iodine is released over an 8-hour period.

6.2. Dose Calculations

The RADTRAD v. 3.03 computer code is used to determine B/B Units 1 & 2 SGTR accident doses at the three dose points cited in Reg. Guide 1.183 (Ref. 1); the Exclusion Area Boundary (EAB), Low Population Zone (LPZ), and Control Room. RADTRAD is a simplified model of RADionuclide Transport and Removal And Dose Estimation developed for, and endorsed by, the NRC as an acceptable methodology for reanalysis of the radiological consequences of design basis accidents.

In this analysis RADTRAD is used to estimate the releases using the reference Alternative Source Term source terms and assumptions. The RADTRAD code uses a combination of tables and/or numerical models of source term reduction phenomena to determine the time-dependent dose at user-specified locations for a given accident scenario. The code system also provides the inventory, decay chain, and dose conversion factor tables needed for the dose calculation. The technical basis for the RADTRAD code is documented in NUREG/CR-6604 (Ref. 15).

See Section 2 and subsequent sections for descriptions of the calculational simulations detailed in the tables that follow.

6.2.1. Case 1: Pre-accident Iodine Spike Doses from Release through Intact & Ruptured SG

6.2.1.1. *RADTRAD Run Compartment Information*

SGTR Case 1: Pre-accident Iodine Spike Doses from Release through Intact & Ruptured SG RADTRAD Compartments				
Compartment Number	1	2	3	4
Name	(Iodine) Primary Loop 1 - Reactor Coolant System (RCS)	(Noble Gas) Primary Loop 2 - Reactor Coolant System (RCS)	Secondary Loop - Steam Generator Volumes (3 Intact SGs)	Secondary Loop - Steam Generator Volume (Failed SG)
Type	Other	Other	Other	Other
Volume (ft^3)	8041	8041	3380	1126
Source Term Fraction	1.000	1.000	0.000	0.000
Compartment Features	None	None	None	None

Comments	Compartment used for Iodine Transport only. Separated from noble gas in order to apply specific partitioning factors to the steaming flows.	Compartment used for Noble Gas Transport only. Separated from iodine in order to apply un-partitioned steaming flows.	Compartment used for Iodine Transport only. Separated from noble gas in order to apply specific partitioning factors to the steaming flows.	Compartment used for Iodine Transport only. Separated from noble gas in order to apply specific partitioning factors to the steaming flows.

SGTR Case 1: Pre-accident Iodine Spike Doses from Release through Intact & Ruptured SG
RADTRAD Compartments (con't)

Compartment Number	5	6		
Name	Control Room	Environment		
Type	Control Room	Environment		
Volume (ft^3)	200,000	N/A		
Source Term Fraction	0.000	0.000		
Compartment Features	Recirculating Filters: 39,150cfm Flow Rate 0-0.5 hrs - No Filtration (30-minute initiation time) 0.5-720 hrs - 80% Aerosol, 90% Elemental & Organic	N/A		
Comments	Actual Control Room proper volume is smaller, therefore this value is conservative.			

6.2.1.2. *RADTRAD Run Transfer Pathway Information*

SGTR Case 1: Pre-accident Iodine Spike Doses from Release through Intact & Ruptured SG
RADTRAD Transfer Pathways

Pathway Number	1	2	3	4
Name	(Iodine Leakage) Primary Loop 1 (RCS) to Secondary Loop - Steam Generator Volumes (3 Intact SGs)	(Un-Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Secondary Loop - Steam Generator Volume (Failed SG)	(Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Environment	(Flashed Break Flow-Noble Gas) Primary Loop 2 - (RCS) to Environment (Combined Intact and Ruptured SG Leak)
From - To	1 - 3	1 - 4	1 - 6	2 - 6
Transfer Mechanism	Filter	Filter	Filter	Filter
Transfer Mechanism Details	Filter Panel – Flow rate - 0-720.000hrs, 8.743E-02cfm, equal to 0.218 gpm leak rate times the 3 intact continuing for the accident duration. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration because there is no credited filtration removal mechanism for Primary Loop to Secondary Loop leakage.	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration because there is no credited filtration removal mechanism for Primary Loop to Secondary Loop leakage.	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration because there is no credited filtration removal mechanism for Primary Loop to Secondary Loop leakage.	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 100% for all chemical forms for the accident duration, in order to ensure that only the activity from noble gas isotopes is transferred.

Comments	See reference 5.	See Attachment B and reference 6.	No partitioning factor is applied to these release rates after reactor trip and loss of offsite power. Prior to reactor trip, partitioning is associated with the Condenser. See Attachment B and references 1 & 6.	No partitioning factor is applied to the steaming rate associated with noble gas isotopes. See Attachment B and reference 6.

SGTR Case 1: Pre-accident Iodine Spike Doses from Release through Intact & Ruptured SG
RADTRAD Transfer Pathways (con't)

Pathway Number	5	6	7	8
Name	(Steam Release-Intact SGs) Secondary Loop - Steam Generator Volumes to Environment	(Steam Release-Failed SG) Secondary Loop - Steam Generator Volume to Environment	(Filtered Intake) Environment to Control Room	(Unfiltered Inleakage) Environment to Control Room
From - To	3- 6	4 - 6	6 - 5	6 - 5
Transfer Mechanism	Filter	Filter	Filter	Filter
Transfer Mechanism Details	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration to ensure that all activity from iodine is transferred at these partitioned flow rates through the SG PORVs via this pathway.	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration to ensure that all activity from iodine is transferred at these partitioned flow rates through the SG PORVs via this pathway.	Filter Panel – Flow rate - 0-0.5hrs, 6.424E+03cfm; 0.5-720hrs, 8.575E+03cfm. Filter Efficiency - Efficiency is entered as 99% for aerosol activity, and 95% for elemental and organic forms of iodine, after CR Mode 2 is initiated in 30 min, and then for the duration of the accident. This corresponds to the presence of the HEPA filter, and relaxed charcoal testing requirements analyzed as acceptable by this calculation, respectively.	Filter Panel – Flow rate - 0-0.5hrs, 1.000E+03cfm; 0.5-720hrs, 1.000E+03cfm. Filter Efficiency - Efficiency is entered as 0.0% for all chemical forms of iodine, for the accident duration, because this is an unfiltered path.
Comments	Partitioning factor applied to steaming rate through SG PORVs for iodine isotopes is based on regulatory guidance. See Section 2.4 (Ref. 1, 6).	Partitioning factor applied to steaming rate through SG PORVs for iodine isotopes is based on regulatory guidance. See Section 2.4 (Ref. 1, 6).	See Section 2.6.	See Section 2.6.

SGTR Case 1: Pre-accident Iodine Spike Doses from Release through Intact & Ruptured SG
RADTRAD Transfer Pathways (con't)

Pathway Number	9			
Name	(Control Room Exhaust) Control Room to Environment			
From - To	5 - 6			
Transfer Mechanism	Filter			

Transfer Mechanism Details	Filter Panel – Flow rate - 0-0.5hrs, 7.424E+03cfm; 0.5-720hrs, 9.575E+03cfm. Filter Efficiency - Efficiency is entered as 100.0% for all chemical forms of iodine, for all time periods. This is the exhaust from the control room to the environment; the filtration prevents a double counting of the iodine release. Although RADTRAD 3.03 documentation indicates that this effect has been eliminated, this was still done for completeness.			
Comments	See Section 2.6.			

6.2.1.3. *RADTRAD Run Dose Location Information*

SGTR Case 1: Pre-accident Iodine Spike Doses from Release through Intact & Ruptured SG RADTRAD Dose Locations			
Dose Location Number	1	2	3
Name	Control Room	Exclusion Area Boundary (EAB)	Low Population Zone (LPZ)
In Compartment	Control Room (5)	Environment (6)	Environment (6)
Breathing Rate (m^3/sec)	0 - 720 hrs: 3.5E-04	0 - 8 hrs: 3.5E-04 8 - 24 hrs: 1.8E-04 24 - 720 hrs: 2.3E-04	0 - 8 hrs: 3.5E-04 8 - 24 hrs: 1.8E-04 24 - 720 hrs: 2.3E-04
Occupancy Fractions	0 - 8 hrs: 1.0 8 - 24 hrs: 0.6 24 - 720 hrs: 0.4	Worst 2-hour Period: 1.0	0 - 720 hrs: 1.0
Dispersion Factors	See Section 4.1.	See Section 4.1.	See Section 4.1.

6.2.1.4. *RADTRAD Run Source Term & Dose Conversion Factor Information*

SGTR Case 1: Pre-accident Iodine Spike Doses from Release through Intact & Ruptured SG RADTRAD Source Term & Dose Conversion Factors		
Core Power	3658.3 MWth	See Section 2.2 and reference 5.
Nuclide Inventory	ORIGEN calculated specific B/B core inventory for 60 MACCS isotopes. Inventory is calculated at DBA power shown above, and input into the NIF file.	See Attachment D, Section 4.4, and references 8 and 9.
Release Fractions & Timing	User defined Release Fractions calculated 100% instantaneous for B/B SGTR, to ensure that release timing is not delayed, consistent with RG 1.183 guidance. Fractions and timing are shown in RFT file.	See Section 2.2, Attachment E, and references 1 and 5.
Dose Conversion Factors	RADTRAD Library of FGR 11 & 12 values for 60 MACCS isotopes.	References 16 and 17.

Decay & No Daughter Products	Enabled - Therefore only Decay is considered. Consideration of daughter products is not a recommended, or historical, design basis for this accident. Also, no parent isotopes of iodine are assumed to be released from the fuel.		
Iodine Chemical Fractions	Aerosol: Elemental: Organic:	0.0000 1.0000 0.0000	User defined iodine chemical fractions, consistent with RG 1.183 guidance, as manipulated in calculation.

6.2.2. Case 2: Concurrent Iodine Spike Doses from Release through Intact & Ruptured SG

6.2.2.1. RADTRAD Run Compartment Information

SGTR Case 2: Concurrent Iodine Spike Doses from Release through Intact & Ruptured SG RADTRAD Compartments				
Compartment Number	1	2	3	4
Name	(Iodine) Primary Loop 1 - Reactor Coolant System (RCS)	(Noble Gas) Primary Loop 2 - Reactor Coolant System (RCS)	Secondary Loop - Steam Generator Volumes (3 Intact SGs)	Secondary Loop - Steam Generator Volume (Failed SG)
Type	Other	Other	Other	Other
Volume (ft^3)	8041	8041	3380	1126
Source Term Fraction	1.000	1.000	0.000	0.000
Compartment Features	None	None	None	None
Comments	Compartment used for Iodine Transport only. Separated from noble gas in order to apply specific partitioning factors to the steaming flows.	Compartment used for Noble Gas Transport only. Separated from iodine in order to apply un-partitioned steaming flows.	Compartment used for Iodine Transport only. Separated from noble gas in order to apply specific partitioning factors to the steaming flows.	Compartment used for Iodine Transport only. Separated from noble gas in order to apply specific partitioning factors to the steaming flows.

SGTR Case 2: Concurrent Iodine Spike Doses from Release through Intact & Ruptured SG RADTRAD Compartments (con't)				
Compartment Number	5	6		
Name	Control Room	Environment		
Type	Control Room	Environment		
Volume (ft^3)	200,000	N/A		
Source Term Fraction	0.000	0.000		

Compartment Features	Recirculating Filters: 39,150cfm Flow Rate 0-0.5 hrs - No Filtration (30-minute initiation time) 0.5-720 hrs - 80% Aerosol, 90% Elemental & Organic	N/A		
Comments	Actual Control Room proper volume is smaller, therefore this value is conservative.			

6.2.2.2. RADTRAD Run Transfer Pathway Information

SGTR Case 2: Concurrent Iodine Spike Doses from Release through Intact & Ruptured SG RADTRAD Transfer Pathways				
Pathway Number	1	2	3	4
Name	(Iodine Leakage) Primary Loop 1 (RCS) to Secondary Loop - Steam Generator Volumes (3 Intact SGs)	(Un-Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Secondary Loop - Steam Generator Volume (Failed SG)	(Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Environment	(Flashed Break Flow-Noble Gas) Primary Loop 2 - (RCS) to Environment (Combined Intact and Ruptured SG Leak)
From - To	1 - 3	1 - 4	1 - 6	2 - 6
Transfer Mechanism	Filter	Filter	Filter	Filter
Transfer Mechanism Details	Filter Panel – Flow rate - 0-720.000hrs, 8.743E-02cfm, equal to 0.218 gpm leak rate times the 3 intact continuing for the accident duration. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration because there is no credited filtration removal mechanism for Primary Loop to Secondary Loop leakage.	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration because there is no credited filtration removal mechanism for Primary Loop to Secondary Loop leakage.	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration because there is no credited filtration removal mechanism for Primary Loop to Secondary Loop leakage.	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 100% for all chemical forms for the accident duration, in order to ensure that only the activity from noble gas isotopes is transferred.
Comments	See reference 5.	See Attachment B and reference 6.	No partitioning factor is applied to these release rates after reactor trip and loss of offsite power. Prior to reactor trip, partitioning is associated with the Condenser. See Attachment B and references 1 & 6.	No partitioning factor is applied to the steaming rate associated with noble gas isotopes. See Attachment B and reference 6.

SGTR Case 2: Concurrent Iodine Spike Doses from Release through Intact & Ruptured SG
RADTRAD Transfer Pathways (con't)

Pathway Number	5	6	7	8
Name	(Steam Release-Intact SGs) Secondary Loop - Steam Generator Volumes to Environment	(Steam Release-Failed SG) Secondary Loop - Steam Generator Volume to Environment	(Filtered Intake) Environment to Control Room	(Unfiltered Inleakage) Environment to Control Room
From - To	3- 6	4 - 6	6 - 5	6 - 5
Transfer Mechanism	Filter	Filter	Filter	Filter
Transfer Mechanism Details	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration to ensure that all activity from iodine is transferred at these partitioned flow rates through the SG PORVs via this pathway.	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration to ensure that all activity from iodine is transferred at these partitioned flow rates through the SG PORVs via this pathway.	Filter Panel – Flow rate - 0-0.5hrs, 6.424E+03cfm; 0.5-720hrs, 8.575E+03cfm. Filter Efficiency - Efficiency is entered as 99% for aerosol activity, and 95% for elemental and organic forms of iodine, after CR Mode 2 is initiated in 30 min, and then for the duration of the accident. This corresponds to the presence of the HEPA filter, and relaxed charcoal testing requirements analyzed as acceptable by this calculation, respectively.	Filter Panel – Flow rate - 0-0.5hrs, 1.000E+03cfm; 0.5-720hrs, 1.000E+03cfm. Filter Efficiency - Efficiency is entered as 0.0% for all chemical forms of iodine, for the accident duration, because this is an unfiltered path.
Comments	Partitioning factor applied to steaming rate through SG PORVs for iodine isotopes is based on regulatory guidance. See Section 2.4 (Ref. 1, 6).	Partitioning factor applied to steaming rate through SG PORVs for iodine isotopes is based on regulatory guidance. See Section 2.4 (Ref. 1, 6).	See Section 2.6.	See Section 2.6.

SGTR Case 2: Concurrent Iodine Spike Doses from Release through Intact & Ruptured SG
RADTRAD Transfer Pathways (con't)

Pathway Number	9			
Name	(Control Room Exhaust) Control Room to Environment			
From - To	5 - 6			
Transfer Mechanism	Filter			
Transfer Mechanism Details	Filter Panel – Flow rate - 0-0.5hrs, 7.424E+03cfm; 0.5-720hrs, 9.575E+03cfm. Filter Efficiency - Efficiency is entered as 100.0% for all chemical forms of iodine, for all time periods. This is the exhaust from the control room to the environment; the filtration prevents a double counting of the iodine release. Although RADTRAD 3.03 documentation indicates that this effect has been eliminated, this was still done for completeness.			
Comments	See Section 2.6.			

6.2.2.3. RADTRAD Run Dose Location Information

SGTR Case 2: Concurrent Iodine Spike Doses from Release through Intact & Ruptured SG RADTRAD Dose Locations			
Dose Location Number	1	2	3
Name	Control Room	Exclusion Area Boundary (EAB)	Low Population Zone (LPZ)
In Compartment	Control Room (5)	Environment (6)	Environment (6)
Breathing Rate (m^3/sec)	0 - 720 hrs: 3.5E-04	0 - 8 hrs: 3.5E-04 8 - 24 hrs: 1.8E-04 24 - 720 hrs: 2.3E-04	0 - 8 hrs: 3.5E-04 8 - 24 hrs: 1.8E-04 24 - 720 hrs: 2.3E-04
Occupancy Fractions	0 - 8 hrs: 1.0 8 - 24 hrs: 0.6 24 - 720 hrs: 0.4	Worst 2-hour Period: 1.0	0 - 720 hrs: 1.0
Dispersion Factors	See Section 4.1.	See Section 4.1.	See Section 4.1.

6.2.2.4. RADTRAD Run Source Term & Dose Conversion Factor Information

SGTR Case 2: Concurrent Iodine Spike Doses from Release through Intact & Ruptured SG RADTRAD Source Term & Dose Conversion Factors		
Core Power	3658.3 MWth	See Section 2.2 and reference 5.
Nuclide Inventory	ORIGEN calculated specific B/B core inventory for 60 MACCS isotopes. Inventory is calculated at DBA power shown above, and input into the NIF file.	See Attachment D, Section 4.4, and references 8 and 9.
Release Fractions & Timing	User defined Release Fractions calculated as 100% iodine release over an 8-hour period beginning at accident initiation and 100% instantaneous noble gas release for B/B SGTR. This is consistent with RG 1.183 guidance and historical design bases. Fractions and timing are shown in RFT file.	See Section 2.2, Attachment E, and references 1, 5, and 8.
Dose Conversion Factors	RADTRAD Library of FGR 11 & 12 values for 60 MACCS isotopes.	References 16 and 17.
Decay & No Daughter Products	Enabled - Therefore only Decay is considered. Consideration of daughter products is not a recommended, or historical, design basis for this accident. Also, no parent isotopes of iodine are assumed to be released from the fuel.	
Iodine Chemical Fractions	Aerosol: 0.0000 Elemental: 1.0000 Organic: 0.0000	User defined iodine chemical fractions, consistent with RG 1.183 guidance, as manipulated in calculation.

6.2.3. Case 3: Initial Secondary Coolant Activity Release Doses

6.2.3.1. RADTRAD Run Compartment Information

SGTR Case 3: Initial Secondary Coolant Activity Release Doses RADTRAD Compartments				
Compartment Number	1	2	3	4
Name	Secondary Loop - Steam Generator Volumes (3 Intact SGs)	Secondary Loop - Steam Generator Volume (Failed SG)	Control Room	Environment
Type	Other	Other	Control Room	Environment
Volume (ft^3)	3380	1126	200,000	N/A
Source Term Fraction	1.000	0.3332	0.000	0.000
Compartment Features	None	None	Recirculating Filters: 39,150cfm Flow Rate 0-0.5 hrs - No Filtration (30-minute initiation time) 0.5-720 hrs - 80% Aerosol, 90% Elemental & Organic	N/A
Comments	The source term input to the NIF of this run is based on the fluid contents of this 3 SG compartment volume, therefore a 100% fraction is modeled here.	The source term input to the NIF of this run is based on the fluid contents of the 3 SG volume. Therefore the fraction of the source term here is the ratio of this 1 Failed SG compartment volume to that of the previous.	Actual Control Room proper volume is smaller, therefore this value is conservative.	

6.2.3.2. RADTRAD Run Transfer Pathway Information

SGTR Case 3: Initial Secondary Coolant Activity Release Doses RADTRAD Transfer Pathways				
Pathway Number	1	2	3	4
Name	(Steam Release-Intact SGs) Secondary Loop - Steam Generator Volumes to Environment	(Steam Release-Failed SG) Secondary Loop - Steam Generator Volume to Environment	(Filtered Intake) Environment to Control Room	(Unfiltered Inleakage) Environment to Control Room
From - To	1 - 4	2 - 4	4 - 3	4 - 3
Transfer Mechanism	Filter	Filter	Filter	Filter

Transfer Mechanism Details	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration to ensure that all activity from iodine is transferred at these partitioned flow rates through the SG PORVs via this pathway.	Filter Panel – Flow rate See Attachment B for all flowrates and timing. Filter Efficiency - Efficiency is entered as 0.0% for elemental forms of iodine, for the accident duration to ensure that all activity from iodine is transferred at these partitioned flow rates through the SG PORVs via this pathway.	Filter Panel – Flow rate - 0-0.5hrs, 6.424E+03cfm; 0.5-720hrs, 8.575E+03cfm. Filter Efficiency - Efficiency is entered as 99% for aerosol activity, and 95% for elemental and organic forms of iodine, after CR Mode 2 is initiated in 30 min, and then for the duration of the accident. This corresponds to the presence of the HEPA filter, and relaxed charcoal testing requirements analyzed as acceptable by this calculation, respectively.	Filter Panel – Flow rate - 0-0.5hrs, 1.000E+03cfm; 0.5-720hrs, 1.000E+03cfm. Filter Efficiency - Efficiency is entered as 0.0% for all chemical forms of iodine, for the accident duration, because this is an unfiltered path.
Comments	Prior to reactor trip, partitioning is associated with the Condenser. Partitioning factor applied to steaming rate through SG PORVs for iodine isotopes is based on regulatory guidance. See Section 2.4 (Ref. 1, 6).	Prior to reactor trip, partitioning is associated with the Condenser. Partitioning factor applied to steaming rate through SG PORVs for iodine isotopes is based on regulatory guidance. See Section 2.4 (Ref. 1, 6).	See Section 2.6.	See Section 2.6.

SGTR Case 3: Initial Secondary Coolant Activity Release Doses
RADTRAD Transfer Pathways (con't)

Pathway Number	5			
Name	(Control Room Exhaust) Control Room to Environment			
From - To	3 - 4			
Transfer Mechanism	Filter			
Transfer Mechanism Details	Filter Panel – Flow rate - 0-0.5hrs, 7.424E+03cfm; 0.5-720hrs, 9.575E+03cfm. Filter Efficiency - Efficiency is entered as 100.0% for all chemical forms of iodine, for all time periods. This is the exhaust from the control room to the environment; the filtration prevents a double counting of the iodine release. Although RADTRAD 3.03 documentation indicates that this effect has been eliminated, this was still done for completeness.			
Comments	See Section 2.6.			

6.2.3.3. RADTRAD Run Dose Location Information

SGTR Case 3: Initial Secondary Coolant Activity Release Doses
RADTRAD Dose Locations

Dose Location Number	1	2	3
Name	Control Room	Exclusion Area Boundary (EAB)	Low Population Zone (LPZ)
In Compartment	Control Room (3)	Environment (4)	Environment (4)

Breathing Rate (m^3/sec)	0 - 720 hrs: 3.5E-04	0 - 8 hrs: 3.5E-04 8 - 24 hrs: 1.8E-04 24 - 720 hrs: 2.3E-04	0 - 8 hrs: 3.5E-04 8 - 24 hrs: 1.8E-04 24 - 720 hrs: 2.3E-04
Occupancy Fractions	0 - 8 hrs: 1.0 8 - 24 hrs: 0.6 24 - 720 hrs: 0.4	Worst 2-hour Period: 1.0	0 - 720 hrs: 1.0
Dispersion Factors	See Section 4.1.	See Section 4.1.	See Section 4.1.

6.2.3.4. RADTRAD Run Source Term & Dose Conversion Factor Information

SGTR Case 3: Initial Secondary Coolant Activity Release Doses RADTRAD Source Term & Dose Conversion Factors		
Core Power	3658.3 MWth	See Section 2.2 and reference 5.
Nuclide Inventory	ORIGEN calculated specific B/B core inventory for 60 MACCS isotopes. Inventory is calculated at DBA power shown above, and input into the NIF.	See Attachment D, Section 4.4, and references 8 and 9.
Release Fractions & Timing	User defined Release Fractions calculated as 100% instantaneous iodine release for B/B SGTR. This is consistent with RG 1.183 guidance and historical design bases. Fractions and timing are shown in RFT file.	See Section 2.2, Attachment E, and references 1, 5, and 8.
Dose Conversion Factors	RADTRAD Library of FGR 11 & 12 values for 60 MACCS isotopes.	References 16 and 17.
Decay & No Daughter Products	Enabled - Therefore only Decay is considered. Consideration of daughter products is not a recommended, or historical, design basis for this accident. Also, no parent isotopes of iodine are assumed to be released from the fuel.	
Iodine Chemical Fractions	Aerosol: 0.0000 Elemental: 1.0000 Organic: 0.0000	User defined iodine chemical fractions, consistent with RG 1.183 guidance, as manipulated in calculation.

WGII has pre-qualified RADTRAD for application to perform such calculations, as documented in the Computer Disclosure Sheet of Attachment G. The new design basis RADTRAD simulations utilized the design input parameters as provided in Section 4.

7. SUMMARY AND CONCLUSIONS

Table 7.1 below provides the results from the Case 1 and Case 2 simulations that were modeled using the RADTRAD 3.03 code. The total dose for the two cases includes the dose result from the Case 3 simulation, therefore for convenience, the doses shown in the Table include the Case 3 dose.

Table 7.1. RADTRAD Analysis Results

Case 1: Pre-Accident 60 μCi/gm DE I-131 Spike RADTRAD Dose Assessment Results		
Control Room (rem TEDE)	**EAB (rem TEDE)**	**LPZ (rem TEDE)**
0.760	0.721	0.165
Case 2: Accident Initiated 335 times Equilibrium Iodine Release Rate Spike RADTRAD Dose Assessment Results		
Control Room (rem TEDE)	**EAB (rem TEDE)**	**LPZ (rem TEDE)**
0.196	0.327	0.077

For the cases analyzed in this calculation, it is shown that a Case 1 SGTR that involves a pre-accident 60 μCi/gm iodine spike, which instantaneously releases activity into the RCS prior to initiating SGTR releases, would be the bounding SGTR accident scenario. Using the design basis assumptions, described methodology, and credited margin relaxation of this analysis, the limiting CR dose is **0.76 rem TEDE**. This limiting dose, and all other doses, are well below their respective acceptance criteria, so it is verified that this design basis Steam Generator Tube Rupture accident is sufficiently mitigated at both Byron and Braidwood Generating Stations.

	A	B	C	D	E	F	G	H	I	J	K	L
1		Thermal Power (MWth)	3658.3									
2		RCS Liquid Mass Used (gm)	2.063E+08									
3		Analysis RCS Liquid Mass (gm)	2.277E+08									
4		3 Intact SGs Liquid Mass (gm)	9.571E+07	3.3317536E-01	Ratio							
5		1 Failed SGs Liquid Mass (gm)	3.189E+07									
6												
7	**Initial Coolent Iodine Activity (Equilibrium 1.0 µCi/gm D.E. I-131 in RCS & 0.1 µCi/gm D.E. I-131in Secondary Coolant)**											
8												
9		Equilibrium		Secondary Loop	Secondary	Secondary		Secondary	Secondary	Initial Activity	Initial Activity	Initial Activity
10		Conc. in RCS	RCS	Iodine Conc.	Loop (Intact SG)	Loop (Ruptured SG)	RCS	Loop (Intact SG)	Loop (Ruptured SG)	Fraction in	Fraction in	Fraction in
11		(µCi/gm)	(Ci)	(µCi/gm)	(Ci)	(Ci)	(Ci/MW)	(Ci/MW)	(Ci/MW)	RCS	Intact SG	Ruptured SG
12	I-131	0.742	168.96	0.0742	7.10	2.37	4.6184E-02	1.9412E-03	6.4676E-04	94.69%	3.98%	1.33%
13	I-132	0.979	222.9	0.0979	9.37	3.12	6.0936E-02	2.5612E-03	8.5334E-04	94.69%	3.98%	1.33%
14	I-133	1.35	307.4	0.135	12.92	4.30	8.4028E-02	3.5319E-03	1.1767E-03	94.69%	3.98%	1.33%
15	I-134	0.243	55.3	0.0243	2.33	0.77	1.5125E-02	6.3573E-04	2.1181E-04	94.69%	3.98%	1.33%
16	I-135	0.842	191.7	0.0842	8.06	2.68	5.2409E-02	2.2028E-03	7.3393E-04	94.69%	3.98%	1.33%
17												
18							Average	94.69%	3.980%	1.326%		
19												
20	**Pre-Accident Iodine Spike (Equilibrium 60 µCi/gm D.E. I-131) Above Initial Coolant Activity times 60**											
21												
22		RCS	RCS									
23		(Ci)	(Ci/MW)									
24	I-131	10137	2.7711E+00				1.00E+00	0.74200	0.07420			
25	I-132	13375	3.6562E+00				1.68E+02	0.00583	0.00058			
26	I-133	18444	5.0417E+00				6.01E+00	0.22469	0.02247			
27	I-134	3320	9.0750E-01				1.01E+03	0.00024	0.00002			
28	I-135	11504	3.1445E+00				3.45E+01	0.02439	0.00244			
29								1.00	0.10			
30												
31	**Concurrent Accident Initiated Iodine Spike (500 times Equlibrium Iodine Release Rate)**											
32												
33												
34		RCS		RCS	RCS							
35		Equilibrium	RCS	Total Activity	Specific Activity							
36		Release Rate	500x Rate	335x Rate	335x Rate 8 hrs							
37		(Ci/min)	(Ci/min)	8 hrs (Ci)	(Ci/MW)							
38	I-131	0.4160	208	66892.8	1.8285E+01							
39	I-132	1.7540	877	282043.2	7.7097E+01							
40	I-133	0.9240	462	148579.2	4.0614E+01							
41	I-134	0.9260	463	148900.8	4.0702E+01							
42	I-135	0.8260	413	132820.8	3.6307E+01							
43												
44												
45												
46												
47												
48			Adjusted RCS									
49		RCS Activity	Activity	Activity								
50		(Ci)	(Ci)	(Ci/MW)								
51	KR-85m	3.713E+02	4.098E+02	1.1203E-01								
52	KR-85	1.467E+03	1.619E+03	4.4261E-01								
53	KR-87	2.372E+02	2.618E+02	7.1566E-02								
54	KR-88	6.911E+02	7.628E+02	2.0851E-01								
55	XE-131m	6.829E+02	7.538E+02	2.0604E-01								
56	XE-133m	7.530E+02	8.311E+02	2.2719E-01								
57	XE-133	5.178E+04	5.715E+04	1.5623E+01								
58	XE-135m	1.007E+02	1.111E+02	3.0382E-02								
59	XE-135	1.593E+03	1.758E+03	4.8063E-01								
60	XE-138	1.368E+02	1.510E+02	4.1274E-02								

	A	B	C	D	E	F	G	H	I	J	K	L
1		Thermal Power (MWth)	3658.3									
2		RCS Liquid Mass Used (gm)	206300000									
3		Analysis RCS Liquid Mass (gm)	227703370									
4		3 Intact SGs Liquid Mass (gm)	95707990		Ratio							
5		1 Failed SGs Liquid Mass (gm)	31887544	=C5/C4								
6												
7		**Initial Coolent Iodine Activity (Equilibrium 1.0 µCi/gm D.E. I-131 in RCS & 0.1 µCi/gm D.E. I-131in Secondary Coolant)**										
8												
9		Equilibrium		Secondary Loop	Secondary	Secondary		Secondary	Secondary	Initial Activity	Initial Activity	Initial Activity
10		Conc. in RCS	RCS	Iodine Conc.	Loop (Intact SG)	Loop (Ruptured SG)	RCS	Loop (Intact SG)	Loop (Ruptured SG)	Fraction in	Fraction in	Fraction in
11		(µCi/gm)	(Ci)	(µCi/gm)	(Ci)	(Ci)	(Ci/MW)	(Ci/MW)	(Ci/MW)	RCS	Intact SG	Ruptured SG
12	I-131	0.742	=($C$3*B12)/1000000	0.0742	=(D12*$C$4)/1000000	=(D12*$C$5)/1000000	=C12/$C$1	=E12/$C$1	=F12/$C$1	=G12/($G12+$H12+$I12)	=H12/($G12+$H12+$I12)	=I12/($G12+$H12+$I12)
13	I-132	0.979	=($C$3*B13)/1000000	0.0979	=(D13*$C$4)/1000000	=(D13*$C$5)/1000000	=C13/$C$1	=E13/$C$1	=F13/$C$1	=G13/($G13+$H13+$I13)	=H13/($G13+$H13+$I13)	=I13/($G13+$H13+$I13)
14	I-133	1.35	=($C$3*B14)/1000000	0.135	=(D14*$C$4)/1000000	=(D14*$C$5)/1000000	=C14/$C$1	=E14/$C$1	=F14/$C$1	=G14/($G14+$H14+$I14)	=H14/($G14+$H14+$I14)	=I14/($G14+$H14+$I14)
15	I-134	0.243	=($C$3*B15)/1000000	0.0243	=(D15*$C$4)/1000000	=(D15*$C$5)/1000000	=C15/$C$1	=E15/$C$1	=F15/$C$1	=G15/($G15+$H15+$I15)	=H15/($G15+$H15+$I15)	=I15/($G15+$H15+$I15)
16	I-135	0.842	=($C$3*B16)/1000000	0.0842	=(D16*$C$4)/1000000	=(D16*$C$5)/1000000	=C16/$C$1	=E16/$C$1	=F16/$C$1	=G16/($G16+$H16+$I16)	=H16/($G16+$H16+$I16)	=I16/($G16+$H16+$I16)
17												
18							Average	=AVERAGE(J12:J16)	=AVERAGE(K12:K16)	=AVERAGE(L12:L16)		
19												
20		**Pre-Accident Iodine Spike (Equilibrium 60 µCi/gm D.E. I-131) Above Initial Coolant Activity times 60**										
21												
22		RCS	RCS									
23		(Ci)	(Ci/MW)									
24	I-131	=C12*60	=B24/$C$1				1	=B12/G24	=D12/G24			
25	I-132	=C13*60	=B25/$C$1				167.816091954023	=B13/G25	=D13/G25			
26	I-133	=C14*60	=B26/$C$1				6.0082304526749	=B14/G26	=D14/G26			
27	I-134	=C15*60	=B27/$C$1				1013.88888888889	=B15/G27	=D15/G27			
28	I-135	=C16*60	=B28/$C$1				34.5153664302601	=B16/G28	=D16/G28			
29								=SUM(H24:H28)	=SUM(I24:I28)			
30												
31		**Concurrent Accident Initiated Iodine Spike (500 times Equilibrium Iodine Release Rate)**										
32												
33												
34		RCS		RCS	RCS							
35		Equilibrium	RCS	Total Activity	Specific Activity							
36		Release Rate	500x Rate	335x Rate	335x Rate 8 hrs							
37		(Ci/min)	(Ci/min)	8 hrs (Ci)	(Ci/MW)							
38	I-131	=C38/500	208	=B38*335*(8*60)	=D38/$C$1							
39	I-132	=C39/500	877	=B39*335*(8*60)	=D39/$C$1							
40	I-133	=C40/500	462	=B40*335*(8*60)	=D40/$C$1							
41	I-134	=C41/500	463	=B41*335*(8*60)	=D41/$C$1							
42	I-135	=C42/500	413	=B42*335*(8*60)	=D42/$C$1							
43												
44												
45												
46												
47												
48			Adjusted RCS									
49		RCS Activity	Activity	Activity								
50		(Ci)	(Ci)	(Ci/MW)								
51	KR-85m	371.3	=B51*($C$3/$C$2)	=C51/$C$1								
52	KR-85	1467	=B52*($C$3/$C$2)	=C52/$C$1								
53	KR-87	237.2	=B53*($C$3/$C$2)	=C53/$C$1								
54	KR-88	691.1	=B54*($C$3/$C$2)	=C54/$C$1								
55	XE-131m	682.9	=B55*($C$3/$C$2)	=C55/$C$1								
56	XE-133m	753	=B56*($C$3/$C$2)	=C56/$C$1								
57	XE-133	51780	=B57*($C$3/$C$2)	=C57/$C$1								
58	XE-135m	100.7	=B58*($C$3/$C$2)	=C58/$C$1								
59	XE-135	1593	=B59*($C$3/$C$2)	=C59/$C$1								
60	XE-138	136.8	=B60*($C$3/$C$2)	=C60/$C$1								

	A	B	C	D	E	F	G
1							
2		**Release Pathways and Associated Release Rates**					
3							
4	3.5315E-05	cm^3 per ft^3					
5							
6		**RCS 1 to Ruptured SG Volume (Un-Flashed Break Flow)**					
7							
8		Time	Time	Flow Rate	Flow Rate		
9		(sec)	(hrs)	(cm^3/min)	(ft^3/min)		
10		0	0.000	1.462E+06	**5.1630E+01**		
11		445	0.124	1.215E+06	**4.2907E+01**		
12		465	0.129	1.454E+06	**5.1348E+01**		
13		1700	0.472	1.534E+06	**5.4173E+01**		
14		2800	0.778	1.426E+06	**5.0359E+01**		
15		3000	0.833	1.140E+06	**4.0259E+01**		
16		3500	0.972	6.505E+05	**2.2972E+01**		
17		3590	0.997	0.000E+00	**0.0000E+00**		
18		7200	2.000	0.000E+00	**0.0000E+00**		
19		28800	8.000	0.000E+00	**0.0000E+00**		
20							
21							
22		**(Noble Gas) RCS 2 to Environment (Flashed Break Flow)**					
23							Noble Gas
24		Time	Time	Flow Rate	Flow Rate	Filtration to Remove	Transfer Rate
25		(sec)	(hrs)	(cm^3/min)	(ft^3/min)	(Iodine)	(ft^3/min)
26		0	0.000	1.575E+06	5.5621E+01	100%	**5.5621E+01**
27		445	0.124	1.243E+06	4.3896E+01	100%	**4.3896E+01**
28		465	0.129	1.504E+06	5.3113E+01	100%	**5.3113E+01**
29		1700	0.472	1.551E+06	5.4773E+01	100%	**5.4773E+01**
30		2800	0.778	1.434E+06	5.0641E+01	100%	**5.0641E+01**
31		3000	0.833	1.142E+06	4.0329E+01	100%	**4.0329E+01**
32		3500	0.972	6.530E+05	2.3060E+01	100%	**2.3060E+01**
33		3590	0.997	2.475E+03	8.7404E-02	100%	**8.7404E-02**
34		7200	2.000	2.475E+03	8.7404E-02	100%	**8.7404E-02**
35		28800	8.000	0.000E+00	0.0000E+00	100%	**0.0000E+00**
36							
37							
38		**(Iodine) RCS 1 to Environment (Flashed Break Flow)**					
39							Iodine
40		Time	Time	Flow Rate	Flow Rate	Partition Factor	Transfer Rate
41		(sec)	(hrs)	(cm^3/min)	(ft^3/min)	(Iodine)	(ft^3/min)
42		0	0.000	1.108E+05	3.9129E+00	0.01	**3.9129E-02**
43		445	0.124	2.632E+04	9.2948E-01	1	**9.2948E-01**
44		465	0.129	4.844E+04	1.7106E+00	1	**1.7106E+00**
45		1700	0.472	1.475E+04	5.2089E-01	1	**5.2089E-01**
46		2800	0.778	6.260E+03	2.2107E-01	1	**2.2107E-01**
47		3000	0.833	0.000E+00	0.0000E+00	1	**0.0000E+00**
48		3500	0.972	0.000E+00	0.0000E+00	1	**0.0000E+00**
49		3590	0.997	0.000E+00	0.0000E+00	1	**0.0000E+00**
50		7200	2.000	0.000E+00	0.0000E+00	1	**0.0000E+00**
51		28800	8.000	0.000E+00	0.0000E+00	1	**0.0000E+00**
52							

	A	B	C	D	E	F	G
53							
54		Intact SGs to Environment (Steam Release)					
55							Iodine
56		Time	Time	Flow Rate	Flow Rate	Partition Factor	Transfer Rate
57		(sec)	(hrs)	(cm^3/min)	(ft^3/min)	(Iodine)	(ft^3/min)
58		0	0.000	9.095E+07	3.21E+03	0.0001	**3.2119E-01**
59		2800	0.778	2.115E+07	7.47E+02	0.01	**7.4691E+00**
60		3500	0.972	0.000E+00	0.00E+00	0.01	**0.0000E+00**
61		7200	2.000	1.474E+06	5.21E+01	0.01	**5.2054E-01**
62		28800	8.000	0.000E+00	0.00E+00	0.01	**0.0000E+00**
63							
64							
65		Ruptured SG to Environment (Steam Release)					
66							Iodine
67		Time	Time	Flow Rate	Flow Rate	Partition Factor	Transfer Rate
68		(sec)	(hrs)	(cm^3/min)	(ft^3/min)	(Iodine)	(ft^3/min)
69		0	0	3.032E+07	1.07E+03	0.0001	**1.0707E-01**
70		465	0.129	2.076E+06	7.33E+01	0.01	**7.3313E-01**
71		1700	0.472	0.000E+00	0.00E+00	0.01	**0.0000E+00**
72		7200	2	3.352E+04	1.18E+00	0.01	**1.1837E-02**

	A	B	C	D	E	F	G
1							
2		**Release Pathways and Associated Release Rates**					
3							
4	0.0000353146667215	**cm^3 per ft^3**					
5							
6		**RCS 1 to Ruptured SG Volume (Un-Flashed Break Flow)**					
7							
8		**Time**	**Time**	**Flow Rate**	**Flow Rate**		
9		**(sec)**	**(hrs)**	**(cm^3/min)**	**(ft^3/min)**		
10		0	=B10/3600	1462000	=D10*$A$4		
11		445	=B11/3600	1215000	=D11*$A$4		
12		465	=B12/3600	1454000	=D12*$A$4		
13		1700	=B13/3600	1534000	=D13*$A$4		
14		2800	=B14/3600	1426000	=D14*$A$4		
15		3000	=B15/3600	1140000	=D15*$A$4		
16		3500	=B16/3600	650500	=D16*$A$4		
17		3590	=B17/3600	0	=D17*$A$4		
18		7200	=B18/3600	0	=D18*$A$4		
19		28800	=B19/3600	0	=D19*$A$4		
20							
21							
22		**(Noble Gas) RCS 2 to Environment (Flashed Break Flow)**					
23							**Noble Gas**
24		**Time**	**Time**	**Flow Rate**	**Flow Rate**	**ion to R**	**ransfer Rat**
25		**(sec)**	**(hrs)**	**(cm^3/min)**	**(ft^3/min)**	**(Iodine)**	**(ft^3/min)**
26		0	=B26/3600	1575000	=D26*$A$4	1	=E26
27		445	=B27/3600	1243000	=D27*$A$4	1	=E27
28		465	=B28/3600	1504000	=D28*$A$4	1	=E28
29		1700	=B29/3600	1551000	=D29*$A$4	1	=E29
30		2800	=B30/3600	1434000	=D30*$A$4	1	=E30
31		3000	=B31/3600	1142000	=D31*$A$4	1	=E31
32		3500	=B32/3600	653000	=D32*$A$4	1	=E32
33		3590	=B33/3600	2475	=D33*$A$4	1	=E33
34		7200	=B34/3600	2475	=D34*$A$4	1	=E34
35		28800	=B35/3600	0	=D35*$A$4	1	=E35
36							
37							
38		**(Iodine) RCS 1 to Environment (Flashed Break Flow)**					
39							**Iodine**
40		**Time**	**Time**	**Flow Rate**	**Flow Rate**	**ition Fa**	**ransfer Rat**
41		**(sec)**	**(hrs)**	**(cm^3/min)**	**(ft^3/min)**	**(Iodine)**	**(ft^3/min)**
42		0	=B42/3600	110800	=D42*$A$4	0.01	=E42*F42
43		445	=B43/3600	26320	=D43*$A$4	1	=E43*F43
44		465	=B44/3600	48440	=D44*$A$4	1	=E44*F44
45		1700	=B45/3600	14750	=D45*$A$4	1	=E45*F45
46		2800	=B46/3600	6260	=D46*$A$4	1	=E46*F46
47		3000	=B47/3600	0	=D47*$A$4	1	=E47*F47
48		3500	=B48/3600	0	=D48*$A$4	1	=E48*F48
49		3590	=B49/3600	0	=D49*$A$4	1	=E49*F49
50		7200	=B50/3600	0	=D50*$A$4	1	=E50*F50
51		28800	=B51/3600	0	=D51*$A$4	1	=E51*F51
52							

	A	B	C	D	E	F	G
53							
54		Intact SGs to Environment (Steam Release)					
55							Iodine
56		Time	Time	Flow Rate	Flow Rate	ition Fa	ransfer Rat
57		(sec)	(hrs)	(cm^3/min)	(ft^3/min)	(Iodine)	(ft^3/min)
58		0	=B58/3600	90950000	=D58*$A$4	=0.01*0.	=E58*F58
59		2800	=B59/3600	21150000	=D59*$A$4	0.01	=E59*F59
60		3500	=B60/3600	0	=D60*$A$4	0.01	=E60*F60
61		7200	=B61/3600	1474000	=D61*$A$4	0.01	=E61*F61
62		28800	=B62/3600	0	=D62*$A$4	0.01	=E62*F62
63							
64							
65		Ruptured SG to Environment (Steam Release)					
66							Iodine
67		Time	Time	Flow Rate	Flow Rate	ition Fa	ransfer Rat
68		(sec)	(hrs)	(cm^3/min)	(ft^3/min)	(Iodine)	(ft^3/min)
69		0	0	30320000	=D69*$A$4	=0.01*0.	=E69*F69
70		465	0.129	2076000	=D70*$A$4	0.01	=E70*F70
71		1700	0.472	0	=D71*$A$4	0.01	=E71*F71
72		7200	2	33520	=D72*$A$4	0.01	=E72*F72

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:26:56
#######################################################################

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

 Plant file           = C:\Documents and Settings\Aleem Boatright\My
Documents\My Work\Exelon\Byron & Braidwood\SGTR\RADTRAD\Rev 1\B-B AST SGTR -
Case 1 - Large CR Volume 1000cfm Inleak - 95 percent Intake Filt.psf
 Inventory file       = c:\program files\radtrad3-03\defaults\byron-braidwood
ast sgtr case 1 source terms.nif
 Release file         = c:\program files\radtrad3-03\defaults\byron-braidwood
sgtr case 1-release fractions.rft
 Dose Conversion file = c:\program files\radtrad3-03\defaults\fgr11&12.inp



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


 Radtrad 3.03 4/15/2001
 Byron/Braidwood SGTR - Case 1 - Dose from Pre-Accident Iodine Spike -
Control Room @ 200,000 cu. ft. CR Volume with 8575cfm Intake - 1000cfm Unfilt
Inleakage - 95% CR Intake Fiters - 80% Aerosol, 90% Elemental & Organic
Recirc Filtration
 Nuclide Inventory File:
 c:\program files\radtrad3-03\defaults\byron-braidwood ast sgtr case 1 source
terms.nif
 Plant Power Level:
  3.6583E+03
 Compartments:
   6
 Compartment 1:
 (Iodines) Primary Loop 1 - Reactor Coolant System (RCS)
   3
  8.0410E+03
   0
   0
   0
   0
   0
 Compartment 2:
 (Noble Gas) Primary Loop 2 - Reactor Coolant System (RCS)
   3
  8.0410E+03
   0
   0
```

```
   0
   0
   0
 Compartment 3:
 Secondary Loop - Steam Generator Volumes (3 Intact SGs)
   3
  3.3800E+03
   0
   0
   0
   0
   0
 Compartment 4:
 Secondary Loop - Steam Generator Volume (Failed SG)
   3
  1.1260E+03
   0
   0
   0
   0
   0
 Compartment 5:
 Control Room
   1
  2.0000E+05
   0
   0
   1
   0
   0
 Compartment 6:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Pathways:
   9
 Pathway 1:
 (Iodine Leakage) Primary Loop 1 (RCS) to  Secondary Loop - Steam Generator
Volumes (3 Intact SGs)
   1
   3
   2
 Pathway 2:
 (Un-Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Secondary Loop -
Steam Generator Volume (Failed SG)
   1
   4
   2
 Pathway 3:
 (Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Environment
   1
   6
   2
```

```
 Pathway 4:
 (Flashed Break Flow-Noble Gas) Primary Loop 2 - (RCS) to Environment
(Combined Intact and Ruptured SG Leak)
   2
   6
   2
 Pathway 5:
 (Steam Release-Intact SGs) Secondary Loop - Steam Generator Volumes to
Environment
   3
   6
   2
 Pathway 6:
 (Steam Release-Failed SG) Secondary Loop - Steam Generator Volume to
Environment
   4
   6
   2
 Pathway 7:
 (Filtered Intake) Environment to Control Room
   6
   5
   2
 Pathway 8:
 (Unfiltered Inleakage) Environment to Control Room
   6
   5
   2
 Pathway 9:
 (Control Room Exhaust) Control Room to Environment
   5
   6
   2
 End of Plant Model File
 Scenario Description Name:

 Plant Model Filename:

 Source Term:
   2
   1   1.0000E+00
   2   1.0000E+00
 c:\program files\radtrad3-03\defaults\fgr11&12.inp
 c:\program files\radtrad3-03\defaults\byron-braidwood sgtr case 1-release
fractions.rft
   0.0000E+00
   0
   0.0000E+00   1.0000E+00   0.0000E+00   1.0000E+00
 Overlying Pool:
   0
   0.0000E+00
   0
   0
   0
   0
 Compartments:
   6
 Compartment 1:
```

```
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 4:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 5:
  0
  1
  0
  0
  0
  0
  1
  3.9150E+04
  3
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   8.0000E+01   9.0000E+01   9.0000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
Compartment 6:
  0
  1
  0
```

```
  0
  0
  0
  0
  0
  0
Pathways:
  9
Pathway 1:
  0
  0
  0
  0
  0
  1
  2
  0.0000E+00   8.7430E-02   1.0000E+02   0.0000E+00   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 2:
  0
  0
  0
  0
  0
  1
 10
  0.0000E+00   5.1630E+01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2400E-01   4.2910E+01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2900E-01   5.1350E+01   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   5.4170E+01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   5.0360E+01   1.0000E+02   0.0000E+00   1.0000E+02
  8.3300E-01   4.0260E+01   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   2.2970E+01   1.0000E+02   0.0000E+00   1.0000E+02
  9.9700E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
 10
  0.0000E+00   3.9130E-02   1.0000E+02   0.0000E+00   1.0000E+02
  1.2400E-01   9.2950E-01   1.0000E+02   0.0000E+00   1.0000E+02
```

```
  1.2900E-01   1.7110E+00   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   5.2090E-01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   2.2110E-01   1.0000E+02   0.0000E+00   1.0000E+02
  8.3300E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.9700E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
 10
  0.0000E+00   5.5621E+01   1.0000E+02   1.0000E+02   1.0000E+02
  1.2400E-01   4.3896E+01   1.0000E+02   1.0000E+02   1.0000E+02
  1.2900E-01   5.3113E+01   1.0000E+02   1.0000E+02   1.0000E+02
  4.7200E-01   5.4773E+01   1.0000E+02   1.0000E+02   1.0000E+02
  7.7800E-01   5.0641E+01   1.0000E+02   1.0000E+02   1.0000E+02
  8.3300E-01   4.0329E+01   1.0000E+02   1.0000E+02   1.0000E+02
  9.7200E-01   2.3060E+01   1.0000E+02   1.0000E+02   1.0000E+02
  9.9700E-01   8.7404E-02   1.0000E+02   1.0000E+02   1.0000E+02
  2.0000E+00   8.7404E-02   1.0000E+02   1.0000E+02   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   1.0000E+02   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 5:
  0
  0
  0
  0
  0
  1
  5
  0.0000E+00   3.2120E-01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   7.4690E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   5.2050E-01   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 6:
```

```
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.0710E-01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2900E-01   7.3310E-01   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   1.1840E-02   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 7:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   6.4240E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   8.5750E+03   9.9000E+01   9.5000E+01   9.5000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 8:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   1.0000E+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
Pathway 9:
  0
  0
  0
  0
  0
  1
```

```
  3
  0.0000E+00   7.4240E+03   1.0000E+02   1.0000E+02   1.0000E+02
  5.0000E-01   9.5750E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary (EAB)
  6
  1
  3
  0.0000E+00   5.3600E-04
  5.0000E-01   5.3600E-04
  2.0000E+00   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone (LPZ)
  6
  1
  7
  0.0000E+00   9.3200E-05
  5.0000E-01   9.3200E-05
  2.0000E+00   4.5000E-05
  8.0000E+00   3.1200E-05
  2.4000E+01   1.4100E-05
  9.6000E+01   4.5400E-06
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 3:
Control Room
  5
  0
  1
  2
  0.0000E+00   3.5000E-04
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   1.0000E+00
  2.4000E+01   6.0000E-01
```

```
  9.6000E+01   4.0000E-01
  7.2000E+02   0.0000E+00
Effective Volume Location:
  1
  7
  0.0000E+00   1.7700E-03
  5.0000E-01   8.1400E-04
  2.0000E+00   6.9800E-04
  8.0000E+00   3.1200E-04
  2.4000E+01   1.9500E-04
  9.6000E+01   1.6700E-04
  7.2000E+02   0.0000E+00
Simulation Parameters:
  1
  0.0000E+00   0.0000E+00
Output Filename:
C:\Documents and Settings\Aleem Boatright\My Documents\My Work\Exelon\Byron
& Braidwood\SGTR\RADTRAD\Rev 1\B-B AST SGTR - Case 1 - Large CR Volume
1000cfm Inleak - 95 percent Intake Filt.o0
  1
  1
  1
  0
  0
End of Scenario File
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:26:56
#######################################################################

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

Number of Nuclides =  60

Inventory Power =   1.0000E+00 MWth
Plant Power Level =   3.6583E+03 MWth

Number of compartments    =   6

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: (Iodines) Primary Loop 1 - Reactor Coola
Compartment volume =   8.0410E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  1
   Exit Pathway Number    1: (Iodine Leakage) Primary Loop 1 (RCS) to
Secondar
   Exit Pathway Number    2: (Un-Flashed Break Flow-Iodines) Primary Loop 1
- (
   Exit Pathway Number    3: (Flashed Break Flow-Iodines) Primary Loop 1 -
(RCS

Compartment number  2  (Source term fraction =   1.0000E+00
)
Name: (Noble Gas) Primary Loop 2 - Reactor Coo
Compartment volume =   8.0410E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  2
   Exit Pathway Number    4: (Flashed Break Flow-Noble Gas) Primary Loop 2 -
(R

Compartment number  3
Name: Secondary Loop - Steam Generator Volumes
Compartment volume =   3.3800E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  3
   Inlet Pathway Number   1: (Iodine Leakage) Primary Loop 1 (RCS) to
Secondar
   Exit Pathway Number    5: (Steam Release-Intact SGs) Secondary Loop -
Steam

Compartment number  4
Name: Secondary Loop - Steam Generator Volume
Compartment volume =   1.1260E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  4
   Inlet Pathway Number   2: (Un-Flashed Break Flow-Iodines) Primary Loop 1
- (
```

```
    Exit Pathway Number     6: (Steam Release-Failed SG) Secondary Loop -
Steam G

 Compartment number  5
 Name: Control Room
 Compartment volume =   2.0000E+05 (Cubic feet)
 Compartment type is Control Room
 Removal devices within compartment:
      Filter(s)
 Pathways into and out of compartment  5
    Inlet Pathway Number   7: (Filtered Intake) Environment to Control Room
    Inlet Pathway Number   8: (Unfiltered Inleakage) Environment to Control
Room
    Exit Pathway Number    9: (Control Room Exhaust) Control Room to
Environment

 Compartment number  6
 Name: Environment
 Compartment type is Environment
 Pathways into and out of compartment  6
    Inlet Pathway Number   3: (Flashed Break Flow-Iodines) Primary Loop 1 -
(RCS
    Inlet Pathway Number   4: (Flashed Break Flow-Noble Gas) Primary Loop 2 -
(R
    Inlet Pathway Number   5: (Steam Release-Intact SGs) Secondary Loop -
Steam
    Inlet Pathway Number   6: (Steam Release-Failed SG) Secondary Loop -
Steam G
    Inlet Pathway Number   9: (Control Room Exhaust) Control Room to
Environment
    Exit Pathway Number    7: (Filtered Intake) Environment to Control Room
    Exit Pathway Number    8: (Unfiltered Inleakage) Environment to Control
Room

 Total number of pathways =   9
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:26:56
#######################################################################

#######################################################################
                      Scenario Description
#######################################################################
```

Radioactive Decay is enabled

Release Fractions and Timings

	GAP	EARLY IN-VESSEL	LATE RELEASE	RELEASE MASS
	0.000010 hr	0.0000 hrs	0.0000 hrs	(gm)
NOBLES	1.0000E+00	0.0000E+00	0.0000E+00	4.433E+00
IODINE	1.0000E+00	0.0000E+00	0.0000E+00	1.027E-01
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 = 3658. MWt

Nuclide Name	Group	Specific Inventory (Ci/MWt)	half life (s)	Whole Body DCF (Sv-m3/Bq-s)	Inhaled Thyroid (Sv/Bq)	Inhaled Effective (Sv/Bq)
Kr-85	1	4.426E-01	3.383E+08	1.190E-16	0.000E+00	0.000E+00
Kr-85m	1	1.120E-01	1.613E+04	7.480E-15	0.000E+00	0.000E+00
Kr-87	1	7.157E-02	4.578E+03	4.120E-14	0.000E+00	0.000E+00
Kr-88	1	2.085E-01	1.022E+04	1.020E-13	0.000E+00	0.000E+00
I-131	2	2.771E+00	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	3.656E+00	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	5.042E+00	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	9.075E-01	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	3.144E+00	2.380E+04	8.294E-14	8.460E-09	3.320E-10
Xe-133	1	1.562E+01	4.532E+05	1.560E-15	0.000E+00	0.000E+00
Xe-135	1	4.806E-01	3.272E+04	1.190E-14	0.000E+00	0.000E+00

Iodine fractions

```
     Aerosol     =   0.0000E+00
     Elemental   =   1.0000E+00
     Organic     =   0.0000E+00
```

COMPARTMENT DATA

Compartment number 1: (Iodines) Primary Loop 1 - Reactor Coola

Compartment number 2: (Noble Gas) Primary Loop 2 - Reactor Coo

Compartment number 3: Secondary Loop - Steam Generator Volumes

Compartment number 4: Secondary Loop - Steam Generator Volume

Compartment number 5: Control Room

Compartment Filter Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	3.9150E+04	8.0000E+01	9.0000E+01	9.0000E+01
7.2000E+02	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00

Compartment number 6: Environment

PATHWAY DATA

Pathway number 1: (Iodine Leakage) Primary Loop 1 (RCS) to Secondar

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	8.7430E-02	1.0000E+02	0.0000E+00	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 2: (Un-Flashed Break Flow-Iodines) Primary Loop 1 - (

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	5.1630E+01	1.0000E+02	0.0000E+00	1.0000E+02
1.2400E-01	4.2910E+01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	5.1350E+01	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	5.4170E+01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	5.0360E+01	1.0000E+02	0.0000E+00	1.0000E+02
8.3300E-01	4.0260E+01	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	2.2970E+01	1.0000E+02	0.0000E+00	1.0000E+02
9.9700E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 3: (Flashed Break Flow-Iodines) Primary Loop 1 - (RCS

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.9130E-02	1.0000E+02	0.0000E+00	1.0000E+02
1.2400E-01	9.2950E-01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	1.7110E+00	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	5.2090E-01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	2.2110E-01	1.0000E+02	0.0000E+00	1.0000E+02
8.3300E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.9700E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 4: (Flashed Break Flow-Noble Gas) Primary Loop 2 - (R

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	5.5621E+01	1.0000E+02	1.0000E+02	1.0000E+02
1.2400E-01	4.3896E+01	1.0000E+02	1.0000E+02	1.0000E+02
1.2900E-01	5.3113E+01	1.0000E+02	1.0000E+02	1.0000E+02
4.7200E-01	5.4773E+01	1.0000E+02	1.0000E+02	1.0000E+02
7.7800E-01	5.0641E+01	1.0000E+02	1.0000E+02	1.0000E+02
8.3300E-01	4.0329E+01	1.0000E+02	1.0000E+02	1.0000E+02
9.7200E-01	2.3060E+01	1.0000E+02	1.0000E+02	1.0000E+02
9.9700E-01	8.7404E-02	1.0000E+02	1.0000E+02	1.0000E+02
2.0000E+00	8.7404E-02	1.0000E+02	1.0000E+02	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	1.0000E+02	1.0000E+02

Pathway number 5: (Steam Release-Intact SGs) Secondary Loop - Steam

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.2120E-01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	7.4690E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	5.2050E-01	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 6: (Steam Release-Failed SG) Secondary Loop - Steam G

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0710E-01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	7.3310E-01	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	1.1840E-02	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 7: (Filtered Intake) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	6.4240E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	8.5750E+03	9.9000E+01	9.5000E+01	9.5000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 8: (Unfiltered Inleakage) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0000E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	1.0000E+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

Pathway number 9: (Control Room Exhaust) Control Room to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	7.4240E+03	1.0000E+02	1.0000E+02	1.0000E+02
5.0000E-01	9.5750E+03	1.0000E+02	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

LOCATION DATA

Location Exclusion Area Boundary (EAB) is in compartment 6

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	5.3600E-04
5.0000E-01	5.3600E-04
2.0000E+00	0.0000E+00

Location Breathing Rate Data

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

Location Low Population Zone (LPZ) is in compartment 6

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	9.3200E-05
5.0000E-01	9.3200E-05
2.0000E+00	4.5000E-05
8.0000E+00	3.1200E-05
2.4000E+01	1.4100E-05
9.6000E+01	4.5400E-06
7.2000E+02	0.0000E+00

Location Breathing Rate Data

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

Location Control Room is in compartment 5

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	1.7700E-03
5.0000E-01	8.1400E-04
2.0000E+00	6.9800E-04
8.0000E+00	3.1200E-04
2.4000E+01	1.9500E-04
9.6000E+01	1.6700E-04
7.2000E+02	0.0000E+00

Location Breathing Rate Data

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

Location Occupancy Factor Data

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

USER SPECIFIED TIME STEP DATA - SUPPLEMENTAL TIME STEPS

Time	Time step
0.0000E+00	0.0000E+00

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:26:56
#######################################################################
```

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

```
#######################################################################
                                Dose Output
#######################################################################
```

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.4208E-07	4.0313E-06	9.6832E-07
Accumulated dose (rem)	8.4208E-07	4.0313E-06	9.6832E-07

Low Population Zone (LPZ) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4642E-07	7.0096E-07	1.6837E-07
Accumulated dose (rem)	1.4642E-07	7.0096E-07	1.6837E-07

Control Room Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.6343E-12	1.4824E-10	6.2767E-12
Accumulated dose (rem)	1.6343E-12	1.4824E-10	6.2767E-12

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.1240	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.0427E-02	1.4356E-01	2.4922E-02
Accumulated dose (rem)	2.0427E-02	1.4356E-01	2.4923E-02

Low Population Zone (LPZ) Doses:

Time (h) = 0.1240	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.5518E-03	2.4962E-02	4.3334E-03
Accumulated dose (rem)	3.5519E-03	2.4963E-02	4.3336E-03

Control Room Doses:

Time (h) = 0.1240	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.3869E-04	5.6217E-02	2.1990E-03
Accumulated dose (rem)	4.3869E-04	5.6217E-02	2.1990E-03

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.6441E-04	9.4773E-02	3.8313E-03
Accumulated dose (rem)	2.1292E-02	2.3833E-01	2.8754E-02

Low Population Zone (LPZ) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5030E-04	1.6479E-02	6.6618E-04
Accumulated dose (rem)	3.7022E-03	4.1442E-02	4.9998E-03

Control Room Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.4763E-05	6.3772E-03	2.3440E-04
Accumulated dose (rem)	4.7345E-04	6.2594E-02	2.4334E-03

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.4621E-02	1.4677E+01	5.4390E-01
Accumulated dose (rem)	1.0591E-01	1.4915E+01	5.7265E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4714E-02	2.5520E+00	9.4573E-02
Accumulated dose (rem)	1.8416E-02	2.5934E+00	9.9573E-02

Control Room Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.0327E-03	1.4464E+01	4.5861E-01
Accumulated dose (rem)	6.5061E-03	1.4527E+01	4.6105E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.1545E-03	2.4663E-01	1.1868E-02
Accumulated dose (rem)	1.1007E-01	1.5162E+01	5.8452E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.2239E-04	4.2885E-02	2.0636E-03
Accumulated dose (rem)	1.9138E-02	2.6363E+00	1.0164E-01

Control Room Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.0825E-04	2.1127E+00	6.6784E-02
Accumulated dose (rem)	7.2144E-03	1.6640E+01	5.2783E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.8146E-02	2.2981E+00	1.1000E-01

Accumulated dose (rem)	1.4821E-01	1.7460E+01	6.9452E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.6328E-03	3.9959E-01	1.9126E-02
Accumulated dose (rem)	2.5771E-02	3.0359E+00	1.2076E-01

Control Room Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.6565E-03	6.2201E+00	1.9916E-01
Accumulated dose (rem)	1.1871E-02	2.2860E+01	7.2699E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.8330	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.8846E-03	1.8865E-01	1.1780E-02
Accumulated dose (rem)	1.5410E-01	1.7648E+01	7.0630E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.8330	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0232E-03	3.2803E-02	2.0483E-03
Accumulated dose (rem)	2.6795E-02	3.0687E+00	1.2281E-01

Control Room Doses:

Time (h) = 0.8330	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.5856E-04	8.9081E-02	3.4424E-03
Accumulated dose (rem)	1.2529E-02	2.2949E+01	7.3044E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0578E-02	2.4455E-02	1.1342E-02
Accumulated dose (rem)	1.6467E-01	1.7673E+01	7.1764E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8393E-03	4.2522E-03	1.9721E-03
Accumulated dose (rem)	2.8634E-02	3.0730E+00	1.2478E-01

Control Room Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4646E-03	7.9134E-02	3.9372E-03
Accumulated dose (rem)	1.3994E-02	2.3028E+01	7.3437E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.9970	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0435E-03	0.0000E+00	1.0435E-03
Accumulated dose (rem)	1.6572E-01	1.7673E+01	7.1868E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.9970	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8145E-04	0.0000E+00	1.8145E-04
Accumulated dose (rem)	2.8815E-02	3.0730E+00	1.2496E-01

Control Room Doses:

Time (h) = 0.9970	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.3257E-04	3.8035E-03	3.5138E-04
Accumulated dose (rem)	1.4227E-02	2.3032E+01	7.3472E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5023E-04	0.0000E+00	1.5023E-04
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.6122E-05	0.0000E+00	2.6122E-05
Accumulated dose (rem)	2.8841E-02	3.0730E+00	1.2499E-01

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.9237E-03	1.0804E-02	3.2612E-03
Accumulated dose (rem)	1.7150E-02	2.3043E+01	7.3798E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.3070E-04	2.7995E-01	9.1233E-03
Accumulated dose (rem)	2.9272E-02	3.3529E+00	1.3411E-01

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.3248E-04	1.3635E-01	4.4658E-03
Accumulated dose (rem)	1.7383E-02	2.3179E+01	7.4245E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.0257E-04	2.1619E-01	6.9709E-03
Accumulated dose (rem)	2.9575E-02	3.5691E+00	1.4109E-01

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.5021E-05	1.3528E-01	4.1976E-03
Accumulated dose (rem)	1.7408E-02	2.3314E+01	7.4665E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.3107E-04	4.1666E-01	1.2973E-02
Accumulated dose (rem)	2.9806E-02	3.9858E+00	1.5406E-01

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.3477E-05	1.7123E-01	5.2604E-03
Accumulated dose (rem)	1.7431E-02	2.3486E+01	7.5191E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.1733E-04	3.2875E-01	1.0128E-02
Accumulated dose (rem)	2.9923E-02	4.3145E+00	1.6419E-01

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.2741E-05	2.3507E-01	7.1807E-03
Accumulated dose (rem)	1.7454E-02	2.3721E+01	7.5909E-01

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##
I-131 Summary
##

	(Iodines) Primary Loo	(Noble Gas) Primary L	Secondary Loop - Stea
Time (hr)	I-131 (Curies)	I-131 (Curies)	I-131 (Curies)
0.000	1.0137E+04	1.0137E+04	3.3068E-05
0.124	9.6592E+03	9.6247E+03	8.0008E-01
0.129	9.6432E+03	9.6088E+03	8.3152E-01
0.472	8.4064E+03	8.3772E+03	2.8419E+00
0.500	8.3099E+03	8.2810E+03	2.9938E+00
0.778	7.4099E+03	7.3842E+03	4.4081E+00
0.833	7.2560E+03	7.2309E+03	4.6374E+00
0.972	6.9551E+03	6.9313E+03	5.1885E+00

0.997	6.9247E+03	6.9009E+03	5.3013E+00
1.397	6.9129E+03	6.8892E+03	7.0978E+00
1.697	6.9041E+03	6.8804E+03	8.4416E+00
1.997	6.8953E+03	6.8717E+03	9.7821E+00
2.000	6.8953E+03	6.8716E+03	9.7955E+00
2.400	6.8836E+03	6.8599E+03	1.1539E+01
2.700	6.8748E+03	6.8512E+03	1.2838E+01
3.000	6.8660E+03	6.8425E+03	1.4131E+01
3.300	6.8573E+03	6.8338E+03	1.5417E+01
3.600	6.8486E+03	6.8251E+03	1.6696E+01
3.900	6.8399E+03	6.8164E+03	1.7969E+01
4.200	6.8312E+03	6.8077E+03	1.9235E+01
4.500	6.8225E+03	6.7990E+03	2.0495E+01
4.800	6.8138E+03	6.7904E+03	2.1748E+01
5.100	6.8051E+03	6.7817E+03	2.2994E+01
5.400	6.7965E+03	6.7731E+03	2.4235E+01
5.700	6.7878E+03	6.7645E+03	2.5468E+01
6.000	6.7792E+03	6.7559E+03	2.6695E+01
6.300	6.7705E+03	6.7473E+03	2.7916E+01
6.600	6.7619E+03	6.7387E+03	2.9131E+01
6.900	6.7533E+03	6.7301E+03	3.0339E+01
7.200	6.7447E+03	6.7216E+03	3.1541E+01
7.500	6.7361E+03	6.7130E+03	3.2736E+01
7.800	6.7276E+03	6.7045E+03	3.3925E+01
8.000	6.7219E+03	6.6988E+03	3.4715E+01
8.300	6.7133E+03	6.6916E+03	3.5991E+01
8.600	6.7048E+03	6.6844E+03	3.7265E+01
8.900	6.6962E+03	6.6772E+03	3.8535E+01
9.200	6.6877E+03	6.6700E+03	3.9803E+01
9.500	6.6792E+03	6.6628E+03	4.1067E+01
9.800	6.6707E+03	6.6556E+03	4.2329E+01
10.100	6.6622E+03	6.6484E+03	4.3587E+01
10.400	6.6537E+03	6.6413E+03	4.4843E+01
24.000	6.2805E+03	6.3246E+03	9.8676E+01
96.000	4.6267E+03	4.8833E+03	2.9870E+02
720.000	3.2734E+02	5.1908E+02	1.9622E+02

Time (hr)	Secondary Loop - Stea I-131 (Curies)	Control Room I-131 (Curies)	Environment I-131 (Curies)
0.000	1.9527E-02	9.1783E-08	1.4800E-05
0.124	4.7247E+02	2.8954E-03	5.2705E-01
0.129	4.8790E+02	5.0121E-03	8.7546E-01
0.472	1.6562E+03	2.3929E-01	5.4894E+01
0.500	1.7506E+03	2.3027E-01	5.5804E+01
0.778	2.6307E+03	6.6613E-03	6.4292E+01
0.833	2.7817E+03	3.4502E-03	6.4990E+01
0.972	3.0769E+03	5.5512E-04	6.5081E+01
0.997	3.1064E+03	3.9663E-04	6.5081E+01
1.397	3.1019E+03	1.8301E-06	6.5081E+01
1.697	3.0986E+03	3.2399E-08	6.5081E+01
1.997	3.0952E+03	5.7358E-10	6.5081E+01
2.000	3.0952E+03	5.5090E-10	6.5081E+01
2.400	3.0900E+03	7.1554E-05	6.5901E+01
2.700	3.0860E+03	7.2213E-05	6.6519E+01
3.000	3.0821E+03	7.2551E-05	6.7140E+01
3.300	3.0782E+03	7.2881E-05	6.7764E+01
3.600	3.0743E+03	7.3209E-05	6.8390E+01
3.900	3.0705E+03	7.3535E-05	6.9020E+01

4.200	3.0666E+03	7.3860E-05	6.9652E+01
4.500	3.0627E+03	7.4182E-05	7.0287E+01
4.800	3.0588E+03	7.4502E-05	7.0925E+01
5.100	3.0549E+03	7.4820E-05	7.1565E+01
5.400	3.0511E+03	7.5136E-05	7.2208E+01
5.700	3.0472E+03	7.5450E-05	7.2854E+01
6.000	3.0433E+03	7.5762E-05	7.3503E+01
6.300	3.0395E+03	7.6073E-05	7.4154E+01
6.600	3.0356E+03	7.6381E-05	7.4808E+01
6.900	3.0318E+03	7.6687E-05	7.5464E+01
7.200	3.0280E+03	7.6992E-05	7.6123E+01
7.500	3.0241E+03	7.7294E-05	7.6785E+01
7.800	3.0203E+03	7.7594E-05	7.7449E+01
8.000	3.0177E+03	7.7794E-05	7.7894E+01
8.300	3.0139E+03	3.0609E-05	7.8464E+01
8.600	3.0101E+03	2.9737E-05	7.9034E+01
8.900	3.0063E+03	2.9684E-05	7.9604E+01
9.200	3.0025E+03	2.9647E-05	8.0172E+01
9.500	2.9987E+03	2.9609E-05	8.0740E+01
9.800	2.9949E+03	2.9572E-05	8.1307E+01
10.100	2.9911E+03	2.9534E-05	8.1874E+01
10.400	2.9873E+03	2.9497E-05	8.2439E+01
24.000	2.8206E+03	2.7850E-05	1.0723E+02
96.000	2.0811E+03	1.2843E-05	2.1692E+02
720.000	1.4922E+02	7.8865E-07	5.0345E+02

##
Cumulative Dose Summary
##

	Exclusion Area Bounda		Low Population Zone (		Control Room	
Time (hr)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.124	1.4356E-01	2.4923E-02	2.4963E-02	4.3336E-03	5.6217E-02	2.1990E-03
0.129	2.3833E-01	2.8754E-02	4.1442E-02	4.9998E-03	6.2594E-02	2.4334E-03
0.472	1.4915E+01	5.7265E-01	2.5934E+00	9.9573E-02	1.4527E+01	4.6105E-01
0.500	1.5162E+01	5.8452E-01	2.6363E+00	1.0164E-01	1.6640E+01	5.2783E-01
0.778	1.7460E+01	6.9452E-01	3.0359E+00	1.2076E-01	2.2860E+01	7.2699E-01
0.833	1.7648E+01	7.0630E-01	3.0687E+00	1.2281E-01	2.2949E+01	7.3044E-01
0.972	1.7673E+01	7.1764E-01	3.0730E+00	1.2478E-01	2.3028E+01	7.3437E-01
0.997	1.7673E+01	7.1868E-01	3.0730E+00	1.2496E-01	2.3032E+01	7.3472E-01
1.397	1.7673E+01	7.1874E-01	3.0730E+00	1.2498E-01	2.3043E+01	7.3720E-01
1.697	1.7673E+01	7.1879E-01	3.0730E+00	1.2498E-01	2.3043E+01	7.3776E-01
1.997	1.7673E+01	7.1883E-01	3.0730E+00	1.2499E-01	2.3043E+01	7.3798E-01
2.000	1.7673E+01	7.1883E-01	3.0730E+00	1.2499E-01	2.3043E+01	7.3798E-01
2.400	1.7673E+01	7.1883E-01	3.0913E+00	1.2560E-01	2.3050E+01	7.3832E-01
2.700	1.7673E+01	7.1883E-01	3.1051E+00	1.2606E-01	2.3057E+01	7.3856E-01
3.000	1.7673E+01	7.1883E-01	3.1189E+00	1.2651E-01	2.3063E+01	7.3879E-01
3.300	1.7673E+01	7.1883E-01	3.1327E+00	1.2697E-01	2.3070E+01	7.3902E-01
3.600	1.7673E+01	7.1883E-01	3.1466E+00	1.2743E-01	2.3077E+01	7.3923E-01
3.900	1.7673E+01	7.1883E-01	3.1605E+00	1.2788E-01	2.3084E+01	7.3945E-01
4.200	1.7673E+01	7.1883E-01	3.1744E+00	1.2834E-01	2.3091E+01	7.3967E-01
4.500	1.7673E+01	7.1883E-01	3.1884E+00	1.2879E-01	2.3098E+01	7.3989E-01
4.800	1.7673E+01	7.1883E-01	3.2023E+00	1.2925E-01	2.3105E+01	7.4011E-01
5.100	1.7673E+01	7.1883E-01	3.2163E+00	1.2970E-01	2.3112E+01	7.4033E-01
5.400	1.7673E+01	7.1883E-01	3.2304E+00	1.3016E-01	2.3119E+01	7.4054E-01
5.700	1.7673E+01	7.1883E-01	3.2444E+00	1.3061E-01	2.3125E+01	7.4076E-01

6.000	1.7673E+01	7.1883E-01	3.2585E+00	1.3107E-01	2.3132E+01	7.4098E-01
6.300	1.7673E+01	7.1883E-01	3.2726E+00	1.3153E-01	2.3139E+01	7.4120E-01
6.600	1.7673E+01	7.1883E-01	3.2867E+00	1.3198E-01	2.3146E+01	7.4142E-01
6.900	1.7673E+01	7.1883E-01	3.3008E+00	1.3244E-01	2.3153E+01	7.4164E-01
7.200	1.7673E+01	7.1883E-01	3.3150E+00	1.3289E-01	2.3160E+01	7.4186E-01
7.500	1.7673E+01	7.1883E-01	3.3292E+00	1.3335E-01	2.3167E+01	7.4208E-01
7.800	1.7673E+01	7.1883E-01	3.3434E+00	1.3381E-01	2.3174E+01	7.4230E-01
8.000	1.7673E+01	7.1883E-01	3.3529E+00	1.3411E-01	2.3179E+01	7.4245E-01
8.300	1.7673E+01	7.1883E-01	3.3573E+00	1.3426E-01	2.3183E+01	7.4257E-01
8.600	1.7673E+01	7.1883E-01	3.3616E+00	1.3440E-01	2.3186E+01	7.4266E-01
8.900	1.7673E+01	7.1883E-01	3.3659E+00	1.3454E-01	2.3188E+01	7.4274E-01
9.200	1.7673E+01	7.1883E-01	3.3702E+00	1.3468E-01	2.3191E+01	7.4283E-01
9.500	1.7673E+01	7.1883E-01	3.3745E+00	1.3482E-01	2.3194E+01	7.4291E-01
9.800	1.7673E+01	7.1883E-01	3.3787E+00	1.3496E-01	2.3196E+01	7.4299E-01
10.100	1.7673E+01	7.1883E-01	3.3830E+00	1.3510E-01	2.3199E+01	7.4307E-01
10.400	1.7673E+01	7.1883E-01	3.3872E+00	1.3524E-01	2.3202E+01	7.4315E-01
24.000	1.7673E+01	7.1883E-01	3.5691E+00	1.4109E-01	2.3314E+01	7.4665E-01
96.000	1.7673E+01	7.1883E-01	3.9858E+00	1.5406E-01	2.3486E+01	7.5191E-01
720.000	1.7673E+01	7.1883E-01	4.3145E+00	1.6419E-01	2.3721E+01	7.5909E-01

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

Exclusion Area Boundary (EAB)

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	1.6587E-01	1.7673E+01	7.1883E-01

```
 ######################################################################
    RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:27:17
 ######################################################################

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

 Plant file           = C:\Documents and Settings\Aleem Boatright\My
Documents\My Work\Exelon\Byron & Braidwood\SGTR\RADTRAD\Rev 1\B-B AST SGTR -
Case 2 - Large CR Volume 1000cfm Inleak - 95 percent Intake Filt.psf
 Inventory file       = c:\program files\radtrad3-03\defaults\byron-braidwood
ast sgtr case 2 source terms.nif
 Release file         = c:\program files\radtrad3-03\defaults\byron-braidwood
sgtr case 2-release fractions.rft
 Dose Conversion file = c:\program files\radtrad3-03\defaults\fgr11&12.inp



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


 Radtrad 3.03 4/15/2001
 Byron/Braidwood SGTR - Case 2 - Dose from Accident Initiated Iodine Spike -
Control Room @ 200,000 cu. ft. CR Volume with 8575cfm Intake - 1000cfm Unfilt
Inleakage - 95% CR Intake Fiters - 80% Aerosol, 90% Elemental & Organic
Recirc Filtration
 Nuclide Inventory File:
 c:\program files\radtrad3-03\defaults\byron-braidwood ast sgtr case 2 source
terms.nif
 Plant Power Level:
  3.6583E+03
 Compartments:
   6
 Compartment 1:
 (Iodines) Primary Loop 1 - Reactor Coolant System (RCS)
   3
  8.0410E+03
   0
   0
   0
   0
   0
 Compartment 2:
 (Noble Gas) Primary Loop 2 - Reactor Coolant System (RCS)
   3
  8.0410E+03
   0
   0
```

```
   0
   0
   0
 Compartment 3:
 Secondary Loop - Steam Generator Volumes (3 Intact SGs)
   3
  3.3800E+03
   0
   0
   0
   0
   0
 Compartment 4:
 Secondary Loop - Steam Generator Volume (Failed SG)
   3
  1.1260E+03
   0
   0
   0
   0
   0
 Compartment 5:
 Control Room
   1
  2.0000E+05
   0
   0
   1
   0
   0
 Compartment 6:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Pathways:
   9
 Pathway 1:
 (Iodine Leakage) Primary Loop 1 (RCS) to  Secondary Loop - Steam Generator
Volumes (3 Intact SGs)
   1
   3
   2
 Pathway 2:
 (Un-Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Secondary Loop -
Steam Generator Volume (Failed SG)
   1
   4
   2
 Pathway 3:
 (Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Environment
   1
   6
   2
```

```
 Pathway 4:
 (Flashed Break Flow-Noble Gas) Primary Loop 2 - (RCS) to Environment
(Combined Intact and Ruptured SG Leak)
   2
   6
   2
 Pathway 5:
 (Steam Release-Intact SGs) Secondary Loop - Steam Generator Volumes to
Environment
   3
   6
   2
 Pathway 6:
 (Steam Release-Failed SG) Secondary Loop - Steam Generator Volume to
Environment
   4
   6
   2
 Pathway 7:
 (Filtered Intake) Environment to Control Room
   6
   5
   2
 Pathway 8:
 (Unfiltered Inleakage) Environment to Control Room
   6
   5
   2
 Pathway 9:
 (Control Room Exhaust) Control Room to Environment
   5
   6
   2
 End of Plant Model File
 Scenario Description Name:

 Plant Model Filename:

 Source Term:
   2
   1   1.0000E+00
   2   1.0000E+00
 c:\program files\radtrad3-03\defaults\fgr11&12.inp
 c:\program files\radtrad3-03\defaults\byron-braidwood sgtr case 2-release
fractions.rft
   0.0000E+00
   0
   0.0000E+00   1.0000E+00   0.0000E+00   1.0000E+00
 Overlying Pool:
   0
   0.0000E+00
   0
   0
   0
   0
 Compartments:
   6
 Compartment 1:
```

```
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 4:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 5:
  0
  1
  0
  0
  0
  0
  1
  3.9150E+04
  3
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   8.0000E+01   9.0000E+01   9.0000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
Compartment 6:
  0
  1
  0
```

```
  0
  0
  0
  0
  0
  0
Pathways:
  9
Pathway 1:
  0
  0
  0
  0
  0
  1
  2
  0.0000E+00   8.7430E-02   1.0000E+02   0.0000E+00   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 2:
  0
  0
  0
  0
  0
  1
 10
  0.0000E+00   5.1630E+01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2400E-01   4.2910E+01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2900E-01   5.1350E+01   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   5.4170E+01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   5.0360E+01   1.0000E+02   0.0000E+00   1.0000E+02
  8.3300E-01   4.0260E+01   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   2.2970E+01   1.0000E+02   0.0000E+00   1.0000E+02
  9.9700E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
 10
  0.0000E+00   3.9130E-02   1.0000E+02   0.0000E+00   1.0000E+02
  1.2400E-01   9.2950E-01   1.0000E+02   0.0000E+00   1.0000E+02
```

```
  1.2900E-01   1.7110E+00   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   5.2090E-01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   2.2110E-01   1.0000E+02   0.0000E+00   1.0000E+02
  8.3300E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.9700E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
 10
  0.0000E+00   5.5621E+01   1.0000E+02   1.0000E+02   1.0000E+02
  1.2400E-01   4.3896E+01   1.0000E+02   1.0000E+02   1.0000E+02
  1.2900E-01   5.3113E+01   1.0000E+02   1.0000E+02   1.0000E+02
  4.7200E-01   5.4773E+01   1.0000E+02   1.0000E+02   1.0000E+02
  7.7800E-01   5.0641E+01   1.0000E+02   1.0000E+02   1.0000E+02
  8.3300E-01   4.0329E+01   1.0000E+02   1.0000E+02   1.0000E+02
  9.7200E-01   2.3060E+01   1.0000E+02   1.0000E+02   1.0000E+02
  9.9700E-01   8.7404E-02   1.0000E+02   1.0000E+02   1.0000E+02
  2.0000E+00   8.7404E-02   1.0000E+02   1.0000E+02   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   1.0000E+02   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 5:
  0
  0
  0
  0
  0
  1
  5
  0.0000E+00   3.2120E-01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   7.4690E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   5.2050E-01   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 6:
```

```
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.0710E-01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2900E-01   7.3310E-01   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   1.1840E-02   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 7:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   6.4240E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   8.5750E+03   9.9000E+01   9.5000E+01   9.5000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 8:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   1.0000E+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
Pathway 9:
  0
  0
  0
  0
  0
  1
```

```
  3
  0.0000E+00   7.4240E+03   1.0000E+02   1.0000E+02   1.0000E+02
  5.0000E-01   9.5750E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary (EAB)
  6
  1
  3
  0.0000E+00   5.3600E-04
  5.0000E-01   5.3600E-04
  2.0000E+00   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone (LPZ)
  6
  1
  7
  0.0000E+00   9.3200E-05
  5.0000E-01   9.3200E-05
  2.0000E+00   4.5000E-05
  8.0000E+00   3.1200E-05
  2.4000E+01   1.4100E-05
  9.6000E+01   4.5400E-06
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 3:
Control Room
  5
  0
  1
  2
  0.0000E+00   3.5000E-04
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   1.0000E+00
  2.4000E+01   6.0000E-01
```

```
  9.6000E+01   4.0000E-01
  7.2000E+02   0.0000E+00
Effective Volume Location:
  1
  7
  0.0000E+00   1.7700E-03
  5.0000E-01   8.1400E-04
  2.0000E+00   6.9800E-04
  8.0000E+00   3.1200E-04
  2.4000E+01   1.9500E-04
  9.6000E+01   1.6700E-04
  7.2000E+02   0.0000E+00
Simulation Parameters:
  1
  0.0000E+00   0.0000E+00
Output Filename:
C:\Documents and Settings\Aleem Boatright\My Documents\My Work\Exelon\Byron
& Braidwood\SGTR\RADTRAD\Rev 1\B-B AST SGTR - Case 2 - Large CR Volume
1000cfm Inleak - 95 percent Intake Filt.o0
  1
  1
  1
  0
  0
End of Scenario File
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:27:17
#######################################################################

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

Number of Nuclides =  60

Inventory Power =   1.0000E+00 MWth
Plant Power Level =   3.6583E+03 MWth

Number of compartments    =   6

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: (Iodines) Primary Loop 1 - Reactor Coola
Compartment volume =   8.0410E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  1
   Exit Pathway Number    1: (Iodine Leakage) Primary Loop 1 (RCS) to
Secondar
   Exit Pathway Number    2: (Un-Flashed Break Flow-Iodines) Primary Loop 1
- (
   Exit Pathway Number    3: (Flashed Break Flow-Iodines) Primary Loop 1 -
(RCS

Compartment number  2  (Source term fraction =   1.0000E+00
)
Name: (Noble Gas) Primary Loop 2 - Reactor Coo
Compartment volume =   8.0410E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  2
   Exit Pathway Number    4: (Flashed Break Flow-Noble Gas) Primary Loop 2 -
(R

Compartment number  3
Name: Secondary Loop - Steam Generator Volumes
Compartment volume =   3.3800E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  3
   Inlet Pathway Number   1: (Iodine Leakage) Primary Loop 1 (RCS) to
Secondar
   Exit Pathway Number    5: (Steam Release-Intact SGs) Secondary Loop -
Steam

Compartment number  4
Name: Secondary Loop - Steam Generator Volume
Compartment volume =   1.1260E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  4
   Inlet Pathway Number   2: (Un-Flashed Break Flow-Iodines) Primary Loop 1
- (
```

```
    Exit Pathway Number     6: (Steam Release-Failed SG) Secondary Loop -
Steam G

 Compartment number  5
 Name: Control Room
 Compartment volume =   2.0000E+05 (Cubic feet)
 Compartment type is Control Room
 Removal devices within compartment:
      Filter(s)
 Pathways into and out of compartment  5
    Inlet Pathway Number    7: (Filtered Intake) Environment to Control Room
    Inlet Pathway Number    8: (Unfiltered Inleakage) Environment to Control
Room
    Exit Pathway Number     9: (Control Room Exhaust) Control Room to
Environment

 Compartment number  6
 Name: Environment
 Compartment type is Environment
 Pathways into and out of compartment  6
    Inlet Pathway Number    3: (Flashed Break Flow-Iodines) Primary Loop 1 -
(RCS
    Inlet Pathway Number    4: (Flashed Break Flow-Noble Gas) Primary Loop 2 -
(R
    Inlet Pathway Number    5: (Steam Release-Intact SGs) Secondary Loop -
Steam
    Inlet Pathway Number    6: (Steam Release-Failed SG) Secondary Loop -
Steam G
    Inlet Pathway Number    9: (Control Room Exhaust) Control Room to
Environment
    Exit Pathway Number     7: (Filtered Intake) Environment to Control Room
    Exit Pathway Number     8: (Unfiltered Inleakage) Environment to Control
Room

 Total number of pathways =   9
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:27:17
#######################################################################

#######################################################################
                    Scenario Description
#######################################################################
```

Radioactive Decay is enabled

Release Fractions and Timings

	GAP	EARLY IN-VESSEL	LATE RELEASE	RELEASE MASS
	0.000010 hr	8.0000 hrs	0.0000 hrs	(gm)
NOBLES	1.0000E+00	0.0000E+00	0.0000E+00	4.433E+00
IODINE	0.0000E+00	1.0000E+00	0.0000E+00	7.414E-01
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 = 3658. MWt

Nuclide Name	Group	Specific Inventory (Ci/MWt)	half life (s)	Whole Body DCF (Sv-m3/Bq-s)	Inhaled Thyroid (Sv/Bq)	Inhaled Effective (Sv/Bq)
Kr-85	1	4.426E-01	3.383E+08	1.190E-16	0.000E+00	0.000E+00
Kr-85m	1	1.120E-01	1.613E+04	7.480E-15	0.000E+00	0.000E+00
Kr-87	1	7.157E-02	4.578E+03	4.120E-14	0.000E+00	0.000E+00
Kr-88	1	2.085E-01	1.022E+04	1.020E-13	0.000E+00	0.000E+00
I-131	2	1.829E+01	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	7.710E+01	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	4.061E+01	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	4.070E+01	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	3.631E+01	2.380E+04	8.294E-14	8.460E-09	3.320E-10
Xe-133	1	1.562E+01	4.532E+05	1.560E-15	0.000E+00	0.000E+00
Xe-135	1	4.806E-01	3.272E+04	1.190E-14	0.000E+00	0.000E+00

Iodine fractions

```
     Aerosol     =   0.0000E+00
     Elemental   =   1.0000E+00
     Organic     =   0.0000E+00
```

COMPARTMENT DATA

Compartment number 1: (Iodines) Primary Loop 1 - Reactor Coola

Compartment number 2: (Noble Gas) Primary Loop 2 - Reactor Coo

Compartment number 3: Secondary Loop - Steam Generator Volumes

Compartment number 4: Secondary Loop - Steam Generator Volume

Compartment number 5: Control Room

Compartment Filter Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	3.9150E+04	8.0000E+01	9.0000E+01	9.0000E+01
7.2000E+02	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00

Compartment number 6: Environment

PATHWAY DATA

Pathway number 1: (Iodine Leakage) Primary Loop 1 (RCS) to Secondar

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	8.7430E-02	1.0000E+02	0.0000E+00	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 2: (Un-Flashed Break Flow-Iodines) Primary Loop 1 - (

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	5.1630E+01	1.0000E+02	0.0000E+00	1.0000E+02
1.2400E-01	4.2910E+01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	5.1350E+01	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	5.4170E+01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	5.0360E+01	1.0000E+02	0.0000E+00	1.0000E+02
8.3300E-01	4.0260E+01	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	2.2970E+01	1.0000E+02	0.0000E+00	1.0000E+02
9.9700E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 3: (Flashed Break Flow-Iodines) Primary Loop 1 - (RCS

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.9130E-02	1.0000E+02	0.0000E+00	1.0000E+02
1.2400E-01	9.2950E-01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	1.7110E+00	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	5.2090E-01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	2.2110E-01	1.0000E+02	0.0000E+00	1.0000E+02
8.3300E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.9700E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 4: (Flashed Break Flow-Noble Gas) Primary Loop 2 - (R

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	5.5621E+01	1.0000E+02	1.0000E+02	1.0000E+02
1.2400E-01	4.3896E+01	1.0000E+02	1.0000E+02	1.0000E+02
1.2900E-01	5.3113E+01	1.0000E+02	1.0000E+02	1.0000E+02
4.7200E-01	5.4773E+01	1.0000E+02	1.0000E+02	1.0000E+02
7.7800E-01	5.0641E+01	1.0000E+02	1.0000E+02	1.0000E+02
8.3300E-01	4.0329E+01	1.0000E+02	1.0000E+02	1.0000E+02
9.7200E-01	2.3060E+01	1.0000E+02	1.0000E+02	1.0000E+02
9.9700E-01	8.7404E-02	1.0000E+02	1.0000E+02	1.0000E+02
2.0000E+00	8.7404E-02	1.0000E+02	1.0000E+02	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	1.0000E+02	1.0000E+02

Pathway number 5: (Steam Release-Intact SGs) Secondary Loop - Steam

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.2120E-01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	7.4690E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	5.2050E-01	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 6: (Steam Release-Failed SG) Secondary Loop - Steam G

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0710E-01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	7.3310E-01	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	1.1840E-02	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 7: (Filtered Intake) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	6.4240E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	8.5750E+03	9.9000E+01	9.5000E+01	9.5000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 8: (Unfiltered Inleakage) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0000E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	1.0000E+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

Pathway number 9: (Control Room Exhaust) Control Room to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	7.4240E+03	1.0000E+02	1.0000E+02	1.0000E+02
5.0000E-01	9.5750E+03	1.0000E+02	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

LOCATION DATA

Location Exclusion Area Boundary (EAB) is in compartment 6

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	5.3600E-04
5.0000E-01	5.3600E-04
2.0000E+00	0.0000E+00

Location Breathing Rate Data

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

Location Low Population Zone (LPZ) is in compartment 6

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	9.3200E-05
5.0000E-01	9.3200E-05
2.0000E+00	4.5000E-05
8.0000E+00	3.1200E-05
2.4000E+01	1.4100E-05
9.6000E+01	4.5400E-06
7.2000E+02	0.0000E+00

Location Breathing Rate Data

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

Location Control Room is in compartment 5

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	1.7700E-03
5.0000E-01	8.1400E-04
2.0000E+00	6.9800E-04
8.0000E+00	3.1200E-04
2.4000E+01	1.9500E-04
9.6000E+01	1.6700E-04
7.2000E+02	0.0000E+00

Location Breathing Rate Data

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

Location Occupancy Factor Data

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

USER SPECIFIED TIME STEP DATA - SUPPLEMENTAL TIME STEPS

Time	Time step
0.0000E+00	0.0000E+00

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:27:17
#######################################################################
```

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

```
#######################################################################
                                Dose Output
#######################################################################
```

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.3163E-07	0.0000E+00	8.3163E-07
Accumulated dose (rem)	8.3163E-07	0.0000E+00	8.3163E-07

Low Population Zone (LPZ) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4460E-07	0.0000E+00	1.4460E-07
Accumulated dose (rem)	1.4460E-07	0.0000E+00	1.4460E-07

Control Room Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.6140E-12	0.0000E+00	1.6140E-12
Accumulated dose (rem)	1.6140E-12	0.0000E+00	1.6140E-12

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.1240	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.0104E-02	7.1429E-03	2.0332E-02
Accumulated dose (rem)	2.0105E-02	7.1429E-03	2.0333E-02

Low Population Zone (LPZ) Doses:

Time (h) = 0.1240	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.4957E-03	1.2420E-03	3.5354E-03
Accumulated dose (rem)	3.4959E-03	1.2420E-03	3.5355E-03

Control Room Doses:

Time (h) = 0.1240	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.3193E-04	2.4702E-03	5.1084E-04
Accumulated dose (rem)	4.3193E-04	2.4702E-03	5.1084E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.9490E-04	1.0733E-02	1.0375E-03
Accumulated dose (rem)	2.0800E-02	1.7876E-02	2.1371E-02

Low Population Zone (LPZ) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2083E-04	1.8663E-03	1.8039E-04
Accumulated dose (rem)	3.6167E-03	3.1084E-03	3.7159E-03

Control Room Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.4064E-05	4.3578E-04	4.7973E-05
Accumulated dose (rem)	4.6599E-04	2.9060E-03	5.5881E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.0080E-02	3.6111E+00	1.8510E-01
Accumulated dose (rem)	9.0880E-02	3.6289E+00	2.0647E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2186E-02	6.2789E-01	3.2184E-02
Accumulated dose (rem)	1.5802E-02	6.3100E-01	3.5900E-02

Control Room Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.1191E-03	3.0032E+00	1.0077E-01
Accumulated dose (rem)	5.5851E-03	3.0061E+00	1.0132E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.2108E-03	1.1697E-01	7.9292E-03
Accumulated dose (rem)	9.5091E-02	3.7459E+00	2.1440E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.3218E-04	2.0339E-02	1.3787E-03
Accumulated dose (rem)	1.6535E-02	6.5134E-01	3.7279E-02

Control Room Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.1035E-04	5.5485E-01	1.8257E-02
Accumulated dose (rem)	6.1954E-03	3.5609E+00	1.1958E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.0361E-02	1.4719E+00	8.7087E-02

Accumulated dose (rem)	1.3545E-01	5.2178E+00	3.0148E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.0179E-03	2.5594E-01	1.5143E-02
Accumulated dose (rem)	2.3552E-02	9.0728E-01	5.2422E-02

Control Room Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.3803E-03	1.6773E+00	5.7703E-02
Accumulated dose (rem)	1.0576E-02	5.2382E+00	1.7729E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.8330	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.1908E-03	1.5370E-01	1.1062E-02
Accumulated dose (rem)	1.4164E-01	5.3715E+00	3.1254E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.8330	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0765E-03	2.6725E-02	1.9235E-03
Accumulated dose (rem)	2.4629E-02	9.3400E-01	5.4345E-02

Control Room Doses:

Time (h) = 0.8330	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.5654E-04	3.1945E-02	1.6700E-03
Accumulated dose (rem)	1.1232E-02	5.2701E+00	1.7896E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0574E-02	1.0356E-02	1.0902E-02
Accumulated dose (rem)	1.5222E-01	5.3819E+00	3.2345E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8386E-03	1.8007E-03	1.8957E-03
Accumulated dose (rem)	2.6467E-02	9.3581E-01	5.6241E-02

Control Room Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4632E-03	3.0323E-02	2.4247E-03
Accumulated dose (rem)	1.2695E-02	5.3005E+00	1.8138E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.9970	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0435E-03	0.0000E+00	1.0435E-03
Accumulated dose (rem)	1.5326E-01	5.3819E+00	3.2449E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.9970	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8145E-04	0.0000E+00	1.8145E-04
Accumulated dose (rem)	2.6649E-02	9.3581E-01	5.6423E-02

Control Room Doses:

Time (h) = 0.9970	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.3250E-04	1.4634E-03	2.7887E-04
Accumulated dose (rem)	1.2928E-02	5.3019E+00	1.8166E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5023E-04	0.0000E+00	1.5023E-04
Accumulated dose (rem)	1.5341E-01	5.3819E+00	3.2464E-01

Low Population Zone (LPZ) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.6122E-05	0.0000E+00	2.6122E-05
Accumulated dose (rem)	2.6675E-02	9.3581E-01	5.6449E-02

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.9235E-03	4.1556E-03	3.0552E-03
Accumulated dose (rem)	1.5851E-02	5.3061E+00	1.8471E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.5341E-01	5.3819E+00	3.2464E-01

Low Population Zone (LPZ) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.5545E-04	1.9902E-01	6.6692E-03
Accumulated dose (rem)	2.7131E-02	1.1348E+00	6.3118E-02

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.3306E-04	9.6398E-02	3.2426E-03
Accumulated dose (rem)	1.6085E-02	5.4025E+00	1.8796E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.5341E-01	5.3819E+00	3.2464E-01

Low Population Zone (LPZ) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.9236E-10	6.4228E-08	2.1906E-09
Accumulated dose (rem)	2.7131E-02	1.1348E+00	6.3118E-02

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.1456E-10	2.4436E-07	7.7055E-09
Accumulated dose (rem)	1.6085E-02	5.4025E+00	1.8796E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.5341E-01	5.3819E+00	3.2464E-01

Low Population Zone (LPZ) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8959E-04	9.4926E-02	3.1270E-03
Accumulated dose (rem)	2.7320E-02	1.2298E+00	6.6245E-02

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.3167E-05	6.0598E-02	1.8985E-03
Accumulated dose (rem)	1.6108E-02	5.4631E+00	1.8986E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.5341E-01	5.3819E+00	3.2464E-01

Low Population Zone (LPZ) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.3341E-04	1.7846E-01	5.5961E-03
Accumulated dose (rem)	2.7454E-02	1.4082E+00	7.1841E-02

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.2073E-05	7.3362E-02	2.2680E-03
Accumulated dose (rem)	1.6130E-02	5.5364E+00	1.9212E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.5341E-01	5.3819E+00	3.2464E-01

Low Population Zone (LPZ) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.4959E-05	1.3897E-01	4.2967E-03
Accumulated dose (rem)	2.7518E-02	1.5472E+00	7.6138E-02

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.1442E-05	9.9368E-02	3.0473E-03

Accumulated dose (rem) 1.6151E-02 5.6358E+00 1.9517E-01

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##
I-131 Summary
##

Time (hr)	(Iodines) Primary Loo I-131 (Curies)	(Noble Gas) Primary L I-131 (Curies)	Secondary Loop - Stea I-131 (Curies)
0.000	0.0000E+00	0.0000E+00	0.0000E+00
0.124	1.0118E+03	1.0100E+03	4.1240E-02
0.129	1.0518E+03	1.0501E+03	4.4604E-02
0.472	3.5914E+03	3.5900E+03	5.6991E-01
0.500	3.7822E+03	3.7808E+03	6.3710E-01
0.778	5.5590E+03	5.5579E+03	1.4846E+00
0.833	5.8961E+03	5.8950E+03	1.6783E+00
0.972	6.7824E+03	6.7815E+03	2.2167E+00
0.997	6.9598E+03	6.9589E+03	2.3286E+00
1.397	1.0262E+04	1.0261E+04	4.5710E+00
1.697	1.2728E+04	1.2727E+04	6.8148E+00
1.997	1.5186E+04	1.5185E+04	9.5378E+00
2.000	1.5211E+04	1.5210E+04	9.5675E+00
2.400	1.8475E+04	1.8474E+04	1.3903E+01
2.700	2.0913E+04	2.0912E+04	1.7697E+01
3.000	2.3343E+04	2.3342E+04	2.1952E+01
3.300	2.5765E+04	2.5764E+04	2.6664E+01
3.600	2.8178E+04	2.8177E+04	3.1830E+01
3.900	3.0583E+04	3.0582E+04	3.7447E+01
4.200	3.2979E+04	3.2978E+04	4.3512E+01
4.500	3.5367E+04	3.5366E+04	5.0020E+01
4.800	3.7747E+04	3.7746E+04	5.6969E+01
5.100	4.0119E+04	4.0118E+04	6.4356E+01
5.400	4.2482E+04	4.2481E+04	7.2176E+01
5.700	4.4838E+04	4.4837E+04	8.0428E+01
6.000	4.7185E+04	4.7184E+04	8.9107E+01
6.300	4.9523E+04	4.9523E+04	9.8210E+01
6.600	5.1854E+04	5.1853E+04	1.0773E+02
6.900	5.4177E+04	5.4176E+04	1.1768E+02
7.200	5.6491E+04	5.6491E+04	1.2803E+02
7.500	5.8798E+04	5.8797E+04	1.3880E+02
7.800	6.1096E+04	6.1095E+04	1.4998E+02
8.000	6.2624E+04	6.2623E+04	1.5766E+02
8.000	6.2624E+04	6.2623E+04	1.5766E+02
8.400	6.2518E+04	6.2533E+04	1.7375E+02
8.700	6.2438E+04	6.2466E+04	1.8578E+02
9.000	6.2359E+04	6.2399E+04	1.9779E+02
9.300	6.2279E+04	6.2332E+04	2.0976E+02
9.600	6.2200E+04	6.2264E+04	2.2171E+02
9.900	6.2121E+04	6.2197E+04	2.3363E+02
10.200	6.2042E+04	6.2130E+04	2.4552E+02
24.000	5.8512E+04	5.9125E+04	7.6281E+02
96.000	4.3105E+04	4.5651E+04	2.6620E+03
720.000	3.0496E+03	4.8525E+03	1.8152E+03

Time (hr)	Secondary Loop - Stea I-131 (Curies)	Control Room I-131 (Curies)	Environment I-131 (Curies)
0.000	0.0000E+00	0.0000E+00	0.0000E+00

0.124	2.4354E+01	1.3809E-04	2.4240E-02
0.129	2.6004E+01	3.6167E-04	6.0742E-02
0.472	3.3279E+02	5.7802E-02	1.2392E+01
0.500	3.7448E+02	5.6715E-02	1.2793E+01
0.778	9.0064E+02	2.1463E-03	1.7860E+01
0.833	1.0188E+03	1.2313E-03	1.8391E+01
0.972	1.2831E+03	1.9920E-04	1.8427E+01
0.997	1.3124E+03	1.4233E-04	1.8427E+01
1.397	1.3105E+03	6.5672E-07	1.8427E+01
1.697	1.3091E+03	1.1626E-08	1.8427E+01
1.997	1.3077E+03	2.0583E-10	1.8427E+01
2.000	1.3077E+03	1.9769E-10	1.8427E+01
2.400	1.3055E+03	3.2912E-05	1.8799E+01
2.700	1.3039E+03	3.4209E-05	1.9090E+01
3.000	1.3022E+03	3.5514E-05	1.9391E+01
3.300	1.3006E+03	3.6965E-05	1.9705E+01
3.600	1.2989E+03	3.8564E-05	2.0032E+01
3.900	1.2973E+03	4.0308E-05	2.0373E+01
4.200	1.2956E+03	4.2197E-05	2.0731E+01
4.500	1.2940E+03	4.4230E-05	2.1105E+01
4.800	1.2923E+03	4.6406E-05	2.1498E+01
5.100	1.2907E+03	4.8724E-05	2.1911E+01
5.400	1.2891E+03	5.1182E-05	2.2344E+01
5.700	1.2874E+03	5.3780E-05	2.2799E+01
6.000	1.2858E+03	5.6517E-05	2.3277E+01
6.300	1.2842E+03	5.9391E-05	2.3780E+01
6.600	1.2826E+03	6.2401E-05	2.4308E+01
6.900	1.2809E+03	6.5548E-05	2.4863E+01
7.200	1.2793E+03	6.8828E-05	2.5446E+01
7.500	1.2777E+03	7.2242E-05	2.6057E+01
7.800	1.2761E+03	7.5788E-05	2.6699E+01
8.000	1.2750E+03	7.8225E-05	2.7144E+01
8.000	1.2750E+03	7.8217E-05	2.7144E+01
8.400	1.2728E+03	1.2871E-05	2.7465E+01
8.700	1.2712E+03	1.2557E-05	2.7706E+01
9.000	1.2696E+03	1.2536E-05	2.7946E+01
9.300	1.2680E+03	1.2520E-05	2.8187E+01
9.600	1.2664E+03	1.2505E-05	2.8426E+01
9.900	1.2648E+03	1.2489E-05	2.8666E+01
10.200	1.2632E+03	1.2473E-05	2.8905E+01
24.000	1.1917E+03	1.1767E-05	3.9538E+01
96.000	8.7925E+02	5.4260E-06	8.5880E+01
720.000	6.3046E+01	3.3320E-07	2.0694E+02

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#####################################################################
                        Cumulative Dose Summary
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	Exclusion Area Bounda		Low Population Zone (		Control Room	
Time (hr)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.124	7.1429E-03	2.0333E-02	1.2420E-03	3.5355E-03	2.4702E-03	5.1084E-04
0.129	1.7876E-02	2.1371E-02	3.1084E-03	3.7159E-03	2.9060E-03	5.5881E-04
0.472	3.6289E+00	2.0647E-01	6.3100E-01	3.5900E-02	3.0061E+00	1.0132E-01
0.500	3.7459E+00	2.1440E-01	6.5134E-01	3.7279E-02	3.5609E+00	1.1958E-01
0.778	5.2178E+00	3.0148E-01	9.0728E-01	5.2422E-02	5.2382E+00	1.7729E-01
0.833	5.3715E+00	3.1254E-01	9.3400E-01	5.4345E-02	5.2701E+00	1.7896E-01

0.972	5.3819E+00	3.2345E-01	9.3581E-01	5.6241E-02	5.3005E+00	1.8138E-01
0.997	5.3819E+00	3.2449E-01	9.3581E-01	5.6423E-02	5.3019E+00	1.8166E-01
1.397	5.3819E+00	3.2455E-01	9.3581E-01	5.6433E-02	5.3061E+00	1.8393E-01
1.697	5.3819E+00	3.2460E-01	9.3581E-01	5.6441E-02	5.3061E+00	1.8448E-01
1.997	5.3819E+00	3.2464E-01	9.3581E-01	5.6449E-02	5.3061E+00	1.8471E-01
2.000	5.3819E+00	3.2464E-01	9.3581E-01	5.6449E-02	5.3061E+00	1.8471E-01
2.400	5.3819E+00	3.2464E-01	9.4469E-01	5.6765E-02	5.3095E+00	1.8494E-01
2.700	5.3819E+00	3.2464E-01	9.5158E-01	5.7008E-02	5.3129E+00	1.8507E-01
3.000	5.3819E+00	3.2464E-01	9.5870E-01	5.7257E-02	5.3164E+00	1.8520E-01
3.300	5.3819E+00	3.2464E-01	9.6608E-01	5.7512E-02	5.3200E+00	1.8532E-01
3.600	5.3819E+00	3.2464E-01	9.7374E-01	5.7776E-02	5.3238E+00	1.8545E-01
3.900	5.3819E+00	3.2464E-01	9.8170E-01	5.8049E-02	5.3276E+00	1.8557E-01
4.200	5.3819E+00	3.2464E-01	9.9001E-01	5.8332E-02	5.3317E+00	1.8570E-01
4.500	5.3819E+00	3.2464E-01	9.9867E-01	5.8625E-02	5.3359E+00	1.8584E-01
4.800	5.3819E+00	3.2464E-01	1.0077E+00	5.8931E-02	5.3404E+00	1.8598E-01
5.100	5.3819E+00	3.2464E-01	1.0172E+00	5.9248E-02	5.3450E+00	1.8613E-01
5.400	5.3819E+00	3.2464E-01	1.0271E+00	5.9579E-02	5.3498E+00	1.8629E-01
5.700	5.3819E+00	3.2464E-01	1.0375E+00	5.9924E-02	5.3549E+00	1.8645E-01
6.000	5.3819E+00	3.2464E-01	1.0483E+00	6.0284E-02	5.3602E+00	1.8662E-01
6.300	5.3819E+00	3.2464E-01	1.0597E+00	6.0660E-02	5.3658E+00	1.8679E-01
6.600	5.3819E+00	3.2464E-01	1.0716E+00	6.1052E-02	5.3716E+00	1.8698E-01
6.900	5.3819E+00	3.2464E-01	1.0840E+00	6.1461E-02	5.3777E+00	1.8717E-01
7.200	5.3819E+00	3.2464E-01	1.0971E+00	6.1887E-02	5.3840E+00	1.8737E-01
7.500	5.3819E+00	3.2464E-01	1.1107E+00	6.2333E-02	5.3907E+00	1.8758E-01
7.800	5.3819E+00	3.2464E-01	1.1250E+00	6.2797E-02	5.3977E+00	1.8780E-01
8.000	5.3819E+00	3.2464E-01	1.1348E+00	6.3118E-02	5.4025E+00	1.8796E-01
8.000	5.3819E+00	3.2464E-01	1.1348E+00	6.3118E-02	5.4025E+00	1.8796E-01
8.400	5.3819E+00	3.2464E-01	1.1374E+00	6.3205E-02	5.4058E+00	1.8806E-01
8.700	5.3819E+00	3.2464E-01	1.1393E+00	6.3270E-02	5.4070E+00	1.8810E-01
9.000	5.3819E+00	3.2464E-01	1.1412E+00	6.3335E-02	5.4082E+00	1.8814E-01
9.300	5.3819E+00	3.2464E-01	1.1431E+00	6.3399E-02	5.4094E+00	1.8818E-01
9.600	5.3819E+00	3.2464E-01	1.1450E+00	6.3463E-02	5.4105E+00	1.8821E-01
9.900	5.3819E+00	3.2464E-01	1.1469E+00	6.3526E-02	5.4117E+00	1.8825E-01
10.200	5.3819E+00	3.2464E-01	1.1488E+00	6.3589E-02	5.4129E+00	1.8829E-01
24.000	5.3819E+00	3.2464E-01	1.2298E+00	6.6245E-02	5.4631E+00	1.8986E-01
96.000	5.3819E+00	3.2464E-01	1.4082E+00	7.1841E-02	5.5364E+00	1.9212E-01
720.000	5.3819E+00	3.2464E-01	1.5472E+00	7.6138E-02	5.6358E+00	1.9517E-01

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#################################################################
                    Worst Two-Hour Doses
#################################################################
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Exclusion Area Boundary (EAB)

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	1.5341E-01	5.3819E+00	3.2464E-01

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 ######################################################################
    RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:27:37
 ######################################################################

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

 Plant file           = C:\Documents and Settings\Aleem Boatright\My
Documents\My Work\Exelon\Byron & Braidwood\SGTR\RADTRAD\Rev 1\B-B AST SGTR -
Case 3 - Large CR Volume 1000cfm Inleak - 95 percent Intake Filt.psf
 Inventory file       = c:\program files\radtrad3-03\defaults\byron-braidwood
ast sgtr case 3 secondary loop equilibrium iodine activity source terms.nif
 Release file         = c:\program files\radtrad3-03\defaults\byron-braidwood
sgtr case 3 iodine only-release fractions.rft
 Dose Conversion file = c:\program files\radtrad3-03\defaults\fgr11&12.inp


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


 Radtrad 3.03 4/15/2001
 Byron/Braidwood SGTR - Case 3 - Dose from Pre-Accident Secondary Coolant
Equilibrium Iodine Activity - Control Room @ 200,000 cu. ft. CR Volume with
8575cfm Intake - 1000cfm Unfilt Inleakage - 95% CR Intake Fiters - 80%
Aerosol, 90% Elemental & Organic Rec
 Nuclide Inventory File:
 c:\program files\radtrad3-03\defaults\byron-braidwood ast sgtr case 3
secondary loop equilibrium iodine activity source terms.nif
 Plant Power Level:
  3.6583E+03
 Compartments:
   4
 Compartment 1:
 Secondary Loop - Steam Generator Volumes (3 Intact SGs)
   3
  3.3800E+03
   0
   0
   0
   0
   0
 Compartment 2:
 Secondary Loop - Steam Generator Volume (Failed SG)
   3
  1.1260E+03
   0
   0
```

```
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.0000E+05
   0
   0
   1
   0
   0
 Compartment 4:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Pathways:
   5
 Pathway 1:
 (Steam Release-Intact SGs) Secondary Loop - Steam Generator Volumes to
Environment
   1
   4
   2
 Pathway 2:
 (Steam Release-Failed SG) Secondary Loop - Steam Generator Volume to
Environment
   2
   4
   2
 Pathway 3:
 (Filtered Intake) Environment to Control Room
   4
   3
   2
 Pathway 4:
 (Unfiltered Inleakage) Environment to Control Room
   4
   3
   2
 Pathway 5:
 (Control Room Exhaust) Control Room to Environment
   3
   4
   2
 End of Plant Model File
 Scenario Description Name:

 Plant Model Filename:

 Source Term:
   2
   1   1.0000E+00
```

```
   2   3.3318E-01
 c:\program files\radtrad3-03\defaults\fgr11&12.inp
 c:\program files\radtrad3-03\defaults\byron-braidwood sgtr case 3 iodine
only-release fractions.rft
   0.0000E+00
   0
   0.0000E+00   1.0000E+00   0.0000E+00   1.0000E+00
 Overlying Pool:
   0
   0.0000E+00
   0
   0
   0
   0
 Compartments:
   4
 Compartment 1:
   0
   1
   0
   0
   0
   0
   0
   0
   0
 Compartment 2:
   0
   1
   0
   0
   0
   0
   0
   0
   0
 Compartment 3:
   0
   1
   0
   0
   0
   0
   1
   3.9150E+04
   3
   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
   5.0000E-01   8.0000E+01   9.0000E+01   9.0000E+01
   7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00
   0
   0
 Compartment 4:
   0
   1
   0
   0
   0
   0
```

```
  0
  0
  0
Pathways:
  5
Pathway 1:
  0
  0
  0
  0
  0
  1
  5
  0.0000E+00   3.2120E-01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   7.4690E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   5.2050E-01   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.0710E-01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2900E-01   7.3310E-01   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   1.1840E-02   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   6.4240E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   8.5750E+03   9.9000E+01   9.5000E+01   9.5000E+01
  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   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   1.0000E+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
Pathway 5:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   7.4240E+03   1.0000E+02   1.0000E+02   1.0000E+02
  5.0000E-01   9.5750E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary (EAB)
  4
  1
  3
  0.0000E+00   5.3600E-04
  5.0000E-01   5.3600E-04
  2.0000E+00   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone (LPZ)
  4
  1
  7
  0.0000E+00   9.3200E-05
```

```
  5.0000E-01   9.3200E-05
  2.0000E+00   4.5000E-05
  8.0000E+00   3.1200E-05
  2.4000E+01   1.4100E-05
  9.6000E+01   4.5400E-06
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  0.0000E+00   3.5000E-04
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   1.0000E+00
  2.4000E+01   6.0000E-01
  9.6000E+01   4.0000E-01
  7.2000E+02   0.0000E+00
Effective Volume Location:
  1
  7
  0.0000E+00   1.7700E-03
  5.0000E-01   8.1400E-04
  2.0000E+00   6.9800E-04
  8.0000E+00   3.1200E-04
  2.4000E+01   1.9500E-04
  9.6000E+01   1.6700E-04
  7.2000E+02   0.0000E+00
Simulation Parameters:
  1
  0.0000E+00   0.0000E+00
Output Filename:
C:\Documents and Settings\Aleem Boatright\My Documents\My Work\Exelon\Byron
& Braidwood\SGTR\RADTRAD\Rev 1\B-B AST SGTR - Case 3 - Large CR Volume
1000cfm Inleak - 95 percent Intake Filt.o0
  1
  1
  1
  0
  0
End of Scenario File
```

```
 ######################################################################
    RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:27:37
 ######################################################################

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

 Number of Nuclides =  60

 Inventory Power =   1.0000E+00 MWth
 Plant Power Level =   3.6583E+03 MWth

 Number of compartments    =   4

 Compartment information

 Compartment number  1  (Source term fraction =   1.0000E+00
 )
 Name: Secondary Loop - Steam Generator Volumes
 Compartment volume =   3.3800E+03 (Cubic feet)
 Compartment type is Normal
 Pathways into and out of compartment  1
    Exit Pathway Number    1: (Steam Release-Intact SGs) Secondary Loop -
Steam

 Compartment number  2  (Source term fraction =   3.3318E-01
 )
 Name: Secondary Loop - Steam Generator Volume
 Compartment volume =   1.1260E+03 (Cubic feet)
 Compartment type is Normal
 Pathways into and out of compartment  2
    Exit Pathway Number    2: (Steam Release-Failed SG) Secondary Loop -
Steam G

 Compartment number  3
 Name: Control Room
 Compartment volume =   2.0000E+05 (Cubic feet)
 Compartment type is Control Room
 Removal devices within compartment:
      Filter(s)
 Pathways into and out of compartment  3
    Inlet Pathway Number   3: (Filtered Intake) Environment to Control Room
    Inlet Pathway Number   4: (Unfiltered Inleakage) Environment to Control
Room
    Exit Pathway Number    5: (Control Room Exhaust) Control Room to
Environment

 Compartment number  4
 Name: Environment
 Compartment type is Environment
 Pathways into and out of compartment  4
    Inlet Pathway Number   1: (Steam Release-Intact SGs) Secondary Loop -
Steam
    Inlet Pathway Number   2: (Steam Release-Failed SG) Secondary Loop -
Steam G
```

```
    Inlet Pathway Number    5: (Control Room Exhaust) Control Room to
Environment
    Exit Pathway Number     3: (Filtered Intake) Environment to Control Room
    Exit Pathway Number     4: (Unfiltered Inleakage) Environment to Control
Room

 Total number of pathways =   5
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:27:37
#######################################################################

#######################################################################
                      Scenario Description
#######################################################################
```

Radioactive Decay is enabled

Release Fractions and Timings

	GAP	EARLY IN-VESSEL	LATE RELEASE	RELEASE MASS
	0.000010 hr	0.0000 hrs	0.0000 hrs	(gm)
NOBLES	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
IODINE	1.0000E+00	0.0000E+00	0.0000E+00	7.198E-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 = 3658. MWt

Nuclide Name	Group	Specific Inventory (Ci/MWt)	half life (s)	Whole Body DCF (Sv-m3/Bq-s)	Inhaled Thyroid (Sv/Bq)	Inhaled Effective (Sv/Bq)
I-131	2	1.941E-03	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	2.561E-03	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	3.532E-03	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	6.357E-04	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	2.203E-03	2.380E+04	8.294E-14	8.460E-09	3.320E-10

Iodine fractions

Aerosol = 0.0000E+00
Elemental = 1.0000E+00
Organic = 0.0000E+00

COMPARTMENT DATA

Compartment number 1: Secondary Loop - Steam Generator Volumes

Compartment number 2: Secondary Loop - Steam Generator Volume

Compartment number 3: Control Room

Compartment Filter Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	3.9150E+04	8.0000E+01	9.0000E+01	9.0000E+01
7.2000E+02	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00

Compartment number 4: Environment

PATHWAY DATA

Pathway number 1: (Steam Release-Intact SGs) Secondary Loop - Steam

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.2120E-01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	7.4690E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	5.2050E-01	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 2: (Steam Release-Failed SG) Secondary Loop - Steam G

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0710E-01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	7.3310E-01	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	1.1840E-02	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 3: (Filtered Intake) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	6.4240E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	8.5750E+03	9.9000E+01	9.5000E+01	9.5000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 4: (Unfiltered Inleakage) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0000E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	1.0000E+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

Pathway number 5: (Control Room Exhaust) Control Room to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	7.4240E+03	1.0000E+02	1.0000E+02	1.0000E+02
5.0000E-01	9.5750E+03	1.0000E+02	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

LOCATION DATA

Location Exclusion Area Boundary (EAB) is in compartment 4

```
Location X/Q Data
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00           5.3600E-04
  5.0000E-01           5.3600E-04
  2.0000E+00           0.0000E+00

Location Breathing Rate Data
 Time (hr)          Breathing Rate (m^3 * sec^-1)
  0.0000E+00                 3.5000E-04
  8.0000E+00                 1.8000E-04
  2.4000E+01                 2.3000E-04
  7.2000E+02                 0.0000E+00
Location Low Population Zone (LPZ)     is in compartment   4

Location X/Q Data
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00           9.3200E-05
  5.0000E-01           9.3200E-05
  2.0000E+00           4.5000E-05
  8.0000E+00           3.1200E-05
  2.4000E+01           1.4100E-05
  9.6000E+01           4.5400E-06
  7.2000E+02           0.0000E+00

Location Breathing Rate Data
 Time (hr)          Breathing Rate (m^3 * sec^-1)
  0.0000E+00                 3.5000E-04
  8.0000E+00                 1.8000E-04
  2.4000E+01                 2.3000E-04
  7.2000E+02                 0.0000E+00
Location Control Room     is in compartment   3

Location X/Q Data
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00           1.7700E-03
  5.0000E-01           8.1400E-04
  2.0000E+00           6.9800E-04
  8.0000E+00           3.1200E-04
  2.4000E+01           1.9500E-04
  9.6000E+01           1.6700E-04
  7.2000E+02           0.0000E+00

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

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

USER SPECIFIED TIME STEP DATA - SUPPLEMENTAL TIME STEPS
     Time            Time step
      0.0000E+00       0.0000E+00
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:27:37
#######################################################################
```

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

```
#######################################################################
                                Dose Output
#######################################################################
```

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.9069E-10	7.3535E-08	2.4935E-09
Accumulated dose (rem)	1.9069E-10	7.3535E-08	2.4935E-09

Low Population Zone (LPZ) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.3157E-11	1.2786E-08	4.3358E-10
Accumulated dose (rem)	3.3157E-11	1.2786E-08	4.3358E-10

Control Room Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.7007E-16	2.7042E-12	8.5054E-14
Accumulated dose (rem)	3.7007E-16	2.7042E-12	8.5054E-14

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.8901E-06	1.8957E-03	6.4254E-05
Accumulated dose (rem)	4.8903E-06	1.8958E-03	6.4256E-05

Low Population Zone (LPZ) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.5029E-07	3.2963E-04	1.1172E-05
Accumulated dose (rem)	8.5033E-07	3.2965E-04	1.1173E-05

Control Room Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0856E-07	8.0057E-04	2.5177E-05
Accumulated dose (rem)	1.0856E-07	8.0057E-04	2.5177E-05

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.0098E-05	1.2302E-02	4.1508E-04
Accumulated dose (rem)	3.4988E-05	1.4198E-02	4.7934E-04

Low Population Zone (LPZ) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.2334E-06	2.1391E-03	7.2175E-05
Accumulated dose (rem)	6.0837E-06	2.4688E-03	8.3348E-05

Control Room Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.9242E-06	1.5026E-02	4.7208E-04
Accumulated dose (rem)	2.0328E-06	1.5826E-02	4.9726E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.1278E-07	3.0586E-04	1.0279E-05
Accumulated dose (rem)	3.5701E-05	1.4504E-02	4.8962E-04

Low Population Zone (LPZ) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2394E-07	5.3184E-05	1.7873E-06
Accumulated dose (rem)	6.2076E-06	2.5220E-03	8.5135E-05

Control Room Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.3298E-07	1.8943E-03	5.9478E-05
Accumulated dose (rem)	2.2658E-06	1.7720E-02	5.5673E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.8827E-06	3.0290E-03	1.0159E-04
Accumulated dose (rem)	4.2583E-05	1.7533E-02	5.9120E-04

Low Population Zone (LPZ) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.1968E-06	5.2668E-04	1.7664E-05
Accumulated dose (rem)	7.4044E-06	3.0487E-03	1.0280E-04

Control Room Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.8462E-07	5.6354E-03	1.7691E-04
Accumulated dose (rem)	2.9504E-06	2.3356E-02	7.3364E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0464E-04	4.8327E-02	1.6147E-03

Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8194E-05	8.4032E-03	2.8077E-04
Accumulated dose (rem)	2.5599E-05	1.1452E-02	3.8357E-04

Control Room Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.7730E-07	1.5562E-03	4.8802E-05
Accumulated dose (rem)	3.1277E-06	2.4912E-02	7.8244E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.5599E-05	1.1452E-02	3.8357E-04

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0571E-07	9.5867E-04	3.0049E-05
Accumulated dose (rem)	3.2334E-06	2.5871E-02	8.1249E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0175E-05	8.1687E-03	2.6384E-04
Accumulated dose (rem)	3.5774E-05	1.9621E-02	6.4741E-04

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.6013E-07	3.9816E-03	1.2389E-04
Accumulated dose (rem)	3.4935E-06	2.9852E-02	9.3638E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.0171E-07	1.6178E-04	5.1918E-06
Accumulated dose (rem)	3.5975E-05	1.9782E-02	6.5260E-04

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.9370E-09	1.5370E-04	4.7527E-06
Accumulated dose (rem)	3.4995E-06	3.0006E-02	9.4114E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.3808E-07	3.1179E-04	9.6730E-06
Accumulated dose (rem)	3.6113E-05	2.0094E-02	6.6227E-04

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.9896E-09	1.2813E-04	3.9208E-06
Accumulated dose (rem)	3.5015E-06	3.0134E-02	9.4506E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.8102E-08	2.4601E-04	7.5591E-06
Accumulated dose (rem)	3.6182E-05	2.0340E-02	6.6983E-04

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.6891E-09	1.7590E-04	5.3580E-06
Accumulated dose (rem)	3.5032E-06	3.0310E-02	9.5042E-04

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I-131 Summary

##

Time (hr)	Secondary Loop - Stea I-131 (Curies)	Secondary Loop - Stea I-131 (Curies)	Control Room I-131 (Curies)
0.000	7.1015E+00	2.3661E+00	1.6742E-09
0.129	7.0930E+00	2.3632E+00	3.7511E-05
0.472	7.0704E+00	2.3289E+00	2.1358E-04
0.500	7.0686E+00	2.3287E+00	2.0743E-04

0.778	7.0503E+00	2.3264E+00	6.5393E-06
0.972	6.8665E+00	2.3247E+00	3.5185E-05
1.272	6.8591E+00	2.3222E+00	6.2290E-07
1.572	6.8517E+00	2.3197E+00	1.1028E-08
1.872	6.8443E+00	2.3172E+00	1.9523E-10
2.000	6.8412E+00	2.3162E+00	3.4918E-11
2.400	6.8062E+00	2.3123E+00	2.2439E-06
2.700	6.7800E+00	2.3093E+00	2.2456E-06
3.000	6.7540E+00	2.3064E+00	2.2373E-06
3.300	6.7280E+00	2.3035E+00	2.2288E-06
3.600	6.7022E+00	2.3006E+00	2.2204E-06
3.900	6.6764E+00	2.2977E+00	2.2120E-06
4.200	6.6508E+00	2.2947E+00	2.2036E-06
4.500	6.6252E+00	2.2918E+00	2.1953E-06
4.800	6.5998E+00	2.2889E+00	2.1870E-06
5.100	6.5744E+00	2.2860E+00	2.1787E-06
5.400	6.5491E+00	2.2831E+00	2.1705E-06
5.700	6.5240E+00	2.2803E+00	2.1623E-06
6.000	6.4989E+00	2.2774E+00	2.1541E-06
6.300	6.4739E+00	2.2745E+00	2.1460E-06
6.600	6.4491E+00	2.2716E+00	2.1378E-06
6.900	6.4243E+00	2.2687E+00	2.1298E-06
7.200	6.3996E+00	2.2659E+00	2.1217E-06
7.500	6.3750E+00	2.2630E+00	2.1137E-06
7.800	6.3505E+00	2.2601E+00	2.1057E-06
8.000	6.3343E+00	2.2582E+00	2.1004E-06
8.300	6.3274E+00	2.2554E+00	5.9059E-08
8.600	6.3206E+00	2.2525E+00	2.2892E-08
8.900	6.3138E+00	2.2496E+00	2.2225E-08
9.200	6.3070E+00	2.2468E+00	2.2185E-08
9.500	6.3002E+00	2.2440E+00	2.2157E-08
9.800	6.2934E+00	2.2411E+00	2.2129E-08
10.100	6.2867E+00	2.2383E+00	2.2101E-08
10.400	6.2799E+00	2.2354E+00	2.2073E-08
24.000	5.9805E+00	2.1107E+00	2.0841E-08
96.000	4.6175E+00	1.5573E+00	9.6104E-09
720.000	4.9083E-01	1.1166E-01	5.9016E-10

Time (hr)	Environment I-131 (Curies)
0.000	2.6997E-07
0.129	6.9598E-03
0.472	5.2236E-02
0.500	5.3365E-02
0.778	6.4553E-02
0.972	2.4349E-01
1.272	2.4349E-01
1.572	2.4349E-01
1.872	2.4349E-01
2.000	2.4349E-01
2.400	2.6929E-01
2.700	2.8856E-01
3.000	3.0775E-01
3.300	3.2686E-01
3.600	3.4591E-01
3.900	3.6488E-01
4.200	3.8379E-01
4.500	4.0262E-01

4.800	4.2138E-01
5.100	4.4006E-01
5.400	4.5868E-01
5.700	4.7723E-01
6.000	4.9571E-01
6.300	5.1411E-01
6.600	5.3245E-01
6.900	5.5072E-01
7.200	5.6892E-01
7.500	5.8705E-01
7.800	6.0511E-01
8.000	6.1711E-01
8.300	6.1754E-01
8.600	6.1797E-01
8.900	6.1839E-01
9.200	6.1882E-01
9.500	6.1924E-01
9.800	6.1967E-01
10.100	6.2009E-01
10.400	6.2051E-01
24.000	6.3906E-01
96.000	7.2114E-01
720.000	9.3556E-01

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Cumulative Dose Summary

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	Exclusion Area Bounda		Low Population Zone (		Control Room	
Time	Thyroid	TEDE	Thyroid	TEDE	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
0.129	1.8958E-03	6.4256E-05	3.2965E-04	1.1173E-05	8.0057E-04	2.5177E-05
0.472	1.4198E-02	4.7934E-04	2.4688E-03	8.3348E-05	1.5826E-02	4.9726E-04
0.500	1.4504E-02	4.8962E-04	2.5220E-03	8.5135E-05	1.7720E-02	5.5673E-04
0.778	1.7533E-02	5.9120E-04	3.0487E-03	1.0280E-04	2.3356E-02	7.3364E-04
0.972	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.4912E-02	7.8244E-04
1.272	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.5854E-02	8.1196E-04
1.572	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.5870E-02	8.1248E-04
1.872	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.5871E-02	8.1249E-04
2.000	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.5871E-02	8.1249E-04
2.400	6.5860E-02	2.2059E-03	1.2029E-02	4.0255E-04	2.6096E-02	8.1952E-04
2.700	6.5860E-02	2.2059E-03	1.2459E-02	4.1663E-04	2.6308E-02	8.2615E-04
3.000	6.5860E-02	2.2059E-03	1.2886E-02	4.3058E-04	2.6519E-02	8.3275E-04
3.300	6.5860E-02	2.2059E-03	1.3310E-02	4.4441E-04	2.6729E-02	8.3930E-04
3.600	6.5860E-02	2.2059E-03	1.3731E-02	4.5812E-04	2.6938E-02	8.4580E-04
3.900	6.5860E-02	2.2059E-03	1.4150E-02	4.7172E-04	2.7145E-02	8.5226E-04
4.200	6.5860E-02	2.2059E-03	1.4566E-02	4.8520E-04	2.7351E-02	8.5867E-04
4.500	6.5860E-02	2.2059E-03	1.4980E-02	4.9858E-04	2.7556E-02	8.6504E-04
4.800	6.5860E-02	2.2059E-03	1.5391E-02	5.1184E-04	2.7759E-02	8.7137E-04
5.100	6.5860E-02	2.2059E-03	1.5799E-02	5.2501E-04	2.7961E-02	8.7766E-04
5.400	6.5860E-02	2.2059E-03	1.6205E-02	5.3808E-04	2.8162E-02	8.8390E-04
5.700	6.5860E-02	2.2059E-03	1.6608E-02	5.5104E-04	2.8361E-02	8.9011E-04
6.000	6.5860E-02	2.2059E-03	1.7009E-02	5.6391E-04	2.8560E-02	8.9627E-04
6.300	6.5860E-02	2.2059E-03	1.7407E-02	5.7669E-04	2.8757E-02	9.0240E-04
6.600	6.5860E-02	2.2059E-03	1.7803E-02	5.8938E-04	2.8953E-02	9.0848E-04
6.900	6.5860E-02	2.2059E-03	1.8197E-02	6.0197E-04	2.9148E-02	9.1453E-04
7.200	6.5860E-02	2.2059E-03	1.8588E-02	6.1448E-04	2.9341E-02	9.2054E-04

7.500	6.5860E-02	2.2059E-03	1.8977E-02	6.2690E-04	2.9534E-02	9.2651E-04
7.800	6.5860E-02	2.2059E-03	1.9364E-02	6.3923E-04	2.9725E-02	9.3245E-04
8.000	6.5860E-02	2.2059E-03	1.9621E-02	6.4741E-04	2.9852E-02	9.3638E-04
8.300	6.5860E-02	2.2059E-03	1.9624E-02	6.4752E-04	2.9907E-02	9.3807E-04
8.600	6.5860E-02	2.2059E-03	1.9627E-02	6.4762E-04	2.9910E-02	9.3816E-04
8.900	6.5860E-02	2.2059E-03	1.9630E-02	6.4773E-04	2.9912E-02	9.3823E-04
9.200	6.5860E-02	2.2059E-03	1.9633E-02	6.4783E-04	2.9914E-02	9.3829E-04
9.500	6.5860E-02	2.2059E-03	1.9637E-02	6.4794E-04	2.9916E-02	9.3835E-04
9.800	6.5860E-02	2.2059E-03	1.9640E-02	6.4804E-04	2.9918E-02	9.3841E-04
10.100	6.5860E-02	2.2059E-03	1.9643E-02	6.4814E-04	2.9920E-02	9.3847E-04
10.400	6.5860E-02	2.2059E-03	1.9646E-02	6.4825E-04	2.9922E-02	9.3853E-04
24.000	6.5860E-02	2.2059E-03	1.9782E-02	6.5260E-04	3.0006E-02	9.4114E-04
96.000	6.5860E-02	2.2059E-03	2.0094E-02	6.6227E-04	3.0134E-02	9.4506E-04
720.000	6.5860E-02	2.2059E-03	2.0340E-02	6.6983E-04	3.0310E-02	9.5042E-04

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#####################################################################
                        Worst Two-Hour Doses
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Exclusion Area Boundary (EAB)

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	1.4722E-04	6.5860E-02	2.2059E-03

RADTRAD SGTR Case 1 Nuclide Inventory File

```
Nuclide Inventory Name:  Modified Source Terms for the SGTR Accident - Pre-Accident 60
microCi/gm D.E. Iodine Spike
 Byron and Braidwood Plants (B-B) AST - in Ci/MW
 Power Level:
  0.1000E+01
 Nuclides:
  60
 Nuclide 001:
 Co-58
   7
  0.6117120000E+07
  0.5800E+02
  0.2553E+03
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 002:
 Co-60
   7
  0.1663401096E+09
  0.6000E+02
  0.1953E+03
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 003:
 Kr-85
   1
  0.3382974720E+09
  0.8500E+02
  4.4261E-01
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 004:
 Kr-85m
   1
  0.1612800000E+05
  0.8500E+02
  1.1203E-01
 Kr-85     0.2100E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 005:
 Kr-87
   1
  0.4578000000E+04
  0.8700E+02
  7.1566E-02
 Rb-87     0.1000E+01
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 006:
 Kr-88
   1
  0.1022400000E+05
```

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 0.8800E+02
 2.0851E-01
Rb-88     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 007:
Rb-86
  3
 0.1612224000E+07
 0.8600E+02
 0.6480E+02
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 008:
Sr-89
  5
 0.4363200000E+07
 0.8900E+02
 0.2907E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 009:
Sr-90
  5
 0.9189573120E+09
 0.9000E+02
 0.2242E+04
Y-90      0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 010:
Sr-91
  5
 0.3420000000E+05
 0.9100E+02
 0.3930E+05
Y-91m     0.5800E+00
Y-91      0.4200E+00
none      0.0000E+00
Nuclide 011:
Sr-92
  5
 0.9756000000E+04
 0.9200E+02
 0.4136E+05
Y-92      0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 012:
Y-90
  9
 0.2304000000E+06
 0.9000E+02
 0.2347E+04
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 013:
```

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Y-91
  9
 0.5055264000E+07
 0.9100E+02
 0.3553E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 014:
Y-92
  9
 0.1274400000E+05
 0.9200E+02
 0.4150E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 015:
Y-93
  9
 0.3636000000E+05
 0.9300E+02
 0.4624E+05
Zr-93     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 016:
Zr-95
  9
 0.5527872000E+07
 0.9500E+02
 0.4560E+05
Nb-95m    0.7000E-02
Nb-95     0.9900E+00
none      0.0000E+00
Nuclide 017:
Zr-97
  9
 0.6084000000E+05
 0.9700E+02
 0.4663E+05
Nb-97m    0.9500E+00
Nb-97     0.5300E-01
none      0.0000E+00
Nuclide 018:
Nb-95
  9
 0.3036960000E+07
 0.9500E+02
 0.4593E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 019:
Mo-99
  7
 0.2376000000E+06
 0.9900E+02
 0.5058+05
Tc-99m    0.8800E+00
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Tc-99     0.1200E+00
none      0.0000E+00
Nuclide 020:
Tc-99m
  7
 0.2167200000E+05
 0.9900E+02
 0.4429E+05
Tc-99     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 021:
Ru-103
  7
 0.3393792000E+07
 0.1030E+03
 0.4094E+05
Rh-103m   0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 022:
Ru-105
  7
 0.1598400000E+05
 0.1050E+03
 0.2798E+05
Rh-105    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 023:
Ru-106
  7
 0.3181248000E+08
 0.1060E+03
 0.1387E+05
Rh-106    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 024:
Rh-105
  7
 0.1272960000E+06
 0.1050E+03
 0.2552E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 025:
Sb-127
  4
 0.3326400000E+06
 0.1270E+03
 0.2848E+04
Te-127m   0.1800E+00
Te-127    0.8200E+00
none      0.0000E+00
Nuclide 026:
Sb-129
  4
 0.1555200000E+05
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```
 0.1290E+03
 0.8523E+04
Te-129m  0.2200E+00
Te-129   0.7700E+00
none     0.0000E+00
Nuclide 027:
Te-127
  4
 0.3366000000E+05
 0.1270E+03
 0.2812E+04
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 028:
Te-127m
  4
 0.9417600000E+07
 0.1270E+03
 0.3668E+03
Te-127   0.9800E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 029:
Te-129
  4
 0.4176000000E+04
 0.1290E+03
 0.8389E+04
I-129    0.1000E+01
none     0.0000E+00
none     0.0000E+00
Nuclide 030:
Te-129m
  4
 0.2903040000E+07
 0.1290E+03
 0.1249E+04
Te-129   0.6500E+00
I-129    0.3500E+00
none     0.0000E+00
Nuclide 031:
Te-131m
  4
 0.1080000000E+06
 0.1310E+03
 0.3838E+04
Te-131   0.2200E+00
I-131    0.7800E+00
none     0.0000E+00
Nuclide 032:
Te-132
  4
 0.2815200000E+06
 0.1320E+03
 0.3804E+05
I-132    0.1000E+01
none     0.0000E+00
none     0.0000E+00
Nuclide 033:
```

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I-131
  2
 0.6946560000E+06
 0.1310E+03
 2.7711E+00
Xe-131m  0.1100E-01
none     0.0000E+00
none     0.0000E+00
Nuclide 034:
I-132
  2
 0.8280000000E+04
 0.1320E+03
 3.6562E+00
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 035:
I-133
  2
 0.7488000000E+05
 0.1330E+03
 5.0417E+00
Xe-133m  0.2900E-01
Xe-133   0.9700E+00
none     0.0000E+00
Nuclide 036:
I-134
  2
 0.3156000000E+04
 0.1340E+03
 9.0750E-01
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 037:
I-135
  2
 0.2379600000E+05
 0.1350E+03
 3.1445E+00
Xe-135m  0.1500E+00
Xe-135   0.8500E+00
none     0.0000E+00
Nuclide 038:
Xe-133
  1
 0.4531680000E+06
 0.1330E+03
 1.5623E+01
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 039:
Xe-135
  1
 0.3272400000E+05
 0.1350E+03
 4.8063E-01
Cs-135   0.1000E+01
```

```
none      0.0000E+00
none      0.0000E+00
Nuclide 040:
Cs-134
  3
 0.6507177120E+08
 0.1340E+03
 0.5306E+04
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 041:
Cs-136
  3
 0.1131840000E+07
 0.1360E+03
 0.1503E+04
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 042:
Cs-137
  3
 0.9467280000E+09
 0.1370E+03
 0.3077E+04
Ba-137m  0.9500E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 043:
Ba-139
  6
 0.4962000000E+04
 0.1390E+03
 0.5089E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 044:
Ba-140
  6
 0.1100736000E+07
 0.1400E+03
 0.4922E+05
La-140   0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 045:
La-140
  9
 0.1449792000E+06
 0.1400E+03
 0.5036E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 046:
La-141
  9
 0.1414800000E+05
```

```
 0.1410E+03
 0.4646E+05
Ce-141    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 047:
La-142
  9
 0.5550000000E+04
 0.1420E+03
 0.4557E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 048:
Ce-141
  8
 0.2808086400E+07
 0.1410E+03
 0.4498E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 049:
Ce-143
  8
 0.1188000000E+06
 0.1430E+03
 0.4468E+05
Pr-143    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 050:
Ce-144
  8
 0.2456352000E+08
 0.1440E+03
 0.3414E+05
Pr-144m   0.1800E-01
Pr-144    0.9800E+00
none      0.0000E+00
Nuclide 051:
Pr-143
  9
 0.1171584000E+07
 0.1430E+03
 0.4350E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 052:
Nd-147
  9
 0.9486720000E+06
 0.1470E+03
 0.1836E+05
Pm-147    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 053:
```

```
Np-239
  8
 0.2034720000E+06
 0.2390E+03
 0.5178E+06
Pu-239    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 054:
Pu-238
  8
 0.2768863824E+10
 0.2380E+03
 0.1027E+03
U-234     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 055:
Pu-239
  8
 0.7594336440E+12
 0.2390E+03
 0.7698E+01
U-235     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 056:
Pu-240
  8
 0.2062920312E+12
 0.2400E+03
 0.8971E+01
U-236     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 057:
Pu-241
  8
 0.4544294400E+09
 0.2410E+03
 0.3548E+04
U-237     0.2400E-04
Am-241    0.1000E+01
none      0.0000E+00
Nuclide 058:
Am-241
  9
 0.1363919472E+11
 0.2410E+03
 0.3921E+01
Np-237    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 059:
Cm-242
  9
 0.1406592000E+08
 0.2420E+03
 0.1110E+04
Pu-238    0.1000E+01
```

```
none      0.0000E+00
none      0.0000E+00
Nuclide 060:
Cm-244
  9
 0.5715081360E+09
 0.2440E+03
 0.1209E+03
Pu-240    0.1000E+01
none      0.0000E+00
none      0.0000E+00
End of Nuclear Inventory File
```

RADTRAD SGTR Case 2 Nuclide Inventory File

```
Nuclide Inventory Name:  Modified Source Terms for the SGTR Accident - Pre-Accident 60
microCi/gm D.E. Iodine Spike
 Byron and Braidwood Plants (B-B) AST - in Ci/MW
 Power Level:
  0.1000E+01
 Nuclides:
  60
 Nuclide 001:
 Co-58
   7
  0.6117120000E+07
  0.5800E+02
  0.2553E+03
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 002:
 Co-60
   7
  0.1663401096E+09
  0.6000E+02
  0.1953E+03
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 003:
 Kr-85
   1
  0.3382974720E+09
  0.8500E+02
  4.4261E-01
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 004:
 Kr-85m
   1
  0.1612800000E+05
  0.8500E+02
  1.1203E-01
 Kr-85     0.2100E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 005:
 Kr-87
   1
  0.4578000000E+04
  0.8700E+02
  7.1566E-02
 Rb-87     0.1000E+01
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 006:
 Kr-88
   1
  0.1022400000E+05
```

```
 0.8800E+02
 2.0851E-01
Rb-88     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 007:
Rb-86
  3
 0.1612224000E+07
 0.8600E+02
 0.6480E+02
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 008:
Sr-89
  5
 0.4363200000E+07
 0.8900E+02
 0.2907E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 009:
Sr-90
  5
 0.9189573120E+09
 0.9000E+02
 0.2242E+04
Y-90      0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 010:
Sr-91
  5
 0.3420000000E+05
 0.9100E+02
 0.3930E+05
Y-91m     0.5800E+00
Y-91      0.4200E+00
none      0.0000E+00
Nuclide 011:
Sr-92
  5
 0.9756000000E+04
 0.9200E+02
 0.4136E+05
Y-92      0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 012:
Y-90
  9
 0.2304000000E+06
 0.9000E+02
 0.2347E+04
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 013:
```

```
Y-91
  9
 0.5055264000E+07
 0.9100E+02
 0.3553E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 014:
Y-92
  9
 0.1274400000E+05
 0.9200E+02
 0.4150E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 015:
Y-93
  9
 0.3636000000E+05
 0.9300E+02
 0.4624E+05
Zr-93     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 016:
Zr-95
  9
 0.5527872000E+07
 0.9500E+02
 0.4560E+05
Nb-95m    0.7000E-02
Nb-95     0.9900E+00
none      0.0000E+00
Nuclide 017:
Zr-97
  9
 0.6084000000E+05
 0.9700E+02
 0.4663E+05
Nb-97m    0.9500E+00
Nb-97     0.5300E-01
none      0.0000E+00
Nuclide 018:
Nb-95
  9
 0.3036960000E+07
 0.9500E+02
 0.4593E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 019:
Mo-99
  7
 0.2376000000E+06
 0.9900E+02
 0.5058+05
Tc-99m    0.8800E+00
```

```
Tc-99     0.1200E+00
none      0.0000E+00
Nuclide 020:
Tc-99m
  7
 0.2167200000E+05
 0.9900E+02
 0.4429E+05
Tc-99     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 021:
Ru-103
  7
 0.3393792000E+07
 0.1030E+03
 0.4094E+05
Rh-103m   0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 022:
Ru-105
  7
 0.1598400000E+05
 0.1050E+03
 0.2798E+05
Rh-105    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 023:
Ru-106
  7
 0.3181248000E+08
 0.1060E+03
 0.1387E+05
Rh-106    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 024:
Rh-105
  7
 0.1272960000E+06
 0.1050E+03
 0.2552E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 025:
Sb-127
  4
 0.3326400000E+06
 0.1270E+03
 0.2848E+04
Te-127m   0.1800E+00
Te-127    0.8200E+00
none      0.0000E+00
Nuclide 026:
Sb-129
  4
 0.1555200000E+05
```

```
 0.1290E+03
 0.8523E+04
Te-129m  0.2200E+00
Te-129   0.7700E+00
none     0.0000E+00
Nuclide 027:
Te-127
  4
 0.3366000000E+05
 0.1270E+03
 0.2812E+04
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 028:
Te-127m
  4
 0.9417600000E+07
 0.1270E+03
 0.3668E+03
Te-127   0.9800E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 029:
Te-129
  4
 0.4176000000E+04
 0.1290E+03
 0.8389E+04
I-129    0.1000E+01
none     0.0000E+00
none     0.0000E+00
Nuclide 030:
Te-129m
  4
 0.2903040000E+07
 0.1290E+03
 0.1249E+04
Te-129   0.6500E+00
I-129    0.3500E+00
none     0.0000E+00
Nuclide 031:
Te-131m
  4
 0.1080000000E+06
 0.1310E+03
 0.3838E+04
Te-131   0.2200E+00
I-131    0.7800E+00
none     0.0000E+00
Nuclide 032:
Te-132
  4
 0.2815200000E+06
 0.1320E+03
 0.3804E+05
I-132    0.1000E+01
none     0.0000E+00
none     0.0000E+00
Nuclide 033:
```

```
I-131
  2
 0.6946560000E+06
 0.1310E+03
 1.8285E+01
Xe-131m  0.1100E-01
none     0.0000E+00
none     0.0000E+00
Nuclide 034:
I-132
  2
 0.8280000000E+04
 0.1320E+03
 7.7097E+01
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 035:
I-133
  2
 0.7488000000E+05
 0.1330E+03
 4.0614E+01
Xe-133m  0.2900E-01
Xe-133   0.9700E+00
none     0.0000E+00
Nuclide 036:
I-134
  2
 0.3156000000E+04
 0.1340E+03
 4.0702E+01
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 037:
I-135
  2
 0.2379600000E+05
 0.1350E+03
 3.6307E+01
Xe-135m  0.1500E+00
Xe-135   0.8500E+00
none     0.0000E+00
Nuclide 038:
Xe-133
  1
 0.4531680000E+06
 0.1330E+03
 1.5623E+01
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 039:
Xe-135
  1
 0.3272400000E+05
 0.1350E+03
 4.8063E-01
Cs-135   0.1000E+01
```

```
none      0.0000E+00
none      0.0000E+00
Nuclide 040:
Cs-134
  3
 0.6507177120E+08
 0.1340E+03
 0.5306E+04
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 041:
Cs-136
  3
 0.1131840000E+07
 0.1360E+03
 0.1503E+04
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 042:
Cs-137
  3
 0.9467280000E+09
 0.1370E+03
 0.3077E+04
Ba-137m  0.9500E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 043:
Ba-139
  6
 0.4962000000E+04
 0.1390E+03
 0.5089E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 044:
Ba-140
  6
 0.1100736000E+07
 0.1400E+03
 0.4922E+05
La-140   0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 045:
La-140
  9
 0.1449792000E+06
 0.1400E+03
 0.5036E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 046:
La-141
  9
 0.1414800000E+05
```

```
 0.1410E+03
 0.4646E+05
Ce-141    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 047:
La-142
  9
 0.5550000000E+04
 0.1420E+03
 0.4557E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 048:
Ce-141
  8
 0.2808086400E+07
 0.1410E+03
 0.4498E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 049:
Ce-143
  8
 0.1188000000E+06
 0.1430E+03
 0.4468E+05
Pr-143    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 050:
Ce-144
  8
 0.2456352000E+08
 0.1440E+03
 0.3414E+05
Pr-144m   0.1800E-01
Pr-144    0.9800E+00
none      0.0000E+00
Nuclide 051:
Pr-143
  9
 0.1171584000E+07
 0.1430E+03
 0.4350E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 052:
Nd-147
  9
 0.9486720000E+06
 0.1470E+03
 0.1836E+05
Pm-147    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 053:
```

```
Np-239
  8
 0.2034720000E+06
 0.2390E+03
 0.5178E+06
Pu-239    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 054:
Pu-238
  8
 0.2768863824E+10
 0.2380E+03
 0.1027E+03
U-234     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 055:
Pu-239
  8
 0.7594336440E+12
 0.2390E+03
 0.7698E+01
U-235     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 056:
Pu-240
  8
 0.2062920312E+12
 0.2400E+03
 0.8971E+01
U-236     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 057:
Pu-241
  8
 0.4544294400E+09
 0.2410E+03
 0.3548E+04
U-237     0.2400E-04
Am-241    0.1000E+01
none      0.0000E+00
Nuclide 058:
Am-241
  9
 0.1363919472E+11
 0.2410E+03
 0.3921E+01
Np-237    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 059:
Cm-242
  9
 0.1406592000E+08
 0.2420E+03
 0.1110E+04
Pu-238    0.1000E+01
```

```
none      0.0000E+00
none      0.0000E+00
Nuclide 060:
Cm-244
  9
 0.5715081360E+09
 0.2440E+03
 0.1209E+03
Pu-240    0.1000E+01
none      0.0000E+00
none      0.0000E+00
End of Nuclear Inventory File
```

RADTRAD SGTR Case 3 Nuclide Inventory File

```
Nuclide Inventory Name:  Modified Source Terms for 0.1 microCi/gm Secondary Loop
Equilibrium Iodine Cases
 Byron and Braidwood Plants (B-B) AST - in Ci/MW
 Power Level:
  0.1000E+01
 Nuclides:
  60
 Nuclide 001:
 Co-58
   7
  0.6117120000E+07
  0.5800E+02
  0.2553E+03
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 002:
 Co-60
   7
  0.1663401096E+09
  0.6000E+02
  0.1953E+03
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 003:
 Kr-85
   1
  0.3382974720E+09
  0.8500E+02
  0.5702E+03
 none      0.0000E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 004:
 Kr-85m
   1
  0.1612800000E+05
  0.8500E+02
  0.8592E+04
 Kr-85     0.2100E+00
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 005:
 Kr-87
   1
  0.4578000000E+04
  0.8700E+02
  0.1696E+05
 Rb-87     0.1000E+01
 none      0.0000E+00
 none      0.0000E+00
 Nuclide 006:
 Kr-88
   1
  0.1022400000E+05
```

```
 0.8800E+02
 0.2392E+05
Rb-88     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 007:
Rb-86
  3
 0.1612224000E+07
 0.8600E+02
 0.6480E+02
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 008:
Sr-89
  5
 0.4363200000E+07
 0.8900E+02
 0.2907E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 009:
Sr-90
  5
 0.9189573120E+09
 0.9000E+02
 0.2242E+04
Y-90      0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 010:
Sr-91
  5
 0.3420000000E+05
 0.9100E+02
 0.3930E+05
Y-91m     0.5800E+00
Y-91      0.4200E+00
none      0.0000E+00
Nuclide 011:
Sr-92
  5
 0.9756000000E+04
 0.9200E+02
 0.4136E+05
Y-92      0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 012:
Y-90
  9
 0.2304000000E+06
 0.9000E+02
 0.2347E+04
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 013:
```

```
Y-91
  9
 0.5055264000E+07
 0.9100E+02
 0.3553E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 014:
Y-92
  9
 0.1274400000E+05
 0.9200E+02
 0.4150E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 015:
Y-93
  9
 0.3636000000E+05
 0.9300E+02
 0.4624E+05
Zr-93     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 016:
Zr-95
  9
 0.5527872000E+07
 0.9500E+02
 0.4560E+05
Nb-95m    0.7000E-02
Nb-95     0.9900E+00
none      0.0000E+00
Nuclide 017:
Zr-97
  9
 0.6084000000E+05
 0.9700E+02
 0.4663E+05
Nb-97m    0.9500E+00
Nb-97     0.5300E-01
none      0.0000E+00
Nuclide 018:
Nb-95
  9
 0.3036960000E+07
 0.9500E+02
 0.4593E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 019:
Mo-99
  7
 0.2376000000E+06
 0.9900E+02
 0.5058+05
Tc-99m    0.8800E+00
```

```
Tc-99     0.1200E+00
none      0.0000E+00
Nuclide 020:
Tc-99m
  7
 0.2167200000E+05
 0.9900E+02
 0.4429E+05
Tc-99     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 021:
Ru-103
  7
 0.3393792000E+07
 0.1030E+03
 0.4094E+05
Rh-103m   0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 022:
Ru-105
  7
 0.1598400000E+05
 0.1050E+03
 0.2798E+05
Rh-105    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 023:
Ru-106
  7
 0.3181248000E+08
 0.1060E+03
 0.1387E+05
Rh-106    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 024:
Rh-105
  7
 0.1272960000E+06
 0.1050E+03
 0.2552E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 025:
Sb-127
  4
 0.3326400000E+06
 0.1270E+03
 0.2848E+04
Te-127m   0.1800E+00
Te-127    0.8200E+00
none      0.0000E+00
Nuclide 026:
Sb-129
  4
 0.1555200000E+05
```

```
 0.1290E+03
 0.8523E+04
Te-129m  0.2200E+00
Te-129   0.7700E+00
none     0.0000E+00
Nuclide 027:
Te-127
  4
 0.3366000000E+05
 0.1270E+03
 0.2812E+04
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 028:
Te-127m

  4
 0.9417600000E+07
 0.1270E+03
 0.3668E+03
Te-127   0.9800E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 029:
Te-129
  4
 0.4176000000E+04
 0.1290E+03
 0.8389E+04
I-129    0.1000E+01
none     0.0000E+00
none     0.0000E+00
Nuclide 030:
Te-129m
  4
 0.2903040000E+07
 0.1290E+03
 0.1249E+04
Te-129   0.6500E+00
I-129    0.3500E+00
none     0.0000E+00
Nuclide 031:
Te-131m
  4
 0.1080000000E+06
 0.1310E+03
 0.3838E+04
Te-131   0.2200E+00
I-131    0.7800E+00
none     0.0000E+00
Nuclide 032:
Te-132
  4
 0.2815200000E+06
 0.1320E+03
 0.3804E+05
I-132    0.1000E+01
none     0.0000E+00
none     0.0000E+00
```

```
 Nuclide 033:
 I-131
   2
  0.6946560000E+06
  0.1310E+03
  1.9412E-03      0.1 microCi/gm DE I-131 Eqilibrium Iodine Activity in Secondary
Coolent.
 Xe-131m  0.1100E-01
 none     0.0000E+00
 none     0.0000E+00
 Nuclide 034:
 I-132
   2
  0.8280000000E+04
  0.1320E+03
  2.5612E-03      0.1 microCi/gm DE I-131 Eqilibrium Iodine Activity in Secondary
Coolent.
 none     0.0000E+00
 none     0.0000E+00
 none     0.0000E+00
 Nuclide 035:
 I-133
   2
  0.7488000000E+05
  0.1330E+03
  3.5319E-03      0.1 microCi/gm DE I-131 Eqilibrium Iodine Activity in Secondary
Coolent.
 Xe-133m  0.2900E-01
 Xe-133   0.9700E+00
 none     0.0000E+00
 Nuclide 036:
 I-134
   2
  0.3156000000E+04
  0.1340E+03
  6.3573E-04      0.1 microCi/gm DE I-131 Eqilibrium Iodine Activity in Secondary
Coolent.
 none     0.0000E+00
 none     0.0000E+00
 none     0.0000E+00
 Nuclide 037:
 I-135
   2
  0.2379600000E+05
  0.1350E+03
  2.2028E-03      0.1 microCi/gm DE I-131 Eqilibrium Iodine Activity in Secondary
Coolent.
 Xe-135m  0.1500E+00
 Xe-135   0.8500E+00
 none     0.0000E+00
 Nuclide 038:
 Xe-133
   1
  0.4531680000E+06
  0.1330E+03
  0.5396E+05
 none     0.0000E+00
 none     0.0000E+00
 none     0.0000E+00
 Nuclide 039:
```

```
Xe-135
  1
 0.3272400000E+05
 0.1350E+03
 0.1532E+05
Cs-135   0.1000E+01
none     0.0000E+00
none     0.0000E+00
Nuclide 040:
Cs-134
  3
 0.6507177120E+08
 0.1340E+03
 0.5306E+04
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 041:
Cs-136
  3
 0.1131840000E+07
 0.1360E+03
 0.1503E+04
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 042:
Cs-137
  3
 0.9467280000E+09
 0.1370E+03
 0.3077E+04
Ba-137m  0.9500E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 043:
Ba-139
  6
 0.4962000000E+04
 0.1390E+03
 0.5089E+05
none     0.0000E+00
none     0.0000E+00
none     0.0000E+00
Nuclide 044:
Ba-140
  6
 0.1100736000E+07
 0.1400E+03
 0.4922E+05
La-140   0.1000E+01
none     0.0000E+00
none     0.0000E+00
Nuclide 045:
La-140
  9
 0.1449792000E+06
 0.1400E+03
 0.5036E+05
none     0.0000E+00
```

```
none      0.0000E+00
none      0.0000E+00
Nuclide 046:
La-141
  9
 0.1414800000E+05
 0.1410E+03
 0.4646E+05
Ce-141    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 047:
La-142
  9
 0.5550000000E+04
 0.1420E+03
 0.4557E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 048:
Ce-141
  8
 0.2808086400E+07
 0.1410E+03
 0.4498E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 049:
Ce-143
  8
 0.1188000000E+06
 0.1430E+03
 0.4468E+05
Pr-143    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 050:
Ce-144
  8
 0.2456352000E+08
 0.1440E+03
 0.3414E+05
Pr-144m   0.1800E-01
Pr-144    0.9800E+00
none      0.0000E+00
Nuclide 051:
Pr-143
  9
 0.1171584000E+07
 0.1430E+03
 0.4350E+05
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 052:
Nd-147
  9
 0.9486720000E+06
```

```
 0.1470E+03
 0.1836E+05
Pm-147    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 053:
Np-239
  8
 0.2034720000E+06
 0.2390E+03
 0.5178E+06
Pu-239    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 054:
Pu-238
  8
 0.2768863824E+10
 0.2380E+03
 0.1027E+03
U-234     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 055:
Pu-239
  8
 0.7594336440E+12
 0.2390E+03
 0.7698E+01
U-235     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 056:
Pu-240
  8
 0.2062920312E+12
 0.2400E+03
 0.8971E+01
U-236     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 057:
Pu-241
  8
 0.4544294400E+09
 0.2410E+03
 0.3548E+04
U-237     0.2400E-04
Am-241    0.1000E+01
none      0.0000E+00
Nuclide 058:
Am-241
  9
 0.1363919472E+11
 0.2410E+03
 0.3921E+01
Np-237    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 059:
```

```
Cm-242
  9
 0.1406592000E+08
 0.2420E+03
 0.1110E+04
Pu-238   0.1000E+01
none     0.0000E+00
none     0.0000E+00
Nuclide 060:
Cm-244
  9
 0.5715081360E+09
 0.2440E+03
 0.1209E+03
Pu-240   0.1000E+01
none     0.0000E+00
none     0.0000E+00
End of Nuclear Inventory File
```

RADTRAD SGTR Case 1 Release Fraction/Timing File

```
Release Fraction and Timing Name:
 B-B Plants AST SGTR Case 1, RG 1.183,
 Duration (h):  Design Basis Accident
  0.1000E-04  0.0000E+00  0.0000E+00  0.0000E+00
 Noble Gases:
  0.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00
 Iodine:
  0.1000E+01  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
```

RADTRAD SGTR Case 2 Release Fraction/Timing File

```
Release Fraction and Timing Name:
 B-B Plants AST SGTR Case 2, RG 1.183,
 Duration (h):  Design Basis Accident
  0.1000E-04  0.8000E+01  0.0000E+00  0.0000E+00
 Noble Gases:
  0.1000E+01  0.0000E+00  0.0000E+00  0.0000E+00
 Iodine:
  0.0000E+00  0.1000E+01  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
```

RADTRAD SGTR Case 3 Release Fraction/Timing File

```
Release Fraction and Timing Name:
 B-B Plants Iodine Activity "Release Fractions"
 Duration (h):  Design Basis Accident
  0.1000E-04  0.0000E+00  0.0000E+00  0.0000E+00
 Noble Gases:
  0.0000E+00  0.0000E+00  0.0000E+00  0.0000E+00
 Iodine:
  0.1000E+01  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 E
Demonstration that Smaller Control Room Volume Used in Analysis Bounds Actual Byron and Braidwood Control Room Volumes

I. Purpose

The purpose of this attachment is to demonstrate that using a smaller value of 200,000 ft^3 to bound both the Byron and Braidwood Control Room (CR) volumes of 230,830 ft^3 and 232,872 ft^3, respectively, provides the conservative approach to modeling of CR doses in this accident analysis.

II. Approach

Shown in this attachment, is a re-evaluation of this worst-case design basis accident using a Control Room volume of 240,000 ft^3 instead of the 200,000 ft^3 volume used in the analysis. It is intended to show that the implementation of the larger Control Room volume leads to a lower end-of-accident dose consequence than that which is calculated when implementing the smaller volume. For this particular AST Steam Generator Tube Rupture (SGTR) accident analysis, CR doses from the two runs shown in this attachment are summed to give the re-evaluated CR dose from the worst-case DBA-SGTR, for comparison to the same dose calculated in the analysis.

III. Results

Shown below is a table comparing the dose from the bounding design basis accident case as compared to the test case of this attachment that uses the larger Control Room volume.

It is clearly shown that the dose assessment calculated in the Control Room using a smaller volume of 200,000 ft^3 is more conservative than that using a larger volume of 240,000 ft^3.

Sensitivity Run Description	Control Room Dose (rem TEDE)
DBA-SGTR with a Pre-Accident 60 μCi/gm D.E. I-131 Spike using a CR Volume of 200,000 ft^3 for Dose Analysis	0.7600
DBA-SGTR with a Pre-Accident 60 μCi/gm D.E. I-131 Spike using a CR Volume of 240,000 ft^3 for Dose Analysis	0.6972

```
 ######################################################################
    RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:34:21
 ######################################################################

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

 Plant file           = C:\Documents and Settings\Aleem Boatright\My Documents\My
Work\Exelon\Byron & Braidwood\SGTR\RADTRAD\Rev 1\(Large CR Volume Conservatism
Test) B-B AST SGTR - Case 1 - Large CR Volume 1000cfm Inleak - 95 percent Intake
Filt.psf
 Inventory file       = c:\program files\radtrad3-03\defaults\byron-braidwood ast
sgtr case 1 source terms.nif
 Release file         = c:\program files\radtrad3-03\defaults\byron-braidwood sgtr
case 1-release fractions.rft
 Dose Conversion file = c:\program files\radtrad3-03\defaults\fgr11&12.inp



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


 Radtrad 3.03 4/15/2001
 Byron/Braidwood SGTR - Case 1 - Dose from Pre-Accident Iodine Spike - Control Room
@ 240,000 cu. ft. CR Volume with 8575cfm Intake - 1000cfm Unfilt Inleakage - 95% CR
Intake Fiters - 80% Aerosol, 90% Elemental & Organic Recirc Filtration
 Nuclide Inventory File:
 c:\program files\radtrad3-03\defaults\byron-braidwood ast sgtr case 1 source
terms.nif
 Plant Power Level:
  3.6583E+03
 Compartments:
   6
 Compartment 1:
 (Iodines) Primary Loop 1 - Reactor Coolant System (RCS)
   3
  8.0410E+03
   0
   0
   0
   0
   0
 Compartment 2:
 (Noble Gas) Primary Loop 2 - Reactor Coolant System (RCS)
   3
  8.0410E+03
   0
```

```
   0
   0
   0
   0
 Compartment 3:
 Secondary Loop - Steam Generator Volumes (3 Intact SGs)
   3
  3.3800E+03
   0
   0
   0
   0
   0
 Compartment 4:
 Secondary Loop - Steam Generator Volume (Failed SG)
   3
  1.1260E+03
   0
   0
   0
   0
   0
 Compartment 5:
 Control Room
   1
  2.4000E+05
   0
   0
   1
   0
   0
 Compartment 6:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Pathways:
   9
 Pathway 1:
 (Iodine Leakage) Primary Loop 1 (RCS) to  Secondary Loop - Steam Generator Volumes
(3 Intact SGs)
   1
   3
   2
 Pathway 2:
 (Un-Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Secondary Loop - Steam
Generator Volume (Failed SG)
   1
   4
   2
 Pathway 3:
 (Flashed Break Flow-Iodines) Primary Loop 1 - (RCS) to Environment
   1
```

```
   6
   2
 Pathway 4:
 (Flashed Break Flow-Noble Gas) Primary Loop 2 - (RCS) to Environment (Combined
Intact and Ruptured SG Leak)
   2
   6
   2
 Pathway 5:
 (Steam Release-Intact SGs) Secondary Loop - Steam Generator Volumes to Environment
   3
   6
   2
 Pathway 6:
 (Steam Release-Failed SG) Secondary Loop - Steam Generator Volume to Environment
   4
   6
   2
 Pathway 7:
 (Filtered Intake) Environment to Control Room
   6
   5
   2
 Pathway 8:
 (Unfiltered Inleakage) Environment to Control Room
   6
   5
   2
 Pathway 9:
 (Control Room Exhaust) Control Room to Environment
   5
   6
   2
 End of Plant Model File
 Scenario Description Name:

 Plant Model Filename:

 Source Term:
   2
   1   1.0000E+00
   2   1.0000E+00
 c:\program files\radtrad3-03\defaults\fgr11&12.inp
 c:\program files\radtrad3-03\defaults\byron-braidwood sgtr case 1-release
fractions.rft
   0.0000E+00
   0
   0.0000E+00   1.0000E+00   0.0000E+00   1.0000E+00
 Overlying Pool:
   0
   0.0000E+00
   0
   0
   0
   0
 Compartments:
   6
```

```
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 4:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 5:
  0
  1
  0
  0
  0
  0
  1
  3.9150E+04
  3
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   8.0000E+01   9.0000E+01   9.0000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
Compartment 6:
  0
```

```
  1
  0
  0
  0
  0
  0
  0
  0
Pathways:
  9
Pathway 1:
  0
  0
  0
  0
  0
  1
  2
  0.0000E+00   8.7430E-02   1.0000E+02   0.0000E+00   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 2:
  0
  0
  0
  0
  0
  1
 10
  0.0000E+00   5.1630E+01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2400E-01   4.2910E+01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2900E-01   5.1350E+01   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   5.4170E+01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   5.0360E+01   1.0000E+02   0.0000E+00   1.0000E+02
  8.3300E-01   4.0260E+01   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   2.2970E+01   1.0000E+02   0.0000E+00   1.0000E+02
  9.9700E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
```

```
 10
  0.0000E+00   3.9130E-02   1.0000E+02   0.0000E+00   1.0000E+02
  1.2400E-01   9.2950E-01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2900E-01   1.7110E+00   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   5.2090E-01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   2.2110E-01   1.0000E+02   0.0000E+00   1.0000E+02
  8.3300E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.9700E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
 10
  0.0000E+00   5.5621E+01   1.0000E+02   1.0000E+02   1.0000E+02
  1.2400E-01   4.3896E+01   1.0000E+02   1.0000E+02   1.0000E+02
  1.2900E-01   5.3113E+01   1.0000E+02   1.0000E+02   1.0000E+02
  4.7200E-01   5.4773E+01   1.0000E+02   1.0000E+02   1.0000E+02
  7.7800E-01   5.0641E+01   1.0000E+02   1.0000E+02   1.0000E+02
  8.3300E-01   4.0329E+01   1.0000E+02   1.0000E+02   1.0000E+02
  9.7200E-01   2.3060E+01   1.0000E+02   1.0000E+02   1.0000E+02
  9.9700E-01   8.7404E-02   1.0000E+02   1.0000E+02   1.0000E+02
  2.0000E+00   8.7404E-02   1.0000E+02   1.0000E+02   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   1.0000E+02   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 5:
  0
  0
  0
  0
  0
  1
  5
  0.0000E+00   3.2120E-01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   7.4690E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   5.2050E-01   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
```

```
  0
  0
  0
Pathway 6:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.0710E-01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2900E-01   7.3310E-01   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   1.1840E-02   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 7:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   6.4240E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   8.5750E+03   9.9000E+01   9.5000E+01   9.5000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 8:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   1.0000E+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
Pathway 9:
  0
```

```
  0
  0
  0
  0
  1
  3
  0.0000E+00   7.4240E+03   1.0000E+02   1.0000E+02   1.0000E+02
  5.0000E-01   9.5750E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary (EAB)
  6
  1
  3
  0.0000E+00   5.3600E-04
  5.0000E-01   5.3600E-04
  2.0000E+00   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone (LPZ)
  6
  1
  7
  0.0000E+00   9.3200E-05
  5.0000E-01   9.3200E-05
  2.0000E+00   4.5000E-05
  8.0000E+00   3.1200E-05
  2.4000E+01   1.4100E-05
  9.6000E+01   4.5400E-06
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 3:
Control Room
  5
  0
  1
  2
```

```
  0.0000E+00   3.5000E-04
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   1.0000E+00
  2.4000E+01   6.0000E-01
  9.6000E+01   4.0000E-01
  7.2000E+02   0.0000E+00
Effective Volume Location:
  1
  7
  0.0000E+00   1.7700E-03
  5.0000E-01   8.1400E-04
  2.0000E+00   6.9800E-04
  8.0000E+00   3.1200E-04
  2.4000E+01   1.9500E-04
  9.6000E+01   1.6700E-04
  7.2000E+02   0.0000E+00
Simulation Parameters:
  1
  0.0000E+00   0.0000E+00
Output Filename:
C:\Documents and Settings\Aleem Boatright\My Documents\My Work\Exelon\Byron &
Braidwood\SGTR\RADTRAD\Rev 1\(Large CR Volume Conservatism Test) B-B AST SGTR -
Case 1 - Large CR Volume 1000cfm Inleak - 95 percent Intake Filt.o0
  1
  1
  1
  0
  0
End of Scenario File
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:34:21
#######################################################################

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

Number of Nuclides =  60

Inventory Power =   1.0000E+00 MWth
Plant Power Level =   3.6583E+03 MWth

Number of compartments    =   6

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: (Iodines) Primary Loop 1 - Reactor Coola
Compartment volume =   8.0410E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  1
   Exit Pathway Number    1: (Iodine Leakage) Primary Loop 1 (RCS) to  Secondar
   Exit Pathway Number    2: (Un-Flashed Break Flow-Iodines) Primary Loop 1 - (
   Exit Pathway Number    3: (Flashed Break Flow-Iodines) Primary Loop 1 - (RCS

Compartment number  2  (Source term fraction =   1.0000E+00
)
Name: (Noble Gas) Primary Loop 2 - Reactor Coo
Compartment volume =   8.0410E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  2
   Exit Pathway Number    4: (Flashed Break Flow-Noble Gas) Primary Loop 2 - (R

Compartment number  3
Name: Secondary Loop - Steam Generator Volumes
Compartment volume =   3.3800E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  3
   Inlet Pathway Number   1: (Iodine Leakage) Primary Loop 1 (RCS) to  Secondar
   Exit Pathway Number    5: (Steam Release-Intact SGs) Secondary Loop - Steam

Compartment number  4
Name: Secondary Loop - Steam Generator Volume
Compartment volume =   1.1260E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  4
   Inlet Pathway Number   2: (Un-Flashed Break Flow-Iodines) Primary Loop 1 - (
   Exit Pathway Number    6: (Steam Release-Failed SG) Secondary Loop - Steam G

Compartment number  5
Name: Control Room
Compartment volume =   2.4000E+05 (Cubic feet)
Compartment type is Control Room
Removal devices within compartment:
```

```
     Filter(s)
Pathways into and out of compartment  5
   Inlet Pathway Number   7: (Filtered Intake) Environment to Control Room
   Inlet Pathway Number   8: (Unfiltered Inleakage) Environment to Control Room
   Exit Pathway Number    9: (Control Room Exhaust) Control Room to Environment

Compartment number  6
Name: Environment
Compartment type is Environment
Pathways into and out of compartment  6
   Inlet Pathway Number   3: (Flashed Break Flow-Iodines) Primary Loop 1 - (RCS
   Inlet Pathway Number   4: (Flashed Break Flow-Noble Gas) Primary Loop 2 - (R
   Inlet Pathway Number   5: (Steam Release-Intact SGs) Secondary Loop - Steam
   Inlet Pathway Number   6: (Steam Release-Failed SG) Secondary Loop - Steam G
   Inlet Pathway Number   9: (Control Room Exhaust) Control Room to Environment
   Exit Pathway Number    7: (Filtered Intake) Environment to Control Room
   Exit Pathway Number    8: (Unfiltered Inleakage) Environment to Control Room

Total number of pathways =   9
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:34:21
#######################################################################

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

Radioactive Decay is enabled

Release Fractions and Timings
                GAP        EARLY IN-VESSEL  LATE RELEASE    RELEASE MASS
             0.000010 hr     0.0000 hrs       0.0000 hrs        (gm)
NOBLES       1.0000E+00      0.0000E+00       0.0000E+00       4.433E+00
IODINE       1.0000E+00      0.0000E+00       0.0000E+00       1.027E-01
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 =      3658. 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)
 Kr-85     1   4.426E-01  3.383E+08   1.190E-16   0.000E+00   0.000E+00
 Kr-85m    1   1.120E-01  1.613E+04   7.480E-15   0.000E+00   0.000E+00
 Kr-87     1   7.157E-02  4.578E+03   4.120E-14   0.000E+00   0.000E+00
 Kr-88     1   2.085E-01  1.022E+04   1.020E-13   0.000E+00   0.000E+00
 I-131     2   2.771E+00  6.947E+05   1.820E-14   2.920E-07   8.890E-09
 I-132     2   3.656E+00  8.280E+03   1.120E-13   1.740E-09   1.030E-10
 I-133     2   5.042E+00  7.488E+04   2.940E-14   4.860E-08   1.580E-09
 I-134     2   9.075E-01  3.156E+03   1.300E-13   2.880E-10   3.550E-11
 I-135     2   3.144E+00  2.380E+04   8.294E-14   8.460E-09   3.320E-10
 Xe-133    1   1.562E+01  4.532E+05   1.560E-15   0.000E+00   0.000E+00
 Xe-135    1   4.806E-01  3.272E+04   1.190E-14   0.000E+00   0.000E+00

Iodine fractions
     Aerosol     =   0.0000E+00
     Elemental   =   1.0000E+00
     Organic     =   0.0000E+00

COMPARTMENT DATA

Compartment number   1: (Iodines) Primary Loop 1 - Reactor Coola

Compartment number   2: (Noble Gas) Primary Loop 2 - Reactor Coo

Compartment number   3: Secondary Loop - Steam Generator Volumes

Compartment number   4: Secondary Loop - Steam Generator Volume

Compartment number   5: Control Room
```

Compartment Filter Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	3.9150E+04	8.0000E+01	9.0000E+01	9.0000E+01
7.2000E+02	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00

Compartment number 6: Environment

PATHWAY DATA

Pathway number 1: (Iodine Leakage) Primary Loop 1 (RCS) to Secondar

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	8.7430E-02	1.0000E+02	0.0000E+00	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 2: (Un-Flashed Break Flow-Iodines) Primary Loop 1 - (

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	5.1630E+01	1.0000E+02	0.0000E+00	1.0000E+02
1.2400E-01	4.2910E+01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	5.1350E+01	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	5.4170E+01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	5.0360E+01	1.0000E+02	0.0000E+00	1.0000E+02
8.3300E-01	4.0260E+01	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	2.2970E+01	1.0000E+02	0.0000E+00	1.0000E+02
9.9700E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 3: (Flashed Break Flow-Iodines) Primary Loop 1 - (RCS

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.9130E-02	1.0000E+02	0.0000E+00	1.0000E+02
1.2400E-01	9.2950E-01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	1.7110E+00	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	5.2090E-01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	2.2110E-01	1.0000E+02	0.0000E+00	1.0000E+02
8.3300E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.9700E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 4: (Flashed Break Flow-Noble Gas) Primary Loop 2 - (R

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	5.5621E+01	1.0000E+02	1.0000E+02	1.0000E+02
1.2400E-01	4.3896E+01	1.0000E+02	1.0000E+02	1.0000E+02
1.2900E-01	5.3113E+01	1.0000E+02	1.0000E+02	1.0000E+02
4.7200E-01	5.4773E+01	1.0000E+02	1.0000E+02	1.0000E+02
7.7800E-01	5.0641E+01	1.0000E+02	1.0000E+02	1.0000E+02
8.3300E-01	4.0329E+01	1.0000E+02	1.0000E+02	1.0000E+02
9.7200E-01	2.3060E+01	1.0000E+02	1.0000E+02	1.0000E+02
9.9700E-01	8.7404E-02	1.0000E+02	1.0000E+02	1.0000E+02
2.0000E+00	8.7404E-02	1.0000E+02	1.0000E+02	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	1.0000E+02	1.0000E+02

Pathway number 5: (Steam Release-Intact SGs) Secondary Loop - Steam

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.2120E-01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	7.4690E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	5.2050E-01	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 6: (Steam Release-Failed SG) Secondary Loop - Steam G

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0710E-01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	7.3310E-01	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	1.1840E-02	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 7: (Filtered Intake) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	6.4240E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	8.5750E+03	9.9000E+01	9.5000E+01	9.5000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 8: (Unfiltered Inleakage) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0000E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	1.0000E+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

Pathway number  9: (Control Room Exhaust) Control Room to Environment

     Pathway Filter: Removal Data

       Time (hr)       Flow Rate          Filter Efficiencies (%)
                        (cfm)        Aerosol     Elemental     Organic
       0.0000E+00    7.4240E+03   1.0000E+02   1.0000E+02   1.0000E+02
       5.0000E-01    9.5750E+03   1.0000E+02   1.0000E+02   1.0000E+02
       7.2000E+02    0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00

LOCATION DATA
     Location Exclusion Area Boundary (EAB)     is in compartment   6

     Location X/Q Data
      Time (hr)          X/Q (s * m^-3)
       0.0000E+00           5.3600E-04
       5.0000E-01           5.3600E-04
       2.0000E+00           0.0000E+00

     Location Breathing Rate Data
      Time (hr)          Breathing Rate (m^3 * sec^-1)
       0.0000E+00                  3.5000E-04
       8.0000E+00                  1.8000E-04
       2.4000E+01                  2.3000E-04
       7.2000E+02                  0.0000E+00
     Location Low Population Zone (LPZ)     is in compartment   6

     Location X/Q Data
      Time (hr)          X/Q (s * m^-3)
       0.0000E+00           9.3200E-05
       5.0000E-01           9.3200E-05
       2.0000E+00           4.5000E-05
       8.0000E+00           3.1200E-05
       2.4000E+01           1.4100E-05
       9.6000E+01           4.5400E-06
       7.2000E+02           0.0000E+00

     Location Breathing Rate Data
      Time (hr)          Breathing Rate (m^3 * sec^-1)
       0.0000E+00                  3.5000E-04
       8.0000E+00                  1.8000E-04
       2.4000E+01                  2.3000E-04
       7.2000E+02                  0.0000E+00
     Location Control Room     is in compartment   5

     Location X/Q Data
      Time (hr)          X/Q (s * m^-3)
       0.0000E+00           1.7700E-03
       5.0000E-01           8.1400E-04
       2.0000E+00           6.9800E-04
       8.0000E+00           3.1200E-04
       2.4000E+01           1.9500E-04
       9.6000E+01           1.6700E-04
       7.2000E+02           0.0000E+00
```

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

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

USER SPECIFIED TIME STEP DATA - SUPPLEMENTAL TIME STEPS
     Time              Time step
      0.0000E+00        0.0000E+00
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:34:21
#######################################################################
```

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

```
#######################################################################
                                Dose Output
#######################################################################
```

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.4208E-07	4.0313E-06	9.6832E-07
Accumulated dose (rem)	8.4208E-07	4.0313E-06	9.6832E-07

Low Population Zone (LPZ) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4642E-07	7.0096E-07	1.6837E-07
Accumulated dose (rem)	1.4642E-07	7.0096E-07	1.6837E-07

Control Room Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4484E-12	1.2354E-10	5.3171E-12
Accumulated dose (rem)	1.4484E-12	1.2354E-10	5.3171E-12

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.1240	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.0427E-02	1.4356E-01	2.4922E-02
Accumulated dose (rem)	2.0427E-02	1.4356E-01	2.4923E-02

Low Population Zone (LPZ) Doses:

Time (h) = 0.1240	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.5518E-03	2.4962E-02	4.3334E-03
Accumulated dose (rem)	3.5519E-03	2.4963E-02	4.3336E-03

Control Room Doses:

Time (h) = 0.1240	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.9618E-04	4.7652E-02	1.8883E-03
Accumulated dose (rem)	3.9618E-04	4.7652E-02	1.8883E-03

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.6441E-04	9.4773E-02	3.8313E-03
Accumulated dose (rem)	2.1292E-02	2.3833E-01	2.8754E-02

Low Population Zone (LPZ) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5030E-04	1.6479E-02	6.6618E-04
Accumulated dose (rem)	3.7022E-03	4.1442E-02	4.9998E-03

Control Room Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.1515E-05	5.3966E-03	2.0045E-04
Accumulated dose (rem)	4.2770E-04	5.3049E-02	2.0888E-03

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.4621E-02	1.4677E+01	5.4390E-01
Accumulated dose (rem)	1.0591E-01	1.4915E+01	5.7265E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4714E-02	2.5520E+00	9.4573E-02
Accumulated dose (rem)	1.8416E-02	2.5934E+00	9.9573E-02

Control Room Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.6201E-03	1.2536E+01	3.9785E-01
Accumulated dose (rem)	6.0478E-03	1.2589E+01	3.9994E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.1545E-03	2.4663E-01	1.1868E-02
Accumulated dose (rem)	1.1007E-01	1.5162E+01	5.8452E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.2239E-04	4.2885E-02	2.0636E-03
Accumulated dose (rem)	1.9138E-02	2.6363E+00	1.0164E-01

Control Room Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.7421E-04	1.8688E+00	5.9121E-02
Accumulated dose (rem)	6.7220E-03	1.4458E+01	4.5906E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.8146E-02	2.2981E+00	1.1000E-01
Accumulated dose (rem)	1.4821E-01	1.7460E+01	6.9452E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.6328E-03	3.9959E-01	1.9126E-02
Accumulated dose (rem)	2.5771E-02	3.0359E+00	1.2076E-01

Control Room Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.6923E-03	6.2388E+00	1.9978E-01
Accumulated dose (rem)	1.1414E-02	2.0696E+01	6.5884E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.8330	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.8846E-03	1.8865E-01	1.1780E-02
Accumulated dose (rem)	1.5410E-01	1.7648E+01	7.0630E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.8330	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0232E-03	3.2803E-02	2.0483E-03
Accumulated dose (rem)	2.6795E-02	3.0687E+00	1.2281E-01

Control Room Doses:

Time (h) = 0.8330	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.8956E-04	1.4100E-01	5.0960E-03
Accumulated dose (rem)	1.2104E-02	2.0837E+01	6.6394E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0578E-02	2.4455E-02	1.1342E-02
Accumulated dose (rem)	1.6467E-01	1.7673E+01	7.1764E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8393E-03	4.2522E-03	1.9721E-03
Accumulated dose (rem)	2.8634E-02	3.0730E+00	1.2478E-01

Control Room Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5565E-03	1.4224E-01	6.0011E-03
Accumulated dose (rem)	1.3660E-02	2.0980E+01	6.6994E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.9970	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0435E-03	0.0000E+00	1.0435E-03
Accumulated dose (rem)	1.6572E-01	1.7673E+01	7.1868E-01

Low Population Zone (LPZ) Doses:

Time (h) = 0.9970	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8145E-04	0.0000E+00	1.8145E-04
Accumulated dose (rem)	2.8815E-02	3.0730E+00	1.2496E-01

Control Room Doses:

Time (h) = 0.9970	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.5103E-04	8.6710E-03	5.2189E-04
Accumulated dose (rem)	1.3911E-02	2.0988E+01	6.7046E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.5023E-04	0.0000E+00	1.5023E-04
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.6122E-05	0.0000E+00	2.6122E-05
Accumulated dose (rem)	2.8841E-02	3.0730E+00	1.2499E-01

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.6347E-03	2.9354E-02	4.5515E-03
Accumulated dose (rem)	1.7546E-02	2.1018E+01	6.7501E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.3070E-04	2.7995E-01	9.1233E-03
Accumulated dose (rem)	2.9272E-02	3.3529E+00	1.3411E-01

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.0464E-04	1.3601E-01	4.6276E-03
Accumulated dose (rem)	1.7951E-02	2.1154E+01	6.7964E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.0257E-04	2.1619E-01	6.9709E-03
Accumulated dose (rem)	2.9575E-02	3.5691E+00	1.4109E-01

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.7240E-05	1.3547E-01	4.2058E-03
Accumulated dose (rem)	1.7978E-02	2.1289E+01	6.8385E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.3107E-04	4.1666E-01	1.2973E-02
Accumulated dose (rem)	2.9806E-02	3.9858E+00	1.5406E-01

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.4970E-05	1.7123E-01	5.2619E-03
Accumulated dose (rem)	1.8003E-02	2.1460E+01	6.8911E-01

Exclusion Area Boundary (EAB) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.6587E-01	1.7673E+01	7.1883E-01

Low Population Zone (LPZ) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.1733E-04	3.2875E-01	1.0128E-02
Accumulated dose (rem)	2.9923E-02	4.3145E+00	1.6419E-01

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.4187E-05	2.3507E-01	7.1822E-03
Accumulated dose (rem)	1.8027E-02	2.1695E+01	6.9629E-01

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#################################################################
                          I-131 Summary
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	(Iodines) Primary Loo	(Noble Gas) Primary L	Secondary Loop - Stea
Time (hr)	I-131 (Curies)	I-131 (Curies)	I-131 (Curies)
0.000	1.0137E+04	1.0137E+04	3.3068E-05
0.124	9.6592E+03	9.6247E+03	8.0008E-01
0.129	9.6432E+03	9.6088E+03	8.3152E-01

0.472	8.4064E+03	8.3772E+03	2.8419E+00
0.500	8.3099E+03	8.2810E+03	2.9938E+00
0.778	7.4099E+03	7.3842E+03	4.4081E+00
0.833	7.2560E+03	7.2309E+03	4.6374E+00
0.972	6.9551E+03	6.9313E+03	5.1885E+00
0.997	6.9247E+03	6.9009E+03	5.3013E+00
1.397	6.9129E+03	6.8892E+03	7.0978E+00
1.697	6.9041E+03	6.8804E+03	8.4416E+00
1.997	6.8953E+03	6.8717E+03	9.7821E+00
2.000	6.8953E+03	6.8716E+03	9.7955E+00
2.400	6.8836E+03	6.8599E+03	1.1539E+01
2.700	6.8748E+03	6.8512E+03	1.2838E+01
3.000	6.8660E+03	6.8425E+03	1.4131E+01
3.300	6.8573E+03	6.8338E+03	1.5417E+01
3.600	6.8486E+03	6.8251E+03	1.6696E+01
3.900	6.8399E+03	6.8164E+03	1.7969E+01
4.200	6.8312E+03	6.8077E+03	1.9235E+01
4.500	6.8225E+03	6.7990E+03	2.0495E+01
4.800	6.8138E+03	6.7904E+03	2.1748E+01
5.100	6.8051E+03	6.7817E+03	2.2994E+01
5.400	6.7965E+03	6.7731E+03	2.4235E+01
5.700	6.7878E+03	6.7645E+03	2.5468E+01
6.000	6.7792E+03	6.7559E+03	2.6695E+01
6.300	6.7705E+03	6.7473E+03	2.7916E+01
6.600	6.7619E+03	6.7387E+03	2.9131E+01
6.900	6.7533E+03	6.7301E+03	3.0339E+01
7.200	6.7447E+03	6.7216E+03	3.1541E+01
7.500	6.7361E+03	6.7130E+03	3.2736E+01
7.800	6.7276E+03	6.7045E+03	3.3925E+01
8.000	6.7219E+03	6.6988E+03	3.4715E+01
8.300	6.7133E+03	6.6916E+03	3.5991E+01
8.600	6.7048E+03	6.6844E+03	3.7265E+01
8.900	6.6962E+03	6.6772E+03	3.8535E+01
9.200	6.6877E+03	6.6700E+03	3.9803E+01
9.500	6.6792E+03	6.6628E+03	4.1067E+01
9.800	6.6707E+03	6.6556E+03	4.2329E+01
10.100	6.6622E+03	6.6484E+03	4.3587E+01
10.400	6.6537E+03	6.6413E+03	4.4843E+01
24.000	6.2805E+03	6.3246E+03	9.8676E+01
96.000	4.6267E+03	4.8833E+03	2.9870E+02
720.000	3.2734E+02	5.1908E+02	1.9622E+02

Time (hr)	Secondary Loop - Stea I-131 (Curies)	Control Room I-131 (Curies)	Environment I-131 (Curies)
0.000	1.9527E-02	9.1784E-08	1.4800E-05
0.124	4.7247E+02	2.9532E-03	5.2705E-01
0.129	4.8790E+02	5.0766E-03	8.7546E-01
0.472	1.6562E+03	2.5287E-01	5.4894E+01
0.500	1.7506E+03	2.4554E-01	5.5804E+01
0.778	2.6307E+03	1.2286E-02	6.4292E+01
0.833	2.7817E+03	6.9195E-03	6.4990E+01
0.972	3.0769E+03	1.4830E-03	6.5081E+01
0.997	3.1064E+03	1.1207E-03	6.5081E+01
1.397	3.1019E+03	1.2670E-05	6.5081E+01
1.697	3.0986E+03	4.3929E-07	6.5081E+01
1.997	3.0952E+03	1.5231E-08	6.5081E+01
2.000	3.0952E+03	1.4727E-08	6.5081E+01

2.400	3.0900E+03	8.5268E-05	6.5901E+01
2.700	3.0860E+03	8.6604E-05	6.6519E+01
3.000	3.0821E+03	8.7035E-05	6.7140E+01
3.300	3.0782E+03	8.7433E-05	6.7764E+01
3.600	3.0743E+03	8.7827E-05	6.8390E+01
3.900	3.0705E+03	8.8218E-05	6.9020E+01
4.200	3.0666E+03	8.8607E-05	6.9652E+01
4.500	3.0627E+03	8.8994E-05	7.0287E+01
4.800	3.0588E+03	8.9378E-05	7.0925E+01
5.100	3.0549E+03	8.9760E-05	7.1565E+01
5.400	3.0511E+03	9.0140E-05	7.2208E+01
5.700	3.0472E+03	9.0517E-05	7.2854E+01
6.000	3.0433E+03	9.0891E-05	7.3503E+01
6.300	3.0395E+03	9.1264E-05	7.4154E+01
6.600	3.0356E+03	9.1634E-05	7.4808E+01
6.900	3.0318E+03	9.2001E-05	7.5464E+01
7.200	3.0280E+03	9.2367E-05	7.6123E+01
7.500	3.0241E+03	9.2730E-05	7.6785E+01
7.800	3.0203E+03	9.3091E-05	7.7449E+01
8.000	3.0177E+03	9.3330E-05	7.7894E+01
8.300	3.0139E+03	3.7708E-05	7.8464E+01
8.600	3.0101E+03	3.5736E-05	7.9034E+01
8.900	3.0063E+03	3.5624E-05	7.9604E+01
9.200	3.0025E+03	3.5576E-05	8.0172E+01
9.500	2.9987E+03	3.5531E-05	8.0740E+01
9.800	2.9949E+03	3.5486E-05	8.1307E+01
10.100	2.9911E+03	3.5441E-05	8.1874E+01
10.400	2.9873E+03	3.5396E-05	8.2439E+01
24.000	2.8206E+03	3.3421E-05	1.0723E+02
96.000	2.0811E+03	1.5411E-05	2.1692E+02
720.000	1.4922E+02	9.4639E-07	5.0345E+02

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#####################################################################
                        Cumulative Dose Summary
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	Exclusion Area Bounda		Low Population Zone (		Control Room	
Time (hr)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.124	1.4356E-01	2.4923E-02	2.4963E-02	4.3336E-03	4.7652E-02	1.8883E-03
0.129	2.3833E-01	2.8754E-02	4.1442E-02	4.9998E-03	5.3049E-02	2.0888E-03
0.472	1.4915E+01	5.7265E-01	2.5934E+00	9.9573E-02	1.2589E+01	3.9994E-01
0.500	1.5162E+01	5.8452E-01	2.6363E+00	1.0164E-01	1.4458E+01	4.5906E-01
0.778	1.7460E+01	6.9452E-01	3.0359E+00	1.2076E-01	2.0696E+01	6.5884E-01
0.833	1.7648E+01	7.0630E-01	3.0687E+00	1.2281E-01	2.0837E+01	6.6394E-01
0.972	1.7673E+01	7.1764E-01	3.0730E+00	1.2478E-01	2.0980E+01	6.6994E-01
0.997	1.7673E+01	7.1868E-01	3.0730E+00	1.2496E-01	2.0988E+01	6.7046E-01
1.397	1.7673E+01	7.1874E-01	3.0730E+00	1.2498E-01	2.1017E+01	6.7387E-01
1.697	1.7673E+01	7.1879E-01	3.0730E+00	1.2498E-01	2.1018E+01	6.7464E-01
1.997	1.7673E+01	7.1883E-01	3.0730E+00	1.2499E-01	2.1018E+01	6.7501E-01
2.000	1.7673E+01	7.1883E-01	3.0730E+00	1.2499E-01	2.1018E+01	6.7501E-01
2.400	1.7673E+01	7.1883E-01	3.0913E+00	1.2560E-01	2.1025E+01	6.7543E-01
2.700	1.7673E+01	7.1883E-01	3.1051E+00	1.2606E-01	2.1031E+01	6.7571E-01
3.000	1.7673E+01	7.1883E-01	3.1189E+00	1.2651E-01	2.1038E+01	6.7596E-01
3.300	1.7673E+01	7.1883E-01	3.1327E+00	1.2697E-01	2.1045E+01	6.7619E-01
3.600	1.7673E+01	7.1883E-01	3.1466E+00	1.2743E-01	2.1052E+01	6.7642E-01

3.900	1.7673E+01	7.1883E-01	3.1605E+00	1.2788E-01	2.1059E+01	6.7664E-01
4.200	1.7673E+01	7.1883E-01	3.1744E+00	1.2834E-01	2.1066E+01	6.7686E-01
4.500	1.7673E+01	7.1883E-01	3.1884E+00	1.2879E-01	2.1072E+01	6.7707E-01
4.800	1.7673E+01	7.1883E-01	3.2023E+00	1.2925E-01	2.1079E+01	6.7729E-01
5.100	1.7673E+01	7.1883E-01	3.2163E+00	1.2970E-01	2.1086E+01	6.7751E-01
5.400	1.7673E+01	7.1883E-01	3.2304E+00	1.3016E-01	2.1093E+01	6.7773E-01
5.700	1.7673E+01	7.1883E-01	3.2444E+00	1.3061E-01	2.1100E+01	6.7795E-01
6.000	1.7673E+01	7.1883E-01	3.2585E+00	1.3107E-01	2.1107E+01	6.7817E-01
6.300	1.7673E+01	7.1883E-01	3.2726E+00	1.3153E-01	2.1114E+01	6.7839E-01
6.600	1.7673E+01	7.1883E-01	3.2867E+00	1.3198E-01	2.1121E+01	6.7861E-01
6.900	1.7673E+01	7.1883E-01	3.3008E+00	1.3244E-01	2.1128E+01	6.7883E-01
7.200	1.7673E+01	7.1883E-01	3.3150E+00	1.3289E-01	2.1135E+01	6.7905E-01
7.500	1.7673E+01	7.1883E-01	3.3292E+00	1.3335E-01	2.1142E+01	6.7927E-01
7.800	1.7673E+01	7.1883E-01	3.3434E+00	1.3381E-01	2.1149E+01	6.7949E-01
8.000	1.7673E+01	7.1883E-01	3.3529E+00	1.3411E-01	2.1154E+01	6.7964E-01
8.300	1.7673E+01	7.1883E-01	3.3573E+00	1.3426E-01	2.1158E+01	6.7977E-01
8.600	1.7673E+01	7.1883E-01	3.3616E+00	1.3440E-01	2.1160E+01	6.7985E-01
8.900	1.7673E+01	7.1883E-01	3.3659E+00	1.3454E-01	2.1163E+01	6.7994E-01
9.200	1.7673E+01	7.1883E-01	3.3702E+00	1.3468E-01	2.1166E+01	6.8002E-01
9.500	1.7673E+01	7.1883E-01	3.3745E+00	1.3482E-01	2.1168E+01	6.8010E-01
9.800	1.7673E+01	7.1883E-01	3.3787E+00	1.3496E-01	2.1171E+01	6.8019E-01
10.100	1.7673E+01	7.1883E-01	3.3830E+00	1.3510E-01	2.1174E+01	6.8027E-01
10.400	1.7673E+01	7.1883E-01	3.3872E+00	1.3524E-01	2.1176E+01	6.8035E-01
24.000	1.7673E+01	7.1883E-01	3.5691E+00	1.4109E-01	2.1289E+01	6.8385E-01
96.000	1.7673E+01	7.1883E-01	3.9858E+00	1.5406E-01	2.1460E+01	6.8911E-01
720.000	1.7673E+01	7.1883E-01	4.3145E+00	1.6419E-01	2.1695E+01	6.9629E-01

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

Exclusion Area Boundary (EAB)

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	1.6587E-01	1.7673E+01	7.1883E-01

```
 ######################################################################
    RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:34:50
 ######################################################################

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

 Plant file           = C:\Documents and Settings\Aleem Boatright\My Documents\My
Work\Exelon\Byron & Braidwood\SGTR\RADTRAD\Rev 1\(Large CR Volume Conservatism
Test) B-B AST SGTR - Case 3 - Large CR Volume 1000cfm Inleak - 95 percent Intake
Filt.psf
 Inventory file       = c:\program files\radtrad3-03\defaults\byron-braidwood ast
sgtr case 3 secondary loop equilibrium iodine activity source terms.nif
 Release file         = c:\program files\radtrad3-03\defaults\byron-braidwood sgtr
case 3 iodine only-release fractions.rft
 Dose Conversion file = c:\program files\radtrad3-03\defaults\fgr11&12.inp



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


 Radtrad 3.03 4/15/2001
 Byron/Braidwood SGTR - Case 3 - Dose from Pre-Accident Secondary Coolant
Equilibrium Iodine Activity - Control Room @ 240,000 cu. ft. CR Volume with 8575cfm
Intake - 1000cfm Unfilt Inleakage - 95% CR Intake Fiters - 80% Aerosol, 90%
Elemental & Organic Rec
 Nuclide Inventory File:
 c:\program files\radtrad3-03\defaults\byron-braidwood ast sgtr case 3 secondary
loop equilibrium iodine activity source terms.nif
 Plant Power Level:
  3.6583E+03
 Compartments:
   4
 Compartment 1:
 Secondary Loop - Steam Generator Volumes (3 Intact SGs)
   3
  3.3800E+03
   0
   0
   0
   0
   0
 Compartment 2:
 Secondary Loop - Steam Generator Volume (Failed SG)
   3
  1.1260E+03
```

```
  0
  0
  0
  0
  0
Compartment 3:
Control Room
  1
 2.4000E+05
  0
  0
  1
  0
  0
Compartment 4:
Environment
  2
 0.0000E+00
  0
  0
  0
  0
  0
Pathways:
  5
Pathway 1:
(Steam Release-Intact SGs) Secondary Loop - Steam Generator Volumes to Environment
  1
  4
  2
Pathway 2:
(Steam Release-Failed SG) Secondary Loop - Steam Generator Volume to Environment
  2
  4
  2
Pathway 3:
(Filtered Intake) Environment to Control Room
  4
  3
  2
Pathway 4:
(Unfiltered Inleakage) Environment to Control Room
  4
  3
  2
Pathway 5:
(Control Room Exhaust) Control Room to Environment
  3
  4
  2
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
  2
```

```
  1   1.0000E+00
  2   3.3318E-01
 c:\program files\radtrad3-03\defaults\fgr11&12.inp
 c:\program files\radtrad3-03\defaults\byron-braidwood sgtr case 3 iodine only-
release fractions.rft
  0.0000E+00
  0
  0.0000E+00   1.0000E+00   0.0000E+00   1.0000E+00
 Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
 Compartments:
  4
 Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
 Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
 Compartment 3:
  0
  1
  0
  0
  0
  0
  1
  3.9150E+04
  3
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   8.0000E+01   9.0000E+01   9.0000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
 Compartment 4:
  0
  1
  0
  0
```

```
  0
  0
  0
  0
  0
Pathways:
  5
Pathway 1:
  0
  0
  0
  0
  0
  1
  5
  0.0000E+00   3.2120E-01   1.0000E+02   0.0000E+00   1.0000E+02
  7.7800E-01   7.4690E+00   1.0000E+02   0.0000E+00   1.0000E+02
  9.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   5.2050E-01   1.0000E+02   0.0000E+00   1.0000E+02
  8.0000E+00   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  4
  0.0000E+00   1.0710E-01   1.0000E+02   0.0000E+00   1.0000E+02
  1.2900E-01   7.3310E-01   1.0000E+02   0.0000E+00   1.0000E+02
  4.7200E-01   0.0000E+00   1.0000E+02   0.0000E+00   1.0000E+02
  2.0000E+00   1.1840E-02   1.0000E+02   0.0000E+00   1.0000E+02
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   6.4240E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   8.5750E+03   9.9000E+01   9.5000E+01   9.5000E+01
  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   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   1.0000E+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
Pathway 5:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   7.4240E+03   1.0000E+02   1.0000E+02   1.0000E+02
  5.0000E-01   9.5750E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary (EAB)
  4
  1
  3
  0.0000E+00   5.3600E-04
  5.0000E-01   5.3600E-04
  2.0000E+00   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone (LPZ)
```

```
  4
  1
  7
  0.0000E+00   9.3200E-05
  5.0000E-01   9.3200E-05
  2.0000E+00   4.5000E-05
  8.0000E+00   3.1200E-05
  2.4000E+01   1.4100E-05
  9.6000E+01   4.5400E-06
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   3.5000E-04
  8.0000E+00   1.8000E-04
  2.4000E+01   2.3000E-04
  7.2000E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  0.0000E+00   3.5000E-04
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   1.0000E+00
  2.4000E+01   6.0000E-01
  9.6000E+01   4.0000E-01
  7.2000E+02   0.0000E+00
Effective Volume Location:
  1
  7
  0.0000E+00   1.7700E-03
  5.0000E-01   8.1400E-04
  2.0000E+00   6.9800E-04
  8.0000E+00   3.1200E-04
  2.4000E+01   1.9500E-04
  9.6000E+01   1.6700E-04
  7.2000E+02   0.0000E+00
Simulation Parameters:
  1
  0.0000E+00   0.0000E+00
Output Filename:
C:\Documents and Settings\Aleem Boatright\My Documents\My Work\Exelon\Byron &
Braidwood\SGTR\RADTRAD\Rev 1\(Large CR Volume Conservatism Test) B-B AST SGTR -
Case 3 - Large CR Volume 1000cfm Inleak - 95 percent Intake Filt.o0
  1
  1
  1
  0
  0
End of Scenario File
```

(Large CR Volume Conservatism Test) B-B AST SGTR - Case 3 - Large CR Volume 1000cfm Inleak - 95 percent Intake Filt.o0

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:34:50
#######################################################################

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

Number of Nuclides =  60

Inventory Power =   1.0000E+00 MWth
Plant Power Level =   3.6583E+03 MWth

Number of compartments    =   4

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: Secondary Loop - Steam Generator Volumes
Compartment volume =   3.3800E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  1
   Exit Pathway Number    1: (Steam Release-Intact SGs) Secondary Loop - Steam

Compartment number  2  (Source term fraction =   3.3318E-01
)
Name: Secondary Loop - Steam Generator Volume
Compartment volume =   1.1260E+03 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  2
   Exit Pathway Number    2: (Steam Release-Failed SG) Secondary Loop - Steam G

Compartment number  3
Name: Control Room
Compartment volume =   2.4000E+05 (Cubic feet)
Compartment type is Control Room
Removal devices within compartment:
     Filter(s)
Pathways into and out of compartment  3
   Inlet Pathway Number   3: (Filtered Intake) Environment to Control Room
   Inlet Pathway Number   4: (Unfiltered Inleakage) Environment to Control Room
   Exit Pathway Number    5: (Control Room Exhaust) Control Room to Environment

Compartment number  4
Name: Environment
Compartment type is Environment
Pathways into and out of compartment  4
   Inlet Pathway Number   1: (Steam Release-Intact SGs) Secondary Loop - Steam
   Inlet Pathway Number   2: (Steam Release-Failed SG) Secondary Loop - Steam G
   Inlet Pathway Number   5: (Control Room Exhaust) Control Room to Environment
   Exit Pathway Number    3: (Filtered Intake) Environment to Control Room
   Exit Pathway Number    4: (Unfiltered Inleakage) Environment to Control Room

Total number of pathways =   5
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:34:50
#######################################################################

#######################################################################
                    Scenario Description
#######################################################################
```

Radioactive Decay is enabled

Release Fractions and Timings

	GAP	EARLY IN-VESSEL	LATE RELEASE	RELEASE MASS
	0.000010 hr	0.0000 hrs	0.0000 hrs	(gm)
NOBLES	0.0000E+00	0.0000E+00	0.0000E+00	0.000E+00
IODINE	1.0000E+00	0.0000E+00	0.0000E+00	7.198E-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 = 3658. MWt

Nuclide Name	Group	Specific Inventory (Ci/MWt)	half life (s)	Whole Body DCF (Sv-m3/Bq-s)	Inhaled Thyroid (Sv/Bq)	Inhaled Effective (Sv/Bq)
I-131	2	1.941E-03	6.947E+05	1.820E-14	2.920E-07	8.890E-09
I-132	2	2.561E-03	8.280E+03	1.120E-13	1.740E-09	1.030E-10
I-133	2	3.532E-03	7.488E+04	2.940E-14	4.860E-08	1.580E-09
I-134	2	6.357E-04	3.156E+03	1.300E-13	2.880E-10	3.550E-11
I-135	2	2.203E-03	2.380E+04	8.294E-14	8.460E-09	3.320E-10

Iodine fractions

Aerosol = 0.0000E+00
Elemental = 1.0000E+00
Organic = 0.0000E+00

COMPARTMENT DATA

Compartment number 1: Secondary Loop - Steam Generator Volumes

Compartment number 2: Secondary Loop - Steam Generator Volume

Compartment number 3: Control Room

Compartment Filter Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	3.9150E+04	8.0000E+01	9.0000E+01	9.0000E+01
7.2000E+02	3.9150E+04	0.0000E+00	0.0000E+00	0.0000E+00

Compartment number 4: Environment

PATHWAY DATA

Pathway number 1: (Steam Release-Intact SGs) Secondary Loop - Steam

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	3.2120E-01	1.0000E+02	0.0000E+00	1.0000E+02
7.7800E-01	7.4690E+00	1.0000E+02	0.0000E+00	1.0000E+02
9.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	5.2050E-01	1.0000E+02	0.0000E+00	1.0000E+02
8.0000E+00	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 2: (Steam Release-Failed SG) Secondary Loop - Steam G

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0710E-01	1.0000E+02	0.0000E+00	1.0000E+02
1.2900E-01	7.3310E-01	1.0000E+02	0.0000E+00	1.0000E+02
4.7200E-01	0.0000E+00	1.0000E+02	0.0000E+00	1.0000E+02
2.0000E+00	1.1840E-02	1.0000E+02	0.0000E+00	1.0000E+02

Pathway number 3: (Filtered Intake) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	6.4240E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	8.5750E+03	9.9000E+01	9.5000E+01	9.5000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 4: (Unfiltered Inleakage) Environment to Control Room

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.0000E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	1.0000E+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

Pathway number 5: (Control Room Exhaust) Control Room to Environment

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	7.4240E+03	1.0000E+02	1.0000E+02	1.0000E+02
5.0000E-01	9.5750E+03	1.0000E+02	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

LOCATION DATA

```
Location Exclusion Area Boundary (EAB)     is in compartment   4

Location X/Q Data
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00           5.3600E-04
  5.0000E-01           5.3600E-04
  2.0000E+00           0.0000E+00

Location Breathing Rate Data
 Time (hr)          Breathing Rate (m^3 * sec^-1)
  0.0000E+00                 3.5000E-04
  8.0000E+00                 1.8000E-04
  2.4000E+01                 2.3000E-04
  7.2000E+02                 0.0000E+00
Location Low Population Zone (LPZ)     is in compartment   4

Location X/Q Data
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00           9.3200E-05
  5.0000E-01           9.3200E-05
  2.0000E+00           4.5000E-05
  8.0000E+00           3.1200E-05
  2.4000E+01           1.4100E-05
  9.6000E+01           4.5400E-06
  7.2000E+02           0.0000E+00

Location Breathing Rate Data
 Time (hr)          Breathing Rate (m^3 * sec^-1)
  0.0000E+00                 3.5000E-04
  8.0000E+00                 1.8000E-04
  2.4000E+01                 2.3000E-04
  7.2000E+02                 0.0000E+00
Location Control Room     is in compartment   3

Location X/Q Data
 Time (hr)          X/Q (s * m^-3)
  0.0000E+00           1.7700E-03
  5.0000E-01           8.1400E-04
  2.0000E+00           6.9800E-04
  8.0000E+00           3.1200E-04
  2.4000E+01           1.9500E-04
  9.6000E+01           1.6700E-04
  7.2000E+02           0.0000E+00

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

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

USER SPECIFIED TIME STEP DATA - SUPPLEMENTAL TIME STEPS
```

```
Time            Time step
 0.0000E+00       0.0000E+00
```

```
#######################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 11/18/2004  at  1:34:50
#######################################################################
```

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

```
#######################################################################
                                Dose Output
#######################################################################
```

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.9069E-10	7.3535E-08	2.4935E-09
Accumulated dose (rem)	1.9069E-10	7.3535E-08	2.4935E-09

Low Population Zone (LPZ) Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.3157E-11	1.2786E-08	4.3358E-10
Accumulated dose (rem)	3.3157E-11	1.2786E-08	4.3358E-10

Control Room Doses:

Time (h) = 0.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.2800E-16	2.2535E-12	7.0898E-14
Accumulated dose (rem)	3.2800E-16	2.2535E-12	7.0898E-14

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.8901E-06	1.8957E-03	6.4254E-05
Accumulated dose (rem)	4.8903E-06	1.8958E-03	6.4256E-05

Low Population Zone (LPZ) Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	8.5029E-07	3.2963E-04	1.1172E-05
Accumulated dose (rem)	8.5033E-07	3.2965E-04	1.1173E-05

Control Room Doses:

Time (h) = 0.1290	Whole Body	Thyroid	TEDE
Delta dose (rem)	9.8061E-08	6.7994E-04	2.1389E-05
Accumulated dose (rem)	9.8061E-08	6.7994E-04	2.1389E-05

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	3.0098E-05	1.2302E-02	4.1508E-04
Accumulated dose (rem)	3.4988E-05	1.4198E-02	4.7934E-04

Low Population Zone (LPZ) Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	5.2334E-06	2.1391E-03	7.2175E-05
Accumulated dose (rem)	6.0837E-06	2.4688E-03	8.3348E-05

Control Room Doses:

Time (h) = 0.4720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.7867E-06	1.3121E-02	4.1234E-04
Accumulated dose (rem)	1.8848E-06	1.3801E-02	4.3373E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.1278E-07	3.0586E-04	1.0279E-05
Accumulated dose (rem)	3.5701E-05	1.4504E-02	4.8962E-04

Low Population Zone (LPZ) Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2394E-07	5.3184E-05	1.7873E-06
Accumulated dose (rem)	6.2076E-06	2.5220E-03	8.5135E-05

Control Room Doses:

Time (h) = 0.5000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.2112E-07	1.6904E-03	5.3089E-05
Accumulated dose (rem)	2.1059E-06	1.5491E-02	4.8682E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.8827E-06	3.0290E-03	1.0159E-04
Accumulated dose (rem)	4.2583E-05	1.7533E-02	5.9120E-04

Low Population Zone (LPZ) Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.1968E-06	5.2668E-04	1.7664E-05
Accumulated dose (rem)	7.4044E-06	3.0487E-03	1.0280E-04

Control Room Doses:

Time (h) = 0.7780	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.3504E-07	5.6971E-03	1.7888E-04
Accumulated dose (rem)	2.8409E-06	2.1188E-02	6.6571E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0464E-04	4.8327E-02	1.6147E-03
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8194E-05	8.4032E-03	2.8077E-04
Accumulated dose (rem)	2.5599E-05	1.1452E-02	3.8357E-04

Control Room Doses:

Time (h) = 0.9720	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.8980E-07	1.5656E-03	4.9110E-05
Accumulated dose (rem)	3.0307E-06	2.2754E-02	7.1482E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.5599E-05	1.1452E-02	3.8357E-04

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.2631E-07	1.0797E-03	3.3849E-05
Accumulated dose (rem)	3.1570E-06	2.3834E-02	7.4867E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.0175E-05	8.1687E-03	2.6384E-04
Accumulated dose (rem)	3.5774E-05	1.9621E-02	6.4741E-04

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.7580E-07	3.9727E-03	1.2363E-04
Accumulated dose (rem)	3.4328E-06	2.7806E-02	8.7230E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.0171E-07	1.6178E-04	5.1918E-06
Accumulated dose (rem)	3.5975E-05	1.9782E-02	6.5260E-04

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.7283E-09	1.6193E-04	5.0083E-06
Accumulated dose (rem)	3.4396E-06	2.7968E-02	8.7731E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.3808E-07	3.1179E-04	9.6730E-06
Accumulated dose (rem)	3.6113E-05	2.0094E-02	6.6227E-04

Control Room Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.1161E-09	1.2813E-04	3.9210E-06
Accumulated dose (rem)	3.4417E-06	2.8097E-02	8.8123E-04

Exclusion Area Boundary (EAB) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	1.4722E-04	6.5860E-02	2.2059E-03

Low Population Zone (LPZ) Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	6.8102E-08	2.4601E-04	7.5591E-06
Accumulated dose (rem)	3.6182E-05	2.0340E-02	6.6983E-04

Control Room Doses:

Time (h) = 720.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.7965E-09	1.7591E-04	5.3582E-06
Accumulated dose (rem)	3.4435E-06	2.8272E-02	8.8659E-04

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

          Secondary Loop - Stea Secondary Loop - Stea     Control Room
Time (hr)    I-131 (Curies)          I-131 (Curies)       I-131 (Curies)
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0.000	7.1015E+00	2.3661E+00	1.6742E-09
0.129	7.0930E+00	2.3632E+00	3.8380E-05
0.472	7.0704E+00	2.3289E+00	2.2779E-04
0.500	7.0686E+00	2.3287E+00	2.2305E-04
0.778	7.0503E+00	2.3264E+00	1.1779E-05
0.972	6.8665E+00	2.3247E+00	4.1209E-05
1.272	6.8591E+00	2.3222E+00	1.4288E-06
1.572	6.8517E+00	2.3197E+00	4.9538E-08
1.872	6.8443E+00	2.3172E+00	1.7176E-09
2.000	6.8412E+00	2.3162E+00	4.0924E-10
2.400	6.8062E+00	2.3123E+00	2.6748E-06
2.700	6.7800E+00	2.3093E+00	2.6943E-06
3.000	6.7540E+00	2.3064E+00	2.6851E-06
3.300	6.7280E+00	2.3035E+00	2.6750E-06
3.600	6.7022E+00	2.3006E+00	2.6649E-06
3.900	6.6764E+00	2.2977E+00	2.6548E-06
4.200	6.6508E+00	2.2947E+00	2.6447E-06
4.500	6.6252E+00	2.2918E+00	2.6347E-06
4.800	6.5998E+00	2.2889E+00	2.6248E-06
5.100	6.5744E+00	2.2860E+00	2.6148E-06
5.400	6.5491E+00	2.2831E+00	2.6049E-06
5.700	6.5240E+00	2.2803E+00	2.5951E-06
6.000	6.4989E+00	2.2774E+00	2.5853E-06
6.300	6.4739E+00	2.2745E+00	2.5755E-06
6.600	6.4491E+00	2.2716E+00	2.5658E-06
6.900	6.4243E+00	2.2687E+00	2.5561E-06
7.200	6.3996E+00	2.2659E+00	2.5464E-06
7.500	6.3750E+00	2.2630E+00	2.5368E-06
7.800	6.3505E+00	2.2601E+00	2.5272E-06
8.000	6.3343E+00	2.2582E+00	2.5208E-06
8.300	6.3274E+00	2.2554E+00	1.1320E-07
8.600	6.3206E+00	2.2525E+00	2.9688E-08
8.900	6.3138E+00	2.2496E+00	2.6760E-08
9.200	6.3070E+00	2.2468E+00	2.6626E-08
9.500	6.3002E+00	2.2440E+00	2.6589E-08
9.800	6.2934E+00	2.2411E+00	2.6555E-08
10.100	6.2867E+00	2.2383E+00	2.6521E-08
10.400	6.2799E+00	2.2354E+00	2.6488E-08
24.000	5.9805E+00	2.1107E+00	2.5009E-08
96.000	4.6175E+00	1.5573E+00	1.1533E-08
720.000	4.9083E-01	1.1166E-01	7.0819E-10

Time (hr)	Environment I-131 (Curies)
0.000	2.6997E-07
0.129	6.9598E-03
0.472	5.2236E-02
0.500	5.3365E-02
0.778	6.4553E-02
0.972	2.4349E-01
1.272	2.4349E-01
1.572	2.4349E-01
1.872	2.4349E-01
2.000	2.4349E-01
2.400	2.6929E-01
2.700	2.8856E-01
3.000	3.0775E-01

3.300	3.2686E-01
3.600	3.4591E-01
3.900	3.6488E-01
4.200	3.8379E-01
4.500	4.0262E-01
4.800	4.2138E-01
5.100	4.4006E-01
5.400	4.5868E-01
5.700	4.7723E-01
6.000	4.9571E-01
6.300	5.1411E-01
6.600	5.3245E-01
6.900	5.5072E-01
7.200	5.6892E-01
7.500	5.8705E-01
7.800	6.0511E-01
8.000	6.1711E-01
8.300	6.1754E-01
8.600	6.1797E-01
8.900	6.1839E-01
9.200	6.1882E-01
9.500	6.1924E-01
9.800	6.1967E-01
10.100	6.2009E-01
10.400	6.2051E-01
24.000	6.3906E-01
96.000	7.2114E-01
720.000	9.3556E-01

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#####################################################################
                        Cumulative Dose Summary
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	Exclusion Area Bounda		Low Population Zone (		Control Room	
Time (hr)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.129	1.8958E-03	6.4256E-05	3.2965E-04	1.1173E-05	6.7994E-04	2.1389E-05
0.472	1.4198E-02	4.7934E-04	2.4688E-03	8.3348E-05	1.3801E-02	4.3373E-04
0.500	1.4504E-02	4.8962E-04	2.5220E-03	8.5135E-05	1.5491E-02	4.8682E-04
0.778	1.7533E-02	5.9120E-04	3.0487E-03	1.0280E-04	2.1188E-02	6.6571E-04
0.972	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.2754E-02	7.1482E-04
1.272	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.3796E-02	7.4750E-04
1.572	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.3832E-02	7.4863E-04
1.872	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.3834E-02	7.4866E-04
2.000	6.5860E-02	2.2059E-03	1.1452E-02	3.8357E-04	2.3834E-02	7.4867E-04
2.400	6.5860E-02	2.2059E-03	1.2029E-02	4.0255E-04	2.4050E-02	7.5542E-04
2.700	6.5860E-02	2.2059E-03	1.2459E-02	4.1663E-04	2.4262E-02	7.6204E-04
3.000	6.5860E-02	2.2059E-03	1.2886E-02	4.3058E-04	2.4473E-02	7.6863E-04
3.300	6.5860E-02	2.2059E-03	1.3310E-02	4.4441E-04	2.4683E-02	7.7518E-04
3.600	6.5860E-02	2.2059E-03	1.3731E-02	4.5812E-04	2.4892E-02	7.8169E-04
3.900	6.5860E-02	2.2059E-03	1.4150E-02	4.7172E-04	2.5099E-02	7.8815E-04
4.200	6.5860E-02	2.2059E-03	1.4566E-02	4.8520E-04	2.5305E-02	7.9456E-04
4.500	6.5860E-02	2.2059E-03	1.4980E-02	4.9858E-04	2.5509E-02	8.0094E-04
4.800	6.5860E-02	2.2059E-03	1.5391E-02	5.1184E-04	2.5713E-02	8.0727E-04
5.100	6.5860E-02	2.2059E-03	1.5799E-02	5.2501E-04	2.5915E-02	8.1356E-04
5.400	6.5860E-02	2.2059E-03	1.6205E-02	5.3808E-04	2.6116E-02	8.1980E-04

5.700	6.5860E-02	2.2059E-03	1.6608E-02	5.5104E-04	2.6315E-02	8.2601E-04
6.000	6.5860E-02	2.2059E-03	1.7009E-02	5.6391E-04	2.6514E-02	8.3217E-04
6.300	6.5860E-02	2.2059E-03	1.7407E-02	5.7669E-04	2.6711E-02	8.3830E-04
6.600	6.5860E-02	2.2059E-03	1.7803E-02	5.8938E-04	2.6907E-02	8.4439E-04
6.900	6.5860E-02	2.2059E-03	1.8197E-02	6.0197E-04	2.7102E-02	8.5044E-04
7.200	6.5860E-02	2.2059E-03	1.8588E-02	6.1448E-04	2.7296E-02	8.5645E-04
7.500	6.5860E-02	2.2059E-03	1.8977E-02	6.2690E-04	2.7488E-02	8.6242E-04
7.800	6.5860E-02	2.2059E-03	1.9364E-02	6.3923E-04	2.7680E-02	8.6836E-04
8.000	6.5860E-02	2.2059E-03	1.9621E-02	6.4741E-04	2.7806E-02	8.7230E-04
8.300	6.5860E-02	2.2059E-03	1.9624E-02	6.4752E-04	2.7868E-02	8.7420E-04
8.600	6.5860E-02	2.2059E-03	1.9627E-02	6.4762E-04	2.7872E-02	8.7433E-04
8.900	6.5860E-02	2.2059E-03	1.9630E-02	6.4773E-04	2.7874E-02	8.7440E-04
9.200	6.5860E-02	2.2059E-03	1.9633E-02	6.4783E-04	2.7876E-02	8.7446E-04
9.500	6.5860E-02	2.2059E-03	1.9637E-02	6.4794E-04	2.7878E-02	8.7452E-04
9.800	6.5860E-02	2.2059E-03	1.9640E-02	6.4804E-04	2.7880E-02	8.7458E-04
10.100	6.5860E-02	2.2059E-03	1.9643E-02	6.4814E-04	2.7882E-02	8.7464E-04
10.400	6.5860E-02	2.2059E-03	1.9646E-02	6.4825E-04	2.7884E-02	8.7470E-04
24.000	6.5860E-02	2.2059E-03	1.9782E-02	6.5260E-04	2.7968E-02	8.7731E-04
96.000	6.5860E-02	2.2059E-03	2.0094E-02	6.6227E-04	2.8097E-02	8.8123E-04
720.000	6.5860E-02	2.2059E-03	2.0340E-02	6.6983E-04	2.8272E-02	8.8659E-04

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#####################################################################
                        Worst Two-Hour Doses
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Exclusion Area Boundary (EAB)

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	1.4722E-04	6.5860E-02	2.2059E-03

Computer Disclosure Sheet

Discipline Nuclear

Client:	Exelon Corporation	Date:	November 2004
Project:	Byron/Braidwood Stations SGTR AST	Job No.	26760-NCS0023.CALC

Program(s) used:	Rev No.	Rev Date	Calculation Set No.: BYR04-048 & BRW-04-0042-M, Rev. 0
Attachment A, B spreadsheets	0	6/2004	Status [ ] Prelim. [X] Final [ ] Void

WGI Prequalification [X] Yes
[ ] No

Run No. Description:

Analysis Description: Spreadsheets used to perform input development for dose assessment for SGTR, as described in calculation.

The attached computer output has been reviewed, the input data checked, and the results approved for release. Input criteria for this analysis were established.

By: Aleen L. Boatright On: 11/2004

Run by: A. Boatright Aleen L. Boatright

Checked by: P. Reichert P. Reichert

Approved by: H. Rothstein H. Rothstein

Remarks: These spreadsheets are relatively straight-forward and were hand checked. Attachment A and B include the spreadsheets in both normal and formula display so it is completely documented.

Computer Disclosure Sheet

Discipline Nuclear

Client:	Exelon Corporation	Date:	November 2004
Project:	Byron/Braidwood Stations SGTR AST	Job No.	26760-NCS0023.CALC

Program(s) used:	Rev No.	Rev Date	Calculation Set No.: BYR04-048 & BRW-04-0042-M, Rev. 0
RADTRAD 3.03 Attachment C	0	12/23/2002	Status [ ] Prelim. [X] Final [ ] Void

WGI Prequalification [X] Yes [ ] No

Run No. Description:

Analysis Description: RADTRAD output files, where applied to calculations of SGTR dose assessments, as described in calculation.

The attached computer output has been reviewed, the input data checked,
And the results approved for release. Input criteria for this analysis were established.

By: On: 11/2004

Run by: A. Boatright Harold Rothstein for Alan Boatright

Checked by: P.Reichert P. Reichert

Approved by: H. Rothstein Harold Rothstein

Remarks: The RADTRAD computer code is applied in a manner fitting its intended purpose, and well within its operating parameters. All outputs were hand checked. Attachments D & E included the Nuclide Information File and Release Fraction and Timing File used by the RADTRAD code and generated specifically for the Byron/Braidwood Station SGTR analyses. Both were also hand checked for accuracy.