ENCLOSURE 2

TMI Unit 1 Calculation No. C-1101-900-E000-083
Revision 3

"EAB, LPZ, and CR Doses Due to Fuel Handling Accident In Reactor Building With Hatch Doors Opened"

ATTACHMENT 1
Design Analysis Cover Sheet

Design Analysis (Major Revision)		Last Page No. [6] 146	
Analysis No.: [1]	C-1101-900-E000-083	Revision: [2]	3
Title: [3]	EAB, LPZ, and CR Doses Due to Fuel Handling Accident In Reactor Bldg With Hatch Doors Opened		
EC/ECR No.: [4]	ECR 05-00432	Revision: [5]	0

		Component(s): [14]	
Station(s): [7]	Three Mile Island		
Unit No.: [8]	1		
Discipline: [9]	Mechanical		
Descrip. Code/Keyword: [10]	N/A		
Safety/QA Class: [11]	Safety Related/Class 1		
System Code: [12]	191, 240, 241, 411, 826		
Structure: [13]	N/A		

CONTROLLED DOCUMENT REFERENCES [15]

Document No.:	From/To	Document No.:	From/To
C-1101-826-E410-030, Rev. 0	From	C-1101-826-E260-023, Rev. 2	From
C-1101-202-E620-415, Rev. 2	From	C-1101-900-E000-072, Rev. 2	From
C-1101-826-E540-020, Rev. 2	From	C-1101-252-5412-012, Rev. 0	From
C-1101-202-E620-437, Rev. 0	From		

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

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

This Design Analysis SUPERCEDES: [18] C-1101-900-E000-083 Revision 2 in its entirety.

Description of Revision

This revision addresses questions from the NRC RAI associated Amendment Request 326. See page 3 for details.

Preparer: [20]	Thomas J. Mscisz (Print Name)	TMscisz (Sign Name)	9/9/05 (Date)
Method of Review: [21]	Detailed Review ☒	Alternate Calculations (attached) ☐	Testing ☐
Reviewer: [22]	Moussa Mahgerefteh (Print Name)	Moussa Mahgerefteh (Sign Name)	9/12/05 (Date)
Review Notes: [23]	Independent review ☒ Peer review ☐ Changes from Rev. 2 to Rev. 3 of this calculation were reviewed and verified to be correct. Based on this evaluation, the revised calculation is verified to be acceptable.		
(For External Analyses Only) External Approver: [24]	N/A (Print Name)	N/A (Sign Name)	N/A (Date)
Exelon Reviewer: [25]	N/A (Print Name)	N/A (Sign Name)	N/A (Date)

Is a Supplemental Review Required? [26] Yes ☐ No ☒ If yes, complete Attachment 3

Exelon Approver: [27]	Elliott Flick (Print Name)	Elliott Flick (Sign Name)	9/12/05 (Date)

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ATTACHMENT 1
General Review Questions
Page 1 of 1

DESIGN ANALYSIS NO. C-1101-900-E000-083 **REV:** 3

		Yes	No	N/A
1.	Does the Design Analysis conform to design requirements?	☑	☐	☐
2.	Does the Design Analysis conform to applicable codes, standards, and regulatory requirements?	☑	☐	☐
3.	Have applicable design and safety limits been identified?	☑	☐	☐
4.	Is the analysis method appropriate?	☑	☐	☐
5.	Are the methods used and recommendations given conservative relative to the design and safety limits?	☑	☐	☐
6.	Are assumptions/Engineering Judgments explained and appropriate?	☑	☐	☐
7.	Have appropriately verified Computer Program and versions been identified, when applicable?	☑	☐	☐
8.	Does the Computer Program conform with the NRC SER or similar document when applicable?	☐	☐	☑
9.	Has the input been correctly incorporated into the Design Analysis?	☑	☐	☐
10.	Has the input been reviewed by all cognizant design authorities?	☐	☐	☑
11.	Are the analysis outputs and conclusions reasonable compared to the inputs and assumptions?	☑	☐	☐
12.	Are the recommendations/results/conclusions reasonable based on previous experience?	☑	☐	☐
13.	Has a verification of the Design Analysis been performed by alternate methods?	☐	☐	☑
14.	Has all input data been used correctly and is it traceable?	☑	☐	☐
15.	Has the effect on plant drawings, procedures, databases, and/or plant simulator been addressed?	☐	☐	☑
16.	Has the effect on other systems been addressed?	☐	☐	☑
17.	Have any changes in other controlled documents (e.g. UFSAR, Technical Specifications, COLR, etc.) been identified and tracked?	☑	☐	☐
18.	When applicable, are the analysis results consistent with the proposed license amendment?	☑	☐	☐
19.	Have other documents that have used the calculation as input been reviewed and revised as appropriate?	☑	☐	☐
20.	Have all affected design analyses been documented on the Affected Documents List (ADL) for the associated Configuration Change?	☑	☐	☐
21.	Do the sources of inputs and analysis methodology used meet current technical requirements and regulatory commitments? (If the input sources or analysis methodology are based on an out-of-date methodology or code, additional reconciliation may be required if the site has since committed to a more recent code)	☑	☐	☐
22.	Have supporting technical documents and references been reviewed when necessary?	☑	☐	☐

9/12/05

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Revision 2 provided the following:

- In accordance with Technical Specification Change Request No. 326: Elimination of Containment Equipment Hatch Closure During Refueling, release from the reactor building equipment hatch is being re-evaluated in order to support an NRC Request for Additional Information (RAI).
- New atmospheric dispersion factors (X/Qs) have been calculated using the guidance provided in Regulatory Guide 1.194. These X/Qs are applied to the FHA analysis for revised dose consequences to control room operators.
- Table of Contents page numbers were updated to match the new format (CC-AA-309-1001, Rev. 2).
- Reference 3.18 and 3.19 were added.
- Appendix B was revised to reflect twice the iodine and noble gas release fractions minus the cesium.
- New RADTRAD pages were added to replace those from Revision 1.
- Attachment A was removed (Design inputs included in Section 5)

This Revision (Revision 3) provides the following:

- **A request for additional information (RAI) from the NRC required justification for the 1,000 cfm unfiltered inleakage used during the first 30 minutes of the accident (normal mode of CR HVAC) as well as the 4,000 cfm unfiltered intake (assumed as one half of the design nominal flow). In order to preclude tracer gas testing in the normal mode, it was determined that, for this 30-minute period, an intake value equal to or greater than the total CR HVAC fan capacity would conservatively be assumed to enter the CR. A sensitivity study was performed that evaluated the effects on CR operator dose as the (unfiltered) intake is increased. This study has shown that CR dose peaks between 51,000 and 71,000 cfm which reflects equilibrium between the CR air and the outside for this period.**
- **Additional RADTRAD runs were performed to incorporate the sensitivity study demonstrating that total CR dose remains acceptable. These runs are included in Appendix L and are based on the case with the highest CR dose from the flow tolerance sensitivity runs (Appendices C through K). Appendix E was used as the base case for this sensitivity study.**
- **Table of Contents page numbers were updated.**
- **The Results Summary Table in Section 2.0 (now listed as Table A) was updated to reflect the new control room dose values as a result of having 61,000 cfm unfiltered intake entering the CR during the first 30 minutes of the FHA. Note that this change only affects the control room. The EAB and LPZ doses are are not affected by this change.**
- **Table B was added to page 5. This table shows the results of the sensitivity study. Figure A was also added to graphically show these results (page 6).**
- **Additional information regarding the sensitivity study was added to page 12.**
- **The Design Input Table (Section 5.4.4) was updated to reflect the new conservative design assumption of 61,000 cfm unfiltered intake for the period 0 to 30 minutes.**
- **A note was inserted for Design Input 5.4.5 to indicate that 75% efficiency (instead of 90%) was used in the analysis for conservatism.**
- **The RADTRAD outputs were truncated to only include the input scenarios and the pertinent outputs.**

1.0 PURPOSE:

The purpose of this analysis is to determine the Exclusion Area Boundary (EAB), Low Population Zone (LPZ) and Control Room (CR) doses due to a Fuel Handling Accident Occurring in the Reactor Building With Personnel and/or Equipment Hatch Air Lock Doors Opened.

2.0 Results Summary

The results of fuel handling accident occurring in the reactor building with personnel and/or equipment hatch air lock doors opened.

Table A

	FHA Occurring In Reactor Building Post-FHA TEDE Dose (Rem)		
	Control Room	**EAB**	**LPZ**
Calculated Dose	2.52+00	4.49E+00	7.87E-01
Allowable Dose	5.00E+00	6.30E+00	6.30E+00

Significant inputs used in this analysis:

- Reactor building airlocks and equipment hatch remain open for the duration of the accident.
- No reactor building filtration is assumed during the accident.
- All activity released to the environment within 2 hours using a flow rate of 165,780 cfm which bounds the maximum RB purge vent flow of 50,000 cfm.
- A control room unfiltered inleakage of 1,000 cfm is assumed **for the duration of the accident** which bounds the value measured using a tracer gas test. **For the first 30 minutes, an additional 60,000 cfm of unfiltered intake is assumed.**
- A sensitivity evaluation regarding control room HVAC flows (intake and recirculation) was performed to consider the worst combination of the flow tolerances (10% low recirc flow, 10%low intake flow). A summary table and associated RADTRAD outputs are included. This is a change from the previous analysis that used nominal flow rates.
- A 30-minute delay in placing CR HVAC system into the radiation mode is assumed. **This was conservatively modeled as a 61,000 cfm unfiltered intake during this period.**
- 208 fuel rods are assumed to be damaged.
- The iodine and noble gas release fractions are twice those listed in RG 1.183 Table 3. Previously, only the iodine fractions were doubled.
- The highest calculated control room X/Q for any of the containment openings is used .

Table B
HVAC Flow Tolerance Sensitivity Evaluation

	RADTRAD Run								
	0A	0B	0C	0D	0E	0F	0G	0H	0I
CR Recirc, cfm	25,200	25,200	25,200	28,000	28,000	28,000	30,800	30,800	30,800
CR Filtered Intake, cfm	8,800	8,000	7,200	8,800	8,000	7,200	8,800	8,000	7,200
CR Unfiltered Inleakage, cfm	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
CR Exhaust, cfm	9,800	9,000	8,200	9,800	9,000	8,200	9,800	9,000	8,200
CR Dose, Rem TEDE	**1.1038**	**1.1111**	**1.1188**	**1.0833**	**1.0895**	**1.0961**	**1.0655**	**1.0708**	**1.0765**

Conclusion:
Based on the sensitivity runs from RADTRAD (see Appendix C through I), the worst-case flow combination is when both the recirc and intake flows are 10% less.

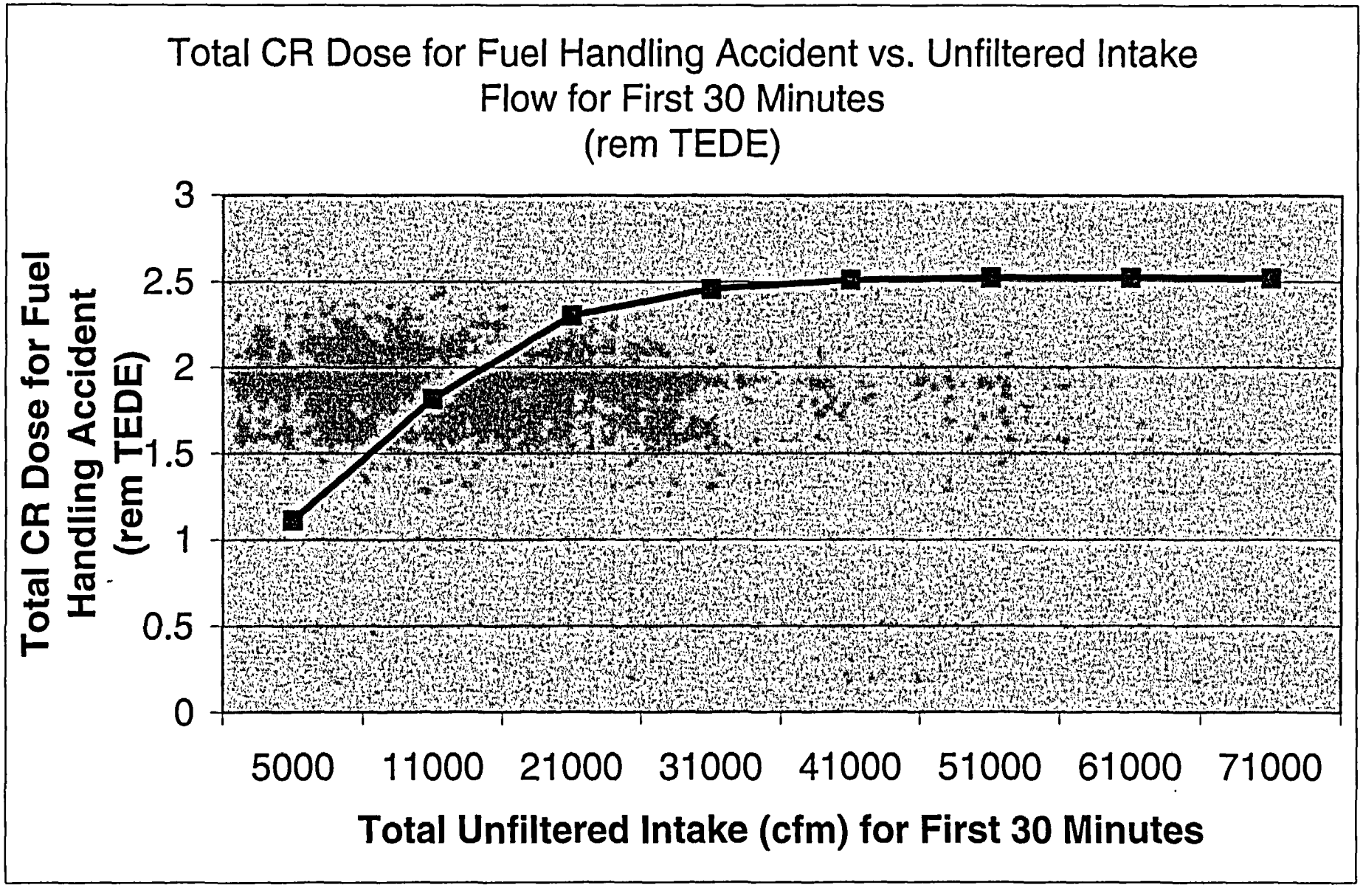
Table C
CR Unfiltered Intake Sensitivity Evaluation

Total Unfiltered Intake for first 30 Minutes (cfm) *	Total CR Dose for Accident (rem TEDE)	RADTRAD Run Information
5000	1.1188	0C.psf (Appendix E, Page 53)
11000	1.8165	0C-1a.psf (Appendix L, Page 109)
21000	2.3002	0C-2a.psf (Appendix L, Page 115)
31000	2.4572	0C-3a.psf (Appendix L, Page 121)
41000	2.5075	0C-4a.psf (Appendix L, Page 127)
51000	2.5213	0C-5a.psf (Appendix L, Page 133)
61000	2.5221	0C-6a.psf (Appendix L, Page 139)
71000	2.5180	0C-7a.psf (Appendix L, Page 145)

*** Includes unfiltered intake plus inleakage (no filtered intake for first 30 minutes)**

Conclusion:
Based on the sensitivity runs from RADTRAD (see Appendix L), the control room air is in equilibrium with the outside with an intake flow of approximately 61,000 cfm.

Figure A


Total CR Dose for Fuel Handling Accident vs. Unfiltered Intake Flow for First 30 Minutes (rem TEDE)
Total CR Dose for Fuel Handling Accident (rem TEDE)
3
2.5
2
1.5
1
0.5
0
5000
11000
21000
31000
41000
51000
61000
71000
Total Unfiltered Intake (cfm) for First 30 Minutes

3.0 References

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

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

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

3.4 AmerGen Calculation C-1101-202-E620-415, Rev. 2, "TMI-1 Isotopic Core Inventory," R. Jaffa, November 10, 2000

3.5 Vendor Calculation G98TM-4L, Rev 0, "PLG Inc. Report dated July 23, 1998 ACCIDENT X/Q VALUES FOR TMI-1"

3.6 TMI 1 Technical Specifications:
3.6.1 Specification TS 3.8.6
3.6.2 Specification TS 3.8.10
3.6.3 Specification TS 3.15.1.2.a
3.6.4 Specification TS 3.15.1.2.b

3.7 GPUN Calculation C-1101-826-E540-020, Rev 2,"Atmospheric Transport X/Q's Using ARCON96 Code – Control Room Habitability"

3.8 AmerGen Calculation No. C-1101-826-E260-023, Rev 2, "TMI-1 Control Building Emergency Envelope Free Air Volume."

3.9 Control Room Envelope Inleakage Testing at TMI Nuclear Station Final Report, November 13, 2000

3.10 Function Test No. 826.05; Control Room Ventilation Configuration For Tracer Gas Testing, Rev. 0, 8/19/00 through 8/21/00

3.11 TMI-1 UFSAR Section 14.2.2.1.b.1

3.12 10 CFR 50.67, "Alternate Source Term."

3.13 GPUN Calculation C-1101-900-E000-072, Rev 2, "TMI-1 Dose Consequences from MHA with 15 gph ECCS Leakage."

3.14 Validation of TMI-1 Design Input Parameters Used In Post-FHA Licensing Basis Analysis (Attachment A).

3.15 GPUN Calculation C-1101-252-5412-012, Rev 0, "Radiological Analysis of FHA and SFCDA for 5.0 w/o, 60 GWD/MTU Fuel."

3.16 Federal Guidance Report 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion."

3.17 Exelon "Verification & Validation of RADTRAD Computer Code

3.18 AmerGen Calculation C-1101-202-E620-437, Revision 0, "Fission Product Release Fractions for Hi Burnup, Hi Power Fuel to Support TMI-1 LAR No. 249"

3.19 AmerGen Calculation C-1101-826-E410-030, Revision 0, "Additional Onsite X/Q Values for Alternative Source Term Application"

4.0 Assumptions

Assumptions for Evaluating the Radiological Consequences of a Fuel Handling Accident (FHA)

The assumptions in these sections are acceptable for evaluating the radiological consequences of FHA. These assumptions supplement the guidance provided in Regulatory Guide 1.183 (Ref. 3.1).

Source Term Assumptions

4.1 Per Reference 3.1, Regulatory Position 3.2, for non-LOCA events, the fractions of the core inventory assumed to be in the gap for the various radionuclides are given in Table 3 of RG 1.183.

For this analysis, the release fractions from Table 3 are incorporated in the design input Table 2 in conjunction with the fission product inventory calculated in Table 1 with the maximum core radial peaking factor of 1.70 consistent with the existing licensing basis.

Additionally, there have previously been approximately 8 to 16 fuel assemblies evaluated to exceed the RG 1.183 footnote 11 value of 6.3 kW/ft peak rod average power for burnups exceeding 54 GWD/MTU. The current core design however, has no such assemblies. Therefore, to account for such assemblies in the future, the RG 1.183 Table 3 gap release fractions for noble gas and halogens is doubled for conservatism, even though an ANSI/ANS Standard 5.4 analysis (Reference 3.18) indicates lower release fractions.

4.2 Per Reference 3.1, Appendix B, Regulatory Position B.1.1, the number of fuel rods damaged during the accident should be based on a conservative analysis that considers the most limiting case. This analysis should consider parameters such as the weight of the dropped heavy load or the weight of a dropped fuel assembly (plus any attached handling grapples), the height of the drop, and the compression, torsion, and shear stresses on the irradiated fuel rods. Damage to adjacent fuel assemblies, if applicable (e.g., events over the reactor vessel), should be considered.

For the purpose of this analysis, all fuel rods (208) in one assembly are assumed to be damaged consistent with the existing licensing basis.

4.3 Per Reference 3.1, Appendix B, Regulatory Position B.1.2, the fission product release from the breached fuel in this analysis is based on Regulatory Position 3.2 and the estimate of the number of fuel rods breached.

Core Inventory

The inventory of fission products in the reactor core and available for gap release from damaged fuel is based on the maximum power level of 2,619 MWt corresponding to current fuel

enrichment and fuel burnup, which is 1.02 times the current licensed rated thermal power of 2,568 MWt. All of the gap activity in the damaged rods is assumed to be instantaneously released. Radionuclides included are xenons, kryptons, and iodines. The cesiums, and rubidiums are assumed to be retained by the water in the fuel pool or reactor cavity (The gap activity is shown in Table 1 of Design Input 5.3.1.2. It is further assumed that irradiated fuel shall not be removed from the reactor until the unit has been sub-critical for at least 72 hours (TS 3.8.10).

4.4 Timing of Release Phase

Per Reference 3.1, Regulatory Position 3.3, for non-LOCA DBAs in which fuel damage is projected, the release from the fuel gap and the fuel pellet is assumed to occur instantaneously with the onset of the projected damage.

4.5 Chemical Form

Per Reference 3.1, Appendix B, Regulatory Position B.1.3, the chemical form of radioiodine released from the fuel to the surrounding water is assumed to be 95% cesium iodide (CsI), 4.85 percent elemental iodine, and 0.15 percent organic iodide. The CsI released from the fuel is assumed to completely dissociate in the pool water. Because of the low pH of the pool water, the iodine re-evolves as elemental iodine. This is assumed to occur instantaneously.

4.6 Water Depth

If the depth of water above the damaged fuel is 23 feet or greater, the decontamination factors for the elemental and organic species are 500 and 1, respectively, giving an overall effective decontamination factor of 200 (i.e., 99.5% of the total iodine released from the damaged rods is retained by the water). This difference in decontamination factors for elemental (99.85%) and organic iodine (0.15%) species results in the iodine above the water being composed of 57% elemental and 43% organic species (Ref. 3.1, RGP B.2). The depth of water above damaged fuel for a fuel handling accident at TMI-1 is greater than 23 feet. Therefore, treatment is per Ref. 3.1, RGP B.2.

4.7 Noble Gases

The retention of noble gases in the water in the fuel pool or reactor cavity is negligible (i.e., decontamination factor of 1). Particulate radionuclides are assumed to be retained by the water in the fuel pool or reactor cavity (i.e., infinite decontamination factor) (Ref. 3.1, RGP B.3).

Fuel Handling Accidents Within Containment

For fuel handling accidents postulated to occur within the containment, the following assumptions are acceptable to the NRC staff (Ref. 3.1, RGP B.5).

4.8 If the containment is isolated during fuel handling operations, no radiological consequences need to be analyzed. This analysis assumes that the airlock doors and equipment hatch remain open.

4.9 Since the containment is open during fuel handling operations (personnel air lock, emergency airlock, or equipment hatch is open) the radioactive material that escapes from the reactor cavity pool to the containment is released to the environment over a 2-hour time period.

4.10 A reduction in the amount of radioactive material released from the containment by ESF filter systems may be taken into account provided that these systems meet the guidance of Regulatory

Guide 1.52 and Generic Letter 99-02 (Ref. 3.3). Delays in radiation detection, actuation of the ESF filtration system, or diversion of ventilation flow to the ESF filtration system should be determined and accounted for in the radioactivity release analyses. No ESF filtration is credited in this analysis prior to activity being released to the environment.

4.11 Credit for dilution or mixing of the activity released from the reactor cavity by natural or forced convection inside the containment may be considered on a case-by-case basis. Such credit is generally limited to 50% of the containment free volume. Evaluation should consider the magnitude of the containment volume and exhaust rate, the potential for bypass to the environment, the location of exhaust plenums relative to the surface of the reactor cavity, recirculation ventilation systems, and internal walls and floors that impede stream flow between the surface of the reactor cavity and the exhaust plenums. In this evaluation, the activity is assumed to mix with 100% of containment volume to calculate a hypothetical maximum release rate to remove almost all activity distributed in the containment volume. The volumetric release rate is dependent on the duration of release and the remaining fraction of activity in the containment volume. Therefore, the release rate becomes independent of the mixing process.

Offsite Dose Consequences

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

4.12 The offsite dose is determined in TEDE, which is the sum of the committed effective dose equivalent (CEDE) from inhalation and the deep dose equivalent (DDE) from external exposure from all radionuclides that are significant with regard to dose consequences and the released radioactivity (Ref. 3.1, RGP 4.1.1).

4.13 The offsite dose analysis is performed using the RADTRAD3.02 code (Ref. 3.2), which uses the Committed Effective Dose (CED) Conversion Factors for inhalation, submersion, and ingestion from Reference 3.11 (Ref 3.1 RGP 4.1.2).

4.14 Since RADTRAD3.02 calculates Deep Dose Equivalent (DDE) using whole body submergence in semi-infinite cloud with appropriate credit for attenuation by body tissue, the DDE can be assumed nominally equivalent to the effective dose equivalent (EDE) from external exposure. Therefore, the code uses DDE in lieu of EDE in determining TEDE. The dose conversion factors are obtained from Reference 3.16 (Ref 3.1 RGP 4.1.4).

4.15 The TEDE for the EAB receptor location is determined for two-hour period following the start of the radioactivity release and used in determining compliance with the dose acceptance criteria in Reference 3.1, RGP 4.4 Table 6.

EAB Dose Acceptance Criteria: 6.3 Rem TEDE

4.16 TEDE is determined for the most limiting receptor at the outer boundary of the low population zone (LPZ) and is used in determining compliance with the dose criteria in Reference 3.1, RGP 4.4 Table 6.

LPZ Dose Acceptance Criteria: 6.3 Rem TEDE

4.17 No correction is made for depletion of the effluent plume by deposition on the ground (Ref 3.1, RGP 4.1.7).

4.18 The breathing rates used for persons at offsite locations (Ref. 3.1, RGPs 4.1.3 & 4.4), which are incorporated in design input 5.5.3.

Control Room Dose Consequences

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

4.19 The CR TEDE analysis considers the following sources of radiation that will cause exposure to control room personnel (Ref 3.1, RGP 4.2.1):

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

Note: The external airborne cloud dose, containment shine dose, and CR filter shine dose due to FHA are insignificant compared to those due to a LOCA (see the core release fractions for LOCA and non-LOCA design basis accidents in Tables 2 and 3 of Reference 3.1), therefore, since these doses are not significant, they are not evaluated for the FHA.

4.20 The radioactivity releases and radiation levels used in evaluating the control room dose are determined using the same source term, transport, and release assumptions used for determining the exclusion area boundary (EAB) and the low population zone (LPZ) TEDE values (Ref 3.1, RGP 4.2.2).

4.21 The occupancy and breathing rate of the maximum exposed individuals present in the control room are incorporated in design inputs 5.4.7 & 5.4.8 (Ref. 3.1, RGP 4.2.6).

4.22 10 CFR 50.67 (Ref 3.12 establishes the following radiological criterion for the control room.

CR Dose Acceptance Criteria: 5 Rem TEDE (50.67(b)(2)(iii))

4.23 Credit for engineered safety features that mitigate airborne activity within the control room is taken for control room isolation or pressurization, intake or recirculation filtration. Refer to SRP 6.5.1, "ESF Atmospheric Cleanup System. The control room design is often optimized for the DBA LOCA and the protection afforded for other accident sequences may not be as advantageous. In most designs, control room isolation is actuated by engineered safeguards feature (ESF) signals or radiation monitors (RMs). In some cases, the ESF signal is effective only for selected accidents, placing reliance on the RMs. Several aspects of RMs can delay the isolation, including the delay for activity to build up to concentrations equivalent to the alarm

setpoint and the effects of different radionuclide accident isotopic mixes on monitor response. To eliminate the effects of RM detection delays, the TMI-1 control room is conservatively assumed to be isolated manually by CR operator 30 minutes after an accident. **During this 30-minute period, an unfiltered intake of 61,000 cfm is assumed. This value bounds the capacity of any HVAC fan associated with the CR HVAC system and produces a CR environment that is in equilibrium with the outside air for this period.**

5.0 Design Inputs:

5.1 General Considerations

5.1.1 Analysis Quality

The design basis accidents postulated and analyzed to provide a conservative set of assumptions to demonstrate the performance of one or more aspects of the facility design to protect the control room operator and the health and safety of general public. The guidance in the Regulatory Guide 1.183 (Ref. 3.1) and plant-specific design input compatible for the AST and TEDE dose criteria are incorporated in this analysis, which provides the selected sets of assumptions, design inputs, and models. This assures an appropriate and prudent safety margin against unpredicted events in the course of an accident and compensates for large uncertainties in facility parameters, accident progression, radioactive material transport, and atmospheric dispersion.

5.1.2 Credit for Engineered Safeguard Features

Credit is taken only for accident mitigation features that are classified as safety-related, are required to be operable by technical specifications, are powered by emergency power sources, and are either automatically actuated or, in limited cases, have actuation requirements explicitly addressed in emergency operating procedures. The CR emergency filtration system including the charcoal and HEPA filters is a safety related system, which is credited for dose mitigation. The values of charcoal and HEPA filter efficiencies (90% and 99%, respectively) are obtained from the applicable technical specifications (see design inputs 5.4.5 & 5.4.6).

5.1.3 Assignment of Numeric Input Values

The numeric values that are chosen as inputs to the analyses required by 10 CFR 50.67 (Ref. 3.12) are compatible to AST and TEDE dose criteria and selected with the objective of maximizing the postulated dose. As a conservative alternative, the limiting value applicable to each portion of the analysis is used in the evaluation of that portion. For parameters addressed by technical specifications, the values used in the analysis are those specified in the technical specifications. The effects of HVAC flow tolerances was evaluated.

5.1.4 Applicability of Prior Licensing Basis

AST is currently licensed at TMI-1. This evaluation expands the original analysis to include an open containment equipment hatch during fuel handling. The analysis in this calculation ensures that analysis assumptions, design inputs, and methods are compatible with the ASTs and the TEDE criteria.

5.1.5 Meteorology Considerations

Atmospheric dispersion values (X/Q) for the EAB, the LPZ, and the control room that are approved by the Staff in previous licensing proceedings are used in performing the radiological analyses identified in this calculation (Refs 3.5 & 3.7). The atmospheric dispersion factors for the CR have been recalculated

(Reference 3.19) using the ARCON96 computer code sponsored by the NRC and the guidance in RG 1.194.

5.2 Accident-Specific Design Inputs/Assumptions

The design inputs/assumptions utilized in the EAB, LPZ, and CR habitability analyses are listed in the following sections. The design inputs are compatible with the AST and TEDE dose criteria and assumptions are consistent with those identified in Regulatory Position 3 and Appendix B of RG 1.183 (Ref. 3.1). The design inputs and assumptions in the following sections represent the as-built design of the plant.

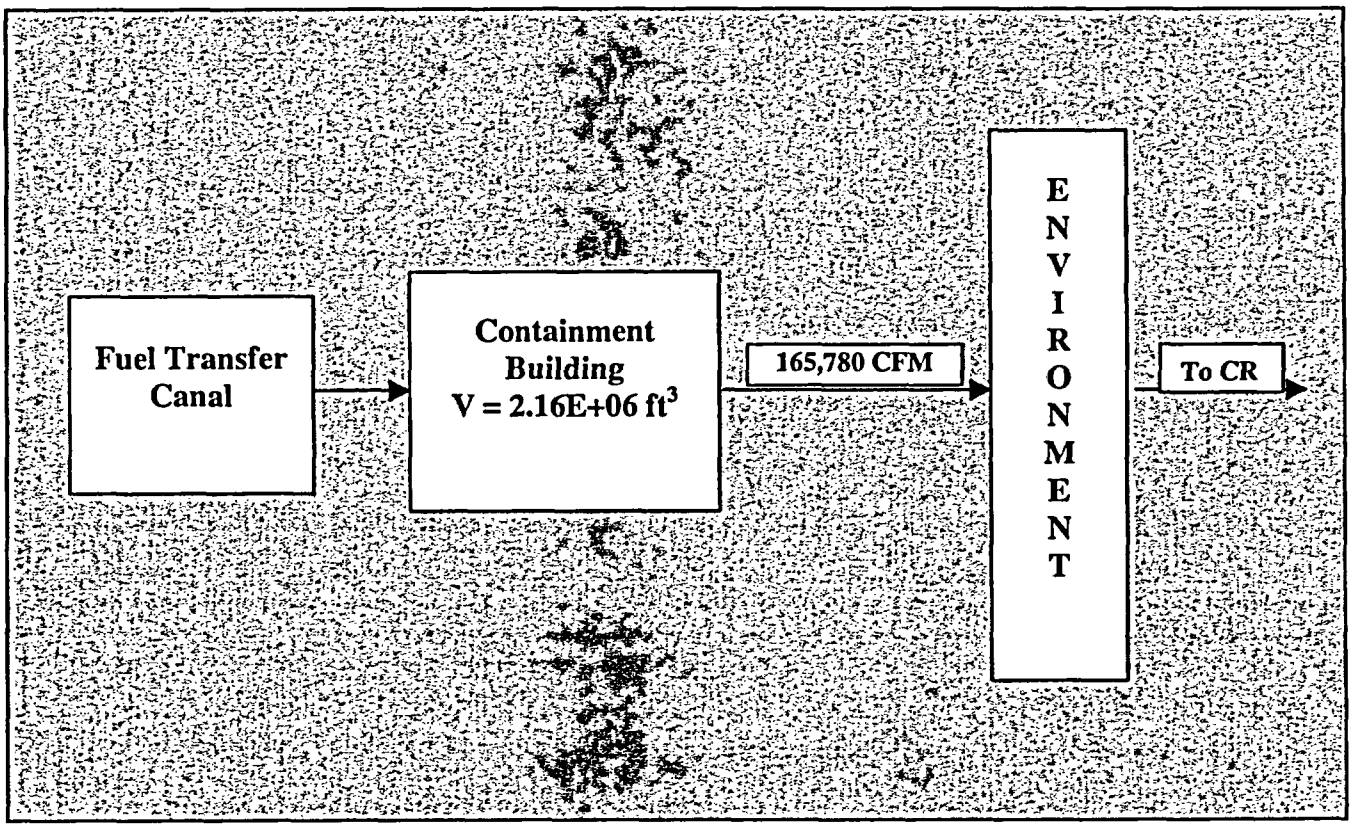


Figure 1: FHA Occurring In Reactor Building With Hatch Opened RADTRAD Nodalization

5.3 FHA Occurring In Reactor Building With Hatch Doors Opened Design Input Parameters		
Design Input Parameter	**Value Assigned**	**Reference**
5.3.1 Source Term		
5.3.1.1 Power Level	2,619 MWt (2,568 x 1.02 = 2,619)	3.4, Page 2
5.3.1.2 Isotopic Core Inventory	See Below	3.4, Table 1

Table 1
Core Inventory

Isotope	Activity	Isotope	Activity	Isotope	Activity
KR 85	1.05E+06	I132	1.03E+08	XE133	1.50E+08
KR 85M	2.33E+07	I133	1.50E+08	XE135	5.51E+07
KR 87	4.60E+07	I134	1.66E+08	XE135M	2.85E+07
KR 88	6.48E+07	I135	1.39E+08	CS134	1.71E+07
RB 86	1.64E+05	XE-131M	7.17E+05	CS136	4.74E+06
I131	7.15E+07	XE-133M	4.56E+06	CS137	1.15E+07

5.3.1.3 Radionuclide Release Fractions. See corrected RADTRAD RFT File in Appendix B

Table 2

Fraction of Fission Product Inventory in Gap
Note: Also refer to Appendix B, "RADTRAD Timing & Release Fraction File FHA Update 6-09-05.rft"

Group	Fraction	3.1, RGP 3.2, Table 3
I-131	0.16	Note: RG 1.183 fractions doubled in this analysis for conservatism.
Kr-85	0.20	
Other Noble Gases	0.10	
Other Halogens	0.10	
Alkali Metals	N/A – Retained in water	

5.3.1.4 Radionuclide Composition

Table 3

Group	Elements	3.1, RGP 3.4, Table 5
Noble Gases	Xe, Kr	
Halogens	I, Br	
Alkali Metals	Cs, Rb	

5.3.1.5 Radial Peaking Factor	1.7	3.15, Page 2
5.3.1.6 Damaged Fuel Rods	208	3.15, Page 2
5.3.1.7 Number of Fuel Assemblies In Core	177	3.15, Page 4
5.3.1.8 Irradiated Fuel Decay	72 hrs	3.6.2

Design Input Parameter	Value Assigned	Reference
5.3.2 Activity Transport in Reactor Building		
5.3.2.1 SFP Water Depth	23 feet	3.11, Ref. 3.2, Appendix B.2
5.3.2.2 Reactor Bldg Volume	2.16E+06 ft^3	3.13, Pages 9 & 10
5.3.2.3 Decontamination Factors (DFs) of Iodine		
Elemental	500	3.1, Appendix B.2
Organic	1	
5.3.2.4 Overall Effective Decontamination Factors (DFs)		
Total Iodine	200	3.1, Appendix B.2
5.3.2.5 Chemical Form of Iodine Released From Pool Water		
Elemental	57%	3.1, Appendix B.2
Organic	43%	
5.3.2.6 DF of Noble Gas	1	3.1, Appendix B.3
5.3.2.7 Duration of Release (Hr)	2	3.1, Appendix B.5.3
5.3.2.8 Reactor Building Filter Efficiencies (Assumed In This Analysis)		
Species	**Efficiency (%)**	Not Credited In Analysis
Aerosol	0	
Elemental	0	
Organic	0	
5.3.2.9 Activity release rate (cfm)	165,780	See Section 7.3

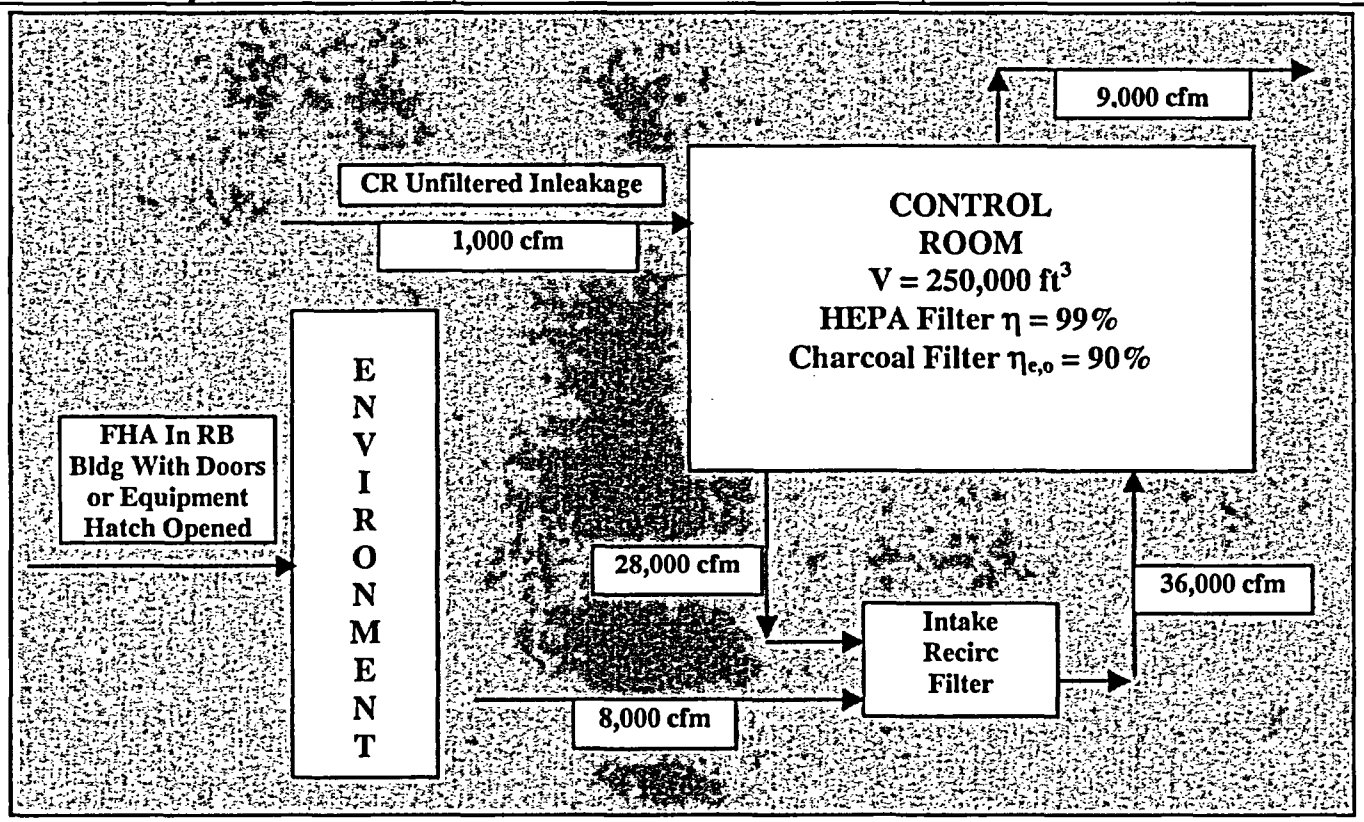


Figure 2 – TMI-1 Control Room RADTRAD Nodalization

Design Input Parameter	Value Assigned	Reference
5.4 Control Room Model Parameters		
5.4.1 CR Volume	250,000 ft^3	3.8, Page 3
5.4.2 CREV System Flow Rate	8,000 cfm +/- 10%	3.9 & 3.10

5.4.3 CR Min Recirc Flow Rate	28,000 cfm +/- 10%	3.9 & 3.10
5.4.4 CR Unfiltered Inleakage	1,000 cfm **0 – 30 minutes: 61,000 cfm**	3.9 & 3.10 **New conservative assumption**
5.4.5 CR Charcoal Filter Efficiencies	90% **(75% used in analysis)**	3.6.4
5.4.6 CR HEPA Filter Efficiency	99% used in analysis (99.95% in TS)	3.6.3
5.4.7 CR Occupancy Factors		
Table 4		
Time (Hr)	%	3.1, RGP 4.2.6
0-24	100	
24-96	60	
96-720	40	
Design Input Parameter	**Value Assigned**	**Reference**
5.4.8 CR Breathing Rate (m^3/sec)	3.5E-04	3.1, RGP 4.2.6
5.4.9 CR Atmospheric Dispersion Factors (X/Qs)		
Table 5		
Time (Hr)	**X/Q (sec/m^3)**	
0-2	5.34E-04	3.19, page 8
2-8	3.10E-04	
8-24	1.36E-04	
24-96	9.70E-05	
96-720	6.02E-05	
5.5 Site Boundary Release Model Parameters		
5.5.1 EAB Atmospheric Dispersion Factor (X/Q) (sec/m^3)	8.0E-04	3.5, Page 6
5.5.2 LPZ Atmospheric Dispersion Factors (X/Qs)		
Table 6		
Time (Hr)	**X/Q (sec/m^3)**	3.5, Page 6
0-2	1.4E-04	
2-8	6.0E-05	
8-24	3.9E-05	
24-96	1.6E-05	
96-720	4.0E-06	
5.5.3 Breathing Rate (m^3/sec) (Ref 3.1, RGP 4.2.6)		
Table 7		
Time (Hr)	**(m^3/sec)**	3.1, RGP 4.1.3
0-8	3.5E-04	
8-24	1.8E-04	
24-720	2.3E-04	

6. OVERALL APPROACH AND METHODOGOLY

Fuel Handling Accident in the Reactor Building With Air Lock Doors and equipment hatch Opened

Activity released from the refueling cavity is uniformly distributed in the entire volume of containment building and released to the environment over a two hour time period such that 99.99% of the activity released from the damaged spent fuel assembly is released to the environment.

The Reference 3.1 Regulatory Position in Appendix B, Section 5.2 allows dilution or mixing of the activity released from the reactor cavity by natural or forced convection inside the containment. Such credit is limited to 50% of the containment free volume. In this case, the activity is assumed to mix with 100% of containment volume to calculate a hypothetical maximum release rate (165,780 cfm) to remove almost all activity (99.99%) distributed in the containment volume. The volumetric release rate (cfm) is dependent on the duration of release (2.0 Hrs) and remaining fraction of activity in the containment volume (1 – 0.9999 = 0.0001); therefore, the release rate becomes independent of the mixing process.

7. CALCULATIONS

7.1 Post-FHA Activity Released in Reactor Building

For the FHA in the containment, it is assumed that one peak fuel assembly was damaged with a peaking factor of 1.7. The undecayed noble gas and iodine isotopic activities released in the reactor building from the damaged fuel assembly are calculated in Table 8 below. These isotopic activities in Ci/MWt are utilized for modifying the RADTRAD Nuclide Inventory File fharb_def_a.nif (see Appendix A).

7.2 TMI-1 Plant Specific Nuclide Inventory File (NIF) For RADTRAD3.02 Input

The RADTRAD nuclide inventory file Pwr_def_nif establishes the power dependent radionuclide activity in Ci/MW$_t$ for the reactor core source term. Since these core radionuclide activities are dependent on the core thermal power level, reload design, and burnup, the nif should be modified based on the plant-specific core inventory. The Ci/MW$_t$ for the core radionuclides are calculated in Table 8 and the NIF for RADTRAD input are modified accordingly as shown in Appendix A.

7.3 Post-FHA Release Rates

The release rate for the source node – Pool to Reactor Building – is calculated such that 99.99% of the activity released into the reactor building is released to the environment in two hours.

$$A = A_0 e^{-\lambda t}$$

Where;

A_0 = Initial Activity in Source Node

A = Final Activity in Source Node

λ = Removal Rate (Vol/hr)

t = Removal Time (hr) = 2.0 hr

Assuming that 99.99% of activity is released into the environment,

$A/A_0 = 0.0001$

Therefore,

$A / A_0 = e^{-\lambda t}$

$0.0001 = e^{-2\lambda}$

$\ln(0.0001) = -2\lambda \ln(e)$

$-9.210 = -2\lambda$

$\lambda = -9.210/-2 = 4.605$ volume/hr

For Reactor Building Release Rate

$= 4.605 \times 2{,}160{,}000\ ft^3/hr = 9{,}946{,}800 ft^3/hr \times 1/60\ hr/min = 165{,}780\ ft^3/min$

Table 8

Post-FHA Activity In Reactor Building - RADTRAD Code Nuclide Inventory File

Isotope	Core Initial Inventory (Ci)	Radial Peaking Factor	Number Of Fuel Assembly In Core	Activity In Damaged Spent Fuel Assembly (Ci)	DF	Post-FHA Activity In RB Bldg For RADTRAD Code Nuclide Inventory File		
						(Ci)	(Ci/MWt)	(Ci/MWt)
	A	B	C	D=A*B/C	E	F=D/E	G=F/2619	G
KR 85*	1.05E+06	1.7	177	1.00E+04	1.0	1.00E+04	3.833E+00	.7666E+01
KR 85M	2.33E+07	1.7	177	2.24E+05	1.0	2.24E+05	8.538E+01	.8538E+02
KR 87	4.60E+07	1.7	177	4.41E+05	1.0	4.41E+05	1.686E+02	.1686E+03
KR 88	6.48E+07	1.7	177	6.23E+05	1.0	6.23E+05	2.377E+02	.2377E+03
I131**	7.15E+07	1.7	177	6.87E+05	200.0	3.43E+03	1.311E+00	.2097E+01
I132	1.03E+08	1.7	177	9.92E+05	200.0	4.96E+03	1.894E+00	.1894E+01
I133	1.50E+08	1.7	177	1.44E+06	200.0	7.18E+03	2.741E+00	.2741E+01
I134	1.66E+08	1.7	177	1.60E+06	200.0	7.98E+03	3.048E+00	.3048E+01
I135	1.39E+08	1.7	177	1.34E+06	200.0	6.70E+03	2.556E+00	.2556E+01
XE-131M	7.17E+05	1.7	177	6.89E+03	1.0	6.89E+03	2.629E+00	.2629E+01
XE-133M	4.56E+06	1.7	177	4.38E+04	1.0	4.38E+04	1.672E+01	.1672E+02
XE133	1.50E+08	1.7	177	1.44E+06	1.0	1.44E+06	5.501E+02	.5501E+03
XE135	5.51E+07	1.7	177	5.29E+05	1.0	5.29E+05	2.021E+02	.2021E+03
XE135M	2.85E+07	1.7	177	2.74E+05	1.0	2.74E+05	1.045E+02	.1045E+03

* KR-85 activity is multiplied by a factor 2 (0.1/0.05) to account for additional fractional release.

** I-131 activity is multiplied by a factor 1.6 (0.08/0.05) to account for additional fractional release.

Appendix A

RADTRAD Nuclide Inventory File fharb_def_a.nif

FHA Occurring In Reactor Building With Hatch Doors Opened

```
Nuclide Inventory Name:FHA Occuring In Reactor Building - fharb_def_a.nif
TMI-1 Plant Specific Core Inventory (2619 MWth)
Power Level:
 0.1000E+01
Nuclides:
 60
Nuclide 001:
Co-58
  7
 0.6117120000E+07
 0.5800E+02
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 002:
Co-60
  7
 0.1663401096E+09
 0.6000E+02
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 003:
Kr-85
  1
 0.3382974720E+09
 0.8500E+02
 0.7666E+01
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 004:
Kr-85m
  1
 0.1612800000E+05
 0.8500E+02
 0.8538E+02
Kr-85     0.2100E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 005:
Kr-87
  1
 0.4578000000E+04
 0.8700E+02
 0.1686E+03
Rb-87     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 006:
Kr-88
  1
 0.1022400000E+05
 0.8800E+02
 0.2377E+03
Rb-88     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 007:
Rb-86
  3
 0.1612224000E+07
 0.8600E+02
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
```

```
none      0.0000E+00
Nuclide 008:
Sr-89
  5
 0.4363200000E+07
 0.8900E+02
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 009:
Sr-90
  5
 0.9189573120E+09
 0.9000E+02
 0.0000E+00
Y-90      0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 010:
Sr-91
  5
 0.3420000000E+05
 0.9100E+02
 0.0000E+00
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
 0.0000E+00
Y-92      0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 012:
Y-90
  9
 0.2304000000E+06
 0.9000E+02
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 013:
Y-91
  9
 0.5055264000E+07
 0.9100E+02
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 014:
Y-92
  9
 0.1274400000E+05
 0.9200E+02
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 015:
Y-93
  9
 0.3636000000E+05
```

```
 0.9300E+02
 0.0000E+00
Zr-93     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 016:
Zr-95
  9
 0.5527872000E+07
 0.9500E+02
 0.0000E+00
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
 0.0000E+00
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
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 019:
Mo-99
  7
 0.2376000000E+06
 0.9900E+02
 0.0000E+00
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
 0.0000E+00
Tc-99     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 021:
Ru-103
  7
 0.3393792000E+07
 0.1030E+03
 0.0000E+00
Rh-103m   0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 022:
Ru-105
  7
 0.1598400000E+05
 0.1050E+03
 0.0000E+00
Rh-105    0.1000E+01
none      0.0000E+00
none      0.0000E+00
```

```
Nuclide 023:
Ru-106
  7
 0.3181248000E+08
 0.1060E+03
 0.0000E+00
Rh-106    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 024:
Rh-105
  7
 0.1272960000E+06
 0.1050E+03
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 025:
Sb-127
  4
 0.3326400000E+06
 0.1270E+03
 0.0000E+00
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
 0.0000E+00
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
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 028:
Te-127m
  4
 0.9417600000E+07
 0.1270E+03
 0.0000E+00
Te-127    0.9800E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 029:
Te-129
  4
 0.4176000000E+04
 0.1290E+03
 0.0000E+00
I-129     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 030:
Te-129m
  4
 0.2903040000E+07
 0.1290E+03
```

```
 0.0000E+00
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
 0.0000E+00
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
 0.0000E+00
I-132     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 033:
I-131
  2
 0.6946560000E+06
 0.1310E+03
 0.2097E+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
 0.1894E+01
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 035:
I-133
  2
 0.7488000000E+05
 0.1330E+03
 0.2741E+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
 0.3048E+01
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 037:
I-135
  2
 0.2379600000E+05
 0.1350E+03
 0.2556E+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
 0.5501E+03
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 039:
Xe-135
  1
 0.3272400000E+05
 0.1350E+03
 0.2021E+03
Cs-135    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 040:
Cs-134
  3
 0.6507177120E+08
 0.1340E+03
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 041:
Cs-136
  3
 0.1131840000E+07
 0.1340E+03
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 042:
Cs-137
  3
 0.9467280000E+09
 0.1370E+03
 0.0000E+00
Ba-137m   0.9500E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 043:
Ba-139
  6
 0.4962000000E+04
 0.1390E+03
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 044:
Ba-140
  6
 0.1100736000E+07
 0.1400E+03
 0.0000E+00
La-140    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 045:
La-140
  9
 0.1449792000E+06
 0.1400E+03
 0.0000E+00
```

```
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 046:
La-141
  9
 0.1414800000E+05
 0.1410E+03
 0.0000E+00
Ce-141    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 047:
La-142
  9
 0.5550000000E+04
 0.1420E+03
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 048:
Ce-141
  8
 0.2808086400E+07
 0.1410E+03
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 049:
Ce-143
  8
 0.1188000000E+06
 0.1430E+03
 0.0000E+00
Pr-143    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 050:
Ce-144
  8
 0.2456352000E+08
 0.1440E+03
 0.0000E+00
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
 0.0000E+00
none      0.0000E+00
none      0.0000E+00
none      0.0000E+00
Nuclide 052:
Nd-147
  9
 0.9486720000E+06
 0.1470E+03
 0.0000E+00
Pm-147    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 053:
Np-239
```

```
  8
 0.2034720000E+06
 0.2390E+03
 0.0000E+00
Pu-239    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 054:
Pu-238
  8
 0.2768863824E+10
 0.2380E+03
 0.0000E+00
U-234     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 055:
Pu-239
  8
 0.7594336440E+12
 0.2390E+03
 0.0000E+00
U-235     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 056:
Pu-240
  8
 0.2062920312E+12
 0.2400E+03
 0.0000E+00
U-236     0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 057:
Pu-241
  8
 0.4544294400E+09
 0.2410E+03
 0.0000E+00
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
 0.0000E+00
Np-237    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 059:
Cm-242
  9
 0.1406592000E+08
 0.2420E+03
 0.0000E+00
Pu-238    0.1000E+01
none      0.0000E+00
none      0.0000E+00
Nuclide 060:
Cm-244
  9
 0.571508136E+9
 0.2440E+03
 0.0000E+00
Pu-240    0.1000E+01
```

```
none      0.0000E+00
none      0.0000E+00
End of Nuclear Inventory File
```

Appendix B

RADTRAD Timing & Release Fraction File FHA Update 6-09-05.rft

Release Fraction and Timing Name: FHA Update 6-09-05.rft
RG-1.183, Tables 3 Section 3.2
Duration (h): NON-LOCA Accident chk inventory
0.0036E+00 0.0000E+00 0.0000E+00 0.0000E+00
Noble Gases:
0.1000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Iodine:
0.1000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Cesium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Tellurium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Strontium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Barium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Ruthenium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Cerium:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Lanthanum:
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
Non-Radioactive Aerosols (kg):
0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
End of Release File

Appendix C

RADTRAD File 0A.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow: **25,200 cfm**
CR Filtered Intake Flow: **8,800 cfm**
CR Unfiltered Inleakage: **1,000 cfm**
CR Exhaust Flow: **9,800 cfm**
Two Times Iodine & Noble Gas Release Fractions

```
#######################################################################
           RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
 #######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0A.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0A.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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


 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC, Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., 25,200 cfm Recirc, 8,800 cfm Intake
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
```

```
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.8000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   1.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+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
  7.2000E+01   5.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.8000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  2
  7.2000E+01   8.0000E-04
  7.2000E+02   0.0000E+00
  1
  2
  7.2000E+01   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  6
  7.2000E+01   1.4000E-04
  7.4000E+01   6.0000E-05
  8.0000E+01   3.9000E-05
  9.6000E+01   1.6000E-05
  1.6800E+02   4.0000E-06
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   3.5000E-04
  8.0000E+01   1.8000E-04
  9.6000E+01   2.3000E-04
  7.9200E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
```

```
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0A.o4
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

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

Exclusion Area Boundary Doses:

Time (h) = 792.0000    Whole Body   Thyroid       TEDE
Delta dose (rem)        0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)  4.8454E-01  1.3150E+02  4.4948E+00

Low Population Zone Doses:

Time (h) = 792.0000    Whole Body   Thyroid       TEDE
Delta dose (rem)        0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)  8.4794E-02  2.3012E+01  7.8659E-01

Control Room Doses:

Time (h) = 792.0000    Whole Body   Thyroid       TEDE
Delta dose (rem)        0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)  1.2504E-02  3.5784E+01  1.1038E+00


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

                  Containment          Environment          Control Room
Time (hr)     I-131 (Curies)       I-131 (Curies)       I-131 (Curies)
  72.001        6.5355E+01           8.3646E-02           1.0538E-04
  72.004        4.2054E+02           3.4959E+00           4.3989E-03
  72.400        6.7659E+01           3.5615E+02           3.3229E-01
  72.500        4.2673E+01           3.8115E+02           3.2416E-01
  72.800        1.0706E+01           4.1309E+02           4.9645E-02
  73.100        2.6861E+00           4.2110E+02           8.4474E-03
  73.400        6.7390E-01           4.2311E+02           1.6123E-03
  73.700        1.6907E-01           4.2362E+02           3.4037E-04
  74.000        4.2419E-02           4.2374E+02           7.7281E-05
  74.300        4.2373E-02           4.2374E+02           9.7764E-06
```

74.600	4.2328E-02	4.2374E+02	1.2368E-06
74.900	4.2282E-02	4.2374E+02	1.5645E-07
75.200	4.2236E-02	4.2374E+02	1.9792E-08
75.500	4.2191E-02	4.2374E+02	2.5038E-09
75.800	4.2146E-02	4.2374E+02	3.1674E-10
76.100	4.2100E-02	4.2374E+02	4.0069E-11
76.400	4.2055E-02	4.2374E+02	5.0690E-12
76.700	4.2010E-02	4.2374E+02	6.4125E-13
77.000	4.1964E-02	4.2374E+02	8.1120E-14
77.300	4.1919E-02	4.2374E+02	1.0262E-14
77.600	4.1874E-02	4.2374E+02	1.2982E-15
77.900	4.1829E-02	4.2374E+02	1.6423E-16
78.200	4.1784E-02	4.2374E+02	2.0776E-17
78.500	4.1739E-02	4.2374E+02	2.6282E-18
78.800	4.1694E-02	4.2374E+02	3.3248E-19
79.100	4.1649E-02	4.2374E+02	4.2060E-20
79.400	4.1604E-02	4.2374E+02	5.3208E-21
79.700	4.1559E-02	4.2374E+02	6.7310E-22
80.000	4.1514E-02	4.2374E+02	8.5151E-23
80.300	4.1470E-02	4.2374E+02	1.0772E-23
80.600	4.1425E-02	4.2374E+02	1.3627E-24
80.900	4.1380E-02	4.2374E+02	1.7239E-25
81.200	4.1336E-02	4.2374E+02	2.1808E-26
81.500	4.1291E-02	4.2374E+02	2.7588E-27
81.800	4.1247E-02	4.2374E+02	3.4900E-28
82.100	4.1202E-02	4.2374E+02	4.4150E-29
82.400	4.1158E-02	4.2374E+02	5.5852E-30
96.000	3.9196E-02	4.2374E+02	1.1012E-70
168.000	3.0263E-02	4.2374E+02	3.4934-286
720.000	4.1664E-03	4.2374E+02	0.0000E+00
792.000	3.2169E-03	4.2374E+02	0.0000E+00

##
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)
72.001	2.5952E-02	8.8702E-04	4.5415E-03	1.5523E-04	5.7730E-06	1.7727E-07
72.004	1.0846E+00	3.7073E-02	1.8981E-01	6.4878E-03	1.2176E-03	3.7387E-05
72.400	1.1053E+02	3.7778E+00	1.9343E+01	6.6111E-01	1.8717E+01	5.7473E-01
72.500	1.1829E+02	4.0429E+00	2.0700E+01	7.0750E-01	2.5190E+01	7.7347E-01
72.800	1.2819E+02	4.3816E+00	2.2434E+01	7.6679E-01	3.4069E+01	1.0475E+00
73.100	1.3068E+02	4.4667E+00	2.2869E+01	7.8167E-01	3.5474E+01	1.0923E+00
73.400	1.3130E+02	4.4881E+00	2.2978E+01	7.8541E-01	3.5722E+01	1.1009E+00
73.700	1.3146E+02	4.4934E+00	2.3005E+01	7.8635E-01	3.5771E+01	1.1029E+00
74.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5782E+01	1.1035E+00
74.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1037E+00
74.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1037E+00
74.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
75.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
75.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
75.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
76.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
76.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
76.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
77.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
77.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
77.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
77.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
78.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
78.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
78.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
79.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
79.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
79.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00
80.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5784E+01	1.1038E+00

```
  80.300 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
  80.600 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
  80.900 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
  81.200 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
  81.500 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
  81.800 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
  82.100 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
  82.400 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
  96.000 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
 168.000 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
 720.000 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00
 792.000 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5784E+01 1.1038E+00

#################################################################
                        Worst Two-Hour Doses
    Note: All of the dose locations are shown below but the
          worst two-hour dose is only meaningful for the EAB
          dose location.  Please disregard the two-hour worst
          doses for the other dose locations
#################################################################

Exclusion Area Boundary
   Time    Whole Body     Thyroid        TEDE
   (hr)      (rem)         (rem)         (rem)
   72.0    4.8443E-01   1.3147E+02   4.4939E+00
```

Appendix D

RADTRAD File 0B.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow: **25,200 cfm**
CR Filtered Intake Flow: **8,000 cfm**
CR Unfiltered Inleakage: **1,000 cfm**
CR Exhaust Flow: **9,000 cfm**
Two Times Iodine & Noble Gas Release Fractions

```
#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0B.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0B.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp


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


 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 25,200 cfm, CR Intake = 8,000 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
```

```
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.0000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   8.0000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
```

```
  1
  3
  7.2000E+01   5.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.0000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   9.0000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  2
  7.2000E+01   8.0000E-04
  7.2000E+02   0.0000E+00
  1
  2
  7.2000E+01   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  6
  7.2000E+01   1.4000E-04
  7.4000E+01   6.0000E-05
  8.0000E+01   3.9000E-05
  9.6000E+01   1.6000E-05
  1.6800E+02   4.0000E-06
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   3.5000E-04
  8.0000E+01   1.8000E-04
  9.6000E+01   2.3000E-04
  7.9200E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
```

```
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0B.o2
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

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


Exclusion Area Boundary Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   4.8453E-01  1.3150E+02  4.4948E+00

Low Population Zone Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   8.4791E-02  2.3012E+01  7.8659E-01

Control Room Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   1.2978E-02  3.6007E+01  1.1111E+00


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

                 Containment          Environment          Control Room
Time (hr)     I-131 (Curies)       I-131 (Curies)       I-131 (Curies)
  72.001        6.5355E+01           8.3646E-02           1.0538E-04
  72.004        4.2054E+02           3.4959E+00           4.3989E-03
  72.400        6.7659E+01           3.5615E+02           3.3229E-01
  72.500        4.2673E+01           3.8115E+02           3.2416E-01
  72.800        1.0706E+01           4.1309E+02           5.1747E-02
  73.100        2.6861E+00           4.2110E+02           9.0188E-03
  73.400        6.7390E-01           4.2311E+02           1.7315E-03
  73.700        1.6907E-01           4.2362E+02           3.6324E-04
  74.000        4.2419E-02           4.2374E+02           8.1594E-05
```

74.300	4.2373E-02	4.2374E+02	1.0934E-05
74.600	4.2328E-02	4.2374E+02	1.4652E-06
74.900	4.2282E-02	4.2374E+02	1.9635E-07
75.200	4.2236E-02	4.2374E+02	2.6311E-08
75.500	4.2191E-02	4.2374E+02	3.5258E-09
75.800	4.2146E-02	4.2374E+02	4.7248E-10
76.100	4.2100E-02	4.2374E+02	6.3315E-11
76.400	4.2055E-02	4.2374E+02	8.4845E-12
76.700	4.2010E-02	4.2374E+02	1.1370E-12
77.000	4.1964E-02	4.2374E+02	1.5236E-13
77.300	4.1919E-02	4.2374E+02	2.0417E-14
77.600	4.1874E-02	4.2374E+02	2.7360E-15
77.900	4.1829E-02	4.2374E+02	3.6663E-16
78.200	4.1784E-02	4.2374E+02	4.9131E-17
78.500	4.1739E-02	4.2374E+02	6.5838E-18
78.800	4.1694E-02	4.2374E+02	8.8226E-19
79.100	4.1649E-02	4.2374E+02	1.1823E-19
79.400	4.1604E-02	4.2374E+02	1.5843E-20
79.700	4.1559E-02	4.2374E+02	2.1231E-21
80.000	4.1514E-02	4.2374E+02	2.8450E-22
80.300	4.1470E-02	4.2374E+02	3.8124E-23
80.600	4.1425E-02	4.2374E+02	5.1089E-24
80.900	4.1380E-02	4.2374E+02	6.8461E-25
81.200	4.1336E-02	4.2374E+02	9.1742E-26
81.500	4.1291E-02	4.2374E+02	1.2294E-26
81.800	4.1247E-02	4.2374E+02	1.6474E-27
82.100	4.1202E-02	4.2374E+02	2.2076E-28
82.400	4.1158E-02	4.2374E+02	2.9584E-29
96.000	3.9196E-02	4.2374E+02	7.9444E-69
168.000	3.0263E-02	4.2374E+02	2.5468-278
720.000	4.1664E-03	4.2374E+02	0.0000E+00
792.000	3.2169E-03	4.2374E+02	0.0000E+00

##
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)
72.001	2.5952E-02	8.8702E-04	4.5415E-03	1.5523E-04	5.7730E-06	1.7727E-07
72.004	1.0846E+00	3.7073E-02	1.8981E-01	6.4878E-03	1.2176E-03	3.7387E-05
72.400	1.1053E+02	3.7778E+00	1.9343E+01	6.6111E-01	1.8717E+01	5.7473E-01
72.500	1.1829E+02	4.0429E+00	2.0700E+01	7.0750E-01	2.5190E+01	7.7347E-01
72.800	1.2819E+02	4.3816E+00	2.2434E+01	7.6679E-01	3.4197E+01	1.0515E+00
73.100	1.3068E+02	4.4667E+00	2.2869E+01	7.8167E-01	3.5674E+01	1.0985E+00
73.400	1.3130E+02	4.4880E+00	2.2978E+01	7.8541E-01	3.5940E+01	1.1077E+00
73.700	1.3146E+02	4.4934E+00	2.3005E+01	7.8635E-01	3.5993E+01	1.1100E+00
74.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6004E+01	1.1106E+00
74.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6006E+01	1.1109E+00
74.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1110E+00
74.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1110E+00
75.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1110E+00
75.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1110E+00
75.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1110E+00
76.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1110E+00
76.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
76.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
77.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
77.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
77.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
77.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
78.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
78.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
78.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
79.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
79.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
79.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00

80.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
80.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
80.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
80.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
81.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
81.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
81.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
82.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
82.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
96.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
168.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
720.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00
792.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.6007E+01	1.1111E+00

```
#####################################################################
                        Worst Two-Hour Doses
    Note: All of the dose locations are shown below but the
          worst two-hour dose is only meaningful for the EAB
          dose location.  Please disregard the two-hour worst
          doses for the other dose locations
#####################################################################
```

Exclusion Area Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
72.0	4.8442E-01	1.3147E+02	4.4939E+00

Appendix E

RADTRAD File 0C.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow: **25,200 cfm**
CR Filtered Intake Flow: **7,200 cfm**
CR Unfiltered Inleakage: **1,000 cfm**
CR Exhaust Flow: **8,200 cfm**
Two Times Iodine & Noble Gas Release Fractions

```
 ######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
 ######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp


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


 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 25,200 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
```

```
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
```

```
  1
  3
  7.2000E+01   5.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  2
  7.2000E+01   8.0000E-04
  7.2000E+02   0.0000E+00
  1
  2
  7.2000E+01   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  6
  7.2000E+01   1.4000E-04
  7.4000E+01   6.0000E-05
  8.0000E+01   3.9000E-05
  9.6000E+01   1.6000E-05
  1.6800E+02   4.0000E-06
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   3.5000E-04
  8.0000E+01   1.8000E-04
  9.6000E+01   2.3000E-04
  7.9200E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
```

```
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0C.o2
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

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


Exclusion Area Boundary Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   4.8453E-01  1.3150E+02  4.4948E+00

Low Population Zone Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   8.4789E-02  2.3012E+01  7.8658E-01

Control Room Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   1.3545E-02  3.6243E+01  1.1188E+00

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

                  Containment            Environment          Control Room
Time (hr)      I-131 (Curies)         I-131 (Curies)       I-131 (Curies)
  72.001         6.5355E+01             8.3646E-02           1.0538E-04
  72.004         4.2054E+02             3.4959E+00           4.3989E-03
  72.400         6.7659E+01             3.5615E+02           3.3229E-01
  72.500         4.2673E+01             3.8115E+02           3.2416E-01
  72.800         1.0706E+01             4.1309E+02           5.3973E-02
  73.100         2.6861E+00             4.2110E+02           9.6581E-03
  73.400         6.7390E-01             4.2311E+02           1.8719E-03
  73.700         1.6907E-01             4.2362E+02           3.9139E-04
  74.000         4.2419E-02             4.2374E+02           8.7089E-05
  74.300         4.2373E-02             4.2374E+02           1.2362E-05
```

74.600	4.2328E-02	4.2374E+02	1.7548E-06
74.900	4.2282E-02	4.2374E+02	2.4910E-07
75.200	4.2236E-02	4.2374E+02	3.5360E-08
75.500	4.2191E-02	4.2374E+02	5.0194E-09
75.800	4.2146E-02	4.2374E+02	7.1250E-10
76.100	4.2100E-02	4.2374E+02	1.0114E-10
76.400	4.2055E-02	4.2374E+02	1.4357E-11
76.700	4.2010E-02	4.2374E+02	2.0380E-12
77.000	4.1964E-02	4.2374E+02	2.8929E-13
77.300	4.1919E-02	4.2374E+02	4.1065E-14
77.600	4.1874E-02	4.2374E+02	5.8291E-15
77.900	4.1829E-02	4.2374E+02	8.2745E-16
78.200	4.1784E-02	4.2374E+02	1.1746E-16
78.500	4.1739E-02	4.2374E+02	1.6673E-17
78.800	4.1694E-02	4.2374E+02	2.3667E-18
79.100	4.1649E-02	4.2374E+02	3.3596E-19
79.400	4.1604E-02	4.2374E+02	4.7690E-20
79.700	4.1559E-02	4.2374E+02	6.7696E-21
80.000	4.1514E-02	4.2374E+02	9.6094E-22
80.300	4.1470E-02	4.2374E+02	1.3641E-22
80.600	4.1425E-02	4.2374E+02	1.9363E-23
80.900	4.1380E-02	4.2374E+02	2.7486E-24
81.200	4.1336E-02	4.2374E+02	3.9016E-25
81.500	4.1291E-02	4.2374E+02	5.5383E-26
81.800	4.1247E-02	4.2374E+02	7.8617E-27
82.100	4.1202E-02	4.2374E+02	1.1160E-27
82.400	4.1158E-02	4.2374E+02	1.5841E-28
96.000	3.9196E-02	4.2374E+02	5.7935E-67
168.000	3.0263E-02	4.2374E+02	1.8762-270
720.000	4.1664E-03	4.2374E+02	0.0000E+00
792.000	3.2169E-03	4.2374E+02	0.0000E+00

##
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)
72.001	2.5952E-02	8.8702E-04	4.5415E-03	1.5523E-04	5.7730E-06	1.7727E-07
72.004	1.0846E+00	3.7073E-02	1.8981E-01	6.4878E-03	1.2176E-03	3.7387E-05
72.400	1.1053E+02	3.7778E+00	1.9343E+01	6.6111E-01	1.8717E+01	5.7473E-01
72.500	1.1829E+02	4.0429E+00	2.0700E+01	7.0750E-01	2.5190E+01	7.7347E-01
72.800	1.2819E+02	4.3816E+00	2.2434E+01	7.6678E-01	3.4328E+01	1.0555E+00
73.100	1.3068E+02	4.4667E+00	2.2869E+01	7.8166E-01	3.5885E+01	1.1051E+00
73.400	1.3130E+02	4.4880E+00	2.2978E+01	7.8540E-01	3.6171E+01	1.1150E+00
73.700	1.3146E+02	4.4934E+00	2.3005E+01	7.8634E-01	3.6228E+01	1.1175E+00
74.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6240E+01	1.1182E+00
74.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6242E+01	1.1185E+00
74.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1187E+00
74.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1187E+00
75.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
75.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
75.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
76.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
76.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
76.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
77.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
77.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
77.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
77.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
78.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
78.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
78.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
79.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
79.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
79.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
80.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00

80.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
80.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
80.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
81.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
81.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
81.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
82.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
82.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
96.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
168.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
720.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00
792.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.6243E+01	1.1188E+00

```
#################################################################
                        Worst Two-Hour Doses
    Note: All of the dose locations are shown below but the
          worst two-hour dose is only meaningful for the EAB
          dose location.  Please disregard the two-hour worst
          doses for the other dose locations
#################################################################
```

Exclusion Area Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
72.0	4.8440E-01	1.3147E+02	4.4939E+00

Appendix F

RADTRAD File 0D.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow: **28,000 cfm**
CR Filtered Intake Flow: **8,800 cfm**
CR Unfiltered Inleakage: **1,000 cfm**
CR Exhaust Flow: **9,800 cfm**
Two Times Iodine & Noble Gas Release Fractions

```
#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0D.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0D.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp


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


 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 28,000 cfm, CR Intake = 8,800 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
```

```
  0
  0
  1
  2.8000E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.8000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+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
  7.2000E+01   5.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.8000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   3.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  2
  7.2000E+01   8.0000E-04
  7.2000E+02   0.0000E+00
  1
  2
  7.2000E+01   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  6
  7.2000E+01   1.4000E-04
  7.4000E+01   6.0000E-05
  8.0000E+01   3.9000E-05
  9.6000E+01   1.6000E-05
  1.6800E+02   4.0000E-06
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   3.5000E-04
  8.0000E+01   1.8000E-04
  9.6000E+01   2.3000E-04
  7.9200E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
```

```
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0D.o1
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

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


Exclusion Area Boundary Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   4.8454E-01  1.3150E+02  4.4948E+00

Low Population Zone Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   8.4794E-02  2.3012E+01  7.8659E-01

Control Room Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   1.2496E-02  3.5112E+01  1.0833E+00


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

                 Containment           Environment          Control Room
Time (hr)     I-131 (Curies)        I-131 (Curies)       I-131 (Curies)
  72.001        6.5355E+01            8.3646E-02           1.0538E-04
  72.004        4.2054E+02            3.4959E+00           4.3989E-03
  72.400        6.7659E+01            3.5615E+02           3.3229E-01
  72.500        4.2673E+01            3.8115E+02           3.2416E-01
  72.800        1.0706E+01            4.1309E+02           4.3338E-02
  73.100        2.6861E+00            4.2110E+02           6.7416E-03
  73.400        6.7390E-01            4.2311E+02           1.2421E-03
  73.700        1.6907E-01            4.2362E+02           2.6276E-04
  74.000        4.2419E-02            4.2374E+02           6.0609E-05
```

74.300	4.2373E-02	4.2374E+02	6.5914E-06
74.600	4.2328E-02	4.2374E+02	7.1683E-07
74.900	4.2282E-02	4.2374E+02	7.7957E-08
75.200	4.2236E-02	4.2374E+02	8.4781E-09
75.500	4.2191E-02	4.2374E+02	9.2201E-10
75.800	4.2146E-02	4.2374E+02	1.0027E-10
76.100	4.2100E-02	4.2374E+02	1.0905E-11
76.400	4.2055E-02	4.2374E+02	1.1859E-12
76.700	4.2010E-02	4.2374E+02	1.2897E-13
77.000	4.1964E-02	4.2374E+02	1.4026E-14
77.300	4.1919E-02	4.2374E+02	1.5254E-15
77.600	4.1874E-02	4.2374E+02	1.6589E-16
77.900	4.1829E-02	4.2374E+02	1.8041E-17
78.200	4.1784E-02	4.2374E+02	1.9620E-18
78.500	4.1739E-02	4.2374E+02	2.1337E-19
78.800	4.1694E-02	4.2374E+02	2.3205E-20
79.100	4.1649E-02	4.2374E+02	2.5236E-21
79.400	4.1604E-02	4.2374E+02	2.7445E-22
79.700	4.1559E-02	4.2374E+02	2.9847E-23
80.000	4.1514E-02	4.2374E+02	3.2460E-24
80.300	4.1470E-02	4.2374E+02	3.5301E-25
80.600	4.1425E-02	4.2374E+02	3.8391E-26
80.900	4.1380E-02	4.2374E+02	4.1751E-27
81.200	4.1336E-02	4.2374E+02	4.5405E-28
81.500	4.1291E-02	4.2374E+02	4.9380E-29
81.800	4.1247E-02	4.2374E+02	5.3702E-30
82.100	4.1202E-02	4.2374E+02	5.8402E-31
82.400	4.1158E-02	4.2374E+02	6.3514E-32
96.000	3.9196E-02	4.2374E+02	1.3193E-75
168.000	3.0263E-02	4.2374E+02	7.2203-307
720.000	4.1664E-03	4.2374E+02	0.0000E+00
792.000	3.2169E-03	4.2374E+02	0.0000E+00

##

Cumulative Dose Summary

##

	Exclusion Area Bounda		Low Population Zone		Control Room	
Time	Thyroid	TEDE	Thyroid	TEDE	Thyroid	TEDE
(hr)	(rem)	(rem)	(rem)	(rem)	(rem)	(rem)
72.001	2.5952E-02	8.8702E-04	4.5415E-03	1.5523E-04	5.7730E-06	1.7727E-07
72.004	1.0846E+00	3.7073E-02	1.8981E-01	6.4878E-03	1.2176E-03	3.7387E-05
72.400	1.1053E+02	3.7778E+00	1.9343E+01	6.6111E-01	1.8717E+01	5.7473E-01
72.500	1.1829E+02	4.0429E+00	2.0700E+01	7.0750E-01	2.5190E+01	7.7347E-01
72.800	1.2819E+02	4.3816E+00	2.2434E+01	7.6679E-01	3.3682E+01	1.0357E+00
73.100	1.3068E+02	4.4667E+00	2.2869E+01	7.8167E-01	3.4869E+01	1.0738E+00
73.400	1.3130E+02	4.4881E+00	2.2978E+01	7.8541E-01	3.5064E+01	1.0808E+00
73.700	1.3146E+02	4.4934E+00	2.3005E+01	7.8635E-01	3.5102E+01	1.0825E+00
74.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5110E+01	1.0830E+00
74.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0831E+00
74.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0832E+00
74.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0832E+00
75.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
75.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
75.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
76.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
76.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
76.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
77.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
77.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
77.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
77.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
78.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
78.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
78.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
79.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
79.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00
79.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5112E+01	1.0833E+00

```
  80.000 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
  80.300 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
  80.600 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
  80.900 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
  81.200 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
  81.500 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
  81.800 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
  82.100 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
  82.400 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
  96.000 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
 168.000 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
 720.000 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00
 792.000 1.3150E+02 4.4948E+00 2.3012E+01 7.8659E-01 3.5112E+01 1.0833E+00

#################################################################
                        Worst Two-Hour Doses
    Note: All of the dose locations are shown below but the
          worst two-hour dose is only meaningful for the EAB
          dose location.  Please disregard the two-hour worst
          doses for the other dose locations
#################################################################

Exclusion Area Boundary
   Time    Whole Body     Thyroid        TEDE
   (hr)      (rem)         (rem)         (rem)
   72.0    4.8443E-01   1.3147E+02   4.4939E+00
```

Appendix G

RADTRAD File 0E.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow: **28,000 cfm**
CR Filtered Intake Flow: **8,000 cfm**
CR Unfiltered Inleakage: **1,000 cfm**
CR Exhaust Flow: **9,000 cfm**
Two Times Iodine & Noble Gas Release Fractions

```
#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0E.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0E.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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


 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 28,000 cfm, CR Intake = 8,000 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
```

```
  0
  0
  1
  2.8000E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.0000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+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
  7.2000E+01   5.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.0000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   2.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  2
  7.2000E+01   8.0000E-04
  7.2000E+02   0.0000E+00
  1
  2
  7.2000E+01   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  6
  7.2000E+01   1.4000E-04
  7.4000E+01   6.0000E-05
  8.0000E+01   3.9000E-05
  9.6000E+01   1.6000E-05
  1.6800E+02   4.0000E-06
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   3.5000E-04
  8.0000E+01   1.8000E-04
  9.6000E+01   2.3000E-04
  7.9200E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
```

```
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0E.o1
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

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


Exclusion Area Boundary Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   4.8453E-01  1.3150E+02  4.4948E+00

Low Population Zone Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   8.4791E-02  2.3012E+01  7.8659E-01

Control Room Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   1.2969E-02  3.5299E+01  1.0895E+00


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

                 Containment           Environment          Control Room
Time (hr)     I-131 (Curies)        I-131 (Curies)       I-131 (Curies)
  72.001        6.5355E+01            8.3646E-02           1.0538E-04
  72.004        4.2054E+02            3.4959E+00           4.3989E-03
  72.400        6.7659E+01            3.5615E+02           3.3229E-01
  72.500        4.2673E+01            3.8115E+02           3.2416E-01
  72.800        1.0706E+01            4.1309E+02           4.5115E-02
  73.100        2.6861E+00            4.2110E+02           7.1470E-03
  73.400        6.7390E-01            4.2311E+02           1.3125E-03
  73.700        1.6907E-01            4.2362E+02           2.7393E-04
  74.000        4.2419E-02            4.2374E+02           6.2347E-05
```

74.300	4.2373E-02	4.2374E+02	7.1824E-06
74.600	4.2328E-02	4.2374E+02	8.2742E-07
74.900	4.2282E-02	4.2374E+02	9.5319E-08
75.200	4.2236E-02	4.2374E+02	1.0981E-08
75.500	4.2191E-02	4.2374E+02	1.2650E-09
75.800	4.2146E-02	4.2374E+02	1.4573E-10
76.100	4.2100E-02	4.2374E+02	1.6788E-11
76.400	4.2055E-02	4.2374E+02	1.9340E-12
76.700	4.2010E-02	4.2374E+02	2.2280E-13
77.000	4.1964E-02	4.2374E+02	2.5667E-14
77.300	4.1919E-02	4.2374E+02	2.9568E-15
77.600	4.1874E-02	4.2374E+02	3.4063E-16
77.900	4.1829E-02	4.2374E+02	3.9241E-17
78.200	4.1784E-02	4.2374E+02	4.5206E-18
78.500	4.1739E-02	4.2374E+02	5.2078E-19
78.800	4.1694E-02	4.2374E+02	5.9994E-20
79.100	4.1649E-02	4.2374E+02	6.9114E-21
79.400	4.1604E-02	4.2374E+02	7.9620E-22
79.700	4.1559E-02	4.2374E+02	9.1722E-23
80.000	4.1514E-02	4.2374E+02	1.0567E-23
80.300	4.1470E-02	4.2374E+02	1.2173E-24
80.600	4.1425E-02	4.2374E+02	1.4023E-25
80.900	4.1380E-02	4.2374E+02	1.6155E-26
81.200	4.1336E-02	4.2374E+02	1.8610E-27
81.500	4.1291E-02	4.2374E+02	2.1439E-28
81.800	4.1247E-02	4.2374E+02	2.4698E-29
82.100	4.1202E-02	4.2374E+02	2.8453E-30
82.400	4.1158E-02	4.2374E+02	3.2778E-31
96.000	3.9196E-02	4.2374E+02	9.2753E-74
168.000	3.0263E-02	4.2374E+02	5.1378-299
720.000	4.1664E-03	4.2374E+02	0.0000E+00
792.000	3.2169E-03	4.2374E+02	0.0000E+00

##
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)
72.001	2.5952E-02	8.8702E-04	4.5415E-03	1.5523E-04	5.7730E-06	1.7727E-07
72.004	1.0846E+00	3.7073E-02	1.8981E-01	6.4878E-03	1.2176E-03	3.7387E-05
72.400	1.1053E+02	3.7778E+00	1.9343E+01	6.6111E-01	1.8717E+01	5.7473E-01
72.500	1.1829E+02	4.0429E+00	2.0700E+01	7.0750E-01	2.5190E+01	7.7347E-01
72.800	1.2819E+02	4.3816E+00	2.2434E+01	7.6679E-01	3.3797E+01	1.0393E+00
73.100	1.3068E+02	4.4667E+00	2.2869E+01	7.8167E-01	3.5042E+01	1.0792E+00
73.400	1.3130E+02	4.4880E+00	2.2978E+01	7.8541E-01	3.5249E+01	1.0867E+00
73.700	1.3146E+02	4.4934E+00	2.3005E+01	7.8635E-01	3.5289E+01	1.0885E+00
74.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5298E+01	1.0891E+00
74.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0893E+00
74.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0894E+00
74.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0894E+00
75.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0894E+00
75.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
75.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
76.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
76.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
76.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
77.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
77.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
77.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
77.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
78.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
78.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
78.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
79.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
79.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
79.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00

80.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
80.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
80.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
80.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
81.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
81.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
81.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
82.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
82.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
96.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
168.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
720.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00
792.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.5299E+01	1.0895E+00

```
#################################################################
                        Worst Two-Hour Doses
    Note: All of the dose locations are shown below but the
          worst two-hour dose is only meaningful for the EAB
          dose location.  Please disregard the two-hour worst
          doses for the other dose locations
#################################################################
```

Exclusion Area Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
72.0	4.8442E-01	1.3147E+02	4.4939E+00

Appendix H

RADTRAD File 0F.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow: **28,000 cfm**
CR Filtered Intake Flow: **7,200 cfm**
CR Unfiltered Inleakage: **1,000 cfm**
CR Exhaust Flow: **8,200 cfm**
Two Times Iodine & Noble Gas Release Fractions

```
#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0F.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0F.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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


 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 28,000 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
```

```
  0
  0
  1
  2.8000E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+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
  7.2000E+01   5.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  2
  7.2000E+01   8.0000E-04
  7.2000E+02   0.0000E+00
  1
  2
  7.2000E+01   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  6
  7.2000E+01   1.4000E-04
  7.4000E+01   6.0000E-05
  8.0000E+01   3.9000E-05
  9.6000E+01   1.6000E-05
  1.6800E+02   4.0000E-06
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   3.5000E-04
  8.0000E+01   1.8000E-04
  9.6000E+01   2.3000E-04
  7.9200E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
```

```
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0F.o2
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

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


Exclusion Area Boundary Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   4.8453E-01  1.3150E+02  4.4948E+00

Low Population Zone Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   8.4789E-02  2.3012E+01  7.8658E-01

Control Room Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   1.3535E-02  3.5498E+01  1.0961E+00


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

                 Containment          Environment          Control Room
Time (hr)     I-131 (Curies)       I-131 (Curies)       I-131 (Curies)
  72.001        6.5355E+01           8.3646E-02           1.0538E-04
  72.004        4.2054E+02           3.4959E+00           4.3989E-03
  72.400        6.7659E+01           3.5615E+02           3.3229E-01
  72.500        4.2673E+01           3.8115E+02           3.2416E-01
  72.800        1.0706E+01           4.1309E+02           4.6996E-02
  73.100        2.6861E+00           4.2110E+02           7.6012E-03
  73.400        6.7390E-01           4.2311E+02           1.3958E-03
  73.700        1.6907E-01           4.2362E+02           2.8780E-04
  74.000        4.2419E-02           4.2374E+02           6.4593E-05
```

74.300	4.2373E-02	4.2374E+02	7.8824E-06
74.600	4.2328E-02	4.2374E+02	9.6189E-07
74.900	4.2282E-02	4.2374E+02	1.1738E-07
75.200	4.2236E-02	4.2374E+02	1.4324E-08
75.500	4.2191E-02	4.2374E+02	1.7480E-09
75.800	4.2146E-02	4.2374E+02	2.1331E-10
76.100	4.2100E-02	4.2374E+02	2.6031E-11
76.400	4.2055E-02	4.2374E+02	3.1765E-12
76.700	4.2010E-02	4.2374E+02	3.8764E-13
77.000	4.1964E-02	4.2374E+02	4.7304E-14
77.300	4.1919E-02	4.2374E+02	5.7726E-15
77.600	4.1874E-02	4.2374E+02	7.0443E-16
77.900	4.1829E-02	4.2374E+02	8.5963E-17
78.200	4.1784E-02	4.2374E+02	1.0490E-17
78.500	4.1739E-02	4.2374E+02	1.2801E-18
78.800	4.1694E-02	4.2374E+02	1.5622E-19
79.100	4.1649E-02	4.2374E+02	1.9063E-20
79.400	4.1604E-02	4.2374E+02	2.3263E-21
79.700	4.1559E-02	4.2374E+02	2.8388E-22
80.000	4.1514E-02	4.2374E+02	3.4643E-23
80.300	4.1470E-02	4.2374E+02	4.2275E-24
80.600	4.1425E-02	4.2374E+02	5.1588E-25
80.900	4.1380E-02	4.2374E+02	6.2954E-26
81.200	4.1336E-02	4.2374E+02	7.6824E-27
81.500	4.1291E-02	4.2374E+02	9.3749E-28
81.800	4.1247E-02	4.2374E+02	1.1440E-28
82.100	4.1202E-02	4.2374E+02	1.3961E-29
82.400	4.1158E-02	4.2374E+02	1.7036E-30
96.000	3.9196E-02	4.2374E+02	6.5668E-72
168.000	3.0263E-02	4.2374E+02	3.6792-291
720.000	4.1664E-03	4.2374E+02	0.0000E+00
792.000	3.2169E-03	4.2374E+02	0.0000E+00

##
Cumulative Dose Summary
##

	Exclusion Area Bounda		Low Population Zone		Control Room	
Time	Thyroid	TEDE	Thyroid	TEDE	Thyroid	TEDE
(hr)	(rem)	(rem)	(rem)	(rem)	(rem)	(rem)
72.001	2.5952E-02	8.8702E-04	4.5415E-03	1.5523E-04	5.7730E-06	1.7727E-07
72.004	1.0846E+00	3.7073E-02	1.8981E-01	6.4878E-03	1.2176E-03	3.7387E-05
72.400	1.1053E+02	3.7778E+00	1.9343E+01	6.6111E-01	1.8717E+01	5.7473E-01
72.500	1.1829E+02	4.0429E+00	2.0700E+01	7.0750E-01	2.5190E+01	7.7347E-01
72.800	1.2819E+02	4.3816E+00	2.2434E+01	7.6678E-01	3.3917E+01	1.0430E+00
73.100	1.3068E+02	4.4667E+00	2.2869E+01	7.8166E-01	3.5224E+01	1.0849E+00
73.400	1.3130E+02	4.4880E+00	2.2978E+01	7.8540E-01	3.5445E+01	1.0929E+00
73.700	1.3146E+02	4.4934E+00	2.3005E+01	7.8634E-01	3.5487E+01	1.0949E+00
74.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5496E+01	1.0955E+00
74.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5497E+01	1.0958E+00
74.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0959E+00
74.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0960E+00
75.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0960E+00
75.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
75.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
76.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
76.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
76.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
77.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
77.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
77.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
77.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
78.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
78.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
78.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
79.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
79.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
79.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00

80.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
80.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
80.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
80.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
81.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
81.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
81.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
82.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
82.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
96.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
168.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
720.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00
792.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.5498E+01	1.0961E+00

```
#################################################################
                    Worst Two-Hour Doses
   Note: All of the dose locations are shown below but the
         worst two-hour dose is only meaningful for the EAB
         dose location.  Please disregard the two-hour worst
         doses for the other dose locations
#################################################################
```

Exclusion Area Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
72.0	4.8440E-01	1.3147E+02	4.4939E+00

Appendix I

RADTRAD File 0G.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow:	**30,800 cfm**
CR Filtered Intake Flow:	**8,800 cfm**
CR Unfiltered Inleakage:	**1,000 cfm**
CR Exhaust Flow:	**9,800 cfm**

Two Times Iodine & Noble Gas Release Fractions

```
#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0G.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0G.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp


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


 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 30,800 cfm, CR Intake = 9,800 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
```

```
  0
  0
  1
  3.0800E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.8000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+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
  7.2000E+01   5.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.8000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  2
  7.2000E+01   8.0000E-04
  7.2000E+02   0.0000E+00
  1
  2
  7.2000E+01   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  6
  7.2000E+01   1.4000E-04
  7.4000E+01   6.0000E-05
  8.0000E+01   3.9000E-05
  9.6000E+01   1.6000E-05
  1.6800E+02   4.0000E-06
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   3.5000E-04
  8.0000E+01   1.8000E-04
  9.6000E+01   2.3000E-04
  7.9200E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
```

```
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0G.o1
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

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


Exclusion Area Boundary Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   4.8454E-01  1.3150E+02  4.4948E+00

Low Population Zone Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   8.4794E-02  2.3012E+01  7.8659E-01

Control Room Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   1.2488E-02  3.4528E+01  1.0655E+00


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

                 Containment          Environment          Control Room
Time (hr)     I-131 (Curies)       I-131 (Curies)       I-131 (Curies)
  72.001        6.5355E+01           8.3646E-02           1.0538E-04
  72.004        4.2054E+02           3.4959E+00           4.3989E-03
  72.400        6.7659E+01           3.5615E+02           3.3229E-01
  72.500        4.2673E+01           3.8115E+02           3.2416E-01
  72.800        1.0706E+01           4.1309E+02           3.7888E-02
  73.100        2.6861E+00           4.2110E+02           5.4444E-03
  73.400        6.7390E-01           4.2311E+02           9.8623E-04
  73.700        1.6907E-01           4.2362E+02           2.1194E-04
  74.000        4.2419E-02           4.2374E+02           4.9853E-05
```

74.300	4.2373E-02	4.2374E+02	4.6609E-06
74.600	4.2328E-02	4.2374E+02	4.3576E-07
74.900	4.2282E-02	4.2374E+02	4.0740E-08
75.200	4.2236E-02	4.2374E+02	3.8089E-09
75.500	4.2191E-02	4.2374E+02	3.5610E-10
75.800	4.2146E-02	4.2374E+02	3.3292E-11
76.100	4.2100E-02	4.2374E+02	3.1126E-12
76.400	4.2055E-02	4.2374E+02	2.9100E-13
76.700	4.2010E-02	4.2374E+02	2.7206E-14
77.000	4.1964E-02	4.2374E+02	2.5436E-15
77.300	4.1919E-02	4.2374E+02	2.3781E-16
77.600	4.1874E-02	4.2374E+02	2.2233E-17
77.900	4.1829E-02	4.2374E+02	2.0786E-18
78.200	4.1784E-02	4.2374E+02	1.9433E-19
78.500	4.1739E-02	4.2374E+02	1.8169E-20
78.800	4.1694E-02	4.2374E+02	1.6986E-21
79.100	4.1649E-02	4.2374E+02	1.5881E-22
79.400	4.1604E-02	4.2374E+02	1.4847E-23
79.700	4.1559E-02	4.2374E+02	1.3881E-24
80.000	4.1514E-02	4.2374E+02	1.2978E-25
80.300	4.1470E-02	4.2374E+02	1.2133E-26
80.600	4.1425E-02	4.2374E+02	1.1344E-27
80.900	4.1380E-02	4.2374E+02	1.0605E-28
81.200	4.1336E-02	4.2374E+02	9.9151E-30
81.500	4.1291E-02	4.2374E+02	9.2699E-31
81.800	4.1247E-02	4.2374E+02	8.6666E-32
82.100	4.1202E-02	4.2374E+02	8.1026E-33
82.400	4.1158E-02	4.2374E+02	7.5753E-34
96.000	3.9196E-02	4.2374E+02	1.6563E-80
168.000	3.0263E-02	4.2374E+02	0.0000E+00
720.000	4.1664E-03	4.2374E+02	0.0000E+00
792.000	3.2169E-03	4.2374E+02	0.0000E+00

##
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)
72.001	2.5952E-02	8.8702E-04	4.5415E-03	1.5523E-04	5.7730E-06	1.7727E-07
72.004	1.0846E+00	3.7073E-02	1.8981E-01	6.4878E-03	1.2176E-03	3.7387E-05
72.400	1.1053E+02	3.7778E+00	1.9343E+01	6.6111E-01	1.8717E+01	5.7473E-01
72.500	1.1829E+02	4.0429E+00	2.0700E+01	7.0750E-01	2.5190E+01	7.7347E-01
72.800	1.2819E+02	4.3816E+00	2.2434E+01	7.6679E-01	3.3326E+01	1.0248E+00
73.100	1.3068E+02	4.4667E+00	2.2869E+01	7.8167E-01	3.4334E+01	1.0575E+00
73.400	1.3130E+02	4.4881E+00	2.2978E+01	7.8541E-01	3.4490E+01	1.0633E+00
73.700	1.3146E+02	4.4934E+00	2.3005E+01	7.8635E-01	3.4520E+01	1.0647E+00
74.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4527E+01	1.0652E+00
74.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0653E+00
74.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0654E+00
74.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0654E+00
75.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
75.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
75.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
76.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
76.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
76.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
77.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
77.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
77.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
77.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
78.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
78.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
78.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
79.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
79.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
79.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00

80.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
80.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
80.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
80.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
81.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
81.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
81.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
82.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
82.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
96.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
168.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
720.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00
792.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4528E+01	1.0655E+00

```
#################################################################
                    Worst Two-Hour Doses
   Note: All of the dose locations are shown below but the
         worst two-hour dose is only meaningful for the EAB
         dose location.  Please disregard the two-hour worst
         doses for the other dose locations
#################################################################
```

Exclusion Area Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
72.0	4.8443E-01	1.3147E+02	4.4939E+00

Appendix J

RADTRAD File 0H.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow:	**30,800 cfm**
CR Filtered Intake Flow:	**8,000 cfm**
CR Unfiltered Inleakage:	**1,000 cfm**
CR Exhaust Flow:	**9,000 cfm**

Two Times Iodine & Noble Gas Release Fractions

```
#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0H.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0H.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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


 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 30,800 cfm, CR Intake = 8,000 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
```

```
  0
  0
  1
  3.0800E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.0000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+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
  7.2000E+01   5.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.0000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  2
  7.2000E+01   8.0000E-04
  7.2000E+02   0.0000E+00
  1
  2
  7.2000E+01   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  6
  7.2000E+01   1.4000E-04
  7.4000E+01   6.0000E-05
  8.0000E+01   3.9000E-05
  9.6000E+01   1.6000E-05
  1.6800E+02   4.0000E-06
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   3.5000E-04
  8.0000E+01   1.8000E-04
  9.6000E+01   2.3000E-04
  7.9200E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
```

```
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0H.o1
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

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


Exclusion Area Boundary Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   4.8453E-01  1.3150E+02  4.4948E+00

Low Population Zone Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   8.4791E-02  2.3012E+01  7.8659E-01

Control Room Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   1.2962E-02  3.4688E+01  1.0708E+00


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

                 Containment            Environment          Control Room
Time (hr)     I-131 (Curies)         I-131 (Curies)       I-131 (Curies)
  72.001        6.5355E+01             8.3646E-02           1.0538E-04
  72.004        4.2054E+02             3.4959E+00           4.3989E-03
  72.400        6.7659E+01             3.5615E+02           3.3229E-01
  72.500        4.2673E+01             3.8115E+02           3.2416E-01
  72.800        1.0706E+01             4.1309E+02           3.9386E-02
  73.100        2.6861E+00             4.2110E+02           5.7276E-03
  73.400        6.7390E-01             4.2311E+02           1.0256E-03
  73.700        1.6907E-01             4.2362E+02           2.1658E-04
  74.000        4.2419E-02             4.2374E+02           5.0302E-05
```

74.300	4.2373E-02	4.2374E+02	4.9817E-06
74.600	4.2328E-02	4.2374E+02	4.9337E-07
74.900	4.2282E-02	4.2374E+02	4.8861E-08
75.200	4.2236E-02	4.2374E+02	4.8389E-09
75.500	4.2191E-02	4.2374E+02	4.7923E-10
75.800	4.2146E-02	4.2374E+02	4.7460E-11
76.100	4.2100E-02	4.2374E+02	4.7003E-12
76.400	4.2055E-02	4.2374E+02	4.6549E-13
76.700	4.2010E-02	4.2374E+02	4.6100E-14
77.000	4.1964E-02	4.2374E+02	4.5656E-15
77.300	4.1919E-02	4.2374E+02	4.5215E-16
77.600	4.1874E-02	4.2374E+02	4.4779E-17
77.900	4.1829E-02	4.2374E+02	4.4347E-18
78.200	4.1784E-02	4.2374E+02	4.3919E-19
78.500	4.1739E-02	4.2374E+02	4.3496E-20
78.800	4.1694E-02	4.2374E+02	4.3076E-21
79.100	4.1649E-02	4.2374E+02	4.2661E-22
79.400	4.1604E-02	4.2374E+02	4.2249E-23
79.700	4.1559E-02	4.2374E+02	4.1842E-24
80.000	4.1514E-02	4.2374E+02	4.1438E-25
80.300	4.1470E-02	4.2374E+02	4.1038E-26
80.600	4.1425E-02	4.2374E+02	4.0642E-27
80.900	4.1380E-02	4.2374E+02	4.0250E-28
81.200	4.1336E-02	4.2374E+02	3.9862E-29
81.500	4.1291E-02	4.2374E+02	3.9478E-30
81.800	4.1247E-02	4.2374E+02	3.9097E-31
82.100	4.1202E-02	4.2374E+02	3.8720E-32
82.400	4.1158E-02	4.2374E+02	3.8346E-33
96.000	3.9196E-02	4.2374E+02	1.1426E-78
168.000	3.0263E-02	4.2374E+02	1.0884-319
720.000	4.1664E-03	4.2374E+02	0.0000E+00
792.000	3.2169E-03	4.2374E+02	0.0000E+00

##
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)
72.001	2.5952E-02	8.8702E-04	4.5415E-03	1.5523E-04	5.7730E-06	1.7727E-07
72.004	1.0846E+00	3.7073E-02	1.8981E-01	6.4878E-03	1.2176E-03	3.7387E-05
72.400	1.1053E+02	3.7778E+00	1.9343E+01	6.6111E-01	1.8717E+01	5.7473E-01
72.500	1.1829E+02	4.0429E+00	2.0700E+01	7.0750E-01	2.5190E+01	7.7347E-01
72.800	1.2819E+02	4.3816E+00	2.2434E+01	7.6679E-01	3.3431E+01	1.0281E+00
73.100	1.3068E+02	4.4667E+00	2.2869E+01	7.8167E-01	3.4484E+01	1.0622E+00
73.400	1.3130E+02	4.4880E+00	2.2978E+01	7.8541E-01	3.4648E+01	1.0683E+00
73.700	1.3146E+02	4.4934E+00	2.3005E+01	7.8635E-01	3.4680E+01	1.0699E+00
74.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4686E+01	1.0704E+00
74.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0706E+00
74.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0707E+00
74.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
75.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
75.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
75.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
76.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
76.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
76.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
77.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
77.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
77.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
77.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
78.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
78.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
78.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
79.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
79.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
79.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00

80.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
80.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
80.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
80.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
81.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
81.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
81.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
82.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
82.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
96.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
168.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
720.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00
792.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8659E-01	3.4688E+01	1.0708E+00

```
#################################################################
                    Worst Two-Hour Doses
    Note: All of the dose locations are shown below but the
          worst two-hour dose is only meaningful for the EAB
          dose location.  Please disregard the two-hour worst
          doses for the other dose locations
#################################################################
```

Exclusion Area Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
72.0	4.8442E-01	1.3147E+02	4.4939E+00

Appendix K

RADTRAD File 0I.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow:	**30,800 cfm**
CR Filtered Intake Flow:	**7,200 cfm**
CR Unfiltered Inleakage:	**1,000 cfm**
CR Exhaust Flow:	**8,200 cfm**

Two Times Iodine & Noble Gas Release Fractions

```
#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0I.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0I.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp


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


 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 30,800 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
  1
  0
  0
```

```
  0
  0
  1
  3.0800E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+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
  7.2000E+01   5.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
Exclusion Area Boundary
  2
  1
  2
  7.2000E+01   8.0000E-04
  7.2000E+02   0.0000E+00
  1
  2
  7.2000E+01   3.5000E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
Low Population Zone
  2
  1
  6
  7.2000E+01   1.4000E-04
  7.4000E+01   6.0000E-05
  8.0000E+01   3.9000E-05
  9.6000E+01   1.6000E-05
  1.6800E+02   4.0000E-06
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   3.5000E-04
  8.0000E+01   1.8000E-04
  9.6000E+01   2.3000E-04
  7.9200E+02   0.0000E+00
  0
Location 3:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
```

```
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0I.o2
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  7/07/2005  at  7:53:39
#######################################################################

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

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


Exclusion Area Boundary Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   4.8453E-01  1.3150E+02  4.4948E+00

Low Population Zone Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   8.4789E-02  2.3012E+01  7.8658E-01

Control Room Doses:

Time (h) = 792.0000     Whole Body   Thyroid       TEDE
Delta dose (rem)         0.0000E+00  0.0000E+00  0.0000E+00
Accumulated dose (rem)   1.3528E-02  3.4856E+01  1.0765E+00


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

                 Containment          Environment          Control Room
Time (hr)     I-131 (Curies)       I-131 (Curies)       I-131 (Curies)
  72.001        6.5355E+01           8.3646E-02           1.0538E-04
  72.004        4.2054E+02           3.4959E+00           4.3989E-03
  72.400        6.7659E+01           3.5615E+02           3.3229E-01
  72.500        4.2673E+01           3.8115E+02           3.2416E-01
  72.800        1.0706E+01           4.1309E+02           4.0973E-02
  73.100        2.6861E+00           4.2110E+02           6.0459E-03
  73.400        6.7390E-01           4.2311E+02           1.0727E-03
  73.700        1.6907E-01           4.2362E+02           2.2254E-04
  74.000        4.2419E-02           4.2374E+02           5.0945E-05
```

74.300	4.2373E-02	4.2374E+02	5.3445E-06
74.600	4.2328E-02	4.2374E+02	5.6068E-07
74.900	4.2282E-02	4.2374E+02	5.8819E-08
75.200	4.2236E-02	4.2374E+02	6.1705E-09
75.500	4.2191E-02	4.2374E+02	6.4734E-10
75.800	4.2146E-02	4.2374E+02	6.7910E-11
76.100	4.2100E-02	4.2374E+02	7.1243E-12
76.400	4.2055E-02	4.2374E+02	7.4739E-13
76.700	4.2010E-02	4.2374E+02	7.8407E-14
77.000	4.1964E-02	4.2374E+02	8.2254E-15
77.300	4.1919E-02	4.2374E+02	8.6291E-16
77.600	4.1874E-02	4.2374E+02	9.0525E-17
77.900	4.1829E-02	4.2374E+02	9.4968E-18
78.200	4.1784E-02	4.2374E+02	9.9628E-19
78.500	4.1739E-02	4.2374E+02	1.0452E-19
78.800	4.1694E-02	4.2374E+02	1.0965E-20
79.100	4.1649E-02	4.2374E+02	1.1503E-21
79.400	4.1604E-02	4.2374E+02	1.2067E-22
79.700	4.1559E-02	4.2374E+02	1.2659E-23
80.000	4.1514E-02	4.2374E+02	1.3281E-24
80.300	4.1470E-02	4.2374E+02	1.3932E-25
80.600	4.1425E-02	4.2374E+02	1.4616E-26
80.900	4.1380E-02	4.2374E+02	1.5333E-27
81.200	4.1336E-02	4.2374E+02	1.6086E-28
81.500	4.1291E-02	4.2374E+02	1.6875E-29
81.800	4.1247E-02	4.2374E+02	1.7703E-30
82.100	4.1202E-02	4.2374E+02	1.8572E-31
82.400	4.1158E-02	4.2374E+02	1.9483E-32
96.000	3.9196E-02	4.2374E+02	7.9104E-77
168.000	3.0263E-02	4.2374E+02	7.6375-312
720.000	4.1664E-03	4.2374E+02	0.0000E+00
792.000	3.2169E-03	4.2374E+02	0.0000E+00

##

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)
72.001	2.5952E-02	8.8702E-04	4.5415E-03	1.5523E-04	5.7730E-06	1.7727E-07
72.004	1.0846E+00	3.7073E-02	1.8981E-01	6.4878E-03	1.2176E-03	3.7387E-05
72.400	1.1053E+02	3.7778E+00	1.9343E+01	6.6111E-01	1.8717E+01	5.7473E-01
72.500	1.1829E+02	4.0429E+00	2.0700E+01	7.0750E-01	2.5190E+01	7.7347E-01
72.800	1.2819E+02	4.3816E+00	2.2434E+01	7.6678E-01	3.3540E+01	1.0314E+00
73.100	1.3068E+02	4.4667E+00	2.2869E+01	7.8166E-01	3.4642E+01	1.0672E+00
73.400	1.3130E+02	4.4880E+00	2.2978E+01	7.8540E-01	3.4815E+01	1.0737E+00
73.700	1.3146E+02	4.4934E+00	2.3005E+01	7.8634E-01	3.4848E+01	1.0754E+00
74.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4854E+01	1.0760E+00
74.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0762E+00
74.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0764E+00
74.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0764E+00
75.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
75.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
75.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
76.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
76.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
76.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
77.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
77.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
77.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
77.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
78.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
78.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
78.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
79.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
79.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
79.700	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00

80.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
80.300	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
80.600	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
80.900	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
81.200	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
81.500	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
81.800	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
82.100	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
82.400	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
96.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
168.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
720.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00
792.000	1.3150E+02	4.4948E+00	2.3012E+01	7.8658E-01	3.4856E+01	1.0765E+00

```
#####################################################################
                        Worst Two-Hour Doses
    Note: All of the dose locations are shown below but the
          worst two-hour dose is only meaningful for the EAB
          dose location.  Please disregard the two-hour worst
          doses for the other dose locations
#####################################################################
```

Exclusion Area Boundary

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
72.0	4.8440E-01	1.3147E+02	4.4939E+00

Appendix L

RADTRAD Files for Unfiltered Intake

0C-1a.psf through 0C-7a.psf

FHA Occurring In Reactor Building With Hatch Doors Opened

CR Recirc Flow: 25,200 cfm
CR Filtered Intake Flow: 7,200 cfm (30 minutes – 720 hours)
CR Unfiltered Inleakage:

0C-1a.psf:	11,000 cfm (0 – 30 minutes); 1,000 cfm (30 minutes – 720 hours)
0C-2a.psf:	21,000 cfm (0 – 30 minutes); 1,000 cfm (30 minutes – 720 hours)
0C-3a.psf:	31,000 cfm (0 – 30 minutes); 1,000 cfm (30 minutes – 720 hours)
0C-4a.psf:	41,000 cfm (0 – 30 minutes); 1,000 cfm (30 minutes – 720 hours)
0C-5a.psf:	51,000 cfm (0 – 30 minutes); 1,000 cfm (30 minutes – 720 hours)
0C-6a.psf:	61,000 cfm (0 – 30 minutes); 1,000 cfm (30 minutes – 720 hours)
0C-7a.psf:	71,000 cfm (0 – 30 minutes); 1,000 cfm (30 minutes – 720 hours)

```
#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
 #######################################################################
 ########################################################################
                      File information
 #######################################################################

 Plant file name            = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-1a.psf
 Inventory file name        = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name         = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-1a.psf
 Release file name          = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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

 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 25,200 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
   4
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
  1
```

```
  1
  0
  0
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.0000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
```

```
Pathway 4:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.1000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  1
Location 1:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0C-1a.o1
  1
  1
  1
  0
  0
End of Scenario File

#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#######################################################################

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

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

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

Control Room Doses:

Time (h) = 792.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.8895E-84	3.1537-268	2.8895E-84
Accumulated dose (rem)	2.0163E-02	5.8904E+01	1.8165E+00

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

Time (hr)	Containment I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
72.001	6.5355E+01	8.3646E-02	2.3177E-04
72.004	4.2054E+02	3.4960E+00	9.6609E-03
72.400	6.7659E+01	3.5650E+02	5.2267E-01
72.500	4.2673E+01	3.8159E+02	4.6178E-01
72.800	1.0706E+01	4.1353E+02	7.3508E-02
73.100	2.6861E+00	4.2154E+02	1.2431E-02
73.400	6.7390E-01	4.2355E+02	2.2655E-03
73.700	1.6907E-01	4.2406E+02	4.4727E-04
74.000	4.2419E-02	4.2418E+02	9.5021E-05
74.300	4.2373E-02	4.2418E+02	1.3488E-05
74.600	4.2328E-02	4.2418E+02	1.9147E-06
74.900	4.2282E-02	4.2418E+02	2.7179E-07
75.200	4.2236E-02	4.2418E+02	3.8580E-08
75.500	4.2191E-02	4.2418E+02	5.4765E-09
75.800	4.2146E-02	4.2418E+02	7.7739E-10
76.100	4.2100E-02	4.2418E+02	1.1035E-10
76.400	4.2055E-02	4.2418E+02	1.5664E-11
76.700	4.2010E-02	4.2418E+02	2.2236E-12
77.000	4.1964E-02	4.2418E+02	3.1563E-13
77.300	4.1919E-02	4.2418E+02	4.4804E-14
77.600	4.1874E-02	4.2418E+02	6.3600E-15
77.900	4.1829E-02	4.2418E+02	9.0281E-16
78.200	4.1784E-02	4.2418E+02	1.2815E-16
78.500	4.1739E-02	4.2418E+02	1.8191E-17
78.800	4.1694E-02	4.2418E+02	2.5823E-18
79.100	4.1649E-02	4.2418E+02	3.6656E-19
79.400	4.1604E-02	4.2418E+02	5.2033E-20
79.700	4.1559E-02	4.2418E+02	7.3861E-21
80.000	4.1514E-02	4.2418E+02	1.0485E-21
80.300	4.1470E-02	4.2418E+02	1.4883E-22
80.600	4.1425E-02	4.2418E+02	2.1126E-23
80.900	4.1380E-02	4.2418E+02	2.9989E-24
81.200	4.1336E-02	4.2418E+02	4.2569E-25
81.500	4.1291E-02	4.2418E+02	6.0427E-26
81.800	4.1247E-02	4.2418E+02	8.5777E-27
82.100	4.1202E-02	4.2418E+02	1.2176E-27
82.400	4.1158E-02	4.2418E+02	1.7284E-28
96.000	3.9196E-02	4.2418E+02	6.3211E-67
168.000	3.0263E-02	4.2418E+02	2.0470-270
792.000	3.2169E-03	4.2418E+02	0.0000E+00

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

Cumulative Dose Summary

##

Control Room

Time (hr)	Thyroid (rem)	TEDE (rem)
72.001	1.2697E-05	3.8988E-07
72.004	2.6744E-03	8.2122E-05
72.400	3.3829E+01	1.0388E+00
72.500	4.3536E+01	1.3368E+00
72.800	5.6377E+01	1.7330E+00
73.100	5.8459E+01	1.7993E+00
73.400	5.8820E+01	1.8119E+00
73.700	5.8887E+01	1.8149E+00
74.000	5.8901E+01	1.8158E+00
74.300	5.8904E+01	1.8162E+00
74.600	5.8904E+01	1.8163E+00
74.900	5.8904E+01	1.8164E+00
75.200	5.8904E+01	1.8165E+00
75.500	5.8904E+01	1.8165E+00
75.800	5.8904E+01	1.8165E+00
76.100	5.8904E+01	1.8165E+00
76.400	5.8904E+01	1.8165E+00
76.700	5.8904E+01	1.8165E+00
77.000	5.8904E+01	1.8165E+00
77.300	5.8904E+01	1.8165E+00
77.600	5.8904E+01	1.8165E+00
77.900	5.8904E+01	1.8165E+00
78.200	5.8904E+01	1.8165E+00
78.500	5.8904E+01	1.8165E+00
78.800	5.8904E+01	1.8165E+00
79.100	5.8904E+01	1.8165E+00
79.400	5.8904E+01	1.8165E+00
79.700	5.8904E+01	1.8165E+00
80.000	5.8904E+01	1.8165E+00
80.300	5.8904E+01	1.8165E+00
80.600	5.8904E+01	1.8165E+00
80.900	5.8904E+01	1.8165E+00
81.200	5.8904E+01	1.8165E+00
81.500	5.8904E+01	1.8165E+00
81.800	5.8904E+01	1.8165E+00
82.100	5.8904E+01	1.8165E+00
82.400	5.8904E+01	1.8165E+00
96.000	5.8904E+01	1.8165E+00
168.000	5.8904E+01	1.8165E+00
792.000	5.8904E+01	1.8165E+00

##

Worst Two-Hour Doses

Note: All of the dose locations are shown below but the worst two-hour dose is only meaningful for the EAB dose location. Please disregard the two-hour worst doses for the other dose locations

##

```
#####################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#####################################################################

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

 Plant file name            = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-2a.psf
 Inventory file name        = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name         = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-2a.psf
 Release file name          = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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

 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 25,200 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
```

```
  1
  1
  0
  0
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   2.0000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
```

```
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   2.1000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  1
Location 1:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0C-2.o0
  1
  1
  1
  0
  0
End of Scenario File

#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#######################################################################

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

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

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

Control Room Doses:

Time (h) = 792.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.9233E-84	3.1674-268	2.9233E-84
Accumulated dose (rem)	2.3560E-02	7.4654E+01	2.3002E+00

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

Time (hr)	Containment I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
72.001	6.5355E+01	8.3646E-02	4.4228E-04
72.004	4.2054E+02	3.4960E+00	1.8391E-02
72.400	6.7659E+01	3.5732E+02	6.0614E-01
72.500	4.2673E+01	3.8255E+02	4.6894E-01
72.800	1.0706E+01	4.1449E+02	7.4525E-02
73.100	2.6861E+00	4.2250E+02	1.2575E-02
73.400	6.7390E-01	4.2451E+02	2.2860E-03
73.700	1.6907E-01	4.2501E+02	4.5018E-04
74.000	4.2419E-02	4.2514E+02	9.5434E-05
74.300	4.2373E-02	4.2514E+02	1.3547E-05
74.600	4.2328E-02	4.2514E+02	1.9230E-06
74.900	4.2282E-02	4.2514E+02	2.7297E-07
75.200	4.2236E-02	4.2514E+02	3.8748E-08
75.500	4.2191E-02	4.2514E+02	5.5003E-09
75.800	4.2146E-02	4.2514E+02	7.8077E-10
76.100	4.2100E-02	4.2514E+02	1.1083E-10
76.400	4.2055E-02	4.2514E+02	1.5732E-11
76.700	4.2010E-02	4.2514E+02	2.2332E-12
77.000	4.1964E-02	4.2514E+02	3.1701E-13
77.300	4.1919E-02	4.2514E+02	4.4999E-14
77.600	4.1874E-02	4.2514E+02	6.3876E-15
77.900	4.1829E-02	4.2514E+02	9.0673E-16
78.200	4.1784E-02	4.2514E+02	1.2871E-16
78.500	4.1739E-02	4.2514E+02	1.8271E-17
78.800	4.1694E-02	4.2514E+02	2.5935E-18
79.100	4.1649E-02	4.2514E+02	3.6815E-19
79.400	4.1604E-02	4.2514E+02	5.2259E-20
79.700	4.1559E-02	4.2514E+02	7.4182E-21
80.000	4.1514E-02	4.2514E+02	1.0530E-21
80.300	4.1470E-02	4.2514E+02	1.4948E-22
80.600	4.1425E-02	4.2514E+02	2.1218E-23
80.900	4.1380E-02	4.2514E+02	3.0119E-24
81.200	4.1336E-02	4.2514E+02	4.2754E-25
81.500	4.1291E-02	4.2514E+02	6.0690E-26
81.800	4.1247E-02	4.2514E+02	8.6150E-27
82.100	4.1202E-02	4.2514E+02	1.2229E-27
82.400	4.1158E-02	4.2514E+02	1.7359E-28
96.000	3.9196E-02	4.2514E+02	6.3486E-67
168.000	3.0263E-02	4.2514E+02	2.0559-270
792.000	3.2169E-03	4.2514E+02	0.0000E+00

```
#####################################################################
                        Cumulative Dose Summary
#####################################################################

              Control Room
  Time     Thyroid       TEDE
  (hr)      (rem)        (rem)
  72.001 2.4229E-05 7.4400E-07
  72.004 5.0923E-03 1.5637E-04
  72.400 4.8461E+01 1.4880E+00
  72.500 5.9060E+01 1.8135E+00
  72.800 7.2095E+01 2.2157E+00
  73.100 7.4204E+01 2.2828E+00
  73.400 7.4569E+01 2.2956E+00
  73.700 7.4637E+01 2.2986E+00
  74.000 7.4651E+01 2.2995E+00
  74.300 7.4653E+01 2.2999E+00
  74.600 7.4654E+01 2.3000E+00
  74.900 7.4654E+01 2.3001E+00
  75.200 7.4654E+01 2.3002E+00
  75.500 7.4654E+01 2.3002E+00
  75.800 7.4654E+01 2.3002E+00
  76.100 7.4654E+01 2.3002E+00
  76.400 7.4654E+01 2.3002E+00
  76.700 7.4654E+01 2.3002E+00
  77.000 7.4654E+01 2.3002E+00
  77.300 7.4654E+01 2.3002E+00
  77.600 7.4654E+01 2.3002E+00
  77.900 7.4654E+01 2.3002E+00
  78.200 7.4654E+01 2.3002E+00
  78.500 7.4654E+01 2.3002E+00
  78.800 7.4654E+01 2.3002E+00
  79.100 7.4654E+01 2.3002E+00
  79.400 7.4654E+01 2.3002E+00
  79.700 7.4654E+01 2.3002E+00
  80.000 7.4654E+01 2.3002E+00
  80.300 7.4654E+01 2.3002E+00
  80.600 7.4654E+01 2.3002E+00
  80.900 7.4654E+01 2.3002E+00
  81.200 7.4654E+01 2.3002E+00
  81.500 7.4654E+01 2.3002E+00
  81.800 7.4654E+01 2.3002E+00
  82.100 7.4654E+01 2.3002E+00
  82.400 7.4654E+01 2.3002E+00
  96.000 7.4654E+01 2.3002E+00
 168.000 7.4654E+01 2.3002E+00
 792.000 7.4654E+01 2.3002E+00

#####################################################################
                        Worst Two-Hour Doses
    Note: All of the dose locations are shown below but the
          worst two-hour dose is only meaningful for the EAB
          dose location.  Please disregard the two-hour worst
          doses for the other dose locations
#####################################################################
```

```
 ######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-3a.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-3a.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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

 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 25,200 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
```

```
  1
  1
  0
  0
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   3.0000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
```

```
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   3.1000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  1
Location 1:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0C-3.o0
  1
  1
  1
  0
  0
End of Scenario File

#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#######################################################################

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

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

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

Control Room Doses:

Time (h) = 792.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.6658E-84	3.0630-268	2.6658E-84
Accumulated dose (rem)	2.3894E-02	7.9790E+01	2.4572E+00

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

Time (hr)	Containment I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
72.001	6.5355E+01	8.3646E-02	6.5260E-04
72.004	4.2054E+02	3.4962E+00	2.7072E-02
72.400	6.7659E+01	3.5825E+02	5.8659E-01
72.500	4.2673E+01	3.8358E+02	4.1435E-01
72.800	1.0706E+01	4.1551E+02	6.6775E-02
73.100	2.6861E+00	4.2353E+02	1.1475E-02
73.400	6.7390E-01	4.2554E+02	2.1299E-03
73.700	1.6907E-01	4.2604E+02	4.2801E-04
74.000	4.2419E-02	4.2617E+02	9.2287E-05
74.300	4.2373E-02	4.2617E+02	1.3100E-05
74.600	4.2328E-02	4.2617E+02	1.8596E-06
74.900	4.2282E-02	4.2617E+02	2.6397E-07
75.200	4.2236E-02	4.2617E+02	3.7470E-08
75.500	4.2191E-02	4.2617E+02	5.3189E-09
75.800	4.2146E-02	4.2617E+02	7.5502E-10
76.100	4.2100E-02	4.2617E+02	1.0718E-10
76.400	4.2055E-02	4.2617E+02	1.5214E-11
76.700	4.2010E-02	4.2617E+02	2.1596E-12
77.000	4.1964E-02	4.2617E+02	3.0655E-13
77.300	4.1919E-02	4.2617E+02	4.3515E-14
77.600	4.1874E-02	4.2617E+02	6.1770E-15
77.900	4.1829E-02	4.2617E+02	8.7683E-16
78.200	4.1784E-02	4.2617E+02	1.2447E-16
78.500	4.1739E-02	4.2617E+02	1.7668E-17
78.800	4.1694E-02	4.2617E+02	2.5080E-18
79.100	4.1649E-02	4.2617E+02	3.5601E-19
79.400	4.1604E-02	4.2617E+02	5.0536E-20
79.700	4.1559E-02	4.2617E+02	7.1736E-21
80.000	4.1514E-02	4.2617E+02	1.0183E-21
80.300	4.1470E-02	4.2617E+02	1.4455E-22
80.600	4.1425E-02	4.2617E+02	2.0519E-23
80.900	4.1380E-02	4.2617E+02	2.9126E-24
81.200	4.1336E-02	4.2617E+02	4.1345E-25
81.500	4.1291E-02	4.2617E+02	5.8689E-26
81.800	4.1247E-02	4.2617E+02	8.3309E-27
82.100	4.1202E-02	4.2617E+02	1.1826E-27
82.400	4.1158E-02	4.2617E+02	1.6787E-28
96.000	3.9196E-02	4.2617E+02	6.1392E-67
168.000	3.0263E-02	4.2617E+02	1.9881-270
792.000	3.2169E-03	4.2617E+02	0.0000E+00

```
#####################################################################
                      Cumulative Dose Summary
#####################################################################
```

Control Room

Time (hr)	Thyroid (rem)	TEDE (rem)
72.001	3.5751E-05	1.0978E-06
72.004	7.4976E-03	2.3023E-04
72.400	5.6040E+01	1.7208E+00
72.500	6.5909E+01	2.0238E+00
72.800	7.7474E+01	2.3807E+00
73.100	7.9375E+01	2.4412E+00
73.400	7.9710E+01	2.4529E+00
73.700	7.9774E+01	2.4557E+00
74.000	7.9787E+01	2.4565E+00
74.300	7.9790E+01	2.4569E+00
74.600	7.9790E+01	2.4570E+00
74.900	7.9790E+01	2.4571E+00
75.200	7.9790E+01	2.4572E+00
75.500	7.9790E+01	2.4572E+00
75.800	7.9790E+01	2.4572E+00
76.100	7.9790E+01	2.4572E+00
76.400	7.9790E+01	2.4572E+00
76.700	7.9790E+01	2.4572E+00
77.000	7.9790E+01	2.4572E+00
77.300	7.9790E+01	2.4572E+00
77.600	7.9790E+01	2.4572E+00
77.900	7.9790E+01	2.4572E+00
78.200	7.9790E+01	2.4572E+00
78.500	7.9790E+01	2.4572E+00
78.800	7.9790E+01	2.4572E+00
79.100	7.9790E+01	2.4572E+00
79.400	7.9790E+01	2.4572E+00
79.700	7.9790E+01	2.4572E+00
80.000	7.9790E+01	2.4572E+00
80.300	7.9790E+01	2.4572E+00
80.600	7.9790E+01	2.4572E+00
80.900	7.9790E+01	2.4572E+00
81.200	7.9790E+01	2.4572E+00
81.500	7.9790E+01	2.4572E+00
81.800	7.9790E+01	2.4572E+00
82.100	7.9790E+01	2.4572E+00
82.400	7.9790E+01	2.4572E+00
96.000	7.9790E+01	2.4572E+00
168.000	7.9790E+01	2.4572E+00
792.000	7.9790E+01	2.4572E+00

```
#####################################################################
                      Worst Two-Hour Doses
    Note: All of the dose locations are shown below but the
          worst two-hour dose is only meaningful for the EAB
          dose location.  Please disregard the two-hour worst
          doses for the other dose locations
#####################################################################
```

```
 ######################################################################
           RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-4a.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-4a.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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

 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 25,200 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
```

```
  1
  1
  0
  0
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.0000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
```

```
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   4.1000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  1
Location 1:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0C-4.o0
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#######################################################################
```

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

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

Control Room Doses:

Time (h) = 792.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.4329E-84	2.9685-268	2.4329E-84
Accumulated dose (rem)	2.3570E-02	8.1449E+01	2.5075E+00

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

Time (hr)	Containment I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
72.001	6.5355E+01	8.3647E-02	8.6274E-04
72.004	4.2054E+02	3.4963E+00	3.5704E-02
72.400	6.7659E+01	3.5920E+02	5.4604E-01
72.500	4.2673E+01	3.8461E+02	3.6497E-01
72.800	1.0706E+01	4.1654E+02	5.9765E-02
73.100	2.6861E+00	4.2455E+02	1.0480E-02
73.400	6.7390E-01	4.2656E+02	1.9886E-03
73.700	1.6907E-01	4.2707E+02	4.0796E-04
74.000	4.2419E-02	4.2719E+02	8.9441E-05
74.300	4.2373E-02	4.2719E+02	1.2696E-05
74.600	4.2328E-02	4.2719E+02	1.8022E-06
74.900	4.2282E-02	4.2719E+02	2.5583E-07
75.200	4.2236E-02	4.2719E+02	3.6315E-08
75.500	4.2191E-02	4.2719E+02	5.1549E-09
75.800	4.2146E-02	4.2719E+02	7.3174E-10
76.100	4.2100E-02	4.2719E+02	1.0387E-10
76.400	4.2055E-02	4.2719E+02	1.4744E-11
76.700	4.2010E-02	4.2719E+02	2.0930E-12
77.000	4.1964E-02	4.2719E+02	2.9710E-13
77.300	4.1919E-02	4.2719E+02	4.2174E-14
77.600	4.1874E-02	4.2719E+02	5.9865E-15
77.900	4.1829E-02	4.2719E+02	8.4979E-16
78.200	4.1784E-02	4.2719E+02	1.2063E-16
78.500	4.1739E-02	4.2719E+02	1.7123E-17
78.800	4.1694E-02	4.2719E+02	2.4307E-18
79.100	4.1649E-02	4.2719E+02	3.4503E-19
79.400	4.1604E-02	4.2719E+02	4.8977E-20
79.700	4.1559E-02	4.2719E+02	6.9524E-21
80.000	4.1514E-02	4.2719E+02	9.8689E-22
80.300	4.1470E-02	4.2719E+02	1.4009E-22
80.600	4.1425E-02	4.2719E+02	1.9886E-23
80.900	4.1380E-02	4.2719E+02	2.8228E-24
81.200	4.1336E-02	4.2719E+02	4.0070E-25
81.500	4.1291E-02	4.2719E+02	5.6879E-26
81.800	4.1247E-02	4.2719E+02	8.0740E-27
82.100	4.1202E-02	4.2719E+02	1.1461E-27
82.400	4.1158E-02	4.2719E+02	1.6269E-28
96.000	3.9196E-02	4.2719E+02	5.9499E-67
168.000	3.0263E-02	4.2719E+02	1.9268-270

792.000	3.2169E-03	4.2719E+02	0.0000E+00

```
#####################################################################
                    Cumulative Dose Summary
#####################################################################
```

Control Room

Time (hr)	Thyroid (rem)	TEDE (rem)
72.001	4.7263E-05	1.4513E-06
72.004	9.8905E-03	3.0370E-04
72.400	6.0134E+01	1.8465E+00
72.500	6.9116E+01	2.1223E+00
72.800	7.9353E+01	2.4382E+00
73.100	8.1065E+01	2.4927E+00
73.400	8.1373E+01	2.5035E+00
73.700	8.1433E+01	2.5060E+00
74.000	8.1446E+01	2.5069E+00
74.300	8.1448E+01	2.5072E+00
74.600	8.1449E+01	2.5073E+00
74.900	8.1449E+01	2.5074E+00
75.200	8.1449E+01	2.5074E+00
75.500	8.1449E+01	2.5074E+00
75.800	8.1449E+01	2.5075E+00
76.100	8.1449E+01	2.5075E+00
76.400	8.1449E+01	2.5075E+00
76.700	8.1449E+01	2.5075E+00
77.000	8.1449E+01	2.5075E+00
77.300	8.1449E+01	2.5075E+00
77.600	8.1449E+01	2.5075E+00
77.900	8.1449E+01	2.5075E+00
78.200	8.1449E+01	2.5075E+00
78.500	8.1449E+01	2.5075E+00
78.800	8.1449E+01	2.5075E+00
79.100	8.1449E+01	2.5075E+00
79.400	8.1449E+01	2.5075E+00
79.700	8.1449E+01	2.5075E+00
80.000	8.1449E+01	2.5075E+00
80.300	8.1449E+01	2.5075E+00
80.600	8.1449E+01	2.5075E+00
80.900	8.1449E+01	2.5075E+00
81.200	8.1449E+01	2.5075E+00
81.500	8.1449E+01	2.5075E+00
81.800	8.1449E+01	2.5075E+00
82.100	8.1449E+01	2.5075E+00
82.400	8.1449E+01	2.5075E+00
96.000	8.1449E+01	2.5075E+00
168.000	8.1449E+01	2.5075E+00
792.000	8.1449E+01	2.5075E+00

```
#####################################################################
                    Worst Two-Hour Doses
   Note: All of the dose locations are shown below but the
         worst two-hour dose is only meaningful for the EAB
         dose location.  Please disregard the two-hour worst
         doses for the other dose locations
#####################################################################
```

```
#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-5a.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-5a.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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

 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 25,200 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
```

```
  1
  1
  0
  0
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   5.0000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
```

```
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   5.1000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  1
Location 1:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0C-5.o0
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#######################################################################
```

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

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

Control Room Doses:

Time (h) = 792.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.2665E-84	2.9011-268	2.2665E-84
Accumulated dose (rem)	2.3189E-02	8.1916E+01	2.5213E+00

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

Time (hr)	Containment I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
72.001	6.5355E+01	8.3648E-02	1.0727E-03
72.004	4.2054E+02	3.4966E+00	4.4288E-02
72.400	6.7659E+01	3.6016E+02	5.0836E-01
72.500	4.2673E+01	3.8562E+02	3.2969E-01
72.800	1.0706E+01	4.1756E+02	5.4757E-02
73.100	2.6861E+00	4.2557E+02	9.7694E-03
73.400	6.7390E-01	4.2758E+02	1.8877E-03
73.700	1.6907E-01	4.2809E+02	3.9364E-04
74.000	4.2419E-02	4.2821E+02	8.7408E-05
74.300	4.2373E-02	4.2821E+02	1.2408E-05
74.600	4.2328E-02	4.2821E+02	1.7613E-06
74.900	4.2282E-02	4.2821E+02	2.5001E-07
75.200	4.2236E-02	4.2821E+02	3.5489E-08
75.500	4.2191E-02	4.2821E+02	5.0377E-09
75.800	4.2146E-02	4.2821E+02	7.1511E-10
76.100	4.2100E-02	4.2821E+02	1.0151E-10
76.400	4.2055E-02	4.2821E+02	1.4409E-11
76.700	4.2010E-02	4.2821E+02	2.0454E-12
77.000	4.1964E-02	4.2821E+02	2.9035E-13
77.300	4.1919E-02	4.2821E+02	4.1215E-14
77.600	4.1874E-02	4.2821E+02	5.8505E-15
77.900	4.1829E-02	4.2821E+02	8.3047E-16
78.200	4.1784E-02	4.2821E+02	1.1789E-16
78.500	4.1739E-02	4.2821E+02	1.6734E-17
78.800	4.1694E-02	4.2821E+02	2.3754E-18
79.100	4.1649E-02	4.2821E+02	3.3719E-19
79.400	4.1604E-02	4.2821E+02	4.7864E-20
79.700	4.1559E-02	4.2821E+02	6.7943E-21
80.000	4.1514E-02	4.2821E+02	9.6446E-22
80.300	4.1470E-02	4.2821E+02	1.3690E-22
80.600	4.1425E-02	4.2821E+02	1.9434E-23
80.900	4.1380E-02	4.2821E+02	2.7586E-24
81.200	4.1336E-02	4.2821E+02	3.9159E-25
81.500	4.1291E-02	4.2821E+02	5.5586E-26
81.800	4.1247E-02	4.2821E+02	7.8904E-27
82.100	4.1202E-02	4.2821E+02	1.1201E-27
82.400	4.1158E-02	4.2821E+02	1.5899E-28
96.000	3.9196E-02	4.2821E+02	5.8147E-67
168.000	3.0263E-02	4.2821E+02	1.8830-270

792.000	3.2169E-03	4.2821E+02	0.0000E+00

```
#####################################################################
                    Cumulative Dose Summary
#####################################################################
```

Control Room

Time (hr)	Thyroid (rem)	TEDE (rem)
72.001	5.8766E-05	1.8045E-06
72.004	1.2271E-02	3.7681E-04
72.400	6.2427E+01	1.9169E+00
72.500	7.0689E+01	2.1706E+00
72.800	7.9977E+01	2.4572E+00
73.100	8.1555E+01	2.5075E+00
73.400	8.1844E+01	2.5175E+00
73.700	8.1901E+01	2.5200E+00
74.000	8.1913E+01	2.5208E+00
74.300	8.1915E+01	2.5211E+00
74.600	8.1916E+01	2.5212E+00
74.900	8.1916E+01	2.5213E+00
75.200	8.1916E+01	2.5213E+00
75.500	8.1916E+01	2.5213E+00
75.800	8.1916E+01	2.5213E+00
76.100	8.1916E+01	2.5213E+00
76.400	8.1916E+01	2.5213E+00
76.700	8.1916E+01	2.5213E+00
77.000	8.1916E+01	2.5213E+00
77.300	8.1916E+01	2.5213E+00
77.600	8.1916E+01	2.5213E+00
77.900	8.1916E+01	2.5213E+00
78.200	8.1916E+01	2.5213E+00
78.500	8.1916E+01	2.5213E+00
78.800	8.1916E+01	2.5213E+00
79.100	8.1916E+01	2.5213E+00
79.400	8.1916E+01	2.5213E+00
79.700	8.1916E+01	2.5213E+00
80.000	8.1916E+01	2.5213E+00
80.300	8.1916E+01	2.5213E+00
80.600	8.1916E+01	2.5213E+00
80.900	8.1916E+01	2.5213E+00
81.200	8.1916E+01	2.5213E+00
81.500	8.1916E+01	2.5213E+00
81.800	8.1916E+01	2.5213E+00
82.100	8.1916E+01	2.5213E+00
82.400	8.1916E+01	2.5213E+00
96.000	8.1916E+01	2.5213E+00
168.000	8.1916E+01	2.5213E+00
792.000	8.1916E+01	2.5213E+00

```
#####################################################################
                    Worst Two-Hour Doses
   Note: All of the dose locations are shown below but the
         worst two-hour dose is only meaningful for the EAB
         dose location.  Please disregard the two-hour worst
         doses for the other dose locations
#####################################################################
```

```
#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-6a.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-6a.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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

 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 25,200 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
```

```
  1
  1
  0
  0
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   6.0000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
```

```
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   6.1000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  1
Location 1:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0C-6.o0
  1
  1
  1
  0
  0
End of Scenario File


#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#######################################################################
```

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

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

Control Room Doses:

Time (h) = 792.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.1532E-84	2.8551-268	2.1532E-84
Accumulated dose (rem)	2.2871E-02	8.1952E+01	2.5221E+00

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

Time (hr)	Containment I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
72.001	6.5355E+01	8.3649E-02	1.2825E-03
72.004	4.2054E+02	3.4969E+00	5.2825E-02
72.400	6.7659E+01	3.6111E+02	4.7852E-01
72.500	4.2673E+01	3.8663E+02	3.0568E-01
72.800	1.0706E+01	4.1857E+02	5.1350E-02
73.100	2.6861E+00	4.2658E+02	9.2857E-03
73.400	6.7390E-01	4.2859E+02	1.8190E-03
73.700	1.6907E-01	4.2910E+02	3.8389E-04
74.000	4.2419E-02	4.2922E+02	8.6024E-05
74.300	4.2373E-02	4.2922E+02	1.2211E-05
74.600	4.2328E-02	4.2922E+02	1.7334E-06
74.900	4.2282E-02	4.2922E+02	2.4605E-07
75.200	4.2236E-02	4.2922E+02	3.4927E-08
75.500	4.2191E-02	4.2922E+02	4.9580E-09
75.800	4.2146E-02	4.2922E+02	7.0379E-10
76.100	4.2100E-02	4.2922E+02	9.9903E-11
76.400	4.2055E-02	4.2922E+02	1.4181E-11
76.700	4.2010E-02	4.2922E+02	2.0130E-12
77.000	4.1964E-02	4.2922E+02	2.8575E-13
77.300	4.1919E-02	4.2922E+02	4.0562E-14
77.600	4.1874E-02	4.2922E+02	5.7578E-15
77.900	4.1829E-02	4.2922E+02	8.1733E-16
78.200	4.1784E-02	4.2922E+02	1.1602E-16
78.500	4.1739E-02	4.2922E+02	1.6469E-17
78.800	4.1694E-02	4.2922E+02	2.3378E-18
79.100	4.1649E-02	4.2922E+02	3.3185E-19
79.400	4.1604E-02	4.2922E+02	4.7106E-20
79.700	4.1559E-02	4.2922E+02	6.6868E-21
80.000	4.1514E-02	4.2922E+02	9.4919E-22
80.300	4.1470E-02	4.2922E+02	1.3474E-22
80.600	4.1425E-02	4.2922E+02	1.9126E-23
80.900	4.1380E-02	4.2922E+02	2.7150E-24
81.200	4.1336E-02	4.2922E+02	3.8539E-25
81.500	4.1291E-02	4.2922E+02	5.4706E-26
81.800	4.1247E-02	4.2922E+02	7.7655E-27
82.100	4.1202E-02	4.2922E+02	1.1023E-27
82.400	4.1158E-02	4.2922E+02	1.5647E-28
96.000	3.9196E-02	4.2922E+02	5.7226E-67
168.000	3.0263E-02	4.2922E+02	1.8532-270

792.000	3.2169E-03	4.2922E+02	0.0000E+00

```
#####################################################################
                    Cumulative Dose Summary
#####################################################################
```

Control Room

Time (hr)	Thyroid (rem)	TEDE (rem)
72.001	7.0258E-05	2.1574E-06
72.004	1.4640E-02	4.4954E-04
72.400	6.3747E+01	1.9574E+00
72.500	7.1479E+01	2.1948E+00
72.800	8.0120E+01	2.4615E+00
73.100	8.1606E+01	2.5089E+00
73.400	8.1882E+01	2.5185E+00
73.700	8.1938E+01	2.5208E+00
74.000	8.1950E+01	2.5216E+00
74.300	8.1952E+01	2.5219E+00
74.600	8.1952E+01	2.5220E+00
74.900	8.1952E+01	2.5221E+00
75.200	8.1952E+01	2.5221E+00
75.500	8.1952E+01	2.5221E+00
75.800	8.1952E+01	2.5221E+00
76.100	8.1952E+01	2.5221E+00
76.400	8.1952E+01	2.5221E+00
76.700	8.1952E+01	2.5221E+00
77.000	8.1952E+01	2.5221E+00
77.300	8.1952E+01	2.5221E+00
77.600	8.1952E+01	2.5221E+00
77.900	8.1952E+01	2.5221E+00
78.200	8.1952E+01	2.5221E+00
78.500	8.1952E+01	2.5221E+00
78.800	8.1952E+01	2.5221E+00
79.100	8.1952E+01	2.5221E+00
79.400	8.1952E+01	2.5221E+00
79.700	8.1952E+01	2.5221E+00
80.000	8.1952E+01	2.5221E+00
80.300	8.1952E+01	2.5221E+00
80.600	8.1952E+01	2.5221E+00
80.900	8.1952E+01	2.5221E+00
81.200	8.1952E+01	2.5221E+00
81.500	8.1952E+01	2.5221E+00
81.800	8.1952E+01	2.5221E+00
82.100	8.1952E+01	2.5221E+00
82.400	8.1952E+01	2.5221E+00
96.000	8.1952E+01	2.5221E+00
168.000	8.1952E+01	2.5221E+00
792.000	8.1952E+01	2.5221E+00

```
#####################################################################
                    Worst Two-Hour Doses
   Note: All of the dose locations are shown below but the
         worst two-hour dose is only meaningful for the EAB
         dose location.  Please disregard the two-hour worst
         doses for the other dose locations
#####################################################################
```

```
 ######################################################################
           RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
######################################################################

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

 Plant file name           = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-7a.psf
 Inventory file name       = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fharb_def_a.nif
 Scenario file name        = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad\0C-7a.psf
 Release file name         = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fha update 6-9-05.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad\defaults\fgr11&12.inp

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

 Radtrad 3.02 1/5/2000
 TMI-1 FHAIC With Hatch Doors Opened, AST Analysis, CR Charcoal Filter Efficiency =
75%., CR Recirc = 25,200 cfm, CR Intake = 7,200 cfm
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad\defaults\fharb_def_a.nif
 Plant Power Level:
  2.6190E+03
 Compartments:
   3
 Compartment 1:
 Containment
   3
  2.1600E+06
   0
   0
   0
   0
   0
 Compartment 2:
 Environment
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  2.5000E+05
   0
   0
   1
   0
   0
 Pathways:
```

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

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fgr11&12.inp
c:\program files\u s nuclear regulatory commission\radtrad\defaults\fha update 6-9-
05.rft
  7.2000E+01
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 3:
```

```
  1
  1
  0
  0
  0
  0
  1
  2.5200E+04
  3
  7.2000E+01   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   9.9000E+01   7.5000E+01   7.5000E+01
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   1.6580E+05   0.0000E+00   0.0000E+00   0.0000E+00
  7.4000E+01   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   7.0000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   7.2000E+03   9.9000E+01   7.5000E+01   7.5000E+01
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
  0
  1
  2
  7.2000E+01   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  7.9200E+02   1.0000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
```

```
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  3
  7.2000E+01   7.1000E+04   0.0000E+00   0.0000E+00   0.0000E+00
  7.2500E+01   8.2000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.9200E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  1
Location 1:
Control Room
  3
  0
  1
  2
  7.2000E+01   3.5000E-04
  7.9200E+02   0.0000E+00
  1
  4
  7.2000E+01   1.0000E+00
  9.6000E+01   6.0000E-01
  1.6800E+02   4.0000E-01
  7.9200E+02   0.0000E+00
Effective Volume Location:
  1
  6
  7.2000E+01   5.3400E-04
  7.4000E+01   3.1000E-04
  8.0000E+01   1.3600E-04
  9.6000E+01   9.7000E-05
  1.6800E+02   6.0200E-05
  7.9200E+02   0.0000E+00
Simulation Parameters:
  6
  7.2000E+01   1.0000E-01
  7.4000E+01   5.0000E-01
  8.0000E+01   1.0000E+00
  9.6000E+01   2.0000E+00
  1.6800E+02   4.0000E+00
  7.9200E+02   0.0000E+00
Output Filename:
C:\Program Files\U S Nuclear Regulatory Commission\Radtrad\0C-7.o0
  1
  1
  1
  0
  0
End of Scenario File

#######################################################################
          RADTRAD Version 3.02 run on  9/09/2005  at 15:46:36
#######################################################################

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

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

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

Control Room Doses:

Time (h) = 792.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	2.0757E-84	2.8237-268	2.0757E-84
Accumulated dose (rem)	2.2621E-02	8.1826E+01	2.5180E+00

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

Time (hr)	Containment I-131 (Curies)	Environment I-131 (Curies)	Control Room I-131 (Curies)
72.001	6.5355E+01	8.3650E-02	1.4921E-03
72.004	4.2054E+02	3.4972E+00	6.1315E-02
72.400	6.7659E+01	3.6206E+02	4.5601E-01
72.500	4.2673E+01	3.8764E+02	2.8923E-01
72.800	1.0706E+01	4.1958E+02	4.9015E-02
73.100	2.6861E+00	4.2759E+02	8.9543E-03
73.400	6.7390E-01	4.2960E+02	1.7720E-03
73.700	1.6907E-01	4.3011E+02	3.7721E-04
74.000	4.2419E-02	4.3023E+02	8.5076E-05
74.300	4.2373E-02	4.3023E+02	1.2077E-05
74.600	4.2328E-02	4.3023E+02	1.7143E-06
74.900	4.2282E-02	4.3023E+02	2.4334E-07
75.200	4.2236E-02	4.3023E+02	3.4543E-08
75.500	4.2191E-02	4.3023E+02	4.9033E-09
75.800	4.2146E-02	4.3023E+02	6.9603E-10
76.100	4.2100E-02	4.3023E+02	9.8802E-11
76.400	4.2055E-02	4.3023E+02	1.4025E-11
76.700	4.2010E-02	4.3023E+02	1.9908E-12
77.000	4.1964E-02	4.3023E+02	2.8260E-13
77.300	4.1919E-02	4.3023E+02	4.0115E-14
77.600	4.1874E-02	4.3023E+02	5.6944E-15
77.900	4.1829E-02	4.3023E+02	8.0832E-16
78.200	4.1784E-02	4.3023E+02	1.1474E-16
78.500	4.1739E-02	4.3023E+02	1.6288E-17
78.800	4.1694E-02	4.3023E+02	2.3120E-18
79.100	4.1649E-02	4.3023E+02	3.2819E-19
79.400	4.1604E-02	4.3023E+02	4.6587E-20
79.700	4.1559E-02	4.3023E+02	6.6131E-21
80.000	4.1514E-02	4.3023E+02	9.3873E-22
80.300	4.1470E-02	4.3023E+02	1.3325E-22
80.600	4.1425E-02	4.3023E+02	1.8915E-23
80.900	4.1380E-02	4.3023E+02	2.6850E-24
81.200	4.1336E-02	4.3023E+02	3.8114E-25
81.500	4.1291E-02	4.3023E+02	5.4103E-26
81.800	4.1247E-02	4.3023E+02	7.6800E-27
82.100	4.1202E-02	4.3023E+02	1.0902E-27
82.400	4.1158E-02	4.3023E+02	1.5475E-28
96.000	3.9196E-02	4.3023E+02	5.6596E-67
168.000	3.0263E-02	4.3023E+02	1.8328-270
792.000	3.2169E-03	4.3023E+02	0.0000E+00

```
#####################################################################
                    Cumulative Dose Summary
#####################################################################
```

Control Room

Time (hr)	Thyroid (rem)	TEDE (rem)
72.001	8.1741E-05	2.5100E-06
72.004	1.6997E-02	5.2191E-04
72.400	6.4520E+01	1.9812E+00
72.500	7.1868E+01	2.2068E+00
72.800	8.0067E+01	2.4598E+00
73.100	8.1490E+01	2.5052E+00
73.400	8.1757E+01	2.5145E+00
73.700	8.1811E+01	2.5168E+00
74.000	8.1823E+01	2.5175E+00
74.300	8.1825E+01	2.5178E+00
74.600	8.1825E+01	2.5179E+00
74.900	8.1826E+01	2.5179E+00
75.200	8.1826E+01	2.5180E+00
75.500	8.1826E+01	2.5180E+00
75.800	8.1826E+01	2.5180E+00
76.100	8.1826E+01	2.5180E+00
76.400	8.1826E+01	2.5180E+00
76.700	8.1826E+01	2.5180E+00
77.000	8.1826E+01	2.5180E+00
77.300	8.1826E+01	2.5180E+00
77.600	8.1826E+01	2.5180E+00
77.900	8.1826E+01	2.5180E+00
78.200	8.1826E+01	2.5180E+00
78.500	8.1826E+01	2.5180E+00
78.800	8.1826E+01	2.5180E+00
79.100	8.1826E+01	2.5180E+00
79.400	8.1826E+01	2.5180E+00
79.700	8.1826E+01	2.5180E+00
80.000	8.1826E+01	2.5180E+00
80.300	8.1826E+01	2.5180E+00
80.600	8.1826E+01	2.5180E+00
80.900	8.1826E+01	2.5180E+00
81.200	8.1826E+01	2.5180E+00
81.500	8.1826E+01	2.5180E+00
81.800	8.1826E+01	2.5180E+00
82.100	8.1826E+01	2.5180E+00
82.400	8.1826E+01	2.5180E+00
96.000	8.1826E+01	2.5180E+00
168.000	8.1826E+01	2.5180E+00
792.000	8.1826E+01	2.5180E+00

```
#####################################################################
                    Worst Two-Hour Doses
   Note: All of the dose locations are shown below but the
         worst two-hour dose is only meaningful for the EAB
         dose location.  Please disregard the two-hour worst
         doses for the other dose locations
#####################################################################
```

ENCLOSURE 3

List of Commitments

SUMMARY OF AMERGEN COMMITMENTS

The following table identifies commitments made in this document by AmerGen. (Any other actions discussed in the submittal represent intended or planned actions by AmerGen. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE OR "OUTAGE"
Procedural controls will ensure that during the movement of irradiated fuel the Equipment Hatch/Missile Shield area will be manned 24 Hours/Day, 7 Days/Week in support of the outage unless the Equipment Hatch is closed and 4 bolts are installed.	T1R16 (Fall 2005)
Complete permanent installation of steel plate to the lower most missile shield carriage area. The added steel plate will cover the area where grating is currently installed.	T1R16 (Fall 2005)
Prior to initial use of this Technical Specification, TMI will demonstrate that the 45-minute closure duration is achievable.	T1R16 (Fall 2005)
TMI Unit 1 procedures will include the following requirements to ensure that General Design Criterion (GDC) 64 requirements will continue to be met during the movement of irradiated fuel: 1) If the Reactor Building Equipment Hatch is removed (open), then place the purge system in operation and control the air flow at the hatch so that the prevailing continuous direction of air flow is into the Reactor Building. 2) If the condition, as described in Item 1 above, cannot be maintained, then fuel handling operations will be terminated until the Reactor Building Equipment Hatch is closed or purge is restored. 3) Whenever the purge system is operating, then ensure purge exhaust radiation monitor is operable or obtain periodic samples as currently specified in the Offsite Dose Calculation Manual (ODCM).	T1R16 (Fall 2005)

COMMITMENT	COMMITTED DATE OR "OUTAGE"
4) Whenever the hatch is open, position a portable radiation monitor at the Reactor Building Equipment Hatch opening. 5) If the purge system is operated with the Reactor Building Equipment Hatch open, then bypass the Reactor Building purge exhaust high radiation interlock. 6) Prior to initiating irradiated fuel movement with the Reactor Building Equipment Hatch open, verify the purge system is operating.	

ENCLOSURE 4

Revised TS Page Markups

Revised Technical Specification Pages

3-44
3-45
3-45a

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3.8 FUEL LOADING ~~AND REFUELING~~

Applicability: Applies to fuel loading and refueling operations.

Objective: To assure that fuel loading and refueling operations are performed in a responsible manner.

Specification

3.8.1 Radiation levels in the Reactor Building refueling area shall be monitored by RM-G6 and RM-G7. Radiation levels in the spent fuel storage area shall be monitored by RM-G9. If any of these instruments become inoperable, portable survey instrumentation, having the appropriate ranges and sensitivity to fully protect individuals involved in refueling operation, shall be used until the permanent instrumentation is returned to service.

3.8.2 Core subcritical neutron flux shall be continuously monitored by at least two neutron flux monitors, each with continuous indication available, whenever core geometry is being changed. When core geometry is not being changed, at least one neutron flux monitor shall be in service.

3.8.3 At least one decay heat removal pump and cooler shall be operable.

3.8.4 During reactor vessel head removal and while loading and unloading fuel from the reactor, the boron concentration shall be maintained at not less than that required for refueling shutdown.

3.8.5 Direct communications between the control room and the refueling personnel in the Reactor Building shall exist whenever changes in core geometry are taking place.

3.8.6 During the handling of irradiated fuel in the Reactor Building at least one door in each of the personnel and emergency air locks shall be capable of being closed.* The equipment hatch cover shall be in place with a minimum of four bolts securing the cover to the sealing surfaces. INSERT "A"

3.8.7 During the handling of irradiated fuel in the Reactor Building, each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either:

1. Closed by an isolation valve, blind flange, manual valve, or equivalent, or capable of being closed,* or

2. Be capable of being closed by an operable automatic containment purge and exhaust isolation valve.

*Administrative controls shall ensure that the Reactor Building Purge Exhaust System is in service, appropriate personnel are aware that air lock doors and/or other penetrations are open, a specific individual(s) is designated and available to close the air lock doors and other penetrations as part of a required evacuation of containment. Any obstruction(s) (e.g., cable and hoses) that could prevent closure of an air lock door or other penetration will be capable of being quickly removed.

3.8.8 If any of the above specified limiting conditions for fuel loading and refueling are not met, movement of fuel into the reactor core shall cease; action shall be initiated to correct the conditions so that the specified limits are met, and no operations which may increase the reactivity of the core shall be made.

3.8.9 The reactor building purge isolation valves, and associated radiation monitors which initiate purge isolation, shall be tested and verified to be operable no more than 7 days prior to initial fuel movement in the reactor building.

3.8.10 Irradiated fuel shall not be removed from the reactor until the unit has been subcritical for at least 72 hours.

3.8.11 During the handling of irradiated fuel in the Reactor Building at least 23 feet of water shall be maintained above the level of the reactor pressure vessel flange, as determined by a shiftly check and a daily verification. If the water level is less than 23 feet above the reactor pressure vessel flange, place the fuel assembly(s) being handled into a safe position, then cease fuel handling until the water level has been restored to 23 feet or greater above the reactor pressure vessel flange.

Bases

Detailed written procedures will be available for use by refueling personnel. These procedures, the above specifications, and the design of the fuel handling equipment as described in Section 9.7 of the UFSAR incorporating built-in interlocks and safety features, provide assurance that no incident could occur during the refueling operations that would result in a hazard to public health and safety. If no change is being made in core geometry, one flux monitor is sufficient. This permits maintenance on the instrumentation. Continuous monitoring of radiation levels and neutron flux provides immediate indication of an unsafe condition. The decay heat removal pump is used to maintain a uniform boron concentration. The shutdown margin indicated in Specification 3.8.4 will keep the core subcritical, even with all control rods withdrawn from the core (Reference 1). The boron concentration will be sufficient to maintain the core $k_{eff} \leq 0.99$ if all the control rods were removed from the core, however only a few control rods will be removed at any one time during fuel shuffling and replacement. The k_{eff} with all rods in the core and with refueling boron concentration is approximately 0.9. Specification 3.8.5 allows the control room operator to inform the reactor building personnel of any impending unsafe condition detected from the main control board indicators during fuel movement.

Per Specification 3.8.6 and 3.8.7, the personnel and emergency air lock doors, and penetrations may be open during movement of irradiated fuel in the containment provided a minimum of one door in each of the air locks, and penetrations are capable of being closed in the event of a fuel handling accident, and the plant is in REFUELING SHUTDOWN or REFUELING OPERATION with at least 23 feet of water above the fuel seated within the reactor pressure vessel. The minimum water level specified is the basis for the accident analysis assumption of a decontamination factor of 200 for the release to the containment atmosphere from the postulated damaged fuel rods located on top of the fuel core seated in the reactor vessel. Should a fuel handling accident occur inside containment, a minimum of one door in each personnel and emergency air lock, and the open penetrations will be closed following an evacuation of containment. Administrative controls will be in place to assure closure of at least one door in each air lock, as well as other open containment penetrations, following a containment evacuation.

INSERT B → TP

Provisions for equivalent isolation methods in Technical Specification 3.8.7 include use of a material (e.g. temporary sealant) that can provide a temporary, atmospheric pressure ventilation barrier for other containment penetrations during fuel movements.

Specification 3.8.9 requires testing of the reactor building purge isolation system. This system consists of the four reactor building purge valves and the associated reactor building purge radiation monitor(s). The test verifies that the purge valves will automatically close when they receive initiation signals from the radiation detectors that monitor reactor building purge exhaust. The test is performed no more than 7 days prior to the start of fuel movement in the reactor building to ensure that the monitors, purge valves, and associated interlocks are functioning prior to operations that could result in a fuel handling accident within the reactor building. ~~For conservatism,~~ The Fuel Handling Accident analysis assumes that the four purge valves remain open, and the valves remain open when the isolation system is bypassed.

Specification 3.8.10 is required as the safety analysis for the fuel handling accident was based on the assumption that the reactor had been shutdown for 72 hours (Reference 2).

REFERENCES

(1) UFSAR, Section 14.2.2.1 - "Fuel Handling Accident"

(2) UFSAR, Section 14.2.2.1(2) - "FHA Inside Containment"

TMI Unit 1 Technical Specification Page Markups

Insert "A" to Technical Specification 3.8.6 (TS Page 3-44)

---------- NOTE ----------

The equipment hatch may be open if all of the following conditions are met:

1) The Reactor Building Equipment Hatch Missile Shield Barrier is capable of being closed within 45 minutes,
2) A designated crew is available to close the Reactor Building Equipment Hatch Missile Shield Barrier, and
3) Reactor Building Purge Exhaust System is in service.

Insert "B" to Technical Specification 3.8 Bases (TS Page 3-45)

Specification 3.8.6 is modified by a NOTE:

NOTE

The equipment hatch may be open if all of the following conditions are met:

1) The Reactor Building Equipment Hatch Missile Shield Barrier is capable of being closed within 45 minutes,
2) A designated crew is available to close the Reactor Building Equipment Hatch Missile Shield Barrier, and
3) Reactor Building Purge Exhaust System is in service.

These restrictions include administrative controls to allow the opening of the reactor building equipment hatch during the handling of irradiated fuel in the Reactor Building provided that 1) The Reactor Building Equipment Hatch Missile Shield Barrier is capable of being closed within 45 minutes, 2) A designated crew is available to close the Reactor Building Equipment Hatch Missile Shield Barrier, and 3) Reactor Building Purge Exhaust System is in service. The Reactor Building Equipment Hatch Missile Shield Barrier includes steel plating on the bottom of the shield structure, which acts to restrict a release of post-accident fission products. The capability to close the reactor building missile shield barrier includes requirements that the barrier is capable of being closed and that any cables or hoses across the opening have quick disconnects to ensure the barrier is capable of being closed within 45 minutes. The 45-minute closure time for the reactor building missile shield barrier starts when the control room communicates the need to shut the Reactor Building Equipment Hatch Missile Shield Barrier. This 45-minute requirement is significantly less than the fuel handling accident analysis assumption that the reactor building remains open to the outside environment for a two-hour period subsequent to the accident. Placing reactor building purge exhaust in service will ensure any release from the reactor building will be monitored, and ensure continued air flow into the Reactor Building in the event of a fuel handling accident. The Reactor Building purge valve high radiation interlock will be bypassed to ensure continued air flow into the Reactor Building in the event of a Fuel Handling Accident.

The administrative controls will also include the responsibility to be able to communicate with the control room, and the responsibility to ensure that the reactor building missile shield barrier is capable of being closed in the event of a fuel handling accident. These administrative controls will ensure reactor building closure would be established in the event of a fuel handling accident inside containment.