

This document was too large to scan as a whole document, therefore it required breaking into smaller sections.

Document number: SD-FF-W-013

Section 1 of 2

Title: Evaluation of Selected Ex-Reactor Accidents
Related to the Tritium and Medical
Isotope Production Missions at the
Fast Flux Test Facility

Date: 11/17/97 Revision: 0

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References: EDT-622302

2. To: (Receiving Organization) FFTF Engineering B&W Hanford Co		3. From: (Originating Organization) Specialty Engineering Fluor Daniel Northwest		4. Related EDT No.: N/A	
5. Proj./Prog./Dept./Div.: FFTF Tritium/Medical Isotope Mission		6. Design Authority/ Design-Agent/Cog. Engr.: D. A. Himes		7. Purchase Order No.: N/A	
8. Originator Remarks: Calculation notes are used to document the originator's analysis but are not to be used as the final or sole document to authorize activities or justify facility modifications.				9. Equip./Component No.: N/A	
				10. System/Bldg./Facility: FFTF	
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ No				12. Major Assm. Dwg. No.: N/A	
				13. Permit/Permit Application No.: N/A	
				14. Required Response Date: N/A	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	HNF-SD-FF-CN-013	N/A	0	Evaluation of Selected Ex-Reactor Accidents Related to the Tritium and Medical Isotope Production Missions at the Fast Flux Test Facility	N/A	1/2		

16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment	4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)									
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature (L) Date (M) MSIN
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18. Signature of EDT Originator D.A. Himes 11/3/97		19. Signature of Authorized Representative for Receiving Organization S. Hultberg 11/12/97		20. Signature of Design Authority/Cognizant Manager B.E. Hey 11/17/97		21. DOE APPROVAL (if required) Ctrl. No. N/A ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	

EVALUATION OF SELECTED EX-REACTOR ACCIDENTS RELATED TO THE TRITIUM AND MEDICAL ISOTOPE PRODUCTION MISSIONS AT THE FAST FLUX TEST FACILITY

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U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 622302 UC: 542
Org Code: 403 Charge Code: BE2600
B&R Code: EX7002000 Total Pages: 547

Key Words: FFTF, Accidents, Tritium, Medical Isotopes

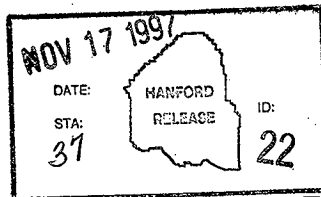
Abstract: The Fast Flux Test Facility (FFTF) has been proposed as a production facility for tritium and medical isotopes. A range of postulated accidents related to ex-reactor irradiated fuel and target handling were identified and evaluated using new source terms for the higher fuel enrichment and for the tritium and medical isotope targets. In addition, two in-containment sodium spill accidents were re-evaluated to estimate effects of increased fuel enrichment and the presence of the Rapid Retrieval System. Radiological and toxicological consequences of the analyzed accidents were found to be well within applicable risk guidelines.

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11-17-97
Date



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**EVALUATION OF SELECTED EX-REACTOR ACCIDENTS RELATED TO THE
TRITIUM AND MEDICAL ISOTOPE PRODUCTION MISSIONS
AT THE FAST FLUX TEST FACILITY**

1.0 INTRODUCTION

A technical input document (TID) is being prepared by the FFTF Standby Project Office Environmental and Safety Analysis Team to 1) provide the Secretary of Energy with necessary information to make a decision on the use of the FFTF for interim tritium production and medical isotope production, and 2) support an Environmental Impact Statement that will be required if FFTF receives a favorable decision to prepare for the new missions. A range of postulated accidents related to ex-reactor irradiated fuel and target handling have been identified for evaluation using new source terms for the higher fuel enrichment and for the tritium and medical isotope targets. In addition, two in-containment sodium spill accidents are to be re-evaluated to estimate effects of increased fuel enrichment and the presence of the Rapid Retrieval System. The purpose of this document is to present the methodology and results of the evaluations of the selected accidents. The selected ex-reactor accidents are:

- a. Seismic event (DBE) during fuel or target assembly transfer by the Bottom Loading Transfer Cask (BLTC) into or out of another vessel. The irradiated fuel or target assembly is assumed to be deformed during movement of the BLTC along the rails. This accident is to be analyzed for maximum releases from a worst-case medical isotope and tritium targets, as well as a fuel assembly.
- b. Drop of a Solid Waste Cask (SWC) while transferring a maximum load of seven irradiated fuel assemblies in a Core Component Container (CCC). A 100% release of fission product gases from all seven fuel assemblies is assumed. This accident is also to be analyzed for maximum release from six tritium targets and from 361 individual tritium target pins.
- c. Drop of a CCC containing seven fuel assemblies, six tritium target assemblies, or 361 tritium target pins from the SWC into an Interim Storage Cask (ISC) coupled with failure of the Cask Loading Station (CLS) elevator allowing the CCC and the ISC to fall to the CLS floor. This accident produces an intense radiation field which is assumed to expose an individual standing at the edge of the CLS. The impact limiter on the CLS elevator is assumed to prevent any releases from fuel assemblies, but maximum releases are to be assumed for the tritium targets or tritium target pins.

- d. Beyond design basis drop of a maximally loaded Interim Storage Cask (ISC). The ISC loaded with seven irradiated fuel assemblies is dropped from above the analyzed height (4 ft above an unyielding surface). This is assumed to damage 100% of the fuel and to damage the CCC and cask so as to provide a small escape path.
- e. Hypothetical (non-mechanistic) release from a maximally loaded ISC. The accident is a hypothetical disruption which is modelled as a crushing/shearing of the CCC and the seven fuel assemblies within it and the creation of a large release path out of the cask.
- f. Large 25000 lb sodium spill to a Heat Transport System (HTS) cell open to reactor containment. The source term is based on FSAR operation with 1% failed fuel. Radiological and toxicological consequences are to be evaluated along with sensitivity to the plutonium enrichment and tritium concentration.
- g. Failure of the Rapid Retrieval System during a Hypothetical Core Disruptive Accident (HCDA). Based on a specified estimate of the amount of additional sodium ejected during an HCDA due to the presence of the Rapid Retrieval System, the effects on radiological and toxicological consequences are to be evaluated.

2.0 METHODOLOGY

This section provides basic information and documentation of methodology for the ex-reactor accidents selected for evaluation. Documentation of computer codes and data files are contained within the code output files associated with each of the accidents listed in Attachments 2 through 8.

2.1 INVENTORIES AT RISK

Inventories at risk include irradiated fuel assemblies decayed to 1.4 kW and 250 W decay heat depending on the accident analyzed as well as the irradiated tritium and medical isotope target assemblies. In addition, tritium and fission product concentrations in the primary sodium are used for the large sodium spill and the HCDA.

2.1.1 Irradiated Fuel Assemblies

The driver fuel assemblies for the proposed tritium and medical isotope production missions are planned to be bounded by an enrichment of 42% (Pu/total heavy metal) and a maximum burnup of 500 effective full power days (EFPD). Administrative limits on decay heat per assembly are 1.4 kW for

handling by the BLTC and 250 W for insertion into a CCC. Inventories of isotopes of concern for atmospheric releases were assembled using the ORIGEN2 code (Croff 1980) and provided as specified input to this analysis for these two decay heat levels. The required decay times were 480 days and 4.6 years, respectively. The resulting inventories are shown in Table 2.1-1. The relevant portions of the ORIGEN2 output files are shown in Attachment 1.

Table 2.1-1. Isotopic inventory per assembly for 42% enriched driver fuel aged to 1.4 kW and 250 W decay heat

Isotope	Inventory Per Assembly (Ci)	
	1.4 kW	250 W
H 3	8.02E+1	6.67E+1
Kr 85	7.12E+2	5.76E+2
Sr 90	4.52E+3	4.18E+3
Y 90	4.52E+3	4.18E+3
Tc 99	1.66E+0	1.66E+0
Ru106	6.85E+4	7.16E+3
Ag110m	2.25E+2	8.06E+0
Cd113m	1.04E+1	8.92E+0
Sb125	2.68E+3	1.18E+3
Te125m	6.53E+2	2.87E+2
I 129	5.52E-3	5.52E-3
Cs134	4.60E+3	1.52E+3
Cs137	1.24E+4	1.15E+4
Ce144	5.12E+4	2.74E+3
Pr144m	6.14E+2	3.29E+1
Pr144	5.12E+4	2.74E+3
Pm147	2.41E+4	1.01E+4
Sm151	4.81E+2	4.69E+2
Eu154	3.73E+2	2.86E+2
Eu155	1.74E+3	1.10E+3
Pu238	2.44E+2	2.50E+2
Pu239	5.75E+2	5.75E+2
Pu240	3.30E+2	3.30E+2
Pu241	8.04E+3	6.87E+3
Am241	2.47E+2	2.85E+2
Am242m	2.92E+1	2.87E+1
Cm242	2.41E+3	3.83E+1
Cm243	7.72E+0	7.13E+0
Cm244	1.35E+0	1.19E+0

A maximum of seven driver fuel assemblies can be placed in the Core Component Container (CCC) at one time. (Part of a nozzle must be cut off one of the assemblies in order to fit it into the center position of the CCC.)

2.1.2 Tritium Targets

The detailed performance data for the tritium targets as related to tritium retention are classified. However, for purposes of this analysis, an unclassified maximum target assembly tritium inventory at discharge was specified to be 55 grams. With no credit taken for decay after discharge, the maximum tritium activity per target assembly is then $(55 \text{ g})(9.64\text{E}+3 \text{ Ci/g}) = 5.30\text{E}+5 \text{ Ci}$. Target assemblies will not be cut in order to fit into the center position of the CCC. A maximum of six target assemblies can therefore be placed in the CCC at one time.

The maximum number of tritium target pins, not in intact assemblies, in a transportation cask is 361. This is the number that could be loaded in a container comparable to the CCC assuming a hypothetical close-packed pin arrangement.

2.1.3 Medical Isotope Targets

Maximum inventories per target assembly of the isotopes to be produced in Long Irradiation Vehicles (LIV) (i.e., in-core assemblies), the Rapid Retrieval (R3) System, or in a gas system were determined in order to rank the various targets with regard to radiological hazard and to determine the worst-case target for purposes of this analysis. These inventories are maximums for either moderated or unmoderated assemblies and are conservatively based on filling the available volume with each target material at maximum density. Self-shielding effects during the irradiation have been accounted for. Gas system inventories are based on a design target system size based on one liter (at STP) of compressed Xenon. The target inventories used in this analysis are intended to reflect bounding cases based on physical capacity, cost or other factors and are not likely to be exceeded. Target characteristics along with maximum inventories of the primary product isotopes are shown in Table 2.1-2 based on preliminary design information supplied by the FFTF project. No credit was taken for decay after end of irradiation.

Table 2.1-2. Maximum product inventories in the candidate isotope production systems

Target Isotope	Target System	Target form	Product Isotope	Max. Product Activity (Ci)
S 32	R3	Unmoderated S	P 32	3.98E+2
S 32	LIV	Unmoderated S	P 32	1.85E+5
S 33	LIV	Unmoderated S	P 33	5.40E+3
Ti 47	R3	Unmoderated Ti	Sc 47	2.30E+2
Zn 64	R3	Unmoderated Zn	Cu 64	3.69E+2
Zn 67	R3	Unmoderated ZnO	Cu 67	1.40E+1
Se 74	LIV	Moderated SeO ₂	Se 75	1.28E+6
Sr 84	LIV	Moderated SrO	Sr 85	1.40E+3
Sr 88	LIV	Unmoderated SrO	Sr 89	2.00E+4
Zr 91	LIV	Unmoderated Zr	Y 91	9.89E+1
Mo 98	R3	Unmoderated Mo	Mo 99	1.40E+4
Pd102	R3	Moderated Pd	Pd103	6.80E+4
Pd102	LIV	Unmoderated Pd	Pd103	7.54E+5
Cd108	LIV	Unmoderated CdO	Cd109	4.00E+5
Sn116	R3	Moderated Sn	Sn117m	3.70E+4
Xe124	Gas Line	Compressed Xe	I 125	2.73E+3
Xe126	Gas Line	Compressed Xe	Xe127	1.02E+3
Te130	R3	Unmoderated Te	I 131	6.02E+2
Sm144	LIV	Moderated Sm	Sm145	6.30E+2
Sm152	R3	Moderated Sm ₂ O ₃	Sm153	1.03E+5
Natural Eu	LIV	Moderated Eu	Gd153	9.02E+3
Ho165	R3	Moderated Ho	Ho166	7.00E+3
Lu176	R3	Moderated Lu ₂ O ₃	Lu177	2.24E+5
Re185	R3	Moderated Re	Re186	1.26E+5
W 186	LIV	Moderated W	W 188	3.28E+4
Ir191	LIV	Unmoderated Ir	Ir192	2.00E+6
Os192	LIV	Unmoderated Os	Os194	2.64E+1
Pt195	R3	Unmoderated Pt	Pt195m	5.27E+3
Au197	R3	Moderated Au	Au198	5.90E+3
Ra226	LIV	Moderated RaCl ₂	Ac227	2.00E+2
			Th228	2.10E+3
			Th229	1.57E-1

The target for ¹⁵³Gd production is natural Europium (47.77% ¹⁵¹Eu, 52.23% ¹⁵³Eu), and so several byproduct isotopes will be produced along with ¹⁵³Gd. In addition, ²²⁶Ra, the target material for production of ²²⁷Ac, ²²⁸Th, and ²²⁹Th, is radioactive and must be accounted for as part of the release if the target assembly is breached. The target isotope ¹⁷⁶Lu in the ¹⁷⁷Lu production target is slightly radioactive with a half-life of 2.2E+10 y, but has such a

low activity (9.25E-8 Ci/s) that it can be considered stable for purposes of this analysis. It should be noted also that another option for ^{177}Lu production is the use of natural Lutetium (97.40% ^{175}Lu , 2.60% ^{176}Lu). The maximum yield of ^{177}Lu for this option would, however, be about a factor of 86 less than the yield using 100% enriched ^{176}Lu as shown in Table 2.1-2. The latter option (shown in Table 2.1-2) is therefore used as the bounding case in this safety analysis. Radioactive isotopes in addition to the primary production isotopes will therefore be present in the irradiated assemblies containing Europium and radium as target material. The complete radioactive inventories for these targets for purposes of calculating release consequences are shown in Table 2.1-3. Self-shielding effects during the irradiation have been accounted for. All the remaining targets shown in Table 2.1-2 will contain only the product isotope.

Table 2.1-3. Post-irradiation inventories in the europium and radium targets

Target Isotope	Final Target Inventory	
	Isotope	Activity (Ci)
Natural Eu	Gd153	9.02E+3
	Eu152	9.55E+2
	Eu152m	8.17E+4
	Eu154	1.31E+4
Ra226	Ra226	2.63E+1
	Ac227	2.00E+2
	Th228	2.10E+3
	Th229	1.57E-1

2.1.4 Primary Sodium Concentrations

Primary sodium concentrations were taken from Table 15.2-10 of the FFTF FSAR, which list concentrations for a release from a HTS pipe failure. This concentration was assumed for the sodium spill accident. A sodium spill from the primary heat transport system could also release cover gas. The cover gas activities from Table 15.2-8 of the FFTF FSAR were also assumed to be released to the containment. Tritium and Pu concentrations were not given in the FSAR Tables. Tritium concentrations in the sodium were assumed to be a factor of 100 higher than measured since the proposed new mission will result in higher tritium concentrations. Pu-239 concentrations a factor of 2 higher than the measured total alpha activity were also assumed because the enrichment of the fuel will approximately double for the new mission. Source data are given in Tables 2.1-4 and 2.1-5.

Table 2.1-4. Concentration in primary sodium

Isotope	Activity/g in Sodium (Ci/g)
Na-22	9.17E-07
Na-24	2.57E-02
I-131	2.43E-04
I-133	4.86E-04
I-135	4.86E-04
Cs-134	2.43E-06
Cs-136	1.70E-05
Cs-137	7.30E-06
Ta-182	9.73E-07
H-3	2.10E-05
Pu-239	3.00E-12

Table 2.1-5. Cover gas activity

Isotope	Activity (Ci)
Kr-83m	6.90E+02
Kr-85m	1.94E+03
Kr-85	3.30E-01
Kr-87	1.58E+03
Kr-88	3.18E+03
Xe-131m	1.30E+03
Xe-133m	3.02E+02
Xe-133	6.321+03
Xe-135	2.28E+04

2.1.5 Source Inventory For Radiation Exposure

The isotopic source term for the driver fuel assembly is the inventory calculated by the ORIGEN2 Code shown in Attachment 1. The inventory used in this case is for the 250 W decay heat assembly (aged 4.6 years), and includes the activation products, which are not generally subject to release into the air, but which will contribute to the direct and scattered radiation. As ORIGEN2 is configured, it will calculate the activation products only from the core region. However detailed calculations and experimental verification with activation foils have produced production numbers for six main activation

products (^{54}Mn , ^{182}Ta , ^{58}Co , ^{60}Co , ^{59}Fe , and ^{51}Cr). (Westinghouse Hanford Letter 8552975, 1 October 1985, W.L.Bunch to H.J.Goldberg) These isotopes were scaled up according to these data. The other activation product isotopes were conservatively scaled in proportion to the largest known scaling factor, that of ^{60}Co . This was the source term used to calculate doses from direct and scattered radiation for the drop of the core component container from the solid waste cask accident.

The driver fuel assembly was judged to be the bounding case for the case of direct radiation exposure. Any decrease in the fuel will decrease the gamma-ray exposure to a degree that is not compensated for by the addition of a tritium or medical isotope target.

2.2 RECEPTOR DESCRIPTIONS AND X/Q's

The ex-reactor accidents involving toxic or radiological releases are to be evaluated for four receptors as follows.

Onsite worker at 100 m in the worst direction

Receptor at 1.5 miles (2400 m) in the worst direction (control distance)

Receptor at 4.5 miles (7200 m) east (site boundary - near river bank)

Receptor at the Hanford site boundary in the worst direction

In addition, offsite population doses out to a radius of 50 miles are to be calculated for the worst sector for radiological releases.

Atmospheric dispersion coefficients (X/Q') were calculated using the GXQ Code (Hey 1994) using 400 Area meteorology data accumulated over the period from 1983 to 1991 along with population data based on the 1990 census. Code versions and data files used are documented in Attachment 2. For accidents occurring inside the FFTF, credit was taken for the effects of building wake using the MACCS virtual source building wake correction (Hey 1994) based on an estimated effective minimum width and height of 60 m and 20 m, respectively, for the FFTF containment and attached buildings (excluding heat exchangers). These effective dimensions are consistent with previous FFTF accident analyses which assumed a minimum cross-section of 1200 m² coupled with a less sophisticated building wake correction. The ISC drop and the hypothetical ISC disruption accidents are assumed to take place in the open on the storage pad so no credit was taken for building wake. The hypothetical ISC disruption is a nonmechanistic beyond design basis accident so 50 percentile meteorology was used to determine expected consequences for this accident only. All the other ex-reactor accidents were analyzed using 99.5 percentile per sector or 95 percentile all-sector (whichever is worse) meteorology to determine worst-case consequences. Population weighted X/Q' s are calculated for each sector by

evaluating the sector average X/Q' at 5 mile radial intervals from the release point out to a maximum radius of 50 miles (total of 10 intervals). Radial intervals inside the Hanford site boundary are not included. The X/Q' for each such sector interval is then multiplied by the population contained therein. All ten population weighted X/Q' 's in each sector are then summed to obtain the population weighted X/Q' for that sector. Population doses were evaluated for both 99.5 and 50 percentile meteorological conditions. All releases were assumed to occur at ground level. The resulting values for X/Q' are shown in Tables 2.2-1 through 2.2-4. GXQ files are listed in Attachment 2.

Table 2.2-1. 99.5 percentile X/Q' 's as functions of direction for 100 m and 2400 m with and without building wake (BW)

Sector	X/Q' (s/m^3)	without BW	X/Q' (s/m^3)	with BW
	100 m	2400 m	100 m	2400 m
S	*3.17E-2*	*1.65E-4*	1.77E-3	*1.23E-4*
SSW	2.32E-2	1.21E-4	1.47E-3	9.18E-5
SW	1.46E-2	7.53E-5	1.33E-3	6.17E-5
WSW	1.05E-2	5.22E-5	1.12E-3	4.27E-5
W	1.43E-2	7.38E-5	1.49E-3	6.23E-5
WNW	1.25E-2	6.46E-5	1.38E-3	5.25E-5
NW	1.53E-2	7.91E-5	1.38E-3	6.33E-5
NNW	2.37E-2	1.24E-4	1.43E-3	8.31E-5
N	*3.17E-2*	*1.65E-4*	*1.78E-3*	*1.23E-4*
NNE	2.62E-2	1.37E-4	1.62E-3	9.76E-5
NE	1.68E-2	8.79E-5	1.59E-3	8.82E-5
ENE	1.50E-2	7.75E-5	1.47E-3	6.59E-5
E	1.73E-2	9.04E-5	1.70E-3	9.55E-5
ESE	1.61E-2	8.42E-5	1.53E-3	8.27E-5
SE	2.66E-2	1.39E-4	1.56E-3	9.66E-5
SSE	2.56E-2	1.34E-4	1.58E-3	9.60E-5
All	3.11E-2	1.62E-4	*1.78E-3*	1.19E-4

Table 2.2-2. 99.5 percentile X/Q's as functions of direction for the site boundary with and without building wake (BW)

Sector	Distance (m)	X/Q' (s/m^3)	
		Without BW	With BW
S	8700	*2.90E-5*	*2.68E-5*
SSW	7000	2.82E-5	2.49E-5
SW	7000	1.67E-5	1.58E-5
WSW	13100	3.92E-6	3.77E-6
W	22200	3.61E-6	3.55E-6
WNW	36400	1.83E-6	1.81E-6
NW	41900	1.65E-6	1.64E-6
NNW	41900	3.12E-6	3.06E-6
N	16200	1.32E-5	1.27E-5
NNE	13100	1.43E-5	1.34E-5
NE	9000	1.48E-5	1.34E-5
ENE	7600	1.53E-5	1.46E-5
E	7200	2.03E-5	1.80E-5
ESE	7500	1.79E-5	1.60E-5
SE	8700	2.44E-5	2.21E-5
SSE	8800	2.32E-5	2.10E-5

Table 2.2-3. 50 percentile X/Q's as functions of direction for 100 m, 2400 m, and the site boundary (no building wake)

Sector	X/Q' (s/m^3)		Site Boundary	
	100 m	2400 m	Distance (m)	X/Q' (s/m^3)
S	2.89E-3	1.46E-5	8700	2.35E-6
SSW	2.67E-3	1.26E-5	7000	2.46E-6
SW	2.83E-3	1.30E-5	7000	2.64E-6
WSW	2.84E-3	1.29E-5	13100	1.05E-6
W	2.86E-3	1.34E-5	22200	5.40E-7
WNW	2.86E-3	1.36E-5	36400	2.37E-7
NW	2.97E-3	1.47E-5	41900	2.59E-7
NNW	*4.51E-3*	*2.33E-5*	41900	4.74E-7
N	2.90E-3	1.49E-5	16200	1.06E-6
NNE	1.90E-3	9.64E-6	13100	8.90E-7
NE	1.89E-3	8.91E-6	9000	1.34E-6
ENE	2.42E-3	1.14E-5	7600	2.08E-6
E	2.87E-3	1.40E-5	7200	2.86E-6
ESE	2.86E-3	1.39E-5	7500	2.66E-6
SE	2.87E-3	1.42E-5	8700	2.23E-6
SSE	3.41E-3	1.95E-5	8800	*3.32E-6*

Table 2.2-4. Population weighted X/Q's as functions of direction for offsite population within 50 mi (80 km)

Sector	Sector Population	99.5% X/Q' (person·s/m ³)	50% X/Q' (person·s/m ³)
S	26053	1.99E-2	2.60E-3
SSW	6982	7.01E-3	1.19E-3
SW	10363	4.79E-3	9.15E-4
WSW	28879	5.65E-3	1.71E-3
W	26415	5.67E-3	1.23E-3
WNW	5787	1.04E-3	2.76E-4
NW	3076	7.44E-4	1.55E-4
NNW	2945	7.92E-4	2.02E-4
N	18742	6.14E-3	7.67E-4
NNE	11095	4.36E-3	5.37E-4
NE	3453	1.83E-3	2.22E-4
ENE	3649	2.10E-3	3.50E-4
E	2800	1.68E-3	3.07E-4
ESE	3038	1.58E-3	2.85E-4
SE	51194	3.46E-2	6.24E-3
SSE	78757	*6.26E-2*	*1.31E-2*

The resulting worst-case X/Q's used in this analysis are shown in Table 2.2-5.

Table 2.2-5. X/Q's used for the FFTF ex-core accident analyses

Receptor	X/Q' (s/m ³)		
	99.5% No BW	99.5% With BW	50% No BW
100 m	3.17E-2 (S,N)	1.78E-3 (N)	4.51E-3 (NNW)
2400 m (1.5 mi)	1.65E-4 (S,N)	1.23E-4 (S,N)	2.33E-5 (NNW)
7200 m E (4.5 mi)	2.03E-5 (E)	1.80E-5 (E)	2.86E-6 (E)
Site Boundary	2.90E-5 (8.7 km S)	2.68E-5 (8.7 km S)	3.32E-6 (8.8 km SSE)
Population within 50 mi (person·s/m ³)	6.26E-2 (SSE)		1.31E-2 (SSE)

Ingestion doses were calculated for information only since (a) any measurable contamination of agricultural land due to a radiological accident at Hanford would cause immediate evacuation of people and interdiction of crops, meat, milk, etc. so that the ingestion dose does not represent a realistic exposure pathway; and (b) any actual doses to the public from such a pathway would be largely determined not by the severity of the accident itself, but by the effectiveness of recovery actions taken after the accident.

Ingestion doses are reported here for two scenarios: a winter scenario in which it is assumed that the passing contamination falls on bare soil and the potential doses represent the result of crop uptake from the soil over the next 50 years; and an autumn (worst case) scenario where, in addition to producing soil contamination, the airborne contamination is assumed to fall on crops which are about to be harvested for human and animal consumption. In both cases the effects of meat, milk, and egg consumption are included, as well as direct shine radiation to a resident from soil contamination and internal exposure due to inadvertent soil ingestion. The ingestion pathway receptor (IPR) for this case is at the same location as the worst-case site boundary receptor. The IPR is assumed to grow his own food, including a variety of crops, meat and dairy products, reside at his location continuously, and to be exposed to direct radiation due to ground contamination while working in his fields for a period of 50 years following the accident. No credit is taken for uncontaminated foodstuffs brought in from outside the area. Details of the modeling are described by Napier, et al. (1988).

For the accident consisting of a drop of the CCC from a SWC into the CLS elevator, the radiation exposure receptor is specified to be at the edge of the CLS elevator at the level of the floor. After the drop, the top of the assembly is eighteen feet below the feet of the receptor. The receptor is specified to remain at the edge of the elevator hole for a period of five seconds after which the receptor retreats from the edge at a speed of four miles per hour (a fast walk).

3.0 ACCIDENT ANALYSES

The following accidents were analyzed in the FFTF FSAR (HEDL-TI-75001, *Fast Flux Test Facility Final Safety Analysis Report*), and are to be re-evaluated (as appropriate) for the new source terms for driver fuel, tritium targets and medical isotope targets as part of the overall evaluation of the proposed tritium and medical isotope production missions.

3.1 SEISMIC EVENT (DBE) DURING FUEL OR TARGET ASSEMBLY TRANSFER

The maximum decay heat permitted for a fuel assembly to be inserted into the Bottom Loading Transfer Cask (BLTC) is 1.4 kW because the thermal characteristics of a 1.4 kW assembly in the BLTC have been shown to protect the assembly from temperatures that are expected to lead to cladding failure regardless of configuration. In addition, the BLTC is qualified to protect an assembly from breach of cladding during a DBE as long as the assembly is fully contained within the BLTC. If, however, a fuel or target assembly is being transferred into or out of another vessel when a DBE occurs, a potential for damage to the assembly exists. This event is much less likely than the DBE due to the small fraction of time spent in transfer from one vessel to another. The frequency of this event is specified to be in the range $1.0E-4$ to $1.0E-6/y$ (extremely unlikely category).

3.1.1 Scenario

The BLTC is designed to remain upright during a DBE at all transfer locations. It is possible, however, that the BLTC could move along the supporting rails during such an event and produce a shearing/crushing impact on an assembly being transferred through the interface between the BLTC and the top of the other vessel or a floor valve. Such an impact could deform a fuel or target assembly and possibly cause breaches in some of the fuel or target pins. Failure of fuel pin cladding is not predicted by analysis; however the following assumptions were made in the FSAR and are specified for this re-evaluation of a fuel assembly.

- The decay heat of the assembly is the maximum of 1.4 kW.
- The fuel region of the assembly is in the transfer interface such that the fuel could be damaged.
- 5% of the fuel pins are assumed to lose cladding integrity.
- Release fractions are 1.0 for noble gases, 0.5 for halogens, and 0.05 for volatile solids.
- The release fraction for transuranics and nonvolatile solids is determined as follows: 5% of the fuel in the column is crushed and 5% of the crushed fuel is of respirable size ($\leq 10 \mu m$). A suspension and release fraction of 1% is assumed for the respirable particles, i.e., 1% is released from the BLTC and from containment or the reactor service building (RSB).
- A 50% plateout fraction is assumed for halogens.
- No containment isolation is assumed and the release is assumed to occur at ground level.

Since the tritium and medical isotope target assemblies have not been structurally analyzed for this type of impact event, all the target assembly rods are assumed to breach. No credible scenario has been identified which could produce temperatures high enough to vaporize target material or release material from a getter. The decay heat of the tritium target is low (less than 350 W), and no credible fire scenario for handling accidents inside the facility has been identified.

3.1.2 Source Term Analysis

The releases calculated here are considered to be very conservative bounding values assuming no sustained high heat source. Since only one assembly can be accommodated by the BLTC, the maximum release for this accident is from one fuel or target assembly only.

3.1.2.1 Driver Fuel Source Term. In accordance with the specified release assumptions shown in Section 3.1.1, net release fractions for the various inventory components for a driver fuel assembly were developed as follows. Tritium is conservatively assumed to be in the form of tritiated water vapor and is treated as a gas in this analysis.

Gases (G)

Fraction of pins breached	0.05
Release from breached pins	<u>1.00</u>
Net release	5.00E-2

Halogens (H)

Fraction of pins breached	0.05
Release from breached pins	0.5
Plateout	<u>0.5</u>
Net release	1.25E-2

Volatile Solids (VS)

Fraction of pins breached	0.05
Release from breached pins	<u>0.05</u>
Net release	2.50E-3

Non-volatile Solids (NVS)

Fraction of pins breached	0.05
Fraction of fuel column crushed	0.05
Respirable fraction	0.05
Release from containment	<u>0.01</u>
Net release	1.25E-6

These net release fractions were applied to the driver fuel assembly inventory for 1.4 kW decay heat shown in Table 2.1-1. The resulting releases are shown in Table 3.1-1.

Table 3.1-1. Net releases for seismic event (DBE) during fuel assembly transfer

Isotope	Class	Inventory per Assembly (Ci)	Release Fraction	Release (Ci)
H 3	G	8.02E+1	5.00E-2	4.01E+0
Kr 85	G	7.12E+2	5.00E-2	3.56E+1
Sr 90	NVS	4.52E+3	1.25E-6	5.65E-3
Y 90	NVS	4.52E+3	1.25E-6	5.65E-3
Tc 99	NVS	1.66E+0	1.25E-6	2.08E-6
Ru106	NVS	6.85E+4	1.25E-6	8.56E-2
Ag110m	NVS	2.25E+2	1.25E-6	2.81E-4
Cd113m	VS	1.04E+1	2.50E-3	2.60E-2
Sb125	NVS	2.68E+3	1.25E-6	3.35E-3
Tel25m	NVS	6.53E+2	1.25E-6	8.16E-4
I 129	H	5.52E-3	1.25E-2	6.90E-5
Cs134	VS	4.60E+3	2.50E-3	1.15E+1
Cs137	VS	1.24E+4	2.50E-3	3.10E+1
Ce144	NVS	5.12E+4	1.25E-6	6.40E-2
Pr144m	NVS	6.14E+2	1.25E-6	7.68E-4
Pr144	NVS	5.12E+4	1.25E-6	6.40E-2
Pm147	NVS	2.41E+4	1.25E-6	3.01E-2
Sm151	NVS	4.81E+2	1.25E-6	6.01E-4
Eu154	NVS	3.73E+2	1.25E-6	4.66E-4
Eu155	NVS	1.74E+3	1.25E-6	2.18E-3
Pu238	NVS	2.44E+2	1.25E-6	3.05E-4
Pu239	NVS	5.75E+2	1.25E-6	7.19E-4
Pu240	NVS	3.30E+2	1.25E-6	4.13E-4
Pu241	NVS	8.04E+3	1.25E-6	1.01E-2
Am241	NVS	2.47E+2	1.25E-6	3.09E-4
Am242m	NVS	2.92E+1	1.25E-6	3.65E-5
Cm242	NVS	2.41E+3	1.25E-6	3.01E-3
Cm243	NVS	7.72E+0	1.25E-6	9.65E-6
Cm244	NVS	1.35E+0	1.25E-6	1.69E-6

Since a range of chemical forms exist in irradiated fuel, worst-case solubilities (lung clearance classes) were assumed for all the releases shown above. This is considered to be a short duration release (i.e., less than 1 hour).

3.1.2.2 Tritium Target Source Term. The specified maximum tritium inventory per target assembly is 55 g based on 3 cycles of operation per assembly before discharge. This is conservative since the target design can only support two cycles of operation in the inner row core locations. Tritium has a 12.3 year half-life so 55 g corresponds to an activity of $(55 \text{ g})(9.64\text{E}+3 \text{ Ci/g}) = 5.30\text{E}+5 \text{ Ci}$. All the target rods in the assembly are assumed to breach due to the bending/shearing impact in this scenario. A cladding breach could release the gaseous (i.e., unbound) tritium content of a tritium target rod. Following irradiation, most of the tritium in the target rods is expected to be bound to the getter and other internal components. In addition, elemental tritium has much lower dose consequences than tritiated water vapor (HTO) and oxidizes slowly in the environment. Based on sensitive information documented elsewhere, the total equivalent release as tritium oxide from a damaged tritium target assembly is specified for purposes of this analysis to be 0.8% of the total inventory or $(5.30\text{E}+5 \text{ Ci})(0.008) = 4.24\text{E}+3 \text{ Ci}$. This is considered to be a short duration release (i.e., less than 1 hour).

3.1.2.3 Medical Isotope Target Source Term. Except for the ^{125}I target which has a gaseous target material (^{129}Xe), the chemical and physical forms of the target material have not been decided upon. The maximum product inventories listed in Section 2.1.3 assume the target cladding tubes to be filled with target material at the highest density allowed for any of the chemical forms being considered in the design. These are therefore considered bounding inventories for safety analysis purposes. Target design loads are still evolving and the actual targets could contain less material than assumed here. For purposes of estimating a maximum release, the material in these targets is assumed to be in the form of powder packed into the cladding tubes. The release mechanism is assumed to be breaking or tearing of the cladding tube due to impact by a heavy object. The recommended bounding airborne release fraction for powder in a can which is broken or torn open due to impact by a heavy object is $1.0\text{E}-3$ with a respirable fraction of 0.1 (DOE 1994) for a net respirable release fraction of $1.0\text{E}-4$. The release fraction for the ^{125}I gas target was assumed to be 1.0. Although the ^{226}Ra target could contain as much as 200 Ci of ^{227}Ac , this target will be transferred to the IEM cell inside containment where it will be disassembled into single capsules containing no more than 100 Ci of ^{227}Ac . Only one capsule at a time will be handled outside containment. The resulting inventories at risk and corresponding releases are shown in Table 3.1-2.

Table 3.1-2. Maximum target inventory releases from the candidate isotope production systems

Target Isotope	Target System	Product Isotope	Maximum Activity (Ci)	Maximum Release (Ci)
S 32	R3	P 32	3.98E+2	3.98E-2
S 32	LIV	P 32	1.85E+5	1.85E+1
S 33	LIV	P 33	5.40E+3	5.40E-1
Ti 47	R3	Sc 47	2.30E+2	2.30E-2
Zn 64	R3	Cu 64	3.69E+2	3.69E-2
Zn 67	R3	Cu 67	1.40E+1	1.40E-3
Se 74	LIV	Se 75	1.28E+6	1.28E+2
Sr 84	LIV	Sr 85	1.40E+3	1.40E-1
Sr 88	LIV	Sr 89	2.00E+4	2.00E+0
Zr 91	LIV	Y 91	9.89E+1	9.89E-3
Mo 98	R3	Mo 99	1.40E+4	1.40E+0
Pd102	R3	Pd103	6.80E+4	6.80E+0
Pd102	LIV	Pd103	7.54E+5	7.54E+1
Cd108	LIV	Cd109	4.00E+5	4.00E+1
Sn116	R3	Sn117m	3.70E+4	3.70E+0
Xe124	Gas Line	I 125	2.73E+3	2.73E+3
Xe126	Gas Line	Xe127	1.02E+3	1.02E+3
Te130	R3	I 131	6.02E+2	6.02E-2
Sm144	LIV	Sm145	6.30E+2	6.30E-2
Sm152	R3	Sm153	1.03E+5	1.03E+1
Natural Eu	LIV	Gd153	9.02E+3	9.02E-1
		Eu152	9.55E+2	9.55E-2
		Eu152m	8.17E+4	8.17E+0
		Eu154	1.31E+4	1.31E+0
Ho165	R3	Ho166	7.00E+3	7.00E-1
Lu176	R3	Lu177	2.24E+5	2.24E+1
Re185	R3	Re186	1.26E+5	1.26E+1
W 186	LIV	W 188	3.28E+4	3.28E+0
Ir191	LIV	Ir192	2.00E+6	2.00E+2
Os192	LIV	Os194	2.64E+1	2.64E-3
Pt195	R3	Pt195m	5.27E+3	5.27E-1
Au197	R3	Au198	5.90E+3	5.90E-1
Ra226	LIV	Ra226	1.32E+1	1.32E-3
		Ac227	1.00E+2	1.00E-2
		Th228	1.05E+3	1.05E-1
		Th229	7.85E-2	7.85E-6

These are considered to be short duration releases (i.e., less than 1 hour).

3.1.3 Consequence Analysis

Effective Dose Equivalents (EDE) for the source terms developed in Section 3.1.2 were calculated using the GENII Hanford Environmental Radiation Dosimetry Software System (Napier et al 1988). These 50-year committed doses included the effects of external exposure to the passing plume as well as inhalation doses, and were calculated for unit atmospheric dispersion (i.e., $X/Q' = 1$). Tritium is assumed to be in oxide form (i.e., as tritiated water vapor) and direct absorption through the skin is accounted for in addition to inhalation for purposes of calculating internal dose. In addition, ingestion doses (including ground shine) are shown for the worst-case site boundary receptor for winter (soil only) and autumn (soil + crops) scenarios. As discussed in Section 2.2, ingestion and ground shine doses do not reflect realistic pathways in an accident situation and are given for information only. The accident doses for the various receptors (including the worst sector population) were then obtained by multiplying the applicable unit dispersion dose (i.e., dose per unit X/Q') by the appropriate X/Q' . GENII output files for these accidents are shown in Attachment 3.

3.1.3.1 Consequences Of Fuel Assembly Damage. The doses per unit X/Q' for the releases shown in Table 3.1-1 are $790 \text{ rem}\cdot\text{m}^3/\text{s}$ for inhalation and $7.7 \text{ rem}\cdot\text{m}^3/\text{s}$ for plume submersion for a total dose of $800 \text{ rem}\cdot\text{m}^3/\text{s}$. The corresponding winter and autumn ingestion pathway receptor (IPR) doses are $7.8\text{E}+3 \text{ rem}$ and $2.7\text{E}+5 \text{ rem}$, respectively. Using the appropriate 99.5 percentile X/Q' s with building wake correction from Table 2.2-5, the receptor doses were developed as shown.

100 m	N ==>	Dose = $(800 \text{ rem}\cdot\text{m}^3/\text{s})(1.78\text{E}-3 \text{ s}/\text{m}^3)$	= $1.42\text{E}+0 \text{ rem}$
2.4 km S,N	==>	Dose = $(800 \text{ rem}\cdot\text{m}^3/\text{s})(1.23\text{E}-4 \text{ s}/\text{m}^3)$	= $9.84\text{E}-2 \text{ rem}$
7.2 km	E ==>	Dose = $(800 \text{ rem}\cdot\text{m}^3/\text{s})(1.80\text{E}-5 \text{ s}/\text{m}^3)$	= $1.44\text{E}-2 \text{ rem}$
8.7 km	S ==>	Dose = $(800 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)$	= $2.14\text{E}-2 \text{ rem}$
Pop.	SSE ==>	Dose = $(800 \text{ rem}\cdot\text{m}^3/\text{s})(6.26\text{E}-2 \text{ per}\cdot\text{s}/\text{m}^3)$	= $5.01\text{E}+1 \text{ per}\cdot\text{rem}$
IPR 8.7 km S			
	Winter ==>	Dose = $(7.8\text{E}+3 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)$	= $2.09\text{E}-1 \text{ rem}$
	Autumn ==>	Dose = $(2.7\text{E}+5 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)$	= $7.24\text{E}+0 \text{ rem}$

3.1.3.2 Consequences Of Tritium Target Damage. The doses per unit X/Q' for the release of $4.24\text{E}+3 \text{ Ci}$ of tritium oxide equivalent developed in Section 3.1.2.2 are $130 \text{ rem}\cdot\text{m}^3/\text{s}$ for inhalation (including direct skin absorption) and $9.4\text{E}-8 \text{ rem}\cdot\text{m}^3/\text{s}$ for plume submersion for a total dose of $130 \text{ rem}\cdot\text{m}^3/\text{s}$. The corresponding winter and autumn ingestion pathway receptor (IPR) doses are $0.0\text{E}+0 \text{ rem}$ and $1.1\text{E}+4 \text{ rem}$, respectively. Using the appropriate 99.5

percentile X/Q's with building wake correction from Table 2.2-5, the receptor doses were developed as shown.

100 m N ==> Dose = $(130 \text{ rem}\cdot\text{m}^3/\text{s})(1.78\text{E-}3 \text{ s}/\text{m}^3) = 2.31\text{E-}1 \text{ rem}$
 2.4 km S,N ==> Dose = $(130 \text{ rem}\cdot\text{m}^3/\text{s})(1.23\text{E-}4 \text{ s}/\text{m}^3) = 1.60\text{E-}2 \text{ rem}$
 7.2 km E ==> Dose = $(130 \text{ rem}\cdot\text{m}^3/\text{s})(1.80\text{E-}5 \text{ s}/\text{m}^3) = 2.34\text{E-}3 \text{ rem}$
 8.7 km S ==> Dose = $(130 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E-}5 \text{ s}/\text{m}^3) = 3.48\text{E-}3 \text{ rem}$
 Pop. SSE ==> Dose = $(130 \text{ rem}\cdot\text{m}^3/\text{s})(6.26\text{E-}2 \text{ per}\cdot\text{s}/\text{m}^3) = 8.14\text{E+}0 \text{ per}\cdot\text{rem}$
 IPR 8.7 km S
 Winter ==> Dose = $(0.0\text{E+}0 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E-}5 \text{ s}/\text{m}^3) = 0.00\text{E+}0 \text{ rem}$
 Autumn ==> Dose = $(1.1\text{E+}4 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E-}5 \text{ s}/\text{m}^3) = 2.95\text{E-}1 \text{ rem}$

3.1.3.3 Consequences Of Medical Isotope Target Damage. Inhalation + submersion doses per unit X/Q' were calculated for each of the product isotope releases in order to determine the worst-case target. Note that ^{32}P and ^{103}Pd are proposed for production in either the LIV or the R3 System. The higher yield LIV cases were calculated using the GENII code and the results ratioed by the respective releases to obtain doses for the R3 cases. In addition, ^{127}Xe was conservatively modelled as ^{135}Xe for purposes of dose calculations since ^{127}Xe is not in the GENII isotope data files. The resulting doses calculated using the GENII code are shown in Table 3.1-3. The corresponding GENII files are listed in Attachment 3.

Table 3.1-3. Doses per unit X/Q' calculated by GENII for medical isotope target releases

Isotope	Inhalation (rem·m ³ /s)	Submersion (rem·m ³ /s)	Dose (rem·m ³ /s)
P 32 (R3)	2.1E-1	3.0E-5	2.1E-1
P 32 (LIV)	9.9E+1	1.4E-2	9.9E+1
P 33	4.2E-1	3.1E-6	4.2E-1
Cu 64	3.4E-3	1.6E-3	5.0E-3
Se 75	3.5E+2	9.2E+0	3.6E+2
Sr 85	6.9E-2	1.6E-2	8.4E-2
Sr 89	3.7E+0	1.1E-3	3.7E+0
Y 91	1.6E-1	1.3E-5	1.6E-1
Mo 99	1.8E+0	4.0E-2	1.9E+0
Pd103 (R3)	3.6E+0	8.9E-3	3.6E+0
Pd103 (LIV)	4.0E+1	9.9E-2	4.0E+1
Cd109	1.5E+3	5.0E-2	1.5E+3
Sn117m	5.2E+0	7.6E-2	5.2E+0

Isotope	Inhalation (rem·m ³ /s)	Submersion (rem·m ³ /s)	Dose (rem·m ³ /s)
I 125	2.0E+4	8.8E+0	2.0E+4
I 131	6.1E-1	4.7E-3	6.1E-1
Xe127	0.0E+0	4.8E+1	4.8E+1
Sm153	6.5E+0	9.9E-2	6.6E+0
Hol66	7.6E-1	4.1E-3	7.6E-1
Ir192	1.9E+3	3.7E+1	1.9E+3
Gd153			
Eu152			
Eu152m			
Eu154	1.3E+2	8.9E-1	1.4E+2
Ra226			
Ac227			
Th228			
Th229	3.4E+4	3.1E-5	3.4E+4

The isotopes shown in Table 3.1-4 are not in the GENII data files so inhalation dose conversion factors (EPA 1988) were used to evaluate these isotopes by multiplying the releases (Ci) by the dose conversion factors (rem/Ci) and the standard light activity breathing rate of 3.3E-4 m³/s. The resulting doses are shown in Table 3.1-4.

Table 3.1-4. Doses per unit X/Q' calculated by using dose conversion factors (EPA 1988)

Isotope	DCF (rem/Ci)	Release (Ci)	Dose (rem·m ³ /s)
Sc 47	1.84E+3	2.30E-2	1.40E-2
Cu 67	2.77E+2	1.40E-3	1.28E-4
Sm145	1.10E+4	6.30E-2	2.29E-1
Lu177	2.45E+3	2.24E+1	1.81E+1
Re186	3.20E+3	1.26E+1	1.33E+1
W 188	4.11E+3	3.28E+0	4.45E+0
Os194	6.70E+5	2.64E-3	5.84E-1
Pt195m	1.22E+3	5.27E-1	2.12E-1
Au198	3.28E+3	5.90E-1	6.39E-1

The highest dose is from the ^{227}Ac (plus ^{228}Th and ^{229}Th) LIV production target. The highest dose from the R3 system occurs with the ^{125}I production target due to the higher release fraction for the gas target material. Note that, except for the natural Eu target material, the target elements shown in Table 3.1-2 are planned to be enriched in the isotope shown. There will, however, be residual amounts of other isotopes of that element which will produce "impurity" isotopes in the irradiated target such as the ones shown for natural Eu. Nearly all of the targets shown in Tables 3.1-3 and 3.1-4 would have accident consequences hundreds of times less than those for the ^{227}Ac or ^{125}I targets. It is highly doubtful, therefore, that an impurity isotope could be produced with sufficient hazard and in sufficient quantity in any of these targets to displace the ^{227}Ac target from its position as worst-case in terms of accident consequence.

The corresponding winter and autumn ingestion pathway receptor (IPR) doses are $1.7\text{E}+4$ rem and $1.9\text{E}+7$ rem, respectively for the release of $2.73\text{E}+3$ Ci of ^{125}I . The IPR doses for the ^{227}Ac production target are roughly three orders of magnitude less. The ^{125}I production target is therefore shown as the worst case with respect to ingestion doses. Using the appropriate 99.5 percentile X/Q's with building wake correction from Table 2.2-5 the receptor doses for the ^{125}I target were developed as shown.

$$100 \text{ m} \quad \text{N} \Rightarrow \text{Dose} = (3.4\text{E}+4 \text{ rem}\cdot\text{m}^3/\text{s})(1.78\text{E}-3 \text{ s}/\text{m}^3) = 6.05\text{E}+1 \text{ rem}$$

$$2.4 \text{ km S,N} \Rightarrow \text{Dose} = (3.4\text{E}+4 \text{ rem}\cdot\text{m}^3/\text{s})(1.23\text{E}-4 \text{ s}/\text{m}^3) = 4.18\text{E}+0 \text{ rem}$$

$$7.2 \text{ km} \quad \text{E} \Rightarrow \text{Dose} = (3.4\text{E}+4 \text{ rem}\cdot\text{m}^3/\text{s})(1.80\text{E}-5 \text{ s}/\text{m}^3) = 6.12\text{E}-1 \text{ rem}$$

$$8.7 \text{ km} \quad \text{S} \Rightarrow \text{Dose} = (3.4\text{E}+4 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3) = 9.11\text{E}-1 \text{ rem}$$

$$\text{Pop.} \quad \text{SSE} \Rightarrow \text{Dose} = (3.4\text{E}+4 \text{ rem}\cdot\text{m}^3/\text{s})(6.26\text{E}-2 \text{ per}\cdot\text{s}/\text{m}^3) \\ = 2.13\text{E}+3 \text{ per}\cdot\text{rem}$$

IPR 8.7 km S

$$\text{Winter} \Rightarrow \text{Dose} = (1.7\text{E}+4 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3) = 4.56\text{E}-1 \text{ rem}$$

$$\text{Autumn} \Rightarrow \text{Dose} = (1.9\text{E}+7 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3) = 5.09\text{E}+2 \text{ rem}$$

It is very doubtful that the drop of a target assembly from the BLTC (for example, into the T-3 cask) could produce as much damage as is assumed here for the seismic accident. It is considered, therefore, that consequences of the seismic event would bound consequences for a loading accident, such as a drop of the target from the BLTC into the T-3 cask.

3.1.4 Comparison To Guidelines

Consequence analysis results for the Seismic Event (DBE) During Fuel or Target Assembly Transfer were compared to risk guidelines given in HNF-PRO-514, Rev 0 (HNF 1997) for accidents in the extremely unlikely frequency category with the results shown in Table 3.1-5. Note that no risk guidelines are given for the 2.4 km receptor, population doses, or ingestion doses. IPR doses do not represent a realistic pathway and so are not included in Table 3.1-5.

Table 3.1-5. Comparison of doses to risk guidelines for seismic event during fuel or target assembly transfer

Receptor	Doses, mSv (rem)			Risk Guideline mSv (rem)
	Fuel Assembly	Tritium Target	Med. Isotope Target	
100 m (N)	1.4E+1 (1.4E+0)	2.3E+0 (2.3E-1)	6.1E+2 (6.1E+1)	1000 (100)
2.4 km (S,N)	9.8E-1 (9.8E-2)	1.6E-1 (1.6E-2)	4.2E+1 (4.2E+0)	-- (--)
7.2 km (E)	1.4E-1 (1.4E-2)	2.3E-2 (2.3E-3)	6.1E+0 (6.1E-1)	250 (25)
8.7 km (S)	2.1E-1 (2.1E-2)	3.5E-2 (3.5E-3)	9.1E+0 (9.1E-1)	250 (25)
Population (SSE)	0.50 per·Sv (50 per·rem)	0.081 per·Sv (8.1 per·rem)	21 per·Sv (2100 per·rem)	-- (--)

Both onsite and offsite individual receptor doses are well within risk guidelines.

3.2 DROP OF THE SOLID WASTE CASK (SWC)

The Solid Waste Cask (SWC) is used to transfer a maximum of seven irradiated fuel assemblies in a Core Component Container (CCC). Administrative controls limit each fuel assembly in the CCC to a maximum decay heat of 250 W, and limit the total decay heat load in the CCC to 1500 W. Anytime the SWC contains fuel, it is administratively controlled to a maximum lift height of 5 feet. For this analysis it is specified that the CCC can also be loaded with a maximum of six irradiated tritium target assemblies. The frequency of this event is specified to be in the range 1.0E-2 to 1.0E-4/y (unlikely category).

3.2.1 Scenario

The SWC is assumed to be dropped from the maximum permitted height with a full load of either seven irradiated fuel assemblies or six irradiated tritium target assemblies. As a limiting case, the impact is assumed to cause 100% of the pins in the SWC to fail so as to release any gases present. No particulates are expected to be released. Even though the CCC is not expected to leak in this accident, it is further assumed that 100% of the gas released into the interior of the CCC is released into the SWC and thence to the environment through failed seals.

Since the tritium target assemblies have not been structurally analyzed for this type of impact event, all the target assembly rods in the six tritium targets are assumed to breach for purposes of this analysis. As previously discussed in Section 3.1.1, no credible heat source has been identified that could vaporize target material or release material from a getter.

3.2.2 Source Term Analysis

3.2.2.1 Driver Fuel Source Term. For conservatism, it is assumed for this analysis that all seven of the fuel assemblies in the CCC have decay heats of 250 W, even though administrative controls limit total decay heat in CCC to 1500 W. Tritium is conservatively assumed to be in the form of tritiated water vapor and is treated as a gas in this analysis. The only noble gas remaining in any significant quantity after decay to 250 W decay power is ^{85}Kr . As shown for 250 W decay heat fuel assemblies (aged 4.6 y) in Attachment 1, the ^3H and ^{85}Kr inventories per assembly are 66.7 Ci and 576 Ci, respectively. The total inventory for seven assemblies is therefore $4.67\text{E}+2$ Ci of ^3H and $4.03\text{E}+3$ Ci of ^{85}Kr . 100% of these isotopes are assumed to be released from the SWC.

3.2.2.2 Tritium Target Source Term. The specified maximum tritium inventory per target assembly is 55 g based on 3 cycles of operation per assembly before discharge. This is conservative since the target design can only support two cycles of operation in the inner row core locations. Tritium has a 12.3 year half-life so 55 g corresponds to an activity of $(55 \text{ g})(9.64\text{E}+3 \text{ Ci/g}) = 5.30\text{E}+5$ Ci. All the target rods in each of the assemblies are assumed to breach due to the impact shock. As discussed in Section 2.1.2, a maximum of six tritium target assemblies can be physically loaded into the CCC.

A cladding breach could release the gaseous (i.e., unbound) tritium content of a tritium target rod. Following irradiation, most of the tritium in the target rods is expected to be bound to the getter and other internal components. The total equivalent release as tritium oxide from a damaged tritium target assembly is specified to be 0.8% of the total inventory or $(5.30\text{E}+5 \text{ Ci})(0.008) = 4.24\text{E}+3$ Ci. For six assemblies the total release would

be $2.54\text{E}+4$ Ci. 100% of this amount of tritium is assumed to be released from the SWC in the form of tritiated water vapor. This is considered to be a short duration release (i.e., less than 1 hour).

3.2.3 Consequence Analysis

Effective Dose Equivalents (EDE) for the source terms developed in Section 3.2.2 were calculated using the GENII Hanford Environmental Radiation Dosimetry Software System (Napier et al 1988). These 50-year committed doses included the effects of external exposure to the passing plume as well as inhalation doses, and were calculated for unit atmospheric dispersion (i.e., $X/Q' = 1$). Tritium is assumed to be in oxide form (i.e., as tritiated water vapor) and direct absorption through the skin is accounted for in addition to inhalation for purposes of calculating internal dose. In addition, ingestion doses (including ground shine) are shown for the worst-case site boundary receptor for winter (soil only) and autumn (soil + crops) scenarios. As discussed in Section 2.2, ingestion and ground shine doses do not reflect realistic pathways in an accident situation and are given for information only. The accident doses for the various receptors (including the worst sector population) were then obtained by multiplying the applicable unit dispersion dose (i.e., dose per unit X/Q') by the appropriate X/Q' .

3.2.3.1 Consequences Of Drop With Fuel Assemblies. The dose per unit X/Q' for the release developed in Section 3.2.2.1 for seven fuel assemblies is $17 \text{ rem}\cdot\text{m}^3/\text{s}$ including $2.3 \text{ rem}\cdot\text{m}^3/\text{s}$ for plume submersion due to the ^{85}Kr . The inhalation dose for ^{85}Kr is negligible. The corresponding winter and autumn ingestion pathway receptor (IPR) doses are $0.0\text{E}+0 \text{ rem}$ and $1.3\text{E}+3 \text{ rem}$, respectively. The GENII output files for this case is shown in Attachment 4. Using the appropriate 99.5 percentile X/Q' s with building wake correction from Table 2.2-5, the receptor doses were developed as shown.

$$100 \text{ m} \quad \text{N} \Rightarrow \text{Dose} = (17 \text{ rem}\cdot\text{m}^3/\text{s})(1.78\text{E}-3 \text{ s}/\text{m}^3) = 3.03\text{E}-2 \text{ rem}$$

$$2.4 \text{ km} \quad \text{S,N} \Rightarrow \text{Dose} = (17 \text{ rem}\cdot\text{m}^3/\text{s})(1.23\text{E}-4 \text{ s}/\text{m}^3) = 2.09\text{E}-3 \text{ rem}$$

$$7.2 \text{ km} \quad \text{E} \Rightarrow \text{Dose} = (17 \text{ rem}\cdot\text{m}^3/\text{s})(1.80\text{E}-5 \text{ s}/\text{m}^3) = 3.06\text{E}-4 \text{ rem}$$

$$8.7 \text{ km} \quad \text{S} \Rightarrow \text{Dose} = (17 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3) = 4.56\text{E}-4 \text{ rem}$$

$$\text{Pop.} \quad \text{SSE} \Rightarrow \text{Dose} = (17 \text{ rem}\cdot\text{m}^3/\text{s})(6.26\text{E}-2 \text{ per}\cdot\text{s}/\text{m}^3) = 1.06\text{E}+0 \text{ per}\cdot\text{rem}$$

IPR 8.7 km S

$$\text{Winter} \Rightarrow \text{Dose} = (0.0\text{E}+0 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3) = 0.00\text{E}+0 \text{ rem}$$

$$\text{Autumn} \Rightarrow \text{Dose} = (1.3\text{E}+3 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3) = 3.48\text{E}-2 \text{ rem}$$

3.2.3.2 Consequences Of Drop With Tritium Targets. The doses per unit X/Q' for the release of $4.24\text{E}+3$ Ci of tritium oxide equivalent from one target assembly developed in Section 3.1.2.2 for the seismic event are $130 \text{ rem}\cdot\text{m}^3/\text{s}$ for inhalation (including direct skin absorption) and $9.4\text{E}-8 \text{ rem}\cdot\text{m}^3/\text{s}$ for plume submersion for a total dose of $130 \text{ rem}\cdot\text{m}^3/\text{s}$. The corresponding winter and autumn ingestion pathway receptor (IPR) doses are $0.0\text{E}+0 \text{ rem}$ and $1.1\text{E}+4 \text{ rem}$, respectively. Since the release per target assembly developed for the SWC drop in Section 3.2.2.2 is equal to that previously developed for the seismic release, the dose per unit X/Q' for one target assembly was multiplied by 6 to account for the six tritium target assemblies damaged during the SWC drop. Using the appropriate 99.5 percentile X/Q' 's with building wake correction from Table 2.2-5, the receptor doses were developed as shown.

$$100 \text{ m} \quad \text{N} \Rightarrow \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.78\text{E}-3 \text{ s}/\text{m}^3)(6) = 1.39\text{E}+0 \text{ rem}$$

$$2.4 \text{ km S,N} \Rightarrow \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.23\text{E}-4 \text{ s}/\text{m}^3)(6) = 9.59\text{E}-2 \text{ rem}$$

$$7.2 \text{ km} \quad \text{E} \Rightarrow \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.80\text{E}-5 \text{ s}/\text{m}^3)(6) = 1.40\text{E}-2 \text{ rem}$$

$$8.7 \text{ km} \quad \text{S} \Rightarrow \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)(6) = 2.09\text{E}-2 \text{ rem}$$

$$\text{Pop. SSE} \Rightarrow \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(6.26\text{E}-2 \text{ per}\cdot\text{s}/\text{m}^3)(6) \\ = 4.88\text{E}+1 \text{ per}\cdot\text{rem}$$

IPR 8.7 km S

$$\text{Winter} \Rightarrow \text{Dose} = (0.0\text{E}+0 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)(6) = 0.00\text{E}+0 \text{ rem}$$

$$\text{Autumn} \Rightarrow \text{Dose} = (1.1\text{E}+4 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)(6) = 1.77\text{E}+0 \text{ rem}$$

The maximum number of tritium target pins in a transportation cask is 361. This is the number that could be loaded in a container comparable to the Core Component Container (CCC) assuming a hypothetical close-packed pin arrangement. The actual number of pins would be less since a pin basket would occupy some space. The bounding transportation accident would be one in which all of the tritium pins were breached. Since 361 pins corresponds to 19 target assemblies, the consequences of the maximum transportation accident in the 400 Area would be 19 times the doses for one assembly as follows.

$$100 \text{ m} \quad \text{N} \Rightarrow \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.78\text{E}-3 \text{ s}/\text{m}^3)(19) = 4.40\text{E}+0 \text{ rem}$$

$$2.4 \text{ km S,N} \Rightarrow \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.23\text{E}-4 \text{ s}/\text{m}^3)(19) = 3.04\text{E}-1 \text{ rem}$$

$$7.2 \text{ km} \quad \text{E} \Rightarrow \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.80\text{E}-5 \text{ s}/\text{m}^3)(19) = 4.45\text{E}-2 \text{ rem}$$

$$8.7 \text{ km} \quad \text{S} \Rightarrow \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)(19) = 6.62\text{E}-2 \text{ rem}$$

$$\begin{aligned}\text{Pop. SSE} \Rightarrow \text{Dose} &= (130 \text{ rem}\cdot\text{m}^3/\text{s})(6.26\text{E-}2 \text{ per}\cdot\text{s}/\text{m}^3)(19) \\ &= 1.55\text{E+}2 \text{ per}\cdot\text{rem}\end{aligned}$$

IPR 8.7 km S

$$\text{Winter} \Rightarrow \text{Dose} = (0.0\text{E+}0 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E-}5 \text{ s}/\text{m}^3)(19) = 0.00\text{E+}0 \text{ rem}$$

$$\text{Autumn} \Rightarrow \text{Dose} = (1.1\text{E+}4 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E-}5 \text{ s}/\text{m}^3)(19) = 5.60\text{E+}0 \text{ rem}$$

3.2.4 Comparison To Guidelines

Consequence analysis results for the Drop of the Solid Waste Cask were compared to risk guidelines given in HNF-PRO-514, Rev 0 (HNF 1997) for accidents in the unlikely frequency category with the results shown in Table 3.2-1. Note that no risk guidelines are given for the 2.4 km receptor, population doses, or ingestion doses. IPR doses do not represent a realistic pathway and so are not included in Table 3.2-1.

Table 3.2-1. Comparison of doses to risk guidelines
for drop of solid waste cask or accident
involving tritium target transportation cask

Receptor	Doses, mSv (rem)			Risk Guideline mSv (rem)
	Fuel Assemblies	6 Tritium Targets	19 Tritium Targets	
100 m (N)	3.0E-1 (3.0E-2)	1.4E+1 (1.4E+0)	4.4E+1 (4.4E+0)	250 (25)
2.4 km (S,N)	2.1E-2 (2.1E-3)	9.6E-1 (9.6E-2)	3.0E+0 (3.0E-1)	-- (--)
7.2 km (E)	3.1E-3 (3.1E-4)	1.4E-1 (1.4E-2)	4.5E-1 (4.5E-2)	50 (5)
8.7 km (S)	4.6E-3 (4.6E-4)	2.1E-1 (2.1E-2)	6.6E-1 (6.6E-2)	50 (5)
Population (SSE)	0.011 per·Sv (1.1 per·rem)	0.49 per·Sv (49 per·rem)	1.6 per·Sv (160 per·rem)	-- (--)

Both onsite and offsite individual receptor doses are well within risk guidelines. The tritium target doses shown above in the fourth column, for a transportation accident inside the 400 Area, are also well within the risk guidelines for the unlikely frequency category (1.0E-2 to 1.0E-4/y).

3.3 DROP OF CORE COMPONENT CONTAINER FROM THE SOLID WASTE CASK

In this accident, an estimate of direct radiation dose to a worker at the cask loading station (CLS) very close to the exposed CCC is required in addition to the usual atmospheric plume exposures to receptors at and beyond 100 m. The fuel assemblies are specified to remain intact with no releases due to the effect of the impact limiter on the CLS elevator. Tritium target assembly releases are to be evaluated assuming a 100% failure of the target pins. The tritium releases and associated consequences are identical to those developed for six tritium target assemblies for the case of the SWC Drop in section 3.2, but will be described in this section also for completeness. The frequency of this event is specified to be in the range $1.0E-2$ to $1.0E-4/y$ (unlikely category).

3.3.1 Scenario Development

If the CCC were to be dropped from the SWC, at its maximum height, into the ISC for any reason, the CLS elevator that supports the ISC could fail. The ISC and the CCC could then fall to the CLS floor. The CLS floor would absorb the impact and the impact limiter on the CLS elevator would limit the loads such that no release of radioactive material has been calculated to occur from a driver fuel assembly. However, since the ISC closure plug would not be installed at the time of the drop, an intense radiation field would result. The radiation would, however, be restricted to a vertical beam by the bore of the ISC. The closest individual is specified to be standing at the edge of the CLS. Following a delay of five seconds, this receptor is assumed to walk away from the edge of the CLS rapidly (four miles per hour).

Since the tritium target assemblies have not been structurally analyzed for their ability to withstand the shock of being dropped in this manner, all the target pins in the tritium targets in the CCC were assumed to fail.

3.3.2 Source Term Analysis

3.3.2.1 Source For Direct Radiation Exposure. The isotopic inventories tabulated in Attachment 1 were input to the ISOSHLD Code (Engel, et. al. 1996, Simmons, et. al. 1967, Rittmann 1995) in two separate runs. The activation product spectrum was calculated using a matrix of steel while the fission products and actinides along with their progeny were in a matrix of UO_2 . Thus each of the two bremsstrahlung sources generated reflects the spectrum of the appropriate matrix. Note that the direct radiation source term includes activation products in the fuel assembly above and below the fueled region. In addition, the activation outside the fueled region included the effects of changes in the neutron spectrum outside the core (see letter, W. L. Bunch to H. J. Goldberg, "FFTF Hardware Activation," dated Oct. 1, 1985 reproduced in Attachment 5). The resulting photon spectrum from one driver fuel assembly is shown in Table 3.3-1.

Table 3.3-1. Photon spectrum from one assembly by energy group

Energy (MEV)	Photons per Second	Energy (MEV)	Photons per Second
0.015	3.93E+13	0.025	2.78E+13
0.035	2.07E+13	0.045	1.30E+13
0.055	7.18E+12	0.065	5.30E+12
0.075	4.20E+12	0.085	8.32E+12
0.095	3.28E+12	0.15	2.76E+13
0.25	7.36E+12	0.35	3.57E+12
0.475	1.85E+13	0.65	1.06E+14
0.825	1.87E+13	1	2.18E+12
1.225	1.06E+13	1.475	1.12E+12
1.7	5.94E+10	1.9	3.12E+10
2.1	1.85E+11	2.3	7.84E+09
2.5	3.52E+09	2.7	1.41E+09
3	6.02E+08	3.6	3.96E+07
5	9.85E+04	7	<u>1.12E+04</u>
11	1.28E+03	Total	3.25E+14

The last three energy groups are neither gamma-ray emissions from the isotopes nor bremsstrahlung, but are the gamma-rays emitted from spontaneous emission and were taken from the output of ORIGEN2 shown in Attachment 1. Neutron radiation was judged to be negligible and thus not included in this analysis.

The combined spectra obtained from the ISOSHLDR runs were used as a source for the computer codes Microshield and Microskyshine¹. The source was modeled as a cylinder in Microshield with the entire driver fuel assembly homogenized, i.e. all of the material in the assembly was assumed to be uniformly distributed throughout the entire volume. This is a conservative assumption in a shielding calculation with the dose point above the end of the cylinder. The code files and documentation associated with the various computer programs used in the above analysis are listed in Attachment 5.

3.3.2.2 Tritium Target Source Term. The specified maximum tritium inventory per target assembly is 55 g based on 3 cycles of operation per assembly before discharge. Tritium has a 12.3 year half-life so 55 g corresponds to an activity of (55 g)(9.64E+3 Ci/g) = 5.30E+5 Ci. All the target pins in each of the assemblies are assumed to breach due to the impact shock. As discussed in Section 2.1.2, a maximum of six tritium target assemblies can be physically loaded into the CCC.

Microshield and Microskyshine are copyrighted by Grove Engineering, Inc.

A cladding breach could release the gaseous (i.e., unbound) tritium content of a tritium target pin. Following irradiation, most of the tritium in the target pins is expected to be bound to the getter and other internal components. The total equivalent release as tritium oxide from a damaged tritium target assembly is specified to be 0.8% of the total inventory or $(5.30\text{E}+5 \text{ Ci})(0.008) = 4.24\text{E}+3 \text{ Ci}$. For six assemblies the total release would be $2.54\text{E}+4 \text{ Ci}$. 100% of this amount of tritium was assumed to be released from the CCC in the form of tritiated water vapor. This is considered to be a short duration release (i.e., less than 1 hour).

3.3.3 Consequence Analysis

3.3.3.1 Doses From Direct and Scattered Radiation. The dose rate from direct exposure above the top of the CCC with seven assemblies inside was calculated to be 74.8 rem/hr using ISOSHL. With a stay time of five seconds, the dose received would be 0.104 rem. In addition to this exposure, the receptor would be exposed to skyshine. The same spectrum used in ISOSHL was input into Microskyshine to determine the dose rate as the receptor retreats from the edge of the CLS. The spectrum was truncated at an energy of .1 MEV, since the model is not applicable to energies below this value. The dose due to exposure to neutrons produced by spontaneous fission was judged to be negligible. The dose rate due to air-scattered radiation at the edge of the elevator was calculated to be 0.39 rem/hr. This would add 5.4×10^{-4} rem to the dose received during the five second response time.

The receptor then retreats from the elevator at a speed, v , of four miles per hour (179 cm/sec). Microskyshine was rerun for various distances from the edge. The results closely approximated a linear falloff when plotted on a semilog graph indicating an exponential decrease of dose rate with distance from the edge. The total dose received was then conservatively calculated by integrating along a path from the edge to infinite distance as shown below using a best fit $\mu = 0.000807 \text{ cm}^{-1}$.

$$D = \int_0^{\infty} \dot{D} dt = \int_0^{\infty} \dot{D}_0 E^{-\mu x} dt = \int_0^{\infty} \dot{D}_0 E^{-\mu vt} dt$$

$$D = -\frac{\dot{D}_0}{\mu v} \left[e^{-\mu vt} \right]_0^{\infty} = \frac{\dot{D}_0}{\mu v}$$

This adds 7.5×10^{-4} rem to the dose received, producing a total estimated dose received by the receptor of 0.105 rem.

3.3.3.2 Consequences Of Drop With Tritium Targets. The doses per unit X/Q' for the release of $4.24E+3$ Ci of tritium oxide equivalent from one target assembly developed in Section 3.1.2.2 for the seismic event are $130 \text{ rem}\cdot\text{m}^3/\text{s}$ for inhalation (including direct skin absorption) and $9.4E-8 \text{ rem}\cdot\text{m}^3/\text{s}$ for plume submersion for a total dose of $130 \text{ rem}\cdot\text{m}^3/\text{s}$. Since the release per target assembly developed for the CCC drop in Section 3.3.2.2 is equal to that previously developed for the seismic release, the dose per unit X/Q' for one target assembly was multiplied by 6 to account for the six tritium target assemblies damaged during the CCC drop and multiplied by 19 to extend the calculation to a CCC close-packed with tritium target pins. Using the appropriate 99.5 percentile X/Q' s with building wake correction from Table 2.2-5, the receptor doses were developed as shown.

$$100 \text{ m} \quad N \implies \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.78E-3 \text{ s}/\text{m}^3)(6) = 1.39E+0 \text{ rem}$$

$$2.4 \text{ km S,N} \implies \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.23E-4 \text{ s}/\text{m}^3)(6) = 9.59E-2 \text{ rem}$$

$$7.2 \text{ km} \quad E \implies \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.80E-5 \text{ s}/\text{m}^3)(6) = 1.40E-2 \text{ rem}$$

$$8.7 \text{ km} \quad S \implies \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(2.68E-5 \text{ s}/\text{m}^3)(6) = 2.09E-2 \text{ rem}$$

$$\text{Pop. SSE} \implies \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(6.26E-2 \text{ per}\cdot\text{s}/\text{m}^3)(6) \\ = 4.88E+1 \text{ per}\cdot\text{rem}$$

IPR 8.7 km S

$$\text{Winter} \implies \text{Dose} = (0.0E+0 \text{ rem}\cdot\text{m}^3/\text{s})(2.68E-5 \text{ s}/\text{m}^3)(6) = 0.00E+0 \text{ rem}$$

$$\text{Autumn} \implies \text{Dose} = (1.1E+4 \text{ rem}\cdot\text{m}^3/\text{s})(2.68E-5 \text{ s}/\text{m}^3)(6) = 1.77E+0 \text{ rem}$$

A maximum of 361 tritium target pins could be loaded into a container comparable to the Core Component Container (CCC) assuming a hypothetical close-packed pin arrangement. The actual number of pins would be less since a pin basket would occupy some space. The bounding transportation accident would be one in which all of the tritium pins were breached. Since 361 pins corresponds to 19 target assemblies, the consequences of the worst-case drop of a CCC containing close-packed tritium target pins would by 19 times the doses for one assembly as follows.

$$100 \text{ m} \quad N \implies \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.78E-3 \text{ s}/\text{m}^3)(19) = 4.40E+0 \text{ rem}$$

$$2.4 \text{ km S,N} \implies \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.23E-4 \text{ s}/\text{m}^3)(19) = 3.04E-1 \text{ rem}$$

$$7.2 \text{ km} \quad E \implies \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(1.80E-5 \text{ s}/\text{m}^3)(19) = 4.45E-2 \text{ rem}$$

$$8.7 \text{ km} \quad S \implies \text{Dose} = (130 \text{ rem}\cdot\text{m}^3/\text{s})(2.68E-5 \text{ s}/\text{m}^3)(19) = 6.62E-2 \text{ rem}$$

$$\begin{aligned}\text{Pop. SSE} \Rightarrow \text{Dose} &= (130 \text{ rem}\cdot\text{m}^3/\text{s})(6.26\text{E-}2 \text{ per}\cdot\text{s}/\text{m}^3)(19) \\ &= 1.55\text{E+}2 \text{ per}\cdot\text{rem}\end{aligned}$$

IPR 8.7 km S

$$\begin{aligned}\text{Winter} \Rightarrow \text{Dose} &= (0.0\text{E+}0 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E-}5 \text{ s}/\text{m}^3)(19) = 0.00\text{E+}0 \text{ rem} \\ \text{Autumn} \Rightarrow \text{Dose} &= (1.1\text{E+}4 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E-}5 \text{ s}/\text{m}^3)(19) = 5.60\text{E+}0 \text{ rem}\end{aligned}$$

3.3.4 Comparison to Guidelines

Consequence analysis results for the drop of a CCC were compared to the risk guidelines given in HNF-PRO-514, Rev 0 (HNF 1997) for accidents in the unlikely frequency category. The 0.11 rem estimated dose to the worker near the accident is well below the risk guideline of 25 rem normally applied to the onsite receptor at 100 m. Due to geometric attenuation and shielding by structures and intervening air, receptors at or beyond the 100 m onsite receptor distance will not receive a significant dose from direct or scattered radiation from the CCC.

Receptor doses due to exposure to the tritium plume for six tritium target assemblies and the equivalent of 19 tritium targets in close-packed tritium target pins in the CCC are compared to the risk guidelines in Table 3.3-2. Note that no risk guidelines are given for the 2.4 km receptor, population doses, or ingestion doses. IPR doses do not represent a realistic pathway and so are not included in Table 3.3-2.

Table 3.3-2. Comparison of tritium doses to risk guidelines for drop of CCC from solid waste cask

Receptor	Doses, mSv (rem)		Risk Guideline mSv (rem)
	6 Tritium Targets	19 Tritium Targets	
100 m (N)	1.4E+1 (1.4E+0)	4.4E+1 (4.4E+0)	250 (25)
2.4 km (S,N)	9.6E-1 (9.6E-2)	3.0E+0 (3.0E-1)	-- (--)
7.2 km (E)	1.4E-1 (1.4E-2)	4.5E-1 (4.5E-2)	50 (5)
8.7 km (S)	2.1E-1 (2.1E-2)	6.6E-1 (6.6E-2)	50 (5)
Population (SSE)	0.49 per·Sv (49 per·rem)	1.6 per·Sv (160 per·rem)	-- (--)

Both onsite and offsite individual receptor doses are well within risk guidelines.

3.4 BEYOND DESIGN BASIS DROP OF A MAXIMALLY LOADED INTERIM STORAGE CASK

The Interim Storage Cask (ISC) provides interim above-ground dry storage for up to seven irradiated fuel assemblies in a Core Component Container (CCC). Administrative controls limit each fuel assembly in the CCC to a maximum decay heat of 250 W, and limit the total decay heat load in the CCC to 1500 W. All of the design basis accidents (handling, weather, seismic, etc.) cause no damage to the seals of the CCC or ISC. Thus no releases result as a consequence of these events.

A beyond design basis accident is assumed here in which the cask is loaded with seven worst-case fuel assemblies and the cask containment boundary is broken by a postulated drop from above the analyzed height. This accident was previously analyzed in the FFTF FSAR and in Himes (1995a) for the original fuel composition. The frequency of this event is specified to be in the range $1.0E-4$ to $1.0E-6/y$ (extremely unlikely category).

3.4.1 Scenario

The cask containment boundary is assumed to be broken by a postulated drop from above the analyzed height. Despite the presence of an impact limiter, the mechanical shock is assumed to cause cracking in 100% of the fuel pins and to crush and expose 1% of the fuel material. However, such an impact is not expected to result in a major escape path out of the cask. Instead, such an impact would, at most, produce some possible cracked welds or failure of a lid seal. The following assumptions were made in the FSAR and are specified for this re-evaluation of a fuel assembly.

- The decay heat of each assembly is the maximum of 250 W.
- 100% of the fuel pins are assumed to lose cladding integrity.
- The following release fractions are assumed:
 - Noble gases and tritium: 100% of pins breached; 100% release
 - Halogens: 100% of pins breached; 10% release of halogens (cold fuel); 50% plateout of halogens
 - Volatile solids (cadmium and cesium): 100% of pins breached; 1% of pellets crushed and exposed; 5% release from exposed pellets; 1% release through cracks in cask

- Nonvolatile solids: 100% of pins breached; 1% of pellets crushed and exposed; 1% release from exposed pellets; 5% respirable ($\leq 10 \mu\text{m}$); 1% release through cracks in cask

3.4.2 Source Term Analysis

The releases calculated here are considered to be very conservative bounding values. Since the CCC can contain up to seven fuel assemblies, the total release is conservatively based on seven assemblies at the maximum decay heat of 250 W for purposes of this analysis, even though the CCC is administratively limited to a total decay heat of 1500 W. The source term is developed below on a per assembly basis.

In accordance with the specified release assumptions shown in Section 3.4.1, net release fractions for the various inventory components for a driver fuel assembly were developed as follows. Tritium is conservatively assumed to be in the form of tritiated water vapor and is treated as a gas in this analysis.

Gases (G)

Fraction of pins breached	1.00
Release from breached pins	<u>1.00</u>
Net release	1.00E+0

Halogens (H)

Fraction of pins breached	1.00
Release from breached pins (cold)	0.10
Plateout	<u>0.50</u>
Net release	5.00E-2

Volatile Solids (VS)

Fraction of pins breached	1.00
Fraction of pellets crushed	0.01
Release from crushed pellets	0.05
Release from cracks in cask	<u>0.01</u>
Net release	5.00E-6

Non-volatile Solids (NVS)

Fraction of pins breached	1.00
Fraction of pellets crushed	0.01
Release from crushed pellets	0.01
Respirable fraction	0.05
Release from cracks in cask	<u>0.01</u>
Net release	5.00E-8

These net release fractions were applied to the driver fuel assembly inventory for 250 W decay heat shown in Table 2.1-1. The resulting releases are shown in Table 3.4-1.

Table 3.4-1. Net releases for Beyond Design Basis Drop
of Maximally Loaded Interim Storage Cask

Isotope	Class	Inventory per Assembly (Ci)	Release Fraction	Release (Ci)
H 3	G	6.67E+1	1.00E+0	6.67E+1
Kr 85	G	5.76E+2	1.00E+0	5.76E+2
Sr 90	NVS	4.18E+3	5.00E-8	2.09E-4
Y 90	NVS	4.18E+3	5.00E-8	2.09E-4
Tc 99	NVS	1.66E+0	5.00E-8	8.30E-8
Ru106	NVS	7.16E+3	5.00E-8	3.58E-4
Ag110m	NVS	8.06E+0	5.00E-8	4.03E-7
Cd113m	VS	8.92E+0	5.00E-6	4.46E-5
Sb125	NVS	1.18E+3	5.00E-8	5.90E-5
Tel25m	NVS	2.87E+2	5.00E-8	1.44E-5
I 129	H	5.52E-3	5.00E-2	2.76E-4
Cs134	VS	1.52E+3	5.00E-6	7.60E-3
Cs137	VS	1.15E+4	5.00E-6	5.75E-2
Ce144	NVS	2.74E+3	5.00E-8	1.37E-4
Pr144m	NVS	3.29E+1	5.00E-8	1.65E-6
Pr144	NVS	2.74E+3	5.00E-8	1.37E-4
Pm147	NVS	1.01E+4	5.00E-8	5.05E-4
Sm151	NVS	4.69E+2	5.00E-8	2.35E-5
Eu154	NVS	2.86E+2	5.00E-8	1.43E-5
Eu155	NVS	1.10E+3	5.00E-8	5.50E-5
Pu238	NVS	2.50E+2	5.00E-8	1.25E-5
Pu239	NVS	5.75E+2	5.00E-8	2.88E-5
Pu240	NVS	3.30E+2	5.00E-8	1.65E-5
Pu241	NVS	6.87E+3	5.00E-8	3.44E-4
Am241	NVS	2.85E+2	5.00E-8	1.43E-5
Am242m	NVS	2.87E+1	5.00E-8	1.44E-6
Cm242	NVS	3.83E+1	5.00E-8	1.92E-6
Cm243	NVS	7.13E+0	5.00E-8	3.57E-7
Cm244	NVS	1.19E+0	5.00E-8	5.95E-8

Since a range of chemical forms exist in irradiated fuel, worst-case solubilities (lung clearance classes) were assumed for all the releases shown above. This is considered to be a short duration release (i.e., less than 1 hour).

3.4.3 Consequence Analysis

The effective Dose Equivalent (EDE) per assembly for the source term developed in Section 3.4.2 was calculated using the GENII Hanford Environmental Radiation Dosimetry Software System (Napier et al 1988). This 50-year committed dose includes the effects of external exposure to the passing plume as well as inhalation doses, and was calculated for unit atmospheric dispersion (i.e., $X/Q' = 1$). In addition, ingestion doses (including ground shine) are shown for the worst-case site boundary receptor for winter (soil only) and autumn (soil + crops) scenarios. As discussed in Section 2.2, ingestion and ground shine doses do not reflect realistic pathways in an accident situation and are given for information only. The accident doses for the various receptors (including the worst sector population) were then obtained by multiplying the unit dispersion dose (i.e., dose per unit X/Q') by the appropriate X/Q' and by the number of assemblies in the ISC. The GENII output file for this accident is shown in Attachment 6.

The doses per unit X/Q' for the releases shown in Table 3.4-1 for one assembly are $14 \text{ rem}\cdot\text{m}^3/\text{s}$ for inhalation and $0.33 \text{ rem}\cdot\text{m}^3/\text{s}$ for plume submersion for a total dose of $14 \text{ rem}\cdot\text{m}^3/\text{s}$. The corresponding winter and autumn ingestion pathway receptor (IPR) doses are $1.5\text{E}+1 \text{ rem}$ and $6.5\text{E}+2 \text{ rem}$, respectively. Using the appropriate 99.5 percentile X/Q' s (no building wake correction) from Table 2.2-5, the receptor doses for seven driver fuel assemblies were developed as shown.

$$100 \text{ m} \quad N \Rightarrow \text{Dose} = (14 \text{ rem}\cdot\text{m}^3/\text{s})(3.17\text{E}-2 \text{ s}/\text{m}^3)(7) = 3.11\text{E}+0 \text{ rem}$$

$$2.4 \text{ km} \quad N \Rightarrow \text{Dose} = (14 \text{ rem}\cdot\text{m}^3/\text{s})(1.65\text{E}-4 \text{ s}/\text{m}^3)(7) = 1.62\text{E}-2 \text{ rem}$$

$$7.2 \text{ km} \quad E \Rightarrow \text{Dose} = (14 \text{ rem}\cdot\text{m}^3/\text{s})(2.03\text{E}-5 \text{ s}/\text{m}^3)(7) = 1.99\text{E}-3 \text{ rem}$$

$$8.7 \text{ km} \quad S \Rightarrow \text{Dose} = (14 \text{ rem}\cdot\text{m}^3/\text{s})(2.90\text{E}-5 \text{ s}/\text{m}^3)(7) = 2.84\text{E}-3 \text{ rem}$$

$$\text{Pop.} \quad \text{SSE} \Rightarrow \text{Dose} = (14 \text{ rem}\cdot\text{m}^3/\text{s})(6.26\text{E}-2 \text{ per}\cdot\text{s}/\text{m}^3)(7) = 6.13\text{E}+0 \text{ per}\cdot\text{rem}$$

IPR 8.7 km S

$$\text{Winter} \Rightarrow \text{Dose} = (1.5\text{E}+1 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)(7) = 2.81\text{E}-3 \text{ rem}$$

$$\text{Autumn} \Rightarrow \text{Dose} = (6.5\text{E}+2 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)(7) = 1.22\text{E}-1 \text{ rem}$$

3.4.4 Comparison To Guidelines

Consequence analysis results for the beyond design basis ISC drop were compared to risk guidelines given in HNF-PRO-514, Rev 0 for accidents in the extremely unlikely frequency category with the results shown in Table 3.4-2. Note that no risk guidelines are given for the 2.4 km receptor, population doses, or ingestion doses. IPR doses do not represent a realistic pathway and so are not included in Table 3.4-2.

Table 3.4-2. Comparison of doses to risk guidelines for the beyond design basis ISC drop

Receptor	Doses mSv (rem)	Risk Guideline mSv (rem)
100 m (N)	3.1E+1 (3.1E+0)	1000 (100)
2.4 km (S,N)	1.6E-1 (1.6E-2)	-- (--)
7.2 km (E)	2.0E-2 (2.0E-3)	250 (25)
8.7 km (S)	2.8E-2 (2.8E-3)	250 (25)
Population (SSE)	0.061 per·Sv (6.1 per·rem)	-- (--)

Both onsite and offsite individual receptor doses are well within risk guidelines.

3.5 HYPOTHETICAL UNRESTRICTED RELEASE OF FUEL INVENTORY

A hypothetical (i.e., non-mechanistic) accident is assumed here in which an Interim Storage Cask (ISC) is loaded with seven worst-case fuel assemblies and is disrupted by an unspecified crushing/shearing force which results in heavy damage to the CCC, and all seven fuel assemblies contained therein, and the creation of a large release path out of the cask. This accident was previously analyzed in the FFTF FSAR and in Himes (1995b) for the original fuel composition. The frequency of this event is specified to be in the range 1.0E-6 to 1.0E-7/y (noncredible).

3.5.1 Scenario

No credible scenario was found that could produce this kind of damage in an ISC, therefore this is considered a non-mechanistic bounding accident and no scenario is given. The following assumptions were made in the FSAR and are specified for this re-evaluation of a fuel assembly.

- The decay heat of each assembly is the maximum of 250 W.
- 100% of the fuel pins are assumed to be breached.
- The following release fractions are assumed:
 - Noble gases and tritium: 100% of pins breached; 100% release
 - Halogens: 100% of pins breached; 10% release of halogens (cold fuel); 50% plateout of halogens
 - Volatile solids (cadmium and cesium): 100% of pins breached; 5% of pellets crushed and exposed; 5% release from exposed pellets
 - Nonvolatile solids: 100% of pins breached; 5% of pellets crushed and exposed; 1% release from exposed pellets; 5% respirable ($\leq 10 \mu\text{m}$).

3.5.2 Source Term Analysis

Since the CCC can contain up to seven fuel assemblies, the total release is conservatively based on seven assemblies at the maximum decay heat of 250 W for purposes of this analysis, even though the CCC is administratively limited to a total decay heat of 1500 W. The source term is developed below on a per assembly basis.

In accordance with the specified release assumptions shown in Section 3.5.1, net release fractions for the various inventory components for a driver fuel assembly were developed as follows. Tritium is conservatively assumed to be in the form of tritiated water vapor and is treated as a gas in this analysis.

Gases (G)

Fraction of pins breached	1.00
Release from breached pins	<u>1.00</u>
Net release	1.00E+0

Halogens (H)

Fraction of pins breached	1.00
Release from breached pins (cold)	0.10
Plateout	<u>0.50</u>
Net release	5.00E-2

Volatile Solids (VS)

Fraction of pins breached	1.00
Fraction of pellets crushed	0.05
Release from crushed pellets	<u>0.05</u>
Net release	2.50E-3

Non-volatile Solids (NVS)

Fraction of pins breached	1.00
Fraction of pellets crushed	0.05
Release from crushed pellets	0.01
Respirable fraction	<u>0.05</u>

Net release 2.50E-5

These net release fractions were applied to the driver fuel assembly inventory for 250 W decay heat shown in Table 2.1-1. The resulting releases are shown in Table 3.5-1.

Table 3.5-1. Net releases for Hypothetical Unrestricted Release of Fuel Inventory

Isotope	Class	Inventory per Assembly (Ci)	Release Fraction	Release (Ci)
H 3	G	6.67E+1	1.00E+0	6.67E+1
Kr 85	G	5.76E+2	1.00E+0	5.76E+2
Sr 90	NVS	4.18E+3	2.50E-5	1.05E-1
Y 90	NVS	4.18E+3	2.50E-5	1.05E-1
Tc 99	NVS	1.66E+0	2.50E-5	4.15E-5
Ru106	NVS	7.16E+3	2.50E-5	1.79E-1
Ag110m	NVS	8.06E+0	2.50E-5	2.02E-4
Cd113m	VS	8.92E+0	2.50E-3	2.23E-2
Sb125	NVS	1.18E+3	2.50E-5	2.95E-2
Te125m	NVS	2.87E+2	2.50E-5	7.18E-3
I 129	H	5.52E-3	5.00E-2	2.76E-4
Cs134	VS	1.52E+3	2.50E-3	3.80E+0
Cs137	VS	1.15E+4	2.50E-3	2.88E+1
Ce144	NVS	2.74E+3	2.50E-5	6.85E-2
Pr144m	NVS	3.29E+1	2.50E-5	8.23E-4
Pr144	NVS	2.74E+3	2.50E-5	6.85E-2
Pm147	NVS	1.01E+4	2.50E-5	2.53E-1
Sm151	NVS	4.69E+2	2.50E-5	1.17E-2
Eu154	NVS	2.86E+2	2.50E-5	7.15E-3
Eu155	NVS	1.10E+3	2.50E-5	2.75E-2
Pu238	NVS	2.50E+2	2.50E-5	6.25E-3
Pu239	NVS	5.75E+2	2.50E-5	1.44E-2
Pu240	NVS	3.30E+2	2.50E-5	8.25E-3
Pu241	NVS	6.87E+3	2.50E-5	1.72E-1
Am241	NVS	2.85E+2	2.50E-5	7.13E-3
Am242m	NVS	2.87E+1	2.50E-5	7.18E-4
Cm242	NVS	3.83E+1	2.50E-5	9.58E-4
Cm243	NVS	7.13E+0	2.50E-5	1.78E-4
Cm244	NVS	1.19E+0	2.50E-5	2.98E-5

Since a range of chemical forms exist in irradiated fuel, worst-case solubilities (lung clearance classes) were assumed for all the releases shown above. This is considered to be a short duration release (i.e., less than 1 hour).

3.5.3 Consequence Analysis

The effective Dose Equivalent (EDE) per assembly for the source term developed in Section 3.5.2 was calculated using the GENII Hanford Environmental Radiation Dosimetry Software System (Napier et al 1988). This 50-year committed dose includes the effects of external exposure to the passing plume as well as inhalation doses, and was calculated for unit atmospheric dispersion (i.e., $X/Q' = 1$). In addition, ingestion doses (including ground shine) are shown for the worst-case site boundary receptor for winter (soil only) and autumn (soil + crops) scenarios. As discussed in Section 2.2, ingestion and ground shine doses do not reflect realistic pathways in an accident situation and are given for information only. The accident doses for the various receptors (including the worst sector population) were then obtained by multiplying the unit dispersion dose (i.e., dose per unit X/Q') by the appropriate X/Q' and by the number of assemblies in the ISC. The GENII output file for this accident is shown in Attachment 7.

The doses per unit X/Q' for the releases shown in Table 3.5-1 for one assembly are $6000 \text{ rem}\cdot\text{m}^3/\text{s}$ for inhalation and $5.0 \text{ rem}\cdot\text{m}^3/\text{s}$ for plume submersion for a total dose of $6000 \text{ rem}\cdot\text{m}^3/\text{s}$. The corresponding winter and autumn ingestion pathway receptor (IPR) doses are $7.2\text{E}+3 \text{ rem}$ and $2.1\text{E}+5 \text{ rem}$, respectively. Using the appropriate 50 percentile X/Q' 's from Table 2.2-5, the receptor doses for seven driver fuel assemblies were developed as shown.

$$100 \text{ m} \quad \text{N} \Rightarrow \text{Dose} = (6000 \text{ rem}\cdot\text{m}^3/\text{s})(4.51\text{E}-3 \text{ s}/\text{m}^3)(7) = 1.89\text{E}+2 \text{ rem}$$

$$2.4 \text{ km} \quad \text{N} \Rightarrow \text{Dose} = (6000 \text{ rem}\cdot\text{m}^3/\text{s})(2.33\text{E}-5 \text{ s}/\text{m}^3)(7) = 9.79\text{E}-1 \text{ rem}$$

$$7.2 \text{ km} \quad \text{E} \Rightarrow \text{Dose} = (6000 \text{ rem}\cdot\text{m}^3/\text{s})(2.86\text{E}-6 \text{ s}/\text{m}^3)(7) = 1.20\text{E}-1 \text{ rem}$$

$$8.7 \text{ km} \quad \text{S} \Rightarrow \text{Dose} = (6000 \text{ rem}\cdot\text{m}^3/\text{s})(3.32\text{E}-6 \text{ s}/\text{m}^3)(7) = 1.39\text{E}-1 \text{ rem}$$

$$\begin{aligned} \text{Pop.} \quad \text{SSE} \Rightarrow \text{Dose} &= (6000 \text{ rem}\cdot\text{m}^3/\text{s})(1.31\text{E}-2 \text{ per}\cdot\text{s}/\text{m}^3)(7) \\ &= 5.50\text{E}+2 \text{ per}\cdot\text{rem} \end{aligned}$$

IPR 8.7 km S

$$\text{Winter} \Rightarrow \text{Dose} = (7.2\text{E}+3 \text{ rem}\cdot\text{m}^3/\text{s})(3.32\text{E}-6 \text{ s}/\text{m}^3)(7) = 1.67\text{E}-1 \text{ rem}$$

$$\text{Autumn} \Rightarrow \text{Dose} = (2.1\text{E}+5 \text{ rem}\cdot\text{m}^3/\text{s})(3.32\text{E}-6 \text{ s}/\text{m}^3)(7) = 4.88\text{E}+0 \text{ rem}$$

3.5.4 Comparison To Guidelines

Although there are no risk guidelines for noncredible accidents (frequency less than $10^{-6}/y$), consequence analysis results for the Hypothetical Unrestricted Release of Fuel Inventory were compared to risk guidelines given in HNF-PRO-514, Rev 0 for accidents in the extremely unlikely frequency category with the results shown in Table 3.5-2. Note that no risk guidelines are given for the 2.4 km receptor, population doses, or ingestion doses. IPR doses do not represent a realistic pathway and so are not included in Table 3.5-2.

Table 3.5-2. Comparison of doses to risk guidelines for the Hypothetical Unrestricted Release of Fuel Inventory

Receptor	Doses mSv (rem)	Risk Guideline mSv (rem)
100 m (NNW)	1.9E+3 (1.9E+2)	1000 (100)
2.4 km (NNW)	9.8E+0 (9.8E-1)	-- (--)
7.2 km (E)	1.2E+0 (1.2E-1)	250 (25)
8.7 km (SSE)	1.4E+0 (1.4E-1)	250 (25)
Population (SSE)	5.5 per·Sv (550 per·rem)	-- (--)

Both offsite individual receptor doses are well within risk guidelines for extremely unlikely accidents. The onsite receptor guidelines are exceeded, but only by less than a factor of two. These comparisons are provided for information only. No risk guidelines apply to non-credible accidents.

3.6 LARGE SODIUM SPILL

The large sodium spill accident assumes a leak of primary coolant sodium to a cell open to containment. As described in the FFTF FSAR, the leak is assumed to release 11,400 kg (25,000 lbs) of sodium, which ignites and fully burns. This accident is the limiting radiological sodium burn accident since it assumes a high radioactive inventory in the sodium, free air access to the sodium pool, and postulates a large quantity of sodium is released.

3.6.1 Scenario Development

This accident assumes that 11,400 kg (25,000 lbs) of primary sodium is spilled to an HTS cell open to containment during reactor shutdown. Cells containing primary sodium piping are normally inerted but these cells may have an air atmosphere and be open to containment during refueling. The entire quantity of sodium is assumed to burn. The Containment Isolation System (CIS) will seal the containment, but a release of radioactive material will still occur since the containment has a design leakage rate of 0.5% per day at 2 psig. The peak pressure in the containment for this accident is given in the FFTF FSAR as 1.7 psig. It takes approximately 17 hours to completely burn the sodium. The pressure decays slowly after the cessation of the burn.

An exposure time of 12 hours is assumed for the onsite receptor, and 48 hours for the offsite receptor. The onsite receptor will not remain onsite for the full duration of the release since the maximum shift duration is 12 hours. Twelve hours is a conservative estimate of the time the onsite receptor remains onsite since it is probable that the onsite personnel will be evacuated prior to the full 12 hours. The activity released in 48 hours at 2 psig is a conservative estimate of the offsite receptor exposure since the average pressure is significantly less than 2 psig during the first 48 hours, and the pressure decays after 48 hours. The release rate is 0.5% per 24 hours, which produces a release of 0.25% of the material in containment for the onsite (100 m) receptor for a 12 hour exposure time, and a 1.0% release for the offsite receptors for a 48 hour exposure time.

The assumptions for this accident scenario are summarized as follows:

- A spill of 11,400 kg (25,000 lbs) sodium is assumed to occur to an HTS cell open to the containment building
- The entire 11,400 (25,000 lbs) of sodium is assumed to burn resulting in a peak pressure of 1.7 psig. The containment is assumed to leak at a rate of 0.5% per day at 2 psig.
- The sodium is assumed to contain fission and activation products corresponding to 1% failed fuel operation. The accident is assumed to occur 2 days after the reactor is shutdown. Cells containing primary sodium piping are inerted during power operation, and 2 days is a

conservative estimate of the time after shutdown to de-inert the HTS cells.

- The entire inventory of the fission products contained in the sodium is assumed to be released to containment. The entire inventory of radioactive material in the cover gas is also assumed to be released to the containment.
- Inventories are based on 1% failed fuel operation.
- No credit for plateout is assumed.
- No credit for containment margin system response is assumed.

3.6.2 Source Term Analysis

The primary sodium is assumed to contain a radioactive material concentration corresponding to operation with 1% failed fuel. This source term is conservative since actual fission product concentrations during power operation were much less than the FSAR 1% failed fuel numbers. The isotope concentrations in Ci/g are taken from the FFTF FSAR, Table 15.2.10, and are shown in Table 3.6-1. 100% of the isotopes contained in the released sodium are assumed to be released to the containment vessel. The fraction released from containment is based on the 0.5% per day leakage rate. The source term was decayed for 2 days. Two days is a very conservative estimate of the minimum time for opening HTS cells to the containment after shutdown of the reactor.

The source term for 1% failed fuel given in the FSAR does not include tritium. In order to estimate the tritium release, the sodium was assumed to contain tritium at higher than the maximum measured concentration values. Measured values of tritium concentration of 2.1×10^{-7} Ci/g have been reported in the primary sodium. A tritium concentration two orders of magnitude higher (2.1×10^{-5} Ci/g) was assumed for this calculation since the tritium production mission could result in higher tritium releases to the sodium. (Tritium concentrations approximately a factor of 60 higher than reference values are expected.) Similarly no data for plutonium was included in the FSAR for this accident since volatile fission products and sodium activation products were assumed to dominate the accident. A plutonium concentration of 1.2×10^{-12} Ci/g based on total alpha activity has been reported in the primary sodium. A level of 3×10^{-12} Ci/g was used in this analysis since the plutonium enrichment may be approximately twice the reference core enrichments. The total alpha activity was assumed to be all Pu-239 since the dose per Ci of this isotope is relatively high. Resulting radioactive releases for a 25,000 lbs primary containment burn source term are shown in Table 3.6-1.

Table 3.6-1. Primary sodium source term concentrations and releases

Isotope	Activity/g in Sodium (Ci/g)	Activity/g in Na after 2 day decay (Ci/g)	Activity in Containment 25000 lb Burn (Ci)	Activity Released from Containment in 12 hr (Ci)
Na 22	9.17E-07	9.16E-07	1.04E+01	2.60E-02
Na 24	2.57E-02	2.80E-03	3.17E+04	7.93E+01
I 131	2.43E-04	2.05E-04	2.32E+03	5.80E+00
I 133	4.86E-04	9.82E-05	1.11E+03	2.78E+00
I 135	4.86E-04	3.15E-06	3.57E+01	8.92E-02
Cs134	2.43E-06	2.43E-06	2.75E+01	6.88E-02
Cs136	1.70E-05	1.53E-05	1.74E+02	4.34E-01
Cs137	7.30E-06	7.30E-06	8.28E+01	2.07E-01
Ta182	9.73E-07	9.61E-07	1.09E+01	2.73E-02
H 3	2.10E-05	2.10E-05	2.38E+02	5.95E-01
Pu239	3.00E-12	3.00E-12	3.40E-05	8.51E-08

A spill of primary sodium also results in a release of reactor cover gas. Cover gas radioactive inventories assuming a 1% failed fuel case are given in Table 15.2-8 of the FFTF FSAR. A release fraction of gas contained in the containment of 0.25% onsite, and 1.0% offsite are assumed for the cover gas also. The cover gas mix was also decayed for 2 days to account for the delay between shutdown and refueling operations. The resulting cover gas activities and releases are shown in Table 3.6-2.

Table 3.6-2. Cover gas source term

Isotope	Activity (Ci)	Activity 2 day decay (Ci)	Activity Released in 12 hr (Ci)
Kr-83m	6.90E+02	8.91E-06	2.23E-08
Kr-85m	1.94E+03	1.17E+00	2.93E-03
Kr-85	3.30E-01	3.30E-01	8.25E-04
Kr-87	1.58E+03	6.95E-09	1.74E-11
Kr-88	3.18E+03	2.52E-02	6.29E-05
Xe-131m	1.30E+03	1.16E+03	2.90E+00
Xe-133m	3.02E+02	1.60E+02	4.01E-01
Xe-133	6.321+03	4.85E+03	1.21E+01
Xe-135	2.28E+04	5.94E+02	1.49E+00

3.6.3 Consequence Analysis

Effective Dose Equivalents (EDE) for the source terms developed in Section 3.6.2 were calculated using the GENII Hanford Environmental Radiation Dosimetry Software System (Napier et al 1988). These 50-year committed doses include the effects of external exposure to the passing plume as well as inhalation doses, and were calculated for unit atmospheric dispersion (i.e., $X/Q' = 1$). Tritium is assumed to be in oxide form (i.e., as tritiated water vapor) and direct absorption through the skin is accounted for in addition to inhalation for purposes of calculating internal dose. In addition, ingestion doses (including ground shine) are shown for the worst-case site boundary receptor for winter (soil only) and autumn (soil + crops) scenarios. As discussed in Section 2.2, ingestion and ground shine doses do not reflect realistic pathways in an accident situation and are given for information only. The accident doses for the various receptors (including the worst sector population) were then obtained by multiplying the applicable unit dispersion dose (i.e., dose per unit X/Q') by the appropriate X/Q' . These X/Q' 's are based on short duration releases. Use of these X/Q' 's is therefore conservative for the 12 hour (100 m and control distance) and 48 hour (offsite) exposures postulated in this analysis. The GENII code file for this accident is shown in Attachment 8.

3.6.3.1 Radiological Analysis. The doses per unit X/Q' for the 12-hour releases shown in Tables 3.6-1 and 3.6-2 are $98 \text{ rem}\cdot\text{m}^3/\text{s}$ for inhalation and $76 \text{ rem}\cdot\text{m}^3/\text{s}$ for plume submersion for a total dose of $174 \text{ rem}\cdot\text{m}^3/\text{s}$. The corresponding winter and autumn ingestion pathway receptor (IPR) doses are $8.3\text{E}+1 \text{ rem}$ and $8.3\text{E}+3 \text{ rem}$, respectively. Using the appropriate 99.5 percentile X/Q' 's with building wake correction from Table 2.2-5, the receptor doses were developed as shown. The resulting doses for the control distance and offsite receptors were multiplied by a factor of 4 since the release for these receptors is 4 times greater than for the 12 hour exposure assumed at 100 m.

$$100 \text{ m} \quad \text{N} \Rightarrow \text{Dose} = (174 \text{ rem}\cdot\text{m}^3/\text{s})(1.78\text{E}-3 \text{ s}/\text{m}^3) = 3.10\text{E}-1 \text{ rem}$$

$$2.4 \text{ km} \quad \text{S,N} \Rightarrow \text{Dose} = (174 \text{ rem}\cdot\text{m}^3/\text{s})(1.23\text{E}-4 \text{ s}/\text{m}^3) = 2.14\text{E}-2 \text{ rem}$$

$$7.2 \text{ km} \quad \text{E} \Rightarrow \text{Dose} = (174 \text{ rem}\cdot\text{m}^3/\text{s})(1.80\text{E}-5 \text{ s}/\text{m}^3)(4) = 1.25\text{E}-2 \text{ rem}$$

$$8.7 \text{ km} \quad \text{S} \Rightarrow \text{Dose} = (174 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)(4) = 1.87\text{E}-2 \text{ rem}$$

$$\text{Pop.} \quad \text{SSE} \Rightarrow \text{Dose} = (174 \text{ rem}\cdot\text{m}^3/\text{s})(6.26\text{E}-2 \text{ per}\cdot\text{s}/\text{m}^3)(4) = 4.36\text{E}+1 \text{ per}\cdot\text{rem}$$

IPR 8.7 km S

$$\text{Winter} \Rightarrow \text{Dose} = (8.3\text{E}+1 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)(4) = 8.90\text{E}-3 \text{ rem}$$

$$\text{Autumn} \Rightarrow \text{Dose} = (8.3\text{E}+3 \text{ rem}\cdot\text{m}^3/\text{s})(2.68\text{E}-5 \text{ s}/\text{m}^3)(4) = 8.90\text{E}+1 \text{ rem}$$

In addition to the inhalation and submersion doses, the onsite receptor will be exposed to gamma radiation from the containment building. The source term inventories shown in Tables 3.6-1 and 3.6-2 were assumed to be uniformly suspended in the containment. The shine dose rate was calculated using the MICROSHIELD 3 computer code (Grove 1986). The containment was modelled as a cylinder 41.2 m (135 ft) in diameter and 32 m (105 ft) high. The receptor was assumed to be 100 m from the containment building and 1.5 m above the ground. The containment wall was modelled as 1 inch of iron. The MICROSHIELD files are shown in Attachment 8. The dose rate was 2.00 rem/hr at the beginning of the 12 hour period, and 1.15 rem/hr at end of 12 hours. The average exposure rate of 1.58 rem/hr was used for the 12 hour exposure. The onsite direct shine dose at 100 m from the material inside the reactor containment building (RCB) was calculated to be $1.58 \text{ rem/h} \times 12 \text{ h} = 19 \text{ rem}$. The direct shine dose at the control distance (2400 m) and at the site boundary were found to be negligible due to distance and attenuation by the intervening air.

The total onsite receptor dose was calculated by adding the direct shine dose from containment to the plume inhalation and submersion dose. The resulting total is 19 rem at the onsite (100 m) receptor.

The dose calculation was examined to determine the sensitivity to tritium levels. The inhalation doses with a X/Q' of 1 is 98 rem. The contribution from the tritium in this calculation is $1.7 \times 10^{-3} \text{ rem}$. The tritium contributes less than 0.002% of the dose. The tritium level would have to be several orders of magnitude higher to significantly affect the inhalation doses. The Pu-239 dose is $1.2 \times 10^{-2} \text{ rem}$ or 0.07% of the total inhalation dose. Changes in enrichment will therefore not significantly affect the results of this accident.

3.6.3.2 Toxicological Releases. Sodium mainly forms sodium oxide upon burning which, in the presence of moisture, can form the more toxic sodium hydroxide (NaOH). Toxic risk guidelines for NaOH are based on peak concentration in air (mg/m^3). The concentration at the receptor is determined by multiplying the release rate times the appropriate X/Q' . The release rate from containment is 0.5% of the material in containment in 24 hours. Peak air concentration for the onsite receptor, for example, was developed as follows.

$$\text{Release rate} = \text{Mass released to containment} \times (0.5\% / 24 \text{ hours})$$

$$\begin{aligned} \text{The mass of NaOH formed from the combustion of 11,400 kg (25,000 lbs) of Na is} \\ = 11,400 \text{ kg} \times (23+16+1)/23 \\ = 19,800 \text{ kg} \end{aligned}$$

$$\begin{aligned} \text{Release rate} &= 19,800 \text{ kg} \times 10^6 \text{ mg/kg} \times 0.005 / (24 \text{ hr} \times 3600 \text{ s/hr}) \\ &= 1150 \text{ mg/s} \end{aligned}$$

The onsite X/Q' (with building wake effect) from Table 2.2-5 is 0.00178 s/m^3

The concentration $C = 1150 \text{ mg/s} \times 0.00178 \text{ s/m}^3 = 2.0 \text{ mg/m}^3$.

The onsite risk guidelines for extremely unlikely events is ERPG-3, which is 100 mg/m^3 for NaOH. Comparison to risk guidelines for the onsite and offsite receptors are given in Section 3.6.4.

3.6.4 Comparison to Risk Guidelines

Doses at the different receptor locations are compared to risk guidelines in Table 3.6-4. The doses to receptors onsite (100 m) and at the 1.5 mile control distance are based on a 12 hour exposure. All other locations are based on a 48 hour exposure. Risk guidelines for extremely unlikely frequency class were taken from HNF-PRO-514, Rev 0. IPR doses do not represent a realistic pathway and so are not included in Table 3.6-4.

Table 3.6-4. Comparison to Risk Guidelines

	Dose (rem)	Radiological Dose (Sv)	Rad Risk Guideline (Sv)	NaOH Conc. (mg/m^3)	Toxic Risk Guideline (mg/m^3)
Onsite	1.9E+1	1.9E-1	1.0	2.0	100
2400 m (1.5 miles)	2.1E-2	2.1E-4	---	0.16	---
7200 m E (4.5 miles)	1.3E-2	1.3E-4	---	0.022	---
Site Boundary	1.9E-2	1.9E-4	0.25	0.032	40
Population within 50 miles	4.4E+1 person·rem	4.4E-1 person·Sv			

Doses and exposures for all receptors are well below risk guidelines.

3.7 EFFECT OF SODIUM RELEASE FROM THE RADIOISOTOPE RAPID RETRIEVAL SYSTEM DURING AN HCDA

The FFTF FSAR includes an evaluation of a Hypothetical Core Disruptive Accident (HCDA) as a bounding test of the FFTF containment capabilities. An accident is assumed to occur which results in an energetic disassembly of the reactor core. It is expected that even the worst case accidents, such as a loss of flow without scram, or a transient overpower without scram, would cause significant core damage, but an energetic reaction would not occur. Even so, the containment and HTS systems were designed to withstand an energetic core disruptive accident. The impact of the Radioisotope Rapid Retrieval system (R3) on the HCDA radiological consequences was evaluated to maintain consistency with that position. The doses were estimated by applying modifying factors to the calculations originally performed for the reference core. The analysis assumes the source term is identical to the FFTF FSAR ULOF-HCDA source term. The effects of modifications to the core loading required by the proposed new mission on the consequences of an HCDA will be developed in a separate analysis.

3.7.1 Scenario and Source Term Development

The R3 system is a new potential release path for sodium during an HCDA. The FSAR HCDA analysis assumes 300 lbs of sodium would be released through the seals around head mounted components. The addition of the R3 path for the sodium release is estimated to result in a sodium release of up to an additional 300 lbs. The 300 lbs of sodium assumed to be released to the containment in the FFTF HCDA analysis occurs because the bolts holding the open test assemblies (OTAs) to the reactor vessel head may exceed their elastic limits during an HCDA. The OTAs will remain attached to the reactor head but some sodium leakage may occur around the seals. The two R3 assemblies may add to this sodium leakage in the event of an HCDA. The target tubes in the R3 will be approximately 0.745 inches in diameter giving a cross sectional area for 2 R3 assemblies of 0.87 in². The flow path area for the 9 OTA assemblies is estimated to be in excess of 2 in². The leakage to a first approximation will be proportional to the cross sectional areas of the flow paths. The area of the R3 tube is smaller than path flow area through the OTA seals, and the R3 sodium leakage would be expected to be further restricted since the R3 tube will tend to crumble rather than shear. The crumbled tube will further restrict flow. Assuming an additional 300 lbs of sodium is released through the two R3 assemblies is therefore conservative.

The original HCDA evaluation assumed a release of 100% of the fission gas plus 1% of the fuel and fission products. This release to containment would not be affected by the additional leak path provided by R3. The radioactivity in the additional 300 lb of sodium will not have dose consequences that significantly affect the results (see analysis for 25,000 lb sodium burn in Section 3.6).

A potential impact of the additional sodium release is an increase in the pressurization of containment along with an increase in leakage. The sodium released in the HCDA would be released as a spray, which can cause higher pressures than the pool fire accident described in Section 3.6. The FSAR HCDA results in a peak pressure to containment of 1.84 psig. The increase due to an additional 300 lbs of sodium is calculated based on the following assumptions:

- The 300 lb of Na from the R3 system will be assumed to mix uniformly with the air in containment.
- All the Na is assumed to burn
- 100% of the energy of combustion and the heat conducted due to elevated sodium temperature will be transferred to the air of the containment.
- Thermal conduction to the walls or structures in the containment is neglected.

3.7.2 Accident Consequences

The material properties which were used in the calculation are shown in Table 3.7-1.

Table 3.7-1. Material Properties

Property	SI units	English units	Source
Heat of combustion of Na	9.6 E+06 J/kg	4080 Btu/lb	
Specific heat of Na	1300 J/kg·°C	0.3 Btu/lb·°F	Glasstone
Air density (STP)	1.3 kg/m ³	0.08 Lb/ft ³	Glasstone
Specific heat of air	1000 J/kg·°C	0.24 Btu/lb·°F	Glasstone
Air volume of containment	42500 m ³	1.50 E+06 ft ³	FFTF FSAR
Additional Na released	136 kg	300 lbs	specified

The heat transferred to the air in the containment is the heat of combustion plus the heat transfer from the release of hot sodium. The sodium temperature was assumed to be 1000 °F, (538 °C), and the initial air temperature was assumed to be 77 °F (25 °C).

The energy available from the release and combustion of the sodium inside containment can be conservatively estimated as:

$$\begin{aligned}
 \text{Energy (Q)} &= \text{Na mass burned} \times [\text{heat of combustion} + (\text{temperature of Na} \\
 &\quad - \text{temperature of air}) \times \text{specific heat of Na}] \\
 &= 136 \text{ kg} \times [9.6 \times 10^6 \text{ J/kg} + (538^\circ\text{C} - 25^\circ\text{C})(1300 \text{ J/kg}\cdot^\circ\text{C})] \\
 &= 1.40 \times 10^9 \text{ J}
 \end{aligned}$$

The maximum temperature increase of the air in containment is

$$\Delta T = Q / (m c_p)$$

where Q is the energy transferred to the air, m is mass of the air, and c_p is specific heat of the air. The temperature increase is:

$$\begin{aligned}
 \Delta T &= 1.40 \times 10^9 \text{ J} / [(1.3 \text{ kg/m}^3)(42,500 \text{ m}^3)(1000 \text{ J/kg}\cdot^\circ\text{C})] \\
 &= 25^\circ\text{C}
 \end{aligned}$$

The increase in pressure in the containment is given by

$$P_f = \frac{(T_i + \Delta T)}{T_i} P_i$$

where T_i and P_i are initial temperature (absolute) and pressure of the air in containment.

$$P_f = \frac{(298+25)}{298} (14.7 \text{ psia})$$

$$P_f = 15.9 \text{ psia}$$

$$\Delta P = 1.2 \text{ psi}$$

The release of the additional 300 lbs of sodium will result in a maximum increase in containment pressure of approximately 1.2 psig. This calculation is very conservative in that it neglects the fact that some of the heat will be transferred to structures in the containment, or conducted out through the walls. Also, some of the sodium will probably not burn and much of the sodium burned will fall out or plate out on surfaces. The calculation is however bounding.

The FFTF FSAR reported a 1.84 psi initial peak increase in containment pressure from the HCDA. The design pressure of containment is 10 psig, so an additional increase in containment pressure of 1.2 psig will not challenge containment integrity. The amount of material released is assumed in the FSAR

analysis is to be proportional to the square root of the pressure increase. The amount of increase in radioactive material released is therefore:

$$\begin{aligned}\text{Increase in Release fraction} &= [(1.84 + 1.2)/1.84]^{1/2} \\ &= 1.29\end{aligned}$$

Doses for the HCDA are given in the FFTF FSAR. The doses are increased by a factor of 1.29 to compensate for the additional pressure increase. The resulting doses are shown in Table 3.7-2.

Table 3.7-2. HCDA dose calculation results

Location	FSAR Doses		Doses Increased	
	(Sv)	(rem)	by 1.26	(rem)
2400 m 2 hr dose*	0.0069	0.69	0.0089	0.89
7200 m 30 d dose	0.0029	0.29	0.0037	0.37

* receptor is assumed to be evacuated after 2 hours.

Toxic consequences were not evaluated in the FSAR for this accident, but an evaluation for a release to containment of a total of 273 kg (600 lbs) of sodium is given as follows. The toxic release is produced by combustion of 273 kg (600 lbs) of sodium, which could produce 475 kgs (1040 lbs) of NaOH. The peak pressure in containment is 1.8 psig + 1.2 psig = 3.0 psig. The design release rate is 0.5 % at 2 psig. The release rate is proportion to the square root of the pressure drop. The release rate of NaOH from containment is therefore:

$$475 \text{ kg} \times 0.005 \times (3.0/2)^{1/2} \times 10^6 \text{ mg/kg} / (24 \text{ h} \times 3600 \text{ s/h}) = 34 \text{ mg/s}$$

The concentration in the air is the release rate times the X/Q' at the location in question.

$$\text{Concentration at 2400 m} = 34 \text{ mg/s} \times 1.23 \times 10^{-4} \text{ s/m}^3 = 0.0042 \text{ mg/m}^3$$

$$\text{Concentration at 7200 m E} = 34 \text{ mg/s} \times 1.80 \times 10^{-5} \text{ s/m}^3 = 6.1 \times 10^{-4} \text{ mg/m}^3$$

Both concentrations are much less than the limits for NaOH offsite for extremely unlikely events of 40 mg/m³.

The calculation shows the doses to be much less than the limits specified.

3.7.3 Comparison to Risk Guidelines

Doses at the various receptor locations are compared to risk guidelines in Table 3.7-3. The dose to at the 1.5 mile control distance is based on a 2 hour evacuation time. All other locations are based on a 30 day exposure. Risk guidelines for extremely unlikely frequency class were taken from HNF-PRO-514, Rev 0.

Table 3.7-3. Comparison to Risk Guidelines

	Radiological Dose (rem)	Dose (Sv)	Rad Risk Guideline (Sv)	NaOH Conc ₃ (mg/m ³)	Toxic Risk Guideline (mg/m ³)
2400 m (1.5 miles)	8.9E-1	8.9E-3	---	4.2E-3	---
7200 m E (4.5 miles)	3.7E-1	3.7E-3	---	6.1E-4	---
Site Boundary	5.6E-1	5.6E-3	0.25	9.2E-4	40
Population within 50 miles	1.2E+3 person·rem	1.2E+1 person·Sv			

Doses and toxic exposures at the worst-case site boundary location (8.7 km south) and the population dose were estimated by multiplying the 4.5 mile dose (or exposure) by 1.5 and 3100, respectively, based on simple ratios of the X/Qs shown in Table 2.2-5. The 100 m onsite receptor (not analyzed in the FFTF FSAR for this accident) would be subjected to a high direct shine dose rate from the material suspended and plated out inside the containment structure in addition to inhalation and submersion doses from the plume. The doses at 100 m would be a sensitive function of the assumed evacuation time (30 minutes or less) as well as the detailed time history of releases into the containment dome space and leakage out of containment during the first 30 minutes of the accident. Information at the level of detail which would be required to estimate the onsite 100 m dose is not yet available.

Doses and exposures for all receptors evaluated are well below risk guidelines.

4.0 REFERENCES

- Croff, A. G., 1980, *ORIGEN2, A Revised and Updated Version of the Oak Ridge Isotope Generation and Depletion Code*, ORNL-5621, Oak Ridge National Laboratory.
- DOE 1994, *DOE Handbook - Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*, DOE-HDBK-3010-YR, October 1994.
- Engel, R.L., J. Greenborg, and M. M. Hendrickson, 1966, *ISOSHL D - A Computer Code for General Purpose Isotope Shielding Analysis*, BNWL-236, Battelle Northwest Laboratories, Richland WA.
- EPA 1988, *Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*, EPA-520/1-88-020, September 1988.
- Glasstone, S. and A. Sesonke, *Nuclear Reactor Engineering*, Van Norstrand Co, New York, 1967.
- Grove, 1988 *Microshield*, Version 3, Grove Engineering, Rockville MD.
- Hey 1994, B. E. Hey, *GXQ Program User's Guide*, WHC-SD-GN-SWD-30002, Rev. 1, Westinghouse Hanford Company, Richland, Washington, December 1994.
- Himes, D. A., 1995a, *Radiological Consequences of a Postulated Drop of a Maximally Loaded FFTF Fuel Cask*, WHC-SD-FF-TA-040, Rev 0, Westinghouse Hanford Company, Richland WA.
- Himes, D. A., 1995b, *Radiological Consequences of a Hypothetical Disruption of a Maximally Loaded FFTF Fuel Cask*, WHC-SD-FF-TA-039, Rev 0, Westinghouse Hanford Company, Richland WA.
- HNF 1997, *Risk Guidelines*, Project Hanford Policy and Procedure System, HNF-PRO-514 Rev. 0, <http://docs.rl.gov/php/nuclear/514r0.asp>, July 1, 1997.
- Napier, B. A., D. L. Streng, R. A. Peloquin, and J. V. Ramsdell, 1988, *GENII - The Hanford Environmental Radiation Dosimetry Software System*, PNL-6584, Vol 1, Pacific Northwest Laboratory, Richland WA.
- Rittmann, P. D., 1995, *ISO-PC Version 1.98 - User's Guide*, WHC-SD-WM-UM-030, Rev 0, Westinghouse Hanford Company, Richland WA.

Simmons, G.L., J. J. Regimbal, J. Greenborg, E. L. Kelly, Jr., H. H. van Tuyt,
1967, *ISOSHL-D-II: Code Revision to Include Calculation of Dose Rate from
Shielded Bremsstrahlung Sources*, BNWL-236 Supplement 1, Battelle
Northwest Laboratories, Richland WA.

Attachment 1

**Source Term Inventories (Ci and Photon)
for 42% Enriched Driver Fuel Assembly
Irradiated to 500 EFPD
From ORIGEN2 Output**

ACTIVATION PRODUCTS
7 SUMMARY TABLE: RADIOACTIVITY, CURIES
42% Pu enriched FFTF DFA, 500 EFPD irradiation

EOEC

480 days

4.6 years

H 3	6.320E-05	5.870E-05	4.881E-05
C 14	5.957E-02	5.956E-02	5.954E-02
P 32	2.050E+00	2.891E-09	2.720E-09
CA 45	1.593E-01	2.068E-02	1.255E-04
SC 46	2.305E+01	4.348E-01	2.122E-05
CR 51	2.132E+03	1.300E-02	1.189E-15
MN 54	8.079E+03	2.786E+03	1.945E+02
FE 55	5.330E+02	3.755E+02	1.564E+02
FE 59	9.668E+01	5.948E-02	5.570E-10
CO 58	3.918E+04	3.560E+02	2.798E-03
CO 60	2.680E+02	2.255E+02	1.463E+02
NI 59	9.162E-02	9.162E-02	9.162E-02
NI 63	1.323E+01	1.310E+01	1.278E+01
ZN 65	2.640E-03	6.747E-04	2.227E-05
Y 90	9.792E-04	7.992E-08	7.390E-08
ZR 95	8.901E-01	4.910E-03	1.108E-08
NB 92	5.064E+01	3.038E-13	0.000E+00
NB 94	1.950E-04	1.950E-04	1.950E-04
NB 95	2.126E+00	1.102E-02	2.459E-08
NB 95M	6.231E-03	3.642E-05	8.217E-11
MO 93	8.665E-03	8.663E-03	8.658E-03
TC 99	3.338E-03	3.366E-03	3.366E-03
RU103	2.189E+00	4.591E-04	2.917E-13
TA182	1.210E+03	6.702E+01	4.837E-02
W185	8.872E-03	1.057E-04	1.634E-09
SUMTOT	9.212E+04	3.824E+03	5.102E+02
TOTAL	9.212E+04	3.824E+03	5.102E+02

ACTIVATION PRODUCTS
7 SUMMARY TABLE: RADIOACTIVITY, CURIES
42% Pu enriched FFTF DFA, 500 EFPD irradiation

EOEC

480 days

4.6 years

H	6.320E-05	5.870E-05	4.881E-05
HE	5.826E-02	0.000E+00	0.000E+00
BE	1.006E-01	9.082E-07	9.082E-07
C	1.073E+01	5.956E-02	5.954E-02

NA	3.187E+00	1.703E-12	7.095E-13
SI	1.077E+02	2.730E-09	2.720E-09
P	2.050E+00	2.891E-09	2.720E-09
CA	1.599E-01	2.068E-02	1.255E-04
SC	6.557E+01	4.348E-01	2.122E-05
V	5.348E+02	2.223E-14	2.223E-14
CR	2.212E+03	1.300E-02	1.189E-15
MN	3.475E+04	2.786E+03	1.945E+02
FE	6.297E+02	3.755E+02	1.564E+02
CO	4.026E+04	5.815E+02	1.463E+02
NI	6.605E+01	1.319E+01	1.287E+01
ZN	2.640E-03	6.747E-04	2.227E-05
SE	4.547E+00	1.634E-08	1.633E-08
Y	2.554E-01	1.747E-07	7.390E-08
ZR	1.164E+00	4.912E-03	1.899E-06
NB	5.541E+01	1.125E-02	1.954E-04
MO	8.132E+03	8.663E-03	8.658E-03
TC	1.893E+03	3.366E-03	3.366E-03
RU	2.189E+00	4.591E-04	2.571E-11
RH	9.540E-03	9.115E-08	4.148E-08
TA	1.313E+03	6.702E+01	4.837E-02
W	5.955E-02	1.057E-04	1.634E-09
SUMTOT	9.212E+04	3.824E+03	5.102E+02
TOTAL	9.212E+04	3.824E+03	5.102E+02

CUMULATIVE TABLE TOTALS

AP+FP	9.212E+04	3.824E+03	5.102E+02
ACT+FP	0.000E+00	0.000E+00	0.000E+00
AP+ACT+FP	9.212E+04	3.824E+03	5.102E+02

ACTINIDES+DAUGHTERS

7 SUMMARY TABLE: RADIOACTIVITY, CURIES
42% Pu enriched FFTF DFA, 500 EFPD irradiation

EOEC

480 days

4.6 years

TL208	1.519E-05	1.343E-04	6.014E-04
PB212	4.228E-05	3.738E-04	1.674E-03
BI212	4.228E-05	3.738E-04	1.674E-03
PO212	2.709E-05	2.395E-04	1.072E-03
PO216	4.228E-05	3.738E-04	1.674E-03
RN220	4.228E-05	3.738E-04	1.674E-03
RA224	4.228E-05	3.738E-04	1.674E-03
TH228	4.228E-05	3.737E-04	1.673E-03
TH231	3.108E-04	3.043E-04	3.061E-04
TH234	5.905E-03	5.876E-03	5.876E-03
PA233	6.202E-03	6.506E-03	6.790E-03

PA234M	5.944E-03	5.876E-03	5.876E-03
U232	3.692E-04	1.335E-03	2.696E-03
U234	5.301E-04	1.340E-03	3.678E-03
U235	3.035E-04	3.043E-04	3.061E-04
U236	9.628E-04	9.756E-04	1.008E-03
U237	1.696E+04	1.973E-01	1.684E-01
U238	5.876E-03	5.876E-03	5.876E-03
U240	1.913E-01	2.848E-10	2.848E-10
NP235	2.859E-03	1.234E-03	1.511E-04
NP237	6.257E-03	6.506E-03	6.790E-03
NP238	3.298E+03	1.459E-01	1.437E-01
NP239	1.601E+06	5.333E-02	5.331E-02
NP240M	3.899E+01	2.848E-10	2.848E-10
PU236	8.966E-02	6.552E-02	2.948E-02
PU237	5.577E+00	3.783E-03	4.518E-11
PU238	1.648E+02	2.441E+02	2.502E+02
PU239	5.743E+02	5.747E+02	5.747E+02
PU240	3.297E+02	3.296E+02	3.295E+02
PU241	8.567E+03	8.042E+03	6.865E+03
PU242	2.715E-02	2.718E-02	2.721E-02
PU243	8.150E+02	4.345E-12	4.345E-12
AM241	2.301E+02	2.471E+02	2.849E+02
AM242M	2.935E+01	2.917E+01	2.874E+01
AM242	2.340E+04	2.903E+01	2.860E+01
AM243	5.327E-02	5.333E-02	5.331E-02
CM241	5.663E-02	5.486E-06	5.055E-16
CM242	1.825E+04	2.408E+03	3.827E+01
CM243	7.972E+00	7.721E+00	7.128E+00
CM244	1.423E+00	1.354E+00	1.194E+00
CM245	1.063E-04	1.063E-04	1.063E-04
SUMTOT	3.278E+06	1.191E+04	8.409E+03
TOTAL	3.278E+06	1.191E+04	8.409E+03

ACTINIDES+DAUGHTERS

7 SUMMARY TABLE: RADIOACTIVITY, CURIES
42% Pu enriched FFTF DFA, 500 EFPD irradiation

EOEC

480 days

4.6 years

TL	1.519E-05	1.343E-04	6.014E-04
PB	4.228E-05	3.738E-04	1.674E-03
BI	4.228E-05	3.738E-04	1.674E-03
PO	6.942E-05	6.133E-04	2.746E-03
RN	4.232E-05	3.738E-04	1.674E-03
RA	4.233E-05	3.738E-04	1.674E-03
TH	6.289E-03	6.554E-03	7.856E-03
PA	1.233E-02	1.239E-02	1.267E-02

U	1.620E+06	2.071E-01	1.820E-01
NP	1.606E+06	2.069E-01	2.040E-01
PU	1.046E+04	9.190E+03	8.020E+03
AM	2.373E+04	3.054E+02	3.423E+02
CM	1.826E+04	2.417E+03	4.660E+01
SUMTOT	3.278E+06	1.191E+04	8.409E+03
TOTAL	3.278E+06	1.191E+04	8.409E+03

CUMULATIVE TABLE TOTALS

AP+FP	9.212E+04	3.824E+03	5.102E+02
ACT+FP	3.278E+06	1.191E+04	8.409E+03
AP+ACT+FP	3.370E+06	1.574E+04	8.919E+03

FISSION PRODUCTS

7 SUMMARY TABLE: RADIOACTIVITY, CURIES
42% Pu enriched FFTF DFA, 500 EFPD irradiation

EOEC

480 days

4.6 years

H 3	8.631E+01	8.017E+01	6.667E+01
SE 79	4.141E-02	4.141E-02	4.141E-02
KR 85	7.753E+02	7.124E+02	5.761E+02
RB 86	1.130E+03	2.034E-05	8.797E-25
SR 89	1.111E+05	1.529E+02	1.071E-05
SR 90	4.659E+03	4.515E+03	4.175E+03
Y 90	5.092E+03	4.516E+03	4.176E+03
Y 91	1.522E+05	5.197E+02	3.474E-04
ZR 93	1.578E-01	1.580E-01	1.580E-01
NB 93M	6.792E-03	1.608E-02	3.674E-02
ZR 95	2.832E+05	1.562E+03	3.524E-03
NB 95	2.817E+05	3.476E+03	7.823E-03
NB 95M	1.997E+03	1.159E+01	2.614E-05
TC 99	1.648E+00	1.661E+00	1.661E+00
RH102	1.476E+00	1.078E+00	4.914E-01
RJ103	3.818E+05	8.007E+01	5.087E-08
RH103M	3.438E+05	7.218E+01	4.586E-08
RJ106	1.692E+05	6.853E+04	7.155E+03
RH106	1.694E+05	6.853E+04	7.155E+03
PD107	2.734E-02	2.734E-02	2.734E-02
AG108	5.568E+00	1.295E-06	1.272E-06
AG109M	9.237E+04	9.730E-03	1.620E-03
CD109	1.993E-02	9.730E-03	1.620E-03
AG110	7.769E+03	2.991E+00	1.072E-01
AG110M	8.517E+02	2.249E+02	8.058E+00
AG111	2.155E+04	8.709E-16	0.000E+00
CD113M	1.110E+01	1.043E+01	8.923E+00
IN114	7.733E-01	2.906E-04	1.464E-11

CD115M	5.116E+02	2.943E-01	2.330E-09
IN115M	5.343E+03	2.068E-05	1.638E-13
SN117M	5.083E+00	2.446E-10	0.000E+00
SN119M	5.537E+01	1.424E+01	4.776E-01
SN121M	1.550E-01	1.522E-01	1.454E-01
SN123	1.220E+03	9.285E+01	1.482E-01
TE123M	8.175E-01	5.071E-02	4.856E-05
SB124	2.073E+02	8.241E-01	8.210E-07
SN125	3.632E+03	3.726E-12	0.000E+00
SB125	3.689E+03	2.680E+03	1.178E+03
TE125M	7.398E+02	6.534E+02	2.874E+02
SN126	1.719E-01	1.719E-01	1.719E-01
SB126	7.400E+02	2.407E-02	2.407E-02
SB126M	2.197E+02	1.719E-01	1.719E-01
TE127	3.107E+04	2.110E+02	1.023E-01
TE127M	4.399E+03	2.154E+02	1.045E-01
TE129	7.734E+04	3.823E-01	6.759E-12
TE129M	1.168E+04	5.873E-01	1.038E-11
I129	5.452E-03	5.523E-03	5.523E-03
I131	2.206E+05	2.436E-13	0.000E+00
XEL131M	2.450E+03	5.531E-09	0.000E+00
CS134	7.152E+03	4.598E+03	1.524E+03
CS135	1.961E-01	1.964E-01	1.964E-01
CS136	1.247E+04	1.168E-07	0.000E+00
BA136M	2.056E+03	1.925E-08	0.000E+00
CS137	1.278E+04	1.239E+04	1.149E+04
BA137M	1.214E+04	1.172E+04	1.087E+04
BA140	2.983E+05	1.502E-06	0.000E+00
LA140	3.012E+05	1.729E-06	0.000E+00
CE141	3.100E+05	1.120E+01	8.648E-11
PR143	2.484E+05	6.164E-06	0.000E+00
CE144	1.650E+05	5.118E+04	2.743E+03
PR144	1.655E+05	5.118E+04	2.743E+03
PR144M	1.984E+03	6.142E+02	3.291E+01
PM146	2.726E+00	2.310E+00	1.527E+00
ND147	1.206E+05	1.041E-08	0.000E+00
PM147	3.267E+04	2.409E+04	1.011E+04
PM148	1.812E+04	3.965E-01	7.076E-10
PM148M	2.221E+04	7.040E+00	1.256E-08
SM151	4.841E+02	4.809E+02	4.689E+02
EU152	2.492E+00	2.330E+00	1.971E+00
GD153	3.207E+00	8.112E-01	2.608E-02
EU154	4.143E+02	3.726E+02	2.859E+02
EU155	2.089E+03	1.739E+03	1.099E+03
EU156	1.187E+04	3.684E-06	0.000E+00
TB160	3.663E+02	3.677E+00	3.704E-05
TB161	5.774E+02	7.610E-19	0.000E+00
SUMTOT	3.126E+07	3.153E+05	6.615E+04
TOTAL	3.126E+07	3.153E+05	6.615E+04

FISSION PRODUCTS
 7 SUMMARY TABLE: RADIOACTIVITY, CURIES
 42% Pu enriched FFTF DFA, 500 EFPD irradiation

EOEC

480 days

4.6 years

H	8.631E+01	8.017E+01	6.667E+01
SE	1.153E+05	4.141E-02	4.141E-02
KR	4.351E+05	7.124E+02	5.761E+02
RB	6.712E+05	2.185E-05	1.517E-06
SR	1.196E+06	4.668E+03	4.175E+03
Y	1.804E+06	5.036E+03	4.176E+03
ZR	1.685E+06	1.562E+03	1.615E-01
NB	2.723E+06	3.487E+03	4.466E-02
TC	2.492E+06	1.661E+00	1.661E+00
RU	1.260E+06	6.861E+04	7.155E+03
RH	1.435E+06	6.861E+04	7.156E+03
PD	2.004E+05	2.734E-02	2.734E-02
AG	1.968E+05	2.279E+02	8.167E+00
CD	4.112E+04	1.074E+01	8.925E+00
IN	8.611E+04	6.141E-04	3.840E-11
SN	2.948E+05	1.074E+02	9.431E-01
SB	7.195E+05	2.681E+03	1.178E+03
TE	1.510E+06	1.081E+03	2.876E+02
I	2.214E+06	5.523E-03	5.523E-03
XE	1.895E+06	7.735E-06	9.250E-16
CS	1.377E+06	1.699E+04	1.301E+04
BA	1.682E+06	1.172E+04	1.087E+04
LA	1.664E+06	1.729E-06	5.103E-12
CE	1.323E+06	5.119E+04	2.743E+03
PR	1.134E+06	5.180E+04	2.776E+03
ND	3.256E+05	1.050E-08	1.111E-10
PM	2.989E+05	2.410E+04	1.011E+04
SM	5.862E+04	4.809E+02	4.689E+02
EU	2.754E+04	2.114E+03	1.386E+03
GD	3.377E+03	8.112E-01	2.608E-02
TB	1.526E+03	3.677E+00	3.704E-05
HO	4.178E+01	2.743E-04	2.738E-04
ER	4.446E-01	6.400E-18	0.000E+00
SUMTOT	3.126E+07	3.153E+05	6.615E+04
TOTAL	3.126E+07	3.153E+05	6.615E+04
CUMULATIVE TABLE TOTALS			
AP+FP	3.135E+07	3.191E+05	6.666E+04
ACT+FP	3.454E+07	3.272E+05	7.456E+04
AP+ACT+FP	3.463E+07	3.310E+05	7.507E+04

" 42% enriched fuel assembly source for hazard analysis
 " 42% Pu enriched FFTF DFA, 500 EFPD irradiation
 " 18 GROUP PHOTON SPECTRUM, PHOTONS/SEC"
 " EMEAN ""EOEC ""480 days""4.6 year"

"ACTIVATION"

1.500E-02 1.163E+15 1.834E+13 1.283E+12
 2.500E-02 1.580E+14 2.633E+11 4.977E+10
 3.750E-02 1.067E+14 1.838E+11 2.837E+10
 5.750E-02 1.917E+14 2.435E+12 3.356E+10
 8.500E-02 9.895E+13 3.219E+11 1.271E+10
 1.250E-01 8.487E+13 5.151E+11 5.149E+09
 2.250E-01 1.237E+14 7.225E+11 2.054E+09
 3.750E-01 1.017E+14 2.934E+10 4.456E+08
 5.750E-01 4.749E+14 3.516E+12 5.322E+07
 8.500E-01 2.704E+15 1.138E+14 7.065E+12
 1.250E+00 1.203E+14 1.899E+13 1.083E+13
 1.750E+00 3.048E+14 6.519E+10 5.123E+05
 2.250E+00 1.398E+14 8.840E+07 5.738E+07
 2.750E+00 1.883E+13 2.735E+05 1.775E+05
 3.500E+00 1.641E+12 2.530E-04 2.642E-05
 5.000E+00 1.620E+10 0.000E+00 0.000E+00
 7.000E+00 2.691E+12 0.000E+00 0.000E+00
 1.100E+01 2.758E+09 0.000E+00 0.000E+00

"ACTINIDES"

1.500E-02 8.290E+16 2.255E+13 8.554E+12
 2.500E-02 3.636E+15 2.474E+11 2.825E+11
 3.750E-02 5.417E+15 6.948E+10 3.880E+10
 5.750E-02 4.152E+15 3.428E+12 3.948E+12
 8.500E-02 3.752E+16 1.074E+11 1.031E+11
 1.250E-01 2.947E+16 1.784E+11 1.689E+11
 2.250E-01 2.081E+16 9.890E+10 9.067E+10
 3.750E-01 2.275E+15 2.278E+09 2.269E+09
 5.750E-01 3.850E+14 3.865E+08 1.850E+08
 8.500E-01 5.909E+14 1.881E+09 1.817E+09
 1.250E+00 3.499E+13 1.145E+09 1.115E+09
 1.750E+00 1.548E+10 7.127E+06 3.094E+06
 2.250E+00 2.566E+07 3.735E+06 4.539E+05
 2.750E+00 1.535E+07 6.871E+06 2.137E+07
 3.500E+00 1.331E+07 1.935E+06 2.324E+05
 5.000E+00 5.694E+06 8.268E+05 9.851E+04
 7.000E+00 6.536E+05 9.482E+04 1.120E+04
 1.100E+01 7.543E+04 1.093E+04 1.279E+03

"FISSION PRODUCTS"

1.500E-02 3.769E+17 3.831E+15 4.778E+14
 2.500E-02 1.013E+17 8.906E+14 1.287E+14
 3.750E-02 7.984E+16 8.118E+14 1.211E+14
 5.750E-02 7.969E+16 8.146E+14 9.791E+13
 8.500E-02 5.920E+16 5.737E+14 7.351E+13

1.250E-01	6.447E+16	5.832E+14	6.210E+13
2.250E-01	1.521E+17	5.155E+14	5.841E+13
3.750E-01	1.135E+17	2.976E+14	4.309E+13
5.750E-01	1.825E+17	1.667E+15	6.036E+14
8.500E-01	1.800E+17	4.081E+14	6.245E+13
1.250E+00	9.838E+16	1.012E+14	1.689E+13
1.750E+00	3.682E+16	1.523E+13	1.587E+12
2.250E+00	1.764E+16	1.814E+13	1.161E+12
2.750E+00	7.688E+15	5.579E+11	5.759E+10
3.500E+00	3.326E+15	7.123E+10	7.437E+09
5.000E+00	1.083E+15	6.365E-06	7.029E-06
7.000E+00	1.061E+13	4.130E-07	4.561E-07
1.100E+01	1.966E+09	2.612E-08	2.884E-08

Attachment 2

**GXQ Files for Calculation of X/Q's
Shown in Section 2.2**

GXQ Version 4.0A
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 09/04/97
Run Time = 19:59:03.27

INPUT ECHO:

FFTF X/Qs - site boundary - 100 m - 2.4 km - 7.2 km E - 99.5%/sector => no BW
c GXQ Version 4.0 Input File

c mode
1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop
T F F F F F

c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting

```

c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff idep isrc iwind
c     0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake ipm   iflow ientr
c     0     0     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c     0     0     0     0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c       = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      mixing      frequency
c   height       height        height      to
c   hs(m)        ha(m)         hm(m)      exceed
c
c   0.00000E+00  1.00000E+01    1.00000E+03  5.00000E-01
c
c   initial      initial
c   plume        plume
c   width        height      release      deposition      gravitational
c   Wb(m)        Hb(m)       duration    velocity        settling
c                                     trd(hr)     vd(m/s)         velocity
c
c   6.00000E+01  2.00000E+01    0.00000E+00  1.00000E-02    1.00000E-02

```


	initial plume temperature Tamb(C)	initial plume temperature T0(C)	initial plume flow rate V0(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
	2.00000E+01	2.20000E+01	1.00000E+00	1.00000E+00	0.00000E+00

(1) If zero then buoyant flux based on plume/ambient temperature difference.

	X/Q scaling factor c(?)	Wind Speed Exponent a(?)
	1.00000E+00	7.80000E-01

RECEPTOR DEPENDENT DATA (no line limit)

FOR MODE make RECEPTOR DEPENDENT DATA

1 (site specific) sector distance receptor-height

2 (by class & wind speed) class windspeed distance offset receptor-height

3 (create plot file) class windspeed xmax imax ymax jmax xqmin power

RECEPTOR PARAMETER DESCRIPTION

sector = 0, 1, 2... (all, S, SSW, etc.)

distance = receptor distance (m)

receptor height = height of receptor (m)

class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)

windspeed = anemometer wind speed (m/s)

offset = offset from plume centerline (m)

xmax = maximum distance to plot or calculate to (m)

imax = distance intervals

ymax = maximum offset to plot (m)

jmax = offset intervals

xqmin = minimum scaled X/Q to calculate

power = exponent in power function step size

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

No normalization of joint frequency.

X/Q calculated for single sector.

MODELS SELECTED:

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:

400 AREA (FFTF) - 10 M - Pasquill A - G (1983 - 1991 Average)

Created 8/26/92 KR

FFTF X/Qs - site boundary - 100 m - 2.4 km - 7.2 km E - 99.5%/sector => no BW

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	8700	0	7.29	1	2.90E-05	2.90E-05	F	0.89
SSW	7000	0	5.75	1	2.82E-05	2.82E-05	G	2.65
SW	7000	0	3.41	1	1.67E-05	1.67E-05	E	0.89
WSW	13100	0	2.22	1	3.92E-06	3.92E-06	F	4.70
W	22200	0	2.87	1	3.61E-06	3.61E-06	E	0.89
WNW	36400	0	2.65	1	1.83E-06	1.83E-06	F	2.65
NW	41900	0	4.08	1	1.65E-06	1.65E-06	E	0.89
NNW	41900	0	7.41	1	3.12E-06	3.12E-06	G	2.65
N	16200	0	13.26	1	1.32E-05	1.32E-05	F	0.89
NNE	13100	0	12.15	1	1.43E-05	1.43E-05	G	2.65
NE	9000	0	6.95	1	1.48E-05	1.48E-05	G	4.70
ENE	7600	0	3.94	1	1.53E-05	1.53E-05	E	0.89
E	7200	0	5.45	1	2.03E-05	2.03E-05	G	4.70
ESE	7500	0	6.48	1	1.79E-05	1.79E-05	G	4.70
SE	8700	0	9.75	1	2.44E-05	2.44E-05	G	2.65
SSE	8800	0	6.32	1	2.32E-05	2.32E-05	G	2.65
S	100	0	7.29	1	3.17E-02	3.17E-02	F	0.89
SSW	100	0	5.75	1	2.32E-02	2.32E-02	G	2.65
SW	100	0	3.41	1	1.46E-02	1.46E-02	E	0.89
WSW	100	0	2.22	1	1.05E-02	1.05E-02	F	2.65
W	100	0	2.87	1	1.43E-02	1.43E-02	E	0.89
WNW	100	0	2.65	1	1.25E-02	1.25E-02	F	2.65
NW	100	0	4.08	1	1.53E-02	1.53E-02	E	0.89
NNW	100	0	7.41	1	2.37E-02	2.37E-02	G	2.65
N	100	0	13.26	1	3.17E-02	3.17E-02	F	0.89
NNE	100	0	12.15	1	2.62E-02	2.62E-02	G	2.65
NE	100	0	6.95	1	1.68E-02	1.68E-02	G	4.70
ENE	100	0	3.94	1	1.50E-02	1.50E-02	E	0.89
E	100	0	5.45	1	1.73E-02	1.73E-02	G	4.70
ESE	100	0	6.48	1	1.61E-02	1.61E-02	G	4.70
SE	100	0	9.75	1	2.66E-02	2.66E-02	G	2.65
SSE	100	0	6.32	1	2.56E-02	2.56E-02	G	2.65
S	2400	0	7.29	1	1.65E-04	1.65E-04	F	0.89

HNF-SD-FF-CN-013 Rev. 0

SSW	2400	0	5.75	1	1.21E-04	1.21E-04 G	2.65
SW	2400	0	3.41	1	7.53E-05	7.53E-05 E	0.89
WSW	2400	0	2.22	1	5.22E-05	5.22E-05 F	2.65
W	2400	0	2.87	1	7.38E-05	7.38E-05 E	0.89
WNW	2400	0	2.65	1	6.46E-05	6.46E-05 F	2.65
NW	2400	0	4.08	1	7.91E-05	7.91E-05 E	0.89
NNW	2400	0	7.41	1	1.24E-04	1.24E-04 G	2.65
N	2400	0	13.26	1	1.65E-04	1.65E-04 F	0.89
NNE	2400	0	12.15	1	1.37E-04	1.37E-04 G	2.65
NE	2400	0	6.95	1	8.79E-05	8.79E-05 G	4.70
ENE	2400	0	3.94	1	7.75E-05	7.75E-05 E	0.89
E	2400	0	5.45	1	9.04E-05	9.04E-05 G	4.70
ESE	2400	0	6.48	1	8.42E-05	8.42E-05 G	4.70
SE	2400	0	9.75	1	1.39E-04	1.39E-04 G	2.65
SSE	2400	0	6.32	1	1.34E-04	1.34E-04 G	2.65
E	7200	0	5.45	1	2.03E-05	2.03E-05 G	4.70
E	8200	0	5.45	1	1.72E-05	1.72E-05 G	4.70

GXQ Version 4.0A
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 09/04/97
Run Time = 20:10:18.20

INPUT ECHO:

FFTF X/Qs - site boundary - 100 m - 2.4 km - 95%/all sectors => no BW

c GXQ Version 4.0 Input File

c mode
1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop
T F F F T F

c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GENII)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting

```

c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c  ipuff idep isrc iwind
c    0      0      0      0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c  iwake ipm  iflow ientr
c    0      0      0      0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c  (irise-igrnd)iwash igrav
c    0      0      0      0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c       = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c      release      reference      mixing      frequency
c      height      height      height      to
c      hs(m)      ha(m)      hm(m)      exceed
c
c      0.00000E+00      1.00000E+01      1.00000E+03      5.00000E+00
c
c      initial      initial      release      deposition      gravitational
c      plume      plume      duration      velocity      settling
c      width      height      trd(hr)      velocity      velocity
c      Wb(m)      Hb(m)      vd(m/s)      vg(m/s)
c
c      6.00000E+01      2.00000E+01      0.00000E+00      1.00000E-02      1.00000E-02
c
c      ambient      initial      initial      release      convective
c      temperature      plume      plume      diameter      heat release
c      Tamb(C)      T0(C)      flow rate      d(m)      rate(l)
c                   V0(m3/s)
c                   qh(w)

```

```

c      2.00000E+01      2.20000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q              Wind
c      scaling          Speed
c      factor           Exponent
c      c(?)             a(?)
c
c      1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.
 No normalization of joint frequency.
 X/Q calculated for overall site.

MODELS SELECTED:

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:

400 AREA (FFTF) - 10 M - Pasquill A - G (1983 - 1991 Average)
 Created 8/26/92 KR

FFTF X/Qs - site boundary - 100 m - 2.4 km - 95%/all sectors => no BW

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
ALL	8800	0	99.98	1	2.48E-05	2.48E-05	G	2.65
ALL	100	0	99.98	1	3.11E-02	3.11E-02	G	2.65
ALL	2400	0	99.98	1	1.62E-04	1.62E-04	G	2.65

GXQ Version 4.0A
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 07/31/97
Run Time = 15:24:28.04

INPUT ECHO:

FFTF X/Qs - site boundary - 100 m - 2.4 km - 7.2 km E - 99.5%/sector => with BW

c GXQ Version 4.0 Input File

c mode
1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

T F F F F F

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting


```

c X/Q and WIND SPEED ADJUSTMENT MODELS:
c   ipuff idep isrc iwind
c     0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake ipm   iflow ientr
c     2     0     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c     0     0     0     0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c       = 0 unless specified otherwise, 0 turns model off
c
c
c PARAMETER INPUT:
c
c   release      reference      frequency
c   height      anemometer     to
c   hs(m)       height          exceed
c               ha(m)           Cx(%)
c
c   0.00000E+00  1.00000E+01  1.00000E+03  5.00000E-01
c
c   initial      initial      gravitational
c   plume        plume        settling
c   width        height      release
c   Wb(m)        Hb(m)        duration
c               Hb(m)        trd(hr)
c               vd(m/s)      velocity
c               vg(m/s)      velocity
c
c   6.00000E+01  2.00000E+01  0.00000E+00  1.00000E-02  1.00000E-02
c
c   ambient      initial      initial      convective
c   temperature  plume        plume        heat release
c   Tamb(C)      T0(C)        flow rate   rate(1)
c               T0(C)        V0(m3/s)   d(m)       qh(w)

```

```

c      2.00000E+01      2.20000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q              Wind
c      scaling          Speed
c      factor           Exponent
c      c(?)             a(?)
c
c      1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

No normalization of joint frequency.

X/Q calculated for single sector.

MODELS SELECTED:

MACCS Virtual source building wake model selected.

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:

400 AREA (FFTF) - 10 M - Pasquill A - G (1983 - 1991 Average)

Created 8/26/92 RR

FFTF X/Qs - site boundary - 100 m - 2.4 km - 7.2 km E - 99.5%/sector => with BW

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	8700	0	7.29	1	2.68E-05	2.68E-05	F	0.89
SSW	7000	0	5.75	1	2.49E-05	2.49E-05	G	2.65
SW	7000	0	3.41	1	1.58E-05	1.58E-05	E	0.89
WSW	13100	0	2.22	1	3.77E-06	3.77E-06	F	4.70
W	22200	0	2.87	1	3.55E-06	3.55E-06	E	0.89
WNW	36400	0	2.65	1	1.81E-06	1.81E-06	F	2.65
NW	41900	0	4.08	1	1.64E-06	1.64E-06	E	0.89
NNW	41900	0	7.41	1	3.06E-06	3.06E-06	G	2.65
N	16200	0	13.26	1	1.27E-05	1.27E-05	F	0.89
NNE	13100	0	12.15	1	1.34E-05	1.34E-05	G	2.65
NE	9000	0	6.95	1	1.34E-05	1.34E-05	G	4.70
ENE	7600	0	3.94	1	1.46E-05	1.46E-05	E	0.89
E	7200	0	5.45	1	1.80E-05	1.80E-05	G	4.70
ESE	7500	0	6.48	1	1.60E-05	1.60E-05	G	4.70
SE	8700	0	9.75	1	2.21E-05	2.21E-05	G	2.65
SSE	8800	0	6.32	1	2.10E-05	2.10E-05	G	2.65
S	100	0	7.29	1	1.77E-03	1.77E-03	E	0.89
SSW	100	0	5.75	1	1.47E-03	1.47E-03	E	0.89
SW	100	0	3.41	1	1.33E-03	1.33E-03	D	0.89
WSW	100	0	2.22	1	1.12E-03	1.12E-03	D	0.89
W	100	0	2.87	1	1.49E-03	1.49E-03	E	0.89
WNW	100	0	2.65	1	1.38E-03	1.38E-03	D	0.89
NW	100	0	4.08	1	1.38E-03	1.38E-03	D	0.89
NNW	100	0	7.41	1	1.43E-03	1.43E-03	D	0.89
N	100	0	13.26	1	1.78E-03	1.78E-03	F	0.89
NNE	100	0	12.15	1	1.62E-03	1.62E-03	E	0.89
NE	100	0	6.95	1	1.59E-03	1.59E-03	E	0.89
ENE	100	0	3.94	1	1.47E-03	1.47E-03	E	0.89
E	100	0	5.45	1	1.70E-03	1.70E-03	E	0.89
ESE	100	0	6.48	1	1.53E-03	1.53E-03	E	0.89
SE	100	0	9.75	1	1.56E-03	1.56E-03	E	0.89
SSE	100	0	6.32	1	1.58E-03	1.58E-03	E	0.89
S	2400	0	7.29	1	1.23E-04	1.23E-04	F	0.89
SSW	2400	0	5.75	1	9.18E-05	9.18E-05	G	2.65
SW	2400	0	3.41	1	6.17E-05	6.17E-05	G	4.70
WSW	2400	0	2.22	1	4.27E-05	4.27E-05	F	2.65
W	2400	0	2.87	1	6.23E-05	6.23E-05	E	0.89
WNW	2400	0	2.65	1	5.25E-05	5.25E-05	F	2.65
NW	2400	0	4.08	1	6.33E-05	6.33E-05	E	0.89

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NNW	2400	0	7.41	1	8.31E-05	8.31E-05 E	0.89
N	2400	0	13.26	1	1.23E-04	1.23E-04 F	0.89
NNE	2400	0	12.15	1	9.76E-05	9.76E-05 G	2.65
NE	2400	0	6.95	1	8.82E-05	8.82E-05 G	2.65
ENE	2400	0	3.94	1	6.59E-05	6.59E-05 E	0.89
E	2400	0	5.45	1	9.55E-05	9.55E-05 G	2.65
ESE	2400	0	6.48	1	8.27E-05	8.27E-05 E	0.89
SE	2400	0	9.75	1	9.66E-05	9.66E-05 G	2.65
SSE	2400	0	6.32	1	9.60E-05	9.60E-05 G	2.65
E	7200	0	5.45	1	1.80E-05	1.80E-05 G	4.70
E	8200	0	5.45	1	1.54E-05	1.54E-05 G	4.70

GXQ Version 4.0A
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 07/31/97
Run Time = 15:32:17.27

INPUT ECHO:

FFTF X/Qs - site boundary - 100 m - 2.4 km - 95%/all sectors => with BW

c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

T F F F T F

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

```

c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c  ipuff idep isrc iwind
c    0      0      0      0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c  iwake ipm  iflow ientr
c    2      0      0      0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c  (irise igrnd)iwash igrav
c    0      0      0      0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c       = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c      release      reference      frequency
c      height      anemometer      to
c      hs(m)       height          exceed
c                      ha(m)       Cx(%)
c
c      0.00000E+00  1.00000E+01  1.00000E+03  5.00000E+00
c
c      initial      initial      release      deposition      gravitational
c      plume        plume        duration     velocity        settling
c      width        height      trd(hr)      velocity        velocity
c      Wb(m)        Hb(m)              vd(m/s)        vg(m/s)
c
c      6.00000E+01  2.00000E+01  0.00000E+00  1.00000E-02  1.00000E-02
c
c      ambient      initial      initial      release      convective
c      temperature  plume        plume        diameter   heat release
c      Tamb(C)      TO(C)        flow rate    d(m)        rate(1)
c                      V0(m3/s)
c                      qh(w)

```

```

c
c 2.00000E+01  2.20000E+01  1.00000E+00  1.00000E+00  0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c X/Q      Wind
c scaling  Speed
c factor   Exponent
c c(?)     a(?)
c
c 1.00000E+00  7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax imax ymax jmax xmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

No normalization of joint frequency.

X/Q calculated for overall site.

MODELS SELECTED:

MACCS Virtual source building wake model selected.

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:

400 AREA (FFTF) - 10 M - Pasquill A - G (1983 - 1991 Average)

Created 8/26/92 KR

FFTF X/Qs - site boundary - 100 m - 2.4 km - 95%/all sectors => with BW

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
ALL	8800	0	99.98	1	2.30E-05	2.30E-05	G	2.65
ALL	100	0	99.98	1	1.78E-03	1.78E-03	F	0.89
ALL	2400	0	99.98	1	1.19E-04	1.19E-04	G	2.65

GXQ Version 4.0A
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 07/31/97
Run Time = 15:38:43.95

INPUT ECHO:

FFTF X/Qs - 50%/sector => no BW

c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

T T F F F F

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

```

c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff idep isrc iwind
c     0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake ipm   iflow ientr
c     0     0     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c     0     0     0     0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c       = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      frequency
c   height      anemometer      to
c   hs(m)       height          exceed
c               ha(m)           Cx(%)
c
c   0.00000E+00  1.00000E+01  1.00000E+03  5.00000E+01
c
c   initial      initial      release      deposition      gravitational
c   plume        plume        duration      velocity        settling
c   width        height      trd(hr)        velocity        velocity
c   Wb(m)        Hb(m)                vd(m/s)        vg(m/s)
c
c   0.00000E+00  1.00000E+01  0.00000E+00  1.00000E-02  1.00000E-02
c
c   ambient      initial      initial      release      convective
c   temperature  plume        plume        diameter    heat release
c   Tamb(C)      TO(C)        flow rate   d(m)         rate(l)
c               V0(m3/s)                qh(w)

```

```

c      2.00000E+01      2.20000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c   X/Q      Wind
c   scaling   Speed
c   factor    Exponent
c   c(?)      a(?)
c
c      1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

Joint frequency data normalized.

X/Q calculated for single sector.

MODELS SELECTED:

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:

400 AREA (FFTF) - 10 M - Pasquill A - G (1983 - 1991 Average)

Created 8/26/92 KR

FFTF X/Qs - 50%/sector => no BW

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	8700	0	100.00	1	2.35E-06	2.35E-06	E	4.70
SSW	7000	0	100.00	1	2.46E-06	2.46E-06	D	2.65
SW	7000	0	100.00	1	2.64E-06	2.64E-06	D	2.65
WSW	13100	0	100.00	1	1.05E-06	1.05E-06	D	2.65
W	22200	0	100.00	1	5.40E-07	5.40E-07	D	2.65
WNW	36400	0	100.00	1	2.37E-07	2.37E-07	D	2.65
NW	41900	0	100.00	1	2.59E-07	2.59E-07	E	7.15
NNW	41900	0	100.00	1	4.74E-07	4.74E-07	E	2.65
N	16200	0	100.00	1	1.06E-06	1.06E-06	E	4.70
NNE	13100	0	100.00	1	8.90E-07	8.90E-07	E	7.15
NE	9000	0	100.00	1	1.34E-06	1.34E-06	E	7.15
ENE	7600	0	100.00	1	2.08E-06	2.08E-06	E	7.15
E	7200	0	100.00	1	2.86E-06	2.86E-06	E	4.70
ESE	7500	0	100.00	1	2.66E-06	2.66E-06	E	4.70
SE	8700	0	100.00	1	2.23E-06	2.23E-06	E	4.70
SSE	8800	0	100.00	1	3.32E-06	3.32E-06	F	7.15
S	100	0	100.00	1	2.89E-03	2.89E-03	E	4.70
SSW	100	0	100.00	1	2.67E-03	2.67E-03	D	2.65
SW	100	0	100.00	1	2.83E-03	2.83E-03	D	2.65
WSW	100	0	100.00	1	2.84E-03	2.84E-03	D	2.65
W	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
WNW	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
NW	100	0	100.00	1	2.97E-03	2.97E-03	E	4.70
NNW	100	0	100.00	1	4.51E-03	4.51E-03	F	7.15
N	100	0	100.00	1	2.90E-03	2.90E-03	E	4.70
NNE	100	0	100.00	1	1.90E-03	1.90E-03	E	7.15
NE	100	0	100.00	1	1.89E-03	1.89E-03	B	0.89
ENE	100	0	100.00	1	2.42E-03	2.42E-03	D	2.65
E	100	0	100.00	1	2.87E-03	2.87E-03	E	4.70
ESE	100	0	100.00	1	2.86E-03	2.86E-03	E	4.70
SE	100	0	100.00	1	2.87E-03	2.87E-03	E	4.70
SSE	100	0	100.00	1	3.41E-03	3.41E-03	C	0.89
S	2400	0	100.00	1	1.46E-05	1.46E-05	E	4.70
SSW	2400	0	100.00	1	1.26E-05	1.26E-05	F	12.70
SW	2400	0	100.00	1	1.30E-05	1.30E-05	D	2.65
WSW	2400	0	100.00	1	1.29E-05	1.29E-05	D	2.65
W	2400	0	100.00	1	1.34E-05	1.34E-05	D	2.65
WNW	2400	0	100.00	1	1.36E-05	1.36E-05	D	2.65
NW	2400	0	100.00	1	1.47E-05	1.47E-05	E	4.70
NNW	2400	0	100.00	1	2.33E-05	2.33E-05	F	7.15

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N	2400	0 100.00	1	1.49E-05	1.49E-05 E	4.70
NNE	2400	0 100.00	1	9.64E-06	9.64E-06 E	7.15
NE	2400	0 100.00	1	8.91E-06	8.91E-06 E	7.15
ENE	2400	0 100.00	1	1.14E-05	1.14E-05 C	0.89
E	2400	0 100.00	1	1.40E-05	1.40E-05 E	4.70
ESE	2400	0 100.00	1	1.39E-05	1.39E-05 E	4.70
SE	2400	0 100.00	1	1.42E-05	1.42E-05 E	4.70
SSE	2400	0 100.00	1	1.95E-05	1.95E-05 F	7.15
E	7200	0 100.00	1	2.86E-06	2.86E-06 E	4.70
E	8200	0 100.00	1	2.39E-06	2.39E-06 E	4.70

GXQ Version 4.0A
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 08/22/97
Run Time = 15:22:15.18

INPUT ECHO:

FFTF X/Qs - 50 mi. population - 99.5 percentile

c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

T F F F F T

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

```

c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff idep isrc iwind
c     0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake ipm   iflow ientr
c     0     3     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c     0     0     0     0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c       = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      frequency
c   height      anemometer      to
c   hs(m)       height          exceed
c               ha(m)           Cx(%)
c
c   0.00000E+00  1.00000E+01  1.00000E+03  5.00000E-01
c
c   initial      initial      release      deposition      gravitational
c   plume        plume        duration     velocity        settling
c   width        height      trd(hr)       velocity        velocity
c   Wb(m)        Hb(m)                vd(m/s)         vg(m/s)
c
c   6.00000E+01  2.00000E+01  0.00000E+00  1.00000E-02  1.00000E-02
c
c   ambient      initial      initial      release      convective
c   temperature  plume        plume        diameter    heat release
c   Tamb(C)      temperature  flow rate    d(m)         rate(l)
c               TO(C)         V0(m3/s)    qh(w)

```

```

c      2.00000E+01      2.20000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q              Wind
c      scaling          Speed
c      factor           Exponent
c      c(?)             a(?)
c
c      1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

```

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate X/Q based on frequency of exceedance.

No normalization of joint frequency.

X/Q calculated for single sector.

X/Q is population weighted.

MODELS SELECTED:

Sector average model selected.

Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:

400 AREA (FFTF) - 10 M - Pasquill A - G (1983 - 1991 Average)

Created 8/26/92 KR

POPULATION DATA:

Population within 80 km of the Hanford 400 Area, 1990 Census (Beck, et al 1991)

Created 10/21/91 KR, Revised 2/4/92 KR

FFTF X/Qs - 50 mi. population - 99.5 percentile

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	80000	0	7.29	26053	1.99E-02	7.64E-07	F	0.89
SSW	80000	0	5.75	6982	7.01E-03	1.00E-06	E	0.89
SW	80000	0	3.41	10363	4.79E-03	4.62E-07	E	0.89
WSW	80000	0	2.22	28879	5.65E-03	1.96E-07	F	2.65
W	80000	0	2.87	26415	5.67E-03	2.15E-07	E	0.89
WNW	80000	0	2.65	5787	1.04E-03	1.80E-07	F	2.65
NW	80000	0	4.08	3076	7.44E-04	2.42E-07	E	0.89
NNW	80000	0	7.41	2945	7.92E-04	2.69E-07	E	0.89
N	80000	0	13.26	18742	6.14E-03	3.28E-07	F	0.89
NNE	80000	0	12.15	11095	4.36E-03	3.93E-07	G	2.65
NE	80000	0	6.95	3453	1.83E-03	5.30E-07	G	2.65
ENE	80000	0	3.94	3649	2.10E-03	5.75E-07	E	0.89
E	80000	0	5.45	2800	1.68E-03	6.01E-07	G	2.65
ESE	80000	0	6.48	3038	1.58E-03	5.20E-07	E	0.89
SE	80000	0	9.75	51194	3.46E-02	6.75E-07	G	2.65
SSE	80000	0	6.32	78757	6.26E-02	7.95E-07	G	2.65

GXQ Version 4.0A
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Hey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 08/22/97
Run Time = 15:32:55.33

INPUT ECHO:

FFTF X/Qs - 50 mi. population - 50 percentile

c GXQ Version 4.0 Input File

c mode

1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology

c mode = 2 then X/Q based on atmospheric stability class and wind speed

c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop

T T F F F T

c ifox = t then joint frequency used to compute frequency to exceed X/Q

c = f then joint frequency used to compute annual average X/Q

c inorm = t then joint frequency data is normalized (as in GENII)

c = f then joint frequency data is un-normalized

c icdf = t then cumulative distribution file created (CDF.OUT)

c = f then no cumulative distribution file created

c ichk = t then X/Q parameter print option turned on

c = f then no parameter print

c isite = t then X/Q based on joint frequency data for all 16 sectors

c = f then X/Q based on joint frequency data of individual sectors

c ipop = t then X/Q is population weighted

c = f then no population weighting

```

c
c X/Q AND WIND SPEED ADJUSTMENT MODELS:
c   ipuff idep isrc iwind
c     0     0     0     0
c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:
c   iwake ipm   iflow ientr
c     0     3     0     0
c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:
c   (irise igrnd)iwash igrav
c     0     0     0     0
c ipuff = 1 then X/Q calculated using puff model
c       = 0 then X/Q calculated using default continuous plume model
c idep  = 1 then plume depletion model turned on (Chamberlain model)
c isrc  = 1 then X/Q multiplied by scalar
c       = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c       = 2 then MACCS virtual distance building wake model turned on
c ipm   = 1 then NRC RG 1.145 plume meander model turned on
c       = 2 then 5th Power Law plume meander model turned on
c       = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c       = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects
c iwash = 1 then stack downwash model turned on
c igrav = 1 then gravitational settling model turned on
c       = 0 unless specified otherwise, 0 turns model off
c
c PARAMETER INPUT:
c
c   release      reference      frequency
c   height       anemometer     to
c   hs(m)        height         exceed
c                ha(m)          Cx(%)
c
c   0.00000E+00  1.00000E+01    1.00000E+03    5.00000E+01
c
c   initial      initial      release      deposition      gravitational
c   plume        plume        duration      velocity        settling
c   width        height      trd(hr)        velocity        velocity
c   Wb(m)        Hb(m)                vd(m/s)        vg(m/s)
c
c   6.00000E+01  2.00000E+01    0.00000E+00    1.00000E-02    1.00000E-02
c
c   ambient      initial      initial      release      convective
c   temperature  plume        plume        diameter    heat release
c   Tamb(C)      TO(C)        flow rate    d(m)         rate(1)
c                V0(m3/s)                qh(w)

```

```

c      2.00000E+01      2.20000E+01      1.00000E+00      1.00000E+00      0.00000E+00
c
c (1) If zero then buoyant flux based on plume/ambient temperature difference.
c
c      X/Q              Wind
c      scaling          Speed
c      factor           Exponent
c      c(?)             a(?)
c
c      1.00000E+00      7.80000E-01
c
c RECEPTOR DEPENDENT DATA (no line limit)
c FOR MODE      make      RECEPTOR DEPENDENT DATA
c 1 (site specific)      sector distance receptor-height
c 2 (by class & wind speed) class windspeed distance offset receptor-height
c 3 (create plot file)   class windspeed xmax imax ymax jmax xqmin power
c
c RECEPTOR PARAMETER DESCRIPTION
c sector = 0, 1, 2... (all, S, SSW, etc.)
c distance = receptor distance (m)
c receptor height = height of receptor (m)
c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
c windspeed = anemometer wind speed (m/s)
c offset = offset from plume centerline (m)
c xmax = maximum distance to plot or calculate to (m)
c imax = distance intervals
c ymax = maximum offset to plot (m)
c jmax = offset intervals
c xqmin = minimum scaled X/Q to calculate
c power = exponent in power function step size

MODE: .
Site specific X/Q calculated.

LOGICAL CHOICES:
Joint frequency used to calculate X/Q based on frequency of exceedance.
Joint frequency data normalized.
X/Q calculated for single sector.
X/Q is population weighted.

MODELS SELECTED:
Sector average model selected.
Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

```

JOINT FREQUENCY DATA:

400 AREA (FFTF) - 10 M - Pasquill A - G (1983 - 1991 Average)

Created 8/26/92 KR

POPULATION DATA:

Population within 80 km of the Hanford 400 Area, 1990 Census (Beck, et al 1991)

Created 10/21/91 KR, Revised 2/4/92 KR

FFTF X/Qs - 50 mi. population - 50 percentile

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	POPULATION	TOTAL POPULATION SCALED X/Q (s/m3)	AVERAGE INDIVIDUAL SCALED X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	80000	0	100.00	26053	2.60E-03	9.96E-08	E	4.70
SSW	80000	0	100.00	6982	1.19E-03	1.71E-07	F	9.80
SW	80000	0	100.00	10363	9.15E-04	8.83E-08	D	2.65
WSW	80000	0	100.00	28879	1.71E-03	5.94E-08	B	0.89
W	80000	0	100.00	26415	1.23E-03	4.64E-08	A	0.89
WNW	80000	0	100.00	5787	2.76E-04	4.77E-08	B	0.89
NW	80000	0	100.00	3076	1.55E-04	5.03E-08	A	0.89
NNW	80000	0	100.00	2945	2.02E-04	6.86E-08	F	7.15
N	80000	0	100.00	18742	7.67E-04	4.09E-08	E	4.70
NNE	80000	0	100.00	11095	5.37E-04	4.84E-08	E	7.15
NE	80000	0	100.00	3453	2.22E-04	6.44E-08	E	7.15
ENE	80000	0	100.00	3649	3.50E-04	9.58E-08	C	0.89
E	80000	0	100.00	2800	3.07E-04	1.10E-07	E	4.70
ESE	80000	0	100.00	3038	2.85E-04	9.38E-08	E	4.70
SE	80000	0	100.00	51194	6.24E-03	1.22E-07	E	4.70
SSE	80000	0	100.00	78757	1.31E-02	1.67E-07	F	7.15

Attachment 3

GENII Output Files for
Seismic Event (DBE) During Fuel or
Target Assembly Transfer (Section 3.1)

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - 42 percent Pu - 1.4 kW decay heat - per
 assembly

Executed on: 08/19/97 at 09:53:19

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:

Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\trit1.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

----- Release Terms -----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

H 3	4.0E+00	0.0E+00	0.0E+00
KR85	3.6E+01	0.0E+00	0.0E+00
SR90	5.7E-03	0.0E+00	0.0E+00
Y 90	5.7E-03	0.0E+00	0.0E+00
TC99	2.1E-06	0.0E+00	0.0E+00
RU106	8.6E-02	0.0E+00	0.0E+00
AG110M	2.8E-04	0.0E+00	0.0E+00
CD113M	2.6E-02	0.0E+00	0.0E+00
SB125	3.3E-03	0.0E+00	0.0E+00
TE125M	8.2E-04	0.0E+00	0.0E+00

I 129	6.9E-05	0.0E+00	0.0E+00
CS134	1.2E+01	0.0E+00	0.0E+00
CS137	3.1E+01	0.0E+00	0.0E+00
CE144	6.4E-02	0.0E+00	0.0E+00
PR144	6.4E-02	0.0E+00	0.0E+00
PR144M	7.7E-04	0.0E+00	0.0E+00
PM147	3.0E-02	0.0E+00	0.0E+00
SM151	6.0E-04	0.0E+00	0.0E+00
EU154	4.7E-04	0.0E+00	0.0E+00
EU155	2.2E-03	0.0E+00	0.0E+00
PU238	3.0E-04	0.0E+00	0.0E+00
PU239	7.2E-04	0.0E+00	0.0E+00
PU240	4.1E-04	0.0E+00	0.0E+00
PU241	1.0E-02	0.0E+00	0.0E+00
AM241	3.1E-04	0.0E+00	0.0E+00
AM242M	3.7E-05	0.0E+00	0.0E+00
CM242	3.0E-03	0.0E+00	0.0E+00
CM243	9.6E-06	0.0E+00	0.0E+00
CM244	1.7E-06	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 1.0E+00 Fraction of time spent in cloud

===== INHALATION =====
 Resuspension not considered

=====

Input prepared by: _____

Date: _____

Input checked by: _____

Date: _____

=====

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - 42 percent Pu - 1.4 kW decay heat - per
assembly

Executed on: 08/19/97 at 09:53:52

Page C. 1

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	6.0E+02	2.5E-01	1.5E+02
Breast	4.6E+02	1.5E-01	6.8E+01
R Marrow	9.1E+02	1.2E-01	1.1E+02
Lung	7.7E+02	1.2E-01	9.2E+01
Thyroid	4.6E+02	3.0E-02	1.4E+01
Bone Sur	5.8E+03	3.0E-02	1.7E+02
Liver	9.8E+02	6.0E-02	5.9E+01
LL Int.	5.5E+02	6.0E-02	3.3E+01
S Int.	5.5E+02	6.0E-02	3.3E+01
UL Int.	5.3E+02	6.0E-02	3.2E+01
Stomach	5.0E+02	6.0E-02	3.0E+01
Internal Effective Dose Equivalent			7.9E+02
External Dose			7.7E+00
Annual Effective Dose Equivalent			8.0E+02

Controlling Organ:	Bone Sur
Controlling Pathway:	Inh
Controlling Radionuclide:	CS137

Total Inhalation EDE:	7.9E+02
Total Ingestion EDE:	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - 42 percent Pu - 1.4 kW decay heat - per assembly

Executed on: 08/19/97 at 09:53:52

Page C. 2

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:	3		0.0E+00	...	
			+		
	2	0.0E+00	0.0E+00	...	Internal Effective Dose Equivalent
		+	+		
	1	4.7E+02	5.2E+01	1.4E+01 + ... = 7.9E+02	
Internal Annual Dose		4.7E+02	5.2E+01	1.4E+01 + ... = 8.0E+02	Cumulative Internal Dose
		+	+	+	
External Annual Dose		7.7E+00	0.0E+00	0.0E+00 ... = 7.7E+00	
Annual Dose		4.8E+02	5.2E+01	1.4E+01 + ... = 8.1E+02	Cumulative Dose
				4.8E+02	Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - 42 percent Pu - 1.4 kW decay heat - per
assembly

Executed on: 08/19/97 at 09:53:52

Page C. 3

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Inhale	7.7E+02	5.0E+02	5.5E+02	5.3E+02	5.5E+02	5.8E+03	9.1E+02	6.0E+02
Total	7.7E+02	5.0E+02	5.5E+02	5.3E+02	5.5E+02	5.8E+03	9.1E+02	6.0E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Inhale	5.4E+02	4.6E+02	4.6E+02	1.7E+02	9.8E+02	1.6E+00
Total	5.4E+02	4.6E+02	4.6E+02	1.7E+02	9.8E+02	1.6E+00

External Dose by Exposure Pathway

Pathway	
Plume	7.7E+00
Total	7.7E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - 42 percent Pu - 1.4 kW decay heat - per assembly

Executed on: 08/19/97 at 09:53:52

Page C. 4

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.2E-01	1.2E-01	1.2E-01	1.2E-01	1.2E-01	1.5E-01	1.5E-01	1.2E-01
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.1E-02	2.9E-03	3.1E-03	7.0E-03	2.2E-02	4.6E+00	2.0E+00	2.7E-03
Y 90	6.8E-02	3.1E-03	7.7E-03	3.7E-02	9.1E-02	1.1E-04	1.1E-04	3.8E-06
TC 99	4.3E-05	1.2E-05	1.8E-07	5.6E-07	1.5E-06	1.3E-07	1.3E-07	1.0E-07
RU 106	1.1E+02	3.0E-01	3.5E-01	1.3E+00	3.8E+00	1.9E-01	2.1E-01	1.2E-01
AG 110M	2.6E-01	3.7E-03	1.8E-03	5.0E-03	1.2E-02	1.8E-03	2.3E-03	1.8E-04
CD 113M	1.1E+00	1.1E+00	1.1E+00	1.1E+00	1.1E+00	1.3E+00	1.3E+00	1.1E+00
SB 125	9.4E-02	2.6E-03	2.1E-03	5.7E-03	1.4E-02	4.7E-03	2.2E-03	3.6E-04
TE 125M	1.0E-02	1.3E-04	1.9E-04	7.9E-04	2.2E-03	1.2E-02	1.2E-03	3.5E-05
I 129	2.6E-05	7.9E-06	6.7E-06	6.7E-06	6.7E-06	9.4E-06	1.0E-05	6.2E-06
CS 134	1.7E+02	1.8E+02	2.1E+02	1.9E+02	2.1E+02	1.6E+02	1.8E+02	1.9E+02
CS 137	3.3E+02	3.2E+02	3.4E+02	3.3E+02	3.4E+02	3.0E+02	3.1E+02	3.3E+02
CE 144	6.1E+01	9.3E-02	1.7E-01	8.5E-01	2.6E+00	3.7E-01	2.3E-01	1.5E-02
PR 144M	3.7E-05	2.9E-06	7.9E-07	1.6E-07	1.4E-08	1.4E-08	1.7E-08	4.3E-09
PR 144	7.5E-03	4.4E-04	1.1E-04	2.1E-05	1.9E-06	1.6E-06	2.1E-06	7.0E-07
PM 147	2.8E+00	1.4E-03	3.6E-03	2.1E-02	6.1E-02	7.4E-01	5.9E-02	4.0E-06
SM 151	2.5E-03	8.9E-06	2.2E-05	1.3E-04	3.8E-04	1.0E-01	8.2E-03	1.3E-07
EU 154	4.7E-02	1.0E-02	9.8E-03	1.4E-02	1.1E-02	3.1E-01	6.3E-02	3.5E-03
EU 155	3.2E-02	2.1E-03	2.1E-03	4.1E-03	5.7E-03	4.0E-01	4.1E-02	4.6E-04
CM 244	4.2E-02	3.5E-06	5.8E-06	2.3E-05	6.4E-05	2.4E+00	2.0E-01	3.2E-02
PU 240	8.8E+00	7.8E-04	1.2E-03	5.0E-03	1.5E-02	1.1E+03	8.7E+01	1.5E+01
AM 242M	1.8E-01	6.2E-05	7.5E-05	1.7E-04	3.6E-04	9.3E+01	7.6E+00	1.3E+00
AM 242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CM 242	5.5E+01	6.2E-03	9.5E-03	4.0E-02	1.2E-01	1.8E+02	1.5E+01	2.2E+00
NP 238	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 238	6.7E+00	5.9E-04	9.5E-04	4.0E-03	1.1E-02	7.0E+02	5.6E+01	9.7E+00
PU 241	9.0E-02	4.6E-04	5.3E-04	1.2E-03	2.0E-03	5.1E+02	4.0E+01	7.8E+00
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 241	6.7E+00	1.3E-03	1.6E-03	4.8E-03	1.2E-02	8.1E+02	6.3E+01	1.1E+01
CM 243	2.4E-01	9.1E-05	1.0E-04	2.4E-04	4.6E-04	1.7E+01	1.4E+00	2.4E-01

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NP 239	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 239	1.5E+01	1.3E-03	2.1E-03	8.6E-03	2.5E-02	1.9E+03	1.5E+02	2.7E+01	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	7.7E+02	5.0E+02	5.5E+02	5.3E+02	5.5E+02	5.8E+03	9.1E+02	6.0E+02	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - 42 percent Pu - 1.4 kW decay heat - per
assembly

Executed on: 08/19/97 at 09:53:52

Page C. 5

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	1.2E-01	1.2E-01	1.2E-01	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.7E-03	2.6E-03	2.7E-03	0.0E+00	0.0E+00	0.0E+00
Y 90	3.7E-06	3.7E-06	3.7E-06	0.0E+00	1.1E-04	0.0E+00
TC 99	1.0E-07	1.0E-07	2.8E-06	0.0E+00	1.4E-07	0.0E+00
RU 106	1.3E-01	1.9E-01	1.8E-01	0.0E+00	0.0E+00	0.0E+00
AG 110M	8.5E-04	2.5E-03	2.2E-03	0.0E+00	1.1E-02	0.0E+00
CD 113M	1.1E+00	1.1E+00	1.1E+00	1.7E+02	2.9E+01	0.0E+00
SB 125	1.5E-03	1.7E-03	1.3E-03	0.0E+00	3.5E-03	0.0E+00
TE 125M	7.9E-05	7.0E-05	3.9E-05	0.0E+00	0.0E+00	0.0E+00
I 129	6.7E-06	1.6E-05	1.2E-01	0.0E+00	0.0E+00	0.0E+00
CS 134	1.6E+02	1.6E+02	1.6E+02	0.0E+00	0.0E+00	0.0E+00
CS 137	3.0E+02	2.9E+02	2.9E+02	0.0E+00	0.0E+00	0.0E+00
CE 144	1.9E-02	2.7E-02	2.3E-02	0.0E+00	2.0E+00	1.6E+00
PR 144M	5.4E-09	1.2E-08	8.0E-09	1.1E-08	2.1E-08	0.0E+00
PR 144	8.5E-07	1.6E-06	1.3E-06	1.7E-06	2.9E-06	0.0E+00
PM 147	4.0E-06	5.1E-06	4.4E-06	0.0E+00	1.9E-01	0.0E+00
SM 151	1.6E-07	2.4E-07	1.3E-07	0.0E+00	2.7E-02	0.0E+00
EU 154	7.1E-03	9.5E-03	4.2E-03	2.0E-02	2.5E-01	0.0E+00
EU 155	9.7E-04	1.7E-03	6.8E-04	4.6E-03	1.3E-01	0.0E+00
CM 244	3.2E-02	2.3E-06	2.1E-06	0.0E+00	4.9E-01	0.0E+00
PU 240	1.5E+01	5.0E-04	4.7E-04	0.0E+00	2.0E+02	0.0E+00
AM 242M	1.3E+00	7.1E-05	2.9E-05	0.0E+00	1.7E+01	0.0E+00
AM 242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CM 242	2.2E+00	3.5E-03	3.5E-03	0.0E+00	4.3E+01	0.0E+00
NP 238	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 238	9.5E+00	3.7E-04	3.6E-04	0.0E+00	1.3E+02	0.0E+00
PU 241	7.6E+00	4.9E-04	2.1E-04	0.0E+00	8.0E+01	0.0E+00
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 241	1.1E+01	1.1E-03	6.3E-04	0.0E+00	1.4E+02	0.0E+00
CM 243	2.4E-01	7.9E-05	4.9E-05	0.0E+00	3.4E+00	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NP 239	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 239	2.6E+01	8.3E-04	8.1E-04	0.0E+00	3.3E+02	0.0E+00
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Total	5.4E+02	4.6E+02	4.6E+02	1.7E+02	9.8E+02	1.6E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - 42 percent Pu - 1.4 kW decay heat - per
 assembly

Executed on: 08/19/97 at 09:53:52

Page C. 6

Acute release
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Radio- nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
H 3	1.2E-01	0.0E+00	9.4E-11	1.2E-01	1.2E-01
KR 85	0.0E+00	0.0E+00	2.0E-02	0.0E+00	2.0E-02
SR 90	3.9E-01	0.0E+00	2.3E-07	3.9E-01	3.9E-01
Y 90	1.7E-02	0.0E+00	8.5E-06	1.7E-02	1.7E-02
TC 99	6.2E-06	0.0E+00	1.6E-11	6.2E-06	6.2E-06
RU 106	1.3E+01	0.0E+00	4.1E-03	1.3E+01	1.3E+01
AG 110M	3.4E-02	0.0E+00	1.6E-04	3.4E-02	3.5E-02
CD 113M	1.3E+01	0.0E+00	1.2E-06	1.3E+01	1.3E+01
SB 125	1.4E-02	0.0E+00	3.1E-04	1.4E-02	1.4E-02
TE 125M	1.9E-03	0.0E+00	2.3E-06	1.9E-03	1.9E-03
I 129	3.5E-03	0.0E+00	1.3E-07	3.5E-03	3.5E-03
CS 134	1.7E+02	0.0E+00	4.1E+00	1.7E+02	1.7E+02
CS 137	3.0E+02	0.0E+00	3.6E+00	3.0E+02	3.0E+02
CE 144	7.8E+00	0.0E+00	1.8E-04	7.8E+00	7.8E+00
PR 144M	4.7E-06	0.0E+00	9.1E-07	4.7E-06	5.6E-06
PR 144	9.4E-04	0.0E+00	5.9E-04	9.4E-04	1.5E-03
PM 147	3.9E-01	0.0E+00	1.3E-07	3.9E-01	3.9E-01
SM 151	6.0E-03	0.0E+00	5.7E-10	6.0E-03	6.0E-03
EU 154	4.4E-02	0.0E+00	1.2E-04	4.4E-02	4.4E-02
EU 155	3.0E-02	0.0E+00	1.9E-05	3.0E-02	3.0E-02
CM 244	1.4E-01	0.0E+00	4.7E-11	1.4E-01	1.4E-01
PU 240	6.1E+01	0.0E+00	1.3E-08	6.1E+01	6.1E+01
AM 242M	5.0E+00	0.0E+00	4.6E-09	5.0E+00	5.0E+00
AM 242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CM 242	1.7E+01	0.0E+00	9.4E-08	1.7E+01	1.7E+01
NP 238	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 238	3.9E+01	0.0E+00	9.6E-09	3.9E+01	3.9E+01
PU 241	2.7E+01	0.0E+00	7.7E-13	2.7E+01	2.7E+01
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

AM 241	4.4E+01	0.0E+00	6.8E-07	4.4E+01	4.4E+01
CM 243	9.8E-01	0.0E+00	2.1E-07	9.8E-01	9.8E-01
PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NP 239	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 239	1.0E+02	0.0E+00	1.5E-08	1.0E+02	1.0E+02
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 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - max tritium target - 0.8 percent releas
 e

Executed on: 08/06/97 at 09:05:42

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\tritla.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

-----Release Terms-----

Release		Surface	Buried
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

H 3	4.2E+03	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 1.0E+00 Fraction of time spent in cloud

===== INHALATION =====
 Resuspension not considered

=====

Input prepared by: _____ Date: _____

Input checked by: _____ Date: _____

=====

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - max tritium target - 0.8 percent releas
 e

Executed on: 08/06/97 at 09:05:46

Page C. 1

Acute release
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.3E+02	2.5E-01	3.2E+01
Breast	1.3E+02	1.5E-01	1.9E+01
R Marrow	1.6E+02	1.2E-01	1.9E+01
Lung	1.3E+02	1.2E-01	1.6E+01
Thyroid	1.3E+02	3.0E-02	3.9E+00
Bone Sur	1.6E+02	3.0E-02	4.8E+00
Stomach	1.3E+02	6.0E-02	7.8E+00
S Int.	1.3E+02	6.0E-02	7.8E+00
UL Int.	1.3E+02	6.0E-02	7.8E+00
LL Int.	1.3E+02	6.0E-02	7.8E+00
Internal Effective Dose Equivalent			1.3E+02
External Dose			9.4E-08
Annual Effective Dose Equivalent			1.3E+02

Controlling Organ:	R Marrow
Controlling Pathway:	Inh
Controlling Radionuclide:	H 3
Total Inhalation EDE:	1.3E+02
Total Ingestion EDE:	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - max tritium target - 0.8 percent releas

Executed on: 08/06/97 at 09:05:46

Page C. 2

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			0.0E+00	...	
			+		
2		0.0E+00	0.0E+00	...	Internal Effective Dose Equivalent
		+	+		
1	1.3E+02	+ 0.0E+00	+ 0.0E+00	+ ... = 1.3E+02	Cumulative Internal Dose
Internal Annual Dose	1.3E+02 + 0.0E+00 + 0.0E+00 + ... = 1.3E+02				
	+	+	+	+	
External Annual Dose	9.4E-08	0.0E+00	0.0E+00	... 9.4E-08	
Annual Dose	1.3E+02 + 0.0E+00 + 0.0E+00 + ... = 1.3E+02				Cumulative Dose
				1.3E+02	Maximum Annual Dose Occurred In Year 1

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - max tritium target - 0.8 percent release

Executed on: 08/06/97 at 09:05:46

Page C. 3

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Inhale	1.3E+02	1.3E+02	1.3E+02	1.3E+02	1.3E+02	1.6E+02	1.6E+02	1.3E+02
Total	1.3E+02	1.3E+02	1.3E+02	1.3E+02	1.3E+02	1.6E+02	1.6E+02	1.3E+02

Pathway	Ovaries	Muscle	Thyroid
Inhale	1.3E+02	1.3E+02	1.3E+02
Total	1.3E+02	1.3E+02	1.3E+02

External Dose by Exposure Pathway

Pathway	
Plume	9.4E-08
Total	9.4E-08

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Targets - except Eu and Ra226
 Executed on: 10/29/97 at 10:45:34

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\tritlb.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R)
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

-----Release Terms-----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3
P 32	1.9E+01	0.0E+00	0.0E+00
P 33	5.4E-01	0.0E+00	0.0E+00
CU64	3.7E-02	0.0E+00	0.0E+00
SE75	1.3E+02	0.0E+00	0.0E+00
SR85	1.4E-01	0.0E+00	0.0E+00
SR89	2.0E+00	0.0E+00	0.0E+00
Y 91	9.9E-03	0.0E+00	0.0E+00
M099	1.4E+00	0.0E+00	0.0E+00
PD103	7.5E+01	0.0E+00	0.0E+00
CD109	4.0E+01	0.0E+00	0.0E+00

SN117M	3.7E+00	0.0E+00	0.0E+00
I 125	2.7E+03	0.0E+00	0.0E+00
XE135	1.0E+03	0.0E+00	0.0E+00
I 131	6.0E-02	0.0E+00	0.0E+00
SM153	1.0E+01	0.0E+00	0.0E+00
HO166	7.0E-01	0.0E+00	0.0E+00
IR192	2.0E+02	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 1.0E+00 Fraction of time spent in cloud

===== INHALATION =====
 Resuspension not considered

Input prepared by: _____

Date: _____

Input checked by: _____

Date: _____

=====

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Targets - except Eu and Ra226

Executed on: 10/29/97 at 10:45:50

Page C. 1

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	5.2E+02	2.5E-01	1.3E+02
Breast	8.2E+02	1.5E-01	1.2E+02
R Marrow	9.0E+02	1.2E-01	1.1E+02
Lung	1.5E+04	1.2E-01	1.8E+03
Thyroid	6.6E+05	3.0E-02	2.0E+04
Bone Sur	7.7E+02	3.0E-02	2.3E+01
Kidneys	2.0E+04	6.0E-02	1.2E+03
Liver	4.5E+03	6.0E-02	2.7E+02
LL Int.	2.2E+03	6.0E-02	1.3E+02
UL Int.	1.2E+03	6.0E-02	7.0E+01
Stomach	8.4E+02	6.0E-02	5.0E+01
Internal Effective Dose Equivalent			2.4E+04
External Dose			1.0E+02
Annual Effective Dose Equivalent			2.4E+04

Controlling Organ:	Thyroid
Controlling Pathway:	Inh
Controlling Radionuclide:	I 125
Total Inhalation EDE:	2.4E+04
Total Ingestion EDE:	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Targets - except Eu and Ra226

Executed on: 10/29/97 at 10:45:50

Page C. 2

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			0.0E+00	...	
2		0.0E+00	0.0E+00	...	Internal Effective Dose Equivalent
1	2.3E+04	4.4E+02	2.1E+02	...	= 2.4E+04
Internal Annual Dose	2.3E+04	4.4E+02	2.1E+02	...	= 2.4E+04
	+	+	+		+
External Annual Dose	1.0E+02	0.0E+00	0.0E+00	...	1.0E+02
Annual Dose	2.3E+04	4.4E+02	2.1E+02	...	= 2.4E+04
					2.3E+04
					Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Targets - except Eu and Ra226

Executed on: 10/29/97 at 10:45:50

Page C. 3

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Inhale	1.5E+04	8.4E+02	6.7E+02	1.2E+03	2.2E+03	7.7E+02	9.0E+02	3.1E+02
Total	1.5E+04	8.4E+02	6.7E+02	1.2E+03	2.2E+03	7.7E+02	9.0E+02	3.1E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Pancrea	Spleen	Brain
Inhale	5.2E+02	8.2E+02	6.6E+05	2.0E+04	4.5E+03	4.0E-01	8.2E+02	4.9E-04
Total	5.2E+02	8.2E+02	6.6E+05	2.0E+04	4.5E+03	4.0E-01	8.2E+02	4.9E-04

External Dose by Exposure Pathway

Pathway	
Plume	1.0E+02
Total	1.0E+02

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Targets - except Eu and Ra226

Executed on: 10/29/97 at 10:45:50

Page C. 4

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes

P 32	6.1E+02	1.6E+01	1.2E+01	3.0E+01	7.2E+01	9.8E+01	1.0E+02	8.2E+00
P 33	2.9E+00	5.9E-02	4.7E-02	1.1E-01	2.5E-01	4.9E-01	1.9E-01	3.4E-02
CU 64	1.6E-02	2.1E-03	2.4E-03	7.1E-03	8.9E-03	9.3E-04	3.7E-04	1.8E-04
SE 75	8.8E+02	2.6E+02	2.1E+02	2.3E+02	1.9E+02	1.9E+02	2.4E+02	1.1E+02
SR 85	6.5E-02	3.9E-02	5.4E-02	5.7E-02	8.0E-02	1.7E-01	1.5E-01	3.6E-02
SR 89	4.6E+00	7.6E-01	9.5E-01	2.9E+00	8.3E+00	2.0E+01	1.3E+01	5.1E-01
Y 91	1.2E+00	4.2E-03	1.0E-02	6.1E-02	1.7E-01	4.0E-03	3.9E-03	7.9E-05
MO 99	7.3E+00	3.9E-01	8.9E-01	3.9E+00	9.5E+00	7.7E-02	9.2E-02	2.0E-02
TC 99M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TC 99	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PD 103	2.5E+02	2.8E+00	7.3E+00	3.6E+01	1.0E+02	4.3E-01	6.6E-01	1.0E-02
RU 103	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RH 103M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CD 109	1.6E+02	1.4E+02	1.4E+02	1.5E+02	1.6E+02	1.5E+02	1.8E+02	1.2E+02
SN 117M	2.7E+01	6.7E-01	1.3E+00	5.3E+00	1.5E+01	9.8E+00	1.2E+00	8.0E-02
I 125	4.0E+02	7.9E+01	5.9E+01	5.9E+01	5.6E+01	1.2E+02	1.3E+02	4.6E+01
I 131	4.8E-02	5.5E-03	2.0E-03	1.9E-03	1.9E-03	8.1E-03	4.4E-03	1.6E-03
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SM 153	2.6E+01	1.3E+00	3.3E+00	1.5E+01	3.2E+01	2.0E+00	8.7E-01	3.3E-02
HO 166	2.9E+00	2.0E-01	4.3E-01	2.0E+00	3.7E+00	8.5E-02	5.9E-02	2.8E-03
IR 192	1.3E+04	3.4E+02	2.3E+02	6.3E+02	1.6E+03	1.7E+02	2.3E+02	2.3E+01

Total	1.5E+04	8.4E+02	6.7E+02	1.2E+03	2.2E+03	7.7E+02	9.0E+02	3.1E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Targets - except Eu and Ra226

Executed on: 10/29/97 at 10:45:50

Page C. 5

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Pancrea	Spleen	Brain
P 32	7.9E+00	8.2E+00	8.2E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
P 33	3.4E-02	3.4E-02	3.4E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CU 64	5.8E-04	3.0E-04	2.3E-04	0.0E+00	6.2E-04	7.5E-04	0.0E+00	4.9E-04
SE 75	1.8E+02	1.8E+02	1.4E+02	7.1E+02	6.2E+02	0.0E+00	4.1E+02	0.0E+00
SR 85	6.1E-02	5.0E-02	4.9E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 89	5.1E-01	5.1E-01	5.1E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Y 91	1.0E-04	1.1E-04	1.1E-04	0.0E+00	3.9E-03	0.0E+00	0.0E+00	0.0E+00
MO 99	1.6E-01	4.8E-02	2.6E-02	1.6E-01	1.9E-01	0.0E+00	0.0E+00	0.0E+00
TC 99M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TC 99	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PD 103	1.8E+00	8.2E-01	1.3E-02	2.6E+00	1.9E+00	0.0E+00	0.0E+00	0.0E+00
RU 103	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RH 103M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CD 109	1.3E+02	1.4E+02	1.3E+02	1.9E+04	3.4E+03	0.0E+00	0.0E+00	0.0E+00
SN 117M	4.9E-01	2.3E-01	1.3E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 125	5.6E+01	2.8E+02	6.6E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	1.8E-03	5.5E-03	2.0E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SM 153	3.2E-01	8.8E-02	3.5E-02	0.0E+00	2.3E+00	0.0E+00	0.0E+00	0.0E+00
HO 166	6.9E-03	3.7E-03	2.9E-03	0.0E+00	1.8E-01	4.0E-01	0.0E+00	0.0E+00
IR 192	1.5E+02	2.1E+02	1.6E+02	2.4E+02	4.4E+02	0.0E+00	4.2E+02	0.0E+00
Total	5.2E+02	8.2E+02	6.6E+05	2.0E+04	4.5E+03	4.0E-01	8.2E+02	4.9E-04

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Targets - except Eu and Ra226

Executed on: 10/29/97 at 10:45:50

Page C. 6

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Radio-nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent

P 32	9.9E+01	0.0E+00	1.4E-02	9.9E+01	9.9E+01
P 33	4.2E-01	0.0E+00	3.1E-06	4.2E-01	4.2E-01
CU 64	3.4E-03	0.0E+00	1.6E-03	3.4E-03	5.0E-03
SE 75	3.5E+02	0.0E+00	9.2E+00	3.5E+02	3.6E+02
SR 85	6.9E-02	0.0E+00	1.6E-02	6.9E-02	8.4E-02
SR 89	3.7E+00	0.0E+00	1.1E-03	3.7E+00	3.7E+00
Y 91	1.6E-01	0.0E+00	1.3E-05	1.6E-01	1.6E-01
MO 99	1.8E+00	0.0E+00	4.0E-02	1.8E+00	1.9E+00
TC 99M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TC 99	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PD 103	4.0E+01	0.0E+00	9.9E-02	4.0E+01	4.0E+01
RU 103	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RH 103M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CD 109	1.5E+03	0.0E+00	5.0E-02	1.5E+03	1.5E+03
SN 117M	5.2E+00	0.0E+00	7.6E-02	5.2E+00	5.2E+00
I 125	2.0E+04	0.0E+00	8.8E+00	2.0E+04	2.0E+04
I 131	6.1E-01	0.0E+00	4.7E-03	6.1E-01	6.1E-01
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	4.8E+01	0.0E+00	4.8E+01
CS 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SM 153	6.5E+00	0.0E+00	9.9E-02	6.5E+00	6.6E+00
HO 166	7.6E-01	0.0E+00	4.1E-03	7.6E-01	7.6E-01
IR 192	1.9E+03	0.0E+00	3.7E+01	1.9E+03	1.9E+03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Natural Eu

Executed on: 09/24/97 at 11:23:13

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\trit1c.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

-----Release Terms-----

Release	Air	Surface	Buried
Radio-		Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3
EU152	9.5E-02	0.0E+00	0.0E+00
EU152M	8.2E+00	0.0E+00	0.0E+00
EU154	1.3E+00	0.0E+00	0.0E+00
GD153	9.0E-01	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 1.0E+00 Fraction of time spent in cloud

===== INHALATION =====
Resuspension not considered
=====

Input prepared by: _____ Date: _____

Input checked by: _____ Date: _____

=====

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Natural Eu

Executed on: 09/24/97 at 11:23:21

Page C. 1

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	2.1E+01	2.5E-01	5.3E+00
Breast	2.8E+01	1.5E-01	4.3E+00
R Marrow	1.9E+02	1.2E-01	2.3E+01
Lung	1.4E+02	1.2E-01	1.7E+01
Thyroid	1.3E+01	3.0E-02	3.8E-01
Bone Sur	9.7E+02	3.0E-02	2.9E+01
Liver	7.4E+02	6.0E-02	4.4E+01
Kidneys	6.1E+01	6.0E-02	3.7E+00
UL Int.	4.9E+01	6.0E-02	2.9E+00
LL Int.	3.8E+01	6.0E-02	2.3E+00
Stomach	3.2E+01	6.0E-02	1.9E+00
Internal Effective Dose Equivalent			1.3E+02
External Dose			8.9E-01
Annual Effective Dose Equivalent			1.4E+02

Controlling Organ:	Bone Sur
Controlling Pathway:	Inh
Controlling Radionuclide:	EU154

Total Inhalation EDE:	1.3E+02
Total Ingestion EDE:	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Natural Eu

Executed on: 09/24/97 at 11:23:21

Page C. 3

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Inhale	1.4E+02	3.2E+01	3.1E+01	4.9E+01	3.8E+01	9.7E+02	1.9E+02	1.0E+01
Total	1.4E+02	3.2E+01	3.1E+01	4.9E+01	3.8E+01	9.7E+02	1.9E+02	1.0E+01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
Inhale	2.1E+01	2.8E+01	1.3E+01	6.1E+01	7.4E+02
Total	2.1E+01	2.8E+01	1.3E+01	6.1E+01	7.4E+02

External Dose by Exposure Pathway

Pathway	
Plume	8.9E-01
Total	8.9E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Natural Eu

Executed on: 09/24/97 at 11:23:21

Page C. 4

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
EU 152M	1.0E+01	1.2E+00	2.2E+00	6.2E+00	6.6E+00	2.1E-01	2.1E-01	3.1E-02
EU 152	6.8E+00	2.3E+00	2.2E+00	3.0E+00	1.7E+00	2.8E+01	9.2E+00	7.6E-01
GD 153	1.6E+00	7.7E-01	7.9E-01	1.2E+00	9.5E-01	1.0E+02	1.2E+01	2.3E-01
EU 154	1.3E+02	2.8E+01	2.6E+01	3.8E+01	2.9E+01	8.4E+02	1.7E+02	9.4E+00
Total	1.4E+02	3.2E+01	3.1E+01	4.9E+01	3.8E+01	9.7E+02	1.9E+02	1.0E+01

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver
EU 152M	1.6E-01	6.7E-02	4.6E-02	4.1E-01	5.1E-01
EU 152	1.5E+00	2.1E+00	9.5E-01	4.3E+00	3.9E+01
GD 153	4.9E-01	7.7E-01	3.2E-01	2.2E+00	3.0E+01
EU 154	1.9E+01	2.5E+01	1.1E+01	5.4E+01	6.7E+02
Total	2.1E+01	2.8E+01	1.3E+01	6.1E+01	7.4E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Natural Eu

Executed on: 09/24/97 at 11:23:21

Page C. 5

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Radio-nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
EU 152M	2.3E+00	0.0E+00	5.3E-01	2.3E+00	2.8E+00
EU 152	6.5E+00	0.0E+00	2.3E-02	6.5E+00	6.5E+00
GD 153	7.0E+00	0.0E+00	1.3E-02	7.0E+00	7.0E+00
EU 154	1.2E+02	0.0E+00	3.2E-01	1.2E+02	1.2E+02

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Ra226

Executed on: 10/29/97 at 20:13:57

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\trit1d.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

----- Release Terms -----

Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3
RA226	1.3E-03	0.0E+00	0.0E+00
AC227	1.0E-02	0.0E+00	0.0E+00
TH228	1.0E-01	0.0E+00	0.0E+00
TH229	7.8E-06	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 1.0E+00 Fraction of time spent in cloud

===== INHALATION =====
Resuspension not considered
=====

Input prepared by: _____

Date: _____

Input checked by: _____

Date: _____

=====

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Ra226

Executed on: 10/29/97 at 20:14:17

Page C. 1

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	4.7E+03	2.5E-01	1.2E+03
Breast	2.9E+01	1.5E-01	4.3E+00
R Marrow	3.4E+04	1.2E-01	4.0E+03
Lung	8.5E+04	1.2E-01	1.0E+04
Thyroid	2.9E+01	3.0E-02	8.6E-01
Bone Sur	4.2E+05	3.0E-02	1.3E+04
Liver	9.0E+04	6.0E-02	5.4E+03
LL Int.	4.0E+01	6.0E-02	2.4E+00
UL Int.	3.2E+01	6.0E-02	1.9E+00
Stomach	3.0E+01	6.0E-02	1.8E+00
S Int.	2.9E+01	6.0E-02	1.7E+00
Internal Effective Dose Equivalent			3.4E+04
External Dose			3.1E-05
Annual Effective Dose Equivalent			3.4E+04

Controlling Organ:	Bone Sur
Controlling Pathway:	Inh
Controlling Radionuclide:	AC227

Total Inhalation EDE:	3.4E+04
Total Ingestion EDE:	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Ra226

Executed on: 10/29/97 at 20:14:17

Page C. 2

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			0.0E+00	...	
				+		
	2		0.0E+00	0.0E+00	...	Internal
			+	+		Effective
	1	6.2E+03	3.7E+03	2.4E+03	+	Dose
					...	Equivalent
					=	3.4E+04
Internal						Cumulative
Annual		6.2E+03	3.7E+03	2.4E+03	+	Internal
Dose					...	Dose
		+	+	+		
External		3.1E-05	0.0E+00	0.0E+00	...	3.1E-05
Annual						
Dose						
Annual						Cumulative
Dose		6.2E+03	3.7E+03	2.4E+03	+	Dose
					...	
					=	3.4E+04
						Maximum
						Annual
						Dose Occurred
						In Year 1

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Ra226

Executed on: 10/29/97 at 20:14:17

Page C. 3

 Acute release
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
-----	-----	-----	-----	-----	-----	-----	-----	-----
Inhale	8.5E+04	3.0E+01	2.9E+01	3.2E+01	4.0E+01	4.2E+05	3.4E+04	4.6E+03
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	8.5E+04	3.0E+01	2.9E+01	3.2E+01	4.0E+01	4.2E+05	3.4E+04	4.6E+03

Pathway	Ovaries	Muscle	Thyroid	Liver
-----	-----	-----	-----	-----
Inhale	4.7E+03	2.9E+01	2.9E+01	9.0E+04
-----	-----	-----	-----	-----
Total	4.7E+03	2.9E+01	2.9E+01	9.0E+04

External Dose by Exposure Pathway

Pathway	
-----	-----
Plume	3.1E-05
-----	-----
Total	3.1E-05

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Ra226

Executed on: 10/29/97 at 20:14:17

Page C. 4

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes

TH 228	8.5E+04	2.9E+01	2.8E+01	3.1E+01	3.9E+01	2.8E+04	2.3E+03	2.8E+01
RA 224	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PB 212	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BI 212	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RA 226	2.6E+01	5.7E-03	6.8E-03	1.5E-02	3.8E-02	1.1E+01	9.4E-01	4.9E-03
RN 222	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PB 210	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BI 210	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PO 210	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TH 229	7.6E-01	2.7E-02	2.7E-02	2.7E-02	2.7E-02	1.4E+02	1.1E+01	2.7E-02
RA 225	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AC 225	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AC 227	1.6E+00	9.6E-01	9.4E-01	1.2E+00	5.7E-01	3.9E+05	3.1E+04	4.6E+03
TH 227	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FR 223	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RA 223	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Total	8.5E+04	3.0E+01	2.9E+01	3.2E+01	4.0E+01	4.2E+05	3.4E+04	4.6E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Ra226

Executed on: 10/29/97 at 20:14:17

Page C. 5

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Liver
TH 228	2.8E+01	2.8E+01	2.8E+01	2.4E+02
RA 224	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PB 212	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BI 212	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RA 226	5.1E-03	5.3E-03	4.9E-03	0.0E+00
RN 222	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PB 210	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BI 210	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PO 210	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TH 229	2.7E-02	2.7E-02	2.7E-02	2.3E-01
RA 225	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AC 225	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AC 227	4.7E+03	8.8E-01	4.8E-01	9.0E+04
TH 227	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FR 223	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RA 223	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	4.7E+03	2.9E+01	2.9E+01	9.0E+04

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC Shear - Medical Isotope Target - Ra226

Executed on: 10/29/97 at 20:14:17

Page C. 6

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Radio-nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
TH 228	1.1E+04	0.0E+00	3.0E-05	1.1E+04	1.1E+04
RA 224	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PB 212	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BI 212	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RA 226	3.5E+00	0.0E+00	9.9E-07	3.5E+00	3.5E+00
RN 222	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PB 210	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BI 210	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PO 210	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TH 229	5.5E+00	0.0E+00	9.3E-08	5.5E+00	5.5E+00
RA 225	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AC 225	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AC 227	2.2E+04	0.0E+00	0.0E+00	2.2E+04	2.2E+04
TH 227	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FR 223	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RA 223	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - Fuel assembly - ingestion doses

Executed on: 10/22/97 at 16:24:22

Page A. 1

This is a far-field (wide-scale release, multiple site) scenario.
Release is acute
Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
Ground, external
Terrestrial foods ingestion
Animal product ingestion
Inadvertent soil ingestion

THE FOLLOWING TIMES ARE USED:
Intake ends after (yr): 50.0
Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\tritlin.in
GENII Default Parameter Values (28-Mar-90 RAP)
Radionuclide Library - Times<100 years (23-July-93 PDR)
PNL Food Transfer Factor Library (by Z, with Fr&Os 7/19/93 PDR)
External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

----- Release Terms-----

Release	Air	Surface	Buried
Radio-	Water	Source	
nuclide	Ci/yr	Ci/yr	Ci/m3
H 3	4.0E+00	0.0E+00	0.0E+00
KR85	3.6E+01	0.0E+00	0.0E+00
SR90	5.7E-03	0.0E+00	0.0E+00
Y 90	5.7E-03	0.0E+00	0.0E+00
TC99	2.1E-06	0.0E+00	0.0E+00
RU106	8.6E-02	0.0E+00	0.0E+00
AG110M	2.8E-04	0.0E+00	0.0E+00

CD113M 2.6E-02 0.0E+00 0.0E+00
 SB125 3.3E-03 0.0E+00 0.0E+00
 TE125M 8.2E-04 0.0E+00 0.0E+00
 I 129 6.9E-05 0.0E+00 0.0E+00
 CS134 1.2E+01 0.0E+00 0.0E+00
 CS137 3.1E+01 0.0E+00 0.0E+00
 CE144 6.4E-02 0.0E+00 0.0E+00
 PR144 6.4E-02 0.0E+00 0.0E+00
 PR144M 7.7E-04 0.0E+00 0.0E+00
 PM147 3.0E-02 0.0E+00 0.0E+00
 SM151 6.0E-04 0.0E+00 0.0E+00
 EU154 4.7E-04 0.0E+00 0.0E+00
 EU155 2.2E-03 0.0E+00 0.0E+00
 PU238 3.0E-04 0.0E+00 0.0E+00
 PU239 7.2E-04 0.0E+00 0.0E+00
 PU240 4.1E-04 0.0E+00 0.0E+00
 PU241 1.0E-02 0.0E+00 0.0E+00
 AM241 3.1E-04 0.0E+00 0.0E+00
 AM242M 3.7E-05 0.0E+00 0.0E+00
 CM242 3.0E-03 0.0E+00 0.0E+00
 CM243 9.6E-06 0.0E+00 0.0E+00
 CM244 1.7E-06 0.0E+00 0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 4.4E+03 Hours of exposure to ground contamination

===== INGESTION POPULATION =====
 1 Atmospheric production definition: 1 - Use population-weighted chi/Q

===== TERRESTRIAL FOOD INGESTION =====

FOOD TYPE	GROW TIME d	--IRRIGATION-- S RATE * in/yr		TIME mo/yr	YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP d		RATE kg/yr
Leaf Veg	90.0	0	0.0	0.0	1.5		1.0	3.0E+01	
Oth. Veg	90.0	0	0.0	0.0	4.0		5.0	2.2E+02	
Fruit	90.0	0	0.0	0.0	2.0		5.0	3.3E+02	
Cereals	90.0	0	0.0	0.0	0.8		180.0	8.0E+01	

===== ANIMAL FOOD INGESTION =====

FOOD TYPE	---HUMAN---		TOTAL PROD- UCTION kg/yr	DRINK WATER CONTA M FRACT.	-----STORED FEED-----				
	CONSUMPTION RATE kg/yr	HOLDUP d			DIET FRAC- TION	GROW TIME d	---IRRIGATION-- S RATE * in/yr	STOR- YIELD kg/m3	AGE d

Meat	8.0E+01	15.0	0.00	0.3	90.00	0	0.0	0.0	0.80	0.0
Poultry	1.8E+01	1.0	0.00	1.0	90.00	0	0.0	0.0	0.80	0.0
Cow Milk	2.7E+02	1.0	0.00	0.3	45.00	0	0.0	0.0	2.00	0.0
Eggs	3.0E+01	1.0	0.00	1.0	90.00	0	0.0	0.0	0.80	0.0

	-----FRESH FORAGE-----									
Meat				0.75	45.0	0	0.0	0.0	2.00	0.0
Cow Milk				0.75	30.0	0	0.0	0.0	1.50	0.0

Note: Animal diet fraction for years 2 through 50.0000

=====

Input prepared by: _____ Date: _____

Input checked by: _____ Date: _____

=====

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:27:13

Page C. 1

Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	8.3E+01	2.5E-01	2.1E+01
Breast	7.3E+01	1.5E-01	1.1E+01
R Marrow	8.2E+01	1.2E-01	9.8E+00
Lung	7.4E+01	1.2E-01	8.9E+00
Thyroid	7.7E+01	3.0E-02	2.3E+00
Bone Sur	8.4E+01	3.0E-02	2.5E+00
LL Int.	8.9E+01	6.0E-02	5.4E+00
S Int.	8.6E+01	6.0E-02	5.1E+00
UL Int.	8.5E+01	6.0E-02	5.1E+00
Stomach	8.1E+01	6.0E-02	4.9E+00
Kidneys	5.9E+01	6.0E-02	3.5E+00
Internal Effective Dose Equivalent			7.9E+01
External Dose			4.1E+02
Annual Effective Dose Equivalent			4.9E+02

Controlling Organ: LL Int.
Controlling Pathway: Ext
Controlling Radionuclide: CS137

Total Inhalation EDE: 0.0E+00
Total Ingestion EDE: 7.9E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:27:13

Page C. 3

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	5.5E-01	6.1E-01	6.4E-01	6.5E-01	7.2E-01	7.7E-01	6.7E-01	6.2E-01
Oth. Veg	1.0E+01	1.1E+01	1.2E+01	1.2E+01	1.3E+01	1.4E+01	1.2E+01	1.1E+01
Fruit	1.1E+01	1.2E+01	1.3E+01	1.3E+01	1.4E+01	1.5E+01	1.3E+01	1.2E+01
Cereals	1.2E+00	1.4E+00	1.4E+00	1.4E+00	1.6E+00	1.3E+00	1.3E+00	1.4E+00
Meat	2.9E+01	3.2E+01	3.4E+01	3.3E+01	3.4E+01	3.0E+01	3.0E+01	3.3E+01
Poultry	1.7E+00	1.9E+00	2.0E+00	2.0E+00	2.0E+00	1.7E+00	1.8E+00	1.9E+00
Cow Milk	1.9E+01	2.1E+01	2.2E+01	2.1E+01	2.2E+01	2.0E+01	2.0E+01	2.1E+01
Eggs	3.3E-01	3.6E-01	3.7E-01	3.7E-01	3.8E-01	4.0E-01	3.7E-01	3.6E-01
Soil Ing	1.4E+00	1.5E+00	1.6E+00	1.6E+00	1.7E+00	1.5E+00	1.5E+00	1.6E+00
Total	7.4E+01	8.1E+01	8.6E+01	8.5E+01	8.9E+01	8.4E+01	8.2E+01	8.3E+01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	5.5E-01	5.5E-01	5.8E-01	1.4E+00	2.3E-01	3.2E-05
Oth. Veg	1.0E+01	1.0E+01	1.1E+01	2.5E+01	4.2E+00	5.5E-04
Fruit	1.1E+01	1.1E+01	1.1E+01	2.8E+01	4.6E+00	5.9E-04
Cereals	1.2E+00	1.2E+00	1.4E+00	2.0E+00	3.3E-01	9.5E-06
Meat	2.9E+01	2.9E+01	2.9E+01	1.0E+00	1.7E-01	1.1E-04
Poultry	1.7E+00	1.7E+00	1.7E+00	8.5E-01	1.4E-01	2.1E-07
Cow Milk	1.9E+01	1.9E+01	2.0E+01	8.3E-01	1.5E-01	6.1E-06
Eggs	3.3E-01	3.2E-01	4.2E-01	1.7E-01	2.8E-02	1.8E-07
Soil Ing	1.4E+00	1.4E+00	1.4E+00	3.6E-02	2.2E-02	5.9E-05
Total	7.4E+01	7.3E+01	7.7E+01	5.9E+01	9.8E+00	1.4E-03

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	4.1E+02
Total	4.1E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:27:13

Page C. 4

Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.3E+01	1.4E+01	1.5E+01	1.5E+01	1.6E+01	1.8E+01	1.6E+01	1.4E+01
Oth. Veg	2.3E+02	2.5E+02	2.6E+02	2.6E+02	2.8E+02	3.2E+02	2.8E+02	2.5E+02
Fruit	2.5E+02	2.7E+02	2.8E+02	2.8E+02	3.0E+02	3.5E+02	3.0E+02	2.7E+02
Cereals	3.0E+01	3.3E+01	3.3E+01	3.3E+01	3.4E+01	3.3E+01	3.2E+01	3.3E+01
Meat	1.5E+02	1.6E+02	1.6E+02	1.6E+02	1.6E+02	1.5E+02	1.5E+02	1.6E+02
Poultry	5.2E+00	5.7E+00	5.8E+00	5.8E+00	5.8E+00	5.2E+00	5.3E+00	5.7E+00
Cow Milk	9.3E+01	1.0E+02	1.0E+02	1.0E+02	1.0E+02	9.9E+01	9.7E+01	1.0E+02
Eggs	9.7E-01	1.1E+00	1.1E+00	1.1E+00	1.1E+00	1.1E+00	1.0E+00	1.1E+00
Soil Ing	3.1E+01	3.4E+01	3.4E+01	3.4E+01	3.4E+01	3.3E+01	3.2E+01	3.4E+01
Total	8.0E+02	8.7E+02	8.9E+02	9.0E+02	9.3E+02	1.0E+03	9.1E+02	8.8E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.3E+01	1.3E+01	1.3E+01	2.4E+01	4.0E+00	8.2E-05
Oth. Veg	2.3E+02	2.3E+02	2.3E+02	4.0E+02	6.7E+01	1.5E-03
Fruit	2.5E+02	2.5E+02	2.5E+02	4.7E+02	7.8E+01	1.6E-03
Cereals	3.0E+01	3.0E+01	3.0E+01	3.4E+01	5.7E+00	2.5E-05
Meat	1.5E+02	1.4E+02	1.4E+02	3.7E+00	6.1E-01	1.4E-04
Poultry	5.2E+00	5.1E+00	5.1E+00	1.6E+00	2.7E-01	2.2E-07
Cow Milk	9.3E+01	9.1E+01	9.3E+01	3.0E+00	5.1E-01	7.7E-06
Eggs	9.7E-01	9.5E-01	1.1E+00	3.2E-01	5.2E-02	1.9E-07
Soil Ing	3.1E+01	3.0E+01	3.0E+01	6.0E-01	5.9E-01	1.0E-04
Total	8.0E+02	7.9E+02	8.0E+02	9.4E+02	1.6E+02	3.4E-03

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	7.0E+03
Total	7.0E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:27:13

Page C. 5

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	5.5E-03	1.1E-02	1.8E-02	1.1E-01	4.7E-01	9.9E+00	4.4E+00	5.5E-03
Y 90	3.0E-07	2.6E-02	6.0E-02	3.0E-01	7.4E-01	9.3E-06	9.1E-06	3.0E-07
TC 99	1.3E-05	1.4E-03	2.5E-05	8.7E-05	2.3E-04	1.6E-05	1.6E-05	1.3E-05
RU 106	2.8E-02	6.1E-02	1.1E-01	4.9E-01	1.4E+00	3.3E-02	3.6E-02	3.0E-02
AG 110M	5.2E-04	1.6E-03	3.7E-03	1.4E-02	3.6E-02	3.4E-04	6.0E-04	3.1E-04
CD 113M	3.5E-01	3.8E-01	4.1E-01	6.6E-01	1.3E+00	4.3E-01	4.3E-01	3.6E-01
SB 125	2.0E-05	9.6E-05	2.4E-04	7.1E-04	1.9E-03	2.2E-04	7.4E-05	2.9E-05
TE 125M	1.0E-04	4.2E-04	8.8E-04	4.0E-03	1.1E-02	3.1E-02	2.8E-03	9.1E-05
I 129	2.3E-04	3.2E-04	2.0E-04	2.0E-04	2.0E-04	2.6E-04	2.7E-04	1.8E-04
CS 134	2.0E+01	2.2E+01	2.6E+01	2.4E+01	2.6E+01	2.0E+01	2.2E+01	2.4E+01
CS 137	5.4E+01	5.9E+01	5.9E+01	5.9E+01	5.9E+01	5.4E+01	5.5E+01	5.9E+01
CE 144	1.5E-05	2.6E-03	8.8E-03	5.2E-02	1.6E-01	3.1E-04	2.2E-04	2.4E-05
PR 144M	6.9E-10	5.2E-06	1.9E-06	4.2E-07	2.4E-08	4.2E-10	8.7E-10	1.2E-10
PR 144	7.6E-08	1.0E-03	2.4E-04	4.5E-05	2.6E-06	3.8E-08	8.1E-08	1.7E-08
PM 147	9.4E-10	4.3E-05	1.1E-04	6.2E-04	2.0E-03	1.6E-04	1.3E-05	1.1E-09
SM 151	1.8E-11	3.7E-07	9.4E-07	5.5E-06	1.6E-05	5.7E-06	4.5E-07	8.3E-12
EU 154	2.7E-06	1.0E-05	2.7E-05	8.5E-05	2.2E-04	5.6E-05	1.5E-05	2.0E-06
EU 155	5.2E-07	5.4E-06	1.5E-05	6.4E-05	1.9E-04	7.0E-05	8.6E-06	4.1E-07
CM 244	1.1E-10	1.6E-08	4.2E-08	2.3E-07	7.1E-07	1.2E-04	9.5E-06	1.5E-06
PU 240	1.1E-08	1.6E-06	4.0E-06	2.2E-05	7.1E-05	2.4E-02	1.8E-03	3.3E-04
AM 242M	4.5E-09	1.9E-08	6.4E-08	5.7E-07	2.3E-06	4.1E-03	3.4E-04	5.9E-05
AM 242	3.7E-11	4.9E-08	1.0E-07	3.9E-07	6.0E-07	3.5E-07	3.0E-08	4.4E-09
CM 242	6.4E-08	1.1E-05	2.5E-05	1.4E-04	4.5E-04	3.2E-03	2.6E-04	3.8E-05
NP 238	1.7E-11	7.5E-10	1.9E-09	7.3E-09	1.6E-08	3.6E-09	4.9E-10	8.7E-11
PU 238	8.5E-09	1.3E-06	3.2E-06	1.9E-05	5.7E-05	1.6E-02	1.3E-03	2.2E-04
PU 241	1.8E-08	1.9E-07	5.0E-07	2.8E-06	8.2E-06	1.1E-02	8.6E-04	1.7E-04
U 237	1.8E-12	2.3E-10	6.1E-10	2.8E-09	7.4E-09	2.9E-11	4.8E-11	9.9E-12
AM 241	7.6E-08	2.9E-06	6.8E-06	3.9E-05	1.2E-04	3.7E-02	2.9E-03	5.2E-04
CM 243	5.6E-09	1.1E-07	2.7E-07	1.5E-06	4.5E-06	8.4E-04	6.8E-05	1.1E-05

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	2.6E-15	1.6E-14	3.9E-14	2.1E-13	6.8E-13	2.0E-10	1.6E-11	2.9E-12	
NP 239	3.9E-17	5.5E-15	1.4E-14	6.1E-14	1.4E-13	6.6E-16	7.5E-16	1.7E-16	
PU 239	1.8E-08	2.8E-06	7.0E-06	4.0E-05	1.2E-04	4.2E-02	3.3E-03	5.8E-04	
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Total	7.4E+01	8.1E+01	8.6E+01	8.5E+01	8.9E+01	8.4E+01	8.2E+01	8.3E+01	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:27:13

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	5.5E-03	5.5E-03	5.5E-03	0.0E+00	0.0E+00	0.0E+00
Y 90	3.5E-07	3.0E-07	3.0E-07	0.0E+00	8.8E-06	0.0E+00
TC 99	1.3E-05	1.3E-05	3.4E-04	0.0E+00	1.8E-05	0.0E+00
RU 106	3.1E-02	2.7E-02	2.8E-02	0.0E+00	0.0E+00	0.0E+00
AG 110M	1.7E-03	4.8E-04	1.7E-04	0.0E+00	1.5E-02	0.0E+00
CD 113M	3.6E-01	3.6E-01	3.6E-01	5.9E+01	9.8E+00	0.0E+00
SB 125	1.7E-04	3.2E-05	1.5E-05	0.0E+00	7.9E-05	0.0E+00
TE 125M	3.0E-04	1.1E-04	9.1E-05	0.0E+00	0.0E+00	0.0E+00
I 129	2.0E-04	4.5E-04	3.4E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	2.0E+01	2.0E+01	2.0E+01	0.0E+00	0.0E+00	0.0E+00
CS 137	5.4E+01	5.3E+01	5.3E+01	0.0E+00	0.0E+00	0.0E+00
CE 144	1.7E-04	2.8E-05	1.2E-05	0.0E+00	1.6E-03	1.4E-03
PR 144M	1.8E-09	8.3E-10	5.2E-11	1.5E-09	9.3E-10	0.0E+00
PR 144	1.9E-07	8.5E-08	9.0E-09	1.8E-07	1.2E-07	0.0E+00
PM 147	5.2E-09	1.3E-09	8.7E-10	0.0E+00	4.3E-05	0.0E+00
SM 151	3.4E-10	2.4E-11	7.5E-12	0.0E+00	1.5E-06	0.0E+00
EU 154	1.7E-05	3.5E-06	7.1E-07	5.6E-06	4.5E-05	0.0E+00
EU 155	5.3E-06	7.5E-07	9.7E-08	1.3E-06	2.2E-05	0.0E+00
CM 244	1.6E-06	1.1E-10	1.0E-10	0.0E+00	2.4E-05	0.0E+00
PU 240	3.3E-04	1.1E-08	9.9E-09	0.0E+00	4.1E-03	0.0E+00
AM 242M	5.8E-05	3.3E-09	1.1E-09	0.0E+00	7.4E-04	0.0E+00
AM 242	6.5E-09	2.2E-10	6.0E-12	0.0E+00	9.0E-08	0.0E+00
CM 242	3.8E-05	6.5E-08	6.4E-08	0.0E+00	7.8E-04	0.0E+00
NP 238	7.0E-10	8.4E-11	2.6E-12	0.0E+00	2.4E-10	0.0E+00
PU 238	2.2E-04	8.4E-09	8.0E-09	0.0E+00	2.9E-03	0.0E+00
PU 241	1.6E-04	1.0E-08	4.4E-09	0.0E+00	1.7E-03	0.0E+00
U 237	1.6E-10	1.5E-11	1.9E-13	2.5E-11	0.0E+00	0.0E+00
AM 241	5.1E-04	5.9E-08	2.9E-08	0.0E+00	6.6E-03	0.0E+00
CM 243	1.2E-05	5.0E-09	2.3E-09	0.0E+00	1.7E-04	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	2.9E-12	1.8E-15	9.1E-16	0.0E+00	3.7E-11	0.0E+00
NP 239	2.7E-15	2.7E-16	3.3E-18	0.0E+00	2.5E-16	0.0E+00
PU 239	5.8E-04	1.8E-08	1.8E-08	0.0E+00	7.4E-03	0.0E+00
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Total	7.4E+01	7.3E+01	7.7E+01	5.9E+01	9.8E+00	1.4E-03

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
KR 85	0.0E+00
SR 90	7.3E-06
Y 90	4.1E-04
TC 99	3.7E-10
RU 106	1.7E-01
AG 110M	5.9E-03
CD 113M	4.1E-05
SB 125	1.7E-02
TE 125M	2.3E-05
I 129	1.4E-05
CS 134	2.0E+02
CS 137	2.1E+02
CE 144	4.8E-03
PR 144M	1.2E-05
PR 144	2.2E-02
PM 147	2.6E-06
SM 151	4.3E-09
EU 154	6.6E-03
EU 155	6.6E-04
CM 244	3.1E-10
PU 240	9.2E-08
AM 242M	7.7E-08
AM 242	3.6E-06
CM 242	3.3E-07
NP 238	1.2E-06
PU 238	6.9E-08
PU 241	4.2E-12
U 237	0.0E+00
AM 241	1.7E-05
CM 243	1.0E-05
PU 243	0.0E+00
AM 243	2.1E-13
NP 239	1.6E-12
PU 239	3.7E-07
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Total	4.1E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:27:13

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.2E-01	2.6E-01	4.0E-01	2.5E+00	1.1E+01	1.9E+02	9.1E+01	1.2E-01
Y 90	5.4E-06	4.6E-01	1.1E+00	5.4E+00	1.3E+01	1.7E-04	1.6E-04	5.4E-06
TC 99	2.2E-05	2.3E-03	4.1E-05	1.4E-04	3.8E-04	2.5E-05	2.5E-05	2.2E-05
RU 106	8.0E-02	1.8E-01	3.2E-01	1.4E+00	4.1E+00	9.4E-02	1.0E-01	8.6E-02
AG 110M	7.0E-04	2.2E-03	4.9E-03	1.8E-02	4.9E-02	4.6E-04	8.0E-04	4.1E-04
CD 113M	5.8E+00	6.3E+00	6.8E+00	1.1E+01	2.3E+01	7.1E+00	7.1E+00	5.9E+00
SB 125	8.6E-05	4.3E-04	1.1E-03	3.1E-03	8.4E-03	9.7E-04	3.3E-04	1.3E-04
TE 125M	9.5E-04	3.9E-03	8.2E-03	3.7E-02	1.0E-01	2.8E-01	2.6E-02	8.4E-04
I 129	3.2E-04	4.5E-04	2.8E-04	2.8E-04	2.8E-04	3.6E-04	3.9E-04	2.6E-04
CS 134	5.0E+01	5.6E+01	6.6E+01	6.1E+01	6.6E+01	5.0E+01	5.6E+01	6.1E+01
CS 137	7.5E+02	8.1E+02	8.2E+02	8.2E+02	8.2E+02	7.5E+02	7.5E+02	8.1E+02
CE 144	3.9E-05	6.5E-03	2.2E-02	1.3E-01	4.0E-01	7.7E-04	5.4E-04	6.0E-05
PR 144M	1.7E-09	1.3E-05	4.7E-06	1.0E-06	6.0E-08	1.0E-09	2.1E-09	2.9E-10
PR 144	1.9E-07	2.5E-03	6.0E-04	1.1E-04	6.5E-06	9.5E-08	2.0E-07	4.2E-08
PM 147	4.3E-09	2.0E-04	5.2E-04	2.9E-03	7.5E-03	7.5E-04	6.0E-05	5.2E-09
SM 151	6.3E-10	1.3E-05	3.4E-05	2.0E-04	5.8E-04	1.6E-04	1.5E-05	2.9E-10
EU 154	3.1E-05	1.2E-04	3.1E-04	9.9E-04	2.6E-03	6.3E-04	1.7E-04	2.3E-05
EU 155	3.8E-06	3.9E-05	1.1E-04	4.7E-04	1.4E-03	5.1E-04	6.3E-05	3.0E-06
CM 244	2.3E-09	3.4E-07	9.1E-07	4.9E-06	1.5E-05	2.1E-03	1.7E-04	2.7E-05
PU 240	5.6E-07	8.2E-05	2.0E-04	1.2E-03	3.7E-03	7.0E-01	5.4E-02	8.9E-03
AM 242M	2.0E-07	8.3E-07	2.9E-06	2.5E-05	1.0E-04	1.1E-01	8.7E-03	1.4E-03
AM 242	1.7E-09	2.2E-06	4.7E-06	1.8E-05	2.7E-05	1.5E-05	1.4E-06	2.0E-07
CM 242	1.8E-07	3.0E-05	7.1E-05	4.0E-04	1.3E-03	8.7E-03	7.4E-04	1.1E-04
NP 238	3.1E-08	1.3E-06	3.4E-06	1.3E-05	2.9E-05	3.8E-06	8.6E-07	1.5E-07
PU 238	3.8E-07	5.8E-05	1.4E-04	8.4E-04	2.5E-03	4.5E-01	3.6E-02	5.7E-03
PU 241	3.6E-07	3.9E-06	1.0E-05	5.8E-05	1.7E-04	1.5E-01	1.1E-02	2.1E-03
U 237	7.7E-11	9.8E-09	2.6E-08	1.2E-07	3.1E-07	1.2E-09	2.0E-09	4.2E-10
AM 241	5.7E-06	2.2E-04	5.2E-04	3.0E-03	9.2E-03	1.6E+00	1.2E-01	2.0E-02
CM 243	1.5E-07	3.0E-06	7.4E-06	4.2E-05	1.2E-04	1.7E-02	1.4E-03	2.2E-04

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	2.6E-12	1.7E-11	4.1E-11	2.3E-10	7.1E-10	9.3E-08	7.4E-09	1.2E-09	
NP 239	2.1E-12	3.0E-10	7.5E-10	3.3E-09	7.5E-09	3.6E-11	4.1E-11	9.4E-12	
PU 239	9.3E-07	1.4E-04	3.6E-04	2.0E-03	6.3E-03	1.2E+00	9.5E-02	1.6E-02	
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Total	8.0E+02	8.7E+02	8.9E+02	9.0E+02	9.3E+02	1.0E+03	9.1E+02	8.8E+02	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:27:13

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.2E-01	1.2E-01	1.2E-01	0.0E+00	0.0E+00	0.0E+00
Y 90	6.3E-06	5.4E-06	5.4E-06	0.0E+00	1.6E-04	0.0E+00
TC 99	2.2E-05	2.2E-05	5.5E-04	0.0E+00	2.9E-05	0.0E+00
RU 106	9.0E-02	7.8E-02	8.0E-02	0.0E+00	0.0E+00	0.0E+00
AG 110M	2.3E-03	6.4E-04	2.3E-04	0.0E+00	2.0E-02	0.0E+00
CD 113M	5.9E+00	5.9E+00	5.9E+00	9.4E+02	1.6E+02	0.0E+00
SB 125	7.5E-04	1.4E-04	6.5E-05	0.0E+00	3.5E-04	0.0E+00
TE 125M	2.8E-03	9.9E-04	8.4E-04	0.0E+00	0.0E+00	0.0E+00
I 129	2.8E-04	6.4E-04	4.8E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	5.0E+01	5.0E+01	5.0E+01	0.0E+00	0.0E+00	0.0E+00
CS 137	7.5E+02	7.4E+02	7.4E+02	0.0E+00	0.0E+00	0.0E+00
CE 144	4.2E-04	7.1E-05	3.0E-05	0.0E+00	4.1E-03	3.4E-03
PR 144M	4.5E-09	2.1E-09	1.3E-10	3.8E-09	2.3E-09	0.0E+00
PR 144	4.6E-07	2.1E-07	2.3E-08	4.5E-07	2.9E-07	0.0E+00
PM 147	2.4E-08	6.0E-09	4.0E-09	0.0E+00	2.0E-04	0.0E+00
SM 151	1.2E-08	8.6E-10	2.7E-10	0.0E+00	4.5E-05	0.0E+00
EU 154	2.0E-04	4.0E-05	8.1E-06	6.4E-05	5.1E-04	0.0E+00
EU 155	3.8E-05	5.5E-06	7.0E-07	9.4E-06	1.6E-04	0.0E+00
CM 244	2.7E-05	2.3E-09	2.2E-09	0.0E+00	4.5E-04	0.0E+00
PU 240	8.9E-03	5.5E-07	5.1E-07	0.0E+00	1.4E-01	0.0E+00
AM 242M	1.4E-03	1.5E-07	4.7E-08	0.0E+00	2.2E-02	0.0E+00
AM 242	2.9E-07	1.0E-08	2.7E-10	0.0E+00	4.1E-06	0.0E+00
CM 242	1.1E-04	1.8E-07	1.8E-07	0.0E+00	2.2E-03	0.0E+00
NP 238	1.2E-06	1.5E-07	4.7E-09	0.0E+00	4.3E-07	0.0E+00
PU 238	5.6E-03	3.8E-07	3.5E-07	0.0E+00	9.1E-02	0.0E+00
PU 241	2.1E-03	2.1E-07	8.9E-08	0.0E+00	2.5E-02	0.0E+00
U 237	6.6E-09	6.3E-10	8.0E-12	1.0E-09	0.0E+00	0.0E+00
AM 241	2.0E-02	4.5E-06	2.2E-06	0.0E+00	3.2E-01	0.0E+00
CM 243	2.3E-04	1.4E-07	6.4E-08	0.0E+00	3.7E-03	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.2E-09	1.8E-12	9.3E-13	0.0E+00	2.0E-08	0.0E+00
NP 239	1.5E-10	1.5E-11	1.8E-13	0.0E+00	1.4E-11	0.0E+00
PU 239	1.6E-02	9.3E-07	9.0E-07	0.0E+00	2.5E-01	0.0E+00
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Total	8.0E+02	7.9E+02	8.0E+02	9.4E+02	1.6E+02	3.4E-03

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	2.0E-04
Y 90	1.1E-02
TC 99	6.9E-10
RU 106	3.5E-01
AG 110M	8.1E-03
CD 113M	7.4E-04
SB 125	6.6E-02
TE 125M	8.1E-05
I 129	2.5E-05
CS 134	7.1E+02
CS 137	6.2E+03
CE 144	8.2E-03
PR 144M	2.0E-05
PR 144	3.7E-02
PM 147	1.1E-05
SM 151	1.8E-07
EU 154	8.3E-02
EU 155	5.1E-03
CM 244	7.0E-09
PU 240	4.5E-06
AM 242M	3.4E-06
AM 242	1.6E-04
CM 242	7.1E-07
NP 238	5.2E-05
PU 238	3.0E-06
PU 241	7.9E-11
U 237	0.0E+00
AM 241	1.3E-03
CM 243	3.0E-04
PU 243	0.0E+00
AM 243	3.5E-10
NP 239	2.7E-09
PU 239	1.8E-05
-----	-----
Total	7.0E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:28:23

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.4E+04	2.5E-01	3.4E+03
Breast	1.2E+04	1.5E-01	1.8E+03
R Marrow	1.3E+04	1.2E-01	1.5E+03
Lung	1.2E+04	1.2E-01	1.4E+03
Thyroid	1.2E+04	3.0E-02	3.6E+02
Bone Sur	1.2E+04	3.0E-02	3.6E+02
LL Int.	1.4E+04	6.0E-02	8.4E+02
S Int.	1.4E+04	6.0E-02	8.4E+02
UL Int.	1.4E+04	6.0E-02	8.2E+02
Stomach	1.3E+04	6.0E-02	7.9E+02
Kidneys	8.2E+01	6.0E-02	4.9E+00
Internal Effective Dose Equivalent			1.2E+04
External Dose			4.1E+02
Annual Effective Dose Equivalent			1.3E+04

Controlling Organ: LL Int.
Controlling Pathway: Ing
Controlling Radionuclide: CS137

Total Inhalation EDE: 0.0E+00
Total Ingestion EDE: 1.2E+04

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:28:23

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			2.8E+01	...	
			+		
2		3.0E+01	3.0E+00	...	Internal Effective Dose Equivalent
		+	+		
1	1.1E+04	+ 9.7E+02	+ 2.1E+02	+ ... = 1.2E+04	
Internal Annual Dose	1.1E+04 + 1.0E+03 + 2.4E+02 + ... = 1.3E+04				Cumulative Internal Dose
	+	+	+	+	
External Annual Dose	4.1E+02	3.5E+02	3.1E+02	...	7.0E+03
Annual Dose	1.1E+04 + 1.3E+03 + 5.5E+02 + ... = 2.0E+04				Cumulative Dose
				1.1E+04	Maximum Annual Dose Occurred In Year 1

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:28:23

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	8.1E+02	8.9E+02	9.5E+02	9.3E+02	9.6E+02	8.6E+02	8.6E+02	9.2E+02
Oth. Veg	1.0E+01	1.1E+01	1.2E+01	1.2E+01	1.4E+01	1.4E+01	1.3E+01	1.2E+01
Fruit	1.1E+01	1.2E+01	1.3E+01	1.3E+01	1.5E+01	1.5E+01	1.3E+01	1.2E+01
Cereals	1.3E+00	1.4E+00	1.5E+00	1.5E+00	1.6E+00	1.4E+00	1.4E+00	1.4E+00
Meat	7.2E+03	7.9E+03	8.4E+03	8.2E+03	8.4E+03	7.2E+03	7.5E+03	8.1E+03
Poultry	1.8E+00	2.0E+00	2.1E+00	2.0E+00	2.1E+00	1.8E+00	1.9E+00	2.0E+00
Cow Milk	4.0E+03	4.4E+03	4.7E+03	4.6E+03	4.7E+03	4.0E+03	4.2E+03	4.5E+03
Eggs	3.3E-01	3.6E-01	3.8E-01	3.8E-01	3.9E-01	4.1E-01	3.8E-01	3.7E-01
Soil Ing	1.4E+00	1.5E+00	1.6E+00	1.6E+00	1.7E+00	1.5E+00	1.5E+00	1.6E+00
Total	1.2E+04	1.3E+04	1.4E+04	1.4E+04	1.4E+04	1.2E+04	1.3E+04	1.4E+04

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	8.1E+02	8.0E+02	8.1E+02	2.1E+01	1.2E+01	4.6E-02
Oth. Veg	1.0E+01	1.0E+01	1.1E+01	2.5E+01	4.2E+00	7.0E-04
Fruit	1.1E+01	1.1E+01	1.2E+01	2.8E+01	4.6E+00	7.6E-04
Cereals	1.3E+00	1.3E+00	1.4E+00	2.0E+00	3.3E-01	1.2E-05
Meat	7.2E+03	7.1E+03	7.1E+03	2.8E+00	1.1E+00	2.5E-02
Poultry	1.8E+00	1.8E+00	1.8E+00	8.7E-01	1.4E-01	2.7E-07
Cow Milk	4.0E+03	4.0E+03	4.0E+03	2.0E+00	5.1E-01	1.3E-03
Eggs	3.3E-01	3.3E-01	4.3E-01	1.7E-01	2.8E-02	2.3E-07
Soil Ing	1.4E+00	1.4E+00	1.4E+00	3.6E-02	2.2E-02	5.9E-05
Total	1.2E+04	1.2E+04	1.2E+04	8.2E+01	2.3E+01	7.5E-02

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	4.1E+02
-----	-----
Total	4.1E+02

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:28:23

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	8.3E+02	9.1E+02	9.6E+02	9.4E+02	9.8E+02	8.8E+02	8.7E+02	9.3E+02
Oth. Veg	2.3E+02	2.5E+02	2.6E+02	2.6E+02	2.8E+02	3.2E+02	2.8E+02	2.5E+02
Fruit	2.5E+02	2.7E+02	2.8E+02	2.8E+02	3.0E+02	3.5E+02	3.0E+02	2.8E+02
Cereals	3.0E+01	3.3E+01	3.3E+01	3.3E+01	3.4E+01	3.3E+01	3.2E+01	3.3E+01
Meat	7.3E+03	8.0E+03	8.5E+03	8.3E+03	8.5E+03	7.3E+03	7.7E+03	8.2E+03
Poultry	5.2E+00	5.7E+00	5.9E+00	5.8E+00	5.9E+00	5.3E+00	5.4E+00	5.8E+00
Cow Milk	4.1E+03	4.5E+03	4.8E+03	4.6E+03	4.8E+03	4.1E+03	4.3E+03	4.6E+03
Eggs	9.7E-01	1.1E+00	1.1E+00	1.1E+00	1.1E+00	1.1E+00	1.0E+00	1.1E+00
Soil Ing	3.1E+01	3.4E+01	3.4E+01	3.4E+01	3.4E+01	3.3E+01	3.2E+01	3.4E+01
Total	1.3E+04	1.4E+04	1.5E+04	1.4E+04	1.5E+04	1.3E+04	1.3E+04	1.4E+04

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	8.3E+02	8.2E+02	8.2E+02	4.4E+01	1.6E+01	4.6E-02
Oth. Veg	2.3E+02	2.3E+02	2.3E+02	4.0E+02	6.7E+01	1.6E-03
Fruit	2.5E+02	2.5E+02	2.5E+02	4.7E+02	7.8E+01	1.7E-03
Cereals	3.0E+01	3.0E+01	3.0E+01	3.4E+01	5.7E+00	2.8E-05
Meat	7.3E+03	7.2E+03	7.2E+03	5.4E+00	1.6E+00	2.5E-02
Poultry	5.2E+00	5.2E+00	5.2E+00	1.6E+00	2.7E-01	2.8E-07
Cow Milk	4.1E+03	4.1E+03	4.1E+03	4.2E+00	8.7E-01	1.3E-03
Eggs	9.8E-01	9.6E-01	1.1E+00	3.2E-01	5.3E-02	2.4E-07
Soil Ing	3.1E+01	3.0E+01	3.0E+01	6.0E-01	5.9E-01	1.0E-04
Total	1.3E+04	1.3E+04	1.3E+04	9.6E+02	1.7E+02	7.7E-02

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	7.0E+03
-----	-----
Total	7.0E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:28:23

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	8.4E-03	1.8E-02	2.8E-02	1.7E-01	7.2E-01	1.5E+01	6.6E+00	8.4E-03
Y 90	4.4E-07	3.7E-02	8.7E-02	4.4E-01	1.1E+00	1.3E-05	1.3E-05	4.4E-07
TC 99	1.3E-05	1.4E-03	2.5E-05	8.5E-05	2.3E-04	1.5E-05	1.5E-05	1.3E-05
RU 106	2.7E-01	6.0E-01	1.1E+00	4.8E+00	1.4E+01	3.2E-01	3.5E-01	2.9E-01
AG 110M	6.8E-03	2.1E-02	4.8E-02	1.8E-01	4.7E-01	4.4E-03	7.7E-03	4.0E-03
CD 113M	4.9E-01	5.3E-01	5.7E-01	9.2E-01	1.9E+00	6.0E-01	6.0E-01	5.0E-01
SB 125	5.1E-04	2.5E-03	6.3E-03	1.8E-02	4.9E-02	5.7E-03	1.9E-03	7.5E-04
TE 125M	2.4E-04	9.8E-04	2.1E-03	9.3E-03	2.6E-02	7.2E-02	6.6E-03	2.1E-04
I 129	1.5E-03	2.2E-03	1.3E-03	1.3E-03	1.3E-03	1.7E-03	1.9E-03	1.2E-03
CS 134	4.0E+03	4.5E+03	5.2E+03	4.8E+03	5.2E+03	4.0E+03	4.5E+03	4.8E+03
CS 137	8.1E+03	8.8E+03	8.8E+03	8.8E+03	8.8E+03	8.1E+03	8.2E+03	8.8E+03
CE 144	8.5E-04	1.4E-01	4.8E-01	2.9E+00	8.8E+00	1.7E-02	1.2E-02	1.3E-03
PR 144M	3.8E-08	2.9E-04	1.1E-04	2.3E-05	1.3E-06	2.3E-08	4.8E-08	6.5E-09
PR 144	4.2E-06	5.5E-02	1.3E-02	2.5E-03	1.4E-04	2.1E-06	4.4E-06	9.3E-07
PM 147	1.5E-07	6.9E-03	1.8E-02	1.0E-01	3.2E-01	2.6E-02	2.1E-03	1.8E-07
SM 151	2.2E-09	4.7E-05	1.2E-04	6.9E-04	2.0E-03	7.1E-04	5.7E-05	1.0E-09
EU 154	3.9E-04	1.4E-03	3.9E-03	1.2E-02	3.2E-02	7.9E-03	2.1E-03	2.8E-04
EU 155	8.0E-05	8.2E-04	2.3E-03	9.9E-03	2.9E-02	1.1E-02	1.3E-03	6.3E-05
CM 244	5.1E-08	7.3E-06	2.0E-05	1.1E-04	3.3E-04	5.5E-02	4.5E-03	7.2E-04
PU 240	4.6E-06	6.7E-04	1.7E-03	9.5E-03	3.0E-02	1.0E+01	7.7E-01	1.4E-01
AM 242M	1.0E-06	4.1E-06	1.4E-05	1.3E-04	5.1E-04	9.1E-01	7.4E-02	1.3E-02
AM 242	7.8E-09	1.0E-05	2.2E-05	8.3E-05	1.3E-04	7.3E-05	6.3E-06	9.2E-07
CM 242	8.0E-05	1.3E-02	3.1E-02	1.8E-01	5.6E-01	4.0E+00	3.3E-01	4.8E-02
NP 238	2.2E-09	9.6E-08	2.5E-07	9.4E-07	2.1E-06	4.6E-07	6.2E-08	1.1E-08
PU 238	3.5E-06	5.3E-04	1.3E-03	7.8E-03	2.3E-02	6.5E+00	5.3E-01	9.1E-02
PU 241	7.5E-06	8.1E-05	2.1E-04	1.2E-03	3.5E-03	4.7E+00	3.7E-01	7.0E-02
U 237	7.1E-10	9.0E-08	2.4E-07	1.1E-06	2.9E-06	1.1E-08	1.9E-08	3.9E-09
AM 241	1.5E-05	5.8E-04	1.4E-03	7.8E-03	2.4E-02	7.5E+00	5.9E-01	1.1E-01
CM 243	2.6E-06	5.1E-05	1.2E-04	7.0E-04	2.1E-03	3.9E-01	3.2E-02	5.3E-03

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	8.1E-14	4.9E-13	1.2E-12	6.7E-12	2.1E-11	6.4E-09	5.1E-10	9.1E-11	
NP 239	7.3E-16	1.0E-13	2.6E-13	1.1E-12	2.6E-12	1.2E-14	1.4E-14	3.2E-15	
PU 239	7.5E-06	1.2E-03	2.9E-03	1.6E-02	5.1E-02	1.7E+01	1.3E+00	2.4E-01	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	1.2E+04	1.3E+04	1.4E+04	1.4E+04	1.4E+04	1.2E+04	1.3E+04	1.4E+04	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:28:23

Page C. 14

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	8.4E-03	8.4E-03	8.4E-03	0.0E+00	0.0E+00	0.0E+00
Y 90	5.0E-07	4.4E-07	4.4E-07	0.0E+00	1.3E-05	0.0E+00
TC 99	1.3E-05	1.3E-05	3.3E-04	0.0E+00	1.8E-05	0.0E+00
RU 106	3.1E-01	2.7E-01	2.7E-01	0.0E+00	0.0E+00	0.0E+00
AG 110M	2.2E-02	6.2E-03	2.2E-03	0.0E+00	2.0E-01	0.0E+00
CD 113M	5.0E-01	5.0E-01	5.0E-01	8.2E+01	1.4E+01	0.0E+00
SB 125	4.4E-03	8.3E-04	3.8E-04	0.0E+00	2.0E-03	0.0E+00
TE 125M	7.1E-04	2.5E-04	2.1E-04	0.0E+00	0.0E+00	0.0E+00
I 129	1.3E-03	3.1E-03	2.3E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	4.0E+03	4.0E+03	4.0E+03	0.0E+00	0.0E+00	0.0E+00
CS 137	8.1E+03	8.0E+03	8.0E+03	0.0E+00	0.0E+00	0.0E+00
CE 144	9.2E-03	1.6E-03	6.7E-04	0.0E+00	9.0E-02	7.5E-02
PR 144M	1.0E-07	4.6E-08	2.9E-09	8.5E-08	5.2E-08	0.0E+00
PR 144	1.0E-05	4.7E-06	5.0E-07	9.8E-06	6.4E-06	0.0E+00
PM 147	8.3E-07	2.1E-07	1.4E-07	0.0E+00	6.9E-03	0.0E+00
SM 151	4.2E-08	3.0E-09	9.3E-10	0.0E+00	1.9E-04	0.0E+00
EU 154	2.5E-03	4.9E-04	1.0E-04	7.9E-04	6.3E-03	0.0E+00
EU 155	8.1E-04	1.2E-04	1.5E-05	2.0E-00	3.4E-03	0.0E+00
CM 244	7.4E-04	5.0E-08	4.8E-08	0.0E+00	1.1E-02	0.0E+00
PU 240	1.4E-01	4.5E-06	4.2E-06	0.0E+00	1.7E+00	0.0E+00
AM 242M	1.3E-02	7.3E-07	2.4E-07	0.0E+00	1.6E-01	0.0E+00
AM 242	1.4E-06	4.7E-08	1.3E-09	0.0E+00	1.9E-05	0.0E+00
CM 242	4.7E-02	8.1E-05	8.0E-05	0.0E+00	9.7E-01	0.0E+00
NP 238	8.9E-08	1.1E-08	3.3E-10	0.0E+00	3.1E-08	0.0E+00
PU 238	8.9E-02	3.5E-06	3.3E-06	0.0E+00	1.2E+00	0.0E+00
PU 241	6.9E-02	4.4E-06	1.9E-06	0.0E+00	7.3E-01	0.0E+00
U 237	6.1E-08	5.8E-09	7.4E-11	9.7E-09	0.0E+00	0.0E+00
AM 241	1.0E-01	1.2E-05	5.8E-06	0.0E+00	1.3E+00	0.0E+00
CM 243	5.4E-03	2.3E-06	1.1E-06	0.0E+00	7.7E-02	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	9.0E-11	5.6E-14	2.9E-14	0.0E+00	1.1E-09	0.0E+00
NP 239	5.0E-14	5.0E-15	6.2E-17	0.0E+00	4.7E-15	0.0E+00
PU 239	2.4E-01	7.5E-06	7.2E-06	0.0E+00	3.0E+00	0.0E+00
-----	-----	-----	-----	-----	-----	-----
Total	1.2E+04	1.2E+04	1.2E+04	8.2E+01	2.3E+01	7.5E-02

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	7.3E-06
Y 90	4.1E-04
TC 99	3.7E-10
RU 106	1.7E-01
AG 110M	5.9E-03
CD 113M	4.1E-05
SB 125	1.7E-02
TE 125M	2.3E-05
I 129	1.4E-05
CS 134	2.0E+02
CS 137	2.1E+02
CE 144	4.8E-03
PR 144M	1.2E-05
PR 144	2.2E-02
PM 147	2.6E-06
SM 151	4.3E-09
EU 154	6.6E-03
EU 155	6.6E-04
CM 244	3.1E-10
PU 240	9.2E-08
AM 242M	7.7E-08
AM 242	3.6E-06
CM 242	3.3E-07
NP 238	1.2E-06
PU 238	6.9E-08
PU 241	4.2E-12
U 237	0.0E+00
AM 241	1.7E-05
CM 243	1.0E-05
PU 243	0.0E+00
AM 243	2.1E-13
NP 239	1.6E-12
PU 239	3.7E-07
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Total	4.1E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:28:23

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes

H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.3E-01	2.6E-01	4.1E-01	2.6E+00	1.1E+01	2.0E+02	9.4E+01	1.3E-01
Y 90	5.6E-06	4.7E-01	1.1E+00	5.6E+00	1.4E+01	1.7E-04	1.7E-04	5.6E-06
TC 99	2.1E-05	2.3E-03	4.1E-05	1.4E-04	3.7E-04	2.5E-05	2.5E-05	2.1E-05
RU 106	3.3E-01	7.2E-01	1.3E+00	5.7E+00	1.7E+01	3.8E-01	4.2E-01	3.5E-01
AG 110M	7.0E-03	2.2E-02	4.9E-02	1.8E-01	4.8E-01	4.5E-03	7.9E-03	4.1E-03
CD 113M	5.9E+00	6.4E+00	7.0E+00	1.1E+01	2.3E+01	7.2E+00	7.2E+00	6.0E+00
SB 125	5.7E-04	2.8E-03	7.1E-03	2.1E-02	5.5E-02	6.4E-03	2.2E-03	8.5E-04
TE 125M	1.1E-03	4.5E-03	9.4E-03	4.2E-02	1.2E-01	3.3E-01	3.0E-02	9.7E-04
I 129	1.6E-03	2.3E-03	1.4E-03	1.4E-03	1.4E-03	1.9E-03	2.0E-03	1.3E-03
CS 134	4.0E+03	4.5E+03	5.3E+03	4.9E+03	5.3E+03	4.0E+03	4.5E+03	4.9E+03
CS 137	8.8E+03	9.5E+03	9.6E+03	9.6E+03	9.6E+03	8.8E+03	8.9E+03	9.5E+03
CE 144	8.7E-04	1.5E-01	5.0E-01	3.0E+00	9.0E+00	1.7E-02	1.2E-02	1.3E-03
PR 144M	3.9E-08	3.0E-04	1.1E-04	2.4E-05	1.4E-06	2.4E-08	4.9E-08	6.7E-09
PR 144	4.3E-06	5.6E-02	1.3E-02	2.6E-03	1.5E-04	2.1E-06	4.6E-06	9.5E-07
PM 147	1.5E-07	7.1E-03	1.8E-02	1.0E-01	3.3E-01	2.7E-02	2.2E-03	1.8E-07
SM 151	2.8E-09	5.9E-05	1.5E-04	8.8E-04	2.6E-03	8.6E-04	7.1E-05	1.3E-09
EU 154	4.2E-04	1.5E-03	4.2E-03	1.3E-02	3.4E-02	8.5E-03	2.3E-03	3.0E-04
EU 155	8.3E-05	8.6E-04	2.4E-03	1.0E-02	3.0E-02	1.1E-02	1.4E-03	6.5E-05
CM 244	5.3E-08	7.6E-06	2.1E-05	1.1E-04	3.5E-04	5.7E-02	4.6E-03	7.5E-04
PU 240	5.1E-06	7.5E-04	1.9E-03	1.1E-02	3.4E-02	1.1E+01	8.3E-01	1.5E-01
AM 242M	1.2E-06	4.9E-06	1.7E-05	1.5E-04	6.1E-04	1.0E+00	8.3E-02	1.4E-02
AM 242	9.4E-09	1.2E-05	2.7E-05	1.0E-04	1.5E-04	8.7E-05	7.6E-06	1.1E-06
CM 242	8.0E-05	1.3E-02	3.1E-02	1.8E-01	5.6E-01	4.0E+00	3.3E-01	4.8E-02
NP 238	3.3E-08	1.4E-06	3.7E-06	1.4E-05	3.1E-05	4.3E-06	9.2E-07	1.7E-07
PU 238	3.9E-06	5.9E-04	1.5E-03	8.6E-03	2.6E-02	7.0E+00	5.6E-01	9.6E-02
PU 241	7.8E-06	8.5E-05	2.2E-04	1.3E-03	3.6E-03	4.8E+00	3.8E-01	7.2E-02
U 237	7.8E-10	1.0E-07	2.6E-07	1.2E-06	3.2E-06	1.2E-08	2.1E-08	4.3E-09
AM 241	2.1E-05	7.9E-04	1.9E-03	1.1E-02	3.3E-02	9.0E+00	7.1E-01	1.2E-01
CM 243	2.7E-06	5.4E-05	1.3E-04	7.4E-04	2.2E-03	4.0E-01	3.3E-02	5.5E-03

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	2.7E-12	1.7E-11	4.3E-11	2.3E-10	7.3E-10	1.0E-07	7.9E-09	1.3E-09	
NP 239	2.1E-12	3.0E-10	7.5E-10	3.3E-09	7.5E-09	3.6E-11	4.1E-11	9.4E-12	
PU 239	8.4E-06	1.3E-03	3.2E-03	1.8E-02	5.7E-02	1.9E+01	1.4E+00	2.6E-01	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	1.3E+04	1.4E+04	1.5E+04	1.4E+04	1.5E+04	1.3E+04	1.3E+04	1.4E+04	

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:28:23

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.3E-01	1.3E-01	1.3E-01	0.0E+00	0.0E+00	0.0E+00
Y 90	6.4E-06	5.6E-06	5.6E-06	0.0E+00	1.6E-04	0.0E+00
TC 99	2.1E-05	2.1E-05	5.4E-04	0.0E+00	2.9E-05	0.0E+00
RU 106	3.7E-01	3.2E-01	3.3E-01	0.0E+00	0.0E+00	0.0E+00
AG 110M	2.3E-02	6.3E-03	2.3E-03	0.0E+00	2.0E-01	0.0E+00
CD 113M	6.0E+00	6.0E+00	6.0E+00	9.6E+02	1.6E+02	0.0E+00
SB 125	5.0E-03	9.4E-04	4.3E-04	0.0E+00	2.3E-03	0.0E+00
TE 125M	3.2E-03	1.1E-03	9.7E-04	0.0E+00	0.0E+00	0.0E+00
I 129	1.4E-03	3.3E-03	2.5E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	4.0E+03	4.0E+03	4.0E+03	0.0E+00	0.0E+00	0.0E+00
CS 137	8.8E+03	8.6E+03	8.6E+03	0.0E+00	0.0E+00	0.0E+00
CE 144	9.4E-03	1.6E-03	6.9E-04	0.0E+00	9.3E-02	7.7E-02
PR 144M	1.0E-07	4.7E-08	3.0E-09	8.7E-08	5.3E-08	0.0E+00
PR 144	1.0E-05	4.8E-06	5.1E-07	1.0E-05	6.6E-06	0.0E+00
PM 147	8.5E-07	2.2E-07	1.4E-07	0.0E+00	7.1E-03	0.0E+00
SM 151	5.4E-08	3.9E-09	1.2E-09	0.0E+00	2.3E-04	0.0E+00
EU 154	2.6E-03	5.3E-04	1.1E-04	8.5E-04	6.8E-03	0.0E+00
EU 155	8.4E-04	1.2E-04	1.5E-05	2.1E-04	3.5E-03	0.0E+00
CM 244	7.6E-04	5.2E-08	5.0E-08	0.0E+00	1.2E-02	0.0E+00
PU 240	1.5E-01	5.0E-06	4.7E-06	0.0E+00	1.9E+00	0.0E+00
AM 242M	1.4E-02	8.8E-07	2.8E-07	0.0E+00	1.8E-01	0.0E+00
AM 242	1.6E-06	5.7E-08	1.5E-09	0.0E+00	2.3E-05	0.0E+00
CM 242	4.7E-02	8.1E-05	8.0E-05	0.0E+00	9.7E-01	0.0E+00
NP 238	1.3E-06	1.6E-07	5.0E-09	0.0E+00	4.6E-07	0.0E+00
PU 238	9.4E-02	3.9E-06	3.6E-06	0.0E+00	1.3E+00	0.0E+00
PU 241	7.1E-02	4.6E-06	2.0E-06	0.0E+00	7.5E-01	0.0E+00
U 237	6.8E-08	6.4E-09	8.2E-11	1.1E-08	0.0E+00	0.0E+00
AM 241	1.2E-01	1.6E-05	7.9E-06	0.0E+00	1.7E+00	0.0E+00
CM 243	5.6E-03	2.5E-06	1.1E-06	0.0E+00	8.1E-02	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.3E-09	1.9E-12	9.6E-13	0.0E+00	2.1E-08	0.0E+00
NP 239	1.5E-10	1.5E-11	1.8E-13	0.0E+00	1.4E-11	0.0E+00
PU 239	2.5E-01	8.4E-06	8.1E-06	0.0E+00	3.3E+00	0.0E+00
-----	-----	-----	-----	-----	-----	-----
Total	1.3E+04	1.3E+04	1.3E+04	9.6E+02	1.7E+02	7.7E-02

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
KR 85	0.0E+00
SR 90	2.0E-04
Y 90	1.1E-02
TC 99	6.9E-10
RU 106	3.5E-01
AG 110M	8.1E-03
CD 113M	7.4E-04
SB 125	6.6E-02
TE 125M	8.1E-05
I 129	2.5E-05
CS 134	7.1E+02
CS 137	6.2E+03
CE 144	8.2E-03
PR 144M	2.0E-05
PR 144	3.7E-02
PM 147	1.1E-05
SM 151	1.8E-07
EU 154	8.3E-02
EU 155	5.1E-03
CM 244	7.0E-09
PU 240	4.5E-06
AM 242M	3.4E-06
AM 242	1.6E-04
CM 242	7.1E-07
NP 238	5.2E-05
PU 238	3.0E-06
PU 241	7.9E-11
U 237	0.0E+00
AM 241	1.3E-03
CM 243	3.0E-04
PU 243	0.0E+00
AM 243	3.5E-10
NP 239	2.7E-09
PU 239	1.8E-05
-----	-----
Total	7.0E+03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:29:32

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Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	2.9E+04	2.5E-01	7.2E+03
Breast	2.5E+04	1.5E-01	3.8E+03
R Marrow	2.7E+04	1.2E-01	3.2E+03
Lung	2.5E+04	1.2E-01	3.1E+03
Thyroid	2.5E+04	3.0E-02	7.6E+02
Bone Sur	2.6E+04	3.0E-02	7.9E+02
LL Int.	3.0E+04	6.0E-02	1.8E+03
S Int.	3.0E+04	6.0E-02	1.8E+03
UL Int.	2.9E+04	6.0E-02	1.7E+03
Stomach	2.8E+04	6.0E-02	1.7E+03
Kidneys	3.5E+02	6.0E-02	2.1E+01
Internal Effective Dose Equivalent			2.6E+04
External Dose			4.1E+02
Annual Effective Dose Equivalent			2.6E+04

Controlling Organ:	LL Int.
Controlling Pathway:	Ing
Controlling Radionuclide:	CS137

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	2.6E+04

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:29:32

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Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			2.8E+01	...	
2		3.0E+01	3.0E+00	...	Internal Effective Dose Equivalent
1	2.3E+04	2.0E+03	4.5E+02	...	= 2.6E+04
Internal Annual Dose	2.3E+04	2.1E+03	4.8E+02	...	= 2.6E+04
External Annual Dose	4.1E+02	3.5E+02	3.1E+02	...	7.0E+03
Annual Dose	2.4E+04	2.4E+03	7.9E+02	...	= 3.3E+04
					Cumulative Internal Dose
					Cumulative External Dose
					Cumulative Annual Dose
					Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:29:32

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	8.1E+02	8.9E+02	9.5E+02	9.3E+02	9.6E+02	8.6E+02	8.6E+02	9.2E+02
Oth. Veg	4.5E+03	4.9E+03	5.2E+03	5.1E+03	5.2E+03	4.8E+03	4.7E+03	5.0E+03
Fruit	4.5E+03	5.0E+03	5.2E+03	5.1E+03	5.3E+03	4.8E+03	4.7E+03	5.1E+03
Cereals	1.5E+03	1.7E+03	1.8E+03	1.7E+03	1.8E+03	1.6E+03	1.6E+03	1.7E+03
Meat	8.8E+03	9.7E+03	1.0E+04	1.0E+04	1.0E+04	8.8E+03	9.2E+03	9.9E+03
Poultry	2.0E+02	2.1E+02	2.3E+02	2.2E+02	2.3E+02	2.0E+02	2.0E+02	2.2E+02
Cow Milk	5.0E+03	5.5E+03	5.9E+03	5.7E+03	5.9E+03	5.0E+03	5.3E+03	5.7E+03
Eggs	3.7E+01	4.0E+01	4.3E+01	4.1E+01	4.3E+01	3.7E+01	3.8E+01	4.1E+01
Soil Ing	1.4E+00	1.5E+00	1.6E+00	1.6E+00	1.7E+00	1.5E+00	1.5E+00	1.6E+00
Total	2.5E+04	2.8E+04	3.0E+04	2.9E+04	3.0E+04	2.6E+04	2.7E+04	2.9E+04

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	8.1E+02	8.0E+02	8.1E+02	2.1E+01	1.2E+01	4.6E-02
Oth. Veg	4.5E+03	4.4E+03	4.4E+03	1.4E+02	7.1E+01	1.7E-01
Fruit	4.5E+03	4.5E+03	4.5E+03	1.4E+02	7.3E+01	1.8E-01
Cereals	1.5E+03	1.5E+03	1.5E+03	4.2E+01	2.5E+01	4.2E-02
Meat	8.8E+03	8.7E+03	8.7E+03	3.2E+00	1.4E+00	3.4E-02
Poultry	2.0E+02	1.9E+02	1.9E+02	1.8E+00	3.0E-01	1.8E-05
Cow Milk	5.0E+03	5.0E+03	5.0E+03	2.3E+00	6.1E-01	1.6E-03
Eggs	3.7E+01	3.6E+01	3.7E+01	3.6E-01	6.6E-02	1.5E-05
Soil Ing	1.4E+00	1.4E+00	1.4E+00	3.6E-02	2.2E-02	5.9E-05
Total	2.5E+04	2.5E+04	2.5E+04	3.5E+02	1.8E+02	4.7E-01

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	4.1E+02
-----	-----
Total	4.1E+02

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:29:32

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	8.3E+02	9.1E+02	9.6E+02	9.4E+02	9.8E+02	8.8E+02	8.7E+02	9.3E+02
Oth. Veg	4.7E+03	5.1E+03	5.4E+03	5.3E+03	5.5E+03	5.1E+03	5.0E+03	5.3E+03
Fruit	4.8E+03	5.2E+03	5.5E+03	5.4E+03	5.6E+03	5.2E+03	5.0E+03	5.3E+03
Cereals	1.6E+03	1.7E+03	1.8E+03	1.8E+03	1.8E+03	1.7E+03	1.6E+03	1.8E+03
Meat	8.9E+03	9.8E+03	1.0E+04	1.0E+04	1.0E+04	8.9E+03	9.3E+03	1.0E+04
Poultry	2.0E+02	2.2E+02	2.3E+02	2.2E+02	2.3E+02	2.0E+02	2.1E+02	2.2E+02
Cow Milk	5.1E+03	5.6E+03	5.9E+03	5.8E+03	5.9E+03	5.1E+03	5.3E+03	5.8E+03
Eggs	3.7E+01	4.1E+01	4.3E+01	4.2E+01	4.3E+01	3.8E+01	3.9E+01	4.2E+01
Soil Ing	3.1E+01	3.4E+01	3.4E+01	3.4E+01	3.4E+01	3.3E+01	3.2E+01	3.4E+01
Total	2.6E+04	2.9E+04	3.0E+04	3.0E+04	3.1E+04	2.7E+04	2.7E+04	2.9E+04

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	8.3E+02	8.2E+02	8.2E+02	4.4E+01	1.6E+01	4.6E-02
Oth. Veg	4.7E+03	4.6E+03	4.7E+03	5.2E+02	1.3E+02	1.7E-01
Fruit	4.8E+03	4.7E+03	4.7E+03	5.8E+02	1.5E+02	1.8E-01
Cereals	1.6E+03	1.5E+03	1.6E+03	7.5E+01	3.0E+01	4.2E-02
Meat	8.9E+03	8.8E+03	8.8E+03	5.8E+00	1.8E+00	3.4E-02
Poultry	2.0E+02	2.0E+02	2.0E+02	2.6E+00	4.2E-01	1.8E-05
Cow Milk	5.1E+03	5.0E+03	5.1E+03	4.5E+00	9.7E-01	1.6E-03
Eggs	3.7E+01	3.7E+01	3.8E+01	5.1E-01	9.1E-02	1.5E-05
Soil Ing	3.1E+01	3.0E+01	3.0E+01	6.0E-01	5.9E-01	1.0E-04
Total	2.6E+04	2.6E+04	2.6E+04	1.2E+03	3.3E+02	4.7E-01

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	7.0E+03
-----	-----
Total	7.0E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:29:32

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	3.0E-02	6.3E-02	9.9E-02	6.2E-01	2.6E+00	5.4E+01	2.4E+01	3.0E-02
Y 90	1.8E-06	1.5E-01	3.5E-01	1.8E+00	4.4E+00	5.5E-05	5.3E-05	1.8E-06
TC 99	1.5E-05	1.7E-03	2.9E-05	1.0E-04	2.7E-04	1.8E-05	1.8E-05	1.5E-05
RU 106	1.7E+00	3.8E+00	6.9E+00	3.0E+01	8.8E+01	2.0E+00	2.2E+00	1.9E+00
AG 110M	1.1E-02	3.4E-02	7.7E-02	2.8E-01	7.6E-01	7.2E-03	1.3E-02	6.5E-03
CD 113M	2.1E+00	2.3E+00	2.5E+00	3.9E+00	8.0E+00	2.6E+00	2.6E+00	2.1E+00
SB 125	3.7E-03	1.8E-02	4.6E-02	1.3E-01	3.6E-01	4.2E-02	1.4E-02	5.6E-03
TE 125M	8.4E-04	3.5E-03	7.3E-03	3.3E-02	9.0E-02	2.5E-01	2.3E-02	7.5E-04
I 129	3.8E-03	5.3E-03	3.3E-03	3.3E-03	3.3E-03	4.3E-03	4.5E-03	3.0E-03
CS 134	8.1E+03	9.0E+03	1.1E+04	9.8E+03	1.1E+04	8.1E+03	9.0E+03	9.8E+03
CS 137	1.7E+04	1.9E+04	1.9E+04	1.9E+04	1.9E+04	1.7E+04	1.8E+04	1.9E+04
CE 144	5.4E-03	9.1E-01	3.1E+00	1.8E+01	5.5E+01	1.1E-01	7.5E-02	8.2E-03
PR 144M	2.4E-07	1.8E-03	6.6E-04	1.4E-04	8.4E-06	1.4E-07	3.0E-07	4.1E-08
PR 144	2.6E-05	3.5E-01	8.2E-02	1.6E-02	9.1E-04	1.3E-05	2.8E-05	5.9E-06
PM 147	8.7E-07	4.0E-02	1.0E-01	5.8E-01	1.9E+00	1.5E-01	1.2E-02	1.0E-06
SM 151	1.5E-08	3.1E-04	7.7E-04	4.5E-03	1.3E-02	4.6E-03	3.7E-04	6.8E-09
EU 154	2.2E-03	8.4E-03	2.2E-02	7.1E-02	1.8E-01	4.6E-02	1.2E-02	1.6E-03
EU 155	4.5E-04	4.6E-03	1.3E-02	5.6E-02	1.6E-01	6.0E-02	7.4E-03	3.5E-04
CM 244	3.3E-07	4.8E-05	1.3E-04	7.0E-04	2.2E-03	3.6E-01	2.9E-02	4.8E-03
PU 240	6.7E-05	9.8E-03	2.4E-02	1.4E-01	4.4E-01	1.5E+02	1.1E+01	2.0E+00
AM 242M	1.4E-05	5.8E-05	2.0E-04	1.8E-03	7.1E-03	1.3E+01	1.0E+00	1.8E-01
AM 242	1.2E-07	1.5E-04	3.2E-04	1.2E-03	1.9E-03	1.1E-03	9.4E-05	1.4E-05
CM 242	2.9E-04	4.9E-02	1.1E-01	6.5E-01	2.1E+00	1.4E+01	1.2E+00	1.8E-01
NP 238	3.5E-08	1.5E-06	3.9E-06	1.5E-05	3.3E-05	7.3E-06	9.8E-07	1.8E-07
PU 238	5.3E-05	7.9E-03	2.0E-02	1.2E-01	3.5E-01	9.7E+01	7.8E+00	1.3E+00
PU 241	1.1E-04	1.2E-03	3.1E-03	1.7E-02	5.0E-02	6.7E+01	5.3E+00	1.0E+00
U 237	1.1E-08	1.3E-06	3.5E-06	1.6E-05	4.3E-05	1.7E-07	2.8E-07	5.7E-08
AM 241	2.3E-04	8.8E-03	2.1E-02	1.2E-01	3.7E-01	1.1E+02	9.0E+00	1.6E+00
CM 243	1.7E-05	3.4E-04	8.2E-04	4.6E-03	1.4E-02	2.6E+00	2.1E-01	3.5E-02

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	6.2E-12	3.8E-11	9.5E-11	5.1E-10	1.6E-09	4.9E-07	3.9E-08	7.0E-09	
NP 239	6.6E-14	9.3E-12	2.3E-11	1.0E-10	2.3E-10	1.1E-12	1.3E-12	2.9E-13	
PU 239	1.1E-04	1.7E-02	4.2E-02	2.4E-01	7.5E-01	2.6E+02	2.0E+01	3.5E+00	
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Total	2.5E+04	2.8E+04	3.0E+04	2.9E+04	3.0E+04	2.6E+04	2.7E+04	2.9E+04	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:29:32

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	3.0E-02	3.0E-02	3.0E-02	0.0E+00	0.0E+00	0.0E+00
Y 90	2.0E-06	1.8E-06	1.8E-06	0.0E+00	5.2E-05	0.0E+00
TC 99	1.5E-05	1.5E-05	3.9E-04	0.0E+00	2.1E-05	0.0E+00
RU 106	2.0E+00	1.7E+00	1.7E+00	0.0E+00	0.0E+00	0.0E+00
AG 110M	3.6E-02	1.0E-02	3.6E-03	0.0E+00	3.2E-01	0.0E+00
CD 113M	2.1E+00	2.1E+00	2.1E+00	3.5E+02	5.8E+01	0.0E+00
SB 125	3.2E-02	6.1E-03	2.8E-03	0.0E+00	1.5E-02	0.0E+00
TE 125M	2.5E-03	8.8E-04	7.5E-04	0.0E+00	0.0E+00	0.0E+00
I 129	3.3E-03	7.5E-03	5.6E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	8.1E+03	8.0E+03	8.1E+03	0.0E+00	0.0E+00	0.0E+00
CS 137	1.7E+04	1.7E+04	1.7E+04	0.0E+00	0.0E+00	0.0E+00
CE 144	5.8E-02	9.9E-03	4.2E-03	0.0E+00	5.7E-01	4.7E-01
PR 144M	6.2E-07	2.9E-07	1.8E-08	5.3E-07	3.2E-07	0.0E+00
PR 144	6.4E-05	3.0E-05	3.1E-06	6.2E-05	4.0E-05	0.0E+00
PM 147	4.8E-06	1.2E-06	8.1E-07	0.0E+00	4.0E-02	0.0E+00
SM 151	2.8E-07	2.0E-08	6.1E-09	0.0E+00	1.2E-03	0.0E+00
EU 154	1.4E-02	2.9E-03	5.8E-04	4.6E-03	3.7E-02	0.0E+00
EU 155	4.5E-03	6.5E-04	8.3E-05	1.1E-03	1.9E-02	0.0E+00
CM 244	4.9E-03	3.3E-07	3.2E-07	0.0E+00	7.3E-02	0.0E+00
PU 240	2.0E+00	6.6E-05	6.1E-05	0.0E+00	2.6E+01	0.0E+00
AM 242M	1.8E-01	1.0E-05	3.3E-06	0.0E+00	2.3E+00	0.0E+00
AM 242	2.0E-05	6.9E-07	1.9E-08	0.0E+00	2.8E-04	0.0E+00
CM 242	1.7E-01	3.0E-04	2.9E-04	0.0E+00	3.6E+00	0.0E+00
NP 238	1.4E-06	1.7E-07	5.3E-09	0.0E+00	4.9E-07	0.0E+00
PU 238	1.3E+00	5.2E-05	4.9E-05	0.0E+00	1.8E+01	0.0E+00
PU 241	1.0E+00	6.3E-05	2.7E-05	0.0E+00	1.0E+01	0.0E+00
U 237	9.1E-07	8.6E-08	1.1E-09	1.4E-07	0.0E+00	0.0E+00
AM 241	1.6E+00	1.8E-04	8.8E-05	0.0E+00	2.0E+01	0.0E+00
CM 243	3.6E-02	1.5E-05	7.2E-06	0.0E+00	5.1E-01	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	6.9E-09	4.3E-12	2.2E-12	0.0E+00	8.8E-08	0.0E+00
NP 239	4.5E-12	4.5E-13	5.6E-15	0.0E+00	4.3E-13	0.0E+00
PU 239	3.5E+00	1.1E-04	1.1E-04	0.0E+00	4.4E+01	0.0E+00
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Total	2.5E+04	2.5E+04	2.5E+04	3.5E+02	1.8E+02	4.7E-01

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	7.3E-06
Y 90	4.1E-04
TC 99	3.7E-10
RU 106	1.7E-01
AG 110M	5.9E-03
CD 113M	4.1E-05
SB 125	1.7E-02
TE 125M	2.3E-05
I 129	1.4E-05
CS 134	2.0E+02
CS 137	2.1E+02
CE 144	4.8E-03
PR 144M	1.2E-05
PR 144	2.2E-02
PM 147	2.6E-06
SM 151	4.3E-09
EU 154	6.6E-03
EU 155	6.6E-04
CM 244	3.1E-10
PU 240	9.2E-08
AM 242M	7.7E-08
AM 242	3.6E-06
CM 242	3.3E-07
NP 238	1.2E-06
PU 238	6.9E-08
PU 241	4.2E-12
U 237	0.0E+00
AM 241	1.7E-05
CM 243	1.0E-05
PU 243	0.0E+00
AM 243	2.1E-13
NP 239	1.6E-12
PU 239	3.7E-07
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Total	4.1E+02

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:29:32

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

 Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.5E-01	3.1E-01	4.8E-01	3.0E+00	1.3E+01	2.4E+02	1.1E+02	1.5E-01
Y 90	6.9E-06	5.8E-01	1.4E+00	6.9E+00	1.7E+01	2.1E-04	2.1E-04	6.9E-06
TC 99	2.4E-05	2.6E-03	4.5E-05	1.5E-04	4.1E-04	2.8E-05	2.8E-05	2.4E-05
RU 106	1.8E+00	3.9E+00	7.1E+00	3.1E+01	9.1E+01	2.1E+00	2.3E+00	1.9E+00
AG 110M	1.1E-02	3.5E-02	7.9E-02	2.9E-01	7.7E-01	7.3E-03	1.3E-02	6.6E-03
CD 113M	7.5E+00	8.1E+00	8.8E+00	1.4E+01	2.9E+01	9.2E+00	9.2E+00	7.7E+00
SB 125	3.8E-03	1.9E-02	4.7E-02	1.4E-01	3.7E-01	4.2E-02	1.4E-02	5.7E-03
TE 125M	1.7E-03	6.9E-03	1.5E-02	6.5E-02	1.8E-01	5.1E-01	4.7E-02	1.5E-03
I 129	3.9E-03	5.4E-03	3.3E-03	3.3E-03	3.3E-03	4.4E-03	4.6E-03	3.1E-03
CS 134	8.1E+03	9.1E+03	1.1E+04	9.8E+03	1.1E+04	8.1E+03	9.1E+03	9.8E+03
CS 137	1.8E+04	2.0E+04	2.0E+04	2.0E+04	2.0E+04	1.8E+04	1.8E+04	2.0E+04
CE 144	5.4E-03	9.1E-01	3.1E+00	1.8E+01	5.5E+01	1.1E-01	7.5E-02	8.3E-03
PR 144M	2.4E-07	1.8E-03	6.6E-04	1.4E-04	8.4E-06	1.4E-07	3.0E-07	4.1E-08
PR 144	2.6E-05	3.5E-01	8.3E-02	1.6E-02	9.1E-04	1.3E-05	2.8E-05	5.9E-06
PM 147	8.8E-07	4.0E-02	1.1E-01	5.8E-01	1.9E+00	1.5E-01	1.2E-02	1.1E-06
SM 151	1.5E-08	3.2E-04	8.0E-04	4.7E-03	1.4E-02	4.8E-03	3.9E-04	7.1E-09
EU 154	2.3E-03	8.5E-03	2.3E-02	7.1E-02	1.9E-01	4.7E-02	1.2E-02	1.7E-03
EU 155	4.5E-04	4.7E-03	1.3E-02	5.6E-02	1.6E-01	6.1E-02	7.5E-03	3.5E-04
CM 244	3.4E-07	4.9E-05	1.3E-04	7.1E-04	2.2E-03	3.6E-01	2.9E-02	4.8E-03
PU 240	6.7E-05	9.9E-03	2.5E-02	1.4E-01	4.4E-01	1.5E+02	1.1E+01	2.0E+00
AM 242M	1.4E-05	5.9E-05	2.0E-04	1.8E-03	7.2E-03	1.3E+01	1.1E+00	1.8E-01
AM 242	1.2E-07	1.5E-04	3.3E-04	1.2E-03	1.9E-03	1.1E-03	9.5E-05	1.4E-05
CM 242	2.9E-04	4.9E-02	1.1E-01	6.5E-01	2.1E+00	1.4E+01	1.2E+00	1.8E-01
NP 238	6.6E-08	2.8E-06	7.3E-06	2.8E-05	6.2E-05	1.1E-05	1.8E-06	3.3E-07
PU 238	5.3E-05	8.0E-03	2.0E-02	1.2E-01	3.5E-01	9.8E+01	7.9E+00	1.4E+00
PU 241	1.1E-04	1.2E-03	3.1E-03	1.7E-02	5.0E-02	6.7E+01	5.3E+00	1.0E+00
U 237	1.1E-08	1.4E-06	3.6E-06	1.6E-05	4.3E-05	1.7E-07	2.8E-07	5.8E-08
AM 241	2.4E-04	9.0E-03	2.1E-02	1.2E-01	3.7E-01	1.2E+02	9.1E+00	1.6E+00
CM 243	1.7E-05	3.4E-04	8.3E-04	4.7E-03	1.4E-02	2.6E+00	2.1E-01	3.5E-02

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	8.9E-12	5.4E-11	1.4E-10	7.4E-10	2.3E-09	5.8E-07	4.6E-08	8.2E-09	
NP 239	2.2E-12	3.1E-10	7.8E-10	3.4E-09	7.8E-09	3.7E-11	4.2E-11	9.7E-12	
PU 239	1.1E-04	1.7E-02	4.3E-02	2.4E-01	7.6E-01	2.6E+02	2.0E+01	3.5E+00	
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Total	2.6E+04	2.9E+04	3.0E+04	3.0E+04	3.1E+04	2.7E+04	2.7E+04	2.9E+04	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:29:32

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.5E-01	1.5E-01	1.5E-01	0.0E+00	0.0E+00	0.0E+00
Y 90	8.0E-06	6.9E-06	6.9E-06	0.0E+00	2.0E-04	0.0E+00
TC 99	2.4E-05	2.4E-05	6.0E-04	0.0E+00	3.2E-05	0.0E+00
RU 106	2.0E+00	1.7E+00	1.8E+00	0.0E+00	0.0E+00	0.0E+00
AG 110M	3.7E-02	1.0E-02	3.7E-03	0.0E+00	3.2E-01	0.0E+00
CD 113M	7.7E+00	7.7E+00	7.7E+00	1.2E+03	2.0E+02	0.0E+00
SB 125	3.3E-02	6.2E-03	2.9E-03	0.0E+00	1.5E-02	0.0E+00
TE 125M	5.0E-03	1.8E-03	1.5E-03	0.0E+00	0.0E+00	0.0E+00
I 129	3.3E-03	7.7E-03	5.8E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	8.1E+03	8.0E+03	8.1E+03	0.0E+00	0.0E+00	0.0E+00
CS 137	1.8E+04	1.8E+04	1.8E+04	0.0E+00	0.0E+00	0.0E+00
CE 144	5.8E-02	9.9E-03	4.2E-03	0.0E+00	5.7E-01	4.7E-01
PR 144M	6.2E-07	2.9E-07	1.8E-08	5.3E-07	3.2E-07	0.0E+00
PR 144	6.5E-05	3.0E-05	3.1E-06	6.2E-05	4.1E-05	0.0E+00
PM 147	4.8E-06	1.2E-06	8.2E-07	0.0E+00	4.0E-02	0.0E+00
SM 151	2.9E-07	2.1E-08	6.4E-09	0.0E+00	1.3E-03	0.0E+00
EU 154	1.4E-02	2.9E-03	5.9E-04	4.7E-03	3.7E-02	0.0E+00
EU 155	4.6E-03	6.5E-04	8.4E-05	1.1E-03	1.9E-02	0.0E+00
CM 244	4.9E-03	3.3E-07	3.2E-07	0.0E+00	7.3E-02	0.0E+00
PU 240	2.0E+00	6.6E-05	6.2E-05	0.0E+00	2.6E+01	0.0E+00
AM 242M	1.8E-01	1.0E-05	3.3E-06	0.0E+00	2.3E+00	0.0E+00
AM 242	2.1E-05	7.0E-07	1.9E-08	0.0E+00	2.9E-04	0.0E+00
CM 242	1.7E-01	3.0E-04	2.9E-04	0.0E+00	3.6E+00	0.0E+00
NP 238	2.6E-06	3.2E-07	9.9E-09	0.0E+00	9.2E-07	0.0E+00
PU 238	1.3E+00	5.2E-05	4.9E-05	0.0E+00	1.8E+01	0.0E+00
PU 241	1.0E+00	6.4E-05	2.7E-05	0.0E+00	1.0E+01	0.0E+00
U 237	9.2E-07	8.7E-08	1.1E-09	1.4E-07	0.0E+00	0.0E+00
AM 241	1.6E+00	1.9E-04	9.0E-05	0.0E+00	2.1E+01	0.0E+00
CM 243	3.6E-02	1.6E-05	7.2E-06	0.0E+00	5.1E-01	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	8.0E-09	6.2E-12	3.1E-12	0.0E+00	1.1E-07	0.0E+00
NP 239	1.5E-10	1.5E-11	1.9E-13	0.0E+00	1.4E-11	0.0E+00
PU 239	3.5E+00	1.1E-04	1.1E-04	0.0E+00	4.5E+01	0.0E+00

Total	2.6E+04	2.6E+04	2.6E+04	1.2E+03	3.3E+02	4.7E-01

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	2.0E-04
Y 90	1.1E-02
TC 99	6.9E-10
RU 106	3.5E-01
AG 110M	8.1E-03
CD 113M	7.4E-04
SB 125	6.6E-02
TE 125M	8.1E-05
I 129	2.5E-05
CS 134	7.1E+02
CS 137	6.2E+03
CE 144	8.2E-03
PR 144M	2.0E-05
PR 144	3.7E-02
PM 147	1.1E-05
SM 151	1.8E-07
EU 154	8.3E-02
EU 155	5.1E-03
CM 244	7.0E-09
PU 240	4.5E-06
AM 242M	3.4E-06
AM 242	1.6E-04
CM 242	7.1E-07
NP 238	5.2E-05
PU 238	3.0E-06
PU 241	7.9E-11
U 237	0.0E+00
AM 241	1.3E-03
CM 243	3.0E-04
PU 243	0.0E+00
AM 243	3.5E-10
NP 239	2.7E-09
PU 239	1.8E-05

Total	7.0E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:30:41

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	2.9E+05	2.5E-01	7.3E+04
Breast	2.5E+05	1.5E-01	3.8E+04
R Marrow	2.7E+05	1.2E-01	3.2E+04
Lung	2.6E+05	1.2E-01	3.1E+04
Thyroid	2.6E+05	3.0E-02	7.7E+03
Bone Sur	2.6E+05	3.0E-02	7.9E+03
LL Int.	3.0E+05	6.0E-02	1.8E+04
S Int.	3.0E+05	6.0E-02	1.8E+04
UL Int.	2.9E+05	6.0E-02	1.8E+04
Stomach	2.8E+05	6.0E-02	1.7E+04
Kidneys	1.6E+03	6.0E-02	9.7E+01
Internal Effective Dose Equivalent			2.6E+05
External Dose			4.1E+02
Annual Effective Dose Equivalent			2.6E+05

Controlling Organ:	LL Int.
Controlling Pathway:	Ing
Controlling Radionuclide:	CS137
Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	2.6E+05

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:30:41

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			2.8E+01	...	
				+		
	2		3.0E+01	3.0E+00	...	Internal
			+	+		Effective
	1	2.3E+05	+ 2.1E+04	+ 4.5E+03	+ ...	Dose
					=	Equivalent
Internal						Cumulative
Annual		2.3E+05	+ 2.1E+04	+ 4.6E+03	+ ...	Internal
Dose					=	Dose
		+	+	+	+	
External						
Annual		4.1E+02	3.5E+02	3.1E+02	...	7.0E+03
Dose						
Annual						Cumulative
Dose		2.3E+05	+ 2.1E+04	+ 4.9E+03	+ ...	Dose
					=	
					2.3E+05	Maximum
						Annual
						Dose Occurred
						In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:30:41

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.4E+04	1.5E+04	1.6E+04	1.6E+04	1.6E+04	1.5E+04	1.5E+04	1.6E+04
Oth. Veg	2.0E+04	2.2E+04	2.3E+04	2.2E+04	2.3E+04	2.1E+04	2.1E+04	2.2E+04
Fruit	2.0E+04	2.2E+04	2.4E+04	2.3E+04	2.4E+04	2.2E+04	2.1E+04	2.3E+04
Cereals	6.7E+03	7.4E+03	7.8E+03	7.6E+03	7.8E+03	7.2E+03	7.1E+03	7.6E+03
Meat	1.3E+05	1.4E+05	1.5E+05	1.4E+05	1.5E+05	1.3E+05	1.3E+05	1.4E+05
Poultry	8.5E+02	9.3E+02	9.8E+02	9.6E+02	9.8E+02	8.5E+02	8.9E+02	9.5E+02
Cow Milk	7.1E+04	7.7E+04	8.2E+04	8.0E+04	8.2E+04	7.1E+04	7.4E+04	7.9E+04
Eggs	1.6E+02	1.8E+02	1.9E+02	1.8E+02	1.9E+02	1.6E+02	1.7E+02	1.8E+02
Soil Ing	1.4E+00	1.5E+00	1.6E+00	1.6E+00	1.7E+00	1.5E+00	1.5E+00	1.6E+00
Total	2.6E+05	2.8E+05	3.0E+05	2.9E+05	3.0E+05	2.6E+05	2.7E+05	2.9E+05

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.4E+04	1.4E+04	1.4E+04	3.6E+02	2.1E+02	5.9E-01
Oth. Veg	2.0E+04	1.9E+04	1.9E+04	4.9E+02	3.0E+02	8.0E-01
Fruit	2.0E+04	2.0E+04	2.0E+04	5.1E+02	3.1E+02	8.2E-01
Cereals	6.8E+03	6.7E+03	6.7E+03	1.8E+02	1.1E+02	2.8E-01
Meat	1.3E+05	1.2E+05	1.2E+05	4.2E+01	1.5E+01	3.4E-01
Poultry	8.5E+02	8.4E+02	8.4E+02	4.2E+00	7.0E-01	8.2E-05
Cow Milk	7.1E+04	7.0E+04	7.0E+04	3.0E+01	7.1E+00	1.7E-02
Eggs	1.6E+02	1.6E+02	1.6E+02	8.3E-01	1.7E-01	6.7E-05
Soil Ing	1.4E+00	1.4E+00	1.4E+00	3.6E-02	2.2E-02	5.9E-05
Total	2.6E+05	2.5E+05	2.6E+05	1.6E+03	9.5E+02	2.8E+00

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	4.1E+02
-----	-----
Total	4.1E+02

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:30:41

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Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.4E+04	1.5E+04	1.6E+04	1.6E+04	1.6E+04	1.5E+04	1.5E+04	1.6E+04
Oth. Veg	2.0E+04	2.2E+04	2.3E+04	2.3E+04	2.3E+04	2.1E+04	2.1E+04	2.2E+04
Fruit	2.1E+04	2.3E+04	2.4E+04	2.3E+04	2.4E+04	2.2E+04	2.2E+04	2.3E+04
Cereals	6.8E+03	7.4E+03	7.8E+03	7.6E+03	7.9E+03	7.3E+03	7.1E+03	7.6E+03
Meat	1.3E+05	1.4E+05	1.5E+05	1.4E+05	1.5E+05	1.3E+05	1.3E+05	1.4E+05
Poultry	8.5E+02	9.3E+02	9.9E+02	9.6E+02	9.9E+02	8.5E+02	8.9E+02	9.6E+02
Cow Milk	7.1E+04	7.7E+04	8.2E+04	8.0E+04	8.2E+04	7.1E+04	7.4E+04	7.9E+04
Eggs	1.6E+02	1.8E+02	1.9E+02	1.8E+02	1.9E+02	1.6E+02	1.7E+02	1.8E+02
Soil Ing	3.1E+01	3.4E+01	3.4E+01	3.4E+01	3.4E+01	3.3E+01	3.2E+01	3.4E+01
Total	2.6E+05	2.8E+05	3.0E+05	2.9E+05	3.0E+05	2.6E+05	2.7E+05	2.9E+05

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.4E+04	1.4E+04	1.4E+04	3.8E+02	2.2E+02	5.9E-01
Oth. Veg	2.0E+04	2.0E+04	2.0E+04	8.6E+02	3.6E+02	8.0E-01
Fruit	2.1E+04	2.0E+04	2.0E+04	9.5E+02	3.8E+02	8.2E-01
Cereals	6.8E+03	6.7E+03	6.7E+03	2.1E+02	1.2E+02	2.0E-01
Meat	1.3E+05	1.2E+05	1.2E+05	4.5E+01	1.5E+01	3.4E-01
Poultry	8.5E+02	8.4E+02	8.4E+02	5.0E+00	8.3E-01	8.2E-05
Cow Milk	7.1E+04	7.0E+04	7.0E+04	3.2E+01	7.5E+00	1.7E-02
Eggs	1.6E+02	1.6E+02	1.6E+02	9.7E-01	1.9E-01	6.7E-05
Soil Ing	3.1E+01	3.0E+01	3.0E+01	6.0E-01	5.9E-01	1.0E-04
Total	2.6E+05	2.6E+05	2.6E+05	2.5E+03	1.1E+03	2.8E+00

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	7.0E+03
-----	-----
Total	7.0E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:30:41

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
-----	-----	-----	-----	-----	-----	-----	-----	-----
H 3	1.1E+01	1.1E+01	1.1E+01	1.1E+01	1.1E+01	1.3E+01	1.4E+01	1.1E+01
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.6E-01	3.3E-01	5.2E-01	3.3E+00	1.4E+01	2.9E+02	1.3E+02	1.6E-01
Y 90	8.6E-06	7.2E-01	1.7E+00	8.6E+00	2.1E+01	2.6E-04	2.6E-04	8.6E-06
TC 99	1.6E-05	1.7E-03	3.0E-05	1.0E-04	2.8E-04	1.9E-05	1.9E-05	1.6E-05
RU 106	1.0E+01	2.2E+01	4.0E+01	1.8E+02	5.2E+02	1.2E+01	1.3E+01	1.1E+01
AG 110M	9.5E-02	2.9E-01	6.6E-01	2.4E+00	6.6E+00	6.2E-02	1.1E-01	5.6E-02
CD 113M	9.6E+00	1.0E+01	1.1E+01	1.8E+01	3.7E+01	1.2E+01	1.2E+01	9.8E+00
SB 125	2.2E-02	1.1E-01	2.7E-01	7.9E-01	2.1E+00	2.5E-01	8.3E-02	3.3E-02
TE 125M	5.0E-03	2.0E-02	4.3E-02	1.9E-01	5.4E-01	1.5E+00	1.4E-01	4.4E-03
I 129	3.4E-02	4.8E-02	3.0E-02	3.0E-02	3.0E-02	3.9E-02	4.1E-02	2.7E-02
CS 134	7.8E+04	8.8E+04	1.0E+05	9.5E+04	1.0E+05	7.8E+04	8.8E+04	9.5E+04
CS 137	1.8E+05	2.0E+05	2.0E+05	2.0E+05	2.0E+05	1.8E+05	1.8E+05	2.0E+05
CE 144	3.2E-02	5.3E+00	1.8E+01	1.1E+02	3.3E+02	6.3E-01	4.4E-01	4.9E-02
PR 144M	1.4E-06	1.0E-02	3.8E-03	8.4E-04	4.9E-05	8.4E-07	1.7E-06	2.4E-07
PR 144	1.6E-04	2.0E+00	4.9E-01	9.2E-02	5.3E-03	7.8E-05	1.6E-04	3.4E-05
PM 147	5.5E-06	2.6E-01	6.7E-01	3.7E+00	1.2E+01	9.6E-01	7.8E-02	6.7E-06
SM 151	9.3E-08	2.0E-03	4.9E-03	2.9E-02	8.5E-02	3.0E-02	2.4E-03	4.3E-08
EU 154	1.5E-02	5.5E-02	1.5E-01	4.7E-01	1.2E+00	3.0E-01	8.1E-02	1.1E-02
EU 155	3.0E-03	3.1E-02	8.6E-02	3.7E-01	1.1E+00	4.0E-01	4.9E-02	2.3E-03
CM 244	2.1E-06	3.1E-04	8.2E-04	4.5E-03	1.4E-02	2.3E+00	1.9E-01	3.0E-02
PU 240	3.6E-04	5.2E-02	1.3E-01	7.4E-01	2.4E+00	7.9E+02	6.1E+01	1.1E+00
AM 242M	7.5E-05	3.1E-04	1.1E-03	9.4E-03	3.8E-02	6.8E+01	5.6E+00	9.7E-01
AM 242	6.3E-07	8.2E-04	1.8E-03	6.7E-03	1.0E-02	5.9E-03	5.1E-04	7.5E-05
CM 242	1.8E-03	3.0E-01	7.1E-01	4.0E+00	1.3E+01	9.0E+01	7.5E+00	1.1E+00
NP 238	1.9E-07	8.1E-06	2.1E-05	8.0E-05	1.8E-04	3.9E-05	5.3E-06	9.5E-07
PU 238	2.8E-04	4.2E-02	1.0E-01	6.2E-01	1.9E+00	5.2E+02	4.2E+01	7.2E+00
PU 241	5.8E-04	6.3E-03	1.7E-02	9.3E-02	2.7E-01	3.6E+02	2.8E+01	5.4E+00
U 237	6.0E-08	7.6E-06	2.0E-05	9.3E-05	2.4E-04	9.6E-07	1.6E-06	3.3E-07
AM 241	1.2E-03	4.7E-02	1.1E-01	6.4E-01	2.0E+00	6.1E+02	4.8E+01	8.6E+00
CM 243	1.1E-04	2.2E-03	5.3E-03	3.0E-02	8.9E-02	1.6E+01	1.3E+00	2.2E-01

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	3.0E-11	1.8E-10	4.6E-10	2.5E-09	7.8E-09	2.4E-06	1.9E-07	3.4E-08	
NP 239	3.2E-13	4.5E-11	1.1E-10	5.0E-10	1.1E-09	5.4E-12	6.2E-12	1.4E-12	
PU 239	6.0E-04	9.2E-02	2.3E-01	1.3E+00	4.1E+00	1.4E+03	1.1E+02	1.9E+01	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	2.6E+05	2.8E+05	3.0E+05	2.9E+05	3.0E+05	2.6E+05	2.7E+05	2.9E+05	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:30:41

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Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	1.1E+01	1.1E+01	1.1E+01	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.6E-01	1.6E-01	1.6E-01	0.0E+00	0.0E+00	0.0E+00
Y 90	9.9E-06	8.6E-06	8.6E-06	0.0E+00	2.5E-04	0.0E+00
TC 99	1.6E-05	1.6E-05	4.0E-04	0.0E+00	2.2E-05	0.0E+00
RU 106	1.1E+01	9.8E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00
AG 110M	3.1E-01	8.6E-02	3.1E-02	0.0E+00	2.7E+00	0.0E+00
CD 113M	9.8E+00	9.8E+00	9.8E+00	1.6E+03	2.7E+02	0.0E+00
SB 125	1.9E-01	3.6E-02	1.7E-02	0.0E+00	8.9E-02	0.0E+00
TE 125M	1.5E-02	5.2E-03	4.4E-03	0.0E+00	0.0E+00	0.0E+00
I 129	3.0E-02	6.9E-02	5.1E+02	0.0E+00	0.0E+00	0.0E+00
CS 134	7.8E+04	7.8E+04	7.8E+04	0.0E+00	0.0E+00	0.0E+00
CS 137	1.8E+05	1.8E+05	1.8E+05	0.0E+00	0.0E+00	0.0E+00
CE 144	3.4E-01	5.8E-02	2.5E-02	0.0E+00	3.3E+00	2.8E+00
PR 144M	3.6E-06	1.7E-06	1.0E-07	3.1E-06	1.9E-06	0.0E+00
PR 144	3.8E-04	1.7E-04	1.8E-05	3.6E-04	2.4E-04	0.0E+00
PM 147	3.1E-05	7.8E-06	5.2E-06	0.0E+00	2.6E-01	0.0E+00
SM 151	1.8E-06	1.3E-07	3.9E-08	0.0E+00	8.0E-03	0.0E+00
EU 154	9.5E-02	1.9E-02	3.8E-03	3.0E-02	2.4E-01	0.0E+00
EU 155	3.0E-02	4.3E-03	5.5E-04	7.3E-03	1.3E-01	0.0E+00
CM 244	3.1E-02	2.1E-06	2.0E-06	0.0E+00	4.6E-01	0.0E+00
PU 240	1.1E+01	3.5E-04	3.3E-04	0.0E+00	1.4E+02	0.0E+00
AM 242M	9.6E-01	5.5E-05	1.8E-05	0.0E+00	1.2E+01	0.0E+00
AM 242	1.1E-04	3.8E-06	1.0E-07	0.0E+00	1.5E-03	0.0E+00
CM 242	1.1E+00	1.8E-03	1.8E-03	0.0E+00	2.2E+01	0.0E+00
NP 238	7.6E-06	9.1E-07	2.8E-08	0.0E+00	2.7E-06	0.0E+00
PU 238	7.1E+00	2.8E-04	2.6E-04	0.0E+00	9.5E+01	0.0E+00
PU 241	5.4E+00	3.4E-04	1.4E-04	0.0E+00	5.6E+01	0.0E+00
U 237	5.2E-06	4.9E-07	6.3E-09	8.2E-07	0.0E+00	0.0E+00
AM 241	8.5E+00	9.8E-04	4.7E-04	0.0E+00	1.1E+02	0.0E+00
CM 243	2.3E-01	9.8E-05	4.6E-05	0.0E+00	3.3E+00	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	3.3E-08	2.1E-11	1.1E-11	0.0E+00	4.2E-07	0.0E+00
NP 239	2.2E-11	2.2E-12	2.7E-14	0.0E+00	2.1E-12	0.0E+00
PU 239	1.9E+01	6.0E-04	5.7E-04	0.0E+00	2.4E+02	0.0E+00

Total	2.6E+05	2.5E+05	2.6E+05	1.6E+03	9.5E+02	2.8E+00

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	7.3E-06
Y 90	4.1E-04
TC 99	3.7E-10
RU 106	1.7E-01
AG 110M	5.9E-03
CD 113M	4.1E-05
SB 125	1.7E-02
TE 125M	2.3E-05
I 129	1.4E-05
CS 134	2.0E+02
CS 137	2.1E+02
CE 144	4.8E-03
PR 144M	1.2E-05
PR 144	2.2E-02
PM 147	2.6E-06
SM 151	4.3E-09
EU 154	6.6E-03
EU 155	6.6E-04
CM 244	3.1E-10
PU 240	9.2E-08
AM 242M	7.7E-08
AM 242	3.6E-06
CM 242	3.3E-07
NP 238	1.2E-06
PU 238	6.9E-08
PU 241	4.2E-12
U 237	0.0E+00
AM 241	1.7E-05
CM 243	1.0E-05
PU 243	0.0E+00
AM 243	2.1E-13
NP 239	1.6E-12
PU 239	3.7E-07

Total	4.1E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:30:41

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.1E+01	1.1E+01	1.1E+01	1.1E+01	1.1E+01	1.3E+01	1.4E+01	1.1E+01
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.8E-01	5.8E-01	9.1E-01	5.7E+00	2.4E+01	4.7E+02	2.1E+02	2.8E-01
Y 90	1.4E-05	1.2E+00	2.7E+00	1.4E+01	3.4E+01	4.2E-04	4.1E-04	1.4E-05
TC 99	2.4E-05	2.6E-03	4.6E-05	1.6E-04	4.2E-04	2.8E-05	2.8E-05	2.4E-05
RU 106	1.0E+01	2.2E+01	4.1E+01	1.8E+02	5.2E+02	1.2E+01	1.3E+01	1.1E+01
AG 110M	9.5E-02	2.9E-01	6.7E-01	2.4E+00	6.6E+00	6.2E-02	1.1E-01	5.6E-02
CD 113M	1.5E+01	1.6E+01	1.8E+01	2.8E+01	5.8E+01	1.8E+01	1.8E+01	1.5E+01
SB 125	2.2E-02	1.1E-01	2.8E-01	8.0E-01	2.1E+00	2.5E-01	8.3E-02	3.3E-02
TE 125M	5.9E-03	2.4E-02	5.1E-02	2.3E-01	6.3E-01	1.8E+00	1.6E-01	5.2E-03
I 129	3.4E-02	4.8E-02	3.0E-02	3.0E-02	3.0E-02	3.9E-02	4.1E-02	2.8E-02
CS 134	7.8E+04	8.8E+04	1.0E+05	9.5E+04	1.0E+05	7.8E+04	8.8E+04	9.5E+04
CS 137	1.8E+05	2.0E+05	2.0E+05	2.0E+05	2.0E+05	1.8E+05	1.8E+05	2.0E+05
CE 144	3.2E-02	5.3E+00	1.8E+01	1.1E+02	3.3E+02	6.3E-01	4.4E-01	4.9E-02
PR 144M	1.4E-06	1.0E-02	3.8E-03	8.4E-04	4.9E-05	8.4E-07	1.7E-06	2.4E-07
PR 144	1.6E-04	2.0E+00	4.9E-01	9.2E-02	5.3E-03	7.8E-05	1.7E-04	3.4E-05
PM 147	5.6E-06	2.6E-01	6.7E-01	3.7E+00	1.2E+01	9.6E-01	7.8E-02	6.7E-06
SM 151	9.4E-08	2.0E-03	5.0E-03	2.9E-02	8.6E-02	3.0E-02	2.4E-03	4.4E-08
EU 154	1.5E-02	5.5E-02	1.5E-01	4.7E-01	1.2E+00	3.0E-01	8.1E-02	1.1E-02
EU 155	3.0E-03	3.1E-02	8.6E-02	3.7E-01	1.1E+00	4.0E-01	4.9E-02	2.3E-03
CM 244	2.1E-06	3.1E-04	8.2E-04	4.5E-03	1.4E-02	2.3E+00	1.9E-01	3.0E-02
PU 240	3.6E-04	5.2E-02	1.3E-01	7.4E-01	2.4E+00	7.9E+02	6.1E+01	1.1E+01
AM 242M	7.5E-05	3.1E-04	1.1E-03	9.5E-03	3.8E-02	6.8E+01	5.6E+00	9.7E-01
AM 242	6.3E-07	8.3E-04	1.8E-03	6.7E-03	1.0E-02	5.9E-03	5.1E-04	7.5E-05
CM 242	1.8E-03	3.0E-01	7.1E-01	4.0E+00	1.3E+01	9.0E+01	7.5E+00	1.1E+00
NP 238	2.2E-07	9.5E-06	2.4E-05	9.3E-05	2.0E-04	4.3E-05	6.2E-06	1.1E-06
PU 238	2.8E-04	4.2E-02	1.0E-01	6.2E-01	1.9E+00	5.2E+02	4.2E+01	7.2E+00
PU 241	5.8E-04	6.3E-03	1.7E-02	9.3E-02	2.7E-01	3.6E+02	2.8E+01	5.4E+00
U 237	6.0E-08	7.7E-06	2.0E-05	9.3E-05	2.4E-04	9.6E-07	1.6E-06	3.3E-07
AM 241	1.3E-03	4.7E-02	1.1E-01	6.4E-01	2.0E+00	6.2E+02	4.8E+01	8.6E+00
CM 243	1.1E-04	2.2E-03	5.3E-03	3.0E-02	8.9E-02	1.6E+01	1.3E+00	2.2E-01

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	3.3E-11	2.0E-10	5.0E-10	2.7E-09	8.5E-09	2.4E-06	1.9E-07	3.5E-08	
NP 239	2.5E-12	3.5E-10	8.7E-10	3.8E-09	8.7E-09	4.1E-11	4.7E-11	1.1E-11	
PU 239	6.0E-04	9.2E-02	2.3E-01	1.3E+00	4.1E+00	1.4E+03	1.1E+02	1.9E+01	
-----	-----	-----	-----	-----	-----	-----	-----	-----	
Total	2.6E+05	2.8E+05	3.0E+05	2.9E+05	3.0E+05	2.6E+05	2.7E+05	2.9E+05	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - ingestion doses

Executed on: 10/22/97 at 16:30:41

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	1.1E+01	1.1E+01	1.1E+01	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.8E-01	2.8E-01	2.8E-01	0.0E+00	0.0E+00	0.0E+00
Y 90	1.6E-05	1.4E-05	1.4E-05	0.0E+00	4.0E-04	0.0E+00
TC 99	2.4E-05	2.4E-05	6.1E-04	0.0E+00	3.3E-05	0.0E+00
RU 106	1.1E+01	9.9E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00
AG 110M	3.1E-01	8.6E-02	3.1E-02	0.0E+00	2.7E+00	0.0E+00
CD 113M	1.5E+01	1.5E+01	1.5E+01	2.5E+03	4.1E+02	0.0E+00
SB 125	1.9E-01	3.6E-02	1.7E-02	0.0E+00	8.9E-02	0.0E+00
TE 125M	1.7E-02	6.1E-03	5.2E-03	0.0E+00	0.0E+00	0.0E+00
I 129	3.0E-02	6.9E-02	5.2E+02	0.0E+00	0.0E+00	0.0E+00
CS 134	7.8E+04	7.8E+04	7.8E+04	0.0E+00	0.0E+00	0.0E+00
CS 137	1.8E+05	1.8E+05	1.8E+05	0.0E+00	0.0E+00	0.0E+00
CE 144	3.4E-01	5.8E-02	2.5E-02	0.0E+00	3.3E+00	2.8E+00
PR 144M	3.6E-06	1.7E-06	1.0E-07	3.1E-06	1.9E-06	0.0E+00
PR 144	3.8E-04	1.7E-04	1.8E-05	3.6E-04	2.4E-04	0.0E+00
PM 147	3.1E-05	7.8E-06	5.2E-06	0.0E+00	2.6E-01	0.0E+00
SM 151	1.8E-06	1.3E-07	3.9E-08	0.0E+00	8.0E-03	0.0E+00
EU 154	9.5E-02	1.9E-02	3.9E-03	3.0E-02	2.4E-01	0.0E+00
EU 155	3.0E-02	4.3E-03	5.5E-04	7.4E-03	1.3E-01	0.0E+00
CM 244	3.1E-02	2.1E-06	2.0E-06	0.0E+00	4.6E-01	0.0E+00
PU 240	1.1E+01	3.5E-04	3.3E-04	0.0E+00	1.4E+02	0.0E+00
AM 242M	9.6E-01	5.5E-05	1.8E-05	0.0E+00	1.2E+01	0.0E+00
AM 242	1.1E-04	3.8E-06	1.0E-07	0.0E+00	1.5E-03	0.0E+00
CM 242	1.1E+00	1.8E-03	1.8E-03	0.0E+00	2.2E+01	0.0E+00
NP 238	8.8E-06	1.1E-06	3.3E-08	0.0E+00	3.1E-06	0.0E+00
PU 238	7.1E+00	2.8E-04	2.6E-04	0.0E+00	9.5E+01	0.0E+00
PU 241	5.4E+00	3.4E-04	1.4E-04	0.0E+00	5.6E+01	0.0E+00
U 237	5.2E-06	4.9E-07	6.3E-09	8.2E-07	0.0E+00	0.0E+00
AM 241	8.5E+00	9.8E-04	4.7E-04	0.0E+00	1.1E+02	0.0E+00
CM 243	2.3E-01	9.8E-05	4.6E-05	0.0E+00	3.3E+00	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	3.4E-08	2.3E-11	1.1E-11	0.0E+00	4.4E-07	0.0E+00
NP 239	1.7E-10	1.7E-11	2.1E-13	0.0E+00	1.6E-11	0.0E+00
PU 239	1.9E+01	6.0E-04	5.8E-04	0.0E+00	2.4E+02	0.0E+00

Total	2.6E+05	2.6E+05	2.6E+05	2.5E+03	1.1E+03	2.8E+00

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	2.0E-04
Y 90	1.1E-02
TC 99	6.9E-10
RU 106	3.5E-01
AG 110M	8.1E-03
CD 113M	7.4E-04
SB 125	6.6E-02
TE 125M	8.1E-05
I 129	2.5E-05
CS 134	7.1E+02
CS 137	6.2E+03
CE 144	8.2E-03
PR 144M	2.0E-05
PR 144	3.7E-02
PM 147	1.1E-05
SM 151	1.8E-07
EU 154	8.3E-02
EU 155	5.1E-03
CM 244	7.0E-09
PU 240	4.5E-06
AM 242M	3.4E-06
AM 242	1.6E-04
CM 242	7.1E-07
NP 238	5.2E-05
PU 238	3.0E-06
PU 241	7.9E-11
U 237	0.0E+00
AM 241	1.3E-03
CM 243	3.0E-04
PU 243	0.0E+00
AM 243	3.5E-10
NP 239	2.7E-09
PU 239	1.8E-05

Total	7.0E+03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - tritium target - ingestion doses

Executed on: 10/22/97 at 16:44:14

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Ground, external
 Terrestrial foods ingestion
 Animal product ingestion
 Inadvertent soil ingestion

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 50.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\tritlain.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 PNL Food Transfer Factor Library (by Z, with Fr&Os 7/19/93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

-----Release Terms-----

Release	Surface	Buried
Radio-	Air	Water
nuclide	Ci/yr	Ci/yr
		Ci/m3
H 3	4.2E+03	0.0E+00 0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 4.4E+03 Hours of exposure to ground contamination

===== INGESTION POPULATION =====
1 Atmospheric production definition: 1 - Use population-weighted chi/Q

===== TERRESTRIAL FOOD INGESTION =====

FOOD TYPE	GROW TIME d	--IRRIGATION-- S RATE * in/yr	TIME mo/yr	YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP d	RATE kg/yr
Leaf Veg	90.0	0	0.0	0.0	1.5	1.0	3.0E+01
Oth. Veg	90.0	0	0.0	0.0	4.0	5.0	2.2E+02
Fruit	90.0	0	0.0	0.0	2.0	5.0	3.3E+02
Cereals	90.0	0	0.0	0.0	0.8	180.0	8.0E+01

===== ANIMAL FOOD INGESTION =====

FOOD TYPE	---HUMAN--- CONSUMPTION RATE kg/yr	TOTAL PROD- UCTION kg/yr	DRINK WATER CONTAM FRACT.	DIET FRAC- TION	GROW TIME d	---STORED FEED--- --IRRIGATION-- S RATE * in/yr	TIME mo/yr	STOR- YIELD kg/m3	AGE d
Meat	8.0E+01	15.0	0.00	0.3	90.00	0	0.0	0.0	0.80
Poultry	1.8E+01	1.0	0.00	1.0	90.00	0	0.0	0.0	0.80
Cow Milk	2.7E+02	1.0	0.00	0.3	45.00	0	0.0	0.0	2.00
Eggs	3.0E+01	1.0	0.00	1.0	90.00	0	0.0	0.0	0.80

	-----FRESH FORAGE-----							
Meat	0.75	45.0	0	0.0	0.0	2.00	0.0	
Cow Milk	0.75	30.0	0	0.0	0.0	1.50	0.0	

Note: Animal diet fraction for years 2 through 50.0000

Input prepared by: _____ Date: _____
Input checked by: _____ Date: _____

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - tritium target - ingestion dose

Executed on: 10/22/97 at 16:44:21

Page C. 1

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			0.0E+00	...	
			+		
2		0.0E+00	0.0E+00	...	
		+	+		
1	0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ... = 0.0E+00	Internal Effective Dose Equivalent
Internal Annual Dose	0.0E+00 + 0.0E+00 + 0.0E+00 + ... = 0.0E+00				Cumulative Internal Dose
	+	+	+	+	
External Annual Dose	0.0E+00	0.0E+00	0.0E+00	... 0.0E+00	
Annual Dose	0.0E+00 + 0.0E+00 + 0.0E+00 + ... = 0.0E+00				Cumulative Dose
				0.0E+00	Maximum Annual Dose Occurred In Year 0

External Dose by Exposure Pathway

Pathway	
Sur Soil	0.0E+00
Total	0.0E+00

External Dose by Exposure Pathway

Pathway	
Sur Soil	0.0E+00
Total	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - tritium target - ingestion dose

Executed on: 10/22/97 at 16:44:23

Page C. 2

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			0.0E+00	...	
			+		
2		0.0E+00	0.0E+00	...	Internal Effective Dose Equivalent
		+	+		
1	0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ... = 0.0E+00	
Internal Annual Dose	0.0E+00 + 0.0E+00 + 0.0E+00 + ... = 0.0E+00				Cumulative Internal Dose
	+	+	+	+	
External Annual Dose	0.0E+00	0.0E+00	0.0E+00	...	0.0E+00
Annual Dose	0.0E+00 + 0.0E+00 + 0.0E+00 + ... = 0.0E+00				Cumulative Dose
				0.0E+00	Maximum Annual Dose Occurred In Year 0

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - tritium target - ingestion dose

Executed on: 10/22/97 at 16:44:26

Page C. 3

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			0.0E+00	...	
				+		
	2		0.0E+00	0.0E+00	...	Internal
			+	+		Effective
	1	0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ...	Dose
					=	Equivalent
Internal						Cumulative
Annual		0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ...	Internal
Dose					=	Dose
		+	+	+	+	
External		0.0E+00	0.0E+00	0.0E+00	...	0.0E+00
Annual						
Dose						
Annual		0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ...	Cumulative
Dose					=	Dose
					0.0E+00	Maximum
						Annual
						Dose Occurred
						In Year 0

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - tritium target - ingestion dose

Executed on: 10/22/97 at 16:44:28

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.2E+04	2.5E-01	2.9E+03
Breast	1.2E+04	1.5E-01	1.7E+03
R Marrow	1.4E+04	1.2E-01	1.7E+03
Lung	1.2E+04	1.2E-01	1.4E+03
Thyroid	1.2E+04	3.0E-02	3.5E+02
Bone Sur	1.4E+04	3.0E-02	4.1E+02
Stomach	1.2E+04	6.0E-02	7.0E+02
S Int.	1.2E+04	6.0E-02	7.0E+02
UL Int.	1.2E+04	6.0E-02	7.0E+02
LL Int.	1.2E+04	6.0E-02	7.0E+02
Internal Effective Dose Equivalent			1.1E+04
External Dose			0.0E+00
Annual Effective Dose Equivalent			1.1E+04

Controlling Organ:	R Marrow
Controlling Pathway:	Ing
Controlling Radionuclide:	H 3

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	1.1E+04

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - tritium target - ingestion dose

Executed on: 10/22/97 at 16:44:28

Page C. 5

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			0.0E+00	...	
				+		
	2		0.0E+00	0.0E+00	...	Internal
			+	+		Effective
	1	1.1E+04	+ 0.0E+00	+ 0.0E+00	+ ... = 1.1E+04	Dose
						Equivalent
Internal						
Annual		1.1E+04	+ 0.0E+00	+ 0.0E+00	+ ... = 1.1E+04	Cumulative
Dose						Internal
		+	+	+	+	Dose
External		0.0E+00	0.0E+00	0.0E+00	...	
Annual						
Dose						
Annual		1.1E+04	+ 0.0E+00	+ 0.0E+00	+ ... = 1.1E+04	Cumulative
Dose						Dose
					1.1E+04	Maximum
						Annual
						Dose Occurred
						In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - tritium target - ingestion dose

Executed on: 10/22/97 at 16:44:28

Page C. 6

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	3.3E+02	3.3E+02	3.3E+02	3.3E+02	3.3E+02	3.9E+02	4.1E+02	3.3E+02
Oth. Veg	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.9E+03	3.0E+03	2.5E+03
Fruit	3.6E+03	3.6E+03	3.6E+03	3.6E+03	3.6E+03	4.3E+03	4.5E+03	3.6E+03
Cereals	5.8E+02	5.8E+02	5.8E+02	5.8E+02	5.8E+02	6.8E+02	7.1E+02	5.8E+02
Meat	8.8E+02	8.8E+02	8.8E+02	8.8E+02	8.8E+02	1.0E+03	1.1E+03	8.8E+02
Poultry	2.0E+02	2.0E+02	2.0E+02	2.0E+02	2.0E+02	2.4E+02	2.5E+02	2.0E+02
Cow Milk	3.1E+03	3.1E+03	3.1E+03	3.1E+03	3.1E+03	3.7E+03	3.9E+03	3.1E+03
Eggs	3.5E+02	3.5E+02	3.5E+02	3.5E+02	3.5E+02	4.1E+02	4.3E+02	3.5E+02
Soil Ing	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	1.2E+04	1.2E+04	1.2E+04	1.2E+04	1.2E+04	1.4E+04	1.4E+04	1.2E+04

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	3.3E+02	3.3E+02	3.3E+02
Oth. Veg	2.5E+03	2.5E+03	2.5E+03
Fruit	3.6E+03	3.6E+03	3.6E+03
Cereals	5.8E+02	5.8E+02	5.8E+02
Meat	8.8E+02	8.8E+02	8.8E+02
Poultry	2.0E+02	2.0E+02	2.0E+02
Cow Milk	3.1E+03	3.1E+03	3.1E+03
Eggs	3.5E+02	3.5E+02	3.5E+02
Soil Ing	0.0E+00	0.0E+00	0.0E+00
Total	1.2E+04	1.2E+04	1.2E+04

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - tritium target - ingestion dose

Executed on: 10/22/97 at 16:44:28

Page C. 7

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
-----	-----	-----	-----	-----	-----	-----	-----	-----
Leaf Veg	3.3E+02	3.3E+02	3.3E+02	3.3E+02	3.3E+02	3.9E+02	4.1E+02	3.3E+02
Oth. Veg	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.5E+03	2.9E+03	3.0E+03	2.5E+03
Fruit	3.6E+03	3.6E+03	3.6E+03	3.6E+03	3.6E+03	4.3E+03	4.5E+03	3.6E+03
Cereals	5.8E+02	5.8E+02	5.8E+02	5.8E+02	5.8E+02	6.8E+02	7.1E+02	5.8E+02
Meat	8.8E+02	8.8E+02	8.8E+02	8.8E+02	8.8E+02	1.0E+03	1.1E+03	8.8E+02
Poultry	2.0E+02	2.0E+02	2.0E+02	2.0E+02	2.0E+02	2.4E+02	2.5E+02	2.0E+02
Cow Milk	3.1E+03	3.1E+03	3.1E+03	3.1E+03	3.1E+03	3.7E+03	3.9E+03	3.1E+03
Eggs	3.5E+02	3.5E+02	3.5E+02	3.5E+02	3.5E+02	4.1E+02	4.3E+02	3.5E+02
Soil Ing	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	1.2E+04	1.2E+04	1.2E+04	1.2E+04	1.2E+04	1.4E+04	1.4E+04	1.2E+04

Pathway	Ovaries	Muscle	Thyroid
-----	-----	-----	-----
Leaf Veg	3.3E+02	3.3E+02	3.3E+02
Oth. Veg	2.5E+03	2.5E+03	2.5E+03
Fruit	3.6E+03	3.6E+03	3.6E+03
Cereals	5.8E+02	5.8E+02	5.8E+02
Meat	8.8E+02	8.8E+02	8.8E+02
Poultry	2.0E+02	2.0E+02	2.0E+02
Cow Milk	3.1E+03	3.1E+03	3.1E+03
Eggs	3.5E+02	3.5E+02	3.5E+02
Soil Ing	0.0E+00	0.0E+00	0.0E+00
-----	-----	-----	-----
Total	1.2E+04	1.2E+04	1.2E+04

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	0.0E+00
Total	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Seismic BLTC shear - I-125 target - ingestion.doses

Executed on: 10/24/97 at 14:00:20

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Ground, external
 Terrestrial foods ingestion
 Animal product ingestion
 Inadvertent soil ingestion

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 50.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\tritbin.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 PNL Food Transfer Factor Library (by Z, with Fr&Os 7/19/93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

----- Release Terms -----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3
I 125	2.7E+03	0.0E+00	0.0E+00

===== AIR TRANSPORT =====

1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====

4.4E+03 Hours of exposure to ground contamination

===== INGESTION POPULATION =====
 1 Atmospheric production definition: 1 - Use population-weighted chi/Q

===== TERRESTRIAL FOOD INGESTION =====

FOOD TYPE	GROW TIME d	--IRRIGATION-- S RATE * in/yr	TIME mo/yr	YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP d	RATE kg/yr
Leaf Veg	90.0	0	0.0	0.0	1.5	1.0	3.0E+01
Oth. Veg	90.0	0	0.0	0.0	4.0	5.0	2.2E+02
Fruit	90.0	0	0.0	0.0	2.0	5.0	3.3E+02
Cereals	90.0	0	0.0	0.0	0.8	180.0	8.0E+01

===== ANIMAL FOOD INGESTION =====

FOOD TYPE	---HUMAN--- CONSUMPTION RATE kg/yr	TOTAL PROD- HOLDUP d	DRINK WATER CONTAM FRACT.	DIET FRAC- TION	GROW TIME d	---STORED FEED--- --IRRIGATION-- S RATE * in/yr	TIME mo/yr	YIELD kg/m3	STOR- AGE d
Meat	8.0E+01	15.0	0.00	0.3	90.00	0	0.0	0.0	0.80
Poultry	1.8E+01	1.0	0.00	1.0	90.00	0	0.0	0.0	0.80
Cow Milk	2.7E+02	1.0	0.00	0.3	45.00	0	0.0	0.0	2.00
Eggs	3.0E+01	1.0	0.00	1.0	90.00	0	0.0	0.0	0.80
-----FRESH FORAGE-----									
Meat				0.75	45.0	0	0.0	0.0	2.00
Cow Milk				0.75	30.0	0	0.0	0.0	1.50

Note: Animal diet fraction for years 2 through 50.0000

Input prepared by: _____ Date: _____

Input checked by: _____ Date: _____

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:29

Page C. 1

Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	4.3E+01	2.5E-01	1.1E+01
Breast	2.0E+02	1.5E-01	3.1E+01
R Marrow	9.3E+01	1.2E-01	1.1E+01
Lung	6.0E+01	1.2E-01	7.2E+00
Thyroid	5.1E+05	3.0E-02	1.5E+04
Bone Sur	9.1E+01	3.0E-02	2.7E+00
Stomach	1.0E+02	6.0E-02	6.2E+00
S Int.	4.6E+01	6.0E-02	2.7E+00
UL Int.	4.6E+01	6.0E-02	2.7E+00
LL Int.	4.4E+01	6.0E-02	2.6E+00
Internal Effective Dose Equivalent			1.5E+04
External Dose			2.2E+02
Annual Effective Dose Equivalent			1.5E+04

Controlling Organ:	Thyroid
Controlling Pathway:	Ing
Controlling Radionuclide:	I 125

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	1.5E+04

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:29

Page C. 2

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			1.0E+01	...	
			+		
2		1.7E+03	2.9E+00	...	Internal Effective Dose Equivalent
		+	+		
1	1.5E+04	2.5E+01	0.0E+00	...	= 1.5E+04
Internal Annual Dose	1.5E+04	1.8E+03	1.3E+01	...	= 1.7E+04
	+	+	+	+	
External Annual Dose	2.2E+02	1.5E+00	9.8E-03	...	2.3E+02
Annual Dose	1.5E+04	1.8E+03	1.3E+01	...	= 1.7E+04
				1.5E+04	Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:29

Page C. 3

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	5.8E-01	1.0E+00	4.4E-01	4.4E-01	4.2E-01	8.8E-01	9.0E-01	3.3E-01
Oth. Veg	1.0E+01	1.7E+01	7.6E+00	7.6E+00	7.4E+00	1.5E+01	1.5E+01	5.8E+00
Fruit	1.1E+01	1.9E+01	8.3E+00	8.3E+00	8.0E+00	1.7E+01	1.7E+01	6.3E+00
Cereals	3.5E-01	6.1E-01	2.7E-01	2.7E-01	2.6E-01	5.4E-01	5.5E-01	2.0E-01
Meat	1.8E+00	3.2E+00	1.4E+00	1.4E+00	1.3E+00	2.8E+00	2.8E+00	1.1E+00
Poultry	7.5E-03	1.3E-02	5.7E-03	5.7E-03	5.5E-03	1.1E-02	1.2E-02	4.3E-03
Cow Milk	3.4E+01	5.9E+01	2.6E+01	2.6E+01	2.5E+01	5.2E+01	5.2E+01	2.0E+01
Eggs	2.0E+00	3.4E+00	1.5E+00	1.5E+00	1.5E+00	3.0E+00	3.1E+00	1.1E+00
Soil Ing	5.9E-01	1.0E+00	4.5E-01	4.5E-01	4.4E-01	9.0E-01	9.2E-01	3.4E-01
Total	6.0E+01	1.0E+02	4.6E+01	4.6E+01	4.4E+01	9.1E+01	9.3E+01	3.5E+01

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	4.1E-01	2.0E+00	4.9E+03
Oth. Veg	7.1E+00	3.4E+01	8.4E+04
Fruit	7.7E+00	3.7E+01	9.1E+04
Cereals	2.5E-01	1.2E+00	3.0E+03
Meat	1.3E+00	6.3E+00	1.5E+04
Poultry	5.3E-03	2.5E-02	6.3E+01
Cow Milk	2.4E+01	1.2E+02	2.8E+05
Eggs	1.4E+00	6.7E+00	1.7E+04
Soil Ing	4.2E-01	2.0E+00	5.0E+03
Total	4.3E+01	2.0E+02	5.1E+05

External Dose by Exposure Pathway

Pathway	
Sur Soil	2.2E+02
Total	2.2E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:29

Page C. 4

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	7.1E-01	1.2E+00	5.4E-01	5.4E-01	5.2E-01	1.1E+00	1.1E+00	4.1E-01
Oth. Veg	1.2E+01	2.2E+01	9.5E+00	9.5E+00	9.1E+00	1.9E+01	1.9E+01	7.2E+00
Fruit	1.3E+01	2.3E+01	1.0E+01	1.0E+01	9.9E+00	2.0E+01	2.1E+01	7.7E+00
Cereals	4.3E-01	7.5E-01	3.3E-01	3.3E-01	3.2E-01	6.6E-01	6.7E-01	2.5E-01
Meat	1.9E+00	3.3E+00	1.5E+00	1.5E+00	1.4E+00	2.9E+00	3.0E+00	1.1E+00
Poultry	7.8E-03	1.3E-02	5.9E-03	5.9E-03	5.7E-03	1.2E-02	1.2E-02	4.5E-03
Cow Milk	3.5E+01	6.1E+01	2.7E+01	2.7E+01	2.6E+01	5.4E+01	5.5E+01	2.0E+01
Eggs	2.1E+00	3.6E+00	1.6E+00	1.6E+00	1.5E+00	3.1E+00	3.2E+00	1.2E+00
Soil Ing	5.9E-01	1.0E+00	4.5E-01	4.5E-01	4.4E-01	9.1E-01	9.2E-01	3.4E-01
Total	6.7E+01	1.2E+02	5.1E+01	5.1E+01	4.9E+01	1.0E+02	1.0E+02	3.9E+01

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	5.1E-01	2.4E+00	6.0E+03
Oth. Veg	8.8E+00	4.2E+01	1.0E+05
Fruit	9.5E+00	4.6E+01	1.1E+05
Cereals	3.1E-01	1.5E+00	3.7E+03
Meat	1.4E+00	6.5E+00	1.6E+04
Poultry	5.5E-03	2.7E-02	6.5E+01
Cow Milk	2.5E+01	1.2E+02	3.0E+05
Eggs	1.5E+00	7.0E+00	1.7E+04
Soil Ing	4.2E-01	2.0E+00	5.0E+03
Total	4.7E+01	2.3E+02	5.6E+05

External Dose by Exposure Pathway

Pathway	
Sur Soil	2.3E+02
Total	2.3E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:31

Page C. 5

Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	7.9E+03	2.5E-01	2.0E+03
Breast	3.8E+04	1.5E-01	5.7E+03
R Marrow	1.7E+04	1.2E-01	2.1E+03
Lung	1.1E+04	1.2E-01	1.3E+03
Thyroid	9.4E+07	3.0E-02	2.8E+06
Bone Sur	1.7E+04	3.0E-02	5.1E+02
Stomach	1.9E+04	6.0E-02	1.2E+03
S Int.	8.5E+03	6.0E-02	5.1E+02
UL Int.	8.5E+03	6.0E-02	5.1E+02
LL Int.	8.2E+03	6.0E-02	4.9E+02
Internal Effective Dose Equivalent			2.8E+06
External Dose			2.2E+02
Annual Effective Dose Equivalent			2.8E+06

Controlling Organ:	Thyroid
Controlling Pathway:	Ing
Controlling Radionuclide:	I 125

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	2.8E+06

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:31

Page C. 6

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			1.0E+01	...	
				+		
	2		1.7E+03	2.9E+00	...	Internal
			+	+		Effective
	1	2.8E+06	+ 4.7E+03	+ 0.0E+00	+ ... = 2.8E+06	Dose
						Equivalent
Internal						
Annual		2.8E+06	+ 6.4E+03	+ 1.3E+01	+ ... = 2.8E+06	Cumulative
Dose						Internal
		+	+	+	+	Dose
External		2.2E+02	1.5E+00	9.8E-03	...	2.3E+02
Annual						
Dose						
Annual						
Dose		2.8E+06	+ 6.4E+03	+ 1.3E+01	+ ... = 2.8E+06	Cumulative
						Dose
					2.8E+06	Maximum
						Annual
						Dose Occurred
						In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:31

Page C. 7

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.1E+03	1.9E+03	8.5E+02	8.5E+02	8.2E+02	1.7E+03	1.7E+03	6.4E+02
Oth. Veg	2.8E+01	4.9E+01	2.1E+01	2.1E+01	2.1E+01	4.3E+01	4.4E+01	1.6E+01
Fruit	3.1E+01	5.4E+01	2.4E+01	2.4E+01	2.3E+01	4.7E+01	4.8E+01	1.8E+01
Cereals	1.0E+00	1.7E+00	7.6E-01	7.6E-01	7.4E-01	1.5E+00	1.5E+00	5.8E-01
Meat	5.5E+02	9.5E+02	4.2E+02	4.2E+02	4.0E+02	8.4E+02	8.5E+02	3.2E+02
Poultry	2.1E-02	3.7E-02	1.6E-02	1.6E-02	1.6E-02	3.2E-02	3.3E-02	1.2E-02
Cow Milk	9.4E+03	1.6E+04	7.2E+03	7.2E+03	6.9E+03	1.4E+04	1.5E+04	5.5E+03
Eggs	5.5E+00	9.5E+00	4.2E+00	4.2E+00	4.0E+00	8.4E+00	8.5E+00	3.2E+00
Soil Ing	5.9E-01	1.0E+00	4.5E-01	4.5E-01	4.4E-01	9.0E-01	9.2E-01	3.4E-01
Total	1.1E+04	1.9E+04	8.5E+03	8.5E+03	8.2E+03	1.7E+04	1.7E+04	6.5E+03

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	7.9E+02	3.8E+03	9.4E+06
Oth. Veg	2.0E+01	9.6E+01	2.4E+05
Fruit	2.2E+01	1.1E+02	2.6E+05
Cereals	7.1E-01	3.4E+00	8.4E+03
Meat	3.9E+02	1.9E+03	4.6E+06
Poultry	1.5E-02	7.2E-02	1.8E+02
Cow Milk	6.7E+03	3.2E+04	7.9E+07
Eggs	3.9E+00	1.9E+01	4.6E+04
Soil Ing	4.2E-01	2.0E+00	5.0E+03
Total	7.9E+03	3.8E+04	9.4E+07

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.2E+02
-----	-----
Total	2.2E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Seismic BLTC shear -- I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:31

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.1E+03	1.9E+03	8.5E+02	8.5E+02	8.2E+02	1.7E+03	1.7E+03	6.4E+02
Oth. Veg	3.1E+01	5.3E+01	2.3E+01	2.3E+01	2.2E+01	4.7E+01	4.7E+01	1.8E+01
Fruit	3.3E+01	5.8E+01	2.6E+01	2.6E+01	2.5E+01	5.1E+01	5.2E+01	1.9E+01
Cereals	1.1E+00	1.9E+00	8.2E-01	8.2E-01	8.0E-01	1.6E+00	1.7E+00	6.3E-01
Meat	5.5E+02	9.5E+02	4.2E+02	4.2E+02	4.0E+02	8.4E+02	8.5E+02	3.2E+02
Poultry	2.1E-02	3.7E-02	1.6E-02	1.6E-02	1.6E-02	3.3E-02	3.3E-02	1.2E-02
Cow Milk	9.4E+03	1.6E+04	7.2E+03	7.2E+03	6.9E+03	1.4E+04	1.5E+04	5.5E+03
Eggs	5.6E+00	9.7E+00	4.2E+00	4.2E+00	4.1E+00	8.5E+00	8.6E+00	3.2E+00
Soil Ing	5.9E-01	1.0E+00	4.5E-01	4.5E-01	4.4E-01	9.1E-01	9.2E-01	3.4E-01
Total	1.1E+04	1.9E+04	8.5E+03	8.5E+03	8.2E+03	1.7E+04	1.7E+04	6.5E+03

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	7.9E+02	3.8E+03	9.4E+06
Oth. Veg	2.2E+01	1.0E+02	2.6E+05
Fruit	2.4E+01	1.1E+02	2.8E+05
Cereals	7.7E-01	3.7E+00	9.1E+03
Meat	3.9E+02	1.9E+03	4.6E+06
Poultry	1.5E-02	7.3E-02	1.8E+02
Cow Milk	6.7E+03	3.2E+04	7.9E+07
Eggs	4.0E+00	1.9E+01	4.7E+04
Soil Ing	4.2E-01	2.0E+00	5.0E+03
Total	7.9E+03	3.8E+04	9.4E+07

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.3E+02
-----	-----
Total	2.3E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:33

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.2E+04	2.5E-01	2.9E+03
Breast	5.6E+04	1.5E-01	8.3E+03
R Marrow	2.5E+04	1.2E-01	3.0E+03
Lung	1.6E+04	1.2E-01	1.9E+03
Thyroid	1.4E+08	3.0E-02	4.1E+06
Bone Sur	2.5E+04	3.0E-02	7.4E+02
Stomach	2.8E+04	6.0E-02	1.7E+03
S Int.	1.2E+04	6.0E-02	7.4E+02
UL Int.	1.2E+04	6.0E-02	7.4E+02
LL Int.	1.2E+04	6.0E-02	7.2E+02
Internal Effective Dose Equivalent			4.1E+06
External Dose			2.2E+02
Annual Effective Dose Equivalent			4.1E+06

Controlling Organ:	Thyroid
Controlling Pathway:	Ing
Controlling Radionuclide:	I 125

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	4.1E+06

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year					
		1	2	3	...		
Internal	:						
Intake	:						
Year:	3	1.0E+01 ...					
		+					
	2	1.7E+03 2.9E+00 ...					
		+					
	1	4.1E+06 + 6.8E+03 + 0.0E+00 + ... = 4.1E+06					Internal Effective Dose Equivalent
Internal							Cumulative Internal Dose
Annual							
Dose		4.1E+06 + 8.5E+03 + 1.3E+01 + ... = 4.1E+06					
		+	+	+	+		
External							
Annual		2.2E+02 1.5E+00 9.8E-03 ... 2.3E+02					
Dose							
Annual							Cumulative Dose
Dose		4.1E+06 + 8.5E+03 + 1.3E+01 + ... = 4.1E+06					
							Maximum Annual Dose Occurred In Year 1
		4.1E+06					

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.1E+03	1.9E+03	8.5E+02	8.5E+02	8.2E+02	1.7E+03	1.7E+03	6.4E+02
Oth. Veg	1.3E+03	2.2E+03	9.9E+02	9.9E+02	9.5E+02	2.0E+03	2.0E+03	7.5E+02
Fruit	1.3E+03	2.3E+03	1.0E+03	1.0E+03	9.8E+02	2.0E+03	2.1E+03	7.7E+02
Cereals	6.3E+01	1.1E+02	4.8E+01	4.8E+01	4.7E+01	9.7E+01	9.8E+01	3.7E+01
Meat	6.9E+02	1.2E+03	5.3E+02	5.3E+02	5.1E+02	1.1E+03	1.1E+03	4.0E+02
Poultry	2.8E-01	4.9E-01	2.1E-01	2.1E-01	2.1E-01	4.3E-01	4.4E-01	1.6E-01
Cow Milk	1.2E+04	2.0E+04	8.9E+03	8.9E+03	8.6E+03	1.8E+04	1.8E+04	6.8E+03
Eggs	7.2E+01	1.2E+02	5.5E+01	5.5E+01	5.3E+01	1.1E+02	1.1E+02	4.2E+01
Soil Ing	5.9E-01	1.0E+00	4.5E-01	4.5E-01	4.4E-01	9.0E-01	9.2E-01	3.4E-01
Total	1.6E+04	2.8E+04	1.2E+04	1.2E+04	1.2E+04	2.5E+04	2.5E+04	9.4E+03

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	7.9E+02	3.8E+03	9.4E+06
Oth. Veg	9.2E+02	4.4E+03	1.1E+07
Fruit	9.5E+02	4.6E+03	1.1E+07
Cereals	4.5E+01	2.2E+02	5.3E+05
Meat	4.9E+02	2.4E+03	5.8E+06
Poultry	2.0E-01	9.6E-01	2.4E+03
Cow Milk	8.3E+03	4.0E+04	9.8E+07
Eggs	5.1E+01	2.5E+02	6.0E+05
Soil Ing	4.2E-01	2.0E+00	5.0E+03
Total	1.2E+04	5.6E+04	1.4E+08

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	2.2E+02
Total	2.2E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.1E+03	1.9E+03	8.5E+02	8.5E+02	8.2E+02	1.7E+03	1.7E+03	6.4E+02
Oth. Veg	1.3E+03	2.3E+03	9.9E+02	9.9E+02	9.5E+02	2.0E+03	2.0E+03	7.5E+02
Fruit	1.3E+03	2.3E+03	1.0E+03	1.0E+03	9.9E+02	2.0E+03	2.1E+03	7.7E+02
Cereals	6.3E+01	1.1E+02	4.8E+01	4.8E+01	4.7E+01	9.7E+01	9.8E+01	3.7E+01
Meat	6.9E+02	1.2E+03	5.3E+02	5.3E+02	5.1E+02	1.1E+03	1.1E+03	4.0E+02
Poultry	2.8E-01	4.9E-01	2.1E-01	2.1E-01	2.1E-01	4.3E-01	4.4E-01	1.6E-01
Cow Milk	1.2E+04	2.0E+04	8.9E+03	8.9E+03	8.6E+03	1.8E+04	1.8E+04	6.8E+03
Eggs	7.2E+01	1.2E+02	5.5E+01	5.5E+01	5.3E+01	1.1E+02	1.1E+02	4.2E+01
Soil Ing	5.9E-01	1.0E+00	4.5E-01	4.5E-01	4.4E-01	9.1E-01	9.2E-01	3.4E-01
Total	1.6E+04	2.8E+04	1.2E+04	1.2E+04	1.2E+04	2.5E+04	2.5E+04	9.4E+03

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	7.9E+02	3.8E+03	9.4E+06
Oth. Veg	9.2E+02	4.4E+03	1.1E+07
Fruit	9.5E+02	4.6E+03	1.1E+07
Cereals	4.5E+01	2.2E+02	5.3E+05
Meat	4.9E+02	2.4E+03	5.8E+06
Poultry	2.0E-01	9.6E-01	2.4E+03
Cow Milk	8.3E+03	4.0E+04	9.8E+07
Eggs	5.1E+01	2.5E+02	6.1E+05
Soil Ing	4.2E-01	2.0E+00	5.0E+03
Total	1.2E+04	5.6E+04	1.4E+08

External Dose by Exposure Pathway

Pathway	
Sur Soil	2.3E+02
Total	2.3E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:36

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	5.3E+04	2.5E-01	1.3E+04
Breast	2.5E+05	1.5E-01	3.8E+04
R Marrow	1.2E+05	1.2E-01	1.4E+04
Lung	7.4E+04	1.2E-01	8.9E+03
Thyroid	6.3E+08	3.0E-02	1.9E+07
Bone Sur	1.1E+05	3.0E-02	3.4E+03
Stomach	1.3E+05	6.0E-02	7.7E+03
S Int.	5.7E+04	6.0E-02	3.4E+03
UL Int.	5.7E+04	6.0E-02	3.4E+03
LL Int.	5.5E+04	6.0E-02	3.3E+03
Internal Effective Dose Equivalent			1.9E+07
External Dose			2.2E+02
Annual Effective Dose Equivalent			1.9E+07

Controlling Organ:	Thyroid
Controlling Pathway:	Ing
Controlling Radionuclide:	I 125

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	1.9E+07

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:36

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			1.0E+01	...	
				+		
	2		1.7E+03	2.9E+00	...	Internal
			+	+		Effective
	1	1.9E+07	+ 3.1E+04	+ 0.0E+00	+ ... = 1.9E+07	Dose
						Equivalent
Internal						
Annual						
Dose		1.9E+07	+ 3.3E+04	+ 1.3E+01	+ ... = 1.9E+07	Cumulative
		+	+	+	+	Internal
External						
Annual						
Dose		2.2E+02	1.5E+00	9.8E-03	... 2.3E+02	Dose
Annual						
Dose		1.9E+07	+ 3.3E+04	+ 1.3E+01	+ ... = 1.9E+07	Cumulative
						Dose
					1.9E+07	Maximum
						Annual
						Dose Occurred
						In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:36

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	5.8E+03	1.0E+04	4.4E+03	4.4E+03	4.2E+03	8.8E+03	9.0E+03	3.3E+03
Oth. Veg	7.7E+03	1.3E+04	5.9E+03	5.9E+03	5.7E+03	1.2E+04	1.2E+04	4.5E+03
Fruit	7.9E+03	1.4E+04	6.0E+03	6.0E+03	5.8E+03	1.2E+04	1.2E+04	4.6E+03
Cereals	3.8E+02	6.6E+02	2.9E+02	2.9E+02	2.8E+02	5.8E+02	5.9E+02	2.2E+02
Meat	3.0E+03	5.1E+03	2.3E+03	2.3E+03	2.2E+03	4.5E+03	4.6E+03	1.7E+03
Poultry	1.4E+00	2.4E+00	1.1E+00	1.1E+00	1.0E+00	2.1E+00	2.2E+00	8.1E-01
Cow Milk	4.9E+04	8.5E+04	3.8E+04	3.8E+04	3.6E+04	7.5E+04	7.6E+04	2.8E+04
Eggs	3.8E+02	6.6E+02	2.9E+02	2.9E+02	2.8E+02	5.8E+02	5.9E+02	2.2E+02
Soil Ing	5.9E-01	1.0E+00	4.5E-01	4.5E-01	4.4E-01	9.0E-01	9.2E-01	3.4E-01
Total	7.4E+04	1.3E+05	5.7E+04	5.7E+04	5.5E+04	1.1E+05	1.2E+05	4.3E+04

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	4.1E+03	2.0E+04	4.9E+07
Oth. Veg	5.5E+03	2.6E+04	6.5E+07
Fruit	5.6E+03	2.7E+04	6.6E+07
Cereals	2.7E+02	1.3E+03	3.2E+06
Meat	2.1E+03	1.0E+04	2.5E+07
Poultry	1.0E+00	4.8E+00	1.2E+04
Cow Milk	3.5E+04	1.7E+05	4.2E+08
Eggs	2.7E+02	1.3E+03	3.2E+06
Soil Ing	4.2E-01	2.0E+00	5.0E+03
Total	5.3E+04	2.5E+05	6.3E+08

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.2E+02
-----	-----
Total	2.2E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Seismic BLTC shear - I-125 target - ingestion doses

Executed on: 10/24/97 at 14:00:36

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
-----	-----	-----	-----	-----	-----	-----	-----	-----
Leaf Veg	5.8E+03	1.0E+04	4.4E+03	4.4E+03	4.2E+03	8.8E+03	9.0E+03	3.3E+03
Oth. Veg	7.7E+03	1.3E+04	5.9E+03	5.9E+03	5.7E+03	1.2E+04	1.2E+04	4.5E+03
Fruit	7.9E+03	1.4E+04	6.0E+03	6.0E+03	5.8E+03	1.2E+04	1.2E+04	4.6E+03
Cereals	3.8E+02	6.6E+02	2.9E+02	2.9E+02	2.8E+02	5.8E+02	5.9E+02	2.2E+02
Meat	3.0E+03	5.1E+03	2.3E+03	2.3E+03	2.2E+03	4.5E+03	4.6E+03	1.7E+03
Poultry	1.4E+00	2.4E+00	1.1E+00	1.1E+00	1.0E+00	2.1E+00	2.2E+00	8.1E-01
Cow Milk	4.9E+04	8.5E+04	3.8E+04	3.8E+04	3.6E+04	7.5E+04	7.6E+04	2.8E+04
Eggs	3.8E+02	6.6E+02	2.9E+02	2.9E+02	2.8E+02	5.8E+02	5.9E+02	2.2E+02
Soil Ing	5.9E-01	1.0E+00	4.5E-01	4.5E-01	4.4E-01	9.1E-01	9.2E-01	3.4E-01
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	7.4E+04	1.3E+05	5.7E+04	5.7E+04	5.5E+04	1.1E+05	1.2E+05	4.3E+04

Pathway	Ovaries	Muscle	Thyroid
-----	-----	-----	-----
Leaf Veg	4.1E+03	2.0E+04	4.9E+07
Oth. Veg	5.5E+03	2.6E+04	6.5E+07
Fruit	5.6E+03	2.7E+04	6.6E+07
Cereals	2.7E+02	1.3E+03	3.2E+06
Meat	2.1E+03	1.0E+04	2.5E+07
Poultry	1.0E+00	4.8E+00	1.2E+04
Cow Milk	3.5E+04	1.7E+05	4.2E+08
Eggs	2.7E+02	1.3E+03	3.2E+06
Soil Ing	4.2E-01	2.0E+00	5.0E+03
-----	-----	-----	-----
Total	5.3E+04	2.5E+05	6.3E+08

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.3E+02
-----	-----
Total	2.3E+02

This document was too large to scan as a whole document,
therefore it required breaking into smaller sections.

Document number: SD-FF-CN-013

Section 2 of 2

Title: Evaluation of Selected Ex-Reactor Accidents
Related to the Tritium and Medical
Isotope Production Missions at the
Sast Flux Sast Facility

Date: 11/17/97 Revision: 0

Originator: Himes DA, Van Keuren JC, Gledburg DG
Co: FNW

Recipient: _____
Co: _____

References: EDT-622302

Attachment 4

GENII Output File for
Drop of Solid Waste Cask (SWC)
(Section 3.2)

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Drop of SWC - 42 percent Pu - 250 W decay heat - 7 assemblie
 S

Executed on: 08/19/97 at 13:23:51

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\trit3.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

-----Release Terms-----				
Release	Air		Surface	Buried
Radio-			Water	Source
nuclide	Ci/yr	Ci/yr	Ci/yr	Ci/m3

KR85	4.0E+03	0.0E+00	0.0E+00	
H 3	4.7E+02	0.0E+00	0.0E+00	

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 1.0E+00 Fraction of time spent in cloud

===== INHALATION =====
Resuspension not considered
=====

Input prepared by: _____ Date: _____
Input checked by: _____ Date: _____

=====

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of SWC - 42 percent Pu - 250 W decay heat - 7 assemblies

Executed on: 08/19/97 at 13:23:55

Page C. 1

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.5E+01	2.5E-01	3.7E+00
Breast	1.5E+01	1.5E-01	2.2E+00
R Marrow	1.8E+01	1.2E-01	2.2E+00
Lung	1.5E+01	1.2E-01	1.8E+00
Thyroid	1.5E+01	3.0E-02	4.4E-01
Bone Sur	1.8E+01	3.0E-02	5.5E-01
Stomach	1.5E+01	6.0E-02	8.9E-01
S Int.	1.5E+01	6.0E-02	8.9E-01
UL Int.	1.5E+01	6.0E-02	8.9E-01
LL Int.	1.5E+01	6.0E-02	8.9E-01
Internal Effective Dose Equivalent			1.4E+01
External Dose			2.3E+00
Annual Effective Dose Equivalent			1.7E+01

Controlling Organ:	R Marrow
Controlling Pathway:	Inh
Controlling Radionuclide:	H 3
Total Inhalation EDE:	1.4E+01
Total Ingestion EDE:	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Drop of SWC - 42 percent Pu - 250 W decay heat - 7 assemblie

Executed on: 08/19/97 at 13:23:55

Page C. 2

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year					
	1	2	3	...		
Internal	:					
Intake	:					
Year:	3		0.0E+00	...		
			+			
2		0.0E+00	0.0E+00	...		
		+	+			
1	1.4E+01	+ 0.0E+00	+ 0.0E+00	+ ... = 1.4E+01	Internal Effective Dose Equivalent	
Internal Annual Dose	1.4E+01	+ 0.0E+00	+ 0.0E+00	+ ... = 1.4E+01	Cumulative Internal Dose	
	+	+	+	+		
External Annual Dose	2.3E+00	0.0E+00	0.0E+00	... 2.3E+00		
Annual Dose	1.7E+01	+ 0.0E+00	+ 0.0E+00	+ ... = 1.7E+01	Cumulative Dose	
				1.7E+01	Maximum Annual Dose Occurred In Year 1	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of SWC - 42 percent Pu - 250 W decay heat - 7 assemblie

Executed on: 08/19/97 at 13:23:55

Page C. 3

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Inhale	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.8E+01	1.8E+01	1.5E+01
Total	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.8E+01	1.8E+01	1.5E+01

Pathway	Ovaries	Muscle	Thyroid
Inhale	1.5E+01	1.5E+01	1.5E+01
Total	1.5E+01	1.5E+01	1.5E+01

External Dose by Exposure Pathway

Pathway	
Plume	2.3E+00
Total	2.3E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of SWC - 42 percent Pu - 250 W decay heat - 7 assemblie

Executed on: 08/19/97 at 13:23:55

Page C. 4

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.8E+01	1.8E+01	1.5E+01
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.5E+01	1.8E+01	1.8E+01	1.5E+01

Radionuclide	Ovaries	Muscle	Thyroid
H 3	1.5E+01	1.5E+01	1.5E+01
KR 85	0.0E+00	0.0E+00	0.0E+00
Total	1.5E+01	1.5E+01	1.5E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of SWC - 42 percent Pu - 250 W decay heat - 7 assemblies

Executed on: 08/19/97 at 13:23:55

Page C. 5

Acute release

Uptake/exposure period: 1.0

Dose commitment period: 50.0

Dose units: Rem

Radio-nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
H 3	1.4E+01	0.0E+00	1.1E-08	1.4E+01	1.4E+01
KR 85	0.0E+00	0.0E+00	2.3E+00	0.0E+00	2.3E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:16

Page A. 1

This is a far-field (wide-scale release, multiple site) scenario.
Release is acute
Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
Air .

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
Ground, external
Terrestrial foods ingestion
Animal product ingestion
Inadvertent soil ingestion

THE FOLLOWING TIMES ARE USED:
Intake ends after (yr): 50.0
Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\trit3in.in
GENII Default Parameter Values (28-Mar-90 RAP)
Radionuclide Library - Times<100 years (23-July-93 PDR)
PNL Food Transfer Factor Library (by Z, with Fr&Os 7/19/93 PDR)
External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

----- Release Terms -----

Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

H 3	4.7E+02	0.0E+00	0.0E+00
KR85	4.0E+03	0.0E+00	0.0E+00

===== AIR TRANSPORT =====

1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====

4.4E+03 Hours of exposure to ground contamination

===== INGESTION POPULATION =====
 1 Atmospheric production definition: 1 - Use population-weighted chi/Q

===== TERRESTRIAL FOOD INGESTION =====

FOOD TYPE	GROW TIME d	--IRRIGATION-- S RATE * in/yr	TIME mo/yr	YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP d	RATE kg/yr
Leaf Veg	90.0	0	0.0	0.0	1.5	1.0	3.0E+01
Oth. Veg	90.0	0	0.0	0.0	4.0	5.0	2.2E+02
Fruit	90.0	0	0.0	0.0	2.0	5.0	3.3E+02
Cereals	90.0	0	0.0	0.0	0.8	180.0	8.0E+01

===== ANIMAL FOOD INGESTION =====

FOOD TYPE	---HUMAN---		TOTAL PROD- UCTION kg/yr	DRINK WATER CONTAM FRACT.	DIET FRAC- TION	GROW TIME d	--STORED FEED--		STOR- AGE d		
	CONSUMPTION RATE kg/yr	HOLDUP d					--IRRIGATION-- S RATE * in/yr	TIME mo/yr			
Meat	8.0E+01	15.0		0.00	0.3	90.00	0	0.0	0.0	0.80	0.0
Poultry	1.8E+01	1.0		0.00	1.0	90.00	0	0.0	0.0	0.80	0.0
Cow Milk	2.7E+02	1.0		0.00	0.3	45.00	0	0.0	0.0	2.00	0.0
Eggs	3.0E+01	1.0		0.00	1.0	90.00	0	0.0	0.0	0.80	0.0
-----FRESH FORAGE-----											
Meat					0.75	45.0	0	0.0	0.0	2.00	0.0
Cow Milk					0.75	30.0	0	0.0	0.0	1.50	0.0

Note: Animal diet fraction for years 2 through 50.0000

Input prepared by: _____

Date: _____

Input checked by: _____

Date: _____

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Winter: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:26

Page C. 1

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year					
	1	2	3	...		
Internal	:	-----				
Intake	:					
Year:	3		0.0E+00	...		
			+			
	2	0.0E+00	0.0E+00	...		
		+	+			
	1	0.0E+00	+ 0.0E+00	+ 0.0E+00 + ... = 0.0E+00	Internal Effective Dose Equivalent	
Internal Annual Dose		0.0E+00	+ 0.0E+00	+ 0.0E+00 + ... = 0.0E+00	Cumulative Internal Dose	
		+	+	+	+	
External Annual Dose		0.0E+00	0.0E+00	0.0E+00 ... 0.0E+00		
Annual Dose		0.0E+00	+ 0.0E+00	+ 0.0E+00 + ... = 0.0E+00	Cumulative Dose	
				0.0E+00	Maximum Annual Dose Occurred In Year 0	

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

External Dose by Radionuclide

Radionuclide	
-----	-----
H 3	0.0E+00
KR 85	0.0E+00
-----	-----
Total	0.0E+00

External Dose by Radionuclide

Radionuclide	
-----	-----
H 3	0.0E+00
KR 85	0.0E+00
-----	-----
Total	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:29

Page C. 2

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			0.0E+00	...	
				+		
	2		0.0E+00	0.0E+00	...	
			+	+		
	1	0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ... = 0.0E+00	Internal Effective Dose Equivalent
Internal Annual Dose		0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ... = 0.0E+00	Cumulative Internal Dose
		+	+	+	+	
External Annual Dose		0.0E+00	0.0E+00	0.0E+00	... 0.0E+00	
Annual Dose		0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ... = 0.0E+00	Cumulative Dose
					0.0E+00	Maximum Annual Dose Occurred In Year 0

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	0.0E+00
Total	0.0E+00

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	0.0E+00
Total	0.0E+00

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
Total	0.0E+00

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
Total	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:31

Page C. 3

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year					
		1	2	3	...		
Internal	:						
Intake	:						
Year:	3			0.0E+00	...		
				+			
	2		0.0E+00	0.0E+00	...		
			+	+			
	1	0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ... = 0.0E+00	Internal Effective Dose Equivalent	
Internal Annual Dose		0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ... = 0.0E+00	Cumulative Internal Dose	
		+	+	+	+		
External Annual Dose		0.0E+00	0.0E+00	0.0E+00	... 0.0E+00		
Annual Dose		0.0E+00	+ 0.0E+00	+ 0.0E+00	+ ... = 0.0E+00	Cumulative Dose	
					0.0E+00	Maximum Annual Dose Occurred In Year 0	

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

External Dose by Radionuclide

Radionuclide	
-----	-----
H 3	0.0E+00
KR 85	0.0E+00
-----	-----
Total	0.0E+00

External Dose by Radionuclide

Radionuclide	
-----	-----
H 3	0.0E+00
KR 85	0.0E+00
-----	-----
Total	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:34

Page C. 4

Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.3E+03	2.5E-01	3.2E+02
Breast	1.3E+03	1.5E-01	1.9E+02
R Marrow	1.6E+03	1.2E-01	1.9E+02
Lung	1.3E+03	1.2E-01	1.6E+02
Thyroid	1.3E+03	3.0E-02	3.9E+01
Bone Sur	1.5E+03	3.0E-02	4.6E+01
Stomach	1.3E+03	6.0E-02	7.8E+01
S Int.	1.3E+03	6.0E-02	7.8E+01
UL Int.	1.3E+03	6.0E-02	7.8E+01
LL Int.	1.3E+03	6.0E-02	7.8E+01
Internal Effective Dose Equivalent			1.3E+03
External Dose			0.0E+00
Annual Effective Dose Equivalent			1.3E+03

Controlling Organ:	R Marrow
Controlling Pathway:	Ing
Controlling Radionuclide:	H 3

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	1.3E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:34

Page C. 5

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			0.0E+00	...	
				+		
	2		0.0E+00	0.0E+00	...	Internal
			+	+		Effective
	1	1.3E+03	+ 0.0E+00	+ 0.0E+00	+ ... = 1.3E+03	Dose
						Equivalent
Internal						
Annual		1.3E+03	+ 0.0E+00	+ 0.0E+00	+ ... = 1.3E+03	Cumulative
Dose		+	+	+	+	Internal
External						Dose
Annual		0.0E+00	0.0E+00	0.0E+00	...	
Dose						
Annual		1.3E+03	+ 0.0E+00	+ 0.0E+00	+ ... = 1.3E+03	Cumulative
Dose						Dose
					1.3E+03	Maximum
						Annual
						Dose Occurred
						In Year 1

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:34

Page C. 6

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	3.7E+01	3.7E+01	3.7E+01	3.7E+01	3.7E+01	4.4E+01	4.6E+01	3.7E+01
Oth. Veg	2.7E+02	2.7E+02	2.7E+02	2.7E+02	2.7E+02	3.2E+02	3.3E+02	2.7E+02
Fruit	4.1E+02	4.1E+02	4.1E+02	4.1E+02	4.1E+02	4.8E+02	5.1E+02	4.1E+02
Cereals	6.3E+01	6.3E+01	6.3E+01	6.3E+01	6.3E+01	7.4E+01	7.8E+01	6.3E+01
Meat	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.2E+02	1.2E+02	1.0E+02
Poultry	2.3E+01	2.3E+01	2.3E+01	2.3E+01	2.3E+01	2.7E+01	2.8E+01	2.3E+01
Cow Milk	3.5E+02	3.5E+02	3.5E+02	3.5E+02	3.5E+02	4.1E+02	4.4E+02	3.5E+02
Eggs	3.9E+01	3.9E+01	3.9E+01	3.9E+01	3.9E+01	4.6E+01	4.8E+01	3.9E+01
Soil Ing	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.5E+03	1.6E+03	1.3E+03

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	3.7E+01	3.7E+01	3.7E+01
Oth. Veg	2.7E+02	2.7E+02	2.7E+02
Fruit	4.1E+02	4.1E+02	4.1E+02
Cereals	6.3E+01	6.3E+01	6.3E+01
Meat	1.0E+02	1.0E+02	1.0E+02
Poultry	2.3E+01	2.3E+01	2.3E+01
Cow Milk	3.5E+02	3.5E+02	3.5E+02
Eggs	3.9E+01	3.9E+01	3.9E+01
Soil Ing	0.0E+00	0.0E+00	0.0E+00
Total	1.3E+03	1.3E+03	1.3E+03

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:34

Page C. 7

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	3.7E+01	3.7E+01	3.7E+01	3.7E+01	3.7E+01	4.4E+01	4.6E+01	3.7E+01
Oth. Veg	2.7E+02	2.7E+02	2.7E+02	2.7E+02	2.7E+02	3.2E+02	3.3E+02	2.7E+02
Fruit	4.1E+02	4.1E+02	4.1E+02	4.1E+02	4.1E+02	4.8E+02	5.1E+02	4.1E+02
Cereals	6.3E+01	6.3E+01	6.3E+01	6.3E+01	6.3E+01	7.4E+01	7.8E+01	6.3E+01
Meat	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.0E+02	1.2E+02	1.2E+02	1.0E+02
Poultry	2.3E+01	2.3E+01	2.3E+01	2.3E+01	2.3E+01	2.7E+01	2.8E+01	2.3E+01
Cow Milk	3.5E+02	3.5E+02	3.5E+02	3.5E+02	3.5E+02	4.1E+02	4.4E+02	3.5E+02
Eggs	3.9E+01	3.9E+01	3.9E+01	3.9E+01	3.9E+01	4.6E+01	4.8E+01	3.9E+01
Soil Ing	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.5E+03	1.6E+03	1.3E+03

Pathway	Ovaries	Muscle	Thyroid
Leaf Veg	3.7E+01	3.7E+01	3.7E+01
Oth. Veg	2.7E+02	2.7E+02	2.7E+02
Fruit	4.1E+02	4.1E+02	4.1E+02
Cereals	6.3E+01	6.3E+01	6.3E+01
Meat	1.0E+02	1.0E+02	1.0E+02
Poultry	2.3E+01	2.3E+01	2.3E+01
Cow Milk	3.5E+02	3.5E+02	3.5E+02
Eggs	3.9E+01	3.9E+01	3.9E+01
Soil Ing	0.0E+00	0.0E+00	0.0E+00
Total	1.3E+03	1.3E+03	1.3E+03

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	0.0E+00
-----	-----
Total	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:34

Page C. 8

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.5E+03	1.6E+03	1.3E+03
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.5E+03	1.6E+03	1.3E+03

Radionuclide	Ovaries	Muscle	Thyroid
H 3	1.3E+03	1.3E+03	1.3E+03
KR 85	0.0E+00	0.0E+00	0.0E+00
Total	1.3E+03	1.3E+03	1.3E+03

External Dose by Radionuclide

Radionuclide	
H 3	0.0E+00
KR 85	0.0E+00
Total	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Drop of SWC - ingestion doses

Executed on: 10/23/97 at 08:18:34

Page C. 9

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.5E+03	1.6E+03	1.3E+03
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.5E+03	1.6E+03	1.3E+03

Radionuclide	Ovaries	Muscle	Thyroid
H 3	1.3E+03	1.3E+03	1.3E+03
KR 85	0.0E+00	0.0E+00	0.0E+00
Total	1.3E+03	1.3E+03	1.3E+03

External Dose by Radionuclide

Radionuclide	
H 3	0.0E+00
KR 85	0.0E+00
Total	0.0E+00

Attachment 5

Letter, W. L. Bunch to H. J. Goldberg,
"FFTF Hardware Activation," Dated Oct. 1, 1985

Code Output Files for
Drop of Core Component Container From
the Solid Waste Cask (Section 3.3)

Westinghouse Hanford

P.O. BOX 1970 RICHLAND, WA 99352

8552975

October 1, 1985

H. J. Goldberg
Rockwell Hanford Operations
P. O. Box 800
Richland, Washington 99352

FFTF HARDWARE ACTIVATION

- References: [1] Letter, H. J. Goldberg to J. W. Daughtry, "FFTF Flux Distribution," #R85-3413, August 28, 1985.
- [2] Telecon, H. J. Goldberg with W. L. Bunch and A. Flagg, same subject, September 25, 1985.

The referenced letter [1] requested information concerning the axial neutron flux distribution associated with the Fast Flux Test Facility (FFTF) fuel pins. In a subsequent telephone conversation [2] with the Fluor Engineering shielding analyst requesting the information, it was established that the desired information was the axial distribution of activation products associated with the hardware. It is the latter information that is being supplied by this letter.

We routinely calculate the inventory of long-lived radioisotopes associated with core components as a function of irradiation history. The axial distribution of the radioactivity is based on generic three-dimensional calculations that model the atom densities of the components in great detail. These calculated activation rates have been confirmed by comparison to experimental data obtained during initial operation of the reactor. The calculations accommodate uncertainties associated with all parameters, including composition of materials and impurities such as cobalt and tantalum, to provide upper limit values. For example, if the actual cobalt impurity in a particular component is significantly less than the criterion for that material, the cobalt activity would in turn be less than the calculated value. Assuming that the impurity limits are met, the activity would not be expected to exceed the calculated upper limit value.

H. J. Goldberg
8552975
Page 2

Because of the manner in which fuel assemblies are taken apart in the Interim Examination and Maintenance (IEM) Cell at FFTF, we calculate the hardware activity for four separate components: (1) the inlet shield/orifice (nozzle) assembly; (2) the duct; (3) the handling socket; and (4) internal hardware (cladding, wire wrap, axial reflectors). In the telephone conversation with A. Flagg, Fluor requested that more detailed information be provided for the internal hardware. Whereas Table 1 contains values for the four basic hardware components, Table 2 presents factors for a more detailed breakdown of the internals. The factors in Table 2 can be used to obtain the desired distribution at any time given in Table 1.

The values in Table 2 were obtained from an actual computer run for an assembly that was irradiated during Cycles 3, 4, 5 and 6. This assembly reached an average exposure of about 85,000 MWD/MTHM and a peak exposure of about 105,000 MWD/MTHM. This exposure is not as high as the upper limit that will be achieved, but is higher than the average irradiation history that is anticipated at this time for FFTF fuel. It should provide a realistically conservative basis for the design of shielding for the hardware.

If you need additional clarification or explanation of this information, you can phone me on 376-5134.



W. L. Bunch, Manager
Radiation and Shield Analysis

llr

Attachments: Tables 1 and 2

cc: J. Garfield, RHO

TABLE 1
UPPER LIMIT HARDWARE ACTIVITY

DECAY TIME	RADIO- ISOTOPES	TOTAL ACTIVITY (CURIES)	***** * INLET NOZZLE	PART ACTIVITY (CURIES) DUCT	***** INTERNAL CHARGE	HANDLING SOCKET
6 MONTHS						
	MN54	5.59+03	3.49+01	2.89+03	2.67+03	5.88-04
	Ti102	1.41+03	5.68+02	4.32+02	4.08+02	1.44+00
	CS58	3.39+03	2.59+01	2.79+03	2.57+03	5.42-04
	CS60	3.93+03	1.43+03	1.20+03	1.20+03	3.45+00
	FE59	4.64+01	1.47+01	1.65+01	1.52+01	3.29-02
	CR51	1.68+02	5.69+01	6.79+01	6.27+01	1.32-01
	WATTS	1.62+02	2.83+01	6.96+01	6.42+01	6.73-02
7 MONTHS						
	MN54	5.22+03	3.25+01	2.70+03	2.49+03	5.49-04
	Ti102	1.19+03	4.68+02	3.66+02	3.38+02	1.20+00
	CS58	3.66+03	1.69+01	2.06+03	1.90+03	4.01-04
	CS60	3.89+03	1.41+03	1.28+03	1.19+03	3.41+00
	FE59	2.86+01	8.04+00	1.02+01	9.38+00	2.03-02
	CR51	8.66+01	2.62+01	3.13+01	2.69+01	6.09-02
	WATTS	1.41+02	2.69+01	5.95+01	5.49+01	6.40-02
8 MONTHS						
	MN54	4.90+03	3.06+01	2.53+03	2.34+03	5.16-04
	Ti102	1.01+03	4.12+02	3.10+02	2.86+02	1.01+00
	CS58	3.03+03	1.52+01	1.57+03	1.45+03	3.05-04
	CS60	3.85+03	1.40+03	1.27+03	1.17+03	3.36+00
	FE59	1.85+01	5.84+00	6.57+00	6.06+00	1.31-02
	CR51	4.30+01	1.30+01	1.56+01	1.44+01	3.03-02
	WATTS	1.27+02	2.58+01	5.24+01	4.84+01	6.16-02
11 MONTHS						
	MN54	4.00+03	2.49+01	2.07+03	1.91+03	4.21-04
	Ti102	5.79+02	2.37+02	1.79+02	1.64+02	5.81-01
	CS58	1.24+03	6.20+00	6.42+02	5.93+02	1.25-04
	CS60	3.72+03	1.35+03	1.23+03	1.14+03	3.27+00
	FE59	4.40+00	1.39+00	1.56+00	1.44+00	3.12-03
	CR51	4.73+00	1.31+00	1.57+00	1.45+00	3.05-03
	WATTS	9.81+01	2.32+01	3.79+01	3.50+01	5.57-02

TABLE 1 (continued)

UPPER LIMIT HARDWARE ACTIVITY

DECAY TIME	RADIO- ISOTOPES	TOTAL ACTIVITY (CURIES)	XXXXXXXXXXXXX M INLET NOZZLE	DUCT	PART ACTIVITY (CURIES) INTERNAL (CHARGE)	XXXXXXXXXXXXX HANDLING SOCKET
17 MONTHS						
	HN54	2.67+03	1.66+01	1.38+03	1.27+03	2.80+04
	TR182	1.82+02	7.88+01	5.90+01	5.45+01	1.91+01
	C058	2.09+02	1.05+00	1.09+02	1.00+02	2.11+05
	C060	3.43+03	1.27+03	1.15+03	1.06+03	7.06+00
	F559	2.53+01	8.00+02	9.00+02	8.31+02	1.79+04
	CR51	4.50+02	1.36+02	1.63+02	1.50+02	3.16+05
	WATTS	7.09+01	2.03+01	2.63+01	2.42+01	4.89+02
1.5 YEARS						
	HN54	2.43+03	1.55+01	1.29+03	1.19+03	2.82+04
	TR182	1.53+02	6.52+01	4.90+01	4.52+01	1.80+01
	C058	1.55+02	7.74+01	8.02+01	7.40+01	1.56+05
	C060	3.43+03	1.25+03	1.14+03	1.05+03	3.02+00
	F559	1.58+01	4.93+02	5.55+02	5.12+02	1.11+04
	CR51	2.07+02	6.29+03	7.51+03	6.93+03	1.46+05
	WATTS	9.85+01	2.00+01	2.52+01	2.33+01	4.80+02
2.5 YEARS						
	HN54	1.11+03	6.90+00	5.72+02	5.29+02	1.19+04
	TR182	1.77+01	7.23+00	5.43+00	5.01+00	1.77+02
	C058	4.46+00	2.23+02	2.31+00	2.13+00	4.48+07
	C060	3.02+03	1.10+03	9.99+02	9.22+02	2.65+00
	F559	2.26+04	1.66+04	1.87+04	1.72+04	3.73+07
	CR51	2.29+06	8.95+07	8.30+07	7.66+07	1.61+09
	WATTS	5.22+01	1.70+01	1.83+01	1.69+01	4.10+02
3.5 YEARS						
	HN54	4.93+02	3.07+00	2.55+02	2.35+02	5.18+05
	TR182	1.96+00	8.01+01	6.02+01	5.55+01	1.97+03
	C058	1.28+01	6.40+04	6.83+02	6.12+02	1.29+08
	C060	2.65+03	9.64+02	8.78+02	8.08+02	2.33+00
	F559	1.77+06	5.59+07	6.23+07	5.80+07	1.25+09
	CR51	2.53+10	7.68+11	9.17+11	8.46+11	1.78+13
	WATTS	4.33+01	1.49+01	1.48+01	1.59+01	5.58+02

TABLE 2

DISTRIBUTION OF ACTIVITY ASSOCIATED WITH INTERNALS
(CLADDING, WIRE WRAP, UPPER AND LOWER AXIAL REFLECTORS)

	<u>Plenum</u>	<u>UAR</u>	<u>Core</u>	<u>LAR</u>
Mn-54	0.003	0.021	0.945	0.031
Ta-182	0.206	0.200	0.234	0.360
Co-58	0.003	0.124	0.697	0.176
Co-60	0.192	0.219	0.210	0.379
Fe-59	0.159	0.085	0.597	0.159
Cr-51	0.147	0.155	0.433	0.265

Run started at 10:06:12 08/05/97

ISO-PC Version 1.98 August 1994
 originally ISOSHL-D-II; RIBD was removed

Please send questions or comments to:
 Paul D. Rittmann, PhD CHP 509-376-8715
 Westinghouse Hanford Company HO-36
 PO Box 1970 Richland, WA 99352

Title Line from Library File (ISO-PC.LIB):
 Attenuation & Buildup for 30 Groups; Photon & Beta Production 7/6/94 PDR

Run Title: CCC Drop Accident - FFTF

Source Term for Core - One Assembly

Table of Source Activity:

Scale Factor = 1.000E+00

Isotope Name	Initial Values	Final uCi/cc
SE- 79	4.14E-02	4.140E-02
KR- 85	5.76E+02	5.760E+02
RB- 86	8.80E-25	8.800E-25
SR- 89	1.07E-05	1.070E-05
SR- 90	4.18E+03	4.180E+03
Y - 90	4.18E+03	4.180E+03
Y - 91	3.47E-04	3.470E-04
ZR- 93	1.58E-04	1.580E-04
ZR- 95	3.52E-03	3.520E-03
NB- 93M	3.67E-02	3.670E-02
NB- 95	7.82E-03	7.820E-03
NB- 95M	2.61E-05	2.610E-05
TC- 99	1.66E+00	1.660E+00
RU-103	5.09E-08	5.090E-08
RU-106	7.16E+03	7.160E+03
RH-103M	4.59E-08	4.590E-08
RH-106	7.16E+03	7.160E+03
PD-107	2.73E-02	2.730E-02
PD-109M	1.62E-03	1.620E-03

AG-108	1.27E-06	1.270E-06
AG-110	1.07E-01	1.070E-01
AG-110M	8.06E+00	8.060E+00
CD-109	1.62E-03	1.620E-03
CD-115M	2.33E-09	2.330E-09
IN-114	1.46E-11	1.460E-11
IN-115M	1.64E-13	1.640E-13
SN-119M	4.78E-01	4.780E-01
SN-121M	1.45E-01	1.450E-01
SN-123	1.48E-01	1.480E-01
SN-126	1.72E-01	1.720E-01
SB-124	8.21E-07	8.210E-07
SB-125	1.18E+03	1.180E+03
SB-126	2.41E-02	2.410E-02
SB-126M	1.72E-01	1.720E-01
TE-123M	4.86E-05	4.860E-05
TE-125M	2.87E+02	2.870E+02
TE-127	1.02E-01	1.020E-01
TE-127M	1.05E-01	1.050E-01
TE-129	6.76E-12	6.760E-12
TE-129M	1.04E-11	1.040E-11
I -129	5.52E-03	5.520E-03
CS-134	1.52E+03	1.520E+03
CS-135	1.96E-01	1.960E-01
CS-137	1.15E+04	1.150E+04
BA-137M	1.09E+04	1.090E+04
CE-141	8.65E-11	8.650E-11
CE-144	2.74E+03	2.740E+03
PR-144	2.74E+03	2.740E+03
PM-146	1.53E+00	1.530E+00
PM-147	1.01E+04	1.010E+04
PM-148	7.08E-10	7.080E-10
PM-148M	1.26E-08	1.260E-08
SM-149	1.01E-03	1.010E-03
SM-151	4.69E+02	4.690E+02
SM-154	6.01E-04	6.010E-04
EU-152	1.97E+00	1.970E+00
EU-153	1.44E-01	1.440E-01
EU-154	2.86E+02	2.860E+02
EU-155	1.74E+03	1.740E+03
TB-159	2.70E-03	2.700E-03
TB-160	3.68E+00	3.680E+00
PB-212	1.67E-03	1.670E-03
BI-212	1.67E-03	1.670E-03
RN-220	1.67E-03	1.670E-03
RA-224	1.67E-03	1.670E-03
TH-228	1.67E-03	1.670E-03
TH-231	3.06E-04	3.060E-04
TH-234	5.88E-03	5.880E-03

PA-233	6.79E-03	6.790E-03
PA-234M	5.88E-03	5.880E-03
U -234	3.68E-03	3.680E-03
U -235	3.06E-04	3.060E-04
U -237	1.68E-01	1.680E-01
U -238	5.88E-03	5.880E-03
NP-237	6.79E-03	6.790E-03
NP-239	5.33E-02	5.330E-02
PU-238	2.50E+02	2.500E+02
PU-239	5.75E+02	5.750E+02
PU-240	3.30E+02	3.300E+02
PU-241	6.87E+03	6.870E+03
PU-242	2.72E-02	2.720E-02
AM-241	2.85E+02	2.850E+02
AM-242	2.86E+01	2.860E+01
AM-242M	2.87E+01	2.870E+01
AM-243	5.33E-02	5.330E-02
CM-242	3.83E+01	3.830E+01
CM-243	7.13E+00	7.130E+00
CM-244	1.19E+00	1.190E+00
CM-245	1.06E-04	1.060E-04

Source Term for Core - One Assembly

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3
AIR	0.000E+00	0.000E+00	1.290E-03
OXYGEN	5.000E-02	0.000E+00	0.000E+00
IRON	0.000E+00	7.800E+00	0.000E+00
URANIUM	2.400E-01	0.000E+00	0.000E+00
PLUTONIUM	1.700E-01	0.000E+00	0.000E+00
Totals:	4.600E-01	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.015	1.715E+01	4.586E+02	2.046E-03
0.025	2.239E+01	1.088E+02	6.138E-04
0.035	8.780E+00	4.155E+01	3.664E-04
0.045	4.396E+00	2.019E+01	2.837E-04
0.055	2.541E+00	1.169E+01	2.491E-04
0.065	1.622E+00	7.656E+00	2.314E-04
0.075	1.120E+00	5.409E+00	2.184E-04
0.085	8.140E-01	4.065E+00	2.090E-04

0.095	6.141E-01	3.212E+00	2.019E-04
0.150	1.055E+00	1.529E+00	1.758E-04
0.250	3.052E-01	9.586E-01	1.477E-04
0.350	1.528E-01	7.862E-01	1.298E-04
0.475	8.919E-02	6.717E-01	1.146E-04
0.650	5.739E-02	5.769E-01	1.001E-04
0.825	4.343E-02	5.132E-01	8.984E-05
1.000	3.577E-02	4.664E-01	8.194E-05
1.225	2.998E-02	4.207E-01	7.398E-05
1.475	2.624E-02	3.831E-01	6.718E-05
1.700	2.420E-02	3.575E-01	6.249E-05
1.900	2.302E-02	3.394E-01	5.889E-05
2.100	2.222E-02	3.243E-01	5.564E-05
2.300	2.168E-02	3.117E-01	5.263E-05
2.500	2.130E-02	3.010E-01	5.003E-05
2.700	2.102E-02	2.920E-01	4.778E-05
3.000	2.073E-02	2.808E-01	4.511E-05
3.600	2.036E-02	2.649E-01	4.158E-05
4.500	2.028E-02	2.502E-01	3.746E-05
5.500	2.054E-02	2.409E-01	3.381E-05
6.600	2.098E-02	2.352E-01	3.111E-05
8.600	2.206E-02	2.307E-01	2.771E-05

Source Term for Core - One Assembly

Photon Production Rate for Each Radionuclide:

ISOSHLD Energy Group Structure:

Group Number	Photon Energy, Mev			Group Number	Photon Energy, Mev		
	Low	Mid	High		Low	Mid	High
1	0.010	0.015	0.020	16	0.900	1.000	1.100
2	0.020	0.025	0.030	17	1.100	1.225	1.350
3	0.030	0.035	0.040	18	1.350	1.475	1.600
4	0.040	0.045	0.050	19	1.600	1.700	1.800
5	0.050	0.055	0.060	20	1.800	1.900	2.000
6	0.060	0.065	0.070	21	2.000	2.100	2.200
7	0.070	0.075	0.080	22	2.200	2.300	2.400
8	0.080	0.085	0.090	23	2.400	2.500	2.600
9	0.090	0.095	0.100	24	2.600	2.700	2.800
10	0.100	0.150	0.200	25	2.800	3.000	3.200
11	0.200	0.250	0.300	26	3.200	3.600	4.000
12	0.300	0.350	0.400	27	4.000	4.500	5.000
13	0.400	0.475	0.550	28	5.000	5.500	6.000
14	0.550	0.650	0.750	29	6.000	6.600	7.200
15	0.750	0.825	0.900	30	7.200	8.600	10.000

=====

Note: Since ICONC=1 the nuclide tables below are for 1 cc only.

Nuclide 27 is SE- 79 (Z = 34)				Weight(27) = 4.140E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	8.309E+00	8.309E+00	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	2.697E+00	2.697E+00	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.232E+00	1.232E+00	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	6.218E-01	6.218E-01	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	3.197E-01	3.197E-01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.658E-01	1.658E-01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	8.433E-02	8.433E-02	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	4.047E-02	4.047E-02	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.817E-02	1.817E-02	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	2.840E-02	2.840E-02	25	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 1.352E+01 1.352E+01

Nuclide 55 is KR- 85 (Z = 36)				Weight(55) = 5.760E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	8.688E+05	8.688E+05	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	5.430E+05	5.430E+05	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	3.814E+05	3.814E+05	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	2.199E+05	2.199E+05	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.243E+05	1.243E+05	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	9.984E+04	9.984E+04	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	7.597E+04	7.597E+04	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	5.504E+04	5.504E+04	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	4.587E+04	4.587E+04	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	1.851E+05	1.851E+05	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	3.626E+04	3.626E+04	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	7.741E+03	7.741E+03	27	0.000E+00	0.000E+00	0.000E+00
13	9.164E+04	1.467E+03	9.311E+04	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	4.243E+01	4.243E+01	29	0.000E+00	0.000E+00	0.000E+00

Totals: 9.164E+04 2.645E+06 2.736E+06

Nuclide 61 is RB- 86 (Z = 37)				Weight(61) = 8.800E-31 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	4.787E-21	4.787E-21	16	2.865E-21	1.316E-23	2.878E-21
2	0.000E+00	2.267E-21	2.267E-21	17	0.000E+00	3.727E-24	3.727E-24

3	0.000E+00	1.447E-21	1.447E-21	18	0.000E+00	3.742E-25	3.742E-25
4	0.000E+00	1.006E-21	1.006E-21	19	0.000E+00	1.007E-26	1.007E-26
5	0.000E+00	8.845E-22	8.845E-22	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	7.936E-22	7.936E-22	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	7.035E-22	7.035E-22	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	6.134E-22	6.134E-22	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	5.247E-22	5.247E-22	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	2.068E-21	2.068E-21	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	6.462E-22	6.462E-22	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	2.918E-22	2.918E-22	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	1.957E-22	1.957E-22	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	9.765E-23	9.765E-23	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	2.678E-23	2.678E-23	30	0.000E+00	0.000E+00	0.000E+00

Totals: 2.865E-21 1.637E-20 1.924E-20

Nuclide 76 is SR- 89 (Z = 38)				Weight(76) = 1.070E-11 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	4.891E-02	4.891E-02	16	3.563E-04	4.090E-05	3.972E-04
2	0.000E+00	2.264E-02	2.264E-02	17	0.000E+00	4.743E-06	4.743E-06
3	0.000E+00	1.394E-02	1.394E-02	18	0.000E+00	3.682E-08	3.682E-08
4	0.000E+00	1.154E-02	1.154E-02	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.014E-02	1.014E-02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	8.734E-03	8.734E-03	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	7.330E-03	7.330E-03	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	5.925E-03	5.925E-03	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	4.520E-03	4.520E-03	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	1.871E-02	1.871E-02	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	5.488E-03	5.488E-03	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	2.382E-03	2.382E-03	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	1.433E-03	1.433E-03	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	6.030E-04	6.030E-04	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	1.253E-04	1.253E-04	30	0.000E+00	0.000E+00	0.000E+00

Totals: 3.563E-04 1.625E-01 1.628E-01

Nuclide 82 is SR- 90 (Z = 38)				Weight(82) = 4.180E-03 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	5.130E+06	5.130E+06	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	3.262E+06	3.262E+06	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.833E+06	1.833E+06	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	9.164E+05	9.164E+05	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	6.848E+05	6.848E+05	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	4.765E+05	4.765E+05	21	0.000E+00	0.000E+00	0.000E+00

7	0.000E+00	3.540E+05	3.540E+05	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	2.808E+05	2.808E+05	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.105E+05	2.105E+05	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	7.958E+05	7.958E+05	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.195E+05	1.195E+05	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.560E+04	1.560E+04	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	1.376E+03	1.376E+03	28	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 1.408E+07 1.408E+07

Nuclide 84 is Y - 90 (Z = 39)				Weight(84) = 4.180E-03 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	1.175E+04	3.304E+07	3.306E+07	16	0.000E+00	2.358E+05	2.358E+05
2	0.000E+00	1.677E+07	1.677E+07	17	0.000E+00	1.091E+05	1.091E+05
3	0.000E+00	1.002E+07	1.002E+07	18	0.000E+00	3.137E+04	3.137E+04
4	0.000E+00	7.103E+06	7.103E+06	19	5.258E+03	6.091E+03	1.135E+04
5	0.000E+00	5.259E+06	5.259E+06	20	0.000E+00	1.134E+03	1.134E+03
6	0.000E+00	4.666E+06	4.666E+06	21	2.165E+02	7.601E+01	2.925E+02
7	0.000E+00	4.312E+06	4.312E+06	22	0.000E+00	9.777E-01	9.777E-01
8	0.000E+00	3.957E+06	3.957E+06	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	3.603E+06	3.603E+06	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	1.806E+07	1.806E+07	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	5.481E+06	5.481E+06	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	2.606E+06	2.606E+06	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	1.919E+06	1.919E+06	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	1.098E+06	1.098E+06	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	3.716E+05	3.716E+05	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.723E+04 1.187E+08 1.187E+08

Nuclide 91 is Y - 91 (Z = 39)				Weight(91) = 3.470E-10 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.714E+00	1.714E+00	16	0.000E+00	2.158E-03	2.158E-03
2	0.000E+00	7.980E-01	7.980E-01	17	3.852E-02	3.542E-04	3.887E-02
3	0.000E+00	4.853E-01	4.853E-01	18	0.000E+00	1.014E-05	1.014E-05
4	0.000E+00	3.842E-01	3.842E-01	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	3.414E-01	3.414E-01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	2.985E-01	2.985E-01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.556E-01	2.556E-01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	2.128E-01	2.128E-01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.700E-01	1.700E-01	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	6.856E-01	6.856E-01	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	2.033E-01	2.033E-01	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	8.739E-02	8.739E-02	27	0.000E+00	0.000E+00	0.000E+00

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13	0.000E+00	5.715E-02	5.715E-02	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	2.474E-02	2.474E-02	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	5.622E-03	5.622E-03	30	0.000E+00	0.000E+00	0.000E+00

Totals: 3.852E-02 5.726E+00 5.764E+00

Nuclide 102 is ZR- 93 (Z = 40)				Weight(102) = 1.580E-10 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	5.085E-03	5.085E-03	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	9.856E-04	9.856E-04	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.995E-04	1.995E-04	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	3.384E-05	3.384E-05	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	5.538E-06	5.538E-06	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.095E-06	1.095E-06	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.400E-07	1.400E-07	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	5.490E-09	5.490E-09	23	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 6.311E-03 6.311E-03

Nuclide 117 is ZR- 95 (Z = 40)				Weight(117) = 3.520E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	3.189E+00	3.189E+00	16	0.000E+00	3.956E-07	3.956E-07
2	0.000E+00	1.492E+00	1.492E+00	17	0.000E+00	2.238E-11	2.238E-11
3	0.000E+00	6.895E-01	6.895E-01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	4.356E-01	4.356E-01	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	2.924E-01	2.924E-01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	2.022E-01	2.022E-01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.473E-01	1.473E-01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.087E-01	1.087E-01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	8.199E-02	8.199E-02	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	2.554E-01	2.554E-01	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.913E-02	1.913E-02	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.991E-03	1.991E-03	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	6.561E-04	6.561E-04	28	0.000E+00	0.000E+00	0.000E+00
14	5.691E+01	1.134E-04	5.691E+01	29	0.000E+00	0.000E+00	0.000E+00
15	7.202E+01	5.658E-06	7.202E+01	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.289E+02 6.916E+00 1.359E+02

Nuclide 103 is NB- 93M (Z = 41)				Weight(103) = 3.670E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	1.358E+01	0.000E+00	1.358E+01	16	0.000E+00	0.000E+00	0.000E+00

 Totals: 1.358E+01 0.000E+00 1.358E+01

Nuclide 119 is NB- 95 (Z = 41)				Weight(119) = 7.820E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.752E+00	1.752E+00	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	5.733E-01	5.733E-01	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	2.668E-01	2.668E-01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.373E-01	1.373E-01	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	7.396E-02	7.396E-02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	3.988E-02	3.988E-02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.116E-02	2.116E-02	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.094E-02	1.094E-02	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	5.415E-03	5.415E-03	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	8.805E-03	8.805E-03	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	2.266E-06	2.266E-06	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	9.106E-10	9.106E-10	27	0.000E+00	0.000E+00	0.000E+00
15	2.888E+02	0.000E+00	2.888E+02	30	0.000E+00	0.000E+00	0.000E+00

 Totals: 2.888E+02 2.889E+00 2.917E+02

Nuclide 118 is NB- 95M (Z = 41)				Weight(118) = 2.610E-11 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	7.381E-03	7.381E-03	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	2.469E-03	2.469E-03	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.241E-03	1.241E-03	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	7.063E-04	7.063E-04	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	4.261E-04	4.261E-04	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	2.654E-04	2.654E-04	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.687E-04	1.687E-04	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.078E-04	1.078E-04	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	6.862E-05	6.862E-05	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	1.157E-04	1.157E-04	25	0.000E+00	0.000E+00	0.000E+00
11	2.414E-01	5.316E-08	2.414E-01	26	0.000E+00	0.000E+00	0.000E+00

 Totals: 2.414E-01 1.295E-02 2.544E-01

Nuclide 141 is TC- 99 (Z = 43)				Weight(141) = 1.660E-06 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.125E+03	1.125E+03	16	0.000E+00	0.000E+00	0.000E+00

2	0.000E+00	3.783E+02	3.783E+02	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.977E+02	1.977E+02	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.198E+02	1.198E+02	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	7.632E+01	7.632E+01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	5.111E+01	5.111E+01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	3.567E+01	3.567E+01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	2.485E+01	2.485E+01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.747E+01	1.747E+01	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	4.276E+01	4.276E+01	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	8.699E-01	8.699E-01	26	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 2.070E+03 2.070E+03

Nuclide 155 is RU-103 (Z = 44)				Weight(155) = 5.090E-14 Ci (1 cc)			
Group	Gamma	Total		Group	Gamma	Total	
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.691E-05	1.691E-05	16	0.000E+00	0.000E+00	0.000E+00
2	8.852E-06	6.699E-06	1.555E-05	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	3.653E-06	3.653E-06	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	2.107E-06	2.107E-06	19	0.000E+00	0.000E+00	0.000E+00
5	6.780E-06	1.207E-06	7.987E-06	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	7.984E-07	7.984E-07	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	5.386E-07	5.386E-07	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	3.579E-07	3.579E-07	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.498E-07	2.498E-07	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	7.459E-07	7.459E-07	25	0.000E+00	0.000E+00	0.000E+00
11	5.085E-06	1.137E-07	5.199E-06	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	2.531E-08	2.531E-08	27	0.000E+00	0.000E+00	0.000E+00
13	1.664E-03	5.308E-09	1.664E-03	28	0.000E+00	0.000E+00	0.000E+00
14	1.364E-04	2.364E-10	1.364E-04	29	0.000E+00	0.000E+00	0.000E+00

Totals: 1.821E-03 3.341E-05 1.854E-03

Nuclide 170 is RU-106 (Z = 44)				Weight(170) = 7.160E-03 Ci (1 cc)			
Group	Gamma	Total		Group	Gamma	Total	
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	6.639E+04	6.639E+04	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	4.719E+03	4.719E+03	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.365E+02	1.365E+02	18	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 7.124E+04 7.124E+04

Nuclide 156 is RH-103M (Z = 45)				Weight(156) = 4.590E-14 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
2	2.038E-04	0.000E+00	2.038E-04	17	0.000E+00	0.000E+00	0.000E+00
4	6.793E-06	0.000E+00	6.793E-06	19	0.000E+00	0.000E+00	0.000E+00
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Totals: 2.106E-04				0.000E+00 2.106E-04			

Nuclide 172 is RH-106 (Z = 45)				Weight(172) = 7.160E-03 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	8.250E+07	8.250E+07	16	4.583E+06	1.647E+06	6.230E+06
2	0.000E+00	4.558E+07	4.558E+07	17	1.060E+06	1.092E+06	2.152E+06
3	0.000E+00	2.997E+07	2.997E+07	18	1.960E+06	5.369E+05	2.497E+06
4	0.000E+00	2.076E+07	2.076E+07	19	0.000E+00	2.247E+05	2.247E+05
5	0.000E+00	1.544E+07	1.544E+07	20	0.000E+00	1.250E+05	1.250E+05
6	0.000E+00	1.257E+07	1.257E+07	21	0.000E+00	6.676E+04	6.676E+04
7	0.000E+00	1.000E+07	1.000E+07	22	0.000E+00	3.363E+04	3.363E+04
8	0.000E+00	8.497E+06	8.497E+06	23	0.000E+00	1.556E+04	1.556E+04
9	0.000E+00	7.714E+06	7.714E+06	24	0.000E+00	6.371E+03	6.371E+03
10	0.000E+00	5.492E+07	5.492E+07	25	0.000E+00	2.766E+03	2.766E+03
11	0.000E+00	2.088E+07	2.088E+07	26	0.000E+00	1.825E+02	1.825E+02
12	0.000E+00	9.953E+06	9.953E+06	27	0.000E+00	0.000E+00	0.000E+00
13	5.457E+07	7.840E+06	6.241E+07	28	0.000E+00	0.000E+00	0.000E+00
14	2.782E+07	5.181E+06	3.300E+07	29	0.000E+00	0.000E+00	0.000E+00
15	1.113E+06	2.103E+06	3.216E+06	30	0.000E+00	0.000E+00	0.000E+00
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Totals: 9.111E+07				3.377E+08 4.288E+08			

Nuclide 177 is PD-107 (Z = 46)				Weight(177) = 2.730E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.676E-01	1.676E-01	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	7.317E-03	7.317E-03	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	6.009E-05	6.009E-05	18	0.000E+00	0.000E+00	0.000E+00
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Totals: 0.000E+00				1.750E-01 1.750E-01			

Nuclide 186 is PD-109M (Z = 46)				Weight(186) = 1.620E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
2	1.445E+01	0.000E+00	1.445E+01	17	0.000E+00	0.000E+00	0.000E+00
10	3.477E+01	0.000E+00	3.477E+01	25	0.000E+00	0.000E+00	0.000E+00
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Totals: 4.921E+01				0.000E+00 4.921E+01			

Nuclide 183 is AG-108 (Z = 47)				Weight(183) = 1.270E-12 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	6.449E-03	6.449E-03	16	4.699E-06	1.129E-05	1.599E-05
2	0.000E+00	3.024E-03	3.024E-03	17	0.000E+00	2.387E-06	2.387E-06
3	0.000E+00	1.833E-03	1.833E-03	18	0.000E+00	1.120E-07	1.120E-07
4	0.000E+00	1.396E-03	1.396E-03	19	0.000E+00	1.719E-11	1.719E-11
5	0.000E+00	1.244E-03	1.244E-03	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.099E-03	1.099E-03	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	9.542E-04	9.542E-04	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	8.123E-04	8.123E-04	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	6.709E-04	6.709E-04	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	2.665E-03	2.665E-03	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	8.022E-04	8.022E-04	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	3.547E-04	3.547E-04	27	0.000E+00	0.000E+00	0.000E+00
13	4.746E-04	2.320E-04	7.066E-04	28	0.000E+00	0.000E+00	0.000E+00
14	8.834E-04	1.069E-04	9.903E-04	29	0.000E+00	0.000E+00	0.000E+00
15	9.398E-06	2.659E-05	3.598E-05	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.372E-03 2.168E-02 2.306E-02

Nuclide 192 is AG-110 (Z = 47)				Weight(192) = 1.070E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.081E+03	1.081E+03	16	0.000E+00	1.423E+01	1.423E+01
2	0.000E+00	5.541E+02	5.541E+02	17	0.000E+00	8.151E+00	8.151E+00
3	0.000E+00	3.566E+02	3.566E+02	18	7.918E-01	3.431E+00	4.223E+00
4	0.000E+00	2.428E+02	2.428E+02	19	0.000E+00	1.163E+00	1.163E+00
5	0.000E+00	1.868E+02	1.868E+02	20	0.000E+00	4.967E-01	4.967E-01
6	0.000E+00	1.432E+02	1.432E+02	21	0.000E+00	1.843E-01	1.843E-01
7	0.000E+00	1.220E+02	1.220E+02	22	0.000E+00	5.635E-02	5.635E-02
8	0.000E+00	1.143E+02	1.143E+02	23	0.000E+00	1.072E-02	1.072E-02
9	0.000E+00	1.071E+02	1.071E+02	24	0.000E+00	1.056E-03	1.056E-03
10	0.000E+00	6.811E+02	6.811E+02	25	0.000E+00	2.753E-06	2.753E-06
11	0.000E+00	2.114E+02	2.114E+02	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.036E+02	1.036E+02	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	8.204E+01	8.204E+01	28	0.000E+00	0.000E+00	0.000E+00
14	1.782E+02	5.050E+01	2.287E+02	29	0.000E+00	0.000E+00	0.000E+00
15	1.188E+00	1.952E+01	2.070E+01	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.801E+02 4.084E+03 4.264E+03

Nuclide 191 is AG-110M (Z = 47)				Weight(191) = 8.060E-06 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	3.294E+03	3.294E+03	16	1.005E+05	1.648E-01	1.005E+05
2	1.789E+03	1.913E+03	3.702E+03	17	0.000E+00	1.805E-02	1.805E-02
3	0.000E+00	9.623E+02	9.623E+02	18	1.214E+05	9.649E-05	1.214E+05
4	0.000E+00	5.391E+02	5.391E+02	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	3.973E+02	3.973E+02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	2.739E+02	2.739E+02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.164E+02	2.164E+02	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.646E+02	1.646E+02	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.266E+02	1.266E+02	24	0.000E+00	0.000E+00	0.000E+00
10	2.982E+01	4.765E+02	5.063E+02	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	7.409E+01	7.409E+01	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.538E+01	1.538E+01	27	0.000E+00	0.000E+00	0.000E+00
13	8.052E+03	6.422E+00	8.058E+03	28	0.000E+00	0.000E+00	0.000E+00
14	4.694E+05	2.548E+00	4.694E+05	29	0.000E+00	0.000E+00	0.000E+00
15	3.266E+05	5.128E-01	3.266E+05	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.028E+06 8.462E+03 1.036E+06

Nuclide 189 is CD-109 (Z = 48)				Weight(189) = 1.620E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	8.032E+00	8.079E-05	8.032E+00	16	0.000E+00	0.000E+00	0.000E+00

Totals: 8.032E+00 8.079E-05 8.032E+00

Nuclide 217 is CD-115M (Z = 48)				Weight(217) = 2.330E-15 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.182E-05	1.182E-05	16	3.276E-07	1.988E-08	3.475E-07
2	0.000E+00	5.546E-06	5.546E-06	17	7.759E-07	4.090E-09	7.800E-07
3	0.000E+00	3.355E-06	3.355E-06	18	1.724E-08	1.800E-10	1.742E-08
4	0.000E+00	2.557E-06	2.557E-06	19	0.000E+00	1.791E-14	1.791E-14
5	0.000E+00	2.277E-06	2.277E-06	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	2.013E-06	2.013E-06	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.749E-06	1.749E-06	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.485E-06	1.485E-06	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.222E-06	1.222E-06	24	0.000E+00	0.000E+00	0.000E+00
10	2.586E-08	4.855E-06	4.881E-06	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.456E-06	1.456E-06	26	0.000E+00	0.000E+00	0.000E+00
12	0.430E+00	6.430E-07	6.430E-07	27	0.000E+00	0.000E+00	0.000E+00
13	3.276E-07	4.209E-07	7.485E-07	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	1.930E-07	1.930E-07	29	0.000E+00	0.000E+00	0.000E+00

15 0.000E+00 4.750E-08 4.750E-08 30 0.000E+00 0.000E+00 0.000E+00

Totals: 1.474E-06 3.966E-05 4.114E-05

Nuclide 213 is IN-114 (Z = 49)				Weight(213) = 1.460E-17 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	8.987E-08	8.987E-08	16	0.000E+00	4.173E-10	4.173E-10
2	0.000E+00	4.642E-08	4.642E-08	17	9.183E-10	1.538E-10	1.072E-09
3	0.000E+00	2.863E-08	2.863E-08	18	0.000E+00	2.878E-11	2.878E-11
4	0.000E+00	1.948E-08	1.948E-08	19	0.000E+00	2.589E-12	2.589E-12
5	0.000E+00	1.602E-08	1.602E-08	20	0.000E+00	1.408E-13	1.408E-13
6	0.000E+00	1.465E-08	1.465E-08	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.328E-08	1.328E-08	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.191E-08	1.191E-08	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.054E-08	1.054E-08	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	4.104E-08	4.104E-08	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.338E-08	1.338E-08	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	6.316E-09	6.316E-09	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	4.571E-09	4.571E-09	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	2.374E-09	2.374E-09	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	7.373E-10	7.373E-10	30	0.000E+00	0.000E+00	0.000E+00

Totals: 9.183E-10 3.198E-07 3.207E-07

Nuclide 219 is IN-115M (Z = 49)				Weight(219) = 1.640E-19 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.692E-11	1.692E-11	16	0.000E+00	0.000E+00	0.000E+00
2	2.002E-09	8.743E-12	2.011E-09	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	6.840E-12	6.840E-12	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	5.012E-12	5.012E-12	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	3.185E-12	3.185E-12	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.845E-12	1.845E-12	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.519E-12	1.519E-12	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.251E-12	1.251E-12	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	9.833E-13	9.833E-13	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	4.071E-12	4.071E-12	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	9.942E-13	9.942E-13	26	0.000E+00	0.000E+00	0.000E+00
12	3.034E-09	2.818E-13	3.034E-09	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	9.216E-14	9.216E-14	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	9.228E-15	9.228E-15	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	4.731E-17	4.731E-17	30	0.000E+00	0.000E+00	0.000E+00

Totals: 5.036E-09 5.175E-11 5.088E-09

Nuclide 242 is SN-119M (Z = 50)				Weight(242) = 4.780E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
2	9.727E+03	0.000E+00	9.727E+03	17	0.000E+00	0.000E+00	0.000E+00
6	1.769E+00	0.000E+00	1.769E+00	21	0.000E+00	0.000E+00	0.000E+00

Totals: 9.729E+03 0.000E+00 9.729E+03

Nuclide 249 is SN-121M (Z = 50)				Weight(249) = 1.450E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.196E+02	1.196E+02	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	4.891E+01	4.891E+01	17	0.000E+00	0.000E+00	0.000E+00
3	4.453E+02	2.433E+01	4.696E+02	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.423E+01	1.423E+01	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	9.842E+00	9.842E+00	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	6.674E+00	6.674E+00	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	4.823E+00	4.823E+00	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	3.487E+00	3.487E+00	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.570E+00	2.570E+00	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	7.319E+00	7.319E+00	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	3.208E-01	3.208E-01	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	3.035E-03	3.035E-03	27	0.000E+00	0.000E+00	0.000E+00

Totals: 4.453E+02 2.421E+02 6.874E+02

Nuclide 259 is SN-123 (Z = 50)				Weight(259) = 1.480E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	6.359E+02	6.359E+02	16	1.095E+02	4.113E-01	1.099E+02
2	0.000E+00	2.959E+02	2.959E+02	17	0.000E+00	3.632E-02	3.632E-02
3	0.000E+00	1.806E+02	1.806E+02	18	0.000E+00	1.136E-04	1.136E-04
4	0.000E+00	1.533E+02	1.533E+02	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.337E+02	1.337E+02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.142E+02	1.142E+02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	9.462E+01	9.462E+01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	7.507E+01	7.507E+01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	5.552E+01	5.552E+01	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	2.334E+02	2.334E+02	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	6.818E+01	6.818E+01	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	2.960E+01	2.960E+01	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	1.758E+01	1.758E+01	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	7.045E+00	7.045E+00	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	1.349E+00	1.349E+00	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.095E+02 2.096E+03 2.206E+03

Nuclide 272 is SN-126 (Z = 50)				Weight(272) = 1.720E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	8.959E+01	8.959E+01	16	0.000E+00	0.000E+00	0.000E+00
2	2.291E+03	2.876E+01	2.320E+03	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.476E+01	1.476E+01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	8.570E+00	8.570E+00	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	5.375E+00	5.375E+00	20	0.000E+00	0.000E+00	0.000E+00
6	6.109E+02	3.505E+00	6.144E+02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.314E+00	2.314E+00	22	0.000E+00	0.000E+00	0.000E+00
8	2.927E+03	1.545E+00	2.929E+03	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.030E+00	1.030E+00	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	2.079E+00	2.079E+00	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.127E-02	1.127E-02	26	0.000E+00	0.000E+00	0.000E+00

Totals: 5.829E+03 1.575E+02 5.987E+03

Nuclide 265 is SB-124 (Z = 51)				Weight(265) = 8.210E-13 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	2.499E-03	2.499E-03	16	1.148E-03	1.109E-05	1.159E-03
2	0.000E+00	1.316E-03	1.316E-03	17	4.678E-04	5.069E-06	4.729E-04
3	0.000E+00	8.215E-04	8.215E-04	18	2.017E-03	1.493E-06	2.019E-03
4	0.000E+00	5.460E-04	5.460E-04	19	1.583E-02	3.055E-07	1.583E-02
5	0.000E+00	4.039E-04	4.039E-04	20	1.823E-05	6.264E-08	1.829E-05
6	0.000E+00	3.385E-04	3.385E-04	21	2.154E-03	7.231E-09	2.154E-03
7	0.000E+00	2.907E-04	2.907E-04	22	1.215E-05	2.144E-10	1.215E-05
8	0.000E+00	2.564E-04	2.564E-04	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.263E-04	2.263E-04	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	1.081E-03	1.081E-03	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	3.094E-04	3.094E-04	26	0.000E+00	0.000E+00	0.000E+00
12	2.430E-05	1.388E-04	1.631E-04	27	0.000E+00	0.000E+00	0.000E+00
13	1.671E-04	9.841E-05	2.655E-04	28	0.000E+00	0.000E+00	0.000E+00
14	3.649E-02	5.381E-05	3.654E-02	29	0.000E+00	0.000E+00	0.000E+00
15	2.339E-04	1.793E-05	2.518E-04	30	0.000E+00	0.000E+00	0.000E+00

Totals: 5.856E-02 8.416E-03 6.697E-02

Nuclide 269 is SB-125 (Z = 51)				Weight(269) = 1.180E-03 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	6.991E+05	6.991E+05	16	0.000E+00	0.000E+00	0.000E+00
2	2.144E+07	3.218E+05	2.176E+07	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.805E+05	1.805E+05	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.002E+05	1.002E+05	19	0.000E+00	0.000E+00	0.000E+00

5	0.000E+00	6.430E+04	6.430E+04	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	4.683E+04	4.683E+04	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	3.299E+04	3.299E+04	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	2.451E+04	2.451E+04	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.906E+04	1.906E+04	24	0.000E+00	0.000E+00	0.000E+00
10	3.200E+06	6.477E+04	3.265E+06	25	0.000E+00	0.000E+00	0.000E+00
11	3.056E+05	8.464E+03	3.141E+05	26	0.000E+00	0.000E+00	0.000E+00
12	8.339E+05	1.380E+03	8.353E+05	27	0.000E+00	0.000E+00	0.000E+00
13	1.754E+07	1.843E+02	1.754E+07	28	0.000E+00	0.000E+00	0.000E+00
14	1.569E+07	1.421E+00	1.569E+07	29	0.000E+00	0.000E+00	0.000E+00

Totals: 5.900E+07 1.564E+06 6.057E+07

Nuclide 274 is SB-126 (Z = 51)				Weight(274) = 2.410E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	5.504E+01	5.504E+01	16	9.416E+01	7.406E-02	9.424E+01
2	1.507E+01	2.713E+01	4.220E+01	17	2.131E+01	2.105E-02	2.133E+01
3	0.000E+00	1.731E+01	1.731E+01	18	2.497E+00	2.166E-03	2.499E+00
4	0.000E+00	1.231E+01	1.231E+01	19	0.000E+00	6.243E-05	6.243E-05
5	0.000E+00	9.650E+00	9.650E+00	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	7.840E+00	7.840E+00	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	6.305E+00	6.305E+00	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	5.131E+00	5.131E+00	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	4.319E+00	4.319E+00	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	1.743E+01	1.743E+01	25	0.000E+00	0.000E+00	0.000E+00
11	8.614E+01	4.958E+00	9.110E+01	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	2.058E+00	2.058E+00	27	0.000E+00	0.000E+00	0.000E+00
13	7.515E+02	1.283E+00	7.528E+02	28	0.000E+00	0.000E+00	0.000E+00
14	2.724E+03	5.879E-01	2.724E+03	29	0.000E+00	0.000E+00	0.000E+00
15	1.572E+02	1.528E-01	1.574E+02	30	0.000E+00	0.000E+00	0.000E+00

Totals: 3.851E+03 1.716E+02 4.023E+03

Nuclide 273 is SB-126M (Z = 51)				Weight(273) = 1.720E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	8.322E+02	8.322E+02	16	5.471E+03	2.393E+00	5.474E+03
2	1.025E+02	3.932E+02	4.956E+02	17	0.000E+00	6.946E-01	6.946E-01
3	0.000E+00	2.526E+02	2.526E+02	18	4.245E+02	7.981E-02	4.246E+02
4	0.000E+00	1.746E+02	1.746E+02	19	0.000E+00	1.908E-03	1.908E-03
5	0.000E+00	1.539E+02	1.539E+02	20	0.000E+00	5.524E-08	5.524E-08
6	0.000E+00	1.378E+02	1.378E+02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.222E+02	1.222E+02	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.066E+02	1.066E+02	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	9.145E+01	9.145E+01	24	0.000E+00	0.000E+00	0.000E+00

10	0.000E+00	3.599E+02	3.599E+02	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.131E+02	1.131E+02	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	5.132E+01	5.132E+01	27	0.000E+00	0.000E+00	0.000E+00
13	8.846E+01	3.474E+01	1.232E+02	28	0.000E+00	0.000E+00	0.000E+00
14	4.690E+02	1.733E+01	4.864E+02	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	4.801E+00	4.801E+00	30	0.000E+00	0.000E+00	0.000E+00

Totals: 6.556E+03 2.849E+03 9.405E+03

Nuclide 261 is TE-123M (Z = 52)				Weight(261) = 4.860E-11 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
2	7.912E-01	0.000E+00	7.912E-01	17	0.000E+00	0.000E+00	0.000E+00
8	3.596E-03	0.000E+00	3.596E-03	23	0.000E+00	0.000E+00	0.000E+00
10	1.510E+00	0.000E+00	1.510E+00	25	0.000E+00	0.000E+00	0.000E+00

Totals: 2.305E+00 0.000E+00 2.305E+00

Nuclide 270 is TE-125M (Z = 52)				Weight(270) = 2.870E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	2.467E+04	2.467E+04	16	0.000E+00	0.000E+00	0.000E+00
2	1.274E+07	6.541E+03	1.275E+07	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	2.155E+03	2.155E+03	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	7.399E+02	7.399E+02	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	2.509E+02	2.509E+02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	7.918E+01	7.918E+01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.148E+01	2.148E+01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	4.148E+00	4.148E+00	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	3.838E-01	3.838E-01	24	0.000E+00	0.000E+00	0.000E+00
10	2.973E+04	8.572E-03	2.973E+04	25	0.000E+00	0.000E+00	0.000E+00

Totals: 1.277E+07 3.446E+04 1.281E+07

Nuclide 279 is TE-127 (Z = 52)				Weight(279) = 1.020E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.552E+02	1.552E+02	16	0.000E+00	0.000E+00	0.000E+00
2	5.284E+00	9.514E+01	1.004E+02	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	6.818E+01	6.818E+01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	4.124E+01	4.124E+01	19	0.000E+00	0.000E+00	0.000E+00
5	3.774E-01	2.243E+01	2.281E+01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.779E+01	1.779E+01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.381E+01	1.381E+01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.000E+01	1.000E+01	23	0.000E+00	0.000E+00	0.000E+00

9	0.000E+00	8.161E+00	8.161E+00	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	3.391E+01	3.391E+01	25	0.000E+00	0.000E+00	0.000E+00
11	1.132E+00	6.777E+00	7.909E+00	26	0.000E+00	0.000E+00	0.000E+00
12	1.887E+00	1.513E+00	3.400E+00	27	0.000E+00	0.000E+00	0.000E+00
13	1.132E+01	3.066E-01	1.163E+01	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	1.247E-02	1.247E-02	29	0.000E+00	0.000E+00	0.000E+00

Totals: 2.000E+01 4.744E+02 4.944E+02

Nuclide 278 is TE-127M (Z = 52)				Weight(278) = 1.050E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.385E+00	1.385E+00	16	0.000E+00	0.000E+00	0.000E+00
2	1.360E+03	8.168E-01	1.361E+03	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	6.061E-01	6.061E-01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	3.955E-01	3.955E-01	19	0.000E+00	0.000E+00	0.000E+00
5	7.381E+00	2.035E-01	7.585E+00	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.583E-01	1.583E-01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.273E-01	1.273E-01	22	0.000E+00	0.000E+00	0.000E+00
8	3.108E+00	9.627E-02	3.204E+00	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	7.337E-02	7.337E-02	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	3.191E-01	3.191E-01	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	6.713E-02	6.713E-02	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.635E-02	1.635E-02	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	4.044E-03	4.044E-03	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	2.447E-04	2.447E-04	29	0.000E+00	0.000E+00	0.000E+00

Totals: 1.370E+03 4.269E+00 1.375E+03

Nuclide 289 is TE-129 (Z = 52)				Weight(289) = 6.760E-18 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	2.725E-08	2.725E-08	16	1.626E-09	1.830E-11	1.644E-09
2	2.901E-08	1.266E-08	4.168E-08	17	7.003E-10	1.997E-12	7.023E-10
3	0.000E+00	8.003E-09	8.003E-09	18	0.000E+00	1.065E-14	1.065E-14
4	0.000E+00	6.635E-09	6.635E-09	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	5.714E-09	5.714E-09	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	4.795E-09	4.795E-09	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	3.891E-09	3.891E-09	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	3.130E-09	3.130E-09	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.388E-09	2.388E-09	24	0.000E+00	0.000E+00	0.000E+00
10	6.003E-10	9.980E-09	1.058E-08	25	0.000E+00	0.000E+00	0.000E+00
11	3.677E-09	2.885E-09	6.562E-09	26	0.000E+00	0.000E+00	0.000E+00
12	1.251E-10	1.229E-09	1.354E-09	27	0.000E+00	0.000E+00	0.000E+00
13	2.406E-08	7.195E-10	2.478E-08	28	0.000E+00	0.000E+00	0.000E+00
14	4.252E-10	2.914E-10	7.166E-10	29	0.000E+00	0.000E+00	0.000E+00

15 7.253E-10 5.740E-11 7.828E-10 30 0.000E+00 0.000E+00 0.000E+00

Totals: 6.095E-08 8.965E-08 1.506E-07

Nuclide 288 is TE-129M (Z = 52)				Weight(288) = 1.040E-17 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.703E-08	1.703E-08	16	1.539E-10	2.221E-11	1.761E-10
2	1.539E-08	8.008E-09	2.340E-08	17	0.000E+00	4.113E-12	4.113E-12
3	0.000E+00	4.971E-09	4.971E-09	18	3.848E-11	1.772E-13	3.866E-11
4	0.000E+00	3.845E-09	3.845E-09	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	3.347E-09	3.347E-09	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	2.856E-09	2.856E-09	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.444E-09	2.444E-09	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	2.057E-09	2.057E-09	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.670E-09	1.670E-09	24	0.000E+00	0.000E+00	0.000E+00
10	5.387E-10	6.681E-09	7.220E-09	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.963E-09	1.963E-09	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	8.472E-10	8.472E-10	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	5.463E-10	5.463E-10	28	0.000E+00	0.000E+00	0.000E+00
14	1.539E-08	2.398E-10	1.563E-08	29	0.000E+00	0.000E+00	0.000E+00
15	4.618E-10	5.570E-11	5.175E-10	30	0.000E+00	0.000E+00	0.000E+00

Totals: 3.198E-08 5.659E-08 8.857E-08

Nuclide 290 is I -129 (Z = 53)				Weight(290) = 5.520E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.116E+00	1.116E+00	16	0.000E+00	0.000E+00	0.000E+00
2	1.164E+02	3.614E-01	1.168E+02	17	0.000E+00	0.000E+00	0.000E+00
3	4.232E+01	1.643E-01	4.248E+01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	8.343E-02	8.343E-02	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	4.319E-02	4.319E-02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	2.232E-02	2.232E-02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.151E-02	1.151E-02	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	5.618E-03	5.618E-03	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.522E-03	2.522E-03	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	4.115E-03	4.115E-03	25	0.000E+00	0.000E+00	0.000E+00

Totals: 1.587E+02 1.814E+00 1.605E+02

Nuclide 319 is CS-134 (Z = 55)				Weight(319) = 1.520E-03 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.615E+06	1.615E+06	16	0.000E+00	1.515E-03	1.515E-03

2	4.724E+05	9.949E+05	1.467E+06	17	1.575E+06	0.000E+00	1.575E+06
3	0.000E+00	6.807E+05	6.807E+05	18	1.710E+06	0.000E+00	1.710E+06
4	0.000E+00	3.815E+05	3.815E+05	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	2.225E+05	2.225E+05	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.771E+05	1.771E+05	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.323E+05	1.323E+05	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	9.715E+04	9.715E+04	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	8.064E+04	8.064E+04	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	3.202E+05	3.202E+05	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	6.022E+04	6.022E+04	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.231E+04	1.231E+04	27	0.000E+00	0.000E+00	0.000E+00
13	8.211E+05	2.127E+03	8.232E+05	28	0.000E+00	0.000E+00	0.000E+00
14	6.828E+07	5.666E+01	6.828E+07	29	0.000E+00	0.000E+00	0.000E+00
15	5.294E+07	1.374E-01	5.294E+07	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.258E+08 4.777E+06 1.306E+08

Nuclide 326 is CS-135 (Z = 55)				Weight(326) = 1.960E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	6.415E+01	6.415E+01	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	2.235E+01	2.235E+01	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.118E+01	1.118E+01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	6.261E+00	6.261E+00	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	3.703E+00	3.703E+00	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	2.253E+00	2.253E+00	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.385E+00	1.385E+00	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	8.514E-01	8.514E-01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	5.190E-01	5.190E-01	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	7.799E-01	7.799E-01	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	2.357E-07	2.357E-07	26	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 1.134E+02 1.134E+02

Nuclide 335 is CS-137 (Z = 55)				Weight(335) = 1.150E-02 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.460E+07	1.460E+07	16	0.000E+00	1.833E+02	1.833E+02
2	0.000E+00	8.671E+06	8.671E+06	17	0.000E+00	9.412E-01	9.412E-01
3	0.000E+00	4.651E+06	4.651E+06	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	2.753E+06	2.753E+06	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	2.074E+06	2.074E+06	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.448E+06	1.448E+06	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.112E+06	1.112E+06	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	8.050E+05	8.050E+05	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	6.130E+05	6.130E+05	24	0.000E+00	0.000E+00	0.000E+00

10	0.000E+00	2.431E+06	2.431E+06	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	4.426E+05	4.426E+05	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.086E+05	1.086E+05	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	4.607E+04	4.607E+04	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	1.334E+04	1.334E+04	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	1.524E+03	1.524E+03	30	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 3.977E+07 3.977E+07

Nuclide 336 is BA-137M (Z = 56)				Weight(336) = 1.090E-02 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
3	2.936E+07	0.000E+00	2.936E+07	18	0.000E+00	0.000E+00	0.000E+00
14	3.629E+08	0.000E+00	3.629E+08	29	0.000E+00	0.000E+00	0.000E+00

Totals: 3.922E+08 0.000E+00 3.922E+08

Nuclide 356 is CE-141 (Z = 58)				Weight(356) = 8.650E-17 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	9.152E-08	9.152E-08	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	5.388E-08	5.388E-08	17	0.000E+00	0.000E+00	0.000E+00
3	4.417E-07	2.668E-08	4.683E-07	18	0.000E+00	0.000E+00	0.000E+00
4	1.088E-07	1.532E-08	1.241E-07	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.029E-08	1.029E-08	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	7.629E-09	7.629E-09	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	5.412E-09	5.412E-09	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	4.245E-09	4.245E-09	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	3.256E-09	3.256E-09	24	0.000E+00	0.000E+00	0.000E+00
10	1.549E-06	1.152E-08	1.561E-06	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.417E-09	1.417E-09	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.632E-10	1.632E-10	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	1.337E-11	1.337E-11	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	8.481E-15	8.481E-15	29	0.000E+00	0.000E+00	0.000E+00

Totals: 2.100E-06 2.314E-07 2.331E-06

Nuclide 376 is CE-144 (Z = 58)				Weight(376) = 2.740E-03 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.777E+06	1.777E+06	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	6.110E+05	6.110E+05	17	0.000E+00	0.000E+00	0.000E+00
3	7.309E+06	3.270E+05	7.636E+06	18	0.000E+00	0.000E+00	0.000E+00
4	2.088E+06	1.913E+05	2.280E+06	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.224E+05	1.224E+05	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	8.412E+04	8.412E+04	21	0.000E+00	0.000E+00	0.000E+00

7	0.000E+00	5.756E+04	5.756E+04	22	0.000E+00	0.000E+00	0.000E+00
8	1.622E+06	4.068E+04	1.663E+06	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.920E+04	2.920E+04	24	0.000E+00	0.000E+00	0.000E+00
10	1.095E+07	7.433E+04	1.102E+07	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.736E+03	1.736E+03	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	4.658E-01	4.658E-01	27	0.000E+00	0.000E+00	0.000E+00

Totals: 2.197E+07 3.316E+06 2.529E+07

Nuclide 377 is PR-144 (Z = 59)				Weight(377) = 2.740E-03 Ci (1 cc)			
Group No.	Gamma X-ray	Brems	Total photon/sec	Group No.	Gamma X-ray	Brems	Total photon/sec
1	0.000E+00	2.831E+07	2.831E+07	16	0.000E+00	4.072E+05	4.072E+05
2	0.000E+00	1.457E+07	1.457E+07	17	0.000E+00	2.468E+05	2.468E+05
3	0.000E+00	9.612E+06	9.612E+06	18	3.041E+05	1.075E+05	4.116E+05
4	0.000E+00	6.433E+06	6.433E+06	19	0.000E+00	3.819E+04	3.819E+04
5	0.000E+00	5.021E+06	5.021E+06	20	0.000E+00	1.759E+04	1.759E+04
6	0.000E+00	3.805E+06	3.805E+06	21	7.806E+05	7.355E+03	7.880E+05
7	0.000E+00	3.118E+06	3.118E+06	22	0.000E+00	2.542E+03	2.542E+03
8	0.000E+00	2.907E+06	2.907E+06	23	0.000E+00	6.787E+02	6.787E+02
9	0.000E+00	2.739E+06	2.739E+06	24	0.000E+00	1.149E+02	1.149E+02
10	0.000E+00	1.817E+07	1.817E+07	25	0.000E+00	1.005E+01	1.005E+01
11	0.000E+00	5.747E+06	5.747E+06	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	2.895E+06	2.895E+06	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	2.260E+06	2.260E+06	28	0.000E+00	0.000E+00	0.000E+00
14	1.500E+06	1.422E+06	2.922E+06	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	5.444E+05	5.444E+05	30	0.000E+00	0.000E+00	0.000E+00

Totals: 2.585E+06 1.084E+08 1.110E+08

Nuclide 477 is PM-146 (Z = 61)				Weight(477) = 1.530E-06 Ci (1 cc)			
Group No.	Gamma X-ray	Brems	Total photon/sec	Group No.	Gamma X-ray	Brems	Total photon/sec
1	0.000E+00	1.009E+03	1.009E+03	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	5.392E+02	5.392E+02	17	0.000E+00	0.000E+00	0.000E+00
3	2.225E+04	4.144E+02	2.266E+04	18	0.000E+00	0.000E+00	0.000E+00
4	5.491E+03	2.933E+02	5.784E+03	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.736E+02	1.736E+02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.080E+02	1.080E+02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	9.018E+01	9.018E+01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	7.250E+01	7.250E+01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	5.501E+01	5.501E+01	24	0.000E+00	0.000E+00	0.000E+00
10	1.189E+02	2.310E+02	3.499E+02	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	5.385E+01	5.385E+01	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.455E+01	1.455E+01	27	0.000E+00	0.000E+00	0.000E+00
13	3.549E+04	4.404E+00	3.550E+04	28	0.000E+00	0.000E+00	0.000E+00

14 3.446E+04 3.380E-01 3.446E+04
 15 0.000E+00 2.829E-04 2.829E-04

29 0.000E+00 0.000E+00 0.000E+00
 30 0.000E+00 0.000E+00 0.000E+00

Totals: 9.782E+04 3.059E+03 1.009E+05

Nuclide 388 is PM-147 (Z = 61)				Weight(388) = 1.010E-02 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	4.238E+06	4.238E+06	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	1.399E+06	1.399E+06	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	7.007E+05	7.007E+05	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	3.986E+05	3.986E+05	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	2.417E+05	2.417E+05	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.516E+05	1.516E+05	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	9.637E+04	9.637E+04	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	6.145E+04	6.145E+04	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	3.927E+04	3.927E+04	24	0.000E+00	0.000E+00	0.000E+00
10	1.046E+04	6.825E+04	7.871E+04	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	2.933E+01	2.933E+01	26	0.000E+00	0.000E+00	0.000E+00

Totals: 1.046E+04 7.395E+06 7.406E+06

Nuclide 394 is PM-148 (Z = 61)				Weight(394) = 7.080E-16 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	4.340E-06	4.340E-06	16	3.013E-06	3.062E-08	3.043E-06
2	0.000E+00	2.171E-06	2.171E-06	17	7.859E-08	1.535E-08	9.393E-08
3	0.000E+00	1.355E-06	1.355E-06	18	5.816E-06	5.056E-09	5.821E-06
4	0.000E+00	1.000E-06	1.000E-06	19	0.000E+00	1.239E-09	1.239E-09
5	0.000E+00	7.421E-07	7.421E-07	20	0.000E+00	3.430E-10	3.430E-10
6	0.000E+00	6.005E-07	6.005E-07	21	0.000E+00	6.908E-11	6.908E-11
7	0.000E+00	5.219E-07	5.219E-07	22	0.000E+00	5.099E-12	5.099E-12
8	0.000E+00	4.765E-07	4.765E-07	23	0.000E+00	2.022E-14	2.022E-14
9	0.000E+00	4.342E-07	4.342E-07	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	2.286E-06	2.286E-06	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	6.741E-07	6.741E-07	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	3.187E-07	3.187E-07	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	2.351E-07	2.351E-07	28	0.000E+00	0.000E+00	0.000E+00
14	6.122E-06	1.338E-07	6.256E-06	29	0.000E+00	0.000E+00	0.000E+00
15	3.196E-07	4.623E-08	3.658E-07	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.535E-05 1.539E-05 3.074E-05

Nuclide 393 is PM-148M (Z = 61)				Weight(393) = 1.260E-14 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.368E-05	1.368E-05	16	1.747E-04	1.150E-12	1.747E-04
2	0.000E+00	7.709E-06	7.709E-06	17	0.000E+00	0.000E+00	0.000E+00
3	1.734E-05	4.235E-06	2.158E-05	18	0.000E+00	0.000E+00	0.000E+00
4	2.196E-05	2.618E-06	2.458E-05	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.612E-06	1.612E-06	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.190E-06	1.190E-06	21	0.000E+00	0.000E+00	0.000E+00
7	4.336E-06	8.890E-07	5.225E-06	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	6.608E-07	6.608E-07	23	0.000E+00	0.000E+00	0.000E+00
9	1.152E-05	5.167E-07	1.203E-05	24	0.000E+00	0.000E+00	0.000E+00
10	5.128E-06	1.944E-06	7.072E-06	25	0.000E+00	0.000E+00	0.000E+00
11	5.855E-05	2.968E-07	5.885E-05	26	0.000E+00	0.000E+00	0.000E+00
12	1.911E-05	5.547E-08	1.917E-05	27	0.000E+00	0.000E+00	0.000E+00
13	1.454E-04	1.222E-08	1.454E-04	28	0.000E+00	0.000E+00	0.000E+00
14	1.097E-03	1.083E-09	1.097E-03	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	3.395E-11	3.395E-11	30	0.000E+00	0.000E+00	0.000E+00
Totals: 1.555E-03 3.542E-05 1.591E-03							

Nuclide 398 is SM-149 (Z = 62)				Weight(398) = 1.010E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
(all values are zero)							

Nuclide 403 is SM-151 (Z = 62)				Weight(403) = 4.690E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	2.359E+04	2.359E+04	16	0.000E+00	0.000E+00	0.000E+00
2	1.041E+04	5.691E+03	1.610E+04	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.571E+03	1.571E+03	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	3.802E+02	3.802E+02	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	6.651E+01	6.651E+01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	5.876E+00	5.876E+00	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	9.618E-02	9.618E-02	22	0.000E+00	0.000E+00	0.000E+00
Totals: 1.041E+04 3.131E+04 4.172E+04							

Nuclide 414 is SM-154 (Z = 62)				Weight(414) = 6.010E-10 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
(all values are zero)							

Nuclide 408 is EU-152 (Z = 63)				Weight(408) = 1.970E-06 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.328E+03	1.328E+03	16	2.023E+04	6.115E-01	2.023E+04
2	0.000E+00	6.683E+02	6.683E+02	17	1.219E+04	7.326E-02	1.219E+04
3	0.000E+00	4.324E+02	4.324E+02	18	1.566E+04	9.764E-04	1.566E+04
4	5.391E+04	3.116E+02	5.422E+04	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	2.310E+02	2.310E+02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.914E+02	1.914E+02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.558E+02	1.558E+02	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.224E+02	1.224E+02	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	9.538E+01	9.538E+01	24	0.000E+00	0.000E+00	0.000E+00
10	2.072E+04	3.932E+02	2.112E+04	25	0.000E+00	0.000E+00	0.000E+00
11	5.773E+03	1.050E+02	5.878E+03	26	0.000E+00	0.000E+00	0.000E+00
12	2.002E+04	4.094E+01	2.006E+04	27	0.000E+00	0.000E+00	0.000E+00
13	4.257E+03	2.288E+01	4.280E+03	28	0.000E+00	0.000E+00	0.000E+00
14	3.200E+03	9.089E+00	3.209E+03	29	0.000E+00	0.000E+00	0.000E+00
15	1.297E+04	1.878E+00	1.298E+04	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.690E+05 4.110E+03 1.731E+05

Nuclide 412 is EU-153 (Z = 63)				Weight(412) = 1.440E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
(all values are zero)							

Nuclide 415 is EU-154 (Z = 63)				Weight(415) = 2.860E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	4.994E+05	4.994E+05	16	2.997E+06	6.019E+02	2.997E+06
2	0.000E+00	2.552E+05	2.552E+05	17	3.927E+06	1.868E+02	3.927E+06
3	0.000E+00	1.653E+05	1.653E+05	18	3.735E+05	2.393E+01	3.736E+05
4	2.701E+06	1.051E+05	2.806E+06	19	0.000E+00	7.673E-01	7.673E-01
5	0.000E+00	7.935E+04	7.935E+04	20	0.000E+00	4.708E-04	4.708E-04
6	0.000E+00	6.028E+04	6.028E+04	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	4.956E+04	4.956E+04	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	4.206E+04	4.206E+04	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	3.493E+04	3.493E+04	24	0.000E+00	0.000E+00	0.000E+00
10	4.306E+06	1.366E+05	4.442E+06	25	0.000E+00	0.000E+00	0.000E+00
11	6.984E+05	3.733E+04	7.357E+05	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.484E+04	1.484E+04	27	0.000E+00	0.000E+00	0.000E+00
13	9.841E+04	9.180E+03	1.076E+05	28	0.000E+00	0.000E+00	0.000E+00
14	3.582E+06	4.306E+03	3.586E+06	29	0.000E+00	0.000E+00	0.000E+00
15	1.485E+06	1.189E+03	1.486E+06	30	0.000E+00	0.000E+00	0.000E+00

Totals: 2.017E+07 1.495E+06 2.166E+07

Nuclide 418 is EU-155 (Z = 63)				Weight(418) = 1.740E-03 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	4.482E+05	4.482E+05	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	1.433E+05	1.433E+05	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	6.766E+04	6.766E+04	18	0.000E+00	0.000E+00	0.000E+00
4	1.546E+07	3.598E+04	1.550E+07	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.998E+04	1.998E+04	20	0.000E+00	0.000E+00	0.000E+00
6	8.369E+05	1.156E+04	8.485E+05	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	6.777E+03	6.777E+03	22	0.000E+00	0.000E+00	0.000E+00
8	1.999E+07	3.977E+03	1.999E+07	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.350E+03	2.350E+03	24	0.000E+00	0.000E+00	0.000E+00
10	1.331E+07	4.373E+03	1.331E+07	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.369E+01	1.369E+01	26	0.000E+00	0.000E+00	0.000E+00

Totals: 4.960E+07 7.442E+05 5.034E+07

Nuclide 429 is TB-159 (Z = 65)				Weight(429) = 2.700E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec

(all values are zero)

Nuclide 432 is TB-160 (Z = 65)				Weight(432) = 3.680E-06 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	5.406E+03	5.406E+03	16	4.616E+04	2.090E-01	4.616E+04
2	0.000E+00	3.060E+03	3.060E+03	17	3.853E+04	4.969E-02	3.853E+04
3	0.000E+00	1.983E+03	1.983E+03	18	0.000E+00	3.542E-03	3.542E-03
4	2.451E+04	1.270E+03	2.578E+04	19	0.000E+00	2.857E-05	2.857E-05
5	0.000E+00	8.568E+02	8.568E+02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	5.434E+02	5.434E+02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	4.258E+02	4.258E+02	22	0.000E+00	0.000E+00	0.000E+00
8	1.634E+04	3.449E+02	1.668E+04	23	0.000E+00	0.000E+00	0.000E+00
9	6.808E+01	2.679E+02	3.360E+02	24	0.000E+00	0.000E+00	0.000E+00
10	8.170E+03	1.059E+03	9.229E+03	25	0.000E+00	0.000E+00	0.000E+00
11	4.218E+04	2.207E+02	4.240E+04	26	0.000E+00	0.000E+00	0.000E+00
12	3.676E+03	5.717E+01	3.733E+03	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	1.919E+01	1.919E+01	28	0.000E+00	0.000E+00	0.000E+00
14	8.170E+02	3.437E+00	8.204E+02	29	0.000E+00	0.000E+00	0.000E+00
15	4.915E+04	4.853E-01	4.915E+04	30	0.000E+00	0.000E+00	0.000E+00

Totals: 2.296E+05 1.552E+04 2.451E+05

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Nuclide 524 is PB-212 (Z = 82)				Weight(524) = 1.670E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	2.986E+00	2.986E+00	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	1.622E+00	1.622E+00	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	9.501E-01	9.501E-01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	4.632E-01	4.632E-01	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	3.272E-01	3.272E-01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	2.329E-01	2.329E-01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.611E-01	1.611E-01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.264E-01	1.264E-01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	9.660E-02	9.660E-02	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	3.510E-01	3.510E-01	25	0.000E+00	0.000E+00	0.000E+00
11	2.904E+01	5.340E-02	2.909E+01	26	0.000E+00	0.000E+00	0.000E+00
12	1.977E-01	8.150E-03	2.059E-01	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	7.636E-04	7.636E-04	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	4.477E-07	4.477E-07	29	0.000E+00	0.000E+00	0.000E+00

Totals: 2.924E+01 7.379E+00 3.662E+01

Nuclide 525 is BI-212 (Z = 83)				Weight(525) = 1.670E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	7.688E+00	7.688E+00	16	0.000E+00	4.884E-02	4.884E-02
2	0.000E+00	3.895E+00	3.895E+00	17	0.000E+00	2.198E-02	2.198E-02
3	0.000E+00	2.328E+00	2.328E+00	18	0.000E+00	6.050E-03	6.050E-03
4	0.000E+00	1.643E+00	1.643E+00	19	0.000E+00	1.113E-03	1.113E-03
5	0.000E+00	1.216E+00	1.216E+00	20	0.000E+00	1.985E-04	1.985E-04
6	0.000E+00	1.084E+00	1.084E+00	21	0.000E+00	1.259E-05	1.259E-05
7	0.000E+00	1.001E+00	1.001E+00	22	0.000E+00	1.462E-08	1.462E-08
8	0.000E+00	9.171E-01	9.171E-01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	8.334E-01	8.334E-01	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	4.106E+00	4.106E+00	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.234E+00	1.234E+00	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	5.813E-01	5.813E-01	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	4.216E-01	4.216E-01	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	2.368E-01	2.368E-01	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	7.813E-02	7.813E-02	30	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 2.734E+01 2.734E+01

Nuclide 523 is RN-220 (Z = 86)				Weight(523) = 1.670E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
14	4.325E-02	0.000E+00	4.325E-02	29	0.000E+00	0.000E+00	0.000E+00

Totals: 4.325E-02 0.000E+00 4.325E-02

Nuclide 522 is RA-224 (Z = 88)				Weight(522) = 1.670E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	2.726E+01	2.726E+01	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	9.064E+00	9.064E+00	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	4.520E+00	4.520E+00	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	2.548E+00	2.548E+00	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.527E+00	1.527E+00	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	9.479E-01	9.479E-01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	5.980E-01	5.980E-01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	3.782E-01	3.782E-01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.375E-01	2.375E-01	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	3.977E-01	3.977E-01	25	0.000E+00	0.000E+00	0.000E+00
11	2.286E+00	8.357E-05	2.286E+00	26	0.000E+00	0.000E+00	0.000E+00

Totals: 2.286E+00 4.748E+01 4.976E+01

Nuclide 442 is TH-228 (Z = 90)				Weight(442) = 1.670E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.816E-02	1.816E-02	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	3.996E-03	3.996E-03	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	9.428E-04	9.428E-04	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.801E-04	1.801E-04	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	2.002E-05	2.002E-05	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	7.417E-07	7.417E-07	21	0.000E+00	0.000E+00	0.000E+00
8	7.477E-01	0.000E+00	7.477E-01	23	0.000E+00	0.000E+00	0.000E+00
10	7.415E-02	0.000E+00	7.415E-02	25	0.000E+00	0.000E+00	0.000E+00
11	1.483E-01	0.000E+00	1.483E-01	26	0.000E+00	0.000E+00	0.000E+00

Totals: 9.701E-01 2.330E-02 9.934E-01

Nuclide 450 is TH-231 (Z = 90)				Weight(450) = 3.060E-10 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	8.034E+00	1.960E-01	8.230E+00	16	0.000E+00	0.000E+00	0.000E+00
2	1.659E+00	6.463E-02	1.723E+00	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	3.312E-02	3.312E-02	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.971E-02	1.971E-02	19	0.000E+00	0.000E+00	0.000E+00
5	5.435E-02	1.238E-02	6.673E-02	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	8.229E-03	8.229E-03	21	0.000E+00	0.000E+00	0.000E+00
7	2.830E-02	5.663E-03	3.397E-02	22	0.000E+00	0.000E+00	0.000E+00
8	8.729E-01	3.901E-03	8.768E-01	23	0.000E+00	0.000E+00	0.000E+00

9	2.230E-01	2.735E-03	2.258E-01	24	0.000E+00	0.000E+00	0.000E+00
10	2.615E-01	6.447E-03	2.680E-01	25	0.000E+00	0.000E+00	0.000E+00
11	9.171E-02	1.130E-04	9.182E-02	26	0.000E+00	0.000E+00	0.000E+00
12	6.227E-03	7.656E-11	6.227E-03	27	0.000E+00	0.000E+00	0.000E+00

Totals: 1.123E+01 3.529E-01 1.158E+01

Nuclide 530 is TH-234 (Z = 90)				Weight(530) = 5.880E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	2.082E+01	1.363E+00	2.218E+01	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	4.606E-01	4.606E-01	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	2.174E-01	2.174E-01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.149E-01	1.149E-01	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	6.436E-02	6.436E-02	20	0.000E+00	0.000E+00	0.000E+00
6	8.289E+00	3.716E-02	8.326E+00	21	0.000E+00	0.000E+00	0.000E+00
7	2.828E-01	2.168E-02	3.045E-01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.262E-02	1.262E-02	23	0.000E+00	0.000E+00	0.000E+00
9	1.177E+01	7.259E-03	1.178E+01	24	0.000E+00	0.000E+00	0.000E+00
10	5.221E-01	1.379E-02	5.359E-01	25	0.000E+00	0.000E+00	0.000E+00

Totals: 4.168E+01 2.313E+00 4.400E+01

Nuclide 490 is PA-233 (Z = 91)				Weight(490) = 6.790E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	1.229E+02	4.373E+00	1.273E+02	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	1.548E+00	1.548E+00	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	7.936E-01	7.936E-01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	4.325E-01	4.325E-01	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	2.716E-01	2.716E-01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.752E-01	1.752E-01	21	0.000E+00	0.000E+00	0.000E+00
7	3.165E+00	1.143E-01	3.280E+00	22	0.000E+00	0.000E+00	0.000E+00
8	4.748E+00	7.797E-02	4.826E+00	23	0.000E+00	0.000E+00	0.000E+00
9	7.137E+01	5.295E-02	7.143E+01	24	0.000E+00	0.000E+00	0.000E+00
10	2.294E+01	1.359E-01	2.307E+01	25	0.000E+00	0.000E+00	0.000E+00
11	7.537E-01	1.021E-02	7.639E-01	26	0.000E+00	0.000E+00	0.000E+00
12	1.298E+02	1.374E-03	1.298E+02	27	0.000E+00	0.000E+00	0.000E+00
13	4.070E+00	1.164E-04	4.070E+00	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	1.408E-08	1.408E-08	29	0.000E+00	0.000E+00	0.000E+00

Totals: 3.597E+02 7.986E+00 3.677E+02

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Nuclide 533 is PA-234M (Z = 91)				Weight(533) = 5.880E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	1.088E+00	4.198E+01	4.306E+01	16	1.284E+00	2.682E-01	1.552E+00
2	0.000E+00	2.126E+01	2.126E+01	17	4.134E-02	1.219E-01	1.633E-01
3	0.000E+00	1.268E+01	1.268E+01	18	7.179E-02	3.470E-02	1.065E-01
4	0.000E+00	8.989E+00	8.989E+00	19	5.483E-02	6.703E-03	6.153E-02
5	0.000E+00	6.622E+00	6.622E+00	20	7.506E-02	1.243E-03	7.630E-02
6	0.000E+00	5.841E+00	5.841E+00	21	0.000E+00	9.698E-05	9.698E-05
7	2.176E-02	5.392E+00	5.413E+00	22	0.000E+00	1.927E-06	1.927E-06
8	0.000E+00	4.942E+00	4.942E+00	23	0.000E+00	0.000E+00	0.000E+00
9	6.527E-01	4.495E+00	5.148E+00	24	0.000E+00	0.000E+00	0.000E+00
10	1.958E-01	2.256E+01	2.275E+01	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	6.715E+00	6.715E+00	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	3.155E+00	3.155E+00	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	2.296E+00	2.296E+00	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	1.284E+00	1.284E+00	29	0.000E+00	0.000E+00	0.000E+00
15	4.569E-01	4.296E-01	8.865E-01	30	0.000E+00	0.000E+00	0.000E+00

Totals: 3.942E+00 1.491E+02 1.530E+02

Nuclide 520 is U -234 (Z = 92)				Weight(520) = 3.680E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	1.430E+01	8.968E-03	1.431E+01	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	8.750E-04	8.750E-04	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.061E-04	1.061E-04	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	2.009E-05	2.009E-05	19	0.000E+00	0.000E+00	0.000E+00
5	1.620E-01	6.448E-06	1.620E-01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.968E-06	1.968E-06	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	4.614E-07	4.614E-07	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	6.476E-08	6.476E-08	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.868E-09	2.868E-09	24	0.000E+00	0.000E+00	0.000E+00
10	5.446E-02	8.659E-14	5.446E-02	25	0.000E+00	0.000E+00	0.000E+00
13	5.446E-03	0.000E+00	5.446E-03	28	0.000E+00	0.000E+00	0.000E+00
14	1.634E-05	0.000E+00	1.634E-05	29	0.000E+00	0.000E+00	0.000E+00

Totals: 1.452E+01 9.979E-03 1.453E+01

Nuclide 476 is U -235 (Z = 92)				Weight(476) = 3.060E-10 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	3.500E+00	4.359E-03	3.504E+00	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	1.123E-03	1.123E-03	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	4.193E-04	4.193E-04	18	0.000E+00	0.000E+00	0.000E+00

4	0.000E+00	1.829E-04	1.829E-04	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	8.835E-05	8.835E-05	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	4.534E-05	4.534E-05	21	0.000E+00	0.000E+00	0.000E+00
7	1.245E-02	2.405E-05	1.248E-02	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.271E-05	1.271E-05	23	0.000E+00	0.000E+00	0.000E+00
9	8.141E-01	6.631E-06	8.141E-01	24	0.000E+00	0.000E+00	0.000E+00
10	8.392E+00	1.171E-05	8.392E+00	25	0.000E+00	0.000E+00	0.000E+00
11	6.861E-01	0.000E+00	6.861E-01	26	0.000E+00	0.000E+00	0.000E+00
12	1.472E-02	0.000E+00	1.472E-02	27	0.000E+00	0.000E+00	0.000E+00
13	1.359E-03	0.000E+00	1.359E-03	28	0.000E+00	0.000E+00	0.000E+00
14	4.529E-05	0.000E+00	4.529E-05	29	0.000E+00	0.000E+00	0.000E+00
15	6.793E-05	0.000E+00	6.793E-05	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.342E+01 6.274E-03 1.343E+01

Nuclide 491 is U -237 (Z = 92)				Weight(491) = 1.680E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	4.428E+03	9.711E+01	4.525E+03	16	0.000E+00	0.000E+00	0.000E+00
2	1.417E+02	3.081E+01	1.725E+02	17	0.000E+00	0.000E+00	0.000E+00
3	6.838E+00	1.521E+01	2.205E+01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	8.585E+00	8.585E+00	19	0.000E+00	0.000E+00	0.000E+00
5	2.128E+03	5.145E+00	2.133E+03	20	0.000E+00	0.000E+00	0.000E+00
6	7.335E+01	3.292E+00	7.664E+01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.132E+00	2.132E+00	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.393E+00	1.393E+00	23	0.000E+00	0.000E+00	0.000E+00
9	1.013E+03	9.128E-01	1.013E+03	24	0.000E+00	0.000E+00	0.000E+00
10	2.517E+03	1.747E+00	2.519E+03	25	0.000E+00	0.000E+00	0.000E+00
11	1.429E+03	5.514E-03	1.429E+03	26	0.000E+00	0.000E+00	0.000E+00
12	8.267E+01	0.000E+00	8.267E+01	27	0.000E+00	0.000E+00	0.000E+00

Totals: 1.182E+04 1.663E+02 1.199E+04

Nuclide 526 is U -238 (Z = 92)				Weight(526) = 5.880E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	1.921E+01	8.353E-03	1.922E+01	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	7.183E-04	7.183E-04	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	8.152E-05	8.152E-05	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.858E-05	1.858E-05	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	5.203E-06	5.203E-06	20	0.000E+00	0.000E+00	0.000E+00
6	2.176E-01	1.092E-06	2.176E-01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.383E-07	1.383E-07	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	6.521E-09	6.521E-09	23	0.000E+00	0.000E+00	0.000E+00

Totals: 1.943E+01 9.178E-03 1.944E+01

Nuclide 502 is NP-237 (Z = 93)				Weight(502) = 6.790E-09 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	1.487E+02	1.308E-01	1.488E+02	16	0.000E+00	0.000E+00	0.000E+00
2	3.515E+01	2.369E-02	3.517E+01	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	5.649E-03	5.649E-03	18	0.000E+00	0.000E+00	0.000E+00
4	3.517E-01	1.529E-03	3.533E-01	19	0.000E+00	0.000E+00	0.000E+00
5	1.055E+00	4.631E-04	1.056E+00	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.511E-04	1.511E-04	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	5.086E-05	5.086E-05	22	0.000E+00	0.000E+00	0.000E+00
8	3.206E+01	1.649E-05	3.206E+01	23	0.000E+00	0.000E+00	0.000E+00
9	1.256E+01	4.032E-06	1.256E+01	24	0.000E+00	0.000E+00	0.000E+00
10	8.291E+00	1.544E-06	8.291E+00	25	0.000E+00	0.000E+00	0.000E+00
11	4.020E-01	0.000E+00	4.020E-01	26	0.000E+00	0.000E+00	0.000E+00

Totals: 2.386E+02 1.624E-01 2.387E+02

Nuclide 503 is NP-239 (Z = 93)				Weight(503) = 5.330E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
10	1.158E+03	0.000E+00	1.158E+03	25	0.000E+00	0.000E+00	0.000E+00
11	4.851E+02	0.000E+00	4.851E+02	26	0.000E+00	0.000E+00	0.000E+00
12	2.761E+01	0.000E+00	2.761E+01	27	0.000E+00	0.000E+00	0.000E+00

Totals: 1.670E+03 0.000E+00 1.670E+03

Nuclide 492 is PU-238 (Z = 94)				Weight(492) = 2.500E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	1.073E+06	0.000E+00	1.073E+06	16	0.000E+00	0.000E+00	0.000E+00
4	3.700E+03	0.000E+00	3.700E+03	19	0.000E+00	0.000E+00	0.000E+00
10	9.250E+02	0.000E+00	9.250E+02	25	0.000E+00	0.000E+00	0.000E+00

Totals: 1.078E+06 0.000E+00 1.078E+06

Nuclide 493 is PU-239 (Z = 94)				Weight(493) = 5.750E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	9.361E+05	0.000E+00	9.361E+05	16	4.468E-02	0.000E+00	4.468E-02
3	4.255E+02	0.000E+00	4.255E+02	18	0.000E+00	0.000E+00	0.000E+00
4	1.213E+02	0.000E+00	1.213E+02	19	0.000E+00	0.000E+00	0.000E+00
5	6.170E+01	0.000E+00	6.170E+01	20	0.000E+00	0.000E+00	0.000E+00
6	7.021E+01	0.000E+00	7.021E+01	21	0.000E+00	0.000E+00	0.000E+00
7	6.595E+01	0.000E+00	6.595E+01	22	0.000E+00	0.000E+00	0.000E+00

8	2.766E+00	0.000E+00	2.766E+00	23	0.000E+00	0.000E+00	0.000E+00
9	5.744E+01	0.000E+00	5.744E+01	24	0.000E+00	0.000E+00	0.000E+00
10	1.596E+03	0.000E+00	1.596E+03	25	0.000E+00	0.000E+00	0.000E+00
11	1.085E+02	0.000E+00	1.085E+02	26	0.000E+00	0.000E+00	0.000E+00
12	7.659E+02	0.000E+00	7.659E+02	27	0.000E+00	0.000E+00	0.000E+00
13	3.617E+02	0.000E+00	3.617E+02	28	0.000E+00	0.000E+00	0.000E+00
14	1.362E+01	0.000E+00	1.362E+01	29	0.000E+00	0.000E+00	0.000E+00
15	3.191E+00	0.000E+00	3.191E+00	30	0.000E+00	0.000E+00	0.000E+00

Totals: 9.398E+05 0.000E+00 9.398E+05

Nuclide 494 is PU-240 (Z = 94)				Weight(494) = 3.300E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
4	5.495E+03	0.000E+00	5.495E+03	19	0.000E+00	0.000E+00	0.000E+00
10	9.280E+02	0.000E+00	9.280E+02	25	0.000E+00	0.000E+00	0.000E+00
14	2.198E+00	0.000E+00	2.198E+00	29	0.000E+00	0.000E+00	0.000E+00

Totals: 6.425E+03 0.000E+00 6.425E+03

Nuclide 495 is PU-241 (Z = 94)				Weight(495) = 6.870E-03 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	3.686E+03	3.686E+03	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	3.839E-02	3.839E-02	17	0.000E+00	0.000E+00	0.000E+00
4	1.423E+01	0.000E+00	1.423E+01	19	0.000E+00	0.000E+00	0.000E+00
5	9.405E+00	0.000E+00	9.405E+00	20	0.000E+00	0.000E+00	0.000E+00
7	6.863E+01	0.000E+00	6.863E+01	22	0.000E+00	0.000E+00	0.000E+00
10	3.050E+03	0.000E+00	3.050E+03	25	0.000E+00	0.000E+00	0.000E+00

Totals: 3.143E+03 3.686E+03 6.828E+03

Nuclide 497 is PU-242 (Z = 94)				Weight(497) = 2.720E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	2.415E+02	0.000E+00	2.415E+02	16	0.000E+00	0.000E+00	0.000E+00
4	4.026E-01	0.000E+00	4.026E-01	19	0.000E+00	0.000E+00	0.000E+00

Totals: 2.419E+02 0.000E+00 2.419E+02

Nuclide 496 is AM-241 (Z = 95)				Weight(496) = 2.850E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	4.534E+06	1.588E+03	4.536E+06	16	0.000E+00	0.000E+00	0.000E+00
2	2.531E+05	1.736E+02	2.533E+05	17	0.000E+00	0.000E+00	0.000E+00
3	1.160E+04	2.107E+01	1.162E+04	18	0.000E+00	0.000E+00	0.000E+00
4	9.491E+03	2.316E+00	9.493E+03	19	0.000E+00	0.000E+00	0.000E+00
5	3.765E+06	3.491E-01	3.765E+06	20	0.000E+00	0.000E+00	0.000E+00
6	2.109E+02	6.661E-02	2.110E+02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	9.504E-03	9.504E-03	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	6.134E-04	6.134E-04	23	0.000E+00	0.000E+00	0.000E+00
9	2.214E+03	4.027E-06	2.214E+03	24	0.000E+00	0.000E+00	0.000E+00
10	2.953E+03	0.000E+00	2.953E+03	25	0.000E+00	0.000E+00	0.000E+00
11	9.069E+01	0.000E+00	9.069E+01	26	0.000E+00	0.000E+00	0.000E+00
12	1.371E+02	0.000E+00	1.371E+02	27	0.000E+00	0.000E+00	0.000E+00
13	8.225E+00	0.000E+00	8.225E+00	28	0.000E+00	0.000E+00	0.000E+00
14	7.276E+01	0.000E+00	7.276E+01	29	0.000E+00	0.000E+00	0.000E+00
15	2.320E+00	0.000E+00	2.320E+00	30	0.000E+00	0.000E+00	0.000E+00

Totals: 8.579E+06 1.786E+03 8.581E+06

Nuclide 499 is AM-242 (Z = 95)				Weight(499) = 2.860E-05 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	4.233E+05	3.071E+04	4.540E+05	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	1.988E+04	1.988E+04	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.336E+04	1.336E+04	18	0.000E+00	0.000E+00	0.000E+00
4	7.407E+02	7.051E+03	7.792E+03	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	4.392E+03	4.392E+03	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	3.436E+03	3.436E+03	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.496E+03	2.496E+03	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.883E+03	1.883E+03	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.546E+03	1.546E+03	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	6.028E+03	6.028E+03	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.067E+03	1.067E+03	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	2.002E+02	2.002E+02	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	3.038E+01	3.038E+01	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	5.084E-01	5.084E-01	29	0.000E+00	0.000E+00	0.000E+00

Totals: 4.240E+05 9.208E+04 5.161E+05

Nuclide 498 is AM-242M (Z = 95)				Weight(498) = 2.870E-05 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	4.885E+05	0.000E+00	4.885E+05	16	0.000E+00	0.000E+00	0.000E+00
6	2.549E+03	0.000E+00	2.549E+03	21	0.000E+00	0.000E+00	0.000E+00

7	1.062E+02	0.000E+00	1.062E+02	22	0.000E+00	0.000E+00	0.000E+00
8	4.248E+02	0.000E+00	4.248E+02	23	0.000E+00	0.000E+00	0.000E+00
10	9.557E+02	0.000E+00	9.557E+02	25	0.000E+00	0.000E+00	0.000E+00

Totals: 4.925E+05 0.000E+00 4.925E+05

Nuclide 505 is AM-243 (Z = 95)				Weight(505) = 5.330E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
4	1.045E+02	0.000E+00	1.045E+02	19	0.000E+00	0.000E+00	0.000E+00
7	1.203E+03	0.000E+00	1.203E+03	22	0.000E+00	0.000E+00	0.000E+00

Totals: 1.308E+03 0.000E+00 1.308E+03

Nuclide 504 is CM-242 (Z = 96)				Weight(504) = 3.830E-05 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
4	5.668E+02	0.000E+00	5.668E+02	19	0.000E+00	0.000E+00	0.000E+00

Totals: 5.668E+02 0.000E+00 5.668E+02

Nuclide 506 is CM-243 (Z = 96)				Weight(506) = 7.130E-06 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
10	1.332E+05	0.000E+00	1.332E+05	25	0.000E+00	0.000E+00	0.000E+00
11	6.384E+04	0.000E+00	6.384E+04	26	0.000E+00	0.000E+00	0.000E+00

Totals: 1.971E+05 0.000E+00 1.971E+05

Nuclide 500 is CM-244 (Z = 96)				Weight(500) = 1.190E-06 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	7.925E+03	0.000E+00	7.925E+03	16	0.000E+00	0.000E+00	0.000E+00
4	3.963E+01	0.000E+00	3.963E+01	19	0.000E+00	0.000E+00	0.000E+00

Totals: 7.965E+03 0.000E+00 7.965E+03

Nuclide 507 is CM-245 (Z = 96)				Weight(507) = 1.060E-10 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
10	1.086E+00	0.000E+00	1.086E+00	25	0.000E+00	0.000E+00	0.000E+00

Totals: 1.086E+00 0.000E+00 1.086E+00

Source Term for Core - One Assembly

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Source          Shields      Distance to Detector, X = 2.923E+01 cm
Cylindrical     Cylindrical   Source Volume = 2.167E+05 cc
Source Mass = 9.970E+04 grams
Source Length = 8.446E+01 cm   Distance Along Cylinder, Y = 4.223E+01 cm
Integration Specs: NTHETA = 9   NPSI = 9   DELR = 5.716E+00 cm
Total Intervals: 4.050E+02    (photon source is the 1st region)
Shield Thickness: 2.858E+01, 1.520E-01, 4.980E-01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 6.500E-01 cm (2) Next Layer: 4.980E-01 cm
Dose Buildup Data for Shield 1 with Effective Atomic Number 38.11
Source strength is interpreted as uCi/cc
Fluence-to-Dose Conversion: Photons in Air

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Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/sq.cm/sec	Dose Rate R/hr
0.015	3.931E+13	8.183E-05	1.762E-26	1.442E-30
0.025	2.776E+13	1.656E-05	1.179E-02	1.952E-07
0.035	2.066E+13	6.084E-06	7.619E+02	4.635E-03
0.045	1.295E+13	3.203E-06	2.673E+04	8.561E-02
0.055	7.179E+12	2.216E-06	9.407E+04	2.085E-01
0.065	5.297E+12	1.827E-06	1.927E+05	3.521E-01
0.075	4.195E+12	1.664E-06	2.953E+05	4.914E-01
0.085	8.324E+12	1.603E-06	9.605E+05	1.540E+00
0.095	3.281E+12	1.592E-06	5.858E+05	9.326E-01
0.150	2.757E+13	1.728E-06	1.244E+07	2.150E+01
0.250	7.356E+12	1.935E-06	1.643E+07	3.180E+01
0.350	3.570E+12	2.019E-06	2.329E+07	4.703E+01
0.475	1.848E+13	2.043E-06	2.751E+08	5.620E+02
0.650	1.058E+14	2.029E-06	3.065E+09	6.220E+03
0.825	1.278E+13	1.983E-06	5.586E+08	1.108E+03
1.000	2.177E+12	1.923E-06	1.267E+08	2.436E+02
1.225	1.747E+12	1.850E-06	1.328E+08	2.457E+02
1.475	1.119E+12	1.775E-06	1.062E+08	1.886E+02
1.700	5.944E+10	1.712E-06	6.616E+06	1.133E+01
1.900	3.115E+10	1.660E-06	3.903E+06	6.479E+00
2.100	1.853E+11	1.613E-06	2.572E+07	4.149E+01
2.300	7.840E+09	1.592E-06	1.190E+06	1.895E+00
2.500	3.519E+09	1.534E-06	5.785E+05	8.874E-01
2.700	1.406E+09	1.499E-06	2.481E+05	3.719E-01
3.000	6.017E+08	1.453E-06	1.167E+05	1.696E-01
3.600	3.955E+07	1.375E-06	9.004E+03	1.238E-02
Totals:	3.098E+14 photons/sec		4.357E+09	8.734E+03 R/hr = 6.259E-04 amp/kv

Source Term for Activation Out of Core - One Assembly

Table of Source Activity:

Scale Factor = 1.000E+00

Isotope Name	Initial Values	Final uCi/cc
C - 14	2.24E-01	2.240E-01
P - 32	1.02E-08	1.020E-08
CA- 45	4.72E-04	4.720E-04
SC- 46	7.98E-05	7.980E-05
CR- 51	4.47E-15	4.470E-15
MN- 54	7.32E+02	7.320E+02
FE- 55	5.88E+02	5.880E+02
FE- 59	2.10E-09	2.100E-09
CO- 58	1.05E-02	1.050E-02
CO- 60	5.50E+02	5.500E+02
ZN- 65	8.38E-05	8.380E-05
Y - 90	2.78E-07	2.780E-07
ZR- 95	4.17E-08	4.170E-08
NB- 94	4.17E-08	4.170E-08
NB- 95	9.25E-08	9.250E-08
NB- 95M	3.09E-10	3.090E-10
TC- 99	1.27E-02	1.270E-02
RU-103	1.10E-12	1.100E-12
TA-182	4.84E-02	4.840E-02

Source Term for Activation Out of Core - One Assembly

Shield Composition, g/cc

	Shield 1	Shield 2
AIR	0.000E+00	1.290E-03
IRON	7.800E+00	0.000E+00
Totals:	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.015	4.586E+02	2.046E-03
0.025	1.088E+02	6.138E-04

0.035	4.155E+01	3.664E-04
0.045	2.019E+01	2.837E-04
0.055	1.169E+01	2.491E-04
0.065	7.656E+00	2.314E-04
0.075	5.409E+00	2.184E-04
0.085	4.065E+00	2.090E-04
0.095	3.212E+00	2.019E-04
0.150	1.529E+00	1.758E-04
0.250	9.586E-01	1.477E-04
0.350	7.862E-01	1.298E-04
0.475	6.717E-01	1.146E-04
0.650	5.769E-01	1.001E-04
0.825	5.132E-01	8.984E-05
1.000	4.664E-01	8.194E-05
1.225	4.207E-01	7.398E-05
1.475	3.831E-01	6.718E-05
1.700	3.575E-01	6.249E-05
1.900	3.394E-01	5.889E-05
2.100	3.243E-01	5.564E-05
2.300	3.117E-01	5.263E-05
2.500	3.010E-01	5.003E-05
2.700	2.920E-01	4.778E-05
3.000	2.808E-01	4.511E-05
3.600	2.649E-01	4.158E-05
4.500	2.502E-01	3.746E-05
5.500	2.409E-01	3.381E-05
6.600	2.352E-01	3.111E-05
8.600	2.307E-01	2.771E-05

Source Term for Activation Out of Core - One Assembly

Photon Production Rate for Each Radionuclide:

Nuclide 451 is C - 14 (Z = 6)				Weight(451) = 2.240E-07 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.634E+01	1.634E+01	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	5.447E+00	5.447E+00	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	2.523E+00	2.523E+00	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.319E+00	1.319E+00	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	7.052E-01	7.052E-01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	3.762E-01	3.762E-01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	1.977E-01	1.977E-01	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.014E-01	1.014E-01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	4.868E-02	4.868E-02	24	0.000E+00	0.000E+00	0.000E+00

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10 0.000E+00 8.028E-02 8.028E-02 25 0.000E+00 0.000E+00 0.000E+00

Totals: 0.000E+00 2.714E+01 2.714E+01

Nuclide 459 is P - 32 (Z = 15)				Weight(459) = 1.020E-14 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.861E-05	1.861E-05	16	0.000E+00	5.072E-08	5.072E-08
2	0.000E+00	8.991E-06	8.991E-06	17	0.000E+00	1.391E-08	1.391E-08
3	0.000E+00	5.626E-06	5.626E-06	18	0.000E+00	1.186E-09	1.186E-09
4	0.000E+00	3.949E-06	3.949E-06	19	0.000E+00	1.199E-11	1.199E-11
5	0.000E+00	3.508E-06	3.508E-06	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	3.134E-06	3.134E-06	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.759E-06	2.759E-06	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	2.385E-06	2.385E-06	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.011E-06	2.011E-06	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	8.008E-06	8.008E-06	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	2.504E-06	2.504E-06	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.138E-06	1.138E-06	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	7.648E-07	7.648E-07	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	3.804E-07	3.804E-07	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	1.049E-07	1.049E-07	30	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 6.394E-05 6.394E-05

Nuclide 461 is CA- 45 (Z = 20)				Weight(461) = 4.720E-10 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	8.005E-02	8.005E-02	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	2.595E-02	2.595E-02	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	1.344E-02	1.344E-02	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	7.824E-03	7.824E-03	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	4.968E-03	4.968E-03	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	3.250E-03	3.250E-03	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	2.155E-03	2.155E-03	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	1.445E-03	1.445E-03	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	9.682E-04	9.682E-04	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	2.000E-03	2.000E-03	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.271E-05	1.271E-05	26	0.000E+00	0.000E+00	0.000E+00

Totals: 0.000E+00 1.421E-01 1.421E-01

Nuclide 462 is SC- 46 (Z = 21)				Weight(462) = 7.980E-11 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	2.134E-02	2.134E-02	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	8.927E-03	8.927E-03	17	2.953E+00	0.000E+00	2.953E+00
3	0.000E+00	4.408E-03	4.408E-03	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	2.590E-03	2.590E-03	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.803E-03	1.803E-03	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.224E-03	1.224E-03	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	8.912E-04	8.912E-04	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	6.453E-04	6.453E-04	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	4.802E-04	4.802E-04	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	1.389E-03	1.389E-03	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	6.665E-05	6.665E-05	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	7.611E-07	7.611E-07	27	0.000E+00	0.000E+00	0.000E+00
15	2.953E+00	0.000E+00	2.953E+00	30	0.000E+00	0.000E+00	0.000E+00

Totals: 5.905E+00 4.377E-02 5.949E+00

Nuclide 464 is CR- 51 (Z = 24)				Weight(464) = 4.470E-21 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
12	1.489E-11	0.000E+00	1.489E-11	27	0.000E+00	0.000E+00	0.000E+00

Totals: 1.489E-11 0.000E+00 1.489E-11

Nuclide 465 is MN- 54 (Z = 25)				Weight(465) = 7.320E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
15	2.708E+07	0.000E+00	2.708E+07	30	0.000E+00	0.000E+00	0.000E+00

Totals: 2.708E+07 0.000E+00 2.708E+07

Nuclide 467 is FE- 55 (Z = 26)				Weight(467) = 5.880E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec

(all values are zero)

Nuclide 471 is FE- 59 (Z = 26)				Weight(471) = 2.100E-15 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	5.806E-07	5.806E-07	16	4.351E-05	1.678E-11	4.351E-05
2	0.000E+00	2.940E-07	2.940E-07	17	3.419E-05	3.228E-12	3.419E-05
3	0.000E+00	1.361E-07	1.361E-07	18	0.000E+00	1.396E-13	1.396E-13

4	0.000E+00	8.488E-08	8.488E-08	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	5.772E-08	5.772E-08	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	3.992E-08	3.992E-08	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	3.022E-08	3.022E-08	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	2.201E-08	2.201E-08	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.719E-08	1.719E-08	24	0.000E+00	0.000E+00	0.000E+00
10	2.720E-06	5.799E-08	2.777E-06	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	6.812E-09	6.812E-09	26	0.000E+00	0.000E+00	0.000E+00
12	3.496E-07	9.968E-10	3.506E-07	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	3.821E-10	3.821E-10	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	1.661E-10	1.661E-10	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	3.996E-11	3.996E-11	30	0.000E+00	0.000E+00	0.000E+00

Totals: 8.077E-05 1.329E-06 8.210E-05

Nuclide 470 is CO- 58 (Z = 27)				Weight(470) = 1.050E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
4	0.000E+00	0.000E+00	0.000E+00	19	2.331E+00	0.000E+00	2.331E+00
13	1.166E+02	0.000E+00	1.166E+02	28	0.000E+00	0.000E+00	0.000E+00
15	3.916E+02	0.000E+00	3.916E+02	30	0.000E+00	0.000E+00	0.000E+00

Totals: 5.105E+02 0.000E+00 5.105E+02

Nuclide 472 is CO- 60 (Z = 27)				Weight(472) = 5.500E-04 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.264E+05	1.264E+05	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	4.377E+04	4.377E+04	17	4.070E+07	0.000E+00	4.070E+07
3	0.000E+00	2.382E+04	2.382E+04	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.409E+04	1.409E+04	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	9.129E+03	9.129E+03	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	6.372E+03	6.372E+03	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	4.416E+03	4.416E+03	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	3.161E+03	3.161E+03	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.297E+03	2.297E+03	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	5.975E+03	5.975E+03	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.526E+02	1.526E+02	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	4.953E-02	4.953E-02	27	0.000E+00	0.000E+00	0.000E+00
15	2.035E+03	0.000E+00	2.035E+03	30	0.000E+00	0.000E+00	0.000E+00

Totals: 4.070E+07 2.396E+05 4.094E+07

Nuclide 474 is ZN- 65 (Z = 30)				Weight(474) = 8.380E-11 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
2	0.000E+00	0.000E+00	0.000E+00	17	1.569E+00	0.000E+00	1.569E+00
13	1.054E-01	0.000E+00	1.054E-01	28	0.000E+00	0.000E+00	0.000E+00
Totals: 1.674E+00 0.000E+00 1.674E+00							

Nuclide 84 is Y - 90 (Z = 39)				Weight(84) = 2.780E-13 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	7.817E-07	6.979E-04	6.987E-04	16	0.000E+00	5.565E-06	5.565E-06
2	0.000E+00	3.531E-04	3.531E-04	17	0.000E+00	2.692E-06	2.692E-06
3	0.000E+00	2.176E-04	2.176E-04	18	0.000E+00	8.231E-07	8.231E-07
4	0.000E+00	1.550E-04	1.550E-04	19	3.497E-07	1.726E-07	5.223E-07
5	0.000E+00	1.119E-04	1.119E-04	20	0.000E+00	3.519E-08	3.519E-08
6	0.000E+00	9.805E-05	9.805E-05	21	1.440E-08	2.689E-09	1.709E-08
7	0.000E+00	9.063E-05	9.063E-05	22	0.000E+00	3.759E-11	3.759E-11
8	0.000E+00	8.321E-05	8.321E-05	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	7.579E-05	7.579E-05	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	3.813E-04	3.813E-04	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.171E-04	1.171E-04	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	5.633E-05	5.633E-05	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	4.208E-05	4.208E-05	28	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	2.457E-05	2.457E-05	29	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	8.522E-06	8.522E-06	30	0.000E+00	0.000E+00	0.000E+00
Totals: 1.146E-06 2.522E-03 2.524E-03							

Nuclide 117 is ZR- 95 (Z = 40)				Weight(117) = 4.170E-14 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.123E-05	1.123E-05	16	0.000E+00	1.981E-12	1.981E-12
2	0.000E+00	5.245E-06	5.245E-06	17	0.000E+00	1.664E-16	1.664E-16
3	0.000E+00	2.422E-06	2.422E-06	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.529E-06	1.529E-06	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.024E-06	1.024E-06	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	7.062E-07	7.062E-07	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	5.136E-07	5.136E-07	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	3.783E-07	3.783E-07	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.852E-07	2.852E-07	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	8.867E-07	8.867E-07	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	6.787E-08	6.787E-08	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	7.379E-09	7.379E-09	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	2.508E-09	2.508E-09	28	0.000E+00	0.000E+00	0.000E+00

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14	6.742E-04	4.656E-10	6.742E-04	29	0.000E+00	0.000E+00	0.000E+00
15	8.532E-04	2.569E-11	8.532E-04	30	0.000E+00	0.000E+00	0.000E+00

Totals: 1.527E-03 2.430E-05 1.552E-03

Nuclide 111 is NB- 94 (Z = 41)				Weight(111) = 4.170E-14 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.362E-05	1.362E-05	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	7.922E-06	7.922E-06	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	3.360E-06	3.360E-06	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	2.197E-06	2.197E-06	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.479E-06	1.479E-06	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.038E-06	1.038E-06	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	7.852E-07	7.852E-07	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	5.758E-07	5.758E-07	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	4.562E-07	4.562E-07	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	1.567E-06	1.567E-06	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.701E-07	1.701E-07	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.307E-08	1.307E-08	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	3.883E-10	3.883E-10	28	0.000E+00	0.000E+00	0.000E+00
14	1.543E-03	0.000E+00	1.543E-03	29	0.000E+00	0.000E+00	0.000E+00
15	1.543E-03	0.000E+00	1.543E-03	30	0.000E+00	0.000E+00	0.000E+00

Totals: 3.086E-03 3.318E-05 3.119E-03

Nuclide 119 is NB- 95 (Z = 41)				Weight(119) = 9.250E-14 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	6.067E-06	6.067E-06	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	1.982E-06	1.982E-06	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	9.183E-07	9.183E-07	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	4.701E-07	4.701E-07	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	2.518E-07	2.518E-07	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.351E-07	1.351E-07	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	7.142E-08	7.142E-08	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	3.683E-08	3.683E-08	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.820E-08	1.820E-08	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	2.957E-08	2.957E-08	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	7.963E-12	7.963E-12	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	3.829E-15	3.829E-15	27	0.000E+00	0.000E+00	0.000E+00
15	3.416E-03	0.000E+00	3.416E-03	30	0.000E+00	0.000E+00	0.000E+00

Totals: 3.416E-03 9.980E-06 3.426E-03

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Nuclide 118 is NB- 95M (Z = 41)				Weight(118) = 3.090E-16 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	2.571E-08	2.571E-08	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	8.595E-09	8.595E-09	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	4.302E-09	4.302E-09	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	2.439E-09	2.439E-09	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.467E-09	1.467E-09	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	9.096E-10	9.096E-10	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	5.751E-10	5.751E-10	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	3.664E-10	3.664E-10	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.323E-10	2.323E-10	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	3.919E-10	3.919E-10	25	0.000E+00	0.000E+00	0.000E+00
11	2.858E-06	1.921E-13	2.858E-06	26	0.000E+00	0.000E+00	0.000E+00
Totals: 2.858E-06 4.499E-08 2.903E-06							

Nuclide 141 is TC- 99 (Z = 43)				Weight(141) = 1.270E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	2.540E+00	2.540E+00	16	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	8.544E-01	8.544E-01	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	4.458E-01	4.458E-01	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	2.694E-01	2.694E-01	19	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	1.710E-01	1.710E-01	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	1.143E-01	1.143E-01	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	7.958E-02	7.958E-02	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	5.530E-02	5.530E-02	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	3.872E-02	3.872E-02	24	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	9.461E-02	9.461E-02	25	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	1.966E-03	1.966E-03	26	0.000E+00	0.000E+00	0.000E+00
Totals: 0.000E+00 4.665E+00 4.665E+00							

Nuclide 155 is RU-103 (Z = 44)				Weight(155) = 1.100E-18 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	1.091E-10	1.091E-10	16	0.000E+00	0.000E+00	0.000E+00
2	1.913E-10	4.275E-11	2.340E-10	17	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	2.327E-11	2.327E-11	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.339E-11	1.339E-11	19	0.000E+00	0.000E+00	0.000E+00
5	1.465E-10	7.645E-12	1.542E-10	20	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	5.046E-12	5.046E-12	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	3.405E-12	3.405E-12	22	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	2.263E-12	2.263E-12	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	1.583E-12	1.583E-12	24	0.000E+00	0.000E+00	0.000E+00

10	0.000E+00	4.777E-12	4.777E-12	25	0.000E+00	0.000E+00	0.000E+00
11	1.099E-10	7.412E-13	1.106E-10	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	1.692E-13	1.692E-13	27	0.000E+00	0.000E+00	0.000E+00
13	3.596E-08	3.752E-14	3.596E-08	28	0.000E+00	0.000E+00	0.000E+00
14	2.947E-09	1.850E-15	2.947E-09	29	0.000E+00	0.000E+00	0.000E+00

Totals: 3.935E-08 2.141E-10 3.957E-08

Nuclide 501 is TA-182 (Z = 73)				Weight(501) = 4.840E-08 Ci (1 cc)			
Group	Gamma		Total	Group	Gamma		Total
No.	X-ray	Brems	photon/sec	No.	X-ray	Brems	photon/sec
1	0.000E+00	9.075E+00	9.075E+00	16	4.298E+01	0.000E+00	4.298E+01
2	0.000E+00	4.831E+00	4.831E+00	17	1.778E+03	0.000E+00	1.778E+03
3	0.000E+00	2.193E+00	2.193E+00	18	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.338E+00	1.338E+00	19	0.000E+00	0.000E+00	0.000E+00
5	4.119E+02	8.960E-01	4.128E+02	20	0.000E+00	0.000E+00	0.000E+00
6	9.312E+02	6.116E-01	9.318E+02	21	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	4.580E-01	4.580E-01	22	0.000E+00	0.000E+00	0.000E+00
8	3.940E+01	3.298E-01	3.973E+01	23	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	2.569E-01	2.569E-01	24	0.000E+00	0.000E+00	0.000E+00
10	5.050E+02	8.622E-01	5.059E+02	25	0.000E+00	0.000E+00	0.000E+00
11	2.794E+02	9.150E-02	2.795E+02	26	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	7.334E-03	7.334E-03	27	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	2.874E-04	2.874E-04	28	0.000E+00	0.000E+00	0.000E+00

Totals: 3.988E+03 2.095E+01 4.009E+03

Source Term for Activation Out of Core - One Assembly

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Source          Shields      Distance to Detector, X = 2.923E+01 cm
Cylindrical     Cylindrical    Source Volume = 2.167E+05 cc
Source Mass = 1.691E+06 grams
Source Length = 8.446E+01 cm    Distance Along Cylinder, Y = 4.223E+01 cm
Integration Specs: NTHETA = 9    NPSI = 9    DELR = 5.716E+00 cm
Total Intervals: 4.050E+02    (photon source is the 1st region)
Shield Thickness: 2.858E+01, 6.500E-01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 6.500E-01 cm (2) Next Layer: 0.000E+00 cm
Dose Buildup Data for Shield 1 with Effective Atomic Number 26.00
Source strength is interpreted as uCi/cc
Fluence-to-Dose Conversion: Photons in Air

```

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/sq.cm/sec	Dose Rate R/hr
0.015	2.740E+10	8.183E-05	1.445E+03	1.182E-01
0.025	9.490E+09	1.656E-05	8.357E+02	1.384E-02
0.035	5.163E+09	6.084E-06	6.368E+02	3.874E-03
0.045	3.055E+09	3.203E-06	4.846E+02	1.552E-03
0.055	2.068E+09	2.216E-06	4.010E+02	8.885E-04
0.065	1.583E+09	1.827E-06	3.628E+02	6.627E-04
0.075	9.572E+08	1.664E-06	2.531E+02	4.211E-04
0.085	6.937E+08	1.603E-06	2.079E+02	3.332E-04
0.095	4.979E+08	1.592E-06	1.667E+02	2.655E-04
0.150	1.405E+09	1.728E-06	7.538E+02	1.303E-03
0.250	9.365E+07	1.935E-06	9.660E+01	1.869E-04
0.350	1.234E+04	2.019E-06	2.053E-02	4.144E-08
0.475	2.528E+07	2.043E-06	6.573E+01	1.343E-04
0.650	4.859E+02	2.029E-06	2.004E-03	4.065E-09
0.825	5.871E+12	1.983E-06	3.436E+07	6.813E+01
1.000	9.315E+06	1.923E-06	7.203E+01	1.385E-04
1.225	8.821E+12	1.850E-06	9.096E+07	1.683E+02
1.475	1.786E-01	1.775E-06	2.376E-06	4.217E-12
1.700	5.052E+05	1.712E-06	8.099E+00	1.387E-05
1.900	7.626E-03	1.660E-06	1.411E-07	2.342E-13
2.100	3.704E-03	1.613E-06	7.787E-08	1.256E-13
2.300	8.147E-06	1.592E-06	1.922E-10	3.061E-16

Totals:	1.474E+13 photons/sec		1.253E+08	2.365E+02 R/hr = 1.695E-05 amp/kg

Finish run at 10:06:21 08/05/97

Input File (D:\ISOSHLD\INPUT\FFTF.) is shown below:

```

0      2 CCC Drop Accident - FFTF
Source Term for Core - One Assembly
&INPUT NEXT=1, IGEOM=7, NTHETA=9, NPSI=9, DELR=5.,
NSHLD=2, JBUF=1, IPRNT=0, ICONC=1, OPTION=1,
SLTH=84.46, Y=42.23, X=29.23, T(1)=28.58, T(2)=0.152,
WEIGHT(027)=4.14E-02, WEIGHT(055)=5.76E+02,
WEIGHT(061)=8.80E-25, WEIGHT(076)=1.07E-05,
WEIGHT(082)=4.18E+03, WEIGHT(084)=4.18E+03,
WEIGHT(091)=3.47E-04, WEIGHT(102)=1.58E-04,
WEIGHT(103)=3.67E-02, WEIGHT(117)=3.52E-03,
WEIGHT(119)=7.82E-03, WEIGHT(118)=2.61E-05,
WEIGHT(141)=1.66E+00, WEIGHT(155)=5.09E-08,

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WEIGHT(156)=4.59E-08, WEIGHT(170)=7.16E+03,
 WEIGHT(172)=7.16E+03, WEIGHT(177)=2.73E-02,
 WEIGHT(183)=1.27E-06, WEIGHT(186)=1.62E-03,
 WEIGHT(189)=1.62E-03, WEIGHT(192)=1.07E-01,
 WEIGHT(191)=8.06E+00, WEIGHT(213)=1.46E-11,
 WEIGHT(217)=2.33E-09, WEIGHT(219)=1.64E-13,
 WEIGHT(242)=4.78E-01, WEIGHT(249)=1.45E-01,
 WEIGHT(259)=1.48E-01, WEIGHT(261)=4.86E-05,
 WEIGHT(265)=8.21E-07, WEIGHT(269)=1.18E+03,
 WEIGHT(270)=2.87E+02, WEIGHT(272)=1.72E-01,
 WEIGHT(274)=2.41E-02, WEIGHT(273)=1.72E-01,
 WEIGHT(279)=1.02E-01, WEIGHT(278)=1.05E-01,
 WEIGHT(289)=6.76E-12, WEIGHT(288)=1.04E-11,
 WEIGHT(290)=5.52E-03, WEIGHT(319)=1.52E+03,
 WEIGHT(326)=1.96E-01, WEIGHT(335)=1.15E+04,
 WEIGHT(336)=1.09E+04, WEIGHT(356)=8.65E-11,
 WEIGHT(376)=2.74E+03, WEIGHT(377)=2.74E+03,
 WEIGHT(477)=1.53E+00, WEIGHT(388)=1.01E+04,
 WEIGHT(394)=7.08E-10, WEIGHT(393)=1.26E-08,
 WEIGHT(403)=4.69E+02, WEIGHT(408)=1.97E+00,
 WEIGHT(415)=2.86E+02, WEIGHT(418)=1.74E+03,
 WEIGHT(432)=3.68E+00, WEIGHT(414)=6.01E-04,
 WEIGHT(524)=1.67E-03, WEIGHT(525)=1.67E-03,
 WEIGHT(523)=1.67E-03, WEIGHT(522)=1.67E-03,
 WEIGHT(442)=1.67E-03, WEIGHT(450)=3.06E-04,
 WEIGHT(530)=5.88E-03, WEIGHT(490)=6.79E-03,
 WEIGHT(533)=5.88E-03, WEIGHT(429)=2.70E-03,
 WEIGHT(520)=3.68E-03, WEIGHT(476)=3.06E-04,
 WEIGHT(398)=1.01E-03, WEIGHT(491)=1.68E-01,
 WEIGHT(526)=5.88E-03, WEIGHT(502)=6.79E-03,
 WEIGHT(412)=1.44E-01, WEIGHT(503)=5.33E-02,
 WEIGHT(492)=2.50E+02, WEIGHT(493)=5.75E+02,
 WEIGHT(494)=3.30E+02, WEIGHT(495)=6.87E+03,
 WEIGHT(497)=2.72E-02, WEIGHT(496)=2.85E+02,
 WEIGHT(498)=2.87E+01, WEIGHT(499)=2.86E+01,
 WEIGHT(505)=5.33E-02, WEIGHT(504)=3.83E+01,
 WEIGHT(506)=7.13E+00, WEIGHT(500)=1.19E+00,
 WEIGHT(507)=1.06E-04, &
 SOURCE15 0.24
 SOURCE45 0.17
 SOURCE23 0.05

1 STEEL 9 7.8

Source Term for Activation Out of Core - One Assembly
 &INPUT NEXT=1, IGEOM=7, NTHETA=9, NPSI=9, DELR=5.,
 NSHLD=1, JBUF=1, IPRNT=0, ICONC=1, OPTION=1,
 SLTH=84.46, Y=42.23, X=29.23, T(1)=28.58,
 WEIGHT(027)=0.00E+00, WEIGHT(055)=0.00E+00,
 WEIGHT(061)=0.00E+00, WEIGHT(076)=0.00E+00,
 WEIGHT(082)=0.00E+00, WEIGHT(091)=0.00E+00,

WEIGHT(102)=0.00E+00, WEIGHT(103)=0.00E+00,
 WEIGHT(156)=0.00E+00, WEIGHT(170)=0.00E+00,
 WEIGHT(172)=0.00E+00, WEIGHT(177)=0.00E+00,
 WEIGHT(183)=0.00E+00, WEIGHT(186)=0.00E+00,
 WEIGHT(189)=0.00E+00, WEIGHT(192)=0.00E+00,
 WEIGHT(191)=0.00E+00, WEIGHT(213)=0.00E+00,
 WEIGHT(217)=0.00E+00, WEIGHT(219)=0.00E+00,
 WEIGHT(242)=0.00E+00, WEIGHT(249)=0.00E+00,
 WEIGHT(259)=0.00E+00, WEIGHT(261)=0.00E+00,
 WEIGHT(265)=0.00E+00, WEIGHT(269)=0.00E+00,
 WEIGHT(270)=0.00E+00, WEIGHT(272)=0.00E+00,
 WEIGHT(274)=0.00E+00, WEIGHT(273)=0.00E+00,
 WEIGHT(279)=0.00E+00, WEIGHT(278)=0.00E+00,
 WEIGHT(289)=0.00E+00, WEIGHT(288)=0.00E+00,
 WEIGHT(290)=0.00E+00, WEIGHT(319)=0.00E+00,
 WEIGHT(326)=0.00E+00, WEIGHT(335)=0.00E+00,
 WEIGHT(336)=0.00E+00, WEIGHT(356)=0.00E+00,
 WEIGHT(376)=0.00E+00, WEIGHT(377)=0.00E+00,
 WEIGHT(477)=0.00E+00, WEIGHT(388)=0.00E+00,
 WEIGHT(394)=0.00E+00, WEIGHT(393)=0.00E+00,
 WEIGHT(403)=0.00E+00, WEIGHT(408)=0.00E+00,
 WEIGHT(415)=0.00E+00, WEIGHT(418)=0.00E+00,
 WEIGHT(432)=0.00E+00, WEIGHT(414)=0.00E+00,
 WEIGHT(524)=0.00E+00, WEIGHT(525)=0.00E+00,
 WEIGHT(523)=0.00E+00, WEIGHT(522)=0.00E+00,
 WEIGHT(442)=0.00E+00, WEIGHT(450)=0.00E+00,
 WEIGHT(530)=0.00E+00, WEIGHT(490)=0.00E+00,
 WEIGHT(533)=0.00E+00, WEIGHT(429)=0.00E+00,
 WEIGHT(520)=0.00E+00, WEIGHT(476)=0.00E+00,
 WEIGHT(398)=0.00E+00, WEIGHT(491)=0.00E+00,
 WEIGHT(526)=0.00E+00, WEIGHT(502)=0.00E+00,
 WEIGHT(412)=0.00E+00, WEIGHT(503)=0.00E+00,
 WEIGHT(492)=0.00E+00, WEIGHT(493)=0.00E+00,
 WEIGHT(494)=0.00E+00, WEIGHT(495)=0.00E+00,
 WEIGHT(497)=0.00E+00, WEIGHT(496)=0.00E+00,
 WEIGHT(498)=0.00E+00, WEIGHT(499)=0.00E+00,
 WEIGHT(505)=0.00E+00, WEIGHT(504)=0.00E+00,
 WEIGHT(506)=0.00E+00, WEIGHT(500)=0.00E+00,
 WEIGHT(507)=0.00E+00, WEIGHT(451)=2.24E-01,
 WEIGHT(459)=1.02E-08, WEIGHT(461)=4.72E-04,
 WEIGHT(462)=7.98E-05, WEIGHT(464)=4.47E-15,
 WEIGHT(465)=7.32E+02, WEIGHT(467)=5.88E+02,
 WEIGHT(471)=2.10E-09, WEIGHT(470)=1.05E-02,
 WEIGHT(472)=5.50E+02, WEIGHT(474)=8.38E-05,
 WEIGHT(084)=2.78E-07, WEIGHT(117)=4.17E-08,
 WEIGHT(111)=4.17E-08, WEIGHT(119)=9.25E-08,
 WEIGHT(118)=3.09E-10, WEIGHT(141)=1.27E-02,
 WEIGHT(155)=1.10E-12, WEIGHT(501)=4.84E-02, &

1 STEEL 9 7.8

MicroShield 4.00 - Serial #4.00-00128
Westinghouse Hanford Company

Page : 1	File Ref: _____
DOS File: FFTFC1.MS4	Date: ____/____/____
Run Date: August 15, 1997	By: _____
Run Time: 10:06 a.m. Friday	Checked: _____
Duration: 0:00:15	

Case Title: FFTF - Centerline - 1

GEOMETRY 8 - Cylinder Volume - End Shields

	centimeters	feet	and inches
Dose point coordinate X:	0.0	0.0	.0
Dose point coordinate Y:	1006.0	33.0	.1
Dose point coordinate Z:	0.0	0.0	.0
Cylinder height:	366.0	12.0	.1
Cylinder radius:	25.0	0.0	9.8
Air Gap:	640.0	20.0	12.0

Source Volume: 718639. cm³ 25.3785 cu ft. 43854.1 cu in.

MATERIAL DENSITIES (g/cm³)

Material	Source Shield	Air Gap
Air	0.006	0.00122
Iron	0.179	
Nickel	0.013	
Uranium	0.046	

BUILDUP

Method: Buildup Factor Tables
The material reference is Air Gap

INTEGRATION PARAMETERS

	Quadrature Order
Radial	10
Circumferential	10
Axial (along Z)	10

SOURCE WAS ENTERED AS ENERGIES ONLY

Page : 2
 DOS File: FFTFC1.MS4
 Run Date: August 15, 1997
 Run Time: 10:06 a.m. Friday
 Title : FFTF - Centerline - 1

===== RESULTS =====					
Energy (MeV)	Activity (photons/sec)	Energy Fluence Rate (MeV/sq cm/sec)		Exposure Rate In Air (mR/hr)	
		No Buildup	With Buildup	No Buildup	With Buildup
0.015	3.934e+013	3.880e-001	5.036e-001	3.328e-002	4.320e-002
0.025	2.777e+013	5.102e+000	1.183e+001	8.800e-002	2.041e-001
0.035	2.067e+013	3.393e+001	1.490e+002	2.150e-001	9.440e-001
0.045	1.295e+013	9.722e+001	7.616e+002	3.233e-001	2.533e+000
0.055	7.181e+012	1.798e+002	1.820e+003	4.047e-001	4.096e+000
0.065	5.299e+012	3.194e+002	2.920e+003	5.798e-001	5.300e+000
0.075	4.196e+012	4.733e+002	3.710e+003	7.713e-001	6.047e+000
0.085	8.325e+012	1.506e+003	1.088e+004	2.339e+000	1.690e+001
0.095	3.281e+012	8.706e+002	6.054e+003	1.332e+000	9.265e+000
0.15	2.757e+013	1.288e+004	7.360e+004	2.122e+001	1.212e+002
0.25	7.356e+012	1.485e+004	6.028e+004	2.741e+001	1.112e+002
0.35	3.570e+012	1.579e+004	5.252e+004	3.045e+001	1.013e+002
0.475	1.848e+013	1.492e+005	4.230e+005	2.927e+002	8.299e+002
0.65	1.058e+014	1.474e+006	3.616e+006	2.861e+003	7.019e+003
0.825	1.865e+013	3.821e+005	8.495e+005	7.240e+002	1.610e+003
1.0	2.177e+012	6.022e+004	1.249e+005	1.110e+002	2.302e+002
TOTAL:	3.126e+014	2.112e+006	5.226e+006	4.074e+003	1.007e+004

MicroShield 4.00 - Serial #4.00-00128
Westinghouse Hanford Company

Page : 1
DOS File: FFTFC2.MS4
Run Date: August 15, 1997
Run Time: 10:23 a.m. Friday
Duration: 0:00:11

File Ref: _____
Date: ____/____/____
By: _____
Checked: _____

Case Title: FFTF - Centerline - 2

GEOMETRY 8 - Cylinder Volume - End Shields

	centimeters	feet	and inches
Dose point coordinate X:	0.0	0.0	.0
Dose point coordinate Y:	1006.0	33.0	.1
Dose point coordinate Z:	0.0	0.0	.0
Cylinder height:	366.0	12.0	.1
Cylinder radius:	25.0	0.0	9.8
Air Gap:	640.0	20.0	12.0

Source Volume: 718639. cm³ 25.3785 cu ft. 43854.1 cu in.

MATERIAL DENSITIES (g/cm³)

Material	Source Shield	Air Gap
Air	0.006	0.00122
Iron	0.179	
Nickel	0.013	
Uranium	0.046	

BUILDUP

Method: Buildup Factor Tables
The material reference is Air Gap

INTEGRATION PARAMETERS

	Quadrature Order
Radial	10
Circumferential	10
Axial (along Z)	10

SOURCE WAS ENTERED AS ENERGIES ONLY

Page : 2
 DOS File: FFTFC2.MS4
 Run Date: August 15, 1997
 Run Time: 10:23 a.m. Friday
 Title : FFTF - Centerline - 2

===== RESULTS =====					
Energy (MeV)	Activity (photons/sec)	Energy Fluence Rate (MeV/sq cm/sec)		Exposure Rate In Air (mR/hr)	
		No Buildup	With Buildup	No Buildup	With Buildup
1.225	1.057e+013	3.979e+005	7.702e+005	7.043e+002	1.363e+003
1.475	1.119e+012	5.530e+004	1.010e+005	9.346e+001	1.707e+002
1.7	5.944e+010	3.589e+003	6.297e+003	5.830e+000	1.023e+001
1.9	3.115e+010	2.191e+003	3.734e+003	3.442e+000	5.866e+000
2.1	1.853e+011	1.491e+004	2.478e+004	2.270e+001	3.774e+001
2.3	7.840e+009	7.110e+002	1.157e+003	1.051e+000	1.711e+000
2.5	3.519e+009	3.555e+002	5.677e+002	5.117e-001	8.171e-001
2.7	1.406e+009	1.567e+002	2.460e+002	2.199e-001	3.453e-001
3.0	6.017e+008	7.648e+001	1.175e+002	1.038e-001	1.594e-001
3.6	3.955e+007	6.266e+000	9.295e+000	8.025e-003	1.190e-002
5.0	9.851e+004	2.268e-002	3.181e-002	2.600e-005	3.647e-005
7.0	1.120e+004	3.669e-003	4.877e-003	3.819e-006	5.075e-006
11.0	1.279e+003	6.454e-004	8.030e-004	6.017e-007	7.487e-007
TOTAL:	1.198e+013	4.752e+005	9.081e+005	8.316e+002	1.591e+003

MicroShield 4.00 - Serial #4.00-00128

Westinghouse Hanford Company

Page : 1

DOS File: FFTFE1.MS4

Run Date: August 15, 1997

Run Time: 10:41 a.m. Friday

Duration: 0:00:54

File Ref: _____

Date: ____/____/____

By: _____

Checked: _____

Case Title: FFTF - Edge - 1

GEOMETRY 8 - Cylinder Volume - End Shields

	centimeters	feet and inches	
Dose point coordinate X:	25.0	0.0	9.8
Dose point coordinate Y:	1006.0	33.0	.1
Dose point coordinate Z:	0.0	0.0	.0
Cylinder height:	366.0	12.0	.1
Cylinder radius:	25.0	0.0	9.8
Air Gap:	640.0	20.0	12.0

Source Volume: 718639. cm³ 25.3785 cu ft. 43854.1 cu in.

MATERIAL DENSITIES (g/cm³)

Material	Source Shield	Air Gap
Air	0.006	0.00122
Iron	0.179	
Nickel	0.013	
Uranium	0.046	

BUILDUP

Method: Buildup Factor Tables
The material reference is Air Gap

INTEGRATION PARAMETERS

	Quadrature Order
Radial	10
Circumferential	10
Axial (along Z)	10

SOURCE WAS ENTERED AS ENERGIES ONLY

Page : 2
 DOS File: FFTFE1.MS4
 Run Date: August 15, 1997
 Run Time: 10:41 a.m. Friday
 Title : FFTF - Edge - 1

===== RESULTS =====					
Energy (MeV)	Activity (photons/sec)	Energy Fluence Rate (MeV/sq cm/sec)		Exposure Rate In Air (mR/hr)	
		No Buildup	With Buildup	No Buildup	With Buildup
0.015	3.934e+013	1.996e-026	1.188e-021	1.712e-027	1.019e-022
0.025	2.777e+013	1.054e-008	8.282e-008	1.818e-010	1.429e-009
0.035	2.067e+013	9.014e-002	1.614e+000	5.710e-004	1.023e-002
0.045	1.295e+013	1.463e+001	3.391e+002	4.866e-002	1.128e+000
0.055	1.181e+012	1.557e+001	2.944e+002	3.505e-002	6.627e-001
0.065	5.299e+012	2.547e+002	3.237e+003	4.624e-001	5.876e+000
0.075	4.196e+012	4.379e+002	3.920e+003	7.136e-001	6.389e+000
0.085	8.325e+012	1.467e+003	1.093e+004	2.279e+000	1.697e+001
0.095	3.281e+012	8.624e+002	6.006e+003	1.320e+000	9.191e+000
0.15	2.757e+013	1.280e+004	7.338e+004	2.107e+001	1.208e+002
0.25	7.356e+012	1.482e+004	6.019e+004	2.735e+001	1.111e+002
0.35	3.570e+012	1.576e+004	5.241e+004	3.039e+001	1.011e+002
0.475	1.848e+013	1.489e+005	4.222e+005	2.921e+002	8.283e+002
0.65	1.058e+014	1.471e+006	3.611e+006	2.856e+003	7.011e+003
0.825	1.865e+013	3.814e+005	8.487e+005	7.227e+002	1.608e+003
1.0	2.177e+012	6.012e+004	1.248e+005	1.108e+002	2.300e+002
TOTAL:	3.066e+014	2.108e+006	5.218e+006	4.065e+003	1.005e+004

MicroShield 4.00 - Serial #4.00-00128

Westinghouse Hanford Company

Page : 1

DOS File: FFTFE2.MS4

Run Date: August 15, 1997

Run Time: 11:06 a.m. Friday

Duration: 0:00:32

File Ref: _____

Date: ____/____/____

By: _____

Checked: _____

Case Title: FFTF - Edge - 2

GEOMETRY 8 - Cylinder Volume - End Shields

	centimeters	feet and inches	
Dose point coordinate X:	25.0	0.0	9.8
Dose point coordinate Y:	1006.0	33.0	.1
Dose point coordinate Z:	0.0	0.0	.0
Cylinder height:	366.0	12.0	.1
Cylinder radius:	25.0	0.0	9.8
Air Gap:	640.0	20.0	12.0

Source Volume: 718639. cm³ 25.3785 cu ft. 43854.1 cu in.

MATERIAL DENSITIES (g/cm³)

Material	Source Shield	Air Gap
Air	0.006	0.00122
Iron	0.179	
Nickel	0.013	
Uranium	0.046	

BUILDUP

Method: Buildup Factor Tables
The material reference is Air Gap

INTEGRATION PARAMETERS

	Quadrature Order
Radial	10
Circumferential	10
Axial (along Z)	10

SOURCE WAS ENTERED AS ENERGIES ONLY

Page : 2
 DOS File: FFTFE2.MS4
 Run Date: August 15, 1997
 Run Time: 11:06 a.m. Friday
 Title : FFTF - Edge - 2

===== RESULTS =====					
Energy (MeV)	Activity (photons/sec)	Energy Fluence Rate (MeV/sq cm/sec)		Exposure Rate In Air (mR/hr)	
		No Buildup	With Buildup	No Buildup	With Buildup
1.225	1.057e+013	3.973e+005	7.696e+005	7.032e+002	1.362e+003
1.475	1.119e+012	5.522e+004	1.009e+005	9.333e+001	1.706e+002
1.7	5.944e+010	3.584e+003	6.294e+003	5.822e+000	1.022e+001
1.9	3.115e+010	2.188e+003	3.733e+003	3.438e+000	5.865e+000
2.1	1.853e+011	1.489e+004	2.478e+004	2.267e+001	3.774e+001
2.3	7.840e+009	7.102e+002	1.157e+003	1.050e+000	1.711e+000
2.5	3.519e+009	3.552e+002	5.678e+002	5.112e-001	8.172e-001
2.7	1.406e+009	1.565e+002	2.461e+002	2.197e-001	3.454e-001
3.0	6.017e+008	7.641e+001	1.175e+002	1.037e-001	1.595e-001
3.6	3.995e+007	6.325e+000	9.394e+000	8.100e-003	1.203e-002
5.0	9.851e+004	2.266e-002	3.183e-002	2.598e-005	3.650e-005
7.0	1.120e+004	3.667e-003	4.880e-003	3.817e-006	5.079e-006
11.0	1.279e+003	6.449e-004	8.032e-004	6.013e-007	7.489e-007
TOTAL:	1.198e+013	4.745e+005	9.074e+005	8.303e+002	1.590e+003

MicroSkyshine

=====

(Physics Applications ; WHC - 1.16-007)

Page: 1

File: FFTFSS1.SKY

Run: 12:39 p.m.

: August 15, 1997

File Ref: _____

Date: ____/____/____

By: _____

Checked: _____

CASE: FFTF Skyshine - One Foot

GEOMETRY: Vertical cylinder area source behind a wall

DIMENSIONS (meters):

Distance between wall and detector.....	X	0.3
Depth of source behind wall.....	Y	5.5
Offset of detector.....	Z	0.
Depth of dose point.....	H	0.
Distance between center of source and wall...	R1	25.
Thickness of cover slab.....	T1	0.
Thickness of second shield.....	T2	0.
Radius of source.....	W	25.
Height of source.....	L	3.7

INTEGRATION PARAMETERS:

Number of Radial Segments.....	M	9
Number of Circumferential Segments.....	N	9
Number of Vertical Segments.....	C	9
Quadrature Order.....		16

MATERIAL DENSITIES (g/cc):

Ambient air: .0012

Material	Cover Slab	Lower Shield	Volume Source
-----	-----	-----	-----
Air			
Water			
Concrete			
Iron			0.1920
Lead			
Zirconium			
Urania			0.0520

Buildup factor based on: AIR.

Page 2

CASE: FFTF Skyshine - One Foot

SOURCE NUCLIDES:

Source was entered by energy groups.

RESULTS:

Group #	Energy (mev)	Activity (photons/sec)	Dose point rads/photon	Dose rate (mr/hr)
1	10.00	1.279e+03	6.276e-20	3.310e-10
2	7.00	1.120e+04	7.071e-20	3.266e-09
3	5.00	9.851e+04	7.763e-20	3.153e-08
4	3.60	3.955e+07	8.132e-20	1.326e-05
5	3.00	6.017e+08	8.570e-20	2.126e-04
6	2.70	1.406e+09	8.532e-20	4.947e-04
7	2.50	3.519e+09	8.397e-20	1.218e-03
8	2.30	7.840e+09	8.833e-20	2.856e-03
9	2.10	1.853e+11	9.062e-20	6.924e-02
10	1.90	3.115e+10	9.067e-20	1.165e-02
11	1.70	5.944e+10	8.845e-20	2.168e-02
12	1.48	1.119e+12	8.533e-20	3.937e-01
13	1.23	1.057e+13	9.164e-20	3.994e+00
14	1.00	2.177e+12	8.829e-20	7.926e-01
15	.82	1.865e+13	7.986e-20	6.141e+00
16	.65	1.058e+14	7.809e-20	3.407e+01
17	.47	1.848e+13	6.911e-20	5.267e+00
18	.35	3.570e+12	5.054e-20	7.440e-01
19	.25	7.356e+12	3.729e-20	1.131e+00
20	.15	2.757e+13	7.230e-21	8.220e-01
TOTALS:		1.956e+14		5.346e+01

MicroSkyshine

=====

(Physics Applications ; WHC - 1.16-007)

Page: 1

File: FFTFSS0.SKY

Run: 12:00 p.m.

: August 15, 1997

File Ref:

Date:

By:

Checked:

CASE: FFTF Skyshine - Edge

GEOMETRY: Vertical cylinder area source behind a wall

DIMENSIONS (meters):

Distance between wall and detector.....	X	0.01
Depth of source behind wall.....	Y	5.5
Offset of detector.....	Z	0.
Depth of dose point.....	H	0.
Distance between center of source and wall...	R1	25.
Thickness of cover slab.....	T1	0.
Thickness of second shield.....	T2	0.
Radius of source.....	W	25.
Height of source.....	L	3.7

INTEGRATION PARAMETERS:

Number of Radial Segments.....	M	9
Number of Circumferential Segments.....	N	9
Number of Vertical Segments.....	C	9
Quadrature Order.....		16

MATERIAL DENSITIES (g/cc):

Ambient air: .0012

Material	Cover Slab	Lower Shield	Volume Source
Air			
Water			
Concrete			
Iron			0.1920
Lead			
Zirconium			
Urania			0.0520

Buildup factor based on: AIR.

Page 2

CASE: FFTF Skyshine - Edge

SOURCE NUCLIDES:

Source was entered by energy groups.

RESULTS:

Group #	Energy (mev)	Activity (photons/sec)	Dose point rads/photon	Dose rate (mr/hr)
1	10.00	1.279e+03	6.848e-20	3.612e-10
2	7.00	1.120e+04	7.678e-20	3.546e-09
3	5.00	9.851e+04	8.388e-20	3.407e-08
4	3.60	3.955e+07	8.743e-20	1.426e-05
5	3.00	6.017e+08	9.180e-20	2.278e-04
6	2.70	1.406e+09	9.126e-20	5.291e-04
7	2.50	3.519e+00	8.973e-20	1.302e-12
8	2.30	7.840e+09	9.414e-20	3.043e-03
9	2.10	1.853e+11	9.637e-20	7.363e-02
10	1.90	3.115e+10	9.626e-20	1.236e-02
11	1.70	5.944e+10	9.376e-20	2.298e-02
12	1.48	1.119e+12	9.028e-20	4.166e-01
13	1.23	1.057e+13	9.643e-20	4.203e+00
14	1.00	2.177e+12	9.262e-20	8.314e-01
15	.82	1.865e+13	8.362e-20	6.430e+00
16	.65	1.058e+14	8.137e-20	3.550e+01
17	.47	1.848e+13	7.169e-20	5.463e+00
18	.35	3.570e+12	5.231e-20	7.701e-01
19	.25	7.356e+12	3.839e-20	1.165e+00
20	.15	2.757e+13	7.392e-21	8.403e-01
TOTALS:		1.956e+14		5.573e+01

MicroSkyshine

=====

(Physics Applications ; WHC - 1.16-007)

Page: 1

File: FFTFSS2'.SKY

Run: 1:43 p.m.

: August 15, 1997

File Ref: _____

Date: ____/____/____

By: _____

Checked: _____

CASE: FFTF Skyshine - Two Feet

GEOMETRY: Vertical cylinder area source behind a wall

DIMENSIONS (meters):

Distance between wall and detector.....	X	0.61
Depth of source behind wall.....	Y	5.5
Offset of detector.....	Z	0.
Depth of dose point.....	H	0.
Distance between center of source and wall...	R1	25.
Thickness of cover slab.....	T1	0.
Thickness of second shield.....	T2	0.
Radius of source.....	W	25.
Height of source.....	L	3.7

INTEGRATION PARAMETERS:

Number of Radial Segments.....	M	9
Number of Circumferential Segments.....	N	9
Number of Vertical Segments.....	C	9
Quadrature Order.....		16

MATERIAL DENSITIES (g/cc):

Ambient air: .0012

Material	Cover Slab	Lower Shield	Volume Source
-----	-----	-----	-----
Air			
Water			
Concrete			
Iron			0.1920
Lead			
Zirconium			
Urania			0.0520

Buildup factor based on: AIR.

Page 2

CASE: FFTF Skyshine - Two Feet

SOURCE NUCLIDES:

Source was entered by energy groups.

RESULTS:

Group #	Energy (mev)	Activity (photons/sec)	Dose point rads/photon	Dose rate (mr/hr)
1	10.00	1.279e+03	5.777e-20	3.047e-10
2	7.00	1.120e+04	6.537e-20	3.019e-09
3	5.00	9.851e+04	7.209e-20	2.928e-08
4	3.60	3.955e+07	7.587e-20	1.237e-05
5	3.00	6.017e+08	8.023e-20	1.991e-04
6	2.70	1.406e+09	7.999e-20	4.637e-04
7	2.50	3.519e+09	7.878e-20	1.143e-03
8	2.30	7.840e+09	8.310e-20	2.686e-03
9	2.10	1.853e+11	8.542e-20	6.527e-02
10	1.90	3.115e+10	8.561e-20	1.100e-02
11	1.70	5.944e+10	8.362e-20	2.050e-02
12	1.48	1.119e+12	8.082e-20	3.729e-01
13	1.23	1.057e+13	8.726e-20	3.803e+00
14	1.00	2.177e+12	8.431e-20	7.569e-01
15	.82	1.865e+13	7.639e-20	5.874e+00
16	.65	1.058e+14	7.504e-20	3.274e+01
17	.47	1.848e+13	6.670e-20	5.083e+00
18	.35	3.570e+12	4.886e-20	7.193e-01
19	.25	7.356e+12	3.622e-20	1.099e+00
20	.15	2.757e+13	7.068e-21	8.035e-01
TOTALS:		1.956e+14		5.135e+01

MicroSkyshine

=====

(Physics Applications ; WHC - 1.16-007)

Page: 1

File: FFTFSS2.SKY

Run: 3:44 p.m.

: August 15, 1997

File Ref: _____

Date: / /

By: _____

Checked: _____

CASE: FFTF Skyshine - Two Feet

GEOMETRY: Vertical cylinder area source behind a wall

DIMENSIONS (meters):

Distance between wall and detector.....	X	0.61
Depth of source behind wall.....	Y	5.5
Offset of detector.....	Z	0.
Depth of dose point.....	H	0.
Distance between center of source and wall...	R1	25.
Thickness of cover slab.....	T1	0.
Thickness of second shield.....	T2	0.
Radius of source.....	W	25.
Height of source.....	L	3.7

INTEGRATION PARAMETERS:

Number of Radial Segments.....	M	9
Number of Circumferential Segments.....	N	9
Number of Vertical Segments.....	C	9
Quadrature Order.....		16

MATERIAL DENSITIES (g/cc):

Ambient air: .0012

Material	Cover Slab	Lower Shield	Volume Source
-----	-----	-----	-----
Air			
Water			
Concrete			
Iron			0.1920
Lead			
Zirconium			
Urania			0.0520

Buildup factor based on: AIR.

Page 2

CASE: FFTF Skyshine - Two Feet

SOURCE NUCLIDES:

Source was entered by energy groups.

RESULTS:

Group #	Energy (mev)	Activity (photons/sec)	Dose point rads/photon	Dose rate (mr/hr)
1	10.00	1.279e+03	5.777e-20	3.047e-10
2	7.00	1.120e+04	6.537e-20	3.019e-09
3	5.00	9.851e+04	7.209e-20	2.928e-08
4	3.60	3.955e+07	7.587e-20	1.237e-05
5	3.00	6.017e+08	8.023e-20	1.991e-04
6	2.70	1.406e+09	7.999e-20	4.637e-04
7	2.50	3.519e+09	7.878e-20	1.143e-03
8	2.30	7.840e+09	8.310e-20	2.686e-03
9	2.10	1.853e+11	8.542e-20	6.527e-02
10	1.90	3.115e+10	8.561e-20	1.100e-02
11	1.70	5.944e+10	8.362e-20	2.050e-02
12	1.48	1.119e+12	8.082e-20	3.729e-01
13	1.23	1.057e+13	8.726e-20	3.803e+00
14	1.00	2.177e+12	8.431e-20	7.569e-01
15	.82	1.865e+13	7.639e-20	5.874e+00
16	.65	1.058e+14	7.504e-20	3.274e+01
17	.47	1.848e+13	6.670e-20	5.083e+00
18	.35	3.570e+12	4.886e-20	7.193e-01
19	.25	7.336e+12	3.622e-20	1.096e+00
20	.15	2.757e+13	7.068e-21	8.035e-01
TOTALS:		1.956e+14		5.135e+01

MicroSkyshine

=====

(Physics Applications ; WHC - 1.16-007)

Page: 1

File: FFTFSS5.SKY

Run: 4:37 p.m.

: August 15, 1997

File Ref:

Date:

By:

Checked:

CASE: FFTF Skyshine - Five Feet

GEOMETRY: Vertical cylinder area source behind a wall

DIMENSIONS (meters):

Distance between wall and detector.....	X	1.52
Depth of source behind wall.....	Y	5.5
Offset of detector.....	Z	0.
Depth of dose point.....	H	0.
Distance between center of source and wall...	R1	25.
Thickness of cover slab.....	T1	0.
Thickness of second shield.....	T2	0.
Radius of source.....	W	25.
Height of source.....	L	3.7

INTEGRATION PARAMETERS:

Number of Radial Segments.....	M	9
Number of Circumferential Segments.....	N	9
Number of Vertical Segments.....	C	9
Quadrature Order.....		16

MATERIAL DENSITIES (g/cc):

Ambient air: .0012

Material	Cover Slab	Lower Shield	Volume Source
-----	-----	-----	-----
Air			
Water			
Concrete			
Iron			0.1920
Lead			
Zirconium			
Urania			0.0520

Buildup factor based on: AIR.

Page 2

CASE: FFTF Skyshine - Five Feet

SOURCE NUCLIDES:

Source was entered by energy groups.

RESULTS:

Group #	Energy (mev)	Activity (photons/sec)	Dose point rads/photon	Dose rate (mr/hr)
1	10.00	1.279e+03	4.901e-20	2.585e-10
2	7.00	1.120e+04	5.570e-20	2.572e-09
3	5.00	9.851e+04	6.180e-20	2.510e-08
4	3.60	3.955e+07	6.554e-20	1.069e-05
5	3.00	6.017e+08	6.973e-20	1.730e-04
6	2.70	1.406e+09	6.970e-20	4.041e-04
7	2.50	3.519e+09	6.874e-20	9.975e-04
8	2.30	7.840e+09	7.287e-20	2.356e-03
9	2.10	3.115e+10	7.521e-20	9.660e-03
10	1.90	3.115e+10	7.561e-20	9.711e-03
11	1.70	5.944e+10	7.404e-20	1.815e-02
12	1.48	1.119e+12	7.182e-20	3.314e-01
13	1.23	1.057e+13	7.833e-20	3.414e+00
14	1.00	2.177e+12	7.612e-20	6.833e-01
15	.82	1.865e+13	6.919e-20	5.321e+00
16	.65	1.058e+14	6.860e-20	2.993e+01
17	.47	1.848e+13	6.149e-20	4.685e+00
18	.35	3.570e+12	4.522e-20	6.656e-01
19	.25	7.356e+12	3.379e-20	1.025e+00
20	.15	2.757e+13	6.660e-21	7.572e-01
TOTALS:		1.954e+14		4.685e+01

MicroSkyshine

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(Physics Applications ; WHC - 1.16-007)

Page: 1

File: FFTFSS50.SKY

Run: 6:50 a.m.

: August 18, 1997

File Ref: _____

Date: ____/____/____

By: _____

Checked: _____

CASE: FFTF Skyshine - Fifty Feet

GEOMETRY: Vertical cylinder area source behind a wall

DIMENSIONS (meters):

Distance between wall and detector.....	X	15.24
Depth of source behind wall.....	Y	5.5
Offset of detector.....	Z	0.
Depth of dose point.....	H	0.
Distance between center of source and wall...	R1	25.
Thickness of cover slab.....	T1	0.
Thickness of second shield.....	T2	0.
Radius of source.....	W	25.
Height of source.....	L	3.7

INTEGRATION PARAMETERS:

Number of Radial Segments.....	M	9
Number of Circumferential Segments.....	N	9
Number of Vertical Segments.....	C	9
Quadrature Order.....		16

MATERIAL DENSITIES (g/cc):

Ambient air: .0012

Material	Cover Slab	Lower Shield	Volume Source
-----	-----	-----	-----
Air			
Water			
Concrete			
Iron			0.1920
Lead			
Zirconium			
Urania			0.0520

Buildup factor based on: AIR.

Page 2

CASE: FFTF Skyshine - Fifty Feet

SOURCE NUCLIDES:

Source was entered by energy groups.

RESULTS:

Group #	Energy (mev)	Activity (photons/sec)	Dose point rads/photon	Dose rate (mr/hr)
1	10.00	1.279e+03	1.984e-20	1.046e-10
2	7.00	1.120e+04	2.244e-20	1.036e-09
3	5.00	9.851e+04	2.503e-20	1.017e-08
4	3.60	3.955e+07	2.703e-20	4.408e-06
5	3.00	6.017e+08	2.928e-20	7.265e-05
6	2.70	1.406e+09	2.948e-20	1.709e-04
7	2.50	3.519e+09	2.920e-20	4.238e-04
8	2.30	7.840e+09	3.154e-20	1.020e-03
9	2.10	1.853e+11	3.302e-20	2.523e-02
10	1.90	3.115e+10	3.357e-20	4.312e-03
11	1.70	5.944e+10	3.318e-20	8.132e-03
12	1.48	1.119e+12	3.262e-20	1.505e-01
13	1.23	1.057e+13	3.699e-20	1.612e+00
14	1.00	2.177e+12	3.673e-20	3.297e-01
15	.82	1.865e+13	3.379e-20	2.599e+00
16	.65	1.058e+14	3.470e-20	1.514e+01
17	.47	1.848e+13	3.210e-20	2.446e+00
18	.35	3.570e+12	2.396e-20	3.526e-01
19	.25	7.356e+12	1.797e-20	5.451e-01
20	.15	2.757e+13	3.543e-21	4.028e-01
TOTALS:		1.956e+14		2.362e+01

Attachment 6

GENII Output File for
Beyond Design Basis Drop of a Maximally Loaded
Interim Storage Cask (Section 3.4)

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Drop of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 11:19:19

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\trit4.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

-----Release Terms-----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

H 3	6.7E+01	0.0E+00	0.0E+00
KR85	5.8E+02	0.0E+00	0.0E+00
SR90	2.1E-04	0.0E+00	0.0E+00
Y 90	2.1E-04	0.0E+00	0.0E+00
TC99	8.3E-08	0.0E+00	0.0E+00
RU106	3.6E-04	0.0E+00	0.0E+00
AG110M	4.0E-07	0.0E+00	0.0E+00
CD113M	4.5E-05	0.0E+00	0.0E+00
SB125	5.9E-05	0.0E+00	0.0E+00
TE125M	1.4E-05	0.0E+00	0.0E+00

I 129	2.8E-04	0.0E+00	0.0E+00
CS134	7.6E-03	0.0E+00	0.0E+00
CS137	5.8E-02	0.0E+00	0.0E+00
CE144	1.4E-04	0.0E+00	0.0E+00
PR144	1.4E-04	0.0E+00	0.0E+00
PR144M	1.6E-06	0.0E+00	0.0E+00
PM147	5.1E-04	0.0E+00	0.0E+00
SM151	2.4E-05	0.0E+00	0.0E+00
EU154	1.4E-05	0.0E+00	0.0E+00
EU155	5.5E-05	0.0E+00	0.0E+00
PU238	1.2E-05	0.0E+00	0.0E+00
PU239	2.9E-05	0.0E+00	0.0E+00
PU240	1.7E-05	0.0E+00	0.0E+00
PU241	3.4E-04	0.0E+00	0.0E+00
AM241	1.4E-05	0.0E+00	0.0E+00
AM242M	1.4E-06	0.0E+00	0.0E+00
CM242	1.9E-06	0.0E+00	0.0E+00
CM243	3.6E-07	0.0E+00	0.0E+00
CM244	6.0E-08	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 1.0E+00 Fraction of time spent in cloud

===== INHALATION =====
 Resuspension not considered

=====

Input prepared by: _____

Date: _____

Input checked by: _____

Date: _____

=====

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 11:19:53

Page C. 1

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	5.7E+00	2.5E-01	1.4E+00
Breast	2.7E+00	1.5E-01	4.0E-01
R Marrow	2.0E+01	1.2E-01	2.4E+00
Lung	5.0E+00	1.2E-01	6.0E-01
Thyroid	3.2E+00	3.0E-02	9.5E-02
Bone Sur	2.1E+02	3.0E-02	6.4E+00
Liver	3.7E+01	6.0E-02	2.2E+00
LL Int.	2.8E+00	6.0E-02	1.7E-01
S Int.	2.8E+00	6.0E-02	1.7E-01
UL Int.	2.8E+00	6.0E-02	1.7E-01
Stomach	2.8E+00	6.0E-02	1.7E-01
Internal Effective Dose Equivalent			1.4E+01
External Dose			3.3E-01
Annual Effective Dose Equivalent			1.4E+01

Controlling Organ:	Bone Sur
Controlling Pathway:	Inh
Controlling Radionuclide:	PU239
Total Inhalation EDE:	1.4E+01
Total Ingestion EDE:	0.0E+00

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Rem

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GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 11:19:53

Page C. 3

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Inhale	5.0E+00	2.8E+00	2.8E+00	2.8E+00	2.8E+00	2.1E+02	2.0E+01	5.7E+00
Total	5.0E+00	2.8E+00	2.8E+00	2.8E+00	2.8E+00	2.1E+02	2.0E+01	5.7E+00

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Inhale	5.6E+00	2.7E+00	3.2E+00	3.1E-01	3.7E+01	3.6E-03
Total	5.6E+00	2.7E+00	3.2E+00	3.1E-01	3.7E+01	3.6E-03

External Dose by Exposure Pathway

Pathway	
Plume	3.3E-01
Total	3.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 11:19:53

Page C. 4

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	2.0E+00	2.0E+00	2.0E+00	2.0E+00	2.0E+00	2.5E+00	2.5E+00	2.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	3.8E-04	1.0E-04	1.1E-04	2.6E-04	7.9E-04	1.7E-01	7.4E-02	9.7E-05
Y 90	2.5E-03	1.1E-04	2.8E-04	1.4E-03	3.3E-03	4.1E-06	4.1E-06	1.4E-07
TC 99	1.7E-06	4.6E-07	7.2E-09	2.2E-08	5.8E-08	4.9E-09	4.9E-09	4.1E-09
RU 106	4.5E-01	1.3E-03	1.5E-03	5.8E-03	1.6E-02	8.0E-04	8.9E-04	5.3E-04
AG 110M	3.7E-04	5.3E-06	2.5E-06	7.0E-06	1.7E-05	2.5E-06	3.3E-06	2.5E-07
CD 113M	1.9E-03	1.8E-03	1.8E-03	1.9E-03	1.9E-03	2.3E-03	2.3E-03	1.9E-03
SB 125	1.6E-03	4.5E-05	3.7E-05	9.8E-05	2.4E-04	8.1E-05	3.8E-05	6.3E-06
TE 125M	1.7E-04	2.2E-06	3.2E-06	1.3E-05	3.7E-05	2.1E-04	2.1E-05	6.0E-07
I 129	1.0E-04	3.2E-05	2.7E-05	2.7E-05	2.7E-05	3.7E-05	4.1E-05	2.5E-05
CS 134	1.1E-01	1.1E-01	1.3E-01	1.2E-01	1.3E-01	1.0E-01	1.1E-01	1.2E-01
CS 137	6.2E-01	6.1E-01	6.4E-01	6.3E-01	6.4E-01	5.7E-01	5.9E-01	6.2E-01
CE 144	1.3E-01	2.0E-04	3.7E-04	1.9E-03	5.8E-03	8.2E-04	4.9E-04	3.2E-05
PR 144M	7.8E-08	6.1E-09	1.7E-09	3.3E-10	2.9E-11	2.9E-11	3.5E-11	9.0E-12
PR 144	1.7E-05	9.7E-07	2.4E-07	4.6E-08	4.3E-09	3.6E-09	4.6E-09	1.5E-09
PM 147	4.9E-02	2.4E-05	6.2E-05	3.6E-04	1.0E-03	1.3E-02	1.0E-03	6.9E-08
SM 151	9.7E-05	3.5E-07	8.8E-07	5.0E-06	1.5E-05	4.0E-03	3.2E-04	5.0E-09
EU 154	1.3E-03	3.0E-04	2.8E-04	4.1E-04	3.1E-04	9.0E-03	1.8E-03	1.0E-04
EU 155	7.9E-04	5.1E-05	5.1E-05	1.0E-04	1.4E-04	9.8E-03	1.0E-03	1.1E-05
CM 244	1.5E-03	1.3E-07	2.1E-07	8.1E-07	2.3E-06	8.6E-02	7.0E-03	1.1E-03
PU 240	3.5E-01	3.1E-05	5.0E-05	2.0E-04	5.8E-04	4.5E+01	3.5E+00	6.2E-01
AM 242M	7.0E-03	2.4E-06	2.9E-06	6.5E-06	1.4E-05	3.6E+00	2.9E-01	5.1E-02
AM 242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CM 242	3.5E-02	4.0E-06	6.1E-06	2.6E-05	7.5E-05	1.1E-01	9.6E-03	1.4E-03
NP 238	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 238	2.7E-01	2.4E-05	3.8E-05	1.6E-04	4.4E-04	2.8E+01	2.3E+00	3.9E-01
PU 241	3.0E-03	1.5E-05	1.8E-05	3.9E-05	6.5E-05	1.7E+01	1.3E+00	2.6E-01
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 241	3.1E-01	6.0E-05	7.5E-05	2.2E-04	5.4E-04	3.7E+01	2.9E+00	5.2E-01
CM 243	9.0E-03	3.4E-06	3.9E-06	8.9E-06	1.7E-05	6.5E-01	5.3E-02	8.9E-03

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NP 239	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 239	6.0E-01	5.3E-05	8.5E-05	3.4E-04	9.9E-04	7.7E+01	6.0E+00	1.1E+00
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	5.0E+00	2.8E+00	2.8E+00	2.8E+00	2.8E+00	2.1E+02	2.0E+01	5.7E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 11:19:53

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Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	2.0E+00	2.0E+00	2.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	9.7E-05	9.4E-05	9.7E-05	0.0E+00	0.0E+00	0.0E+00
Y 90	1.4E-07	1.3E-07	1.4E-07	0.0E+00	4.1E-06	0.0E+00
TC 99	4.1E-09	4.1E-09	1.1E-07	0.0E+00	5.6E-09	0.0E+00
RU 106	5.8E-04	8.0E-04	7.5E-04	0.0E+00	0.0E+00	0.0E+00
AG 110M	1.2E-06	3.5E-06	3.1E-06	0.0E+00	1.5E-05	0.0E+00
CD 113M	1.9E-03	1.9E-03	1.9E-03	3.0E-01	5.1E-02	0.0E+00
SB 125	2.5E-05	2.9E-05	2.2E-05	0.0E+00	6.0E-05	0.0E+00
TE 125M	1.3E-06	1.2E-06	6.6E-07	0.0E+00	0.0E+00	0.0E+00
I 129	2.7E-05	6.5E-05	4.6E-01	0.0E+00	0.0E+00	0.0E+00
CS 134	1.0E-01	1.0E-01	1.0E-01	0.0E+00	0.0E+00	0.0E+00
CS 137	5.8E-01	5.6E-01	5.6E-01	0.0E+00	0.0E+00	0.0E+00
CE 144	4.1E-05	6.0E-05	4.9E-05	0.0E+00	4.4E-03	3.6E-03
PR 144M	1.1E-11	2.5E-11	1.7E-11	2.4E-11	4.5E-11	0.0E+00
PR 144	1.9E-09	3.4E-09	2.9E-09	3.7E-09	6.3E-09	0.0E+00
PM 147	6.9E-08	8.8E-08	7.5E-08	0.0E+00	3.3E-03	0.0E+00
SM 151	6.1E-09	9.4E-09	5.3E-09	0.0E+00	1.1E-03	0.0E+00
EU 154	2.0E-04	2.7E-04	1.2E-04	5.8E-04	7.2E-03	0.0E+00
EU 155	2.4E-05	4.1E-05	1.7E-05	1.1E-04	3.2E-03	0.0E+00
CM 244	1.2E-03	8.1E-08	7.4E-08	0.0E+00	1.8E-02	0.0E+00
PU 240	6.2E-01	2.0E-05	1.9E-05	0.0E+00	7.8E+00	0.0E+00
AM 242M	5.0E-02	2.7E-06	1.1E-06	0.0E+00	6.4E-01	0.0E+00
AM 242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CM 242	1.4E-03	2.2E-06	2.2E-06	0.0E+00	2.7E-02	0.0E+00
NP 238	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 238	3.9E-01	1.5E-05	1.4E-05	0.0E+00	5.2E+00	0.0E+00
PU 241	2.5E-01	1.6E-05	6.9E-06	0.0E+00	2.7E+00	0.0E+00
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 241	5.1E-01	5.1E-05	2.9E-05	0.0E+00	6.7E+00	0.0E+00
CM 243	9.0E-03	3.0E-06	1.8E-06	0.0E+00	1.3E-01	0.0E+00

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NP 239	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 239	1.1E+00	3.3E-05	3.2E-05	0.0E+00	1.3E+01	0.0E+00
-----	-----	-----	-----	-----	-----	-----
Total	5.6E+00	2.7E+00	3.2E+00	3.1E-01	3.7E+01	3.6E-03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Drop of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 11:19:53

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Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Radio-nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
H 3	2.0E+00	0.0E+00	1.5E-09	2.0E+00	2.0E+00
KR 85	0.0E+00	0.0E+00	3.2E-01	0.0E+00	3.2E-01
SR 90	1.4E-02	0.0E+00	8.7E-09	1.4E-02	1.4E-02
Y 90	6.0E-04	0.0E+00	3.1E-07	6.0E-04	6.0E-04
TC 99	2.4E-07	0.0E+00	6.4E-13	2.4E-07	2.4E-07
RU 106	5.6E-02	0.0E+00	1.7E-05	5.6E-02	5.6E-02
AG 110M	4.9E-05	0.0E+00	2.4E-07	4.9E-05	4.9E-05
CD 113M	2.3E-02	0.0E+00	2.1E-09	2.3E-02	2.3E-02
SB 125	2.4E-04	0.0E+00	5.9E-06	2.4E-04	2.5E-04
TE 125M	3.3E-05	0.0E+00	3.9E-08	3.3E-05	3.3E-05
I 129	1.4E-02	0.0E+00	5.1E-07	1.4E-02	1.4E-02
CS 134	1.1E-01	0.0E+00	2.6E-03	1.1E-01	1.1E-01
CS 137	5.7E-01	0.0E+00	6.6E-03	5.7E-01	5.8E-01
CE 144	1.7E-02	0.0E+00	3.9E-07	1.7E-02	1.7E-02
PR 144M	9.9E-09	0.0E+00	1.9E-09	9.9E-09	1.2E-08
PR 144	2.1E-06	0.0E+00	1.3E-06	2.1E-06	3.4E-06
PM 147	6.7E-03	0.0E+00	2.2E-09	6.7E-03	6.7E-03
SM 151	2.4E-04	0.0E+00	2.3E-11	2.4E-04	2.4E-04
EU 154	1.3E-03	0.0E+00	3.5E-06	1.3E-03	1.3E-03
EU 155	7.4E-04	0.0E+00	4.5E-07	7.4E-04	7.4E-04
CM 244	5.0E-03	0.0E+00	1.7E-12	5.0E-03	5.0E-03
PU 240	2.4E+00	0.0E+00	5.2E-10	2.4E+00	2.4E+00
AM 242M	1.9E-01	0.0E+00	1.7E-10	1.9E-01	1.9E-01
AM 242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CM 242	1.1E-02	0.0E+00	5.9E-11	1.1E-02	1.1E-02
NP 238	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 238	1.6E+00	0.0E+00	3.8E-10	1.6E+00	1.6E+00
PU 241	9.0E-01	0.0E+00	2.6E-14	9.0E-01	9.0E-01
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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AM 241	2.0E+00	0.0E+00	3.0E-08	2.0E+00	2.0E+00
CM 243	3.7E-02	0.0E+00	7.8E-09	3.7E-02	3.7E-02
PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NP 239	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 239	4.2E+00	0.0E+00	6.2E-10	4.2E+00	4.2E+00
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 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:19:38

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 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Ground, external
 Terrestrial foods ingestion
 Animal product ingestion
 Inadvertent soil ingestion

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 50.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\trit4in.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 PNL Food Transfer Factor Library (by Z, with Fr&Os 7/19/93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

----- Release Terms -----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

H 3	6.7E+01	0.0E+00	0.0E+00
KR85	5.8E+02	0.0E+00	0.0E+00
SR90	2.1E-04	0.0E+00	0.0E+00
Y 90	2.1E-04	0.0E+00	0.0E+00
TC99	8.3E-08	0.0E+00	0.0E+00
RU106	3.6E-04	0.0E+00	0.0E+00
AG110M	4.0E-07	0.0E+00	0.0E+00

```

CD113M  4.5E-05 0.0E+00 0.0E+00
SB125   5.9E-05 0.0E+00 0.0E+00
TE125M  1.4E-05 0.0E+00 0.0E+00
I 129   2.8E-04 0.0E+00 0.0E+00
CS134   7.6E-03 0.0E+00 0.0E+00
CS137   5.8E-02 0.0E+00 0.0E+00
CE144   1.4E-04 0.0E+00 0.0E+00
PR144   1.4E-04 0.0E+00 0.0E+00
PR144M  1.6E-06 0.0E+00 0.0E+00
PM147   5.1E-04 0.0E+00 0.0E+00
SM151   2.4E-05 0.0E+00 0.0E+00
EU154   1.4E-05 0.0E+00 0.0E+00
EU155   5.5E-05 0.0E+00 0.0E+00
PU238   1.2E-05 0.0E+00 0.0E+00
PU239   2.9E-05 0.0E+00 0.0E+00
PU240   1.7E-05 0.0E+00 0.0E+00
PU241   3.4E-04 0.0E+00 0.0E+00
AM241   1.4E-05 0.0E+00 0.0E+00
AM242M  1.4E-06 0.0E+00 0.0E+00
CM242   1.9E-06 0.0E+00 0.0E+00
CM243   3.6E-07 0.0E+00 0.0E+00
CM244   6.0E-08 0.0E+00 0.0E+00

```

```

===== AIR TRANSPORT =====
1.0E+00  Input E/Q value (s/m3)

```

```

===== EXTERNAL EXPOSURE =====
4.4E+03  Hours of exposure to ground contamination

```

```

===== INGESTION POPULATION =====
1  Atmospheric production definition: 1 - Use population-weighted chi/Q

```

```

===== TERRESTRIAL FOOD INGESTION =====

```

FOOD TYPE	GROW TIME d	--IRRIGATION-- S RATE * in/yr		TIME mo/yr	YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP d		RATE kg/yr
Leaf Veg	90.0	0	0.0	0.0	1.5		1.0	3.0E+01	
Oth. Veg	90.0	0	0.0	0.0	4.0		5.0	2.2E+02	
Fruit	90.0	0	0.0	0.0	2.0		5.0	3.3E+02	
Cereals	90.0	0	0.0	0.0	0.8		180.0	8.0E+01	

```

===== ANIMAL FOOD INGESTION =====

```

FOOD TYPE	---HUMAN---		TOTAL PROD- UCTION kg/yr	DRINK WATER CONSUM FRACT.	DIET FRAC- TION	GROW TIME d	-----STORED FEED-----		STOR- AGE kg/m3
	CONSUMPTION RATE kg/yr	HOLDUP d					---IRRIGATION-- S RATE * in/yr	TIME mo/yr	

```

-----
Meat      8.0E+01  15.0      0.00  0.3 90.00  0  0.0  0.0  0.80  0.0
Poultry   1.8E+01   1.0      0.00  1.0 90.00  0  0.0  0.0  0.80  0.0
Cow Milk  2.7E+02   1.0      0.00  0.3 45.00  0  0.0  0.0  2.00  0.0
Eggs      3.0E+01   1.0      0.00  1.0 90.00  0  0.0  0.0  0.80  0.0

```

```

-----FRESH FORAGE-----
Meat      0.75 45.0  0  0.0  0.0  2.00  0.0
Cow Milk  0.75 30.0  0  0.0  0.0  1.50  0.0

```

Note: Animal diet fraction for years 2 through 50.0000

Input prepared by: _____ Date: _____

Input checked by: _____ Date: _____

 GENII Dose Calculation Program
 (Version 1:485 3-Dec-90)

Case title: Winter: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:22:57

Page C. 1

 Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.3E-01	2.5E-01	3.2E-02
Breast	1.2E-01	1.5E-01	1.7E-02
R Marrow	2.8E-01	1.2E-01	3.4E-02
Lung	1.2E-01	1.2E-01	1.4E-02
Thyroid	1.4E+01	3.0E-02	4.2E-01
Bone Sur	4.9E-01	3.0E-02	1.5E-02
LL Int.	1.8E-01	6.0E-02	1.1E-02
UL Int.	1.5E-01	6.0E-02	8.8E-03
S Int.	1.3E-01	6.0E-02	8.0E-03
Stomach	1.3E-01	6.0E-02	7.7E-03
Kidneys	1.0E-01	6.0E-02	6.2E-03
Internal Effective Dose Equivalent			5.7E-01
External Dose			5.3E-01
Annual Effective Dose Equivalent			1.1E+00

 Controlling Organ: Thyroid
 Controlling Pathway: Ing
 Controlling Radionuclide: CS137

 Total Inhalation EDE: 0.0E+00
 Total Ingestion EDE: 5.7E-01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Winter: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:22:57

Page C. 2

Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			8.7E-02	...	
			+		
2		1.4E-01	1.7E-02	...	
		+	+		
1	4.8E-01	5.4E-02	9.8E-03	...	= 5.7E-01
Internal Annual Dose	4.8E-01	1.9E-01	1.1E-01	...	= 2.8E+00
	+	+	+		+
External Annual Dose	5.3E-01	4.8E-01	4.4E-01	...	1.2E+01
Annual Dose	1.0E+00	6.7E-01	5.5E-01	...	= 1.5E+01
					1.0E+00
					Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:22:57

Page C. 3

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	8.6E-04	9.7E-04	1.0E-03	1.3E-03	2.1E-03	8.6E-03	4.3E-03	9.4E-04
Oth. Veg	1.6E-02	1.8E-02	1.9E-02	2.5E-02	3.9E-02	1.6E-01	7.8E-02	1.7E-02
Fruit	1.7E-02	1.9E-02	2.0E-02	2.7E-02	4.3E-02	1.7E-01	8.5E-02	1.9E-02
Cereals	2.0E-03	2.2E-03	2.3E-03	2.5E-03	3.2E-03	5.7E-03	3.7E-03	2.2E-03
Meat	4.6E-02	5.0E-02	5.1E-02	5.1E-02	5.3E-02	5.7E-02	5.2E-02	5.0E-02
Poultry	2.6E-03	2.9E-03	3.0E-03	2.9E-03	3.0E-03	2.8E-03	2.8E-03	2.9E-03
Cow Milk	3.0E-02	3.3E-02	3.3E-02	3.4E-02	3.6E-02	7.9E-02	5.2E-02	3.2E-02
Eggs	5.2E-04	5.8E-04	5.8E-04	6.3E-04	7.9E-04	3.4E-03	1.8E-03	5.6E-04
Soil Ing	2.1E-03	2.3E-03	2.4E-03	2.4E-03	2.5E-03	5.8E-03	2.5E-03	2.4E-03
Total	1.2E-01	1.3E-01	1.3E-01	1.5E-01	1.8E-01	4.9E-01	2.8E-01	1.3E-01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	8.6E-04	8.5E-04	1.3E-01	2.3E-03	3.9E-04	6.7E-08
Oth. Veg	1.6E-02	1.6E-02	2.3E+00	4.4E-02	7.5E-03	1.2E-06
Fruit	1.7E-02	1.7E-02	2.5E+00	4.9E-02	8.2E-03	1.3E-06
Cereals	2.0E-03	2.0E-03	6.0E-01	3.4E-03	5.7E-04	2.1E-08
Meat	4.6E-02	4.5E-02	4.9E-01	1.8E-03	2.9E-04	2.3E-07
Poultry	2.6E-03	2.6E-03	4.2E-03	1.5E-03	2.4E-04	4.9E-10
Cow Milk	3.0E-02	3.0E-02	7.4E+00	1.4E-03	2.5E-04	1.3E-08
Eggs	5.2E-04	5.4E-04	4.2E-01	3.0E-04	4.9E-05	4.0E-10
Soil Ing	2.2E-03	2.1E-03	1.8E-02	6.1E-05	6.2E-04	1.3E-07
Total	1.2E-01	1.2E-01	1.4E+01	1.0E-01	1.8E-02	3.0E-06

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	5.3E-01
-----	-----
Total	5.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:22:57

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
-----	-----	-----	-----	-----	-----	-----	-----	-----
Leaf Veg	2.4E-02	2.6E-02	2.7E-02	3.1E-02	4.2E-02	2.1E-01	1.1E-01	2.6E-02
Oth. Veg	4.2E-01	4.7E-01	4.9E-01	5.9E-01	8.6E-01	3.5E+00	1.8E+00	4.6E-01
Fruit	4.6E-01	5.1E-01	5.3E-01	6.6E-01	9.7E-01	4.0E+00	2.1E+00	5.0E-01
Cereals	5.5E-02	6.0E-02	6.1E-02	6.5E-02	7.6E-02	1.5E-01	9.8E-02	5.9E-02
Meat	2.6E-01	2.8E-01	2.8E-01	2.8E-01	2.9E-01	3.1E-01	2.8E-01	2.8E-01
Poultry	9.0E-03	9.7E-03	9.9E-03	9.8E-03	9.9E-03	9.2E-03	9.2E-03	9.8E-03
Cow Milk	1.6E-01	1.8E-01	1.8E-01	1.8E-01	2.0E-01	3.8E-01	2.7E-01	1.8E-01
Eggs	1.7E-03	1.9E-03	1.9E-03	1.9E-03	2.2E-03	5.7E-03	3.5E-03	1.8E-03
Soil Ing	5.6E-02	6.1E-02	6.1E-02	6.2E-02	6.3E-02	1.6E-01	6.6E-02	6.2E-02
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	1.4E+00	1.6E+00	1.6E+00	1.9E+00	2.5E+00	8.7E+00	4.8E+00	1.6E+00

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
-----	-----	-----	-----	-----	-----	-----
Leaf Veg	2.4E-02	2.4E-02	2.5E-01	4.2E-02	7.5E-03	1.8E-07
Oth. Veg	4.2E-01	4.2E-01	4.5E+00	7.0E-01	1.2E-01	3.2E-06
Fruit	4.6E-01	4.5E-01	4.9E+00	8.1E-01	1.4E-01	3.5E-06
Cereals	5.5E-02	5.4E-02	1.1E+00	5.9E-02	1.0E-02	5.5E-08
Meat	2.6E-01	2.5E-01	7.7E-01	6.3E-03	1.1E-03	2.9E-07
Poultry	9.0E-03	8.8E-03	1.1E-02	2.8E-03	4.6E-04	5.0E-10
Cow Milk	1.6E-01	1.6E-01	8.7E+00	5.2E-03	8.8E-04	1.7E-08
Eggs	1.7E-03	1.7E-03	4.8E-01	5.5E-04	9.2E-05	4.1E-10
Soil Ing	5.7E-02	5.5E-02	8.4E-02	1.0E-03	2.0E-02	2.2E-07
-----	-----	-----	-----	-----	-----	-----
Total	1.5E+00	1.4E+00	2.1E+01	1.6E+00	3.0E-01	7.5E-06

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	1.2E+01
-----	-----
Total	1.2E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:22:57

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.0E-04	4.3E-04	6.7E-04	4.2E-03	1.8E-02	3.7E-01	1.6E-01	2.0E-04
Y 90	1.1E-08	9.6E-04	2.3E-03	1.1E-02	2.8E-02	3.5E-07	3.4E-07	1.1E-08
TC 99	5.3E-07	5.7E-05	1.0E-06	3.4E-06	9.2E-06	6.2E-07	6.2E-07	5.3E-07
RU 106	1.2E-04	2.6E-04	4.7E-04	2.1E-03	6.0E-03	1.4E-04	1.5E-04	1.3E-04
AG 110M	7.2E-07	2.2E-06	5.1E-06	1.9E-05	5.0E-05	4.7E-07	8.2E-07	4.3E-07
CD 113M	6.2E-04	6.7E-04	7.3E-04	1.2E-03	2.4E-03	7.6E-04	7.6E-04	6.4E-04
SB 125	3.5E-07	1.7E-06	4.3E-06	1.2E-05	3.3E-05	3.9E-06	1.3E-06	5.2E-07
TE 125M	1.8E-06	7.4E-06	1.6E-05	7.0E-05	1.9E-04	5.4E-04	5.0E-05	1.6E-06
I 129	9.2E-04	1.3E-03	8.0E-04	8.0E-04	8.0E-04	1.0E-03	1.1E-03	7.3E-04
CS 134	1.3E-02	1.4E-02	1.7E-02	1.5E-02	1.7E-02	1.3E-02	1.4E-02	1.5E-02
CS 137	1.0E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	1.0E-01	1.0E-01	1.1E-01
CE 144	3.4E-08	5.8E-06	1.9E-05	1.2E-04	3.5E-04	6.8E-07	4.8E-07	5.3E-08
PR 144M	1.5E-12	1.1E-08	4.1E-09	9.0E-10	5.3E-11	9.0E-13	1.9E-12	2.6E-13
PR 144	1.7E-10	2.2E-06	5.3E-07	1.0E-07	5.8E-09	8.4E-11	1.8E-10	3.7E-11
PM 147	1.6E-11	7.2E-07	1.9E-06	1.0E-05	3.3E-05	2.7E-06	2.2E-07	1.9E-11
SM 151	7.0E-13	1.5E-08	3.7E-08	2.2E-07	6.4E-07	2.2E-07	1.8E-08	3.3E-13
EU 154	7.9E-08	3.0E-07	7.9E-07	2.5E-06	6.5E-06	1.6E-06	4.3E-07	5.8E-08
EU 155	1.3E-08	1.4E-07	3.8E-07	1.6E-06	4.7E-06	1.8E-06	2.2E-07	1.0E-08
CM 244	3.8E-12	5.5E-10	1.5E-09	8.0E-09	2.5E-08	4.1E-06	3.3E-07	5.4E-08
PU 240	4.4E-10	6.5E-08	1.6E-07	9.2E-07	2.9E-06	9.8E-04	7.5E-05	1.3E-05
AM 242M	1.7E-10	7.0E-10	2.4E-09	2.1E-08	8.6E-08	1.5E-04	1.3E-05	2.2E-06
AM 242	1.4E-12	1.9E-09	4.0E-09	1.5E-08	2.3E-08	1.3E-08	1.2E-09	1.7E-10
CM 242	9.0E-11	1.5E-08	3.5E-08	2.0E-07	6.3E-07	4.4E-06	3.7E-07	5.4E-08
NP 238	6.6E-13	2.8E-11	7.2E-11	2.8E-10	6.1E-10	1.4E-10	1.8E-11	3.3E-12
PU 238	3.4E-10	5.1E-08	1.3E-07	7.4E-07	2.2E-06	6.3E-04	5.0E-05	8.7E-06
PU 241	6.0E-10	6.5E-09	1.7E-08	9.6E-08	2.8E-07	3.7E-04	2.9E-05	5.6E-06
U 237	6.1E-14	7.8E-12	2.0E-11	9.4E-11	2.5E-10	9.7E-13	1.6E-12	3.3E-13
AM 241	3.4E-09	1.3E-07	3.0E-07	1.7E-06	5.3E-06	1.7E-03	1.3E-04	2.3E-05
CM 243	2.1E-10	4.1E-09	1.0E-08	5.7E-08	1.7E-07	3.2E-05	2.6E-06	4.3E-07

HNF-SD-FF-CN-013 Rev. 0

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	9.7E-17	5.9E-16	1.5E-15	8.0E-15	2.5E-14	7.7E-12	6.1E-13	1.1E-13
NP 239	1.5E-18	2.1E-16	5.2E-16	2.3E-15	5.2E-15	2.5E-17	2.8E-17	6.5E-18
PU 239	7.3E-10	1.1E-07	2.8E-07	1.6E-06	4.9E-06	1.7E-03	1.3E-04	2.3E-05
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	1.2E-01	1.3E-01	1.3E-01	1.5E-01	1.8E-01	4.9E-01	2.8E-01	1.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:22:57

Page C. 6

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.0E-04	2.0E-04	2.0E-04	0.0E+00	0.0E+00	0.0E+00
Y 90	1.3E-08	1.1E-08	1.1E-08	0.0E+00	3.3E-07	0.0E+00
TC 99	5.3E-07	5.3E-07	1.3E-05	0.0E+00	7.2E-07	0.0E+00
RU 106	1.3E-04	1.1E-04	1.2E-04	0.0E+00	0.0E+00	0.0E+00
AG 110M	2.4E-06	6.6E-07	2.4E-07	0.0E+00	2.1E-05	0.0E+00
CD 113M	6.4E-04	6.4E-04	6.4E-04	1.0E-01	1.7E-02	0.0E+00
SB 125	3.0E-06	5.7E-07	2.6E-07	0.0E+00	1.4E-06	0.0E+00
TE 125M	5.3E-06	1.9E-06	1.6E-06	0.0E+00	0.0E+00	0.0E+00
I 129	8.0E-04	1.8E-03	1.4E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	1.3E-02	1.3E-02	1.3E-02	0.0E+00	0.0E+00	0.0E+00
CS 137	1.0E-01	1.0E-01	1.0E-01	0.0E+00	0.0E+00	0.0E+00
CE 144	3.7E-07	6.3E-08	2.7E-08	0.0E+00	3.6E-06	3.0E-06
PR 144M	3.9E-12	1.8E-12	1.1E-13	3.3E-12	2.0E-12	0.0E+00
PR 144	4.1E-10	1.9E-10	2.0E-11	3.9E-10	2.6E-10	0.0E+00
PM 147	8.6E-11	2.2E-11	1.5E-11	0.0E+00	7.2E-07	0.0E+00
SM 151	1.3E-11	9.6E-13	2.9E-13	0.0E+00	6.0E-08	0.0E+00
EU 154	5.0E-07	1.0E-07	2.1E-08	1.6E-07	1.3E-06	0.0E+00
EU 155	1.3E-07	1.9E-08	2.4E-09	3.2E-08	5.5E-07	0.0E+00
CM 244	5.5E-08	3.8E-12	3.6E-12	0.0E+00	8.3E-07	0.0E+00
PU 240	1.3E-05	4.4E-10	4.1E-10	0.0E+00	1.7E-04	0.0E+00
AM 242M	2.2E-06	1.2E-10	4.0E-11	0.0E+00	2.8E-05	0.0E+00
AM 242	2.5E-10	8.5E-12	2.3E-13	0.0E+00	3.5E-09	0.0E+00
CM 242	5.3E-08	9.1E-11	9.0E-11	0.0E+00	1.1E-06	0.0E+00
NP 238	2.6E-11	3.2E-12	9.9E-14	0.0E+00	9.2E-12	0.0E+00
PU 238	8.5E-06	3.3E-10	3.1E-10	0.0E+00	1.1E-04	0.0E+00
PU 241	5.5E-06	3.5E-10	1.5E-10	0.0E+00	5.8E-05	0.0E+00
U 237	5.3E-12	5.0E-13	6.4E-15	8.3E-13	0.0E+00	0.0E+00
AM 241	2.3E-05	2.6E-09	1.3E-09	0.0E+00	3.0E-04	0.0E+00
CM 243	4.4E-07	1.9E-10	8.8E-11	0.0E+00	6.3E-06	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.1E-13	6.8E-17	3.4E-17	0.0E+00	1.4E-12	0.0E+00
NP 239	1.0E-16	1.0E-17	1.2E-19	0.0E+00	9.4E-18	0.0E+00
PU 239	2.3E-05	7.3E-10	7.0E-10	0.0E+00	2.9E-04	0.0E+00

Total	1.2E-01	1.2E-01	1.4E+01	1.0E-01	1.8E-02	3.0E-06

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	2.6E-07
Y 90	1.5E-05
TC 99	1.5E-11
RU 106	7.3E-04
AG 110M	8.7E-06
CD 113M	6.9E-08
SB 125	3.0E-04
TE 125M	4.1E-07
I 129	5.7E-05
CS 134	1.3E-01
CS 137	4.0E-01
CE 144	1.0E-05
PR 144M	2.6E-08
PR 144	4.7E-05
PM 147	4.4E-08
SM 151	1.7E-10
EU 154	1.9E-04
EU 155	1.7E-05
CM 244	1.1E-11
PU 240	3.9E-09
AM 242M	3.0E-09
AM 242	1.4E-07
CM 242	3.3E-10
NP 238	4.5E-08
PU 238	2.8E-09
PU 241	1.5E-13
U 237	0.0E+00
AM 241	7.4E-07
CM 243	3.9E-07
PU 243	0.0E+00
AM 243	7.7E-15
NP 239	5.9E-14
PU 239	1.4E-08

Total	5.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:22:57

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	4.5E-03	9.5E-03	1.5E-02	9.3E-02	3.9E-01	7.1E+00	3.4E+00	4.5E-03
Y 90	2.0E-07	1.7E-02	4.0E-02	2.0E-01	4.9E-01	6.2E-06	6.0E-06	2.0E-07
TC 99	8.5E-07	9.2E-05	1.6E-06	5.5E-06	1.5E-05	1.0E-06	1.0E-06	8.5E-07
RU 106	3.4E-04	7.4E-04	1.3E-03	5.8E-03	1.7E-02	4.0E-04	4.3E-04	3.6E-04
AG 110M	9.8E-07	3.0E-06	6.9E-06	2.5E-05	6.8E-05	6.4E-07	1.1E-06	5.8E-07
CD 113M	1.0E-02	1.1E-02	1.2E-02	1.9E-02	4.0E-02	1.2E-02	1.2E-02	1.0E-02
SB 125	1.5E-06	7.6E-06	1.9E-05	5.5E-05	1.5E-04	1.7E-05	5.8E-06	2.3E-06
TE 125M	1.7E-05	6.9E-05	1.5E-04	6.6E-04	1.8E-03	5.1E-03	4.7E-04	1.5E-05
I 129	1.3E-03	1.8E-03	1.1E-03	1.1E-03	1.1E-03	1.5E-03	1.6E-03	1.0E-03
CS 134	3.2E-02	3.6E-02	4.2E-02	3.9E-02	4.2E-02	3.2E-02	3.6E-02	3.9E-02
CS 137	1.4E+00	1.5E+00	1.5E+00	1.5E+00	1.5E+00	1.4E+00	1.4E+00	1.5E+00
CE 144	8.5E-08	1.4E-05	4.8E-05	2.9E-04	8.8E-04	1.7E-06	1.2E-06	1.3E-07
PR 144M	3.7E-12	2.8E-08	1.0E-08	2.2E-09	1.3E-10	2.2E-12	4.7E-12	6.3E-13
PR 144	4.2E-10	5.5E-06	1.3E-06	2.5E-07	1.4E-08	2.1E-10	4.4E-10	9.3E-11
PM 147	7.3E-11	3.3E-06	8.7E-06	4.8E-05	1.5E-04	1.3E-05	1.0E-06	8.7E-11
SM 151	2.5E-11	5.3E-07	1.3E-06	7.9E-06	2.3E-05	6.4E-06	5.8E-07	1.2E-11
EU 154	9.3E-07	3.5E-06	9.3E-06	2.9E-05	7.6E-05	1.9E-05	5.0E-06	6.8E-07
EU 155	9.5E-08	9.8E-07	2.7E-06	1.2E-05	3.4E-05	1.3E-05	1.6E-05	7.5E-08
CM 244	8.2E-11	1.2E-08	3.2E-08	1.7E-07	5.4E-07	7.4E-05	6.0E-06	9.4E-07
PU 240	2.3E-08	3.4E-06	8.5E-06	4.8E-05	1.5E-04	2.9E-02	2.2E-03	3.7E-04
AM 242M	7.5E-09	3.2E-08	1.1E-07	9.6E-07	3.9E-06	4.0E-03	3.3E-04	5.3E-05
AM 242	6.4E-11	8.4E-08	1.8E-07	6.8E-07	1.0E-06	5.5E-07	5.1E-08	7.5E-09
CM 242	3.1E-09	5.1E-07	1.2E-06	6.9E-06	2.2E-05	1.4E-04	1.3E-05	1.8E-06
NP 238	1.2E-09	5.0E-08	1.3E-07	4.9E-07	1.1E-06	1.4E-07	3.2E-08	5.8E-09
PU 238	1.4E-08	2.2E-06	5.4E-06	3.2E-05	9.6E-05	1.7E-02	1.4E-03	2.2E-04
PU 241	1.2E-08	1.3E-07	3.5E-07	2.0E-06	5.6E-06	5.0E-03	3.9E-04	7.1E-05
U 237	2.6E-12	3.3E-10	8.8E-10	4.0E-09	1.1E-08	4.2E-11	6.9E-11	1.4E-11
AM 241	2.3E-07	9.0E-06	2.1E-05	1.2E-04	3.7E-04	6.4E-02	5.0E-03	8.2E-04
CM 243	5.7E-09	1.1E-07	2.8E-07	1.6E-06	4.7E-06	6.5E-04	5.3E-05	8.4E-06

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	9.9E-14	6.2E-13	1.6E-12	8.5E-12	2.7E-11	3.5E-09	2.8E-10	4.4E-11	
NP 239	8.0E-14	1.1E-11	2.8E-11	1.3E-10	2.8E-10	1.3E-12	1.5E-12	3.5E-13	
PU 239	3.8E-08	5.8E-06	1.4E-05	8.2E-05	2.6E-04	5.0E-02	3.8E-03	6.3E-04	
-----	-----	-----	-----	-----	-----	-----	-----	-----	
Total	1.4E+00	1.6E+00	1.6E+00	1.9E+00	2.5E+00	8.7E+00	4.8E+00	1.6E+00	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:22:57

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	4.5E-03	4.5E-03	4.5E-03	0.0E+00	0.0E+00	0.0E+00
Y 90	2.3E-07	2.0E-07	2.0E-07	0.0E+00	5.9E-06	0.0E+00
TC 99	8.5E-07	8.5E-07	2.2E-05	0.0E+00	1.2E-06	0.0E+00
RU 106	3.8E-04	3.3E-04	3.4E-04	0.0E+00	0.0E+00	0.0E+00
AG 110M	3.2E-06	8.9E-07	3.2E-07	0.0E+00	2.8E-05	0.0E+00
CD 113M	1.0E-02	1.0E-02	1.0E-02	1.6E+00	2.7E-01	0.0E+00
SB 125	1.3E-05	2.5E-06	1.2E-06	0.0E+00	6.2E-06	0.0E+00
TE 125M	5.0E-05	1.8E-05	1.5E-05	0.0E+00	0.0E+00	0.0E+00
I 129	1.1E-03	2.6E-03	1.9E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	3.2E-02	3.2E-02	3.2E-02	0.0E+00	0.0E+00	0.0E+00
CS 137	1.4E+00	1.4E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00
CE 144	9.2E-07	1.6E-07	6.7E-08	0.0E+00	9.0E-06	7.5E-06
PR 144M	9.7E-12	4.5E-12	2.8E-13	8.2E-12	5.0E-12	0.0E+00
PR 144	1.0E-09	4.7E-10	5.0E-11	9.8E-10	6.4E-10	0.0E+00
PM 147	4.0E-10	1.0E-10	6.8E-11	0.0E+00	3.3E-06	0.0E+00
SM 151	4.9E-10	3.5E-11	1.1E-11	0.0E+00	1.8E-06	0.0E+00
EU 154	5.9E-06	1.2E-06	2.4E-07	1.9E-06	1.5E-05	0.0E+00
EU 155	9.6E-07	1.4E-07	1.8E-08	2.4E-07	4.0E-06	0.0E+00
CM 244	9.6E-07	8.2E-11	7.8E-11	0.0E+00	1.6E-05	0.0E+00
PU 240	3.7E-04	2.3E-08	2.1E-08	0.0E+00	5.8E-03	0.0E+00
AM 242M	5.2E-05	5.5E-09	1.8E-09	0.0E+00	8.2E-04	0.0E+00
AM 242	1.1E-08	3.8E-10	1.0E-11	0.0E+00	1.5E-07	0.0E+00
CM 242	1.8E-06	3.1E-09	3.1E-09	0.0E+00	3.7E-05	0.0E+00
NP 238	4.7E-08	5.6E-09	1.8E-10	0.0E+00	1.6E-08	0.0E+00
PU 238	2.1E-04	1.4E-08	1.3E-08	0.0E+00	3.5E-03	0.0E+00
PU 241	7.0E-05	7.1E-09	3.0E-09	0.0E+00	8.5E-04	0.0E+00
U 237	2.3E-10	2.1E-11	2.7E-13	3.6E-11	0.0E+00	0.0E+00
AM 241	8.1E-04	1.8E-07	8.9E-08	0.0E+00	1.3E-02	0.0E+00
CM 243	8.5E-06	5.2E-09	2.4E-09	0.0E+00	1.4E-04	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	4.4E-11	6.9E-14	3.5E-14	0.0E+00	7.6E-10	0.0E+00
NP 239	5.5E-12	5.5E-13	6.8E-15	0.0E+00	5.1E-13	0.0E+00
PU 239	6.3E-04	3.8E-08	3.6E-08	0.0E+00	9.9E-03	0.0E+00

Total	1.5E+00	1.4E+00	2.1E+01	1.6E+00	3.0E-01	7.5E-06

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	7.5E-06
Y 90	4.2E-04
TC 99	2.8E-11
RU 106	1.5E-03
AG 110M	1.2E-05
CD 113M	1.3E-06
SB 125	1.2E-03
TE 125M	1.4E-06
I 129	1.0E-04
CS 134	4.5E-01
CS 137	1.2E+01
CE 144	1.8E-05
PR 144M	4.4E-08
PR 144	8.0E-05
PM 147	1.9E-07
SM 151	7.0E-09
EU 154	2.5E-03
EU 155	1.3E-04
CM 244	2.5E-10
PU 240	1.9E-07
AM 242M	1.3E-07
AM 242	6.1E-06
CM 242	1.1E-08
NP 238	2.0E-06
PU 238	1.1E-07
PU 241	2.7E-12
U 237	0.0E+00
AM 241	5.2E-05
CM 243	1.1E-05
PU 243	0.0E+00
AM 243	1.3E-11
NP 239	1.0E-10
PU 239	7.1E-07

Total	1.2E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:24:07

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.9E+01	2.5E-01	4.8E+00
Breast	1.7E+01	1.5E-01	2.5E+00
R Marrow	1.8E+01	1.2E-01	2.2E+00
Lung	1.7E+01	1.2E-01	2.1E+00
Thyroid	1.1E+02	3.0E-02	3.3E+00
Bone Sur	2.0E+01	3.0E-02	5.9E-01
LL Int.	2.0E+01	6.0E-02	1.2E+00
S Int.	1.9E+01	6.0E-02	1.2E+00
UL Int.	1.9E+01	6.0E-02	1.2E+00
Stomach	1.9E+01	6.0E-02	1.1E+00
Liver	3.7E-01	6.0E-02	2.2E-02
Internal Effective Dose Equivalent			2.0E+01
External Dose			5.3E-01
Annual Effective Dose Equivalent			2.1E+01

Controlling Organ:	Thyroid
Controlling Pathway:	Ing
Controlling Radionuclide:	CS137

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	2.0E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:24:07

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year								
		1	2	3	...					
Internal	:									
Intake	:									
Year:	3	8.7E-02 ...								
		+								
	2	1.4E-01	1.7E-02	...		Internal				
		+				Effective				
	1	1.8E+01	1.7E+00	3.5E-01	...	Dose				
		=				Equivalent				
		2.0E+01								
Internal		1.8E+01	1.8E+00	4.6E-01	...	Cumulative				
Annual		=				Internal				
Dose		2.2E+01				Dose				
		+								
External		5.3E-01	4.8E-01	4.4E-01	...					
Annual										
Dose		1.2E+01								
Annual		1.8E+01	2.3E+00	9.0E-01	...	Cumulative				
Dose		=				Dose				
		3.4E+01								
						Maximum				
						Annual				
						Dose Occurred				
						In Year 1				

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:24:07

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.2E+00	1.3E+00	1.4E+00	1.4E+00	1.4E+00	3.3E+00	1.4E+00	1.4E+00
Oth. Veg	1.6E-02	1.8E-02	1.9E-02	2.5E-02	4.0E-02	1.6E-01	7.8E-02	1.8E-02
Fruit	1.7E-02	1.9E-02	2.1E-02	2.7E-02	4.4E-02	1.7E-01	8.6E-02	1.9E-02
Cereals	2.0E-03	2.3E-03	2.3E-03	2.6E-03	3.3E-03	5.7E-03	3.7E-03	2.2E-03
Meat	1.0E+01	1.1E+01	1.2E+01	1.1E+01	1.2E+01	1.0E+01	1.1E+01	1.1E+01
Poultry	2.7E-03	2.9E-03	3.0E-03	3.0E-03	3.0E-03	2.9E-03	2.8E-03	2.9E-03
Cow Milk	5.7E+00	6.2E+00	6.4E+00	6.4E+00	6.4E+00	5.8E+00	5.9E+00	6.3E+00
Eggs	5.3E-04	5.9E-04	6.0E-04	6.4E-04	8.0E-04	3.4E-03	1.8E-03	5.7E-04
Soil Ing	2.1E-03	2.3E-03	2.4E-03	2.4E-03	2.5E-03	5.8E-03	2.5E-03	2.4E-03
Total	1.7E+01	1.9E+01	1.9E+01	1.9E+01	2.0E+01	2.0E+01	1.8E+01	1.9E+01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.2E+00	1.2E+00	9.5E+00	3.8E-02	3.5E-01	1.0E-04
Oth. Veg	1.6E-02	1.6E-02	2.3E+00	4.4E-02	7.5E-03	1.5E-06
Fruit	1.7E-02	1.7E-02	2.5E+00	4.9E-02	8.2E-03	1.6E-06
Cereals	2.0E-03	2.0E-03	6.0E-01	3.4E-03	5.7E-04	2.5E-08
Meat	1.0E+01	1.0E+01	1.5E+01	4.7E-03	4.0E-03	5.7E-05
Poultry	2.7E-03	2.6E-03	4.2E-03	1.5E-03	2.5E-04	6.1E-10
Cow Milk	5.7E+00	5.6E+00	8.0E+01	3.4E-03	8.7E-04	3.0E-06
Eggs	5.3E-04	5.5E-04	4.2E-01	3.0E-04	4.9E-05	5.1E-10
Soil Ing	2.2E-03	2.1E-03	1.8E-02	6.1E-05	6.2E-04	1.3E-07
Total	1.7E+01	1.7E+01	1.1E+02	1.4E-01	3.7E-01	1.7E-04

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	5.3E-01
-----	-----
Total	5.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:24:07

Page C. 12

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.2E+00	1.3E+00	1.4E+00	1.4E+00	1.5E+00	3.5E+00	1.5E+00	1.4E+00
Oth. Veg	4.2E-01	4.7E-01	4.9E-01	5.9E-01	8.6E-01	3.4E+00	1.8E+00	4.6E-01
Fruit	4.6E-01	5.1E-01	5.3E-01	6.6E-01	9.7E-01	4.0E+00	2.1E+00	5.0E-01
Cereals	5.5E-02	6.0E-02	6.1E-02	6.5E-02	7.6E-02	1.5E-01	9.8E-02	5.9E-02
Meat	1.0E+01	1.1E+01	1.2E+01	1.2E+01	1.2E+01	1.1E+01	1.1E+01	1.2E+01
Poultry	9.0E-03	9.8E-03	9.9E-03	9.9E-03	1.0E-02	9.3E-03	9.2E-03	9.8E-03
Cow Milk	5.9E+00	6.4E+00	6.6E+00	6.5E+00	6.6E+00	6.1E+00	6.1E+00	6.5E+00
Eggs	1.7E-03	1.9E-03	1.9E-03	2.0E-03	2.2E-03	5.7E-03	3.5E-03	1.8E-03
Soil Ing	5.6E-02	6.1E-02	6.1E-02	6.2E-02	6.3E-02	1.6E-01	6.6E-02	6.2E-02
Total	1.9E+01	2.0E+01	2.1E+01	2.1E+01	2.2E+01	2.8E+01	2.3E+01	2.0E+01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.3E+00	1.2E+00	9.6E+00	7.7E-02	3.5E-01	1.0E-04
Oth. Veg	4.2E-01	4.2E-01	4.5E+00	7.0E-01	1.2E-01	3.5E-06
Fruit	4.6E-01	4.5E-01	4.9E+00	8.1E-01	1.4E-01	3.8E-06
Cereals	5.5E-02	5.4E-02	1.1E+00	5.9E-02	1.0E-02	6.0E-08
Meat	1.0E+01	1.0E+01	1.5E+01	9.2E-03	4.7E-03	5.7E-05
Poultry	9.0E-03	8.8E-03	1.1E-02	2.8E-03	4.6E-04	6.3E-10
Cow Milk	5.9E+00	5.8E+00	8.1E+01	7.2E-03	1.5E-03	3.0E-06
Eggs	1.7E-03	1.7E-03	4.8E-01	5.5E-04	9.2E-05	5.2E-10
Soil Ing	5.7E-02	5.5E-02	8.4E-02	1.0E-03	2.0E-02	2.2E-07
Total	1.9E+01	1.8E+01	1.2E+02	1.7E+00	6.5E-01	1.7E-04

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	1.2E+01
-----	-----
Total	1.2E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:24:07

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	3.1E-04	6.5E-04	1.0E-03	6.4E-03	2.7E-02	5.6E-01	2.5E-01	3.1E-04
Y 90	1.6E-08	1.4E-03	3.2E-03	1.6E-02	4.0E-02	5.0E-07	4.8E-07	1.6E-08
TC 99	5.2E-07	5.6E-05	9.8E-07	3.4E-06	9.0E-06	6.1E-07	6.1E-07	5.2E-07
RU 106	1.2E-03	2.6E-03	4.7E-03	2.1E-02	6.0E-02	1.4E-03	1.5E-03	1.3E-03
AG 110M	1.0E-05	3.1E-05	7.0E-05	2.6E-04	6.9E-04	6.5E-06	1.1E-05	5.9E-06
CD 113M	8.6E-04	9.3E-04	1.0E-03	1.6E-03	3.3E-03	1.1E-03	1.1E-03	8.8E-04
SB 125	8.9E-06	4.4E-05	1.1E-04	3.2E-04	8.6E-04	1.0E-04	3.4E-05	1.3E-05
TE 125M	4.2E-06	1.7E-05	3.6E-05	1.6E-04	4.5E-04	1.2E-03	1.2E-04	3.7E-06
I 129	6.2E-03	8.7E-03	5.4E-03	5.4E-03	5.4E-03	7.0E-03	7.5E-03	5.0E-03
CS 134	2.5E+00	2.8E+00	3.2E+00	3.0E+00	3.2E+00	2.5E+00	2.8E+00	3.0E+00
CS 137	1.5E+01	1.6E+01	1.6E+01	1.6E+01	1.6E+01	1.5E+01	1.5E+01	1.6E+01
CE 144	1.9E-06	3.2E-04	1.1E-03	6.4E-03	2.0E-02	3.8E-05	2.7E-05	2.9E-06
PR 144M	8.4E-11	6.3E-07	2.3E-07	5.0E-08	2.9E-09	5.0E-11	1.0E-10	1.4E-11
PR 144	9.4E-09	1.2E-04	2.9E-05	5.6E-06	3.2E-07	4.7E-09	9.9E-09	2.1E-09
PM 147	2.5E-09	1.1E-04	2.9E-04	1.6E-03	5.2E-03	4.3E-04	3.4E-05	2.9E-09
SM 151	9.0E-11	1.9E-06	4.7E-06	2.8E-05	8.2E-05	2.9E-05	2.3E-06	4.2E-11
EU 154	1.1E-05	4.3E-05	1.1E-04	3.6E-04	9.4E-04	2.3E-04	6.2E-05	8.3E-06
EU 155	2.0E-06	2.1E-05	5.8E-05	2.5E-04	7.2E-04	2.7E-04	3.3E-05	1.6E-06
CM 244	1.8E-09	2.6E-07	7.0E-07	3.8E-06	1.2E-05	2.0E-03	1.6E-04	2.6E-05
PU 240	1.9E-07	2.8E-05	6.9E-05	3.9E-04	1.2E-03	4.1E-01	3.2E-02	5.7E-03
AM 242M	3.6E-08	1.5E-07	5.1E-07	4.6E-06	1.9E-05	3.3E-02	2.7E-03	4.7E-04
AM 242	3.0E-10	3.9E-07	8.4E-07	3.2E-06	4.9E-06	2.8E-06	2.4E-07	3.6E-08
CM 242	5.3E-08	8.8E-06	2.0E-05	1.2E-04	3.7E-04	2.6E-03	2.2E-04	3.2E-05
NP 238	8.3E-11	3.6E-09	9.1E-09	3.5E-08	7.7E-08	1.7E-08	2.3E-09	4.2E-10
PU 238	1.4E-07	2.1E-05	5.2E-05	3.1E-04	9.3E-04	2.6E-01	2.1E-02	3.6E-03
PU 241	2.5E-07	2.7E-06	7.1E-06	4.0E-05	1.2E-04	1.6E-01	1.2E-02	2.3E-03
U 237	2.4E-11	3.0E-09	8.0E-09	3.7E-08	9.6E-08	3.8E-10	6.2E-10	1.3E-10
AM 241	7.1E-07	2.7E-05	6.3E-05	3.6E-04	1.1E-03	3.5E-01	2.7E-02	4.9E-03
CM 243	9.6E-08	1.9E-06	4.6E-06	2.6E-05	7.8E-05	1.4E-02	1.2E-03	2.0E-04

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	3.1E-15	1.9E-14	4.6E-14	2.5E-13	8.0E-13	2.4E-10	1.9E-11	3.4E-12
NP 239	2.8E-17	3.9E-15	9.8E-15	4.4E-14	9.8E-14	4.7E-16	5.4E-16	1.2E-16
PU 239	3.2E-07	4.9E-05	1.2E-04	6.9E-04	2.2E-03	7.4E-01	5.7E-02	1.0E-02
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Total	1.7E+01	1.9E+01	1.9E+01	1.9E+01	2.0E+01	2.0E+01	1.8E+01	1.9E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:24:07

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Acute release

Uptake/exposure period: 50.0

Dose commitment period: 50.0

Dose units: Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	3.1E-04	3.1E-04	3.1E-04	0.0E+00	0.0E+00	0.0E+00
Y 90	1.9E-08	1.6E-08	1.6E-08	0.0E+00	4.7E-07	0.0E+00
TC 99	5.2E-07	5.2E-07	1.3E-05	0.0E+00	7.0E-07	0.0E+00
RU 106	1.3E-03	1.1E-03	1.2E-03	0.0E+00	0.0E+00	0.0E+00
AG 110M	3.3E-05	9.0E-06	3.3E-06	0.0E+00	2.9E-04	0.0E+00
CD 113M	8.8E-04	8.8E-04	8.8E-04	1.4E-01	2.4E-02	0.0E+00
SB 125	7.8E-05	1.5E-05	6.7E-06	0.0E+00	3.6E-05	0.0E+00
TE 125M	1.2E-05	4.4E-06	3.7E-06	0.0E+00	0.0E+00	0.0E+00
I 129	5.4E-03	1.2E-02	9.3E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	2.5E+00	2.5E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00
CS 137	1.5E+01	1.5E+01	1.5E+01	0.0E+00	0.0E+00	0.0E+00
CE 144	2.0E-05	3.5E-06	1.5E-06	0.0E+00	2.0E-04	1.7E-04
PR 144M	2.2E-10	1.0E-10	6.3E-12	1.8E-10	1.1E-10	0.0E+00
PR 144	2.3E-08	1.1E-08	1.1E-09	2.2E-08	1.4E-08	0.0E+00
PM 147	1.4E-08	3.4E-09	2.3E-09	0.0E+00	1.1E-04	0.0E+00
SM 151	1.7E-09	1.2E-10	3.8E-11	0.0E+00	7.7E-06	0.0E+00
EU 154	7.3E-05	1.5E-05	3.0E-06	2.3E-05	1.9E-04	0.0E+00
EU 155	2.0E-05	2.9E-06	3.7E-07	4.9E-06	8.4E-05	0.0E+00
CM 244	2.6E-05	1.8E-09	1.7E-09	0.0E+00	3.9E-04	0.0E+00
PU 240	5.7E-03	1.9E-07	1.7E-07	0.0E+00	7.2E-02	0.0E+00
AM 242M	4.7E-04	2.7E-08	8.6E-09	0.0E+00	5.9E-03	0.0E+00
AM 242	5.2E-08	1.8E-09	4.9E-11	0.0E+00	7.3E-07	0.0E+00
CM 242	3.1E-05	5.3E-08	5.3E-08	0.0E+00	6.4E-04	0.0E+00
NP 238	3.3E-09	4.0E-10	1.2E-11	0.0E+00	1.2E-09	0.0E+00
PU 238	3.5E-03	1.4E-07	1.3E-07	0.0E+00	4.8E-02	0.0E+00
PU 241	2.3E-03	1.5E-07	6.2E-08	0.0E+00	2.4E-02	0.0E+00
U 237	2.0E-09	1.9E-10	2.5E-12	3.2E-10	0.0E+00	0.0E+00
AM 241	4.8E-03	5.5E-07	2.7E-07	0.0E+00	6.2E-02	0.0E+00
CM 243	2.0E-04	8.7E-08	4.0E-08	0.0E+00	2.9E-03	0.0E+00

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	3.4E-12	2.1E-15	1.1E-15	0.0E+00	4.3E-11	0.0E+00
NP 239	1.9E-15	1.9E-16	2.3E-18	0.0E+00	1.8E-16	0.0E+00
PU 239	1.0E-02	3.2E-07	3.1E-07	0.0E+00	1.3E-01	0.0E+00

Total	1.7E+01	1.7E+01	1.1E+02	1.4E-01	3.7E-01	1.7E-04

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	2.6E-07
Y 90	1.5E-05
TC 99	1.5E-11
RU 106	7.3E-04
AG 110M	8.7E-06
CD 113M	6.9E-08
SB 125	3.0E-04
TE 125M	4.1E-07
I 129	5.7E-05
CS 134	1.3E-01
CS 137	4.0E-01
CE 144	1.0E-05
PR 144M	2.6E-08
PR 144	4.7E-05
PM 147	4.4E-08
SM 151	1.7E-10
EU 154	1.9E-04
EU 155	1.7E-05
CM 244	1.1E-11
PU 240	3.9E-09
AM 242M	3.0E-09
AM 242	1.4E-07
CM 242	3.3E-10
NP 238	4.5E-08
PU 238	2.8E-09
PU 241	1.5E-13
U 237	0.0E+00
AM 241	7.4E-07
CM 243	3.9E-07
PU 243	0.0E+00
AM 243	7.7E-15
NP 239	5.9E-14
PU 239	1.4E-08

Total	5.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:24:07

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes

H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	4.6E-03	9.7E-03	1.5E-02	9.5E-02	4.0E-01	7.3E+00	3.4E+00	4.6E-03
Y 90	2.1E-07	1.7E-02	4.1E-02	2.1E-01	5.1E-01	6.3E-06	6.2E-06	2.1E-07
TC 99	8.4E-07	9.1E-05	1.6E-06	5.5E-06	1.5E-05	9.9E-07	9.9E-07	8.4E-07
RU 106	1.4E-03	3.1E-03	5.6E-03	2.4E-02	7.1E-02	1.6E-03	1.8E-03	1.5E-03
AG 110M	1.0E-05	3.2E-05	7.2E-05	2.6E-04	7.1E-04	6.6E-06	1.2E-05	6.0E-06
CD 113M	1.0E-02	1.1E-02	1.2E-02	2.0E-02	4.0E-02	1.3E-02	1.2E-02	1.0E-02
SB 125	1.0E-05	5.0E-05	1.3E-04	3.6E-04	9.8E-04	1.1E-04	3.8E-05	1.5E-05
TE 125M	1.9E-05	7.9E-05	1.7E-04	7.5E-04	2.1E-03	5.8E-03	5.3E-04	1.7E-05
I 129	6.6E-03	9.2E-03	5.7E-03	5.7E-03	5.7E-03	7.5E-03	7.9E-03	5.3E-03
CS 134	2.5E+00	2.8E+00	3.3E+00	3.0E+00	3.3E+00	2.5E+00	2.8E+00	3.0E+00
CS 137	1.6E+01	1.7E+01	1.8E+01	1.8E+01	1.8E+01	1.6E+01	1.6E+01	1.7E+01
CE 144	2.0E-06	3.3E-04	1.1E-03	6.6E-03	2.0E-02	3.9E-05	2.7E-05	3.0E-06
PR 144M	8.6E-11	6.4E-07	2.4E-07	5.2E-08	3.0E-09	5.2E-11	1.1E-10	1.5E-11
PR 144	9.6E-09	1.3E-04	3.0E-05	5.7E-06	3.3E-07	4.8E-09	1.0E-08	2.1E-09
PM 147	2.5E-09	1.2E-04	3.0E-04	1.7E-03	5.4E-03	4.4E-04	3.5E-05	3.0E-09
SM 151	1.1E-10	2.4E-06	6.0E-06	3.5E-05	1.0E-04	3.5E-05	2.8E-06	5.3E-11
EU 154	1.2E-05	4.6E-05	1.2E-04	3.9E-04	1.0E-03	2.5E-04	6.7E-05	8.9E-06
EU 155	2.1E-06	2.1E-05	6.0E-05	2.6E-04	7.5E-04	2.8E-04	3.4E-05	1.6E-06
CM 244	1.9E-09	2.7E-07	7.3E-07	4.0E-06	1.2E-05	2.0E-03	1.6E-04	2.7E-05
PU 240	2.1E-07	3.1E-05	7.7E-05	4.4E-04	1.4E-03	4.4E-01	3.4E-02	6.1E-03
AM 242M	4.4E-08	1.8E-07	6.2E-07	5.5E-06	2.2E-05	3.7E-02	3.0E-03	5.2E-04
AM 242	3.6E-10	4.7E-07	1.0E-06	3.8E-06	5.9E-06	3.3E-06	2.9E-07	4.3E-08
CM 242	5.6E-08	9.3E-06	2.2E-05	1.2E-04	3.9E-04	2.7E-03	2.3E-04	3.3E-05
NP 238	1.3E-09	5.4E-08	1.4E-07	5.3E-07	1.2E-06	1.6E-07	3.5E-08	6.2E-09
PU 238	1.5E-07	2.3E-05	5.8E-05	3.4E-04	1.0E-03	2.8E-01	2.2E-02	3.8E-03
PU 241	2.6E-07	2.8E-06	7.5E-06	4.2E-05	1.2E-04	1.6E-01	1.3E-02	2.4E-03
U 237	2.6E-11	3.3E-09	8.8E-09	4.0E-08	1.1E-07	4.2E-10	6.9E-10	1.4E-10
AM 241	9.4E-07	3.6E-05	8.4E-05	4.8E-04	1.5E-03	4.1E-01	3.2E-02	5.7E-03
CM 243	1.0E-07	2.0E-06	4.9E-06	2.8E-05	8.3E-05	1.5E-02	1.2E-03	2.0E-04

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.0E-13	6.4E-13	1.6E-12	8.7E-12	2.8E-11	3.7E-09	3.0E-10	4.8E-11
NP 239	8.0E-14	1.1E-11	2.8E-11	1.3E-10	2.8E-10	1.3E-12	1.5E-12	3.5E-13
PU 239	3.6E-07	5.5E-05	1.4E-04	7.7E-04	2.4E-03	7.8E-01	6.1E-02	1.1E-02
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Total	1.9E+01	2.0E+01	2.1E+01	2.1E+01	2.2E+01	2.8E+01	2.3E+01	2.0E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:24:07

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	4.6E-03	4.6E-03	4.6E-03	0.0E+00	0.0E+00	0.0E+00
Y 90	2.4E-07	2.1E-07	2.1E-07	0.0E+00	6.0E-06	0.0E+00
TC 99	8.4E-07	8.4E-07	2.1E-05	0.0E+00	1.1E-06	0.0E+00
RU 106	1.6E-03	1.4E-03	1.4E-03	0.0E+00	0.0E+00	0.0E+00
AG 110M	3.4E-05	9.3E-06	3.4E-06	0.0E+00	3.0E-04	0.0E+00
CD 113M	1.0E-02	1.0E-02	1.0E-02	1.7E+00	2.8E-01	0.0E+00
SB 125	8.8E-05	1.7E-05	7.6E-06	0.0E+00	4.1E-05	0.0E+00
TE 125M	5.7E-05	2.0E-05	1.7E-05	0.0E+00	0.0E+00	0.0E+00
I 129	5.7E-03	1.3E-02	9.9E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	2.5E+00	2.5E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00
CS 137	1.6E+01	1.6E+01	1.6E+01	0.0E+00	0.0E+00	0.0E+00
CE 144	2.1E-05	3.6E-06	1.5E-06	0.0E+00	2.1E-04	1.7E-04
PR 144M	2.2E-10	1.0E-10	6.4E-12	1.9E-10	1.2E-10	0.0E+00
PR 144	2.3E-08	1.1E-08	1.1E-09	2.3E-08	1.5E-08	0.0E+00
PM 147	1.4E-08	3.5E-09	2.3E-09	0.0E+00	1.2E-04	0.0E+00
SM 151	2.2E-09	1.6E-10	4.8E-11	0.0E+00	9.4E-06	0.0E+00
EU 154	7.8E-05	1.6E-05	3.2E-06	2.5E-05	2.0E-04	0.0E+00
EU 155	2.1E-05	3.0E-06	3.9E-07	5.1E-06	8.8E-05	0.0E+00
CM 244	2.7E-05	1.9E-09	1.8E-09	0.0E+00	4.1E-04	0.0E+00
PU 240	6.0E-03	2.1E-07	1.9E-07	0.0E+00	7.8E-02	0.0E+00
AM 242M	5.2E-04	3.2E-08	1.0E-08	0.0E+00	6.7E-03	0.0E+00
AM 242	6.3E-08	2.2E-09	5.9E-11	0.0E+00	8.8E-07	0.0E+00
CM 242	3.3E-05	5.6E-08	5.6E-08	0.0E+00	6.7E-04	0.0E+00
NP 238	5.0E-08	6.0E-09	1.9E-10	0.0E+00	1.7E-08	0.0E+00
PU 238	3.7E-03	1.5E-07	1.4E-07	0.0E+00	5.1E-02	0.0E+00
PU 241	2.4E-03	1.5E-07	6.5E-08	0.0E+00	2.5E-02	0.0E+00
U 237	2.3E-09	2.1E-10	2.7E-12	3.6E-10	0.0E+00	0.0E+00
AM 241	5.6E-03	7.4E-07	3.6E-07	0.0E+00	7.5E-02	0.0E+00
CM 243	2.1E-04	9.2E-08	4.3E-08	0.0E+00	3.0E-03	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	4.7E-11	7.1E-14	3.6E-14	0.0E+00	8.0E-10	0.0E+00
NP 239	5.5E-12	5.5E-13	6.8E-15	0.0E+00	5.1E-13	0.0E+00
PU 239	1.1E-02	3.6E-07	3.4E-07	0.0E+00	1.4E-01	0.0E+00
-----	-----	-----	-----	-----	-----	-----
Total	1.9E+01	1.8E+01	1.2E+02	1.7E+00	6.5E-01	1.7E-04

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	7.5E-06
Y 90	4.2E-04
TC 99	2.8E-11
RU 106	1.5E-03
AG 110M	1.2E-05
CD 113M	1.3E-06
SB 125	1.2E-03
TE 125M	1.4E-06
I 129	1.0E-04
CS 134	4.5E-01
CS 137	1.2E+01
CE 144	1.8E-05
PR 144M	4.4E-08
PR 144	8.0E-05
PM 147	1.9E-07
SM 151	7.0E-09
EU 154	2.5E-03
EU 155	1.3E-04
CM 244	2.5E-10
PU 240	1.9E-07
AM 242M	1.3E-07
AM 242	6.1E-06
CM 242	1.1E-08
NP 238	2.0E-06
PU 238	1.1E-07
PU 241	2.7E-12
U 237	0.0E+00
AM 241	5.2E-05
CM 243	1.1E-05
PU 243	0.0E+00
AM 243	1.3E-11
NP 239	1.0E-10
PU 239	7.1E-07
-----	-----
Total	1.2E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:25:16

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	4.2E+01	2.5E-01	1.1E+01
Breast	3.7E+01	1.5E-01	5.6E+00
R Marrow	4.2E+01	1.2E-01	5.0E+00
Lung	3.8E+01	1.2E-01	4.6E+00
Thyroid	2.7E+02	3.0E-02	8.0E+00
Bone Sur	6.8E+01	3.0E-02	2.0E+00
LL Int.	4.3E+01	6.0E-02	2.6E+00
S Int.	4.3E+01	6.0E-02	2.6E+00
UL Int.	4.2E+01	6.0E-02	2.5E+00
Stomach	4.1E+01	6.0E-02	2.5E+00
Liver	5.0E+00	6.0E-02	3.0E-01
Internal Effective Dose Equivalent			4.6E+01
External Dose			5.3E-01
Annual Effective Dose Equivalent			4.7E+01

Controlling Organ:	Thyroid
Controlling Pathway:	Ing
Controlling Radionuclide:	CS137

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	4.6E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:25:16

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			8.7E-02	...	
				+		
	2		1.4E-01	1.7E-02	...	Internal
			+	+		Effective
	1	4.0E+01	3.9E+00	8.3E-01	+	Dose
					= 4.6E+01	Equivalent
Internal						Cumulative
Annual		4.0E+01	4.0E+00	9.3E-01	+	Internal
Dose					= 4.8E+01	Dose
		+	+	+	+	
External						
Annual		5.3E-01	4.8E-01	4.4E-01	...	1.2E+01
Dose						
Annual						Cumulative
Dose		4.1E+01	4.5E+00	1.4E+00	+	Dose
					= 6.1E+01	
					4.1E+01	Maximum
						Annual
						Dose Occurred
						In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:25:16

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.2E+00	1.3E+00	1.4E+00	1.4E+00	1.4E+00	3.3E+00	1.4E+00	1.4E+00
Oth. Veg	6.7E+00	7.3E+00	7.5E+00	7.5E+00	7.8E+00	1.8E+01	8.0E+00	7.5E+00
Fruit	6.7E+00	7.3E+00	7.5E+00	7.5E+00	7.8E+00	1.9E+01	8.1E+00	7.5E+00
Cereals	2.4E+00	2.6E+00	2.7E+00	2.7E+00	2.8E+00	6.7E+00	2.9E+00	2.7E+00
Meat	1.3E+01	1.4E+01	1.5E+01	1.5E+01	1.5E+01	1.3E+01	1.3E+01	1.4E+01
Poultry	3.0E-01	3.2E-01	3.3E-01	3.3E-01	3.3E-01	3.0E-01	3.0E-01	3.3E-01
Cow Milk	7.4E+00	8.1E+00	8.4E+00	8.3E+00	8.4E+00	7.6E+00	7.7E+00	8.2E+00
Eggs	5.5E-02	6.0E-02	6.2E-02	6.1E-02	6.2E-02	6.3E-02	5.9E-02	6.1E-02
Soil Ing	2.1E-03	2.3E-03	2.4E-03	2.4E-03	2.5E-03	5.8E-03	2.5E-03	2.4E-03
Total	3.8E+01	4.1E+01	4.3E+01	4.2E+01	4.3E+01	6.8E+01	4.2E+01	4.2E+01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.2E+00	1.2E+00	9.5E+00	3.8E-02	3.5E-01	1.0E-04
Oth. Veg	6.9E+00	6.6E+00	5.7E+01	2.3E-01	2.0E+00	3.8E-04
Fruit	6.9E+00	6.6E+00	5.9E+01	2.5E-01	2.0E+00	3.8E-04
Cereals	2.5E+00	2.4E+00	2.1E+01	7.4E-02	7.2E-01	9.1E-05
Meat	1.3E+01	1.3E+01	1.9E+01	5.3E-03	4.9E-03	7.2E-05
Poultry	3.0E-01	2.9E-01	3.0E-01	3.2E-03	5.3E-04	3.8E-08
Cow Milk	7.4E+00	7.3E+00	9.9E+01	4.0E-03	1.0E-03	3.6E-06
Eggs	5.5E-02	5.4E-02	2.7E+00	6.1E-04	3.6E-04	3.2E-08
Soil Ing	2.2E-03	2.1E-03	1.8E-02	6.1E-05	6.2E-04	1.3E-07
Total	3.8E+01	3.7E+01	2.7E+02	6.1E-01	5.0E+00	1.0E-03

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	5.3E-01
-----	-----
Total	5.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:25:16

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.2E+00	1.3E+00	1.4E+00	1.4E+00	1.5E+00	3.5E+00	1.5E+00	1.4E+00
Oth. Veg	7.1E+00	7.8E+00	8.0E+00	8.1E+00	8.6E+00	2.2E+01	9.8E+00	8.0E+00
Fruit	7.1E+00	7.8E+00	8.0E+00	8.2E+00	8.8E+00	2.3E+01	1.0E+01	8.0E+00
Cereals	2.5E+00	2.7E+00	2.8E+00	2.8E+00	2.9E+00	6.8E+00	3.0E+00	2.8E+00
Meat	1.3E+01	1.4E+01	1.5E+01	1.5E+01	1.5E+01	1.3E+01	1.4E+01	1.5E+01
Poultry	3.0E-01	3.3E-01	3.4E-01	3.3E-01	3.4E-01	3.0E-01	3.1E-01	3.3E-01
Cow Milk	7.6E+00	8.3E+00	8.5E+00	8.4E+00	8.5E+00	7.9E+00	7.9E+00	8.4E+00
Eggs	5.6E-02	6.1E-02	6.3E-02	6.2E-02	6.4E-02	6.5E-02	6.1E-02	6.2E-02
Soil Ing	5.6E-02	6.1E-02	6.1E-02	6.2E-02	6.3E-02	1.6E-01	6.6E-02	6.2E-02
Total	3.9E+01	4.3E+01	4.4E+01	4.4E+01	4.6E+01	7.6E+01	4.6E+01	4.4E+01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.3E+00	1.2E+00	9.6E+00	7.7E-02	3.5E-01	1.0E-04
Oth. Veg	7.3E+00	7.0E+00	6.0E+01	8.9E-01	2.1E+00	3.8E-04
Fruit	7.3E+00	7.0E+00	6.1E+01	1.0E+00	2.2E+00	3.8E-04
Cereals	2.5E+00	2.4E+00	2.1E+01	1.3E-01	7.3E-01	9.1E-05
Meat	1.3E+01	1.3E+01	1.9E+01	9.9E-03	5.6E-03	7.2E-05
Poultry	3.0E-01	3.0E-01	3.1E-01	4.5E-03	7.4E-04	3.8E-08
Cow Milk	7.6E+00	7.5E+00	1.0E+02	7.8E-03	1.7E-03	3.6E-06
Eggs	5.6E-02	5.6E-02	2.8E+00	8.7E-04	4.1E-04	3.2E-08
Soil Ing	5.7E-02	5.5E-02	8.4E-02	1.0E-03	2.0E-02	2.2E-07
Total	4.0E+01	3.9E+01	2.7E+02	2.1E+00	5.3E+00	1.0E-03

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	1.2E+01
-----	-----
Total	1.2E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:25:16

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes

H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.1E-03	2.4E-03	3.7E-03	2.3E-02	9.6E-02	2.0E+00	8.9E-01	1.1E-03
Y 90	6.6E-08	5.6E-03	1.3E-02	6.6E-02	1.6E-01	2.0E-06	2.0E-06	6.6E-08
TC 99	6.2E-07	6.7E-05	1.2E-06	4.0E-06	1.1E-05	7.3E-07	7.3E-07	6.2E-07
RU 106	7.3E-03	1.6E-02	2.9E-02	1.3E-01	3.7E-01	8.6E-03	9.4E-03	7.8E-03
AG 110M	1.6E-05	5.0E-05	1.1E-04	4.1E-04	1.1E-03	1.0E-05	1.8E-05	9.4E-06
CD 113M	3.6E-03	4.0E-03	4.3E-03	6.8E-03	1.4E-02	4.5E-03	4.5E-03	3.7E-03
SB 125	6.7E-05	3.3E-04	8.4E-04	2.4E-03	6.5E-03	7.5E-04	2.5E-04	1.0E-04
TE 125M	1.5E-05	6.2E-05	1.3E-04	5.8E-04	1.6E-03	4.5E-03	4.2E-04	1.3E-05
I 129	1.5E-02	2.2E-02	1.3E-02	1.3E-02	1.3E-02	1.7E-02	1.8E-02	1.2E-02
CS 134	5.1E+00	5.7E+00	6.7E+00	6.2E+00	6.7E+00	5.1E+00	5.7E+00	6.2E+00
CS 137	3.3E+01	3.6E+01	3.6E+01	3.6E+01	3.6E+01	3.3E+01	3.3E+01	3.6E+01
CE 144	1.2E-05	2.0E-03	6.7E-03	4.0E-02	1.2E-01	2.3E-04	1.6E-04	1.8E-05
PR 144M	5.1E-10	3.8E-06	1.4E-06	3.1E-07	1.8E-08	3.1E-10	6.4E-10	8.7E-11
PR 144	5.8E-08	7.6E-04	1.8E-04	3.4E-05	2.0E-06	2.9E-08	6.1E-08	1.3E-08
PM 147	1.5E-08	6.8E-04	1.8E-03	9.8E-03	3.1E-02	2.6E-03	2.1E-04	1.8E-08
SM 151	5.9E-10	1.2E-05	3.1E-05	1.8E-04	5.3E-04	1.9E-04	1.5E-05	2.7E-10
EU 154	6.8E-05	2.5E-04	6.8E-04	2.1E-03	5.5E-03	1.4E-03	3.7E-04	4.9E-05
EU 155	1.1E-05	1.2E-04	3.3E-04	1.4E-03	4.1E-03	1.5E-03	1.9E-04	9.0E-06
CM 244	1.2E-08	1.7E-06	4.6E-06	2.5E-05	7.8E-05	1.3E-02	1.0E-03	1.7E-04
PU 240	2.7E-06	4.0E-04	1.0E-03	5.7E-03	1.8E-02	6.0E+00	4.6E-01	8.3E-02
AM 242M	5.3E-07	2.2E-06	7.5E-06	6.7E-05	2.7E-04	4.8E-01	4.0E-02	6.9E-03
AM 242	4.4E-09	5.8E-06	1.2E-05	4.7E-05	7.2E-05	4.2E-05	3.6E-06	5.3E-07
CM 242	3.0E-07	5.0E-05	1.2E-04	6.7E-04	2.1E-03	1.5E-02	1.2E-03	1.8E-04
NP 238	1.3E-09	5.6E-08	1.4E-07	5.5E-07	1.2E-06	2.7E-07	3.7E-08	6.6E-09
PU 238	2.1E-06	3.1E-04	7.7E-04	4.5E-03	1.4E-02	3.8E+00	3.1E-01	5.3E-02
PU 241	3.7E-06	4.0E-05	1.0E-04	5.9E-04	1.7E-03	2.3E+00	1.8E-01	3.4E-02
U 237	3.6E-10	4.5E-08	1.2E-07	5.5E-07	1.4E-06	5.7E-09	9.4E-09	1.9E-09
AM 241	1.1E-05	4.0E-04	9.4E-04	5.4E-03	1.7E-02	5.2E+00	4.1E-01	7.3E-02
CM 243	6.4E-07	1.3E-05	3.1E-05	1.7E-04	5.2E-04	9.7E-02	7.9E-03	1.3E-03

HNF-SD-FF-CN-013 Rev. 0

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	2.3E-13	1.4E-12	3.5E-12	1.9E-11	6.0E-11	1.8E-08	1.4E-09	2.6E-10
NP 239	2.5E-15	3.5E-13	8.7E-13	3.9E-12	8.7E-12	4.2E-14	4.7E-14	1.1E-14
PU 239	4.5E-06	6.9E-04	1.7E-03	9.8E-03	3.0E-02	1.0E+01	8.0E-01	1.4E-01
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	3.8E+01	4.1E+01	4.3E+01	4.2E+01	4.3E+01	6.8E+01	4.2E+01	4.2E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:25:16

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.1E-03	1.1E-03	1.1E-03	0.0E+00	0.0E+00	0.0E+00
Y 90	7.6E-08	6.6E-08	6.6E-08	0.0E+00	1.9E-06	0.0E+00
TC 99	6.2E-07	6.2E-07	1.6E-05	0.0E+00	8.5E-07	0.0E+00
RU 106	8.2E-03	7.1E-03	7.3E-03	0.0E+00	0.0E+00	0.0E+00
AG 110M	5.3E-05	1.5E-05	5.3E-06	0.0E+00	4.6E-04	0.0E+00
CD 113M	3.7E-03	3.7E-03	3.7E-03	6.1E-01	1.0E-01	0.0E+00
SB 125	5.8E-04	1.1E-04	5.1E-05	0.0E+00	2.7E-04	0.0E+00
TE 125M	4.5E-05	1.6E-05	1.3E-05	0.0E+00	0.0E+00	0.0E+00
I 129	1.3E-02	3.1E-02	2.3E+02	0.0E+00	0.0E+00	0.0E+00
CS 134	5.1E+00	5.1E+00	5.1E+00	0.0E+00	0.0E+00	0.0E+00
CS 137	3.3E+01	3.2E+01	3.2E+01	0.0E+00	0.0E+00	0.0E+00
CE 144	1.3E-04	2.2E-05	9.2E-06	0.0E+00	1.2E-03	1.0E-03
PR 144M	1.3E-09	6.1E-10	3.8E-11	1.1E-09	6.9E-10	0.0E+00
PR 144	1.4E-07	6.5E-08	6.9E-09	1.4E-07	8.8E-08	0.0E+00
PM 147	8.1E-08	2.1E-08	1.4E-08	0.0E+00	6.8E-04	0.0E+00
SM 151	1.1E-08	8.0E-10	2.5E-10	0.0E+00	5.0E-05	0.0E+00
EU 154	4.3E-04	8.6E-05	1.8E-05	1.4E-04	1.1E-03	0.0E+00
EU 155	1.2E-04	1.7E-05	2.1E-06	2.8E-05	4.9E-04	0.0E+00
CM 244	1.7E-04	1.2E-08	1.1E-08	0.0E+00	2.6E-03	0.0E+00
PU 240	8.3E-02	2.7E-06	2.5E-06	0.0E+00	1.0E+00	0.0E+00
AM 242M	6.8E-03	3.9E-07	1.3E-07	0.0E+00	8.6E-02	0.0E+00
AM 242	7.8E-07	2.7E-08	7.2E-10	0.0E+00	1.1E-05	0.0E+00
CM 242	1.8E-04	3.1E-07	3.0E-07	0.0E+00	3.7E-03	0.0E+00
NP 238	5.2E-08	6.3E-09	2.0E-10	0.0E+00	1.8E-08	0.0E+00
PU 238	5.2E-02	2.0E-06	1.9E-06	0.0E+00	7.0E-01	0.0E+00
PU 241	3.4E-02	2.2E-06	9.2E-07	0.0E+00	3.6E-01	0.0E+00
U 237	3.1E-08	2.9E-09	3.7E-11	4.8E-09	0.0E+00	0.0E+00
AM 241	7.2E-02	8.3E-06	4.0E-06	0.0E+00	9.3E-01	0.0E+00
CM 243	1.3E-03	5.8E-07	2.7E-07	0.0E+00	1.9E-02	0.0E+00

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	2.5E-10	1.6E-13	8.1E-14	0.0E+00	3.2E-09	0.0E+00
NP 239	1.7E-13	1.7E-14	2.1E-16	0.0E+00	1.6E-14	0.0E+00
PU 239	1.4E-01	4.5E-06	4.3E-06	0.0E+00	1.8E+00	0.0E+00

Total	3.8E+01	3.7E+01	2.7E+02	6.1E-01	5.0E+00	1.0E-03

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	2.6E-07
Y 90	1.5E-05
TC 99	1.5E-11
RU 106	7.3E-04
AG 110M	8.7E-06
CD 113M	6.9E-08
SB 125	3.0E-04
TE 125M	4.1E-07
I 129	5.7E-05
CS 134	1.3E-01
CS 137	4.0E-01
CE 144	1.0E-05
PR 144M	2.6E-08
PR 144	4.7E-05
PM 147	4.4E-08
SM 151	1.7E-10
EU 154	1.9E-04
EU 155	1.7E-05
CM 244	1.1E-11
PU 240	3.9E-09
AM 242M	3.0E-09
AM 242	1.4E-07
CM 242	3.3E-10
NP 238	4.5E-08
PU 238	2.8E-09
PU 241	1.5E-13
U 237	0.0E+00
AM 241	7.4E-07
CM 243	3.9E-07
PU 243	0.0E+00
AM 243	7.7E-15
NP 239	5.9E-14
PU 239	1.4E-08

Total	5.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:25:16

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	5.4E-03	1.1E-02	1.8E-02	1.1E-01	4.7E-01	8.7E+00	4.1E+00	5.4E-03
Y 90	2.5E-07	2.2E-02	5.1E-02	2.5E-01	6.3E-01	7.8E-06	7.6E-06	2.5E-07
TC 99	9.5E-07	1.0E-04	1.8E-06	6.2E-06	1.7E-05	1.1E-06	1.1E-06	9.5E-07
RU 106	7.5E-03	1.7E-02	3.0E-02	1.3E-01	3.8E-01	8.9E-03	9.7E-03	8.1E-03
AG 110M	1.6E-05	5.1E-05	1.1E-04	4.2E-04	1.1E-03	1.1E-05	1.9E-05	9.6E-06
CD 113M	1.3E-02	1.4E-02	1.5E-02	2.5E-02	5.1E-02	1.6E-02	1.6E-02	1.3E-02
SB 125	6.8E-05	3.4E-04	8.5E-04	2.5E-03	6.6E-03	7.6E-04	2.6E-04	1.0E-04
TE 125M	3.0E-05	1.2E-04	2.6E-04	1.2E-03	3.2E-03	9.0E-03	8.4E-04	2.7E-05
I 129	1.6E-02	2.2E-02	1.4E-02	1.4E-02	1.4E-02	1.8E-02	1.9E-02	1.3E-02
CS 134	5.1E+00	5.7E+00	6.7E+00	6.2E+00	6.7E+00	5.1E+00	5.7E+00	6.2E+00
CS 137	3.4E+01	3.7E+01	3.7E+01	3.7E+01	3.7E+01	3.4E+01	3.4E+01	3.7E+01
CE 144	1.2E-05	2.0E-03	6.7E-03	4.0E-02	1.2E-01	2.4E-04	1.6E-04	1.8E-05
PR 144M	5.1E-10	3.9E-06	1.4E-06	3.1E-07	1.8E-08	3.1E-10	6.4E-10	8.8E-11
PR 144	5.8E-08	7.6E-04	1.8E-04	3.4E-05	2.0E-06	2.9E-08	6.2E-08	1.3E-08
PM 147	1.5E-08	6.8E-04	1.8E-03	9.8E-03	3.2E-02	2.6E-03	2.1E-04	1.8E-08
SM 151	6.1E-10	1.3E-05	3.2E-05	1.9E-04	5.6E-04	1.9E-04	1.5E-05	2.8E-10
EU 154	6.8E-05	2.6E-04	6.8E-04	2.1E-03	5.6E-03	1.4E-03	3.7E-04	5.0E-05
EU 155	1.2E-05	1.2E-04	3.3E-04	1.4E-03	4.2E-03	1.6E-03	1.9E-04	9.1E-06
CM 244	1.2E-08	1.7E-06	4.7E-06	2.5E-05	7.8E-05	1.3E-02	1.1E-03	1.7E-04
PU 240	2.8E-06	4.0E-04	1.0E-03	5.7E-03	1.8E-02	6.0E+00	4.7E-01	8.3E-02
AM 242M	5.4E-07	2.2E-06	7.6E-06	6.8E-05	2.7E-04	4.9E-01	4.0E-02	6.9E-03
AM 242	4.5E-09	5.9E-06	1.3E-05	4.8E-05	7.3E-05	4.2E-05	3.7E-06	5.3E-07
CM 242	3.1E-07	5.1E-05	1.2E-04	6.8E-04	2.1E-03	1.5E-02	1.3E-03	1.8E-04
NP 238	2.5E-09	1.1E-07	2.7E-07	1.0E-06	2.3E-06	4.1E-07	6.9E-08	1.2E-08
PU 238	2.1E-06	3.1E-04	7.7E-04	4.6E-03	1.4E-02	3.8E+00	3.1E-01	5.3E-02
PU 241	3.7E-06	4.0E-05	1.1E-04	5.9E-04	1.7E-03	2.3E+00	1.8E-01	3.5E-02
U 237	3.6E-10	4.6E-08	1.2E-07	5.5E-07	1.4E-06	5.7E-09	9.4E-09	2.0E-09
AM 241	1.1E-05	4.1E-04	9.6E-04	5.5E-03	1.7E-02	5.3E+00	4.1E-01	7.4E-02
CM 243	6.5E-07	1.3E-05	3.1E-05	1.8E-04	5.3E-04	9.7E-02	7.9E-03	1.3E-03

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	3.3E-13	2.0E-12	5.1E-12	2.7E-11	8.7E-11	2.2E-08	1.7E-09	3.0E-10
NP 239	8.3E-14	1.2E-11	2.9E-11	1.3E-10	2.9E-10	1.4E-12	1.6E-12	3.6E-13
PU 239	4.5E-06	6.9E-04	1.7E-03	9.8E-03	3.1E-02	1.0E+01	8.0E-01	1.4E-01
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	3.9E+01	4.3E+01	4.4E+01	4.4E+01	4.6E+01	7.6E+01	4.6E+01	4.4E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:25:16

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	5.4E-03	5.4E-03	5.4E-03	0.0E+00	0.0E+00	0.0E+00
Y 90	2.9E-07	2.5E-07	2.5E-07	0.0E+00	7.5E-06	0.0E+00
TC 99	9.5E-07	9.5E-07	2.4E-05	0.0E+00	1.3E-06	0.0E+00
RU 106	8.5E-03	7.3E-03	7.5E-03	0.0E+00	0.0E+00	0.0E+00
AG 110M	5.4E-05	1.5E-05	5.4E-06	0.0E+00	4.7E-04	0.0E+00
CD 113M	1.3E-02	1.3E-02	1.3E-02	2.1E+00	3.5E-01	0.0E+00
SB 125	5.9E-04	1.1E-04	5.2E-05	0.0E+00	2.8E-04	0.0E+00
TE 125M	8.9E-05	3.2E-05	2.7E-05	0.0E+00	0.0E+00	0.0E+00
I 129	1.4E-02	3.1E-02	2.4E+02	0.0E+00	0.0E+00	0.0E+00
CS 134	5.1E+00	5.1E+00	5.1E+00	0.0E+00	0.0E+00	0.0E+00
CS 137	3.4E+01	3.4E+01	3.4E+01	0.0E+00	0.0E+00	0.0E+00
CE 144	1.3E-04	2.2E-05	9.2E-06	0.0E+00	1.3E-03	1.0E-03
PR 144M	1.3E-09	6.2E-10	3.9E-11	1.1E-09	6.9E-10	0.0E+00
PR 144	1.4E-07	6.5E-08	6.9E-09	1.4E-07	8.9E-08	0.0E+00
PM 147	8.2E-08	2.1E-08	1.4E-08	0.0E+00	6.8E-04	0.0E+00
SM 151	1.2E-08	8.3E-10	2.6E-10	0.0E+00	5.2E-05	0.0E+00
EU 154	4.4E-04	8.7E-05	1.8E-05	1.4E-04	1.1E-03	0.0E+00
EU 155	1.2E-04	1.7E-05	2.1E-06	2.9E-05	4.9E-04	0.0E+00
CM 244	1.7E-04	1.2E-08	1.1E-08	0.0E+00	2.6E-03	0.0E+00
PU 240	8.3E-02	2.7E-06	2.5E-06	0.0E+00	1.1E+00	0.0E+00
AM 242M	6.8E-03	3.9E-07	1.3E-07	0.0E+00	8.7E-02	0.0E+00
AM 242	7.9E-07	2.7E-08	7.3E-10	0.0E+00	1.1E-05	0.0E+00
CM 242	1.8E-04	3.1E-07	3.1E-07	0.0E+00	3.7E-03	0.0E+00
NP 238	9.9E-08	1.2E-08	3.7E-10	0.0E+00	3.5E-08	0.0E+00
PU 238	5.2E-02	2.0E-06	1.9E-06	0.0E+00	7.0E-01	0.0E+00
PU 241	3.4E-02	2.2E-06	9.2E-07	0.0E+00	3.6E-01	0.0E+00
U 237	3.1E-08	2.9E-09	3.7E-11	4.9E-09	0.0E+00	0.0E+00
AM 241	7.2E-02	8.5E-06	4.1E-06	0.0E+00	9.4E-01	0.0E+00
CM 243	1.3E-03	5.8E-07	2.7E-07	0.0E+00	1.9E-02	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	3.0E-10	2.3E-13	1.2E-13	0.0E+00	4.0E-09	0.0E+00
NP 239	5.6E-12	5.6E-13	7.0E-15	0.0E+00	5.3E-13	0.0E+00
PU 239	1.4E-01	4.5E-06	4.3E-06	0.0E+00	1.8E+00	0.0E+00

Total	4.0E+01	3.9E+01	2.7E+02	2.1E+00	5.3E+00	1.0E-03

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	7.5E-06
Y 90	4.2E-04
TC 99	2.8E-11
RU 106	1.5E-03
AG 110M	1.2E-05
CD 113M	1.3E-06
SB 125	1.2E-03
TE 125M	1.4E-06
I 129	1.0E-04
CS 134	4.5E-01
CS 137	1.2E+01
CE 144	1.8E-05
PR 144M	4.4E-08
PR 144	8.0E-05
PM 147	1.9E-07
SM 151	7.0E-09
EU 154	2.5E-03
EU 155	1.3E-04
CM 244	2.5E-10
PU 240	1.9E-07
AM 242M	1.3E-07
AM 242	6.1E-06
CM 242	1.1E-08
NP 238	2.0E-06
PU 238	1.1E-07
PU 241	2.7E-12
U 237	0.0E+00
AM 241	5.2E-05
CM 243	1.1E-05
PU 243	0.0E+00
AM 243	1.3E-11
NP 239	1.0E-10
PU 239	7.1E-07

Total	1.2E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:26:25

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 Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	6.2E+02	2.5E-01	1.5E+02
Breast	5.7E+02	1.5E-01	8.5E+01
R Marrow	6.4E+02	1.2E-01	7.7E+01
Lung	5.7E+02	1.2E-01	6.9E+01
Thyroid	2.7E+03	3.0E-02	8.0E+01
Bone Sur	7.7E+02	3.0E-02	2.3E+01
LL Int.	6.3E+02	6.0E-02	3.8E+01
S Int.	6.2E+02	6.0E-02	3.7E+01
UL Int.	6.2E+02	6.0E-02	3.7E+01
Stomach	6.1E+02	6.0E-02	3.7E+01
Liver	2.7E+01	6.0E-02	1.6E+00
Internal Effective Dose Equivalent			6.4E+02
External Dose			5.3E-01
Annual Effective Dose Equivalent			6.4E+02

 Controlling Organ: Thyroid
 Controlling Pathway: Ing
 Controlling Radionuclide: CS137

 Total Inhalation EDE: 0.0E+00
 Total Ingestion EDE: 6.4E+02

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:26:25

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 Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:	3		8.7E-02	...	
			+		
	2	1.4E-01	1.7E-02	...	Internal Effective Dose Equivalent
		+	+		
	1	5.8E+02	+ 3.9E+01	+ 8.2E+00 + ... = 6.4E+02	Cumulative Internal Dose
Internal Annual Dose		5.8E+02	+ 3.9E+01	+ 8.3E+00 + ... = 6.4E+02	
		+	+	+	
External Annual Dose		5.3E-01	4.8E-01	4.4E-01 ... 1.2E+01	
Annual Dose		5.8E+02	+ 3.9E+01	+ 8.7E+00 + ... = 6.5E+02	Cumulative Dose
				5.8E+02	Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:26:25

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	2.7E+01	2.9E+01	2.9E+01	2.9E+01	3.0E+01	6.4E+01	3.2E+01	2.9E+01
Oth. Veg	6.9E+01	7.1E+01	7.2E+01	7.2E+01	7.4E+01	1.3E+02	8.4E+01	7.2E+01
Fruit	8.8E+01	9.1E+01	9.2E+01	9.2E+01	9.3E+01	1.5E+02	1.1E+02	9.2E+01
Cereals	2.0E+01	2.1E+01	2.1E+01	2.1E+01	2.2E+01	4.1E+01	2.4E+01	2.1E+01
Meat	2.0E+02	2.2E+02	2.3E+02	2.2E+02	2.3E+02	2.1E+02	2.1E+02	2.2E+02
Poultry	4.6E+00	4.7E+00	4.7E+00	4.7E+00	4.7E+00	5.1E+00	5.4E+00	4.7E+00
Cow Milk	1.6E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02
Eggs	5.8E+00	5.8E+00	5.8E+00	5.8E+00	5.8E+00	6.8E+00	7.1E+00	5.8E+00
Soil Ing	2.1E-03	2.3E-03	2.4E-03	2.4E-03	2.5E-03	5.8E-03	2.5E-03	2.4E-03
Total	5.7E+02	6.1E+02	6.2E+02	6.2E+02	6.3E+02	7.7E+02	6.4E+02	6.2E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	2.7E+01	2.6E+01	1.8E+02	6.1E-01	6.1E+00	1.3E-03
Oth. Veg	6.9E+01	6.8E+01	2.8E+02	8.5E-01	8.7E+00	1.8E-03
Fruit	8.9E+01	8.8E+01	3.0E+02	8.7E-01	8.7E+00	1.8E-03
Cereals	2.0E+01	2.0E+01	1.0E+02	3.2E-01	3.2E+00	4.2E-04
Meat	2.0E+02	2.0E+02	2.9E+02	7.2E-02	6.9E-02	7.4E-04
Poultry	4.6E+00	4.5E+00	4.6E+00	7.2E-03	1.2E-03	1.8E-07
Cow Milk	1.6E+02	1.6E+02	1.5E+03	5.3E-02	1.3E-02	3.6E-05
Eggs	5.8E+00	5.8E+00	1.6E+01	1.4E-03	1.4E-03	1.5E-07
Soil Ing	2.2E-03	2.1E-03	1.8E-02	6.1E-05	6.2E-04	1.3E-07
Total	5.8E+02	5.7E+02	2.7E+03	2.8E+00	2.7E+01	6.1E-03

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	5.3E-01
-----	-----
Total	5.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:26:25

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	2.7E+01	2.9E+01	2.9E+01	2.9E+01	3.0E+01	6.4E+01	3.2E+01	2.9E+01
Oth. Veg	6.9E+01	7.2E+01	7.3E+01	7.3E+01	7.4E+01	1.3E+02	8.5E+01	7.3E+01
Fruit	8.9E+01	9.1E+01	9.2E+01	9.3E+01	9.4E+01	1.5E+02	1.1E+02	9.2E+01
Cereals	2.0E+01	2.1E+01	2.1E+01	2.1E+01	2.2E+01	4.1E+01	2.4E+01	2.1E+01
Meat	2.0E+02	2.2E+02	2.3E+02	2.3E+02	2.3E+02	2.1E+02	2.1E+02	2.2E+02
Poultry	4.6E+00	4.7E+00	4.7E+00	4.7E+00	4.7E+00	5.1E+00	5.4E+00	4.7E+00
Cow Milk	1.6E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02
Eggs	5.8E+00	5.8E+00	5.8E+00	5.8E+00	5.8E+00	6.8E+00	7.1E+00	5.8E+00
Soil Ing	5.6E-02	6.1E-02	6.1E-02	6.2E-02	6.3E-02	1.6E-01	6.6E-02	6.2E-02
Total	5.8E+02	6.1E+02	6.2E+02	6.2E+02	6.3E+02	7.8E+02	6.5E+02	6.2E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	2.7E+01	2.6E+01	1.8E+02	6.5E-01	6.2E+00	1.3E-03
Oth. Veg	7.0E+01	6.9E+01	2.9E+02	1.5E+00	8.8E+00	1.8E-03
Fruit	8.9E+01	8.8E+01	3.1E+02	1.6E+00	8.8E+00	1.8E-03
Cereals	2.0E+01	2.0E+01	1.0E+02	3.7E-01	3.2E+00	4.2E-04
Meat	2.0E+02	2.0E+02	2.9E+02	7.7E-02	6.9E-02	7.4E-04
Poultry	4.6E+00	4.5E+00	4.6E+00	8.5E-03	1.4E-03	1.8E-07
Cow Milk	1.6E+02	1.6E+02	1.5E+03	5.7E-02	1.3E-02	3.6E-05
Eggs	5.8E+00	5.8E+00	1.6E+01	1.7E-03	1.4E-03	1.5E-07
Soil Ing	5.7E-02	5.5E-02	8.4E-02	1.0E-03	2.0E-02	2.2E-07
Total	5.8E+02	5.7E+02	2.7E+03	4.3E+00	2.7E+01	6.1E-03

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	1.2E+01
-----	-----
Total	1.2E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:26:25

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.9E+02	1.9E+02	1.9E+02	1.9E+02	1.9E+02	2.2E+02	2.3E+02	1.9E+02
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	5.9E-03	1.2E-02	2.0E-02	1.2E-01	5.1E-01	1.1E+01	4.7E+00	5.9E-03
Y 90	3.2E-07	2.7E-02	6.4E-02	3.2E-01	7.8E-01	9.8E-06	9.6E-06	3.2E-07
TC 99	6.3E-07	6.8E-05	1.2E-06	4.1E-06	1.1E-05	7.4E-07	7.4E-07	6.3E-07
RU 106	4.2E-02	9.3E-02	1.7E-01	7.3E-01	2.1E+00	5.0E-02	5.4E-02	4.5E-02
AG 110M	1.4E-04	4.2E-04	9.5E-04	3.5E-03	9.4E-03	8.8E-05	1.5E-04	8.0E-05
CD 113M	1.7E-02	1.8E-02	1.9E-02	3.1E-02	6.3E-02	2.0E-02	2.0E-02	1.7E-02
SB 125	4.0E-04	1.9E-03	4.9E-03	1.4E-02	3.8E-02	4.4E-03	1.5E-03	5.9E-04
TE 125M	9.0E-05	3.7E-04	7.7E-04	3.5E-03	9.6E-03	2.7E-02	2.5E-03	7.9E-05
I 129	1.4E-01	2.0E-01	1.2E-01	1.2E-01	1.2E-01	1.6E-01	1.7E-01	1.1E-01
CS 134	4.9E+01	5.5E+01	6.4E+01	5.9E+01	6.4E+01	4.9E+01	5.5E+01	5.9E+01
CS 137	3.4E+02	3.7E+02	3.7E+02	3.7E+02	3.7E+02	3.4E+02	3.4E+02	3.7E+02
CE 144	6.9E-05	1.2E-02	3.9E-02	2.3E-01	7.1E-01	1.4E-03	9.7E-04	1.1E-04
PR 144M	3.0E-09	2.3E-05	8.3E-06	1.8E-06	1.1E-07	1.8E-09	3.8E-09	5.1E-10
PR 144	3.4E-07	4.5E-03	1.1E-03	2.0E-04	1.2E-05	1.7E-07	3.6E-07	7.6E-08
PM 147	9.4E-08	4.3E-03	1.1E-02	6.3E-02	2.0E-01	1.6E-02	1.3E-03	1.1E-07
SM 151	3.8E-09	7.9E-05	2.0E-04	1.2E-03	3.4E-03	1.2E-03	9.6E-05	1.7E-09
EU 154	4.4E-04	1.7E-03	4.4E-03	1.4E-02	3.6E-02	9.1E-03	2.4E-03	3.2E-04
EU 155	7.4E-05	7.6E-04	2.1E-03	9.1E-03	2.7E-02	9.9E-03	1.2E-03	5.8E-05
CM 244	7.5E-08	1.1E-05	2.9E-05	1.6E-04	4.9E-04	8.1E-02	6.6E-03	1.1E-03
PU 240	1.5E-05	2.2E-03	5.4E-03	3.1E-02	9.8E-02	3.3E+01	2.5E+00	4.5E-01
AM 242M	2.8E-06	1.2E-05	4.0E-05	3.6E-04	1.4E-03	2.6E+00	2.1E-01	3.7E-02
AM 242	2.4E-08	3.1E-05	6.7E-05	2.5E-04	3.8E-04	2.2E-04	1.9E-05	2.8E-06
CM 242	1.9E-06	3.1E-04	7.3E-04	4.2E-03	1.3E-02	9.3E-02	7.7E-03	1.1E-03
NP 238	7.1E-09	3.0E-07	7.8E-07	3.0E-06	6.6E-06	1.5E-06	2.0E-07	3.5E-08
PU 238	1.1E-05	1.6E-03	4.0E-03	2.4E-02	7.2E-02	2.0E+01	1.6E+00	2.8E-01
PU 241	1.9E-05	2.1E-04	5.6E-04	3.1E-03	9.0E-03	1.2E+01	9.5E-01	1.8E-01
U 237	2.0E-09	2.6E-07	6.8E-07	3.1E-06	8.2E-06	3.2E-08	5.4E-08	1.1E-08
AM 241	5.5E-05	2.1E-03	4.9E-03	2.8E-02	8.7E-02	2.7E+01	2.1E+00	3.8E-01
CM 243	4.1E-06	8.1E-05	2.0E-04	1.1E-03	3.3E-03	6.2E-01	5.0E-02	8.4E-03

HNF-SD-FF-CN-013 Rev. 0

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.1E-12	7.0E-12	1.7E-11	9.4E-11	3.0E-10	9.0E-08	7.1E-09	1.3E-09
NP 239	1.2E-14	1.7E-12	4.3E-12	1.9E-11	4.3E-11	2.0E-13	2.3E-13	5.3E-14
PU 239	2.4E-05	3.7E-03	9.2E-03	5.2E-02	1.6E-01	5.5E+01	4.3E+00	7.6E-01
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Total	5.7E+02	6.1E+02	6.2E+02	6.2E+02	6.3E+02	7.7E+02	6.4E+02	6.2E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:26:25

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	1.9E+02	1.9E+02	1.9E+02	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	5.9E-03	5.9E-03	5.9E-03	0.0E+00	0.0E+00	0.0E+00
Y 90	3.7E-07	3.2E-07	3.2E-07	0.0E+00	9.3E-06	0.0E+00
TC 99	6.3E-07	6.3E-07	1.6E-05	0.0E+00	8.6E-07	0.0E+00
RU 106	4.7E-02	4.1E-02	4.2E-02	0.0E+00	0.0E+00	0.0E+00
AG 110M	4.5E-04	1.2E-04	4.5E-05	0.0E+00	3.9E-03	0.0E+00
CD 113M	1.7E-02	1.7E-02	1.7E-02	2.8E+00	4.6E-01	0.0E+00
SB 125	3.4E-03	6.5E-04	3.0E-04	0.0E+00	1.6E-03	0.0E+00
TE 125M	2.6E-04	9.4E-05	7.9E-05	0.0E+00	0.0E+00	0.0E+00
I 129	1.2E-01	2.8E-01	2.1E+03	0.0E+00	0.0E+00	0.0E+00
CS 134	4.9E+01	4.9E+01	4.9E+01	0.0E+00	0.0E+00	0.0E+00
CS 137	3.4E+02	3.4E+02	3.4E+02	0.0E+00	0.0E+00	0.0E+00
CE 144	7.5E-04	1.3E-04	5.4E-05	0.0E+00	7.3E-03	6.1E-03
PR 144M	7.9E-09	3.6E-09	2.3E-10	6.7E-09	4.1E-09	0.0E+00
PR 144	8.3E-07	3.8E-07	4.0E-08	8.0E-07	5.2E-07	0.0E+00
PM 147	5.2E-07	1.3E-07	8.8E-08	0.0E+00	4.3E-03	0.0E+00
SM 151	7.2E-08	5.1E-09	1.6E-09	0.0E+00	3.2E-04	0.0E+00
EU 154	2.8E-03	5.6E-04	1.1E-04	9.1E-04	7.3E-03	0.0E+00
EU 155	7.5E-04	1.1E-04	1.4E-05	1.8E-04	3.1E-03	0.0E+00
CM 244	1.1E-03	7.4E-08	7.1E-08	0.0E+00	1.6E-02	0.0E+00
PU 240	4.5E-01	1.5E-05	1.4E-05	0.0E+00	5.7E+00	0.0E+00
AM 242M	3.6E-02	2.1E-06	6.7E-07	0.0E+00	4.6E-01	0.0E+00
AM 242	4.1E-06	1.4E-07	3.8E-09	0.0E+00	5.8E-05	0.0E+00
CM 242	1.1E-03	1.9E-06	1.9E-06	0.0E+00	2.3E-02	0.0E+00
NP 238	2.8E-07	3.4E-08	1.1E-09	0.0E+00	9.9E-08	0.0E+00
PU 238	2.7E-01	1.1E-05	1.0E-05	0.0E+00	3.7E+00	0.0E+00
PU 241	1.8E-01	1.1E-05	4.9E-06	0.0E+00	1.9E+00	0.0E+00
U 237	1.8E-07	1.7E-08	2.1E-10	2.8E-08	0.0E+00	0.0E+00
AM 241	3.8E-01	4.3E-05	2.1E-05	0.0E+00	4.9E+00	0.0E+00
CM 243	8.5E-03	3.7E-06	1.7E-06	0.0E+00	1.2E-01	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.3E-09	8.0E-13	4.0E-13	0.0E+00	1.6E-08	0.0E+00
NP 239	8.2E-13	8.2E-14	1.0E-15	0.0E+00	7.8E-14	0.0E+00
PU 239	7.6E-01	2.4E-05	2.3E-05	0.0E+00	9.6E+00	0.0E+00
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Total	5.8E+02	5.7E+02	2.7E+03	2.8E+00	2.7E+01	6.1E-03

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	2.6E-07
Y 90	1.5E-05
TC 99	1.5E-11
RU 106	7.3E-04
AG 110M	8.7E-06
CD 113M	6.9E-08
SB 125	3.0E-04
TE 125M	4.1E-07
I 129	5.7E-05
CS 134	1.3E-01
CS 137	4.0E-01
CE 144	1.0E-05
PR 144M	2.6E-08
PR 144	4.7E-05
PM 147	4.4E-08
SM 151	1.7E-10
EU 154	1.9E-04
EU 155	1.7E-05
CM 244	1.1E-11
PU 240	3.9E-09
AM 242M	3.0E-09
AM 242	1.4E-07
CM 242	3.3E-10
NP 238	4.5E-08
PU 238	2.8E-09
PU 241	1.5E-13
U 237	0.0E+00
AM 241	7.4E-07
CM 243	3.9E-07
PU 243	0.0E+00
AM 243	7.7E-15
NP 239	5.9E-14
PU 239	1.4E-08
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Total	5.3E-01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:26:25

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.9E+02	1.9E+02	1.9E+02	1.9E+02	1.9E+02	2.2E+02	2.3E+02	1.9E+02
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.0E-02	2.1E-02	3.4E-02	2.1E-01	8.8E-01	1.7E+01	7.9E+00	1.0E-02
Y 90	5.1E-07	4.3E-02	1.0E-01	5.1E-01	1.2E+00	1.6E-05	1.5E-05	5.1E-07
TC 99	9.5E-07	1.0E-04	1.8E-06	6.2E-06	1.7E-05	1.1E-06	1.1E-06	9.5E-07
RU 106	4.2E-02	9.3E-02	1.7E-01	7.4E-01	2.2E+00	5.0E-02	5.4E-02	4.5E-02
AG 110M	1.4E-04	4.2E-04	9.5E-04	3.5E-03	9.4E-03	8.8E-05	1.5E-04	8.0E-05
CD 113M	2.6E-02	2.8E-02	3.0E-02	4.9E-02	1.0E-01	3.2E-02	3.2E-02	2.7E-02
SB 125	4.0E-04	1.9E-03	4.9E-03	1.4E-02	3.8E-02	4.4E-03	1.5E-03	5.9E-04
TE 125M	1.0E-04	4.3E-04	9.0E-04	4.0E-03	1.1E-02	3.1E-02	2.9E-03	9.3E-05
I 129	1.4E-01	2.0E-01	1.2E-01	1.2E-01	1.2E-01	1.6E-01	1.7E-01	1.1E-01
CS 134	4.9E+01	5.5E+01	6.4E+01	5.9E+01	6.4E+01	4.9E+01	5.5E+01	5.9E+01
CS 137	3.4E+02	3.7E+02	3.7E+02	3.7E+02	3.7E+02	3.4E+02	3.4E+02	3.7E+02
CE 144	6.9E-05	1.2E-02	3.9E-02	2.3E-01	7.1E-01	1.4E-03	9.7E-04	1.1E-04
PR 144M	3.0E-09	2.3E-05	8.3E-06	1.8E-06	1.1E-07	1.8E-09	3.8E-09	5.1E-10
PR 144	3.4E-07	4.5E-03	1.1E-03	2.0E-04	1.2E-05	1.7E-07	3.6E-07	7.6E-08
PM 147	9.4E-08	4.3E-03	1.1E-02	6.3E-02	2.0E-01	1.6E-02	1.3E-03	1.1E-07
SM 151	3.8E-09	7.9E-05	2.0E-04	1.2E-03	3.4E-03	1.2E-03	9.6E-05	1.8E-09
EU 154	4.4E-04	1.7E-03	4.4E-03	1.4E-02	3.6E-02	9.1E-03	2.4E-03	3.2E-04
EU 155	7.4E-05	7.6E-04	2.1E-03	9.1E-03	2.7E-02	9.9E-03	1.2E-03	5.8E-05
CM 244	7.5E-08	1.1E-05	2.9E-05	1.6E-04	4.9E-04	8.2E-02	6.6E-03	1.1E-03
PU 240	1.5E-05	2.2E-03	5.4E-03	3.1E-02	9.8E-02	3.3E+01	2.5E+00	4.5E-01
AM 242M	2.8E-06	1.2E-05	4.0E-05	3.6E-04	1.4E-03	2.6E+00	2.1E-01	3.7E-02
AM 242	2.4E-08	3.1E-05	6.7E-05	2.5E-04	3.9E-04	2.2E-04	1.9E-05	2.8E-06
CM 242	1.9E-06	3.1E-04	7.3E-04	4.2E-03	1.3E-02	9.3E-02	7.7E-03	1.1E-03
NP 238	8.3E-09	3.6E-07	9.1E-07	3.5E-06	7.7E-06	1.6E-06	2.3E-07	4.1E-08
PU 238	1.1E-05	1.6E-03	4.0E-03	2.4E-02	7.2E-02	2.0E+01	1.6E+00	2.8E-01
PU 241	2.0E-05	2.1E-04	5.6E-04	3.1E-03	9.1E-03	1.2E+01	9.5E-01	1.8E-01
U 237	2.0E-09	2.6E-07	6.8E-07	3.1E-06	8.2E-06	3.2E-08	5.4E-08	1.1E-08
AM 241	5.6E-05	2.1E-03	5.0E-03	2.9E-02	8.7E-02	2.7E+01	2.1E+00	3.8E-01
CM 243	4.1E-06	8.1E-05	2.0E-04	1.1E-03	3.4E-03	6.2E-01	5.0E-02	8.4E-03

HNH-SD-FF-CN-013 Rev. 0

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.2E-12	7.6E-12	1.9E-11	1.0E-10	3.3E-10	9.3E-08	7.4E-09	1.3E-09
NP 239	9.2E-14	1.3E-11	3.3E-11	1.4E-10	3.3E-10	1.5E-12	1.8E-12	4.1E-13
PU 239	2.4E-05	3.7E-03	9.2E-03	5.2E-02	1.6E-01	5.5E+01	4.3E+00	7.6E-01
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Total	5.8E+02	6.1E+02	6.2E+02	6.2E+02	6.3E+02	7.8E+02	6.5E+02	6.2E+02

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Drop on ISC - ingestion doses

Executed on: 10/21/97 at 15:26:25

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	1.9E+02	1.9E+02	1.9E+02	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.0E-02	1.0E-02	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Y 90	5.9E-07	5.1E-07	5.1E-07	0.0E+00	1.5E-05	0.0E+00
TC 99	9.5E-07	9.5E-07	2.4E-05	0.0E+00	1.3E-06	0.0E+00
RU 106	4.8E-02	4.1E-02	4.2E-02	0.0E+00	0.0E+00	0.0E+00
AG 110M	4.5E-04	1.2E-04	4.5E-05	0.0E+00	3.9E-03	0.0E+00
CD 113M	2.7E-02	2.7E-02	2.7E-02	4.3E+00	7.1E-01	0.0E+00
SB 125	3.4E-03	6.5E-04	3.0E-04	0.0E+00	1.6E-03	0.0E+00
TE 125M	3.1E-04	1.1E-04	9.3E-05	0.0E+00	0.0E+00	0.0E+00
I 129	1.2E-01	2.8E-01	2.1E+03	0.0E+00	0.0E+00	0.0E+00
CS 134	4.9E+01	4.9E+01	4.9E+01	0.0E+00	0.0E+00	0.0E+00
CS 137	3.4E+02	3.4E+02	3.4E+02	0.0E+00	0.0E+00	0.0E+00
CE 144	7.5E-04	1.3E-04	5.4E-05	0.0E+00	7.4E-03	6.1E-03
PR 144M	7.9E-09	3.6E-09	2.3E-10	6.7E-09	4.1E-09	0.0E+00
PR 144	8.3E-07	3.8E-07	4.0E-08	8.0E-07	5.2E-07	0.0E+00
PM 147	5.2E-07	1.3E-07	8.8E-08	0.0E+00	4.3E-03	0.0E+00
SM 151	7.2E-08	5.2E-09	1.6E-09	0.0E+00	3.2E-04	0.0E+00
EU 154	2.8E-03	5.7E-04	1.2E-04	9.1E-04	7.3E-03	0.0E+00
EU 155	7.5E-04	1.1E-04	1.4E-05	1.8E-04	3.1E-03	0.0E+00
CM 244	1.1E-03	7.5E-08	7.1E-08	0.0E+00	1.6E-02	0.0E+00
PU 240	4.5E-01	1.5E-05	1.4E-05	0.0E+00	5.7E+00	0.0E+00
AM 242M	3.6E-02	2.1E-06	6.7E-07	0.0E+00	4.6E-01	0.0E+00
AM 242	4.2E-06	1.4E-07	3.9E-09	0.0E+00	5.8E-05	0.0E+00
CM 242	1.1E-03	1.9E-06	1.9E-06	0.0E+00	2.3E-02	0.0E+00
NP 238	3.3E-07	4.0E-08	1.2E-09	0.0E+00	1.2E-07	0.0E+00
PU 238	2.7E-01	1.1E-05	1.0E-05	0.0E+00	3.7E+00	0.0E+00
PU 241	1.8E-01	1.2E-05	4.9E-06	0.0E+00	1.9E+00	0.0E+00
U 237	1.8E-07	1.7E-08	2.1E-10	2.8E-08	0.0E+00	0.0E+00
AM 241	3.8E-01	4.4E-05	2.1E-05	0.0E+00	4.9E+00	0.0E+00
CM 243	8.6E-03	3.7E-06	1.7E-06	0.0E+00	1.2E-01	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.3E-09	8.7E-13	4.4E-13	0.0E+00	1.7E-08	0.0E+00
NP 239	6.3E-12	6.3E-13	7.8E-15	0.0E+00	5.9E-13	0.0E+00
PU 239	7.6E-01	2.4E-05	2.3E-05	0.0E+00	9.6E+00	0.0E+00
-----	-----	-----	-----	-----	-----	-----
Total	5.8E+02	5.7E+02	2.7E+03	4.3E+00	2.7E+01	6.1E-03

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	7.5E-06
Y 90	4.2E-04
TC 99	2.8E-11
RU 106	1.5E-03
AG 110M	1.2E-05
CD 113M	1.3E-06
SB 125	1.2E-03
TE 125M	1.4E-06
I 129	1.0E-04
CS 134	4.5E-01
CS 137	1.2E+01
CE 144	1.8E-05
PR 144M	4.4E-08
PR 144	8.0E-05
PM 147	1.9E-07
SM 151	7.0E-09
EU 154	2.5E-03
EU 155	1.3E-04
CM 244	2.5E-10
PU 240	1.9E-07
AM 242M	1.3E-07
AM 242	6.1E-06
CM 242	1.1E-08
NP 238	2.0E-06
PU 238	1.1E-07
PU 241	2.7E-12
U 237	0.0E+00
AM 241	5.2E-05
CM 243	1.1E-05
PU 243	0.0E+00
AM 243	1.3E-11
NP 239	1.0E-10
PU 239	7.1E-07
-----	-----
Total	1.2E+01

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Attachment 7

**GENII Output File for
Hypothetical Unrestricted Release
of Fuel Inventory (Section 3.5)**

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Disruption of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 13:42:45

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\trit5.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

-----Release Terms-----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

H 3	6.7E+01	0.0E+00	0.0E+00
KR85	5.8E+02	0.0E+00	0.0E+00
SR90	1.0E-01	0.0E+00	0.0E+00
Y 90	1.0E-01	0.0E+00	0.0E+00
TC99	4.1E-05	0.0E+00	0.0E+00
RU106	1.8E-01	0.0E+00	0.0E+00
AG110M	2.0E-04	0.0E+00	0.0E+00
CD113M	2.2E-02	0.0E+00	0.0E+00
SB125	3.0E-02	0.0E+00	0.0E+00
TE125M	7.2E-03	0.0E+00	0.0E+00

I 129	2.8E-04	0.0E+00	0.0E+00
CS134	3.8E+00	0.0E+00	0.0E+00
CS137	2.9E+01	0.0E+00	0.0E+00
CE144	6.8E-02	0.0E+00	0.0E+00
PR144	6.8E-02	0.0E+00	0.0E+00
PR144M	8.2E-04	0.0E+00	0.0E+00
PM147	2.5E-01	0.0E+00	0.0E+00
SM151	1.2E-02	0.0E+00	0.0E+00
EU154	7.2E-03	0.0E+00	0.0E+00
EU155	2.7E-02	0.0E+00	0.0E+00
PU238	6.3E-03	0.0E+00	0.0E+00
PU239	1.4E-02	0.0E+00	0.0E+00
PU240	8.3E-03	0.0E+00	0.0E+00
PU241	1.7E-01	0.0E+00	0.0E+00
AM241	7.1E-03	0.0E+00	0.0E+00
AM242M	7.2E-04	0.0E+00	0.0E+00
CM242	9.6E-04	0.0E+00	0.0E+00
CM243	1.8E-04	0.0E+00	0.0E+00
CM244	3.0E-05	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 1.0E+00 Fraction of time spent in cloud

===== INHALATION =====
 Resuspension not considered

Input prepared by: _____ Date: _____

Input checked by: _____ Date: _____

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Disruption of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 13:43:18

Page C. 1

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.8E+03	2.5E-01	4.6E+02
Breast	3.4E+02	1.5E-01	5.1E+01
R Marrow	8.5E+03	1.2E-01	1.0E+03
Lung	1.5E+03	1.2E-01	1.8E+02
Thyroid	3.4E+02	3.0E-02	1.0E+01
Bone Sur	1.0E+05	3.0E-02	3.1E+03
Liver	1.8E+04	6.0E-02	1.1E+03
LL Int.	4.1E+02	6.0E-02	2.4E+01
S Int.	3.9E+02	6.0E-02	2.4E+01
UL Int.	3.9E+02	6.0E-02	2.3E+01
Stomach	3.7E+02	6.0E-02	2.2E+01
Internal Effective Dose Equivalent			6.0E+03
External Dose			5.0E+00
Annual Effective Dose Equivalent			6.0E+03

Controlling Organ:	Bone Sur
Controlling Pathway:	Inh
Controlling Radionuclide:	PU239
Total Inhalation EDE:	6.0E+03
Total Ingestion EDE:	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Disruption of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 13:43:18

Page C. 2

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			0.0E+00	...	
2		0.0E+00	0.0E+00	...	
1	5.7E+02	2.0E+02	1.6E+02	...	= 6.0E+03
Internal Annual Dose	5.7E+02	2.0E+02	1.6E+02	...	= 6.0E+03
	+	+	+		+
External Annual Dose	5.0E+00	0.0E+00	0.0E+00	...	5.0E+00
Annual Dose	5.8E+02	2.0E+02	1.6E+02	...	= 6.0E+03
					5.8E+02
					Maximum Annual Dose Occurred In Year 1

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Disruption of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 13:43:18

Page C. 3

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Inhale	1.5E+03	3.7E+02	3.9E+02	3.9E+02	4.1E+02	1.0E+05	8.5E+03	1.8E+03
Total	1.5E+03	3.7E+02	3.9E+02	3.9E+02	4.1E+02	1.0E+05	8.5E+03	1.8E+03

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Inhale	1.8E+03	3.4E+02	3.4E+02	1.5E+02	1.8E+04	1.7E+00
Total	1.8E+03	3.4E+02	3.4E+02	1.5E+02	1.8E+04	1.7E+00

External Dose by Exposure Pathway

Pathway	
Plume	5.0E+00
Total	5.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Disruption of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 13:43:18

Page C. 4

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	2.0E+00	2.0E+00	2.0E+00	2.0E+00	2.0E+00	2.5E+00	2.5E+00	2.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.8E-01	5.0E-02	5.4E-02	1.2E-01	3.8E-01	8.0E+01	3.5E+01	4.6E-02
Y 90	1.2E+00	5.4E-02	1.3E-01	6.5E-01	1.6E+00	2.0E-03	2.0E-03	6.6E-05
TC 99	8.8E-04	2.4E-04	3.7E-06	1.1E-05	3.0E-05	2.5E-06	2.5E-06	2.1E-06
RU 106	2.2E+02	6.3E-01	7.4E-01	2.8E+00	8.1E+00	3.9E-01	4.4E-01	2.6E-01
AG 110M	1.9E-01	2.7E-03	1.3E-03	3.6E-03	8.5E-03	1.3E-03	1.7E-03	1.3E-04
CD 113M	9.2E-01	8.9E-01	8.9E-01	9.2E-01	9.5E-01	1.1E+00	1.1E+00	9.2E-01
SB 125	8.4E-01	2.3E-02	1.9E-02	5.1E-02	1.2E-01	4.2E-02	2.0E-02	3.3E-03
TE 125M	8.9E-02	1.2E-03	1.7E-03	7.0E-03	2.0E-02	1.1E-01	1.1E-02	3.1E-04
I 129	1.0E-04	3.2E-05	2.7E-05	2.7E-05	2.7E-05	3.7E-05	4.1E-05	2.5E-05
CS 134	5.7E+01	5.7E+01	6.7E+01	6.2E+01	6.7E+01	5.2E+01	5.7E+01	6.2E+01
CS 137	3.2E+02	3.1E+02	3.2E+02	3.2E+02	3.2E+02	2.9E+02	3.0E+02	3.1E+02
CE 144	6.4E+01	9.8E-02	1.8E-01	9.0E-01	2.8E+00	3.9E-01	2.4E-01	1.5E-02
PR 144M	4.0E-05	3.1E-06	8.5E-07	1.7E-07	1.5E-08	1.5E-08	1.8E-08	4.6E-09
PR 144	7.9E-03	4.6E-04	1.1E-04	2.2E-05	2.0E-06	1.7E-06	2.2E-06	7.3E-07
PM 147	2.4E+01	1.2E-02	3.0E-02	1.8E-01	5.1E-01	6.2E+00	4.9E-01	3.4E-05
SM 151	4.9E-02	1.8E-04	4.4E-04	2.5E-03	7.7E-03	2.0E+00	1.6E-01	2.5E-06
EU 154	7.0E-01	1.6E-01	1.5E-01	2.1E-01	1.6E-01	4.7E+00	9.4E-01	5.2E-02
EU 155	3.9E-01	2.5E-02	2.5E-02	4.9E-02	6.9E-02	4.9E+00	4.9E-01	5.6E-03
CM 244	7.4E-01	6.2E-05	1.0E-04	4.0E-04	1.1E-03	4.3E+01	3.5E+00	5.7E-01
PU 240	1.7E+02	1.5E-02	2.4E-02	9.7E-02	2.8E-01	2.2E+04	1.7E+03	3.0E+02
AM 242M	3.6E+00	1.2E-03	1.5E-03	3.4E-03	7.1E-03	1.9E+03	1.5E+02	2.6E+01
AM 242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CM 242	1.8E+01	2.0E-03	3.1E-03	1.3E-02	3.8E-02	5.8E+01	4.9E+00	7.1E-01
NP 238	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 238	1.4E+02	1.2E-02	2.0E-02	8.5E-02	2.3E-01	1.5E+04	1.2E+03	2.1E+02
PU 241	1.5E+00	7.9E-03	8.9E-03	2.0E-02	3.3E-02	8.7E+03	6.9E+02	1.3E+02
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 241	1.5E+02	3.0E-02	3.7E-02	1.1E-01	2.7E-01	1.9E+04	1.5E+03	2.6E+02
CM 243	4.4E+00	1.7E-03	1.9E-03	4.4E-03	8.5E-03	3.2E+02	2.6E+01	4.4E+00

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NP 239	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 239	2.9E+02	2.6E-02	4.1E-02	1.7E-01	4.8E-01	3.7E+04	2.9E+03	5.1E+02
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	1.5E+03	3.7E+02	3.9E+02	3.9E+02	4.1E+02	1.0E+05	8.5E+03	1.8E+03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Disruption of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 13:43:18

Page C. 5

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen

H 3	2.0E+00	2.0E+00	2.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	4.6E-02	4.5E-02	4.6E-02	0.0E+00	0.0E+00	0.0E+00
Y 90	6.5E-05	6.3E-05	6.5E-05	0.0E+00	2.0E-03	0.0E+00
TC 99	2.1E-06	2.1E-06	5.7E-05	0.0E+00	2.9E-06	0.0E+00
RU 106	2.8E-01	3.9E-01	3.7E-01	0.0E+00	0.0E+00	0.0E+00
AG 110M	6.1E-04	1.8E-03	1.6E-03	0.0E+00	7.8E-03	0.0E+00
CD 113M	9.2E-01	9.2E-01	9.2E-01	1.5E+02	2.5E+01	0.0E+00
SB 125	1.3E-02	1.5E-02	1.2E-02	0.0E+00	3.2E-02	0.0E+00
TE 125M	7.0E-04	6.2E-04	3.5E-04	0.0E+00	0.0E+00	0.0E+00
I 129	2.7E-05	6.5E-05	4.6E-01	0.0E+00	0.0E+00	0.0E+00
CS 134	5.2E+01	5.2E+01	5.2E+01	0.0E+00	0.0E+00	0.0E+00
CS 137	2.9E+02	2.8E+02	2.8E+02	0.0E+00	0.0E+00	0.0E+00
CE 144	2.0E-02	2.8E-02	2.4E-02	0.0E+00	2.1E+00	1.7E+00
PR 144M	5.8E-09	1.3E-08	8.7E-09	1.2E-08	2.3E-08	0.0E+00
PR 144	9.0E-07	1.6E-06	1.4E-06	1.8E-06	3.0E-06	0.0E+00
PM 147	3.4E-05	4.3E-05	3.7E-05	0.0E+00	1.6E+00	0.0E+00
SM 151	3.1E-06	4.7E-06	2.7E-06	0.0E+00	5.5E-01	0.0E+00
EU 154	1.1E-01	1.4E-01	6.3E-02	3.0E-01	3.7E+00	0.0E+00
EU 155	1.2E-02	2.0E-02	8.2E-03	5.6E-02	1.6E+00	0.0E+00
CM 244	5.7E-01	4.0E-05	3.7E-05	0.0E+00	8.7E+00	0.0E+00
PU 240	3.0E+02	9.6E-03	9.1E-03	0.0E+00	3.8E+03	0.0E+00
AM 242M	2.6E+01	1.4E-03	5.9E-04	0.0E+00	3.3E+02	0.0E+00
AM 242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CM 242	7.0E-01	1.1E-03	1.1E-03	0.0E+00	1.4E+01	0.0E+00
NP 238	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 238	2.0E+02	7.8E-03	7.5E-03	0.0E+00	2.7E+03	0.0E+00
PU 241	1.3E+02	8.3E-03	3.5E-03	0.0E+00	1.4E+03	0.0E+00
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 241	2.6E+02	2.6E-02	1.4E-02	0.0E+00	3.3E+03	0.0E+00
CM 243	4.4E+00	1.5E-03	9.0E-04	0.0E+00	6.3E+01	0.0E+00

HNH-SD-FF-CN-013 Rev. 0

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NP 239	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 239	5.1E+02	1.6E-02	1.5E-02	0.0E+00	6.4E+03	0.0E+00
-----	-----	-----	-----	-----	-----	-----
Total	1.8E+03	3.4E+02	3.4E+02	1.5E+02	1.8E+04	1.7E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Disruption of ISC - 42 percent Pu - 250 W - 1 assembly

Executed on: 08/18/97 at 13:43:18

Page C. 6

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Radio- nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
H 3	2.0E+00	0.0E+00	1.5E-09	2.0E+00	2.0E+00
KR 85	0.0E+00	0.0E+00	3.2E-01	0.0E+00	3.2E-01
SR 90	6.7E+00	0.0E+00	4.2E-06	6.7E+00	6.7E+00
Y 90	2.9E-01	0.0E+00	1.5E-04	2.9E-01	2.9E-01
TC 99	1.3E-04	0.0E+00	3.2E-10	1.3E-04	1.3E-04
RU 106	2.8E+01	0.0E+00	8.8E-03	2.8E+01	2.8E+01
AG 110M	2.5E-02	0.0E+00	1.1E-04	2.5E-02	2.5E-02
CD 113M	1.1E+01	0.0E+00	1.1E-06	1.1E+01	1.1E+01
SB 125	1.3E-01	0.0E+00	3.0E-03	1.3E-01	1.3E-01
TE 125M	1.7E-02	0.0E+00	2.0E-05	1.7E-02	1.7E-02
I 129	1.4E-02	0.0E+00	5.1E-07	1.4E-02	1.4E-02
CS 134	5.5E+01	0.0E+00	1.3E+00	5.5E+01	5.7E+01
CS 137	2.9E+02	0.0E+00	3.3E+00	2.9E+02	2.9E+02
CE 144	8.2E+00	0.0E+00	2.0E-04	8.2E+00	8.2E+00
PR 144M	5.1E-06	0.0E+00	9.9E-07	5.1E-06	6.0E-06
PR 144	9.8E-04	0.0E+00	6.5E-04	9.8E-04	1.6E-03
PM 147	3.3E+00	0.0E+00	1.1E-06	3.3E+00	3.3E+00
SM 151	1.2E-01	0.0E+00	1.1E-08	1.2E-01	1.2E-01
EU 154	6.6E-01	0.0E+00	1.8E-03	6.6E-01	6.6E-01
EU 155	3.6E-01	0.0E+00	2.3E-04	3.6E-01	3.6E-01
CM 244	2.5E+00	0.0E+00	8.3E-10	2.5E+00	2.5E+00
PU 240	1.2E+03	0.0E+00	2.5E-07	1.2E+03	1.2E+03
AM 242M	1.0E+02	0.0E+00	8.8E-08	1.0E+02	1.0E+02
AM 242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CM 242	5.5E+00	0.0E+00	3.0E-08	5.5E+00	5.5E+00
NP 238	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 238	8.2E+02	0.0E+00	2.0E-07	8.2E+02	8.2E+02
PU 241	4.6E+02	0.0E+00	1.3E-11	4.6E+02	4.6E+02
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

HNF-SD-FF-CN-013 Rev. 0

AM 241	1.0E+03	0.0E+00	1.6E-05	1.0E+03	1.0E+03
CM 243	1.8E+01	0.0E+00	4.0E-06	1.8E+01	1.8E+01
PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NP 239	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PU 239	2.0E+03	0.0E+00	3.0E-07	2.0E+03	2.0E+03
-----	-----	-----	-----	-----	-----

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:50:14

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Ground, external
 Terrestrial foods ingestion
 Animal product ingestion
 Inadvertent soil ingestion

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 50.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\trit5in.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 PNL Food Transfer Factor Library (by Z, with Fr&Os 7/19/93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

----Release Terms-----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

H 3	6.7E+01	0.0E+00	0.0E+00
KR85	5.8E+02	0.0E+00	0.0E+00
SR90	1.0E-01	0.0E+00	0.0E+00
Y 90	1.0E-01	0.0E+00	0.0E+00
TC99	4.1E-05	0.0E+00	0.0E+00
RU106	1.8E-01	0.0E+00	0.0E+00
AG110M	2.0E-04	0.0E+00	0.0E+00

CD113M	2.2E-02	0.0E+00	0.0E+00
SB125	3.0E-02	0.0E+00	0.0E+00
TE125M	7.2E-03	0.0E+00	0.0E+00
I 129	2.8E-04	0.0E+00	0.0E+00
CS134	3.8E+00	0.0E+00	0.0E+00
CS137	2.9E+01	0.0E+00	0.0E+00
CE144	6.8E-02	0.0E+00	0.0E+00
PR144	6.8E-02	0.0E+00	0.0E+00
PR144M	8.2E-04	0.0E+00	0.0E+00
PM147	2.5E-01	0.0E+00	0.0E+00
SM151	1.2E-02	0.0E+00	0.0E+00
EU154	7.2E-03	0.0E+00	0.0E+00
EU155	2.7E-02	0.0E+00	0.0E+00
PU238	6.3E-03	0.0E+00	0.0E+00
PU239	1.4E-02	0.0E+00	0.0E+00
PU240	8.3E-03	0.0E+00	0.0E+00
PU241	1.7E-01	0.0E+00	0.0E+00
AM241	7.1E-03	0.0E+00	0.0E+00
AM242M	7.2E-04	0.0E+00	0.0E+00
CM242	9.6E-04	0.0E+00	0.0E+00
CM243	1.8E-04	0.0E+00	0.0E+00
CM244	3.0E-05	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 4.4E+03 Hours of exposure to ground contamination

===== INGESTION POPULATION =====
 1 Atmospheric production definition: 1 - Use population-weighted chi/Q

===== TERRESTRIAL FOOD INGESTION =====

FOOD TYPE	GROW TIME d	--IRRIGATION-- S RATE * in/yr		TIME mo/yr	YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP d		RATE kg/yr
Leaf Veg	90.0	0	0.0	0.0	1.5		1.0	3.0E+01	
Oth. Veg	90.0	0	0.0	0.0	4.0		5.0	2.2E+02	
Fruit	90.0	0	0.0	0.0	2.0		5.0	3.3E+02	
Cereals	90.0	0	0.0	0.0	0.8		180.0	8.0E+01	

===== ANIMAL FOOD INGESTION =====

FOOD TYPE	---HUMAN---		TOTAL PROD- UCTION kg/yr	DRINK WATER CONTAM FRACT.	-----STORED FEED-----			
	CONSUMPTION RATE kg/yr	HOLDUP d			DIET FRAC- TION	GROW TIME d	---IRRIGATION-- S RATE * in/yr	TIME mo/yr

Meat	8.0E+01	15.0	0.00	0.3	90.00	0	0.0	0.0	0.80	0.0
Poultry	1.8E+01	1.0	0.00	1.0	90.00	0	0.0	0.0	0.80	0.0
Cow Milk	2.7E+02	1.0	0.00	0.3	45.00	0	0.0	0.0	2.00	0.0
Eggs	3.0E+01	1.0	0.00	1.0	90.00	0	0.0	0.0	0.80	0.0

	-----FRESH FORAGE-----									
Meat	0.75	45.0	0	0.0	0.0	2.00	0.0			
Cow Milk	0.75	30.0	0	0.0	0.0	1.50	0.0			

Note: Animal diet fraction for years 2 through 50.0000

Input prepared by: _____ Date: _____

Input checked by: _____ Date: _____

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:53:06

Page C. 1

Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	6.3E+01	2.5E-01	1.6E+01
Breast	5.6E+01	1.5E-01	8.5E+00
R Marrow	1.4E+02	1.2E-01	1.6E+01
Lung	5.7E+01	1.2E-01	6.9E+00
Thyroid	7.0E+01	3.0E-02	2.1E+00
Bone Sur	2.4E+02	3.0E-02	7.1E+00
LL Int.	8.9E+01	6.0E-02	5.4E+00
UL Int.	7.2E+01	6.0E-02	4.3E+00
S Int.	6.5E+01	6.0E-02	3.9E+00
Stomach	6.3E+01	6.0E-02	3.8E+00
Kidneys	5.0E+01	6.0E-02	3.0E+00
Internal Effective Dose Equivalent			7.7E+01
External Dose			2.6E+02
Annual Effective Dose Equivalent			3.4E+02

Controlling Organ:	Bone Sur
Controlling Pathway:	Ext
Controlling Radionuclide:	CS137

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	7.7E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Winter: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:53:06

Page C. 2

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			2.5E+01	...	
2		2.6E+01	3.7E+00	...	Internal Effective Dose Equivalent
1	5.5E+01	6.6E+00	2.6E+00	+ ... = 7.7E+01	
Internal Annual Dose	5.5E+01	3.3E+01	3.1E+01	+ ... = 1.1E+03	Cumulative Internal Dose
External Annual Dose	2.6E+02	2.4E+02	2.3E+02	...	6.1E+03
Annual Dose	3.1E+02	2.8E+02	2.6E+02	+ ... = 7.2E+03	Cumulative Dose
				3.1E+02	Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:53:06

Page C. 3

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	4.3E-01	4.8E-01	5.1E-01	6.7E-01	1.0E+00	4.1E+00	2.0E+00	4.7E-01
Oth. Veg	7.9E+00	8.8E+00	9.4E+00	1.2E+01	1.9E+01	7.5E+01	3.8E+01	8.6E+00
Fruit	8.4E+00	9.5E+00	1.0E+01	1.3E+01	2.1E+01	8.2E+01	4.1E+01	9.3E+00
Cereals	9.9E-01	1.1E+00	1.1E+00	1.3E+00	1.6E+00	2.7E+00	1.8E+00	1.1E+00
Meat	2.3E+01	2.5E+01	2.5E+01	2.5E+01	2.6E+01	2.8E+01	2.5E+01	2.5E+01
Poultry	1.3E+00	1.4E+00	1.5E+00	1.5E+00	1.5E+00	1.4E+00	1.4E+00	1.5E+00
Cow Milk	1.4E+01	1.6E+01	1.6E+01	1.6E+01	1.8E+01	3.8E+01	2.5E+01	1.6E+01
Eggs	2.5E-01	2.8E-01	2.8E-01	3.0E-01	3.8E-01	1.6E+00	8.4E-01	2.7E-01
Soil Ing	1.1E+00	1.2E+00	1.2E+00	1.2E+00	1.2E+00	2.9E+00	1.3E+00	1.2E+00
Total	5.7E+01	6.3E+01	6.5E+01	7.2E+01	8.9E+01	2.4E+02	1.4E+02	6.3E+01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	4.3E-01	4.2E-01	5.5E-01	1.2E+00	2.0E-01	3.2E-05
Oth. Veg	7.9E+00	7.8E+00	1.0E+01	2.1E+01	3.6E+00	5.9E-04
Fruit	8.4E+00	8.3E+00	1.1E+01	2.3E+01	3.9E+00	6.3E-04
Cereals	9.9E-01	9.8E-01	1.6E+00	1.7E+00	2.8E-01	1.0E-05
Meat	2.3E+01	2.2E+01	2.3E+01	8.7E-01	1.4E-01	1.1E-04
Poultry	1.3E+00	1.3E+00	1.3E+00	7.2E-01	1.2E-01	2.3E-07
Cow Milk	1.4E+01	1.4E+01	2.2E+01	7.0E-01	1.2E-01	6.5E-06
Eggs	2.5E-01	2.5E-01	6.6E-01	1.4E-01	2.4E-02	2.0E-07
Soil Ing	1.1E+00	1.1E+00	1.1E+00	3.0E-02	3.1E-01	6.3E-05
Total	5.7E+01	5.6E+01	7.0E+01	5.0E+01	8.7E+00	1.4E-03

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.6E+02
-----	-----
Total	2.6E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:53:06

Page C. 4

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.2E+01	1.3E+01	1.3E+01	1.5E+01	2.1E+01	1.0E+02	5.4E+01	1.3E+01
Oth. Veg	2.1E+02	2.3E+02	2.4E+02	2.9E+02	4.2E+02	1.7E+03	8.9E+02	2.3E+02
Fruit	2.3E+02	2.5E+02	2.6E+02	3.2E+02	4.7E+02	1.9E+03	1.0E+03	2.5E+02
Cereals	2.7E+01	3.0E+01	3.0E+01	3.2E+01	3.8E+01	7.0E+01	4.8E+01	3.0E+01
Meat	1.3E+02	1.4E+02	1.4E+02	1.4E+02	1.4E+02	1.5E+02	1.4E+02	1.4E+02
Poultry	4.5E+00	4.9E+00	4.9E+00	4.9E+00	5.0E+00	4.6E+00	4.6E+00	4.9E+00
Cow Milk	8.1E+01	8.8E+01	9.0E+01	9.1E+01	9.7E+01	1.9E+02	1.3E+02	8.9E+01
Eggs	8.4E-01	9.1E-01	9.3E-01	9.6E-01	1.1E+00	2.7E+00	1.7E+00	9.1E-01
Soil Ing	2.8E+01	3.0E+01	3.1E+01	3.1E+01	3.1E+01	7.9E+01	3.3E+01	3.1E+01
Total	7.2E+02	7.9E+02	8.2E+02	9.3E+02	1.2E+03	4.2E+03	2.3E+03	7.9E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.2E+01	1.2E+01	1.2E+01	2.0E+01	3.7E+00	8.6E-05
Oth. Veg	2.1E+02	2.1E+02	2.1E+02	3.4E+02	6.0E+01	1.6E-03
Fruit	2.3E+02	2.2E+02	2.3E+02	3.9E+02	6.9E+01	1.7E-03
Cereals	2.7E+01	2.7E+01	2.8E+01	2.9E+01	5.0E+00	2.7E-05
Meat	1.3E+02	1.3E+02	1.3E+02	3.1E+00	5.2E-01	1.4E-04
Poultry	4.5E+00	4.4E+00	4.4E+00	1.4E+00	2.2E-01	2.4E-07
Cow Milk	8.1E+01	8.0E+01	8.9E+01	2.5E+00	4.3E-01	8.2E-06
Eggs	8.4E-01	8.2E-01	1.3E+00	2.7E-01	4.5E-02	2.0E-07
Soil Ing	2.9E+01	2.7E+01	2.8E+01	5.1E-01	9.9E+00	1.1E-04
Total	7.2E+02	7.1E+02	7.3E+02	7.9E+02	1.5E+02	3.6E-03

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	6.1E+03
-----	-----
Total	6.1E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:53:06

Page C. 5

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	9.8E-02	2.0E-01	3.2E-01	2.0E+00	8.4E+00	1.8E+02	7.7E+01	9.8E-02
Y 90	5.4E-06	4.6E-01	1.1E+00	5.4E+00	1.3E+01	1.7E-04	1.6E-04	5.4E-06
TC 99	2.6E-04	2.8E-02	4.9E-04	1.7E-03	4.5E-03	3.0E-04	3.0E-04	2.6E-04
RU 106	5.9E-02	1.3E-01	2.4E-01	1.0E+00	3.0E+00	7.0E-02	7.6E-02	6.4E-02
AG 110M	3.6E-04	1.1E-03	2.5E-03	9.3E-03	2.5E-02	2.4E-04	4.1E-04	2.1E-04
CD 113M	3.0E-01	3.2E-01	3.5E-01	5.6E-01	1.1E+00	3.7E-01	3.7E-01	3.0E-01
SB 125	1.8E-04	8.8E-04	2.2E-03	6.4E-03	1.7E-02	2.0E-03	6.7E-04	2.7E-04
TE 125M	9.2E-04	3.8E-03	8.0E-03	3.6E-02	9.9E-02	2.8E-01	2.5E-02	8.2E-04
I 129	9.2E-04	1.3E-03	8.0E-04	8.0E-04	8.0E-04	1.0E-03	1.1E-03	7.3E-04
CS 134	6.3E+00	7.0E+00	8.2E+00	7.6E+00	8.2E+00	6.3E+00	7.0E+00	7.6E+00
CS 137	5.0E+01	5.5E+01	5.5E+01	5.5E+01	5.5E+01	5.0E+01	5.1E+01	5.5E+01
CE 144	1.7E-05	2.8E-03	9.4E-03	5.6E-02	1.7E-01	3.3E-04	2.3E-04	2.5E-05
PR 144M	7.3E-10	5.5E-06	2.0E-06	4.4E-07	2.5E-08	4.4E-10	9.1E-10	1.2E-10
PR 144	8.1E-08	1.1E-03	2.5E-04	4.8E-05	2.8E-06	4.1E-08	8.6E-08	1.8E-08
PM 147	7.8E-09	3.6E-04	9.3E-04	5.2E-03	1.7E-02	1.3E-03	1.1E-04	9.3E-09
SM 151	3.5E-10	7.3E-06	1.9E-05	1.1E-04	3.2E-04	1.1E-04	8.9E-06	1.6E-10
EU 154	4.1E-05	1.5E-04	4.1E-04	1.3E-03	3.3E-03	8.3E-04	2.2E-04	3.0E-05
EU 155	6.4E-06	6.6E-05	1.8E-04	7.9E-04	2.3E-03	8.5E-04	1.0E-04	5.0E-06
CM 244	1.9E-09	2.7E-07	7.4E-07	4.0E-06	1.2E-05	2.1E-03	1.7E-04	2.7E-05
PU 240	2.2E-07	3.2E-05	8.1E-05	4.6E-04	1.5E-03	4.8E-01	3.7E-02	6.7E-03
AM 242M	8.7E-08	3.6E-07	1.2E-06	1.1E-05	4.4E-05	8.0E-02	6.5E-03	1.1E-03
AM 242	7.3E-10	9.6E-07	2.1E-06	7.8E-06	1.2E-05	6.9E-06	6.0E-07	8.7E-08
CM 242	4.6E-08	7.7E-06	1.8E-05	1.0E-04	3.2E-04	2.3E-03	1.9E-04	2.8E-05
NP 238	3.4E-10	1.5E-08	3.7E-08	1.4E-07	3.1E-07	7.0E-08	9.5E-09	1.7E-09
PU 238	1.8E-07	2.7E-05	6.5E-05	3.9E-04	1.2E-03	3.3E-01	2.6E-02	4.5E-03
PU 241	3.0E-07	3.3E-06	8.5E-06	4.8E-05	1.4E-04	1.9E-01	1.5E-02	2.8E-03
U 237	3.0E-11	3.8E-09	1.0E-08	4.6E-08	1.2E-07	4.8E-10	7.9E-10	1.6E-10
AM 241	1.7E-06	6.5E-05	1.5E-04	8.8E-04	2.7E-03	8.4E-01	6.6E-02	1.2E-02
CM 243	1.0E-07	2.1E-06	5.0E-06	2.8E-05	8.5E-05	1.6E-02	1.3E-03	2.1E-04

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	4.8E-14	2.9E-13	7.3E-13	4.0E-12	1.2E-11	3.8E-09	3.0E-10	5.4E-11
NP 239	7.4E-16	1.0E-13	2.6E-13	1.2E-12	2.6E-12	1.2E-14	1.4E-14	3.3E-15
PU 239	3.6E-07	5.5E-05	1.4E-04	7.8E-04	2.4E-03	8.3E-01	6.4E-02	1.1E-02
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	5.7E+01	6.3E+01	6.5E+01	7.2E+01	8.9E+01	2.4E+02	1.4E+02	6.3E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Winter: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:53:06

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	9.8E-02	9.8E-02	9.8E-02	0.0E+00	0.0E+00	0.0E+00
Y 90	6.2E-06	5.4E-06	5.4E-06	0.0E+00	1.6E-04	0.0E+00
TC 99	2.6E-04	2.6E-04	6.6E-03	0.0E+00	3.5E-04	0.0E+00
RU 106	6.7E-02	5.8E-02	5.9E-02	0.0E+00	0.0E+00	0.0E+00
AG 110M	1.2E-03	3.3E-04	1.2E-04	0.0E+00	1.0E-02	0.0E+00
CD 113M	3.0E-01	3.0E-01	3.0E-01	5.0E+01	8.2E+00	0.0E+00
SB 125	1.5E-03	2.9E-04	1.3E-04	0.0E+00	7.2E-04	0.0E+00
TE 125M	2.7E-03	9.7E-04	8.2E-04	0.0E+00	0.0E+00	0.0E+00
I 129	8.0E-04	1.8E-03	1.4E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	6.3E+00	6.2E+00	6.3E+00	0.0E+00	0.0E+00	0.0E+00
CS 137	5.0E+01	5.0E+01	5.0E+01	0.0E+00	0.0E+00	0.0E+00
CE 144	1.8E-04	3.1E-05	1.3E-05	0.0E+00	1.8E-03	1.4E-03
PR 144M	1.9E-09	8.7E-10	5.5E-11	1.6E-09	9.8E-10	0.0E+00
PR 144	2.0E-07	9.2E-08	9.7E-09	1.9E-07	1.2E-07	0.0E+00
PM 147	4.3E-08	1.1E-08	7.2E-09	0.0E+00	3.6E-04	0.0E+00
SM 151	6.7E-09	4.8E-10	1.5E-10	0.0E+00	3.0E-05	0.0E+00
EU 154	2.6E-04	5.2E-05	1.1E-05	8.3E-05	6.7E-04	0.0E+00
EU 155	6.4E-05	9.2E-06	1.2E-06	1.6E-05	2.7E-04	0.0E+00
CM 244	2.8E-05	1.9E-09	1.8E-09	0.0E+00	4.2E-04	0.0E+00
PU 240	6.7E-03	2.2E-07	2.0E-07	0.0E+00	8.4E-02	0.0E+00
AM 242M	1.1E-03	6.4E-08	2.1E-08	0.0E+00	1.4E-02	0.0E+00
AM 242	1.3E-07	4.4E-09	1.2E-10	0.0E+00	1.8E-06	0.0E+00
CM 242	2.7E-05	4.7E-08	4.6E-08	0.0E+00	5.6E-04	0.0E+00
NP 238	1.4E-08	1.6E-09	5.1E-11	0.0E+00	4.7E-09	0.0E+00
PU 238	4.4E-03	1.7E-07	1.6E-07	0.0E+00	6.0E-02	0.0E+00
PU 241	2.8E-03	1.8E-07	7.5E-08	0.0E+00	2.9E-02	0.0E+00
U 237	2.6E-09	2.5E-10	3.1E-12	4.1E-10	0.0E+00	0.0E+00
AM 241	1.2E-02	1.3E-06	6.5E-07	0.0E+00	1.5E-01	0.0E+00
CM 243	2.2E-04	9.4E-08	4.4E-08	0.0E+00	3.1E-03	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	5.3E-11	3.3E-14	1.7E-14	0.0E+00	6.8E-10	0.0E+00
NP 239	5.0E-14	5.0E-15	6.2E-17	0.0E+00	4.7E-15	0.0E+00
PU 239	1.1E-02	3.6E-07	3.4E-07	0.0E+00	1.4E-01	0.0E+00

Total	5.7E+01	5.6E+01	7.0E+01	5.0E+01	8.7E+00	1.4E-03

External Dose by Radionuclide

Radionuclide	-----	-----
H 3	0.0E+00	
KR 85	0.0E+00	
SR 90	1.3E-04	
Y 90	7.2E-03	
TC 99	7.4E-09	
RU 106	3.6E-01	
AG 110M	4.2E-03	
CD 113M	3.5E-05	
SB 125	1.5E-01	
TE 125M	2.1E-04	
I 129	5.7E-05	
CS 134	6.4E+01	
CS 137	1.9E+02	
CE 144	5.0E-03	
PR 144M	1.3E-05	
PR 144	2.3E-02	
PM 147	2.2E-05	
SM 151	8.6E-08	
EU 154	1.0E-01	
EU 155	8.6E-03	
CM 244	5.6E-09	
PU 240	1.9E-06	
AM 242M	1.5E-06	
AM 242	7.3E-05	
CM 242	1.7E-07	
NP 238	2.3E-05	
PU 238	1.4E-06	
PU 241	7.1E-11	
U 237	0.0E+00	
AM 241	3.8E-04	
CM 243	1.9E-04	
PU 243	0.0E+00	
AM 243	3.8E-12	
NP 239	2.9E-11	
PU 239	7.1E-06	
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Total	2.6E+02	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:53:06

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.2E+00	4.5E+00	7.1E+00	4.4E+01	1.8E+02	3.4E+03	1.6E+03	2.2E+00
Y 90	9.5E-05	8.1E+00	1.9E+01	9.5E+01	2.3E+02	2.9E-03	2.9E-03	9.5E-05
TC 99	4.2E-04	4.5E-02	8.0E-04	2.7E-03	7.3E-03	4.9E-04	4.9E-04	4.2E-04
RU 106	1.7E-01	3.7E-01	6.7E-01	2.9E+00	8.6E+00	2.0E-01	2.2E-01	1.8E-01
AG 110M	4.9E-04	1.5E-03	3.4E-03	1.3E-02	3.4E-02	3.2E-04	5.6E-04	2.9E-04
CD 113M	4.9E+00	5.3E+00	5.8E+00	9.4E+00	1.9E+01	6.0E+00	6.0E+00	5.0E+00
SB 125	7.8E-04	3.8E-03	9.7E-03	2.8E-02	7.5E-02	8.7E-03	2.9E-03	1.2E-03
TE 125M	8.6E-03	3.5E-02	7.5E-02	3.3E-01	9.2E-01	2.6E+00	2.4E-01	7.7E-03
I 129	1.3E-03	1.8E-03	1.1E-03	1.1E-03	1.1E-03	1.5E-03	1.6E-03	1.0E-03
CS 134	1.6E+01	1.8E+01	2.1E+01	1.9E+01	2.1E+01	1.6E+01	1.8E+01	1.9E+01
CS 137	7.0E+02	7.6E+02	7.6E+02	7.6E+02	7.6E+02	7.0E+02	7.0E+02	7.6E+02
CE 144	4.1E-05	6.9E-03	2.3E-02	1.4E-01	4.2E-01	8.2E-04	5.7E-04	6.3E-05
PR 144M	1.8E-09	1.4E-05	5.0E-06	1.1E-06	6.4E-08	1.1E-09	2.3E-09	3.1E-10
PR 144	2.0E-07	2.7E-03	6.3E-04	1.2E-04	6.9E-06	1.0E-07	2.1E-07	4.5E-08
PM 147	3.6E-08	1.6E-03	4.3E-03	2.4E-02	7.6E-02	6.2E-03	5.0E-04	4.3E-08
SM 151	1.3E-08	2.7E-04	6.7E-04	3.9E-03	1.2E-02	3.2E-03	2.9E-04	5.9E-09
EU 154	4.8E-04	1.8E-03	4.8E-03	1.5E-02	3.9E-02	9.6E-03	2.6E-03	3.5E-04
EU 155	4.7E-05	4.8E-04	1.3E-03	5.8E-03	1.7E-02	6.2E-03	7.7E-04	3.7E-05
CM 244	4.1E-08	6.0E-06	1.6E-05	8.7E-05	2.7E-04	3.7E-02	3.0E-03	4.7E-04
PU 240	1.1E-05	1.7E-03	4.1E-03	2.3E-02	7.4E-02	1.4E+01	1.1E+00	1.8E-01
AM 242M	3.8E-06	1.6E-05	5.5E-05	4.9E-04	2.0E-03	2.1E+00	1.7E-01	2.7E-02
AM 242	3.3E-08	4.3E-05	9.2E-05	3.5E-04	5.3E-04	2.8E-04	2.6E-05	3.9E-06
CM 242	1.6E-06	2.6E-04	6.2E-04	3.5E-03	1.1E-02	7.3E-02	6.4E-03	9.5E-04
NP 238	6.0E-07	2.6E-05	6.6E-05	2.5E-04	5.6E-04	7.4E-05	1.7E-05	3.0E-06
PU 238	7.6E-06	1.2E-03	2.8E-03	1.7E-02	5.1E-02	8.9E+00	7.2E-01	1.1E-01
PU 241	6.1E-06	6.6E-05	1.7E-04	9.8E-04	2.8E-03	2.5E+00	2.0E-01	3.5E-02
U 237	1.3E-09	1.7E-07	4.4E-07	2.0E-06	5.3E-06	2.1E-08	3.4E-08	7.1E-09
AM 241	1.2E-04	4.5E-03	1.1E-02	6.2E-02	1.9E-01	3.2E+01	2.5E+00	4.2E-01
CM 243	2.9E-06	5.7E-05	1.4E-04	7.8E-04	2.3E-03	3.2E-01	2.6E-02	4.2E-03

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	5.0E-11	3.1E-10	7.8E-10	4.2E-09	1.3E-08	1.8E-06	1.4E-07	2.2E-08
NP 239	4.0E-11	5.6E-09	1.4E-08	6.3E-08	1.4E-07	6.7E-10	7.7E-10	1.8E-10
PU 239	1.8E-05	2.8E-03	7.0E-03	4.0E-02	1.2E-01	2.4E+01	1.9E+00	3.1E-01
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Total	7.2E+02	7.9E+02	8.2E+02	9.3E+02	1.2E+03	4.2E+03	2.3E+03	7.9E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:53:06

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.2E+00	2.2E+00	2.2E+00	0.0E+00	0.0E+00	0.0E+00
Y 90	1.1E-04	9.5E-05	9.5E-05	0.0E+00	2.8E-03	0.0E+00
TC 99	4.2E-04	4.2E-04	1.1E-02	0.0E+00	5.7E-04	0.0E+00
RU 106	1.9E-01	1.6E-01	1.7E-01	0.0E+00	0.0E+00	0.0E+00
AG 110M	1.6E-03	4.5E-04	1.6E-04	0.0E+00	1.4E-02	0.0E+00
CD 113M	5.0E+00	5.0E+00	5.0E+00	7.9E+02	1.3E+02	0.0E+00
SB 125	6.8E-03	1.3E-03	5.9E-04	0.0E+00	3.2E-03	0.0E+00
TE 125M	2.6E-02	9.0E-03	7.7E-03	0.0E+00	0.0E+00	0.0E+00
I 129	1.1E-03	2.6E-03	1.9E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	1.6E+01	1.6E+01	1.6E+01	0.0E+00	0.0E+00	0.0E+00
CS 137	7.0E+02	6.9E+02	6.9E+02	0.0E+00	0.0E+00	0.0E+00
CE 144	4.4E-04	7.6E-05	3.2E-05	0.0E+00	4.4E-03	3.6E-03
PR 144M	4.7E-09	2.2E-09	1.4E-10	4.0E-09	2.5E-09	0.0E+00
PR 144	4.9E-07	2.3E-07	2.4E-08	4.7E-07	3.1E-07	0.0E+00
PM 147	2.0E-07	5.0E-08	3.3E-08	0.0E+00	1.6E-03	0.0E+00
SM 151	2.4E-07	1.7E-08	5.3E-09	0.0E+00	8.9E-04	0.0E+00
EU 154	3.0E-03	6.1E-04	1.2E-04	9.8E-04	7.7E-03	0.0E+00
EU 155	4.7E-04	6.7E-05	8.6E-06	1.2E-04	2.0E-03	0.0E+00
CM 244	4.8E-04	4.1E-08	3.9E-08	0.0E+00	7.9E-03	0.0E+00
PU 240	1.8E-01	1.1E-05	1.0E-05	0.0E+00	2.8E+00	0.0E+00
AM 242M	2.7E-02	2.8E-06	9.1E-07	0.0E+00	4.2E-01	0.0E+00
AM 242	5.7E-06	2.0E-07	5.3E-09	0.0E+00	7.9E-05	0.0E+00
CM 242	9.3E-04	1.6E-06	1.6E-06	0.0E+00	1.9E-02	0.0E+00
NP 238	2.4E-05	2.9E-06	9.1E-08	0.0E+00	8.4E-06	0.0E+00
PU 238	1.1E-01	7.5E-06	7.1E-06	0.0E+00	1.8E+00	0.0E+00
PU 241	3.5E-02	3.6E-06	1.5E-06	0.0E+00	4.2E-01	0.0E+00
U 237	1.1E-07	1.1E-08	1.4E-10	1.8E-08	0.0E+00	0.0E+00
AM 241	4.1E-01	9.3E-05	4.5E-05	0.0E+00	6.7E+00	0.0E+00
CM 243	4.3E-03	2.6E-06	1.2E-06	0.0E+00	7.0E-02	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	2.2E-08	3.5E-11	1.8E-11	0.0E+00	3.8E-07	0.0E+00
NP 239	2.7E-09	2.7E-10	3.4E-12	0.0E+00	2.6E-10	0.0E+00
PU 239	3.0E-01	1.8E-05	1.7E-05	0.0E+00	4.8E+00	0.0E+00

Total	7.2E+02	7.1E+02	7.3E+02	7.9E+02	1.5E+02	3.6E-03

External Dose by Radionuclide

Radionuclide	-----	-----
H 3	0.0E+00	
KR 85	0.0E+00	
SR 90	3.6E-03	
Y 90	2.0E-01	
TC 99	1.4E-08	
RU 106	7.3E-01	
AG 110M	5.8E-03	
CD 113M	6.3E-04	
SB 125	5.9E-01	
TE 125M	7.3E-04	
I 129	1.0E-04	
CS 134	2.3E+02	
CS 137	5.8E+03	
CE 144	8.6E-03	
PR 144M	2.1E-05	
PR 144	3.9E-02	
PM 147	9.5E-05	
SM 151	3.5E-06	
EU 154	1.3E+00	
EU 155	6.4E-02	
CM 244	1.2E-07	
PU 240	9.2E-05	
AM 242M	6.7E-05	
AM 242	3.1E-03	
CM 242	5.6E-06	
NP 238	1.0E-03	
PU 238	5.9E-05	
PU 241	1.3E-09	
U 237	0.0E+00	
AM 241	2.6E-02	
CM 243	5.6E-03	
PU 243	0.0E+00	
AM 243	6.6E-09	
NP 239	5.1E-08	
PU 239	3.5E-04	

Total	6.1E+03	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:54:15

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	9.8E+03	2.5E-01	2.5E+03
Breast	8.8E+03	1.5E-01	1.3E+03
R Marrow	9.3E+03	1.2E-01	1.1E+03
Lung	8.9E+03	1.2E-01	1.1E+03
Thyroid	8.9E+03	3.0E-02	2.7E+02
Bone Sur	1.0E+04	3.0E-02	3.0E+02
LL Int.	1.0E+04	6.0E-02	6.0E+02
S Int.	1.0E+04	6.0E-02	6.0E+02
UL Int.	9.9E+03	6.0E-02	5.9E+02
Stomach	9.7E+03	6.0E-02	5.8E+02
Liver	1.8E+02	6.0E-02	1.1E+01
Internal Effective Dose Equivalent			8.9E+03
External Dose			2.6E+02
Annual Effective Dose Equivalent			9.2E+03

Controlling Organ:	Bone Sur
Controlling Pathway:	Ing
Controlling Radionuclide:	CS137
Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	8.9E+03

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Rem

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GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:54:15

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	6.3E+02	6.8E+02	7.1E+02	7.1E+02	7.4E+02	1.6E+03	7.4E+02	7.1E+02
Oth. Veg	8.0E+00	9.0E+00	9.6E+00	1.2E+01	2.0E+01	7.6E+01	3.8E+01	8.8E+00
Fruit	8.6E+00	9.6E+00	1.0E+01	1.3E+01	2.1E+01	8.2E+01	4.1E+01	9.4E+00
Cereals	1.0E+00	1.1E+00	1.1E+00	1.3E+00	1.6E+00	2.7E+00	1.8E+00	1.1E+00
Meat	5.3E+03	5.7E+03	5.9E+03	5.8E+03	5.9E+03	5.3E+03	5.4E+03	5.8E+03
Poultry	1.3E+00	1.5E+00	1.5E+00	1.5E+00	1.5E+00	1.4E+00	1.4E+00	1.5E+00
Cow Milk	3.0E+03	3.2E+03	3.3E+03	3.3E+03	3.3E+03	3.0E+03	3.1E+03	3.3E+03
Eggs	2.5E-01	2.8E-01	2.9E-01	3.1E-01	3.8E-01	1.6E+00	8.4E-01	2.8E-01
Soil Ing	1.1E+00	1.2E+00	1.2E+00	1.2E+00	1.2E+00	2.9E+00	1.3E+00	1.2E+00
Total	8.9E+03	9.7E+03	1.0E+04	9.9E+03	1.0E+04	1.0E+04	9.3E+03	9.8E+03

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	6.4E+02	6.2E+02	6.3E+02	1.8E+01	1.7E+02	5.1E-02
Oth. Veg	8.0E+00	7.9E+00	1.0E+01	2.1E+01	3.6E+00	7.4E-04
Fruit	8.6E+00	8.4E+00	1.1E+01	2.3E+01	3.9E+00	8.0E-04
Cereals	1.0E+00	9.8E-01	1.6E+00	1.7E+00	2.8E-01	1.3E-05
Meat	5.3E+03	5.2E+03	5.2E+03	2.3E+00	2.0E+00	2.7E-02
Poultry	1.3E+00	1.3E+00	1.3E+00	7.2E-01	1.2E-01	3.0E-07
Cow Milk	3.0E+03	2.9E+03	3.0E+03	1.7E+00	4.3E-01	1.4E-03
Eggs	2.5E-01	2.5E-01	6.6E-01	1.4E-01	2.4E-02	2.5E-07
Soil Ing	1.1E+00	1.1E+00	1.1E+00	3.0E-02	3.1E-01	6.3E-05
Total	8.9E+03	8.8E+03	8.9E+03	6.9E+01	1.8E+02	8.1E-02

External Dose by Exposure Pathway

Pathway	
Sur Soil	2.6E+02
Total	2.6E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:54:15

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	6.4E+02	7.0E+02	7.2E+02	7.2E+02	7.6E+02	1.7E+03	7.9E+02	7.2E+02
Oth. Veg	2.1E+02	2.3E+02	2.4E+02	2.9E+02	4.2E+02	1.7E+03	8.9E+02	2.3E+02
Fruit	2.3E+02	2.5E+02	2.6E+02	3.2E+02	4.8E+02	1.9E+03	1.0E+03	2.5E+02
Cereals	2.7E+01	3.0E+01	3.0E+01	3.2E+01	3.8E+01	7.0E+01	4.8E+01	3.0E+01
Meat	5.4E+03	5.9E+03	6.0E+03	6.0E+03	6.0E+03	5.4E+03	5.5E+03	5.9E+03
Poultry	4.5E+00	4.9E+00	4.9E+00	4.9E+00	5.0E+00	4.6E+00	4.6E+00	4.9E+00
Cow Milk	3.0E+03	3.3E+03	3.4E+03	3.4E+03	3.4E+03	3.2E+03	3.2E+03	3.3E+03
Eggs	8.4E-01	9.1E-01	9.3E-01	9.6E-01	1.1E+00	2.8E+00	1.7E+00	9.1E-01
Soil Ing	2.8E+01	3.0E+01	3.1E+01	3.1E+01	3.1E+01	7.9E+01	3.3E+01	3.1E+01
Total	9.5E+03	1.0E+04	1.1E+04	1.1E+04	1.1E+04	1.4E+04	1.1E+04	1.1E+04

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	6.5E+02	6.3E+02	6.4E+02	3.8E+01	1.7E+02	5.1E-02
Oth. Veg	2.1E+02	2.1E+02	2.1E+02	3.4E+02	6.0E+01	1.7E-03
Fruit	2.3E+02	2.2E+02	2.3E+02	3.9E+02	6.9E+01	1.8E-03
Cereals	2.7E+01	2.7E+01	2.8E+01	2.9E+01	5.0E+00	2.9E-05
Meat	5.4E+03	5.3E+03	5.3E+03	4.6E+00	2.4E+00	2.7E-02
Poultry	4.5E+00	4.4E+00	4.4E+00	1.4E+00	2.2E-01	3.0E-07
Cow Milk	3.0E+03	3.0E+03	3.1E+03	3.5E+00	7.3E-01	1.4E-03
Eggs	8.4E-01	8.2E-01	1.3E+00	2.7E-01	4.5E-02	2.6E-07
Soil Ing	2.9E+01	2.7E+01	2.8E+01	5.1E-01	9.9E+00	1.1E-04
Total	9.6E+03	9.4E+03	9.5E+03	8.1E+02	3.2E+02	8.3E-02

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	6.1E+03
Total	6.1E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:54:15

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.5E-01	3.1E-01	4.9E-01	3.0E+00	1.3E+01	2.7E+02	1.2E+02	1.5E-01
Y 90	7.7E-06	6.5E-01	1.5E+00	7.7E+00	1.9E+01	2.4E-04	2.3E-04	7.7E-06
TC 99	2.5E-04	2.7E-02	4.8E-04	1.7E-03	4.4E-03	3.0E-04	3.0E-04	2.5E-04
RU 106	5.8E-01	1.3E+00	2.3E+00	1.0E+01	3.0E+01	6.9E-01	7.5E-01	6.2E-01
AG 110M	4.8E-03	1.5E-02	3.4E-02	1.2E-01	3.3E-01	3.1E-03	5.5E-03	2.8E-03
CD 113M	4.1E-01	4.5E-01	4.8E-01	7.7E-01	1.6E+00	5.1E-01	5.1E-01	4.2E-01
SB 125	4.6E-03	2.3E-02	5.8E-02	1.7E-01	4.5E-01	5.2E-02	1.7E-02	6.9E-03
TE 125M	2.1E-03	8.8E-03	1.9E-02	8.3E-02	2.3E-01	6.4E-01	5.9E-02	1.9E-03
I 129	6.2E-03	8.7E-03	5.4E-03	5.4E-03	5.4E-03	7.0E-03	7.5E-03	5.0E-03
CS 134	1.3E+03	1.4E+03	1.7E+03	1.6E+03	1.7E+03	1.3E+03	1.4E+03	1.6E+03
CS 137	7.6E+03	8.2E+03	8.3E+03	8.3E+03	8.3E+03	7.6E+03	7.7E+03	8.2E+03
CE 144	9.2E-04	1.6E-01	5.3E-01	3.1E+00	9.5E+00	1.8E-02	1.3E-02	1.4E-03
PR 144M	4.1E-08	3.1E-04	1.1E-04	2.4E-05	1.4E-06	2.4E-08	5.1E-08	6.9E-09
PR 144	4.5E-06	6.0E-02	1.4E-02	2.7E-03	1.6E-04	2.3E-06	4.8E-06	1.0E-06
PM 147	1.2E-06	5.7E-02	1.5E-01	8.2E-01	1.6E+00	2.1E-01	1.7E-02	1.5E-06
SM 151	4.4E-08	9.3E-04	2.3E-03	1.4E-02	4.0E-02	1.4E-02	1.1E-03	2.1E-08
EU 154	5.8E-03	2.2E-02	5.8E-02	1.8E-01	4.8E-01	1.2E-01	3.2E-01	2.8E-03
EU 155	9.7E-04	1.0E-02	2.8E-02	1.2E-01	3.5E-01	1.3E-01	1.6E-02	7.6E-04
CM 244	9.0E-07	1.3E-04	3.5E-04	1.9E-03	5.9E-03	9.8E-01	7.9E-02	1.3E-02
PU 240	9.1E-05	1.3E-02	3.3E-02	1.9E-01	6.0E-01	2.0E+02	1.5E+01	2.8E+00
AM 242M	1.8E-05	7.7E-05	2.6E-04	2.3E-03	9.4E-03	1.7E+01	1.4E+00	2.4E-01
AM 242	1.6E-07	2.0E-04	4.4E-04	1.7E-03	2.5E-03	1.5E-03	1.3E-04	1.8E-05
CM 242	2.7E-05	4.4E-03	1.0E-02	5.9E-02	1.9E-01	1.3E+00	1.1E-01	1.6E-02
NP 238	4.2E-08	1.8E-06	4.6E-06	1.7E-05	3.9E-05	8.6E-06	1.2E-06	2.1E-07
PU 238	7.3E-05	1.1E-02	2.7E-02	1.6E-01	4.9E-01	1.4E+02	1.1E+01	1.9E+00
PU 241	1.3E-04	1.4E-03	3.7E-03	2.1E-02	6.0E-02	8.1E+01	6.3E+00	1.2E+00
U 237	1.2E-08	1.6E-06	4.1E-06	1.9E-05	5.0E-05	2.0E-07	3.2E-07	6.7E-08
AM 241	3.6E-04	1.4E-02	3.2E-02	1.8E-01	5.6E-01	1.8E+02	1.4E+01	2.5E+00
CM 243	4.8E-05	9.5E-04	2.3E-03	1.3E-02	3.9E-02	7.3E+00	5.9E-01	9.9E-02

HNF-SD-FF-CN-013 Rev. 0

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.5E-12	9.3E-12	2.3E-11	1.3E-10	4.0E-10	1.2E-07	9.5E-09	1.7E-09
NP 239	1.4E-14	1.9E-12	4.8E-12	2.1E-11	4.8E-11	2.3E-13	2.6E-13	6.1E-14
PU 239	1.5E-04	2.3E-02	5.7E-02	3.2E-01	1.0E+00	3.4E+02	2.6E+01	4.7E+00
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	8.9E+03	9.7E+03	1.0E+04	9.9E+03	1.0E+04	1.0E+04	9.3E+03	9.8E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:54:15

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	1.5E-01	1.5E-01	1.5E-01	0.0E+00	0.0E+00	0.0E+00
Y 90	8.9E-06	7.7E-06	7.7E-06	0.0E+00	2.2E-04	0.0E+00
TC 99	2.5E-04	2.5E-04	6.4E-03	0.0E+00	3.5E-04	0.0E+00
RU 106	6.6E-01	5.6E-01	5.8E-01	0.0E+00	0.0E+00	0.0E+00
AG 110M	1.6E-02	4.4E-03	1.6E-03	0.0E+00	1.4E-01	0.0E+00
CD 113M	4.2E-01	4.2E-01	4.2E-01	6.9E+01	1.1E+01	0.0E+00
SB 125	4.0E-02	7.6E-03	3.5E-03	0.0E+00	1.9E-02	0.0E+00
TE 125M	6.4E-03	2.2E-03	1.9E-03	0.0E+00	0.0E+00	0.0E+00
I 129	5.4E-03	1.2E-02	9.3E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	1.3E+03	1.3E+03	1.3E+03	0.0E+00	0.0E+00	0.0E+00
CS 137	7.6E+03	7.5E+03	7.5E+03	0.0E+00	0.0E+00	0.0E+00
CE 144	1.0E-02	1.7E-03	7.3E-04	0.0E+00	9.8E-02	8.1E-02
PR 144M	1.1E-07	4.9E-08	3.1E-09	9.0E-08	5.5E-08	0.0E+00
PR 144	1.1E-05	5.1E-06	5.4E-07	1.1E-05	7.0E-06	0.0E+00
PM 147	6.8E-06	1.7E-06	1.1E-06	0.0E+00	5.7E-02	0.0E+00
SM 151	8.5E-07	6.1E-08	1.9E-08	0.0E+00	3.8E-03	0.0E+00
EU 154	3.7E-02	7.4E-03	1.5E-03	1.2E-02	9.6E-02	0.0E+00
EU 155	9.8E-03	1.4E-03	1.8E-04	2.4E-03	4.1E-02	0.0E+00
CM 244	1.3E-02	8.9E-07	8.5E-07	0.0E+00	2.0E-01	0.0E+00
PU 240	2.8E+00	9.0E-05	8.4E-05	0.0E+00	3.5E+01	0.0E+00
AM 242M	2.4E-01	1.4E-05	4.4E-06	0.0E+00	3.0E+00	0.0E+00
AM 242	2.7E-05	9.3E-07	2.5E-08	0.0E+00	3.8E-04	0.0E+00
CM 242	1.6E-02	2.7E-05	2.7E-05	0.0E+00	3.2E-01	0.0E+00
NP 238	1.7E-06	2.0E-07	6.2E-09	0.0E+00	5.8E-07	0.0E+00
PU 238	1.8E+00	7.3E-05	6.8E-05	0.0E+00	2.5E+01	0.0E+00
PU 241	1.2E+00	7.6E-05	3.2E-05	0.0E+00	1.2E+01	0.0E+00
U 237	1.1E-06	1.0E-07	1.3E-09	1.7E-07	0.0E+00	0.0E+00
AM 241	2.4E+00	2.8E-04	1.4E-04	0.0E+00	3.2E+01	0.0E+00
CM 243	1.0E-01	4.4E-05	2.0E-05	0.0E+00	1.4E+00	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.7E-09	1.1E-12	5.4E-13	0.0E+00	2.2E-08	0.0E+00
NP 239	9.4E-13	9.4E-14	1.2E-15	0.0E+00	8.8E-14	0.0E+00
PU 239	4.7E+00	1.5E-04	1.4E-04	0.0E+00	5.9E+01	0.0E+00
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Total	8.9E+03	8.8E+03	8.9E+03	6.9E+01	1.8E+02	8.1E-02

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	1.3E-04
Y 90	7.2E-03
TC 99	7.4E-09
RU 106	3.6E-01
AG 110M	4.2E-03
CD 113M	3.5E-05
SB 125	1.5E-01
TE 125M	2.1E-04
I 129	5.7E-05
CS 134	6.4E+01
CS 137	1.9E+02
CE 144	5.0E-03
PR 144M	1.3E-05
PR 144	2.3E-02
PM 147	2.2E-05
SM 151	8.6E-08
EU 154	1.0E-01
EU 155	8.6E-03
CM 244	5.6E-09
PU 240	1.9E-06
AM 242M	1.5E-06
AM 242	7.3E-05
CM 242	1.7E-07
NP 238	2.3E-05
PU 238	1.4E-06
PU 241	7.1E-11
U 237	0.0E+00
AM 241	3.8E-04
CM 243	1.9E-04
PU 243	0.0E+00
AM 243	3.8E-12
NP 239	2.9E-11
PU 239	7.1E-06
-----	-----
Total	2.6E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:54:15

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes

H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.2E+00	4.6E+00	7.2E+00	4.5E+01	1.9E+02	3.5E+03	1.6E+03	2.2E+00
Y 90	9.8E-05	8.3E+00	2.0E+01	9.8E+01	2.4E+02	3.0E-03	2.9E-03	9.8E-05
TC 99	4.1E-04	4.5E-02	7.9E-04	2.7E-03	7.2E-03	4.9E-04	4.9E-04	4.1E-04
RU 106	6.9E-01	1.5E+00	2.8E+00	1.2E+01	3.5E+01	8.1E-01	8.9E-01	7.4E-01
AG 110M	4.9E-03	1.5E-02	3.5E-02	1.3E-01	3.4E-01	3.2E-03	5.6E-03	2.9E-03
CD 113M	5.0E+00	5.4E+00	5.9E+00	9.6E+00	2.0E+01	6.1E+00	6.1E+00	5.1E+00
SB 125	5.2E-03	2.6E-02	6.5E-02	1.9E-01	5.1E-01	5.9E-02	2.0E-02	7.8E-03
TE 125M	9.9E-03	4.0E-02	8.5E-02	3.8E-01	1.1E+00	3.0E+00	2.7E-01	8.7E-03
I 129	6.6E-03	9.2E-03	5.7E-03	5.7E-03	5.7E-03	7.5E-03	7.9E-03	5.3E-03
CS 134	1.3E+03	1.5E+03	1.7E+03	1.6E+03	1.7E+03	1.3E+03	1.5E+03	1.6E+03
CS 137	8.2E+03	8.9E+03	9.0E+03	9.0E+03	9.0E+03	8.2E+03	8.3E+03	8.9E+03
CE 144	9.5E-04	1.6E-01	5.4E-01	3.2E+00	9.8E+00	1.9E-02	1.3E-02	1.5E-03
PR 144M	4.2E-08	3.1E-04	1.1E-04	2.5E-05	1.5E-06	2.5E-08	5.2E-08	7.1E-09
PR 144	4.7E-06	6.1E-02	1.5E-02	2.8E-03	1.6E-04	2.3E-06	5.0E-06	1.0E-06
PM 147	1.3E-06	5.8E-02	1.5E-01	8.4E-01	2.7E+00	2.2E-01	1.8E-02	1.5E-06
SM 151	5.7E-08	1.2E-03	3.0E-03	1.8E-02	5.2E-02	1.7E-02	1.4E-03	2.6E-08
EU 154	6.3E-03	2.3E-02	6.3E-02	2.0E-01	5.1E-01	1.3E-01	3.4E-02	4.6E-03
EU 155	1.0E-03	1.0E-02	2.9E-02	1.3E-01	3.7E-01	1.4E-01	1.7E-02	7.9E-04
CM 244	9.4E-07	1.4E-04	3.7E-04	2.0E-03	6.2E-03	1.0E+00	8.2E-02	1.3E-02
PU 240	1.0E-04	1.5E-02	3.7E-02	2.1E-01	6.7E-01	2.1E+02	1.7E+01	2.9E+00
AM 242M	2.2E-05	9.3E-05	3.2E-04	2.8E-03	1.1E-02	1.9E+01	1.5E+00	2.7E-01
AM 242	1.9E-07	2.5E-04	5.3E-04	2.0E-03	3.0E-03	1.7E-03	1.5E-04	2.2E-05
CM 242	2.8E-05	4.7E-03	1.1E-02	6.3E-02	2.0E-01	1.4E+00	1.2E-01	1.7E-02
NP 238	6.5E-07	2.8E-05	7.1E-05	2.7E-04	6.0E-04	8.2E-05	1.8E-05	3.2E-06
PU 238	8.1E-05	1.2E-02	3.0E-02	1.8E-01	5.4E-01	1.4E+02	1.2E+01	2.0E+00
PU 241	1.3E-04	1.5E-03	3.8E-03	2.2E-02	6.3E-02	8.3E+01	6.5E+00	1.2E+00
U 237	1.4E-08	1.7E-06	4.6E-06	2.1E-05	5.5E-05	2.2E-07	3.6E-07	7.4E-08
AM 241	4.8E-04	1.8E-02	4.3E-02	2.5E-01	7.5E-01	2.1E+02	1.6E+01	2.9E+00
CM 243	5.1E-05	1.0E-03	2.5E-03	1.4E-02	4.2E-02	7.6E+00	6.2E-01	1.0E-01

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	5.1E-11	3.2E-10	8.0E-10	4.4E-09	1.4E-08	1.9E-06	1.5E-07	2.4E-08
NP 239	4.0E-11	5.6E-09	1.4E-08	6.3E-08	1.4E-07	6.7E-10	7.7E-10	1.8E-10
PU 239	1.7E-04	2.5E-02	6.4E-02	3.6E-01	1.1E+00	3.6E+02	2.8E+01	5.0E+00
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	9.5E+03	1.0E+04	1.1E+04	1.1E+04	1.1E+04	1.4E+04	1.1E+04	1.1E+04

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:54:15

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.2E+00	2.2E+00	2.2E+00	0.0E+00	0.0E+00	0.0E+00
Y 90	1.1E-04	9.8E-05	9.8E-05	0.0E+00	2.9E-03	0.0E+00
TC 99	4.1E-04	4.1E-04	1.1E-02	0.0E+00	5.7E-04	0.0E+00
RU 106	7.8E-01	6.7E-01	6.9E-01	0.0E+00	0.0E+00	0.0E+00
AG 110M	1.6E-02	4.5E-03	1.6E-03	0.0E+00	1.4E-01	0.0E+00
CD 113M	5.1E+00	5.1E+00	5.1E+00	8.1E+02	1.3E+02	0.0E+00
SB 125	4.5E-02	8.6E-03	3.9E-03	0.0E+00	2.1E-02	0.0E+00
TE 125M	2.9E-02	1.0E-02	8.7E-03	0.0E+00	0.0E+00	0.0E+00
I 129	5.7E-03	1.3E-02	9.9E+01	0.0E+00	0.0E+00	0.0E+00
CS 134	1.3E+03	1.3E+03	1.3E+03	0.0E+00	0.0E+00	0.0E+00
CS 137	8.2E+03	8.1E+03	8.1E+03	0.0E+00	0.0E+00	0.0E+00
CE 144	1.0E-02	1.8E-03	7.4E-04	0.0E+00	1.0E-01	8.3E-02
PR 144M	1.1E-07	5.0E-08	3.1E-09	9.2E-08	5.6E-08	0.0E+00
PR 144	1.1E-05	5.3E-06	5.5E-07	1.1E-05	7.2E-06	0.0E+00
PM 147	7.0E-06	1.8E-06	1.2E-06	0.0E+00	5.8E-02	0.0E+00
SM 151	1.1E-06	7.7E-08	2.4E-08	0.0E+00	4.7E-03	0.0E+00
EU 154	4.0E-02	8.0E-03	1.6E-03	1.3E-02	1.0E-01	0.0E+00
EU 155	1.0E-02	1.5E-03	1.9E-04	2.5E-03	4.3E-02	0.0E+00
CM 244	1.4E-02	9.3E-07	8.9E-07	0.0E+00	2.0E-01	0.0E+00
PU 240	2.9E+00	1.0E-04	9.4E-05	0.0E+00	3.8E+01	0.0E+00
AM 242M	2.6E-01	1.6E-05	5.3E-06	0.0E+00	3.4E+00	0.0E+00
AM 242	3.3E-05	1.1E-06	3.0E-08	0.0E+00	4.6E-04	0.0E+00
CM 242	1.7E-02	2.9E-05	2.8E-05	0.0E+00	3.4E-01	0.0E+00
NP 238	2.6E-05	3.1E-06	9.7E-08	0.0E+00	8.9E-06	0.0E+00
PU 238	2.0E+00	8.0E-05	7.5E-05	0.0E+00	2.7E+01	0.0E+00
PU 241	1.2E+00	7.9E-05	3.4E-05	0.0E+00	1.3E+01	0.0E+00
U 237	1.2E-06	1.1E-07	1.4E-09	1.8E-07	0.0E+00	0.0E+00
AM 241	2.8E+00	3.7E-04	1.8E-04	0.0E+00	3.8E+01	0.0E+00
CM 243	1.0E-01	4.6E-05	2.1E-05	0.0E+00	1.5E+00	0.0E+00

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	2.4E-08	3.6E-11	1.8E-11	0.0E+00	4.0E-07	0.0E+00
NP 239	2.7E-09	2.7E-10	3.4E-12	0.0E+00	2.6E-10	0.0E+00
PU 239	5.0E+00	1.7E-04	1.6E-04	0.0E+00	6.4E+01	0.0E+00
-----	-----	-----	-----	-----	-----	-----
Total	9.6E+03	9.4E+03	9.5E+03	8.1E+02	3.2E+02	8.3E-02

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	3.6E-03
Y 90	2.0E-01
TC 99	1.4E-08
RU 106	7.3E-01
AG 110M	5.8E-03
CD 113M	6.3E-04
SB 125	5.9E-01
TE 125M	7.3E-04
I 129	1.0E-04
CS 134	2.3E+02
CS 137	5.8E+03
CE 144	8.6E-03
PR 144M	2.1E-05
PR 144	3.9E-02
PM 147	9.5E-05
SM 151	3.5E-06
EU 154	1.3E+00
EU 155	6.4E-02
CM 244	1.2E-07
PU 240	9.2E-05
AM 242M	6.7E-05
AM 242	3.1E-03
CM 242	5.6E-06
NP 238	1.0E-03
PU 238	5.9E-05
PU 241	1.3E-09
U 237	0.0E+00
AM 241	2.6E-02
CM 243	5.6E-03
PU 243	0.0E+00
AM 243	6.6E-09
NP 239	5.1E-08
PU 239	3.5E-04
-----	-----
Total	6.1E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:55:24

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	2.1E+04	2.5E-01	5.4E+03
Breast	1.9E+04	1.5E-01	2.9E+03
R Marrow	2.1E+04	1.2E-01	2.6E+03
Lung	1.9E+04	1.2E-01	2.3E+03
Thyroid	1.9E+04	3.0E-02	5.8E+02
Bone Sur.	3.4E+04	3.0E-02	1.0E+03
LL Int.	2.2E+04	6.0E-02	1.3E+03
S Int.	2.2E+04	6.0E-02	1.3E+03
UL Int.	2.2E+04	6.0E-02	1.3E+03
Stomach	2.1E+04	6.0E-02	1.3E+03
Liver	2.5E+03	6.0E-02	1.5E+02
Internal Effective Dose Equivalent			2.0E+04
External Dose			2.6E+02
Annual Effective Dose Equivalent			2.0E+04

Controlling Organ:	Bone Sur
Controlling Pathway:	Ing
Controlling Radionuclide:	CS137

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	2.0E+04

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:55:24

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Acute release
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			2.5E+01	...	
2		2.6E+01	3.7E+00	...	
1	1.7E+04	1.6E+03	3.8E+02	...	2.0E+04
Internal Annual Dose	1.7E+04	1.7E+03	4.1E+02	...	2.1E+04
	+	+	+	+	
External Annual Dose	2.6E+02	2.4E+02	2.3E+02	...	6.1E+03
Annual Dose	1.8E+04	1.9E+03	6.4E+02	...	2.7E+04
				1.8E+04	
					Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:55:24

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	6.3E+02	6.8E+02	7.1E+02	7.1E+02	7.4E+02	1.6E+03	7.4E+02	7.1E+02
Oth. Veg	3.4E+03	3.7E+03	3.8E+03	3.8E+03	3.9E+03	9.1E+03	4.0E+03	3.8E+03
Fruit	3.4E+03	3.7E+03	3.8E+03	3.8E+03	4.0E+03	9.3E+03	4.1E+03	3.8E+03
Cereals	1.2E+03	1.3E+03	1.4E+03	1.4E+03	1.4E+03	3.3E+03	1.4E+03	1.4E+03
Meat	6.8E+03	7.4E+03	7.7E+03	7.6E+03	7.7E+03	6.8E+03	7.0E+03	7.5E+03
Poultry	1.5E+02	1.6E+02	1.7E+02	1.7E+02	1.7E+02	1.5E+02	1.5E+02	1.7E+02
Cow Milk	3.7E+03	4.0E+03	4.2E+03	4.1E+03	4.2E+03	3.8E+03	3.8E+03	4.1E+03
Eggs	2.7E+01	3.0E+01	3.1E+01	3.0E+01	3.1E+01	3.1E+01	2.9E+01	3.0E+01
Soil Ing	1.1E+00	1.2E+00	1.2E+00	1.2E+00	1.2E+00	2.9E+00	1.3E+00	1.2E+00
Total	1.9E+04	2.1E+04	2.2E+04	2.2E+04	2.2E+04	3.4E+04	2.1E+04	2.1E+04

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	6.4E+02	6.2E+02	6.3E+02	1.8E+01	1.7E+02	5.1E-02
Oth. Veg	3.4E+03	3.3E+03	3.4E+03	1.2E+02	9.6E+02	1.8E-01
Fruit	3.5E+03	3.4E+03	3.4E+03	1.2E+02	9.9E+02	1.9E-01
Cereals	1.2E+03	1.2E+03	1.2E+03	3.6E+01	3.6E+02	4.4E-02
Meat	6.8E+03	6.7E+03	6.7E+03	2.5E+00	2.4E+00	3.6E-02
Poultry	1.5E+02	1.5E+02	1.5E+02	1.5E+00	2.5E-01	1.9E-05
Cow Milk	3.7E+03	3.7E+03	3.7E+03	1.9E+00	5.0E-01	1.7E-03
Eggs	2.7E+01	2.7E+01	3.0E+01	3.0E-01	1.8E-01	1.6E-05
Soil Ing	1.1E+00	1.1E+00	1.1E+00	3.0E-02	3.1E-01	6.3E-05
Total	2.0E+04	1.9E+04	1.9E+04	3.0E+02	2.5E+03	5.0E-01

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.6E+02
-----	-----
Total	2.6E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:55:24

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	6.4E+02	7.0E+02	7.2E+02	7.2E+02	7.6E+02	1.7E+03	7.9E+02	7.2E+02
Oth. Veg	3.6E+03	3.9E+03	4.0E+03	4.0E+03	4.3E+03	1.1E+04	4.9E+03	4.0E+03
Fruit	3.6E+03	4.0E+03	4.1E+03	4.1E+03	4.4E+03	1.1E+04	5.1E+03	4.1E+03
Cereals	1.2E+03	1.3E+03	1.4E+03	1.4E+03	1.4E+03	3.4E+03	1.5E+03	1.4E+03
Meat	6.9E+03	7.5E+03	7.8E+03	7.7E+03	7.8E+03	7.0E+03	7.1E+03	7.6E+03
Poultry	1.5E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.5E+02	1.6E+02	1.7E+02
Cow Milk	3.8E+03	4.1E+03	4.2E+03	4.2E+03	4.2E+03	3.9E+03	3.9E+03	4.2E+03
Eggs	2.8E+01	3.0E+01	3.1E+01	3.1E+01	3.2E+01	3.2E+01	3.0E+01	3.1E+01
Soil Ing	2.8E+01	3.0E+01	3.1E+01	3.1E+01	3.1E+01	7.9E+01	3.3E+01	3.1E+01
Total	2.0E+04	2.2E+04	2.2E+04	2.2E+04	2.3E+04	3.8E+04	2.3E+04	2.2E+04

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	6.5E+02	6.3E+02	6.4E+02	3.8E+01	1.7E+02	5.1E-02
Oth. Veg	3.6E+03	3.5E+03	3.6E+03	4.4E+02	1.0E+03	1.8E-01
Fruit	3.7E+03	3.6E+03	3.6E+03	4.9E+02	1.1E+03	1.9E-01
Cereals	1.3E+03	1.2E+03	1.2E+03	6.3E+01	3.7E+02	4.4E-02
Meat	6.9E+03	6.8E+03	6.8E+03	4.8E+00	2.8E+00	3.6E-02
Poultry	1.5E+02	1.5E+02	1.5E+02	2.2E+00	3.6E-01	1.9E-05
Cow Milk	3.8E+03	3.7E+03	3.8E+03	3.8E+00	8.1E-01	1.7E-03
Eggs	2.8E+01	2.8E+01	3.0E+01	4.2E-01	2.0E-01	1.6E-05
Soil Ing	2.9E+01	2.7E+01	2.8E+01	5.1E-01	9.9E+00	1.1E-04
Total	2.0E+04	2.0E+04	2.0E+04	1.0E+03	2.6E+03	5.0E-01

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	6.1E+03
-----	-----
Total	6.1E+03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:55:24

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	5.3E-01	1.1E+00	1.7E+00	1.1E+01	4.6E+01	9.5E+02	4.2E+02	5.3E-01
Y 90	3.1E-05	2.6E+00	6.2E+00	3.1E+01	7.7E+01	9.6E-04	9.3E-04	3.1E-05
TC 99	3.0E-04	3.3E-02	5.7E-04	2.0E-03	5.3E-03	3.5E-04	3.5E-04	3.0E-04
RU 106	3.7E+00	8.1E+00	1.5E+01	6.4E+01	1.9E+02	4.3E+00	4.7E+00	3.9E+00
AG 110M	7.8E-03	2.4E-02	5.5E-02	2.0E-01	5.4E-01	5.1E-03	8.9E-03	4.6E-03
CD 113M	1.8E+00	1.9E+00	2.1E+00	3.3E+00	6.8E+00	2.2E+00	2.2E+00	1.8E+00
SB 125	3.4E-02	1.7E-01	4.2E-01	1.2E+00	3.3E+00	3.8E-01	1.3E-01	5.1E-02
TE 125M	7.6E-03	3.1E-02	6.6E-02	3.0E-01	8.2E-01	2.3E+00	2.1E-01	6.8E-03
I 129	1.5E-02	2.2E-02	1.3E-02	1.3E-02	1.3E-02	1.7E-02	1.8E-02	1.2E-02
CS 134	2.6E+03	2.9E+03	3.4E+03	3.1E+03	3.4E+03	2.6E+03	2.9E+03	3.1E+03
CS 137	1.7E+04	1.8E+04	1.8E+04	1.8E+04	1.8E+04	1.7E+04	1.7E+04	1.8E+04
CE 144	5.7E-03	9.7E-01	3.3E+00	1.9E+01	5.9E+01	1.1E-01	8.0E-02	8.8E-03
PR 144M	2.5E-07	1.9E-03	6.9E-04	1.5E-04	8.8E-06	1.5E-07	3.1E-07	4.3E-08
PR 144	2.8E-05	3.7E-01	8.8E-02	1.7E-02	9.7E-04	1.4E-05	3.0E-05	6.2E-06
PM 147	7.3E-06	3.3E-01	8.7E-01	4.8E+00	1.6E+01	1.3E+00	1.0E-01	8.7E-06
SM 151	3.0E-07	6.2E-03	1.6E-02	9.1E-02	2.7E-01	9.4E-02	7.5E-03	1.4E-07
EU 154	3.5E-02	1.3E-01	3.5E-01	1.1E+00	2.8E+00	7.1E-01	1.9E-01	2.5E-02
EU 155	5.5E-03	5.7E-02	1.6E-01	6.8E-01	2.0E+00	7.4E-01	9.1E-02	4.3E-03
CM 244	5.9E-06	8.5E-04	2.3E-03	1.2E-02	3.9E-02	6.4E+00	5.2E-01	8.4E-02
PU 240	1.3E-03	2.0E-01	4.9E-01	2.8E+00	8.9E+00	3.0E+03	2.3E+02	4.1E+01
AM 242M	2.7E-04	1.1E-03	3.8E-03	3.4E-02	1.4E-01	2.4E+02	2.0E+01	3.5E+00
AM 242	2.3E-06	3.0E-03	6.3E-03	2.4E-02	3.7E-02	2.1E-02	1.8E-03	2.7E-04
CM 242	1.5E-04	2.6E-02	6.0E-02	3.4E-01	1.1E+00	7.6E+00	6.4E-01	9.3E-02
NP 238	6.8E-07	2.9E-05	7.5E-05	2.9E-04	6.3E-04	1.4E-04	1.9E-05	3.4E-06
PU 238	1.1E-03	1.6E-01	3.9E-01	2.3E+00	7.0E+00	2.0E+03	1.6E+02	2.7E+01
PU 241	1.8E-03	2.0E-02	5.2E-02	2.9E-01	8.4E-01	1.1E+03	8.9E+01	1.7E+01
U 237	1.8E-07	2.3E-05	6.0E-05	2.8E-04	7.2E-04	2.8E-06	4.7E-06	9.7E-07
AM 241	5.2E-03	2.0E-01	4.7E-01	2.7E+00	8.2E+00	2.6E+03	2.0E+02	3.6E+01
CM 243	3.2E-04	6.4E-03	1.6E-02	8.8E-02	2.6E-01	4.9E+01	4.0E+00	6.6E-01

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.2E-10	7.0E-10	1.8E-09	9.6E-09	3.0E-08	9.1E-06	7.2E-07	1.3E-07
NP 239	1.2E-12	1.7E-10	4.4E-10	1.9E-09	4.4E-09	2.1E-11	2.4E-11	5.4E-12
PU 239	2.2E-03	3.3E-01	8.3E-01	4.7E+00	1.5E+01	5.0E+03	3.9E+02	6.9E+01
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Total	1.9E+04	2.1E+04	2.2E+04	2.2E+04	2.2E+04	3.4E+04	2.1E+04	2.1E+04

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:55:24

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	5.3E-01	5.3E-01	5.3E-01	0.0E+00	0.0E+00	0.0E+00
Y 90	3.6E-05	3.1E-05	3.1E-05	0.0E+00	9.1E-04	0.0E+00
TC 99	3.0E-04	3.0E-04	7.7E-03	0.0E+00	4.1E-04	0.0E+00
RU 106	4.1E+00	3.6E+00	3.7E+00	0.0E+00	0.0E+00	0.0E+00
AG 110M	2.6E-02	7.1E-03	2.6E-03	0.0E+00	2.3E-01	0.0E+00
CD 113M	1.8E+00	1.8E+00	1.8E+00	3.0E+02	4.9E+01	0.0E+00
SB 125	2.9E-01	5.6E-02	2.6E-02	0.0E+00	1.4E-01	0.0E+00
TE 125M	2.3E-02	8.0E-03	6.8E-03	0.0E+00	0.0E+00	0.0E+00
I 129	1.3E-02	3.1E-02	2.3E+02	0.0E+00	0.0E+00	0.0E+00
CS 134	2.6E+03	2.6E+03	2.6E+03	0.0E+00	0.0E+00	0.0E+00
CS 137	1.7E+04	1.6E+04	1.6E+04	0.0E+00	0.0E+00	0.0E+00
CE 144	6.2E-02	1.1E-02	4.5E-03	0.0E+00	6.1E-01	5.0E-01
PR 144M	6.5E-07	3.0E-07	1.9E-08	5.5E-07	3.4E-07	0.0E+00
PR 144	6.9E-05	3.2E-05	3.3E-06	6.6E-05	4.3E-05	0.0E+00
PM 147	4.0E-05	1.0E-05	6.8E-06	0.0E+00	3.3E-01	0.0E+00
SM 151	5.6E-06	4.0E-07	1.2E-07	0.0E+00	2.5E-02	0.0E+00
EU 154	2.2E-01	4.4E-02	9.0E-03	7.1E-02	5.7E-01	0.0E+00
EU 155	5.6E-02	8.0E-03	1.0E-03	1.4E-02	2.3E-01	0.0E+00
CM 244	8.6E-02	5.8E-06	5.6E-06	0.0E+00	1.3E+00	0.0E+00
PU 240	4.1E+01	1.3E-03	1.2E-03	0.0E+00	5.1E+02	0.0E+00
AM 242M	3.4E+00	2.0E-04	6.3E-05	0.0E+00	4.4E+01	0.0E+00
AM 242	3.9E-04	1.4E-05	3.7E-07	0.0E+00	5.5E-03	0.0E+00
CM 242	9.1E-02	1.6E-04	1.5E-04	0.0E+00	1.9E+00	0.0E+00
NP 238	2.7E-05	3.3E-06	1.0E-07	0.0E+00	9.5E-06	0.0E+00
PU 238	2.7E+01	1.0E-03	9.8E-04	0.0E+00	3.6E+02	0.0E+00
PU 241	1.7E+01	1.1E-03	4.5E-04	0.0E+00	1.8E+02	0.0E+00
U 237	1.5E-05	1.5E-06	1.9E-08	2.4E-06	0.0E+00	0.0E+00
AM 241	3.6E+01	4.1E-03	2.0E-03	0.0E+00	4.6E+02	0.0E+00
CM 243	6.7E-01	2.9E-04	1.4E-04	0.0E+00	9.7E+00	0.0E+00

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.3E-07	8.1E-11	4.1E-11	0.0E+00	1.6E-06	0.0E+00
NP 239	8.4E-11	8.4E-12	1.0E-13	0.0E+00	7.9E-12	0.0E+00
PU 239	6.9E+01	2.2E-03	2.1E-03	0.0E+00	8.7E+02	0.0E+00

Total	2.0E+04	1.9E+04	1.9E+04	3.0E+02	2.5E+03	5.0E-01

External Dose by Radionuclide

Radionuclide	-----	-----
H 3	0.0E+00	
KR 85	0.0E+00	
SR 90	1.3E-04	
Y 90	7.2E-03	
TC 99	7.4E-09	
RU 106	3.6E-01	
AG 110M	4.2E-03	
CD 113M	3.5E-05	
SB 125	1.5E-01	
TE 125M	2.1E-04	
I 129	5.7E-05	
CS 134	6.4E+01	
CS 137	1.9E+02	
CE 144	5.0E-03	
PR 144M	1.3E-05	
PR 144	2.3E-02	
PM 147	2.2E-05	
SM 151	8.6E-08	
EU 154	1.0E-01	
EU 155	8.6E-03	
CM 244	5.6E-09	
PU 240	1.9E-06	
AM 242M	1.5E-06	
AM 242	7.3E-05	
CM 242	1.7E-07	
NP 238	2.3E-05	
PU 238	1.4E-06	
PU 241	7.1E-11	
U 237	0.0E+00	
AM 241	3.8E-04	
CM 243	1.9E-04	
PU 243	0.0E+00	
AM 243	3.8E-12	
NP 239	2.9E-11	
PU 239	7.1E-06	

Total	2.6E+02	

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:55:24

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.6E+00	5.4E+00	8.5E+00	5.3E+01	2.2E+02	4.1E+03	1.9E+03	2.6E+00
Y 90	1.2E-04	1.0E+01	2.4E+01	1.2E+02	3.0E+02	3.7E-03	3.6E-03	1.2E-04
TC 99	4.6E-04	5.0E-02	8.8E-04	3.0E-03	8.1E-03	5.4E-04	5.4E-04	4.6E-04
RU 106	3.8E+00	8.3E+00	1.5E+01	6.6E+01	1.9E+02	4.5E+00	4.9E+00	4.0E+00
AG 110M	8.0E-03	2.5E-02	5.6E-02	2.1E-01	5.5E-01	5.2E-03	9.0E-03	4.7E-03
CD 113M	6.3E+00	6.9E+00	7.5E+00	1.2E+01	2.5E+01	7.8E+00	7.8E+00	6.5E+00
SB 125	3.4E-02	1.7E-01	4.3E-01	1.2E+00	3.3E+00	3.9E-01	1.3E-01	5.1E-02
TE 125M	1.5E-02	6.3E-02	1.3E-01	5.9E-01	1.6E+00	4.6E+00	4.2E-01	1.4E-02
I 129	1.6E-02	2.2E-02	1.4E-02	1.4E-02	1.4E-02	1.8E-02	1.9E-02	1.3E-02
CS 134	2.6E+03	2.9E+03	3.4E+03	3.1E+03	3.4E+03	2.6E+03	2.9E+03	3.1E+03
CS 137	1.7E+04	1.9E+04	1.9E+04	1.9E+04	1.9E+04	1.7E+04	1.8E+04	1.9E+04
CE 144	5.7E-03	9.7E-01	3.3E+00	1.9E+01	5.9E+01	1.1E-01	8.0E-02	8.8E-03
PR 144M	2.5E-07	1.9E-03	6.9E-04	1.5E-04	8.8E-06	1.5E-07	3.2E-07	4.3E-08
PR 144	2.8E-05	3.7E-01	8.8E-02	1.7E-02	9.7E-04	1.4E-05	3.0E-05	6.3E-06
PM 147	7.3E-06	3.4E-01	8.8E-01	4.9E+00	1.6E+01	1.3E+00	1.0E-01	8.8E-06
SM 151	3.1E-07	6.4E-03	1.6E-02	9.5E-02	2.8E-01	9.7E-02	7.8E-03	1.4E-07
EU 154	3.5E-02	1.3E-01	3.5E-01	1.1E+00	2.9E+00	7.2E-01	1.9E-01	2.5E-02
EU 155	5.6E-03	5.7E-02	1.6E-01	6.9E-01	2.0E+00	7.5E-01	9.2E-02	4.4E-03
CM 244	5.9E-06	8.6E-04	2.3E-03	1.3E-02	3.9E-02	6.4E+00	5.2E-01	8.5E-02
PU 240	1.4E-03	2.0E-01	5.0E-01	2.8E+00	8.9E+00	3.0E+03	2.3E+02	4.1E+01
AM 242M	2.7E-04	1.1E-03	3.9E-03	3.4E-02	1.4E-01	2.5E+02	2.0E+01	3.5E+00
AM 242	2.3E-06	3.0E-03	6.4E-03	2.4E-02	3.7E-02	2.1E-02	1.9E-03	2.7E-04
CM 242	1.6E-04	2.6E-02	6.1E-02	3.5E-01	1.1E+00	7.7E+00	6.4E-01	9.4E-02
NP 238	1.3E-06	5.5E-05	1.4E-04	5.4E-04	1.2E-03	2.1E-04	3.6E-05	6.4E-06
PU 238	1.1E-03	1.6E-01	3.9E-01	2.3E+00	7.0E+00	2.0E+03	1.6E+02	2.7E+01
PU 241	1.8E-03	2.0E-02	5.2E-02	2.9E-01	8.4E-01	1.1E+03	8.9E+01	1.7E+01
U 237	1.8E-07	2.3E-05	6.0E-05	2.8E-04	7.3E-04	2.9E-06	4.7E-06	9.8E-07
AM 241	5.4E-03	2.0E-01	4.8E-01	2.8E+00	8.4E+00	2.6E+03	2.0E+02	3.7E+01
CM 243	3.3E-04	6.4E-03	1.6E-02	8.8E-02	2.7E-01	4.9E+01	4.0E+00	6.6E-01

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.7E-10	1.0E-09	2.5E-09	1.4E-08	4.4E-08	1.1E-05	8.6E-07	1.5E-07
NP 239	4.1E-11	5.8E-09	1.5E-08	6.5E-08	1.5E-07	6.9E-10	7.9E-10	1.8E-10
PU 239	2.2E-03	3.4E-01	8.4E-01	4.8E+00	1.5E+01	5.0E+03	3.9E+02	7.0E+01
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Total	2.0E+04	2.2E+04	2.2E+04	2.2E+04	2.3E+04	3.8E+04	2.3E+04	2.2E+04

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:55:24

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.6E+00	2.6E+00	2.6E+00	0.0E+00	0.0E+00	0.0E+00
Y 90	1.4E-04	1.2E-04	1.2E-04	0.0E+00	3.5E-03	0.0E+00
TC 99	4.6E-04	4.6E-04	1.2E-02	0.0E+00	6.3E-04	0.0E+00
RU 106	4.3E+00	3.7E+00	3.8E+00	0.0E+00	0.0E+00	0.0E+00
AG 110M	2.6E-02	7.2E-03	2.6E-03	0.0E+00	2.3E-01	0.0E+00
CD 113M	6.5E+00	6.5E+00	6.5E+00	1.0E+03	1.7E+02	0.0E+00
SB 125	3.0E-01	5.7E-02	2.6E-02	0.0E+00	1.4E-01	0.0E+00
TE 125M	4.5E-02	1.6E-02	1.4E-02	0.0E+00	0.0E+00	0.0E+00
I 129	1.4E-02	3.1E-02	2.4E+02	0.0E+00	0.0E+00	0.0E+00
CS 134	2.6E+03	2.6E+03	2.6E+03	0.0E+00	0.0E+00	0.0E+00
CS 137	1.7E+04	1.7E+04	1.7E+04	0.0E+00	0.0E+00	0.0E+00
CE 144	6.2E-02	1.1E-02	4.5E-03	0.0E+00	6.1E-01	5.0E-01
PR 144M	6.6E-07	3.0E-07	1.9E-08	5.5E-07	3.4E-07	0.0E+00
PR 144	6.9E-05	3.2E-05	3.4E-06	6.6E-05	4.3E-05	0.0E+00
PM 147	4.0E-05	1.0E-05	6.8E-06	0.0E+00	3.4E-01	0.0E+00
SM 151	5.9E-06	4.2E-07	1.3E-07	0.0E+00	2.6E-02	0.0E+00
EU 154	2.2E-01	4.5E-02	9.1E-03	7.2E-02	5.7E-01	0.0E+00
EU 155	5.6E-02	8.0E-03	1.0E-03	1.4E-02	2.4E-01	0.0E+00
CM 244	8.6E-02	5.9E-06	5.6E-06	0.0E+00	1.3E+00	0.0E+00
PU 240	4.1E+01	1.3E-03	1.2E-03	0.0E+00	5.2E+02	0.0E+00
AM 242M	3.5E+00	2.0E-04	6.4E-05	0.0E+00	4.4E+01	0.0E+00
AM 242	4.0E-04	1.4E-05	3.7E-07	0.0E+00	5.6E-03	0.0E+00
CM 242	9.2E-02	1.6E-04	1.6E-04	0.0E+00	1.9E+00	0.0E+00
NP 238	5.1E-05	6.2E-06	1.9E-07	0.0E+00	1.8E-05	0.0E+00
PU 238	2.7E+01	1.0E-03	9.9E-04	0.0E+00	3.6E+02	0.0E+00
PU 241	1.7E+01	1.1E-03	4.5E-04	0.0E+00	1.8E+02	0.0E+00
U 237	1.6E-05	1.5E-06	1.9E-08	2.5E-06	0.0E+00	0.0E+00
AM 241	3.6E+01	4.2E-03	2.0E-03	0.0E+00	4.7E+02	0.0E+00
CM 243	6.8E-01	2.9E-04	1.4E-04	0.0E+00	9.7E+00	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	1.5E-07	1.2E-10	5.8E-11	0.0E+00	2.0E-06	0.0E+00
NP 239	2.8E-09	2.8E-10	3.5E-12	0.0E+00	2.6E-10	0.0E+00
PU 239	6.9E+01	2.2E-03	2.1E-03	0.0E+00	8.8E+02	0.0E+00
-----	-----	-----	-----	-----	-----	-----
Total	2.0E+04	2.0E+04	2.0E+04	1.0E+03	2.6E+03	5.0E-01

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	3.6E-03
Y 90	2.0E-01
TC 99	1.4E-08
RU 106	7.3E-01
AG 110M	5.8E-03
CD 113M	6.3E-04
SB 125	5.9E-01
TE 125M	7.3E-04
I 129	1.0E-04
CS 134	2.3E+02
CS 137	5.8E+03
CE 144	8.6E-03
PR 144M	2.1E-05
PR 144	3.9E-02
PM 147	9.5E-05
SM 151	3.5E-06
EU 154	1.3E+00
EU 155	6.4E-02
CM 244	1.2E-07
PU 240	9.2E-05
AM 242M	6.7E-05
AM 242	3.1E-03
CM 242	5.6E-06
NP 238	1.0E-03
PU 238	5.9E-05
PU 241	1.3E-09
U 237	0.0E+00
AM 241	2.6E-02
CM 243	5.6E-03
PU 243	0.0E+00
AM 243	6.6E-09
NP 239	5.1E-08
PU 239	3.5E-04
-----	-----
Total	6.1E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:56:33

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	2.2E+05	2.5E-01	5.4E+04
Breast	1.9E+05	1.5E-01	2.9E+04
R Marrow	2.1E+05	1.2E-01	2.5E+04
Lung	2.0E+05	1.2E-01	2.3E+04
Thyroid	1.9E+05	3.0E-02	5.8E+03
Bone Sur	2.8E+05	3.0E-02	8.3E+03
LL Int.	2.2E+05	6.0E-02	1.3E+04
S Int.	2.2E+05	6.0E-02	1.3E+04
UL Int.	2.2E+05	6.0E-02	1.3E+04
Stomach	2.1E+05	6.0E-02	1.3E+04
Liver	1.3E+04	6.0E-02	8.0E+02
Internal Effective Dose Equivalent			2.0E+05
External Dose			2.6E+02
Annual Effective Dose Equivalent			2.0E+05

Controlling Organ:	Bone Sur
Controlling Pathway:	Ing
Controlling Radionuclide:	CS137

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	2.0E+05

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:56:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			2.5E+01	...	
				+		
	2		2.6E+01	3.7E+00	...	Internal
			+	+		Effective
	1	1.7E+05	+ 1.6E+04	+ 3.7E+03	+ ... = 2.0E+05	Dose
						Equivalent
Internal						Cumulative
Annual		1.7E+05	+ 1.6E+04	+ 3.8E+03	+ ... = 2.0E+05	Internal
Dose						Dose
		+	+	+	+	
External						
Annual		2.6E+02	2.4E+02	2.3E+02	... 6.1E+03	
Dose						
Annual		1.7E+05	+ 1.7E+04	+ 4.0E+03	+ ... = 2.1E+05	Cumulative
Dose						Dose
					1.7E+05	Maximum
						Annual
						Dose Occurred
						In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:56:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.1E+04	1.2E+04	1.2E+04	1.2E+04	1.2E+04	2.9E+04	1.3E+04	1.2E+04
Oth. Veg	1.5E+04	1.6E+04	1.6E+04	1.6E+04	1.7E+04	4.0E+04	1.7E+04	1.6E+04
Fruit	1.5E+04	1.7E+04	1.7E+04	1.7E+04	1.8E+04	4.1E+04	1.8E+04	1.7E+04
Cereals	5.3E+03	5.8E+03	6.0E+03	6.0E+03	6.2E+03	1.5E+04	6.4E+03	6.0E+03
Meat	9.5E+04	1.0E+05	1.1E+05	1.1E+05	1.1E+05	9.6E+04	9.8E+04	1.0E+05
Poultry	6.7E+02	7.3E+02	7.5E+02	7.4E+02	7.5E+02	6.7E+02	6.9E+02	7.4E+02
Cow Milk	5.4E+04	5.8E+04	6.0E+04	5.9E+04	6.0E+04	5.4E+04	5.5E+04	5.9E+04
Eggs	1.3E+02	1.4E+02	1.4E+02	1.4E+02	1.4E+02	1.4E+02	1.4E+02	1.4E+02
Soil Ing	1.1E+00	1.2E+00	1.2E+00	1.2E+00	1.2E+00	2.9E+00	1.3E+00	1.2E+00
Total	2.0E+05	2.1E+05	2.2E+05	2.2E+05	2.2E+05	2.8E+05	2.1E+05	2.2E+05

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.1E+04	1.0E+04	1.1E+04	3.0E+02	3.1E+03	6.3E-01
Oth. Veg	1.5E+04	1.4E+04	1.5E+04	4.2E+02	4.3E+03	8.6E-01
Fruit	1.6E+04	1.5E+04	1.5E+04	4.2E+02	4.4E+03	8.9E-01
Cereals	5.5E+03	5.3E+03	5.4E+03	1.5E+02	1.6E+03	2.1E-01
Meat	9.5E+04	9.4E+04	9.4E+04	3.6E+01	3.4E+01	3.6E-01
Poultry	6.7E+02	6.6E+02	6.6E+02	3.6E+00	6.0E-01	8.6E-05
Cow Milk	5.4E+04	5.3E+04	5.4E+04	2.5E+01	6.2E+00	1.8E-02
Eggs	1.3E+02	1.3E+02	1.4E+02	7.0E-01	6.9E-01	7.4E-05
Soil Ing	1.1E+00	1.1E+00	1.1E+00	3.0E-02	3.1E-01	6.3E-05
Total	2.0E+05	1.9E+05	1.9E+05	1.4E+03	1.3E+04	3.0E+00

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.6E+02
-----	-----
Total	2.6E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:56:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.1E+04	1.2E+04	1.2E+04	1.2E+04	1.2E+04	2.9E+04	1.3E+04	1.2E+04
Oth. Veg	1.5E+04	1.6E+04	1.7E+04	1.7E+04	1.7E+04	4.2E+04	1.8E+04	1.7E+04
Fruit	1.5E+04	1.7E+04	1.7E+04	1.7E+04	1.8E+04	4.3E+04	1.9E+04	1.7E+04
Cereals	5.4E+03	5.9E+03	6.0E+03	6.0E+03	6.2E+03	1.5E+04	6.4E+03	6.0E+03
Meat	9.5E+04	1.0E+05	1.1E+05	1.1E+05	1.1E+05	9.6E+04	9.8E+04	1.0E+05
Poultry	6.8E+02	7.4E+02	7.6E+02	7.5E+02	7.6E+02	6.8E+02	6.9E+02	7.4E+02
Cow Milk	5.4E+04	5.8E+04	6.0E+04	5.9E+04	6.0E+04	5.5E+04	5.5E+04	5.9E+04
Eggs	1.3E+02	1.4E+02	1.4E+02	1.4E+02	1.4E+02	1.4E+02	1.4E+02	1.4E+02
Soil Ing	2.8E+01	3.0E+01	3.1E+01	3.1E+01	3.1E+01	7.9E+01	3.3E+01	3.1E+01
Total	2.0E+05	2.1E+05	2.2E+05	2.2E+05	2.2E+05	2.8E+05	2.1E+05	2.2E+05

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
Leaf Veg	1.1E+04	1.0E+04	1.1E+04	3.2E+02	3.1E+03	6.3E-01
Oth. Veg	1.5E+04	1.5E+04	1.5E+04	7.4E+02	4.3E+03	8.7E-01
Fruit	1.6E+04	1.5E+04	1.5E+04	7.9E+02	4.4E+03	8.9E-01
Cereals	5.5E+03	5.3E+03	5.4E+03	1.8E+02	1.6E+03	2.1E-01
Meat	9.5E+04	9.4E+04	9.4E+04	3.8E+01	3.4E+01	3.6E-01
Poultry	6.8E+02	6.7E+02	6.7E+02	4.2E+00	7.1E-01	8.6E-05
Cow Milk	5.4E+04	5.3E+04	5.4E+04	2.7E+01	6.5E+00	1.8E-02
Eggs	1.3E+02	1.3E+02	1.4E+02	8.3E-01	7.1E-01	7.4E-05
Soil Ing	2.9E+01	2.7E+01	2.8E+01	5.1E-01	9.9E+00	1.1E-04
Total	2.0E+05	1.9E+05	2.0E+05	2.1E+03	1.3E+04	3.0E+00

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	6.1E+03
Total	6.1E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:56:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.9E+02	1.9E+02	1.9E+02	1.9E+02	1.9E+02	2.2E+02	2.3E+02	1.9E+02
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.8E+00	5.8E+00	9.2E+00	5.7E+01	2.4E+02	5.0E+03	2.2E+03	2.8E+00
Y 90	1.5E-04	1.3E+01	3.0E+01	1.5E+02	3.7E+02	4.6E-03	4.5E-03	1.5E-04
TC 99	3.1E-04	3.4E-02	5.9E-04	2.0E-03	5.4E-03	3.7E-04	3.7E-04	3.1E-04
RU 106	2.1E+01	4.7E+01	8.5E+01	3.7E+02	1.1E+03	2.5E+01	2.7E+01	2.3E+01
AG 110M	6.8E-02	2.1E-01	4.7E-01	1.7E+00	4.7E+00	4.4E-02	7.7E-02	4.0E-02
CD 113M	8.1E+00	8.8E+00	9.5E+00	1.5E+01	3.1E+01	1.0E+01	1.0E+01	8.3E+00
SB 125	2.0E-01	9.9E-01	2.5E+00	7.3E+00	2.0E+01	2.3E+00	7.6E-01	3.0E-01
TE 125M	4.5E-02	1.9E-01	3.9E-01	1.7E+00	4.8E+00	1.4E+01	1.3E+00	4.0E-02
I 129	1.4E-01	2.0E-01	1.2E-01	1.2E-01	1.2E-01	1.6E-01	1.7E-01	1.1E-01
CS 134	2.5E+04	2.8E+04	3.3E+04	3.0E+04	3.3E+04	2.5E+04	2.8E+04	3.0E+04
CS 137	1.7E+05	1.8E+05	1.9E+05	1.9E+05	1.9E+05	1.7E+05	1.7E+05	1.8E+05
CE 144	3.4E-02	5.7E+00	1.9E+01	1.1E+02	3.5E+02	6.8E-01	4.7E-01	5.2E-02
PR 144M	1.5E-06	1.1E-02	4.1E-03	8.8E-04	5.2E-05	8.8E-07	1.8E-06	2.5E-07
PR 144	1.7E-04	2.2E+00	5.2E-01	9.9E-02	5.7E-03	8.3E-05	1.8E-04	3.7E-05
PM 147	4.6E-05	2.1E+00	5.5E+00	3.1E+01	9.8E+01	7.9E+00	6.4E-01	5.5E-05
SM 151	1.9E-06	3.9E-02	9.9E-02	5.8E-01	1.7E+00	6.0E-01	4.8E-02	8.7E-07
EU 154	2.3E-01	8.5E-01	2.3E+00	7.1E+00	1.9E+01	4.7E+00	1.2E+00	1.7E-01
EU 155	3.6E-02	3.7E-01	1.0E+00	4.5E+00	1.3E+01	4.9E+00	6.0E-01	2.8E-02
CM 244	3.8E-05	5.4E-03	1.5E-02	7.9E-02	2.5E-01	4.1E+01	3.3E+00	5.4E-01
PU 240	7.2E-03	1.1E+00	2.6E+00	1.5E+01	4.7E+01	1.6E+04	1.2E+03	2.2E+02
AM 242M	1.4E-03	6.0E-03	2.1E-02	1.8E-01	7.4E-01	1.3E+03	1.1E+02	1.9E+01
AM 242	1.2E-05	1.6E-02	3.4E-02	1.3E-01	2.0E-01	1.1E-01	9.8E-03	1.4E-03
CM 242	9.7E-04	1.6E-01	3.8E-01	2.1E+00	6.8E+00	4.8E+01	4.0E+00	5.8E-01
NP 238	3.7E-06	1.6E-04	4.0E-04	1.5E-03	3.4E-03	7.6E-04	1.0E-04	1.8E-05
PU 238	5.7E-03	8.6E-01	2.1E+00	1.3E+01	3.8E+01	1.1E+04	8.5E+02	1.5E+02
PU 241	9.9E-03	1.1E-01	2.8E-01	1.6E+00	4.6E+00	6.2E+03	4.8E+02	9.2E+01
U 237	1.0E-06	1.3E-04	3.5E-04	1.6E-03	4.2E-03	1.6E-05	2.7E-05	5.6E-06
AM 241	2.8E-02	1.1E+00	2.5E+00	1.5E+01	4.4E+01	1.4E+04	1.1E+03	2.0E+02
CM 243	2.0E-03	4.0E-02	9.8E-02	5.5E-01	1.7E+00	3.1E+02	2.5E+01	4.2E+00

HNF-SD-FF-CN-013 Rev. 0

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	5.7E-10	3.5E-09	8.6E-09	4.7E-08	1.5E-07	4.5E-05	3.5E-06	6.4E-07
NP 239	6.1E-12	8.5E-10	2.1E-09	9.4E-09	2.1E-08	1.0E-10	1.2E-10	2.7E-11
PU 239	1.2E-02	1.8E+00	4.4E+00	2.5E+01	7.8E+01	2.7E+04	2.1E+03	3.7E+02
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	2.0E+05	2.1E+05	2.2E+05	2.2E+05	2.2E+05	2.8E+05	2.1E+05	2.2E+05

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:56:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	1.9E+02	1.9E+02	1.9E+02	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	2.8E+00	2.8E+00	2.8E+00	0.0E+00	0.0E+00	0.0E+00
Y 90	1.7E-04	1.5E-04	1.5E-04	0.0E+00	4.4E-03	0.0E+00
TC 99	3.1E-04	3.1E-04	7.9E-03	0.0E+00	4.3E-04	0.0E+00
RU 106	2.4E+01	2.1E+01	2.1E+01	0.0E+00	0.0E+00	0.0E+00
AG 110M	2.2E-01	6.1E-02	2.2E-02	0.0E+00	2.0E+00	0.0E+00
CD 113M	8.3E+00	8.3E+00	8.3E+00	1.4E+03	2.2E+02	0.0E+00
SB 125	1.8E+00	3.3E-01	1.5E-01	0.0E+00	8.2E-01	0.0E+00
TE 125M	1.3E-01	4.7E-02	4.0E-02	0.0E+00	0.0E+00	0.0E+00
I 129	1.2E-01	2.8E-01	2.1E+03	0.0E+00	0.0E+00	0.0E+00
CS 134	2.5E+04	2.5E+04	2.5E+04	0.0E+00	0.0E+00	0.0E+00
CS 137	1.7E+05	1.7E+05	1.7E+05	0.0E+00	0.0E+00	0.0E+00
CE 144	3.6E-01	6.2E-02	2.7E-02	0.0E+00	3.6E+00	3.0E+00
PR 144M	3.8E-06	1.8E-06	1.1E-07	3.2E-06	2.0E-06	0.0E+00
PR 144	4.1E-04	1.9E-04	2.0E-05	3.9E-04	2.6E-04	0.0E+00
PM 147	2.5E-04	6.4E-05	4.3E-05	0.0E+00	2.1E+00	0.0E+00
SM 151	3.6E-05	2.6E-06	7.8E-07	0.0E+00	1.6E-01	0.0E+00
EU 154	1.4E+00	2.9E-01	5.9E-02	4.7E-01	3.7E+00	0.0E+00
EU 155	3.7E-01	5.2E-02	6.7E-03	9.0E-02	1.5E+00	0.0E+00
CM 244	5.5E-01	3.7E-05	3.6E-05	0.0E+00	8.2E+00	0.0E+00
PU 240	2.2E+02	7.1E-03	6.6E-03	0.0E+00	2.7E+03	0.0E+00
AM 242M	1.9E+01	1.1E-03	3.4E-04	0.0E+00	2.4E+02	0.0E+00
AM 242	2.1E-03	7.3E-05	2.0E-06	0.0E+00	2.9E-02	0.0E+00
CM 242	5.7E-01	9.8E-04	9.7E-04	0.0E+00	1.2E+01	0.0E+00
NP 238	1.5E-04	1.8E-05	5.5E-07	0.0E+00	5.1E-05	0.0E+00
PU 238	1.4E+02	5.6E-03	5.3E-03	0.0E+00	1.9E+03	0.0E+00
PU 241	9.1E+01	5.8E-03	2.5E-03	0.0E+00	9.5E+02	0.0E+00
U 237	8.9E-05	8.4E-06	1.1E-07	1.4E-05	0.0E+00	0.0E+00
AM 241	1.9E+02	2.2E-02	1.1E-02	0.0E+00	2.5E+03	0.0E+00
CM 243	4.2E+00	1.8E-03	8.6E-04	0.0E+00	6.1E+01	0.0E+00

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	6.3E-07	3.9E-10	2.0E-10	0.0E+00	8.0E-06	0.0E+00
NP 239	4.1E-10	4.1E-11	5.1E-13	0.0E+00	3.9E-11	0.0E+00
PU 239	3.7E+02	1.2E-02	1.1E-02	0.0E+00	4.6E+03	0.0E+00

Total	2.0E+05	1.9E+05	1.9E+05	1.4E+03	1.3E+04	3.0E+00

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	1.3E-04
Y 90	7.2E-03
TC 99	7.4E-09
RU 106	3.6E-01
AG 110M	4.2E-03
CD 113M	3.5E-05
SB 125	1.5E-01
TE 125M	2.1E-04
I 129	5.7E-05
CS 134	6.4E+01
CS 137	1.9E+02
CE 144	5.0E-03
PR 144M	1.3E-05
PR 144	2.3E-02
PM 147	2.2E-05
SM 151	8.6E-08
EU 154	1.0E-01
EU 155	8.6E-03
CM 244	5.6E-09
PU 240	1.9E-06
AM 242M	1.5E-06
AM 242	7.3E-05
CM 242	1.7E-07
NP 238	2.3E-05
PU 238	1.4E-06
PU 241	7.1E-11
U 237	0.0E+00
AM 241	3.8E-04
CM 243	1.9E-04
PU 243	0.0E+00
AM 243	3.8E-12
NP 239	2.9E-11
PU 239	7.1E-06

Total	2.6E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:56:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes

H 3	1.9E+02	1.9E+02	1.9E+02	1.9E+02	1.9E+02	2.2E+02	2.3E+02	1.9E+02
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	4.8E+00	1.0E+01	1.6E+01	9.9E+01	4.1E+02	8.2E+03	3.7E+03	4.8E+00
Y 90	2.4E-04	2.0E+01	4.8E+01	2.4E+02	5.9E+02	7.4E-03	7.2E-03	2.4E-04
TC 99	4.7E-04	5.1E-02	9.0E-04	3.1E-03	8.2E-03	5.5E-04	5.5E-04	4.7E-04
RU 106	2.1E+01	4.7E+01	8.5E+01	3.7E+02	1.1E+03	2.5E+01	2.7E+01	2.3E+01
AG 110M	6.8E-02	2.1E-01	4.8E-01	1.7E+00	4.7E+00	4.4E-02	7.7E-02	4.0E-02
CD 113M	1.3E+01	1.4E+01	1.5E+01	2.4E+01	9.8E+01	1.6E+01	1.6E+01	1.3E+01
SB 125	2.0E-01	1.0E+00	2.5E+00	7.3E+00	2.0E+01	2.3E+00	7.7E-01	3.0E-01
TE 125M	5.3E-02	2.2E-01	4.6E-01	2.0E+00	5.7E+00	1.6E+01	1.5E+00	4.7E-02
I 129	1.4E-01	2.0E-01	1.2E-01	1.2E-01	1.2E-01	1.6E-01	1.7E-01	1.1E-01
CS 134	2.5E+04	2.8E+04	3.3E+04	3.0E+04	3.3E+04	2.5E+04	2.8E+04	3.0E+04
CS 137	1.7E+05	1.9E+05	1.9E+05	1.9E+05	1.9E+05	1.7E+05	1.7E+05	1.9E+05
CE 144	3.4E-02	5.7E+00	1.9E+01	1.1E+02	3.5E+02	6.8E-01	4.7E-01	5.2E-02
PR 144M	1.5E-06	1.1E-02	4.1E-03	8.9E-04	5.2E-05	8.9E-07	1.8E-06	2.5E-07
PR 144	1.7E-04	2.2E+00	5.2E-01	9.9E-02	5.7E-03	8.3E-05	1.8E-04	3.7E-05
PM 147	4.6E-05	2.1E+00	5.5E+00	3.1E+01	9.8E+01	8.0E+00	6.4E-01	5.5E-05
SM 151	1.9E-06	4.0E-02	1.0E-01	5.8E-01	1.7E+00	6.0E-01	4.8E-02	8.8E-07
EU 154	2.3E-01	8.5E-01	2.3E+00	7.2E+00	1.9E+01	4.7E+00	1.2E+00	1.7E-01
EU 155	3.6E-02	3.8E-01	1.1E+00	4.5E+00	1.3E+01	4.9E+00	6.0E-01	2.9E-02
CM 244	3.8E-05	5.4E-03	1.5E-02	7.9E-02	2.5E-01	4.1E+01	3.3E+00	5.4E-01
PU 240	7.2E-03	1.1E+00	2.6E+00	1.5E+01	4.7E+01	1.6E+04	1.2E+03	2.2E+02
AM 242M	1.4E-03	6.0E-03	2.1E-02	1.8E-01	7.4E-01	1.3E+03	1.1E+02	1.9E+01
AM 242	1.2E-05	1.6E-02	3.4E-02	1.3E-01	2.0E-01	1.1E-01	9.9E-03	1.4E-03
CM 242	9.7E-04	1.6E-01	3.8E-01	2.1E+00	6.8E+00	4.8E+01	4.0E+00	5.8E-01
NP 238	4.3E-06	1.8E-04	4.7E-04	1.8E-03	4.0E-03	8.3E-04	1.2E-04	2.1E-05
PU 238	5.7E-03	8.6E-01	2.1E+00	1.3E+01	3.8E+01	1.1E+04	8.5E+02	1.5E+02
PU 241	9.9E-03	1.1E-01	2.8E-01	1.6E+00	4.6E+00	6.2E+03	4.8E+02	9.3E+01
U 237	1.0E-06	1.3E-04	3.5E-04	1.6E-03	4.2E-03	1.6E-05	2.7E-05	5.6E-06
AM 241	2.8E-02	1.1E+00	2.5E+00	1.5E+01	4.5E+01	1.4E+04	1.1E+03	2.0E+02
CM 243	2.0E-03	4.0E-02	9.8E-02	5.5E-01	1.7E+00	3.1E+02	2.5E+01	4.2E+00

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PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	6.2E-10	3.8E-09	9.4E-09	5.1E-08	1.6E-07	4.6E-05	3.7E-06	6.6E-07
NP 239	4.6E-11	6.5E-09	1.6E-08	7.2E-08	1.6E-07	7.7E-10	8.9E-10	2.0E-10
PU 239	1.2E-02	1.8E+00	4.4E+00	2.5E+01	7.9E+01	2.7E+04	2.1E+03	3.7E+02
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	2.0E+05	2.1E+05	2.2E+05	2.2E+05	2.2E+05	2.8E+05	2.1E+05	2.2E+05

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: Disruption of ISC - 1 assembly - ingestion doses

Executed on: 10/23/97 at 08:56:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver	Spleen
H 3	1.9E+02	1.9E+02	1.9E+02	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SR 90	4.8E+00	4.8E+00	4.8E+00	0.0E+00	0.0E+00	0.0E+00
Y 90	2.8E-04	2.4E-04	2.4E-04	0.0E+00	7.0E-03	0.0E+00
TC 99	4.7E-04	4.7E-04	1.2E-02	0.0E+00	6.4E-04	0.0E+00
RU 106	2.4E+01	2.1E+01	2.1E+01	0.0E+00	0.0E+00	0.0E+00
AG 110M	2.2E-01	6.2E-02	2.2E-02	0.0E+00	2.0E+00	0.0E+00
CD 113M	1.3E+01	1.3E+01	1.3E+01	2.1E+03	3.5E+02	0.0E+00
SB 125	1.8E+00	3.3E-01	1.5E-01	0.0E+00	8.2E-01	0.0E+00
TE 125M	1.6E-01	5.5E-02	4.7E-02	0.0E+00	0.0E+00	0.0E+00
I 129	1.2E-01	2.8E-01	2.1E+03	0.0E+00	0.0E+00	0.0E+00
CS 134	2.5E+04	2.5E+04	2.5E+04	0.0E+00	0.0E+00	0.0E+00
CS 137	1.7E+05	1.7E+05	1.7E+05	0.0E+00	0.0E+00	0.0E+00
CE 144	3.6E-01	6.3E-02	2.7E-02	0.0E+00	3.6E+00	3.0E+00
PR 144M	3.8E-06	1.8E-06	1.1E-07	3.2E-06	2.0E-06	0.0E+00
PR 144	4.1E-04	1.9E-04	2.0E-05	3.9E-04	2.6E-04	0.0E+00
PM 147	2.5E-04	6.4E-05	4.3E-05	0.0E+00	2.1E+00	0.0E+00
SM 151	3.6E-05	2.6E-06	7.9E-07	0.0E+00	1.6E-01	0.0E+00
EU 154	1.5E+00	2.9E-01	5.9E-02	4.7E-01	3.7E+00	0.0E+00
EU 155	3.7E-01	5.3E-02	6.8E-03	9.0E-02	1.5E+00	0.0E+00
CM 244	5.5E-01	3.7E-05	3.6E-05	0.0E+00	8.2E+00	0.0E+00
PU 240	2.2E+02	7.1E-03	6.6E-03	0.0E+00	2.8E+03	0.0E+00
AM 242M	1.9E+01	1.1E-03	3.4E-04	0.0E+00	2.4E+02	0.0E+00
AM 242	2.1E-03	7.3E-05	2.0E-06	0.0E+00	3.0E-02	0.0E+00
CM 242	5.7E-01	9.8E-04	9.7E-04	0.0E+00	1.2E+01	0.0E+00
NP 238	1.7E-04	2.1E-05	6.4E-07	0.0E+00	6.0E-05	0.0E+00
PU 238	1.4E+02	5.6E-03	5.3E-03	0.0E+00	1.9E+03	0.0E+00
PU 241	9.1E+01	5.8E-03	2.5E-03	0.0E+00	9.6E+02	0.0E+00
U 237	8.9E-05	8.4E-06	1.1E-07	1.4E-05	0.0E+00	0.0E+00
AM 241	1.9E+02	2.2E-02	1.1E-02	0.0E+00	2.5E+03	0.0E+00
CM 243	4.2E+00	1.8E-03	8.6E-04	0.0E+00	6.1E+01	0.0E+00

PU 243	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 243	6.5E-07	4.3E-10	2.2E-10	0.0E+00	8.4E-06	0.0E+00
NP 239	3.1E-09	3.1E-10	3.9E-12	0.0E+00	3.0E-10	0.0E+00
PU 239	3.7E+02	1.2E-02	1.1E-02	0.0E+00	4.7E+03	0.0E+00
-----	-----	-----	-----	-----	-----	-----
Total	2.0E+05	1.9E+05	2.0E+05	2.1E+03	1.3E+04	3.0E+00

External Dose by Radionuclide

Radionuclide	-----
H 3	0.0E+00
KR 85	0.0E+00
SR 90	3.6E-03
Y 90	2.0E-01
TC 99	1.4E-08
RU 106	7.3E-01
AG 110M	5.8E-03
CD 113M	6.3E-04
SB 125	5.9E-01
TE 125M	7.3E-04
I 129	1.0E-04
CS 134	2.3E+02
CS 137	5.8E+03
CE 144	8.6E-03
PR 144M	2.1E-05
PR 144	3.9E-02
PM 147	9.5E-05
SM 151	3.5E-06
EU 154	1.3E+00
EU 155	6.4E-02
CM 244	1.2E-07
PU 240	9.2E-05
AM 242M	6.7E-05
AM 242	3.1E-03
CM 242	5.6E-06
NP 238	1.0E-03
PU 238	5.9E-05
PU 241	1.3E-09
U 237	0.0E+00
AM 241	2.6E-02
CM 243	5.6E-03
PU 243	0.0E+00
AM 243	6.6E-09
NP 239	5.1E-08
PU 239	3.5E-04
-----	-----
Total	6.1E+03

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Attachment 8

**Code Files for
Large Sodium Spill (Section 3.6)**

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: FFFT burn, 25000 lb sodium, 0.25% release. Unit X/Q, aged 2
 days, revH3

Executed on: 10/28/97 at 16:42:26

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\FFTFNA08.IN
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

-----Release Terms-----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

NA22	2.6E-02	0.0E+00	0.0E+00
NA24	7.9E+01	0.0E+00	0.0E+00
I 131	5.8E+00	0.0E+00	0.0E+00
I 133	2.8E+00	0.0E+00	0.0E+00
I 135	8.9E-02	0.0E+00	0.0E+00
CS134	6.9E-02	0.0E+00	0.0E+00
CS136	4.3E-01	0.0E+00	0.0E+00
CS137	2.1E-01	0.0E+00	0.0E+00
TA182	2.7E-02	0.0E+00	0.0E+00
H 3	6.0E-01	0.0E+00	0.0E+00

PU239	8.5E-08	0.0E+00	0.0E+00
KR83M	2.2E-08	0.0E+00	0.0E+00
KR85M	2.9E-03	0.0E+00	0.0E+00
KR85	8.3E-04	0.0E+00	0.0E+00
KR87	1.7E-11	0.0E+00	0.0E+00
KR88	6.3E-05	0.0E+00	0.0E+00
XE131M	2.9E+00	0.0E+00	0.0E+00
XE133M	4.0E-01	0.0E+00	0.0E+00
XE133	1.2E+01	0.0E+00	0.0E+00
XE135	1.5E+00	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 1.0E+00 Fraction of time spent in cloud

===== INHALATION =====
 Resuspension not considered

=====

Input prepared by: _____ Date: _____

Input checked by: _____ Date: _____

=====

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: FFFT burn, 25000 lb sodium, 0.25% release. Unit X/Q, aged 2
days, revH3

Executed on: 10/28/97 at 16:42:42

Page C. 1

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	2.2E+01	2.5E-01	5.4E+00
Breast	2.1E+01	1.5E-01	3.1E+00
R Marrow	2.6E+01	1.2E-01	3.1E+00
Lung	1.4E+02	1.2E-01	1.7E+01
Thyroid	2.1E+03	3.0E-02	6.2E+01
Bone Sur	3.2E+01	3.0E-02	9.6E-01
Stomach	3.6E+01	6.0E-02	2.2E+00
LL Int.	2.3E+01	6.0E-02	1.4E+00
S Int.	2.1E+01	6.0E-02	1.3E+00
UL Int.	2.1E+01	6.0E-02	1.3E+00
Kidneys	5.3E-02	6.0E-02	3.2E-03
Internal Effective Dose Equivalent			9.8E+01
External Dose			7.6E+01
Annual Effective Dose Equivalent			1.7E+02

Controlling Organ:	Thyroid
Controlling Pathway:	Inh
Controlling Radionuclide:	NA24

Total Inhalation EDE:	9.8E+01
Total Ingestion EDE:	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: FFFT burn, 25000 lb sodium, 0.25% release. Unit X/Q, aged 2 days, revH3

Executed on: 10/28/97 at 16:42:42

Page C. 2

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			0.0E+00	...	
				+		
	2		0.0E+00	0.0E+00	...	Internal
			+	+		Effective
	1	9.8E+01	+ 2.7E-01	+ 2.7E-02	+ ... = 9.8E+01	Dose
						Equivalent
Internal						Cumulative
Annual		9.8E+01	+ 2.7E-01	+ 2.7E-02	+ ... = 9.8E+01	Internal
Dose						Dose
		+	+	+	+	
External						
Annual		7.6E+01	0.0E+00	0.0E+00	...	7.6E+01
Dose						
Annual						Cumulative
Dose		1.7E+02	+ 2.7E-01	+ 2.7E-02	+ ... = 1.7E+02	Dose
					1.7E+02	Maximum
						Annual
						Dose Occurred
						In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: FFFT burn, 25000 lb sodium, 0.25% release. Unit X/Q, aged 2
days, revH3
Executed on: 10/28/97 at 16:42:42 Page C. 3

Acute release
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Inhale	1.4E+02	3.6E+01	2.1E+01	2.1E+01	2.3E+01	3.2E+01	2.6E+01	1.9E+01
Total	1.4E+02	3.6E+01	2.1E+01	2.1E+01	2.3E+01	3.2E+01	2.6E+01	1.9E+01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
Inhale	2.2E+01	2.1E+01	2.1E+03	5.3E-02	3.9E-02
Total	2.2E+01	2.1E+01	2.1E+03	5.3E-02	3.9E-02

External Dose by Exposure Pathway

Pathway	
Plume	7.6E+01
Total	7.6E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: FFFT burn, 25000 lb sodium, 0.25% release. Unit X/Q, aged 2
 days, revH3

Executed on: 10/28/97 at 16:42:42

Page C. 4

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.9E-02	1.9E-02	1.9E-02	1.9E-02	1.9E-02	2.3E-02	2.3E-02	1.9E-02
NA 22	8.0E-02	5.2E-02	6.1E-02	5.8E-02	6.4E-02	1.1E-01	8.5E-02	5.4E-02
NA 24	1.3E+02	3.1E+01	1.6E+01	1.6E+01	1.7E+01	2.6E+01	2.1E+01	1.4E+01
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	4.6E+00	5.2E-01	1.9E-01	1.8E-01	1.8E-01	7.7E-01	4.1E-01	1.5E-01
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	2.8E+00	3.7E-01	7.5E-02	7.5E-02	7.1E-02	7.5E-02	8.9E-02	6.8E-02
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	1.0E+00	1.0E+00	1.2E+00	1.1E+00	1.2E+00	9.2E-01	1.0E+00	1.1E+00
I 135	4.9E-02	1.1E-02	2.1E-03	2.0E-03	1.9E-03	1.8E-03	2.3E-03	1.7E-03
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 136	1.2E+00	1.0E+00	1.1E+00	1.1E+00	1.1E+00	1.9E+00	9.8E-01	9.8E-01
CS 137	2.3E+00	2.2E+00	2.3E+00	2.3E+00	2.3E+00	2.1E+00	2.1E+00	2.3E+00
TA 182	2.7E+00	9.2E-02	4.6E-02	1.1E-01	2.3E-01	4.9E-02	6.4E-02	4.6E-03
PU 239	1.8E-03	1.6E-07	2.5E-07	1.0E-06	2.9E-06	2.2E-01	1.7E-02	3.1E-03
Total	1.4E+02	3.6E+01	2.1E+01	2.1E+01	2.3E+01	3.2E+01	2.6E+01	1.9E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: FFFT burn, 25000 lb sodium, 0.25% release. Unit X/Q, aged 2
days, revH3

Executed on: 10/28/97 at 16:42:42

Page C. 5

Acute release

Uptake/exposure period:

1.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver

H 3	1.9E-02	1.9E-02	1.9E-02	0.0E+00	0.0E+00
NA 22	5.7E-02	5.2E-02	5.1E-02	0.0E+00	0.0E+00
NA 24	1.7E+01	1.6E+01	1.5E+01	0.0E+00	0.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	1.7E-01	5.3E-01	1.9E+03	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	6.8E-02	1.0E-01	1.6E+02	0.0E+00	0.0E+00
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	9.2E-01	9.2E-01	9.2E-01	0.0E+00	0.0E+00
I 135	1.8E-03	2.5E-03	8.8E-01	0.0E+00	0.0E+00
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 136	9.3E-01	8.8E-01	9.3E-01	0.0E+00	0.0E+00
CS 137	2.1E+00	2.0E+00	2.0E+00	0.0E+00	0.0E+00
TA 182	3.0E-02	6.0E-02	5.0E-02	5.3E-02	0.0E+00
PU 239	3.1E-03	9.6E-08	9.4E-08	0.0E+00	3.9E-02

Total	2.2E+01	2.1E+01	2.1E+03	5.3E-02	3.9E-02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: FFFT burn, 25000 lb sodium, 0.25% release. Unit X/Q, aged 2
days, revH3

Executed on: 10/28/97 at 16:42:42

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Acute release

Uptake/exposure period: 1.0

Dose commitment period: 50.0

Dose units: Rem

Radio- nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
H 3	1.8E-02	0.0E+00	1.4E-11	1.8E-02	1.8E-02
NA 22	6.1E-02	0.0E+00	1.2E-02	6.1E-02	7.3E-02
NA 24	3.0E+01	0.0E+00	7.5E+01	3.0E+01	1.1E+02
KR 83M	0.0E+00	0.0E+00	1.3E-12	0.0E+00	1.3E-12
KR 85M	0.0E+00	0.0E+00	7.8E-05	0.0E+00	7.8E-05
KR 85	0.0E+00	0.0E+00	4.7E-07	0.0E+00	4.7E-07
KR 87	0.0E+00	0.0E+00	3.3E-12	0.0E+00	3.3E-12
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	2.7E-05	0.0E+00	2.7E-05
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	5.8E+01	0.0E+00	4.4E-01	5.8E+01	5.8E+01
XE 131M	0.0E+00	0.0E+00	4.7E-03	0.0E+00	4.7E-03
I 133	5.3E+00	0.0E+00	3.6E-01	5.3E+00	5.7E+00
XE 133M	0.0E+00	0.0E+00	2.5E-03	0.0E+00	2.5E-03
XE 133	0.0E+00	0.0E+00	6.0E-02	0.0E+00	6.0E-02
CS 134	9.8E-01	0.0E+00	2.4E-02	9.8E-01	1.0E+00
I 135	3.4E-02	0.0E+00	3.0E-02	3.4E-02	6.4E-02
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	7.1E-02	0.0E+00	7.1E-02
CS 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 136	9.9E-01	0.0E+00	1.9E-01	9.9E-01	1.2E+00
CS 137	2.1E+00	0.0E+00	2.4E-02	2.1E+00	2.1E+00
TA 182	3.9E-01	0.0E+00	7.3E-03	3.9E-01	4.0E-01
PU 239	1.2E-02	0.0E+00	1.8E-12	1.2E-02	1.2E-02

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Microshield 3.12

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(WESTINGHOUSE HANFORD CO. - #090)

Page : 1	File Ref: _____
File : FFTFCON1.MSH	Date: ____/____/____
Run date: September 24, 1997	By: _____
Run time: 2:11 p.m.	Checked: _____

CASE: fftf vessel dose 100 m 1% failed fuel 2 d decay H3 100x ref

GEOMETRY 7: Cylindrical source from side - cylindrical shields

Distance to detector.....	X	12060.	cm.
Source length.....	L	3200.	"
Dose point height from base.....	Y	150.	"
Source cylinder radius.....	T1	2060.	"
Thickness of second shield.....	T2	2.540	"
Microshield inserted air gap.....	air	9997.460	"

Source Volume: 4.26613e+10 cubic centimeters

MATERIAL DENSITIES (g/cc):

Material	Source	Shield 2	Air gap
-----	-----	-----	-----
Air	.001220		.001220
Aluminum			
Carbon			
Concrete			
Hydrogen			
Iron		7.860	
Lead			
Lithium			
Nickel			
Tin			
Titanium			
Tungsten			
Uranium			
Water			
Zirconium			

Page 2

File: FFTFCON1.MSH

CASE: fftf vessel dose 100 m 1% failed fuel 2 d decay H3 100x ref

BUILDUP FACTOR: based on TAYLOR method.
Using the characteristics of the materials in shield 1.

INTEGRATION PARAMETERS:

Number of lateral angle segments (Ntheta).....	11
Number of azimuthal angle segments (Npsi).....	11
Number of radial segments (Nradius).....	11

SOURCE NUCLIDES:

Nuclide	Curies	Nuclide	Curies	Nuclide	Curies
Ba-137m	7.8300e+01	Cs-134	2.7500e+01	Cs-136	1.7400e+02
Cs-137	8.2800e+01	H-3	2.3800e+02	I-131	2.3200e+03
I-133	1.1100e+03	I-135	3.5700e+01	Kr-83m	8.9100e-06
Kr-85	3.3000e-01	Kr-85m	1.1700e+00	Kr-87	6.9500e-09
Kr-88	2.5000e-02	Na-22	1.0400e+01	Na-24	3.1740e+04
Ta-182	1.0900e+01	Xe-131m	1.1600e+03	Xe-133	4.8500e+03
Xe-133m	1.6000e+02	Xe-135	5.9400e+02		

RESULTS:

Group #	Energy (MeV)	Activity (photons/sec)	Dose point flux MeV/(sq cm)/sec	Dose rate (mr/hr)
1	2.7585	1.174e+15	8.825e+05	1.298e+03
2	2.2086	3.662e+10	2.151e+01	3.372e-02
3	1.3672	1.176e+15	3.701e+05	6.641e+02
4	1.1181	9.107e+12	2.253e+03	4.241e+00
5	.7383	2.160e+13	3.498e+03	7.135e+00
6	.5269	3.972e+13	4.812e+03	9.873e+00
7	.3658	7.372e+13	4.636e+03	9.538e+00
8	.2521	2.671e+13	6.705e+02	1.315e+00
9	.1679	3.080e+12	2.061e+01	3.647e-02
10	.1076	9.264e+10	2.452e-02	3.763e-05
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
TOTALS:		2.523e+15	1.269e+06	1.994e+03

Microshield 3.12

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(WESTINGHOUSE HANFORD CO. - #090)

Page : 1	File Ref: _____
File : FFTFCON2.MSH	Date: ____/____/____
Run date: September 24, 1997	By: _____
Run time: 2:15 p.m.	Checked: _____

CASE: fftf vessel dose 100 m 1% fail fuel 2.5 d decay H3 100 x ref

GEOMETRY 7: Cylindrical source from side - cylindrical shields

Distance to detector.....	X	12060.	cm.
Source length.....	L	3200.	"
Dose point height from base.....	Y	150.	"
Source cylinder radius.....	T1	2060.	"
Thickness of second shield.....	T2	2.540	"
Microshield inserted air gap.....	air	9997.460	"

Source Volume: 4.26613e+10 cubic centimeters

MATERIAL DENSITIES (g/cc):

Material	Source	Shield 2	Air gap
-----	-----	-----	-----
Air	.001220		.001220
Aluminum			
Carbon			
Concrete			
Hydrogen			
Iron		7.860	
Lead			
Lithium			
Nickel			
Tin			
Titanium			
Tungsten			
Urania			
Uranium			
Water			
Zirconium			

Page 2

File: FFTFCON2.MSH

CASE: fftf vessel dose 100 m 1% fail fuel 2.5 d decay H3 100 x ref

BUILDUP FACTOR: based on TAYLOR method.
Using the characteristics of the materials in shield 1.

INTEGRATION PARAMETERS:

Number of lateral angle segments (Ntheta).....	11
Number of azimuthal angle segments (Npsi).....	11
Number of radial segments (Nradius).....	11

SOURCE NUCLIDES:

Nuclide	Curies	Nuclide	Curies	Nuclide	Curies
Ba-137m	7.8326e+01	Cs-134	2.7487e+01	Cs-135	1.6404e-07
Cs-136	1.6948e+02	Cs-137	8.2797e+01	H-3	2.3800e+02
I-131	2.2221e+03	I-133	7.4413e+02	I-135	1.0143e+01
Kr-83m	9.4604e-08	Kr-85	3.2998e-01	Kr-85m	1.8275e-01
Kr-87	1.0031e-11	Kr-88	1.3365e-03	Na-22	1.0396e+01
Na-24	1.8230e+04	Rb-87	2.1285e-23	Rb-88	1.4924e-03
Ta-182	1.0867e+01	Xe-131m	1.1273e+03	Xe-133	4.6062e+03
Xe-133m	1.4042e+02	Xe-135	2.4944e+02	Xe-135m	1.7410e+00

Page 3

File: FFTFCON2.MSH

CASE: fftf vessel dose 100 m 1% fail fuel 2.5 d decay H3 100 x ref

RESULTS:

Group #	Energy (MeV)	Activity (photons/sec)	Dose point flux MeV/(sq cm)/sec	Dose rate (mr/hr)
1	3.8203	4.323e+11	4.329e+02	5.598e-01
2	2.7578	6.736e+14	5.064e+05	7.446e+02
3	1.7238	9.542e+10	4.241e+01	7.227e-02
4	1.3642	6.831e+14	2.144e+05	3.849e+02
5	.8092	1.097e+13	1.902e+03	3.818e+00
6	.5559	3.618e+13	4.623e+03	9.517e+00
7	.3659	7.022e+13	4.417e+03	9.087e+00
8	.2602	1.506e+13	4.124e+02	8.126e-01
9	.1721	2.429e+12	1.795e+01	3.193e-02
10	.1421	5.932e+11	1.561e+00	2.642e-03
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
TOTALS:		1.493e+15	7.327e+05	1.153e+03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2 days Ing
 estion dose

Executed on: 10/24/97 at 13:12:19

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is acute
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Ground, external
 Terrestrial foods ingestion
 Animal product ingestion
 Inadvertent soil ingestion

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 50.0
 Dose calculations ends after (yr): 50.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\ffftnail.in
 GENII Default Parameter Values (28-Mar-90 RAP)
 Radionuclide Library - Times<100 years (23-July-93 PDR)
 PNL Food Transfer Factor Library (by Z, with Fr&Os 7/19/93 PDR)
 External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R
 Worst-Case Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

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-----Release Terms-----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

NA22	2.6E-02	0.0E+00	0.0E+00
NA24	7.9E+01	0.0E+00	0.0E+00
I 131	5.8E+00	0.0E+00	0.0E+00
I 133	2.8E+00	0.0E+00	0.0E+00
I 135	8.9E-02	0.0E+00	0.0E+00
CS134	6.9E-02	0.0E+00	0.0E+00
CS136	4.3E-01	0.0E+00	0.0E+00

CS137	2.1E-01	0.0E+00	0.0E+00
TA182	2.7E-02	0.0E+00	0.0E+00
H 3	6.0E-01	0.0E+00	0.0E+00
PU239	8.5E-08	0.0E+00	0.0E+00
KR83M	2.2E-08	0.0E+00	0.0E+00
KR85M	2.9E-03	0.0E+00	0.0E+00
KR85	8.3E-04	0.0E+00	0.0E+00
KR87	1.7E-11	0.0E+00	0.0E+00
KR88	6.3E-05	0.0E+00	0.0E+00
XE131M	2.9E+00	0.0E+00	0.0E+00
XE133M	4.0E-01	0.0E+00	0.0E+00
XE133	1.2E+01	0.0E+00	0.0E+00
XE135	1.5E+00	0.0E+00	0.0E+00

===== AIR TRANSPORT =====
 1.0E+00 Input E/Q value (s/m3)

===== EXTERNAL EXPOSURE =====
 4.4E+03 Hours of exposure to ground contamination

===== INGESTION POPULATION =====
 1 Atmospheric production definition: 1 - Use population-weighted chi/Q

===== TERRESTRIAL FOOD INGESTION =====

FOOD TYPE	GROW TIME d	--IRRIGATION-- S RATE * in/yr	TIME mo/yr	YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP d	RATE kg/yr
Leaf Veg	90.0	0	0.0	0.0	1.5	1.0	3.0E+01
Oth. Veg	90.0	0	0.0	0.0	4.0	5.0	2.2E+02
Fruit	90.0	0	0.0	0.0	2.0	5.0	3.3E+02
Cereals	90.0	0	0.0	0.0	0.8	180.0	8.0E+01

===== ANIMAL FOOD INGESTION =====

FOOD TYPE	---HUMAN--- CONSUMPTION RATE kg/yr	TOTAL PROD- HOLDUP d	DRINK WATER CONTAM FRACT.	DIET FRAC- TION	GROW TIME d	--IRRIGATION-- S RATE * in/yr	TIME mo/yr	STOR- YIELD kg/m3	AGE d
Meat	8.0E+01	15.0	0.00	0.3	90.00	0	0.0	0.80	0.0
Poultry	1.8E+01	1.0	0.00	1.0	90.00	0	0.0	0.80	0.0
Cow Milk	2.7E+02	1.0	0.00	0.3	45.00	0	0.0	2.00	0.0
Eggs	3.0E+01	1.0	0.00	1.0	90.00	0	0.0	0.80	0.0

	-----FRESH FORAGE-----						
Meat	0.75	45.0	0	0.0	0.0	2.00	0.0
Cow Milk	0.75	30.0	0	0.0	0.0	1.50	0.0

Note: Animal diet fraction for years 2 through 50.0000

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Input prepared by: _____ Date: _____

Input checked by: _____ Date: _____

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GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:13:56

Page C. 1

Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	8.2E+00	2.5E-01	2.1E+00
Breast	7.7E+00	1.5E-01	1.1E+00
R Marrow	1.2E+01	1.2E-01	1.5E+00
Lung	7.4E+00	1.2E-01	8.8E-01
Thyroid	9.3E+00	3.0E-02	2.8E-01
Bone Sur	1.6E+01	3.0E-02	4.8E-01
LL Int.	9.1E+00	6.0E-02	5.5E-01
S Int.	9.1E+00	6.0E-02	5.4E-01
Stomach	8.6E+00	6.0E-02	5.2E-01
UL Int.	8.5E+00	6.0E-02	5.1E-01
Kidneys	7.6E-06	6.0E-02	4.5E-07
Internal Effective Dose Equivalent			8.5E+00
External Dose			2.3E+01
Annual Effective Dose Equivalent			3.1E+01

Controlling Organ:	Bone Sur
Controlling Pathway:	Ext
Controlling Radionuclide:	NA22

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	8.5E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Winter: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
 days Ingestion dos

Executed on: 10/24/97 at 13:13:56

Page C. 2

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			8.3E-01	...	
2		1.7E+00	4.5E-02	...	
1	8.1E+00	1.8E-01	8.7E-02	...	8.5E+00
Internal Annual Dose	8.1E+00	1.9E+00	9.6E-01	...	1.6E+01
	+	+	+	+	
External Annual Dose	2.3E+01	2.5E+00	2.1E+00	...	6.7E+01
Annual Dose	3.1E+01	4.4E+00	3.1E+00	...	8.3E+01
				3.1E+01	

Internal Effective Dose Equivalent

Cumulative Internal Dose

Cumulative Dose

Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:13:56

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	2.8E-02	3.3E-02	3.4E-02	3.2E-02	3.5E-02	5.9E-02	4.6E-02	3.0E-02
Oth. Veg	5.1E-01	6.0E-01	6.3E-01	5.9E-01	6.3E-01	1.1E+00	8.4E-01	5.5E-01
Fruit	5.5E-01	6.5E-01	6.8E-01	6.4E-01	6.8E-01	1.2E+00	9.1E-01	6.0E-01
Cereals	1.1E-01	1.3E-01	1.3E-01	1.2E-01	1.3E-01	2.4E-01	1.8E-01	1.2E-01
Meat	3.6E+00	4.3E+00	4.5E+00	4.2E+00	4.5E+00	8.0E+00	6.2E+00	3.9E+00
Poultry	1.1E-02	1.2E-02	1.3E-02	1.3E-02	1.3E-02	1.1E-02	1.2E-02	1.2E-02
Cow Milk	2.5E+00	2.9E+00	3.1E+00	2.9E+00	3.1E+00	5.5E+00	4.2E+00	2.7E+00
Eggs	7.9E-03	9.1E-03	9.6E-03	9.0E-03	9.6E-03	1.5E-02	1.2E-02	8.5E-03
Soil Ing	1.0E-02	1.3E-02	1.2E-02	1.1E-02	1.2E-02	1.1E-02	1.1E-02	1.1E-02
Total	7.4E+00	8.6E+00	9.1E+00	8.5E+00	9.1E+00	1.6E+01	1.2E+01	7.9E+00

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
Leaf Veg	3.1E-02	2.9E-02	2.8E-02	3.9E-08	5.3E-09
Oth. Veg	5.6E-01	5.3E-01	5.1E-01	7.0E-07	9.6E-08
Fruit	6.1E-01	5.7E-01	5.5E-01	7.6E-07	1.0E-07
Cereals	1.2E-01	1.1E-01	1.1E-01	6.3E-08	2.6E-09
Meat	4.1E+00	3.8E+00	3.6E+00	6.4E-08	2.0E-11
Poultry	1.1E-02	1.1E-02	1.1E-02	2.8E-11	5.7E-13
Cow Milk	2.8E+00	2.6E+00	2.5E+00	5.8E-10	2.7E-12
Eggs	8.6E-03	8.1E-03	7.9E-03	4.6E-11	5.1E-11
Soil Ing	1.0E-02	1.0E-02	2.0E+00	5.9E-06	6.6E-07
Total	8.2E+00	7.7E+00	9.3E+00	7.6E-06	8.7E-07

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.3E+01
-----	-----
Total	2.3E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:13:56

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.4E-01	1.6E-01	1.6E-01	1.6E-01	1.6E-01	2.0E-01	1.8E-01	1.5E-01
Oth. Veg	2.5E+00	2.8E+00	2.8E+00	2.8E+00	2.8E+00	3.6E+00	3.2E+00	2.7E+00
Fruit	2.7E+00	3.0E+00	3.1E+00	3.0E+00	3.1E+00	4.0E+00	3.5E+00	2.9E+00
Cereals	4.1E-01	4.7E-01	4.9E-01	4.7E-01	4.9E-01	6.9E-01	5.8E-01	4.5E-01
Meat	5.2E+00	6.0E+00	6.3E+00	5.9E+00	6.3E+00	1.1E+01	8.3E+00	5.6E+00
Poultry	3.4E-02	3.8E-02	3.8E-02	3.8E-02	3.8E-02	3.5E-02	3.5E-02	3.8E-02
Cow Milk	3.5E+00	4.1E+00	4.3E+00	4.0E+00	4.3E+00	7.2E+00	5.6E+00	3.8E+00
Eggs	1.3E-02	1.5E-02	1.6E-02	1.5E-02	1.6E-02	2.2E-02	1.9E-02	1.5E-02
Soil Ing	2.1E-01	2.3E-01	2.3E-01	2.3E-01	2.3E-01	2.1E-01	2.1E-01	2.3E-01
Total	1.5E+01	1.7E+01	1.7E+01	1.7E+01	1.7E+01	2.6E+01	2.2E+01	1.6E+01

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
Leaf Veg	1.5E-01	1.4E-01	1.4E-01	1.0E-07	5.1E-07
Oth. Veg	2.6E+00	2.5E+00	2.4E+00	1.4E-06	3.5E-06
Fruit	2.8E+00	2.7E+00	2.7E+00	1.5E-06	3.7E-06
Cereals	4.4E-01	4.2E-01	4.1E-01	1.3E-07	2.6E-07
Meat	5.7E+00	5.4E+00	5.2E+00	8.3E-08	2.9E-10
Poultry	3.4E-02	3.4E-02	3.4E-02	3.3E-11	1.6E-12
Cow Milk	3.9E+00	3.6E+00	3.5E+00	7.2E-10	3.3E-11
Eggs	1.4E-02	1.4E-02	1.3E-02	5.5E-11	1.4E-10
Soil Ing	2.1E-01	2.1E-01	2.2E+00	6.7E-06	2.1E-05
Total	1.6E+01	1.5E+01	1.7E+01	9.9E-06	2.9E-05

External Dose by Exposure Pathway

Pathway	
Sur Soil	6.7E+01
Total	6.7E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:13:56

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	6.9E+00	8.1E+00	8.5E+00	8.0E+00	8.6E+00	1.6E+01	1.2E+01	7.4E+00
NA 24	1.3E-04	5.8E-04	1.6E-04	1.5E-04	1.7E-04	2.4E-04	1.8E-04	1.4E-04
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	4.4E-04	1.3E-03	1.9E-04	1.9E-04	1.8E-04	7.5E-04	3.9E-04	1.6E-04
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	1.1E-05	1.3E-04	9.7E-06	9.9E-06	9.2E-06	8.1E-06	9.7E-06	8.8E-06
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	1.2E-01	1.3E-01	1.5E-01	1.4E-01	1.5E-01	1.2E-01	1.3E-01	1.4E-01
I 135	9.1E-08	1.3E-06	1.0E-07	1.0E-07	9.6E-08	6.7E-08	8.2E-08	8.2E-08
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	7.4E-11	7.8E-11	7.4E-11	7.4E-11	7.4E-11	9.2E-11	9.5E-11	7.4E-11
CS 136	1.5E-04	1.9E-04	1.9E-04	1.8E-04	1.9E-04	3.2E-04	1.7E-04	1.7E-04
CS 137	3.7E-01	4.0E-01	4.0E-01	4.0E-01	4.0E-01	3.7E-01	3.7E-01	4.0E-01
TA 182	1.2E-06	2.1E-05	6.5E-05	1.9E-04	4.8E-04	4.1E-06	1.0E-05	4.1E-06
PU 239	2.2E-12	3.3E-10	8.3E-10	4.7E-09	1.5E-08	5.0E-06	3.9E-07	6.9E-08
Total	7.4E+00	8.6E+00	9.1E+00	8.5E+00	9.1E+00	1.6E+01	1.2E+01	7.9E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Winter: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:13:56

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	7.7E+00	7.2E+00	6.9E+00	0.0E+00	0.0E+00
NA 24	1.7E-04	1.3E-04	1.3E-04	0.0E+00	0.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	1.7E-04	5.3E-04	2.0E+00	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	8.5E-06	1.1E-05	2.1E-02	0.0E+00	0.0E+00
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	1.2E-01	1.1E-01	1.2E-01	0.0E+00	0.0E+00
I 135	8.9E-08	9.1E-08	4.1E-05	0.0E+00	0.0E+00
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	7.4E-11	7.4E-11	7.4E-11	0.0E+00	0.0E+00
CS 136	1.6E-04	1.5E-04	1.6E-04	0.0E+00	0.0E+00
CS 137	3.7E-01	3.6E-01	3.6E-01	0.0E+00	0.0E+00
TA 182	4.5E-05	5.8E-06	3.1E-07	7.6E-06	0.0E+00
PU 239	6.9E-08	2.2E-12	2.1E-12	0.0E+00	8.7E-07
Total	8.2E+00	7.7E+00	9.3E+00	7.6E-06	8.7E-07

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
NA 22	5.7E-01
NA 24	9.7E+00
KR 83M	0.0E+00
KR 85M	0.0E+00
KR 85	0.0E+00
KR 87	0.0E+00
RB 87	0.0E+00
KR 88	0.0E+00
RB 88	0.0E+00
I 131	8.3E+00
XE 131M	6.2E-04
I 133	7.0E-01
XE 133M	7.3E-04
XE 133	1.6E-02
CS 134	1.2E+00
I 135	1.8E-02
XE 135M	8.3E-04
XE 135	2.4E-03
CS 135	1.6E-14
CS 136	5.6E-01
CS 137	1.4E+00
TA 182	1.6E-01
PU 239	4.3E-11

Total	2.3E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Winter: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
 days Ingestion dos

Executed on: 10/24/97 at 13:13:56

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	9.3E+00	1.1E+01	1.2E+01	1.1E+01	1.2E+01	2.1E+01	1.6E+01	9.9E+00
NA 24	1.3E-04	5.8E-04	1.6E-04	1.5E-04	1.7E-04	2.4E-04	1.8E-04	1.4E-04
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	4.4E-04	1.3E-03	1.9E-04	1.9E-04	1.8E-04	7.5E-04	3.9E-04	1.6E-04
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	1.1E-05	1.3E-04	9.7E-06	9.9E-06	9.2E-06	8.1E-06	9.7E-06	8.8E-06
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	2.9E-01	3.3E-01	3.8E-01	3.5E-01	3.8E-01	2.9E-01	3.3E-01	3.5E-01
I 135	9.1E-08	1.3E-06	1.0E-07	1.0E-07	9.6E-08	6.7E-08	8.2E-08	8.2E-08
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	1.6E-09	1.7E-09	1.6E-09	1.6E-09	1.6E-09	2.0E-09	2.1E-09	1.6E-09
CS 136	1.5E-04	1.9E-04	1.9E-04	1.8E-04	1.9E-04	3.2E-04	1.7E-04	1.7E-04
CS 137	5.1E+00	5.5E+00	5.5E+00	5.5E+00	5.5E+00	5.1E+00	5.1E+00	5.5E+00
TA 182	1.5E-06	2.8E-05	8.5E-05	2.5E-04	6.3E-04	5.4E-06	1.3E-05	5.4E-06
PU 239	1.1E-10	1.7E-08	4.2E-08	2.4E-07	7.5E-07	1.5E-04	1.1E-05	1.8E-06
Total	1.5E+01	1.7E+01	1.7E+01	1.7E+01	1.7E+01	2.6E+01	2.2E+01	1.6E+01

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Winter: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
 days Ingestion dos

Executed on: 10/24/97 at 13:13:56

Page C. 8

Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	1.0E+01	9.7E+00	9.3E+00	0.0E+00	0.0E+00
NA 24	1.7E-04	1.3E-04	1.3E-04	0.0E+00	0.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	1.7E-04	5.3E-04	2.0E+00	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	8.5E-06	1.1E-05	2.1E-02	0.0E+00	0.0E+00
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	2.9E-01	2.9E-01	2.9E-01	0.0E+00	0.0E+00
I 135	8.9E-08	9.1E-08	4.1E-05	0.0E+00	0.0E+00
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	1.6E-09	1.6E-09	1.6E-09	0.0E+00	0.0E+00
CS 136	1.6E-04	1.5E-04	1.6E-04	0.0E+00	0.0E+00
CS 137	5.1E+00	5.0E+00	5.0E+00	0.0E+00	0.0E+00
TA 182	5.8E-05	7.6E-06	4.1E-07	9.9E-06	0.0E+00
PU 239	1.8E-06	1.1E-10	1.1E-10	0.0E+00	2.9E-05
Total	1.6E+01	1.5E+01	1.7E+01	9.9E-06	2.9E-05

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
NA 22	1.1E+00
NA 24	9.7E+00
KR 83M	0.0E+00
KR 85M	0.0E+00
KR 85	0.0E+00
KR 87	0.0E+00
RB 87	0.0E+00
KR 88	0.0E+00
RB 88	0.0E+00
I 131	8.3E+00
XE 131M	6.2E-04
I 133	7.0E-01
XE 133M	7.3E-04
XE 133	1.6E-02
CS 134	4.1E+00
I 135	1.8E-02
XE 135M	8.3E-04
XE 135	2.4E-03
CS 135	7.5E-13
CS 136	5.6E-01
CS 137	4.2E+01
TA 182	1.8E-01
PU 239	2.1E-09

Total	6.7E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:14:29

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.2E+02	2.5E-01	3.0E+01
Breast	1.3E+02	1.5E-01	1.9E+01
R Marrow	1.3E+02	1.2E-01	1.6E+01
Lung	1.2E+02	1.2E-01	1.5E+01
Thyroid	1.1E+05	3.0E-02	3.3E+03
Bone Sur	1.6E+02	3.0E-02	4.9E+00
Stomach	2.1E+02	6.0E-02	1.3E+01
LL Int.	1.3E+02	6.0E-02	7.6E+00
S Int.	1.3E+02	6.0E-02	7.6E+00
UL Int.	1.2E+02	6.0E-02	7.4E+00
Kidneys	9.0E-03	6.0E-02	5.4E-04
Internal Effective Dose Equivalent			3.4E+03
External Dose			2.3E+01
Annual Effective Dose Equivalent			3.5E+03

Controlling Organ:	Thyroid
Controlling Pathway:	Ing
Controlling Radionuclide:	I 131

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	3.4E+03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Spring: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
 days Ingestion dos

Executed on: 10/24/97 at 13:14:29

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Acute release ,
 Uptake/exposure period: 50.0
 Dose commitment period: 50.0
 Dose units: Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			8.3E-01	...	
			+		
2		1.7E+00	4.5E-02	...	Internal Effective Dose Equivalent
		+	+		
1	3.4E+03	+ 6.4E+00	+ 1.4E+00	+ ... = 3.4E+03	Cumulative Internal Dose
Internal Annual Dose	3.4E+03	+ 8.0E+00	+ 2.3E+00	+ ... = 3.4E+03	
	+	+	+	+	
External Annual Dose	2.3E+01	2.5E+00	2.1E+00	... 6.7E+01	
Annual Dose	3.4E+03	+ 1.1E+01	+ 4.4E+00	+ ... = 3.5E+03	Cumulative Dose
			3.4E+03		Maximum Annual Dose Occurred In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:14:29

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	9.2E+00	1.7E+01	9.0E+00	8.9E+00	9.4E+00	1.2E+01	9.5E+00	8.4E+00
Oth. Veg	5.4E-01	6.3E-01	6.6E-01	6.2E-01	6.6E-01	1.1E+00	8.9E-01	5.8E-01
Fruit	5.8E-01	6.8E-01	7.1E-01	6.7E-01	7.2E-01	1.2E+00	9.6E-01	6.3E-01
Cereals	1.2E-01	1.4E-01	1.4E-01	1.4E-01	1.5E-01	2.6E-01	2.0E-01	1.3E-01
Meat	5.3E+01	6.0E+01	6.2E+01	6.0E+01	6.2E+01	6.1E+01	5.8E+01	5.9E+01
Poultry	1.2E-02	1.3E-02	1.4E-02	1.3E-02	1.4E-02	1.2E-02	1.3E-02	1.3E-02
Cow Milk	5.9E+01	1.3E+02	5.4E+01	5.2E+01	5.4E+01	8.6E+01	6.2E+01	5.0E+01
Eggs	8.4E-03	9.8E-03	1.0E-02	9.7E-03	1.0E-02	1.6E-02	1.3E-02	9.1E-03
Soil Ing	1.0E-02	1.3E-02	1.2E-02	1.1E-02	1.2E-02	1.1E-02	1.1E-02	1.1E-02
Total	1.2E+02	2.1E+02	1.3E+02	1.2E+02	1.3E+02	1.6E+02	1.3E+02	1.2E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
Leaf Veg	7.9E+00	9.8E+00	1.2E+04	7.1E-03	3.6E-04
Oth. Veg	6.0E-01	5.6E-01	6.1E-01	1.2E-06	9.6E-08
Fruit	6.4E-01	6.0E-01	6.6E-01	1.3E-06	1.0E-07
Cereals	1.3E-01	1.2E-01	1.2E-01	1.1E-07	2.6E-09
Meat	5.3E+01	5.3E+01	2.0E+03	1.9E-03	2.1E-07
Poultry	1.2E-02	1.2E-02	1.2E-02	4.8E-11	5.7E-13
Cow Milk	4.8E+01	6.4E+01	9.7E+04	1.5E-05	2.6E-08
Eggs	9.2E-03	8.7E-03	2.8E-02	8.1E-11	5.1E-11
Soil Ing	1.0E-02	1.0E-02	2.0E+00	5.9E-06	6.6E-07
Total	1.1E+02	1.3E+02	1.1E+05	9.0E-03	3.6E-04

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.3E+01
-----	-----
Total	2.3E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:14:29

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
-----	-----	-----	-----	-----	-----	-----	-----	-----
Leaf Veg	9.4E+00	1.7E+01	9.1E+00	9.0E+00	9.5E+00	1.3E+01	9.7E+00	8.5E+00
Oth. Veg	2.5E+00	2.8E+00	2.9E+00	2.8E+00	2.9E+00	3.7E+00	3.2E+00	2.7E+00
Fruit	2.7E+00	3.0E+00	3.1E+00	3.0E+00	3.1E+00	4.0E+00	3.5E+00	2.9E+00
Cereals	4.2E-01	4.8E-01	5.0E-01	4.8E-01	5.0E-01	7.1E-01	5.9E-01	4.6E-01
Meat	5.5E+01	6.2E+01	6.3E+01	6.2E+01	6.3E+01	6.3E+01	6.0E+01	6.1E+01
Poultry	3.5E-02	3.8E-02	3.9E-02	3.9E-02	3.9E-02	3.6E-02	3.6E-02	3.9E-02
Cow Milk	6.0E+01	1.3E+02	5.5E+01	5.4E+01	5.5E+01	8.8E+01	6.4E+01	5.1E+01
Eggs	1.4E-02	1.6E-02	1.6E-02	1.6E-02	1.6E-02	2.3E-02	2.0E-02	1.5E-02
Soil Ing	2.1E-01	2.3E-01	2.3E-01	2.3E-01	2.3E-01	2.1E-01	2.1E-01	2.3E-01
-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	1.3E+02	2.2E+02	1.3E+02	1.3E+02	1.4E+02	1.7E+02	1.4E+02	1.3E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
-----	-----	-----	-----	-----	-----
Leaf Veg	8.0E+00	9.9E+00	1.2E+04	7.1E-03	3.6E-04
Oth. Veg	2.6E+00	2.5E+00	2.5E+00	1.9E-06	3.5E-06
Fruit	2.8E+00	2.7E+00	2.8E+00	2.0E-06	3.7E-06
Cereals	4.5E-01	4.3E-01	4.2E-01	1.8E-07	2.6E-07
Meat	5.5E+01	5.4E+01	2.0E+03	1.9E-03	2.1E-07
Poultry	3.5E-02	3.5E-02	3.5E-02	5.3E-11	1.6E-12
Cow Milk	4.9E+01	6.5E+01	9.7E+04	1.5E-05	2.6E-08
Eggs	1.5E-02	1.4E-02	3.3E-02	8.9E-11	1.4E-10
Soil Ing	2.1E-01	2.1E-01	2.2E+00	6.7E-06	2.1E-05
-----	-----	-----	-----	-----	-----
Total	1.2E+02	1.3E+02	1.1E+05	9.0E-03	3.9E-04

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	6.7E+01
-----	-----
Total	6.7E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:14:29

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes

H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	6.8E+00	8.0E+00	8.4E+00	7.8E+00	8.4E+00	1.5E+01	1.2E+01	7.2E+00
NA 24	6.2E+00	2.8E+01	7.6E+00	7.4E+00	8.3E+00	1.1E+01	8.7E+00	6.7E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	2.5E+01	7.5E+01	1.1E+01	1.1E+01	1.0E+01	4.2E+01	2.2E+01	9.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	4.1E-01	5.1E+00	3.7E-01	3.8E-01	3.6E-01	3.1E-01	3.7E-01	3.4E-01
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	2.3E+01	2.6E+01	3.0E+01	2.8E+01	3.0E+01	2.3E+01	2.6E+01	2.8E+01
I 135	6.6E-04	9.6E-03	7.3E-04	7.3E-04	7.0E-04	4.9E-04	5.9E-04	5.9E-04
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	1.1E-08	1.1E-08	1.1E-08	1.1E-08	1.1E-08	1.3E-08	1.4E-08	1.1E-08
CS 136	7.2E+00	9.4E+00	9.4E+00	8.8E+00	9.4E+00	1.5E+01	8.3E+00	8.3E+00
CS 137	5.5E+01	5.9E+01	6.0E+01	6.0E+01	6.0E+01	5.5E+01	5.5E+01	5.9E+01
TA 182	1.4E-03	2.5E-02	7.8E-02	2.2E-01	5.7E-01	4.9E-03	1.2E-02	4.9E-03
PU 239	9.0E-10	1.4E-07	3.5E-07	2.0E-06	6.1E-06	2.1E-03	1.6E-04	2.9E-05

Total	1.2E+02	2.1E+02	1.3E+02	1.2E+02	1.3E+02	1.6E+02	1.3E+02	1.2E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:14:29

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	7.6E+00	7.1E+00	6.8E+00	0.0E+00	0.0E+00
NA 24	8.0E+00	6.4E+00	6.2E+00	0.0E+00	0.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	9.7E+00	3.0E+01	1.1E+05	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	3.3E-01	4.3E-01	8.1E+02	0.0E+00	0.0E+00
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	2.3E+01	2.3E+01	2.3E+01	0.0E+00	0.0E+00
I 135	6.4E-04	6.6E-04	3.0E-01	0.0E+00	0.0E+00
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	1.1E-08	1.1E-08	1.1E-08	0.0E+00	0.0E+00
CS 136	7.7E+00	7.2E+00	7.7E+00	0.0E+00	0.0E+00
CS 137	5.5E+01	5.4E+01	5.4E+01	0.0E+00	0.0E+00
TA 182	5.3E-02	6.9E-03	3.7E-04	9.0E-03	0.0E+00
PU 239	2.9E-05	9.0E-10	8.6E-10	0.0E+00	3.6E-04
Total	1.1E+02	1.3E+02	1.1E+05	9.0E-03	3.6E-04

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
NA 22	5.7E-01
NA 24	9.7E+00
KR 83M	0.0E+00
KR 85M	0.0E+00
KR 85	0.0E+00
KR 87	0.0E+00
RB 87	0.0E+00
KR 88	0.0E+00
RB 88	0.0E+00
I 131	8.3E+00
XE 131M	6.2E-04
I 133	7.0E-01
XE 133M	7.3E-04
XE 133	1.6E-02
CS 134	1.2E+00
I 135	1.8E-02
XE 135M	8.3E-04
XE 135	2.4E-03
CS 135	1.6E-14
CS 136	5.6E-01
CS 137	1.4E+00
TA 182	1.6E-01
PU 239	4.3E-11

Total	2.3E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:14:29

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	9.2E+00	1.1E+01	1.1E+01	1.1E+01	1.1E+01	2.1E+01	1.6E+01	9.8E+00
NA 24	6.2E+00	2.8E+01	7.6E+00	7.4E+00	8.3E+00	1.1E+01	8.7E+00	6.7E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	2.5E+01	7.5E+01	1.1E+01	1.1E+01	1.0E+01	4.2E+01	2.2E+01	9.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	4.1E-01	5.1E+00	3.7E-01	3.8E-01	3.6E-01	3.1E-01	3.7E-01	3.4E-01
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	2.3E+01	2.6E+01	3.0E+01	2.8E+01	3.0E+01	2.3E+01	2.6E+01	2.8E+01
I 135	6.6E-04	9.6E-03	7.3E-04	7.3E-04	7.0E-04	4.9E-04	5.9E-04	5.9E-04
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	1.2E-08	1.3E-08	1.2E-08	1.2E-08	1.2E-08	1.5E-08	1.6E-08	1.2E-08
CS 136	7.2E+00	9.4E+00	9.4E+00	8.8E+00	9.4E+00	1.5E+01	8.3E+00	8.3E+00
CS 137	5.9E+01	6.4E+01	6.5E+01	6.5E+01	6.5E+01	5.9E+01	6.0E+01	6.4E+01
TA 182	1.4E-03	2.5E-02	7.8E-02	2.2E-01	5.7E-01	4.9E-03	1.2E-02	4.9E-03
PU 239	1.0E-09	1.5E-07	3.9E-07	2.2E-06	6.8E-06	2.2E-03	1.7E-04	3.0E-05
Total	1.3E+02	2.2E+02	1.3E+02	1.3E+02	1.4E+02	1.7E+02	1.4E+02	1.3E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Spring: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:14:29

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver

H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	1.0E+01	9.6E+00	9.2E+00	0.0E+00	0.0E+00
NA 24	8.0E+00	6.4E+00	6.2E+00	0.0E+00	0.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	9.7E+00	3.0E+01	1.1E+05	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	3.3E-01	4.3E-01	8.1E+02	0.0E+00	0.0E+00
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	2.3E+01	2.3E+01	2.3E+01	0.0E+00	0.0E+00
I 135	6.4E-04	6.6E-04	3.0E-01	0.0E+00	0.0E+00
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	1.2E-08	1.2E-08	1.2E-08	0.0E+00	0.0E+00
CS 136	7.7E+00	7.2E+00	7.7E+00	0.0E+00	0.0E+00
CS 137	5.9E+01	5.8E+01	5.8E+01	0.0E+00	0.0E+00
TA 182	5.3E-02	6.9E-03	3.7E-04	9.0E-03	0.0E+00
PU 239	3.0E-05	1.0E-09	9.7E-10	0.0E+00	3.9E-04

Total	1.2E+02	1.3E+02	1.1E+05	9.0E-03	3.9E-04

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
NA 22	1.1E+00
NA 24	9.7E+00
KR 83M	0.0E+00
KR 85M	0.0E+00
KR 85	0.0E+00
KR 87	0.0E+00
RB 87	0.0E+00
KR 88	0.0E+00
RB 88	0.0E+00
I 131	8.3E+00
XE 131M	6.2E-04
I 133	7.0E-01
XE 133M	7.3E-04
XE 133	1.6E-02
CS 134	4.1E+00
I 135	1.8E-02
XE 135M	8.3E-04
XE 135	2.4E-03
CS 135	7.5E-13
CS 136	5.6E-01
CS 137	4.2E+01
TA 182	1.8E-01
PU 239	2.1E-09

Total	6.7E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:01

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Acute release

Uptake/exposure period: 50.0

Dose commitment period: 50.0

Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	2.2E+02	2.5E-01	5.6E+01
Breast	2.3E+02	1.5E-01	3.4E+01
R Marrow	2.3E+02	1.2E-01	2.8E+01
Lung	2.2E+02	1.2E-01	2.6E+01
Thyroid	1.4E+05	3.0E-02	4.1E+03
Bone Sur	2.7E+02	3.0E-02	8.0E+00
Stomach	3.3E+02	6.0E-02	2.0E+01
LL Int.	2.4E+02	6.0E-02	1.4E+01
S Int.	2.4E+02	6.0E-02	1.4E+01
UL Int.	2.3E+02	6.0E-02	1.4E+01
Kidneys	4.2E-02	6.0E-02	2.5E-03
Internal Effective Dose Equivalent			4.3E+03
External Dose			2.3E+01
Annual Effective Dose Equivalent			4.3E+03

Controlling Organ:	Thyroid
Controlling Pathway:	Ing
Controlling Radionuclide:	I 131

Total Inhalation EDE:	0.0E+00
Total Ingestion EDE:	4.3E+03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Summer: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
 days Ingestion dos

Executed on: 10/24/97 at 13:15:01

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

		Dose Commitment Year				
		1	2	3	...	
Internal	:					
Intake	:					
Year:	3			8.3E-01	...	
				+		
	2		1.7E+00	4.5E-02	...	Internal
			+	+		Effective
	1	4.3E+03	+ 1.3E+01	+ 3.0E+00	+ ... = 4.3E+03	Dose
						Equivalent
Internal						Cumulative
Annual		4.3E+03	+ 1.5E+01	+ 3.9E+00	+ ... = 4.3E+03	Internal
Dose						Dose
		+	+	+	+	
External						
Annual		2.3E+01	2.5E+00	2.1E+00	...	6.7E+01
Dose						
Annual						Cumulative
Dose		4.3E+03	+ 1.8E+01	+ 6.0E+00	+ ... = 4.4E+03	Dose
					4.3E+03	Maximum
						Annual
						Dose Occurred
						In Year 1

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:01

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	9.2E+00	1.7E+01	9.0E+00	8.9E+00	9.4E+00	1.2E+01	9.5E+00	8.4E+00
Oth. Veg	3.0E+01	3.3E+01	3.4E+01	3.4E+01	3.5E+01	3.1E+01	3.2E+01	3.3E+01
Fruit	3.0E+01	3.3E+01	3.5E+01	3.4E+01	3.6E+01	3.2E+01	3.2E+01	3.4E+01
Cereals	1.0E+01	1.1E+01	1.2E+01	1.2E+01	1.2E+01	1.1E+01	1.1E+01	1.2E+01
Meat	6.5E+01	7.4E+01	7.6E+01	7.4E+01	7.6E+01	7.4E+01	7.1E+01	7.3E+01
Poultry	1.3E+00	1.4E+00	1.5E+00	1.4E+00	1.5E+00	1.3E+00	1.3E+00	1.4E+00
Cow Milk	7.4E+01	1.6E+02	6.7E+01	6.5E+01	6.7E+01	1.1E+02	7.7E+01	6.2E+01
Eggs	2.5E-01	2.9E-01	2.9E-01	2.8E-01	2.9E-01	2.7E-01	2.7E-01	2.8E-01
Soil Ing	1.0E-02	1.3E-02	1.2E-02	1.1E-02	1.2E-02	1.1E-02	1.1E-02	1.1E-02
Total	2.2E+02	3.3E+02	2.4E+02	2.3E+02	2.4E+02	2.7E+02	2.3E+02	2.2E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
Leaf Veg	7.9E+00	9.8E+00	1.2E+04	7.1E-03	3.6E-04
Oth. Veg	3.0E+01	2.9E+01	3.5E+02	1.5E-02	2.1E-03
Fruit	3.1E+01	3.0E+01	3.6E+02	1.5E-02	2.1E-03
Cereals	1.0E+01	1.0E+01	1.0E+01	2.0E-03	7.7E-04
Meat	6.6E+01	6.5E+01	2.5E+03	2.4E-03	2.7E-07
Poultry	1.3E+00	1.3E+00	1.3E+00	1.5E-07	3.1E-09
Cow Milk	6.0E+01	8.0E+01	1.2E+05	1.9E-05	3.1E-08
Eggs	2.5E-01	2.5E-01	2.5E+01	2.5E-07	2.8E-07
Soil Ing	1.0E-02	1.0E-02	2.0E+00	5.9E-06	6.6E-07
Total	2.1E+02	2.3E+02	1.4E+05	4.2E-02	5.3E-03

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.3E+01
-----	-----
Total	2.3E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:01

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	9.4E+00	1.7E+01	9.1E+00	9.0E+00	9.5E+00	1.3E+01	9.7E+00	8.5E+00
Oth. Veg	3.2E+01	3.5E+01	3.7E+01	3.6E+01	3.7E+01	3.4E+01	3.4E+01	3.5E+01
Fruit	3.2E+01	3.6E+01	3.7E+01	3.7E+01	3.8E+01	3.5E+01	3.5E+01	3.6E+01
Cereals	1.1E+01	1.2E+01	1.2E+01	1.2E+01	1.2E+01	1.1E+01	1.1E+01	1.2E+01
Meat	6.7E+01	7.6E+01	7.8E+01	7.6E+01	7.8E+01	7.7E+01	7.3E+01	7.5E+01
Poultry	1.3E+00	1.4E+00	1.5E+00	1.5E+00	1.5E+00	1.3E+00	1.3E+00	1.4E+00
Cow Milk	7.5E+01	1.7E+02	6.8E+01	6.6E+01	6.8E+01	1.1E+02	7.9E+01	6.3E+01
Eggs	2.6E-01	2.9E-01	2.9E-01	2.9E-01	2.9E-01	2.7E-01	2.7E-01	2.8E-01
Soil Ing	2.1E-01	2.3E-01	2.3E-01	2.3E-01	2.3E-01	2.1E-01	2.1E-01	2.3E-01
Total	2.3E+02	3.4E+02	2.4E+02	2.4E+02	2.5E+02	2.8E+02	2.4E+02	2.3E+02

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
Leaf Veg	8.0E+00	9.9E+00	1.2E+04	7.1E-03	3.6E-04
Oth. Veg	3.2E+01	3.1E+01	3.6E+02	1.5E-02	2.1E-03
Fruit	3.3E+01	3.2E+01	3.6E+02	1.5E-02	2.1E-03
Cereals	1.1E+01	1.1E+01	1.1E+01	2.0E-03	7.7E-04
Meat	6.7E+01	6.7E+01	2.5E+03	2.4E-03	2.7E-07
Poultry	1.3E+00	1.3E+00	1.4E+00	1.5E-07	3.1E-09
Cow Milk	6.1E+01	8.1E+01	1.2E+05	1.9E-05	3.1E-08
Eggs	2.6E-01	2.6E-01	2.5E+01	2.5E-07	2.8E-07
Soil Ing	2.1E-01	2.1E-01	2.2E+00	6.7E-06	2.1E-05
Total	2.1E+02	2.3E+02	1.4E+05	4.2E-02	5.3E-03

External Dose by Exposure Pathway

Pathway	-----
Sur Soil	6.7E+01
Total	6.7E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:01

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes

H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	7.6E+00	8.9E+00	9.4E+00	8.7E+00	9.4E+00	1.7E+01	1.3E+01	8.1E+00
NA 24	7.7E+00	3.4E+01	9.4E+00	9.1E+00	1.0E+01	1.4E+01	1.1E+01	8.3E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	3.0E+01	9.2E+01	1.3E+01	1.3E+01	1.3E+01	5.2E+01	2.7E+01	1.1E+01
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	5.1E-01	6.4E+00	4.7E-01	4.8E-01	4.4E-01	3.9E-01	4.7E-01	4.2E-01
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	4.7E+01	5.2E+01	6.1E+01	5.7E+01	6.1E+01	4.7E+01	5.2E+01	5.7E+01
I 135	8.2E-04	1.2E-02	9.0E-04	9.0E-04	8.6E-04	6.0E-04	7.3E-04	7.3E-04
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	2.3E-08	2.5E-08	2.3E-08	2.3E-08	2.3E-08	2.9E-08	3.0E-08	2.3E-08
CS 136	9.1E+00	1.2E+01	1.2E+01	1.1E+01	1.2E+01	1.9E+01	1.0E+01	1.0E+01
CS 137	1.2E+02	1.3E+02	1.3E+02	1.3E+02	1.3E+02	1.2E+02	1.2E+02	1.3E+02
TA 182	6.4E-03	1.2E-01	3.6E-01	1.0E+00	2.6E+00	2.3E-02	5.7E-02	2.3E-02
PU 239	1.3E-08	2.0E-06	5.1E-06	2.9E-05	9.0E-05	3.1E-02	2.4E-03	4.2E-04

Total	2.2E+02	3.3E+02	2.4E+02	2.3E+02	2.4E+02	2.7E+02	2.3E+02	2.2E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:01

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	8.5E+00	7.9E+00	7.6E+00	0.0E+00	0.0E+00
NA 24	1.0E+01	8.0E+00	7.7E+00	0.0E+00	0.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	1.2E+01	3.7E+01	1.4E+05	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	4.1E-01	5.3E-01	1.0E+03	0.0E+00	0.0E+00
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	4.7E+01	4.6E+01	4.7E+01	0.0E+00	0.0E+00
I 135	8.0E-04	8.2E-04	3.7E-01	0.0E+00	0.0E+00
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	2.3E-08	2.3E-08	2.3E-08	0.0E+00	0.0E+00
CS 136	9.7E+00	9.1E+00	9.7E+00	0.0E+00	0.0E+00
CS 137	1.2E+02	1.2E+02	1.2E+02	0.0E+00	0.0E+00
TA 182	2.5E-01	3.2E-02	1.7E-03	4.2E-02	0.0E+00
PU 239	4.2E-04	1.3E-08	1.3E-08	0.0E+00	5.3E-03
Total	2.1E+02	2.3E+02	1.4E+05	4.2E-02	5.3E-03

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
NA 22	5.7E-01
NA 24	9.7E+00
KR 83M	0.0E+00
KR 85M	0.0E+00
KR 85	0.0E+00
KR 87	0.0E+00
RB 87	0.0E+00
KR 88	0.0E+00
RB 88	0.0E+00
I 131	8.3E+00
XE 131M	6.2E-04
I 133	7.0E-01
XE 133M	7.3E-04
XE 133	1.6E-02
CS 134	1.2E+00
I 135	1.8E-02
XE 135M	8.3E-04
XE 135	2.4E-03
CS 135	1.6E-14
CS 136	5.6E-01
CS 137	1.4E+00
TA 182	1.6E-01
PU 239	4.3E-11
-----	-----
Total	2.3E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: FFTF 25000 1b Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:01

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	1.0E+01	1.2E+01	1.2E+01	1.2E+01	1.2E+01	2.3E+01	1.7E+01	1.1E+01
NA 24	7.7E+00	3.4E+01	9.4E+00	9.1E+00	1.0E+01	1.4E+01	1.1E+01	8.3E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	3.0E+01	9.2E+01	1.3E+01	1.3E+01	1.3E+01	5.2E+01	2.7E+01	1.1E+01
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	5.1E-01	6.4E+00	4.7E-01	4.8E-01	4.4E-01	3.9E-01	4.7E-01	4.2E-01
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	4.7E+01	5.2E+01	6.1E+01	5.7E+01	6.1E+01	4.7E+01	5.2E+01	5.7E+01
I 135	8.2E-04	1.2E-02	9.0E-04	9.0E-04	8.6E-04	6.0E-04	7.3E-04	7.3E-04
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	2.5E-08	2.6E-08	2.5E-08	2.5E-08	2.5E-08	3.1E-08	3.2E-08	2.5E-08
CS 136	9.1E+00	1.2E+01	1.2E+01	1.1E+01	1.2E+01	1.9E+01	1.0E+01	1.0E+01
CS 137	1.2E+02	1.3E+02	1.3E+02	1.3E+02	1.3E+02	1.2E+02	1.2E+02	1.3E+02
TA 182	6.4E-03	1.2E-01	3.6E-01	1.0E+00	2.6E+00	2.3E-02	5.7E-02	2.3E-02
PU 239	1.3E-08	2.0E-06	5.1E-06	2.9E-05	9.0E-05	3.1E-02	2.4E-03	4.2E-04
Total	2.3E+02	3.4E+02	2.4E+02	2.4E+02	2.5E+02	2.8E+02	2.4E+02	2.3E+02

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Summer: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:01

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver
H 3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NA 22	1.1E+01	1.0E+01	1.0E+01	0.0E+00	0.0E+00
NA 24	1.0E+01	8.0E+00	7.7E+00	0.0E+00	0.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	1.2E+01	3.7E+01	1.4E+05	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	4.1E-01	5.3E-01	1.0E+03	0.0E+00	0.0E+00
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	4.7E+01	4.6E+01	4.7E+01	0.0E+00	0.0E+00
I 135	8.0E-04	8.2E-04	3.7E-01	0.0E+00	0.0E+00
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	2.5E-08	2.5E-08	2.5E-08	0.0E+00	0.0E+00
CS 136	9.7E+00	9.1E+00	9.7E+00	0.0E+00	0.0E+00
CS 137	1.2E+02	1.2E+02	1.2E+02	0.0E+00	0.0E+00
TA 182	2.5E-01	3.2E-02	1.7E-03	4.2E-02	0.0E+00
PU 239	4.2E-04	1.3E-08	1.3E-08	0.0E+00	5.3E-03
Total	2.1E+02	2.3E+02	1.4E+05	4.2E-02	5.3E-03

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
NA 22	1.1E+00
NA 24	9.7E+00
KR 83M	0.0E+00
KR 85M	0.0E+00
KR 85	0.0E+00
KR 87	0.0E+00
RB 87	0.0E+00
KR 88	0.0E+00
RB 88	0.0E+00
I 131	8.3E+00
XE 131M	6.2E-04
I 133	7.0E-01
XE 133M	7.3E-04
XE 133	1.6E-02
CS 134	4.1E+00
I 135	1.8E-02
XE 135M	8.3E-04
XE 135	2.4E-03
CS 135	7.5E-13
CS 136	5.6E-01
CS 137	4.2E+01
TA 182	1.8E-01
PU 239	2.1E-09

Total	6.7E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:33

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Acute release
Uptake/exposure period: 50.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	2.0E+03	2.5E-01	4.9E+02
Breast	1.8E+03	1.5E-01	2.7E+02
R Marrow	1.9E+03	1.2E-01	2.3E+02
Lung	1.8E+03	1.2E-01	2.2E+02
Thyroid	2.2E+05	3.0E-02	6.5E+03
Bone Sur	1.9E+03	3.0E-02	5.8E+01
Stomach	2.1E+03	6.0E-02	1.3E+02
LI Int.	2.1E+03	6.0E-02	1.2E+02
S Int.	2.0E+03	6.0E-02	1.2E+02
UL Int.	2.0E+03	6.0E-02	1.2E+02
Kidneys	2.5E-01	6.0E-02	1.5E-02
Internal Effective Dose Equivalent			8.3E+03
External Dose			2.3E+01
Annual Effective Dose Equivalent			8.3E+03

Controlling Organ: Thyroid
Controlling Pathway: Ing
Controlling Radionuclide: I 131

Total Inhalation EDE: 0.0E+00
Total Ingestion EDE: 8.3E+03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
 days Ingestion dos

Executed on: 10/24/97 at 13:15:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			8.3E-01	...	
2		1.7E+00	4.5E-02	...	
1	8.1E+03	1.4E+02	3.0E+01	...	8.3E+03
Internal Annual Dose	8.1E+03	1.4E+02	3.1E+01	...	8.3E+03
	+	+	+	+	
External Annual Dose	2.3E+01	2.5E+00	2.1E+00	...	6.7E+01
Annual Dose	8.1E+03	1.4E+02	3.3E+01	...	8.3E+03
					8.1E+03

Internal Effective Dose Equivalent

Cumulative Internal Dose

Cumulative Dose

Maximum Annual Dose Occurred In Year 1

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: Autumn: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
 days Ingestion dos

Executed on: 10/24/97 at 13:15:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.0E+02	1.2E+02	1.1E+02	1.1E+02	1.2E+02	1.1E+02	1.1E+02	1.1E+02
Oth. Veg	1.4E+02	1.6E+02	1.5E+02	1.5E+02	1.6E+02	1.4E+02	1.4E+02	1.5E+02
Fruit	1.4E+02	1.6E+02	1.6E+02	1.6E+02	1.6E+02	1.5E+02	1.5E+02	1.5E+02
Cereals	4.6E+01	5.0E+01	5.3E+01	5.2E+01	5.3E+01	4.7E+01	4.8E+01	5.1E+01
Meat	8.4E+02	9.3E+02	9.7E+02	9.5E+02	9.7E+02	8.9E+02	9.0E+02	9.4E+02
Poultry	5.8E+00	6.3E+00	6.6E+00	6.5E+00	6.6E+00	5.9E+00	6.0E+00	6.4E+00
Cow Milk	5.3E+02	6.7E+02	5.8E+02	5.7E+02	5.8E+02	5.9E+02	5.6E+02	5.6E+02
Eggs	1.4E+00	2.1E+00	1.4E+00	1.4E+00	1.4E+00	1.6E+00	1.4E+00	1.4E+00
Soil Ing	1.0E-02	1.3E-02	1.2E-02	1.1E-02	1.2E-02	1.1E-02	1.1E-02	1.1E-02
Total	1.8E+03	2.1E+03	2.0E+03	2.0E+03	2.1E+03	1.9E+03	1.9E+03	2.0E+03

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
Leaf Veg	9.9E+01	1.0E+02	1.8E+04	5.9E-02	6.5E-03
Oth. Veg	1.3E+02	1.3E+02	1.8E+04	7.9E-02	9.1E-03
Fruit	1.4E+02	1.4E+02	1.8E+04	8.1E-02	9.3E-03
Cereals	4.6E+01	4.5E+01	4.5E+01	1.1E-02	3.4E-03
Meat	8.5E+02	8.3E+02	4.1E+03	1.5E-02	3.8E-06
Poultry	5.8E+00	5.7E+00	1.0E+01	8.1E-07	1.4E-08
Cow Milk	5.1E+02	5.3E+02	1.6E+05	1.2E-04	4.6E-07
Eggs	1.2E+00	1.5E+00	1.2E+03	1.3E-06	1.2E-06
Soil Ing	1.0E-02	1.0E-02	2.0E+00	5.9E-06	6.6E-07
Total	1.8E+03	1.8E+03	2.2E+05	2.5E-01	2.8E-02

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	2.3E+01
-----	-----
Total	2.3E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
Leaf Veg	1.0E+02	1.2E+02	1.1E+02	1.1E+02	1.2E+02	1.1E+02	1.1E+02	1.1E+02
Oth. Veg	1.4E+02	1.6E+02	1.6E+02	1.5E+02	1.6E+02	1.5E+02	1.4E+02	1.5E+02
Fruit	1.4E+02	1.7E+02	1.6E+02	1.6E+02	1.7E+02	1.5E+02	1.5E+02	1.6E+02
Cereals	4.6E+01	5.0E+01	5.3E+01	5.2E+01	5.3E+01	4.7E+01	4.8E+01	5.1E+01
Meat	8.4E+02	9.3E+02	9.7E+02	9.5E+02	9.8E+02	8.9E+02	9.0E+02	9.4E+02
Poultry	5.8E+00	6.3E+00	6.7E+00	6.5E+00	6.7E+00	5.9E+00	6.0E+00	6.5E+00
Cow Milk	5.3E+02	6.7E+02	5.9E+02	5.7E+02	5.9E+02	5.9E+02	5.6E+02	5.6E+02
Eggs	1.4E+00	2.1E+00	1.4E+00	1.4E+00	1.4E+00	1.6E+00	1.4E+00	1.4E+00
Soil Ing	2.1E-01	2.3E-01	2.3E-01	2.3E-01	2.3E-01	2.1E-01	2.1E-01	2.3E-01
Total	1.8E+03	2.1E+03	2.1E+03	2.0E+03	2.1E+03	1.9E+03	1.9E+03	2.0E+03

Pathway	Ovaries	Muscle	Thyroid	Kidneys	Liver
Leaf Veg	9.9E+01	1.0E+02	1.8E+04	5.9E-02	6.5E-03
Oth. Veg	1.4E+02	1.4E+02	1.8E+04	7.9E-02	9.1E-03
Fruit	1.4E+02	1.4E+02	1.8E+04	8.1E-02	9.3E-03
Cereals	4.6E+01	4.6E+01	4.6E+01	1.1E-02	3.4E-03
Meat	8.5E+02	8.4E+02	4.1E+03	1.5E-02	3.8E-06
Poultry	5.8E+00	5.7E+00	1.0E+01	8.1E-07	1.4E-08
Cow Milk	5.1E+02	5.3E+02	1.6E+05	1.2E-04	4.6E-07
Eggs	1.3E+00	1.5E+00	1.2E+03	1.3E-06	1.2E-06
Soil Ing	2.1E-01	2.1E-01	2.2E+00	6.7E-06	2.1E-05
Total	1.8E+03	1.8E+03	2.2E+05	2.5E-01	2.8E-02

External Dose by Exposure Pathway

Pathway	
-----	-----
Sur Soil	6.7E+01
-----	-----
Total	6.7E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.7E+00	1.7E+00	1.7E+00	1.7E+00	1.7E+00	2.0E+00	2.1E+00	1.7E+00
NA 22	5.8E+01	6.8E+01	7.1E+01	6.7E+01	7.2E+01	1.3E+02	1.0E+02	6.2E+01
NA 24	6.5E+00	2.9E+01	8.0E+00	7.7E+00	8.7E+00	1.2E+01	9.2E+00	7.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	4.8E+01	1.5E+02	2.1E+01	2.1E+01	2.0E+01	8.3E+01	4.3E+01	1.8E+01
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	4.5E-01	5.7E+00	4.1E-01	4.2E-01	3.9E-01	3.4E-01	4.1E-01	3.7E-01
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	4.5E+02	5.0E+02	5.8E+02	5.4E+02	5.8E+02	4.5E+02	5.0E+02	5.4E+02
I 135	7.0E-04	1.0E-02	7.7E-04	7.7E-04	7.3E-04	5.1E-04	6.2E-04	6.2E-04
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	2.5E-07	2.6E-07	2.5E-07	2.5E-07	2.5E-07	3.0E-07	3.1E-07	2.5E-07
CS 136	1.8E+01	2.3E+01	2.3E+01	2.2E+01	2.3E+01	3.7E+01	2.0E+01	2.0E+01
CS 137	1.2E+03	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.2E+03	1.2E+03	1.3E+03
TA 182	3.8E-02	6.9E-01	2.1E+00	6.1E+00	1.6E+01	1.3E-01	3.3E-01	1.3E-01
PU 239	7.0E-08	1.1E-05	2.7E-05	1.5E-04	4.8E-04	1.6E-01	1.3E-02	2.2E-03
Total	1.8E+03	2.1E+03	2.0E+03	2.0E+03	2.1E+03	1.9E+03	1.9E+03	2.0E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver
H 3	1.7E+00	1.7E+00	1.7E+00	0.0E+00	0.0E+00
NA 22	6.5E+01	6.0E+01	5.8E+01	0.0E+00	0.0E+00
NA 24	8.5E+00	6.8E+00	6.5E+00	0.0E+00	0.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	1.9E+01	5.8E+01	2.1E+05	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	3.6E-01	4.8E-01	9.0E+02	0.0E+00	0.0E+00
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	4.5E+02	4.4E+02	4.5E+02	0.0E+00	0.0E+00
I 135	6.8E-04	7.0E-04	3.1E-01	0.0E+00	0.0E+00
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	2.5E-07	2.5E-07	2.5E-07	0.0E+00	0.0E+00
CS 136	1.9E+01	1.8E+01	1.9E+01	0.0E+00	0.0E+00
CS 137	1.2E+03	1.2E+03	1.2E+03	0.0E+00	0.0E+00
TA 182	1.4E+00	1.9E-01	1.0E-02	2.5E-01	0.0E+00
PU 239	2.2E-03	7.0E-08	6.7E-08	0.0E+00	2.8E-02
Total	1.8E+03	1.8E+03	2.2E+05	2.5E-01	2.8E-02

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
NA 22	5.7E-01
NA 24	9.7E+00
KR 83M	0.0E+00
KR 85M	0.0E+00
KR 85	0.0E+00
KR 87	0.0E+00
RB 87	0.0E+00
KR 88	0.0E+00
RB 88	0.0E+00
I 131	8.3E+00
XE 131M	6.2E-04
I 133	7.0E-01
XE 133M	7.3E-04
XE 133	1.6E-02
CS 134	1.2E+00
I 135	1.8E-02
XE 135M	8.3E-04
XE 135	2.4E-03
CS 135	1.6E-14
CS 136	5.6E-01
CS 137	1.4E+00
TA 182	1.6E-01
PU 239	4.3E-11

Total	2.3E+01

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
H 3	1.7E+00	1.7E+00	1.7E+00	1.7E+00	1.7E+00	2.0E+00	2.1E+00	1.7E+00
NA 22	6.0E+01	7.1E+01	7.4E+01	6.9E+01	7.5E+01	1.4E+02	1.0E+02	6.4E+01
NA 24	6.5E+00	2.9E+01	8.0E+00	7.7E+00	8.7E+00	1.2E+01	9.2E+00	7.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	4.8E+01	1.5E+02	2.1E+01	2.1E+01	2.0E+01	8.3E+01	4.3E+01	1.8E+01
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	4.5E-01	5.7E+00	4.1E-01	4.2E-01	3.9E-01	3.4E-01	4.1E-01	3.7E-01
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	4.5E+02	5.0E+02	5.8E+02	5.4E+02	5.8E+02	4.5E+02	5.0E+02	5.4E+02
I 135	7.0E-04	1.0E-02	7.7E-04	7.7E-04	7.3E-04	5.1E-04	6.2E-04	6.2E-04
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	2.5E-07	2.6E-07	2.5E-07	2.5E-07	2.5E-07	3.1E-07	3.1E-07	2.5E-07
CS 136	1.8E+01	2.3E+01	2.3E+01	2.2E+01	2.3E+01	3.7E+01	2.0E+01	2.0E+01
CS 137	1.2E+03	1.3E+03	1.3E+03	1.3E+03	1.3E+03	1.2E+03	1.2E+03	1.3E+03
TA 182	3.8E-02	6.9E-01	2.1E+00	6.1E+00	1.6E+01	1.3E-01	3.3E-01	1.3E-01
PU 239	7.0E-08	1.1E-05	2.7E-05	1.5E-04	4.8E-04	1.6E-01	1.3E-02	2.2E-03
Total	1.8E+03	2.1E+03	2.1E+03	2.0E+03	2.1E+03	1.9E+03	1.9E+03	2.0E+03

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: Autumn: FFTF 25000 lb Na burn 0.25% release UNIT X/Q aged 2
days Ingestion dos

Executed on: 10/24/97 at 13:15:33

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Acute release

Uptake/exposure period:

50.0

Dose commitment period:

50.0

Dose units:

Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Ovaries	Muscle	Thyroid	Kidneys	Liver
H 3	1.7E+00	1.7E+00	1.7E+00	0.0E+00	0.0E+00
NA 22	6.7E+01	6.3E+01	6.0E+01	0.0E+00	0.0E+00
NA 24	8.5E+00	6.8E+00	6.5E+00	0.0E+00	0.0E+00
KR 83M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 87	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
KR 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RB 88	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 131	1.9E+01	5.8E+01	2.1E+05	0.0E+00	0.0E+00
XE 131M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
I 133	3.6E-01	4.8E-01	9.0E+02	0.0E+00	0.0E+00
XE 133M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 133	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 134	4.5E+02	4.4E+02	4.5E+02	0.0E+00	0.0E+00
I 135	6.8E-04	7.0E-04	3.1E-01	0.0E+00	0.0E+00
XE 135M	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
XE 135	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CS 135	2.5E-07	2.5E-07	2.5E-07	0.0E+00	0.0E+00
CS 136	1.9E+01	1.8E+01	1.9E+01	0.0E+00	0.0E+00
CS 137	1.2E+03	1.2E+03	1.2E+03	0.0E+00	0.0E+00
TA 182	1.4E+00	1.9E-01	1.0E-02	2.5E-01	0.0E+00
PU 239	2.2E-03	7.0E-08	6.8E-08	0.0E+00	2.8E-02
Total	1.8E+03	1.8E+03	2.2E+05	2.5E-01	2.8E-02

External Dose by Radionuclide

Radionuclide

H 3	0.0E+00
NA 22	1.1E+00
NA 24	9.7E+00
KR 83M	0.0E+00
KR 85M	0.0E+00
KR 85	0.0E+00
KR 87	0.0E+00
RB 87	0.0E+00
KR 88	0.0E+00
RB 88	0.0E+00
I 131	8.3E+00
XE 131M	6.2E-04
I 133	7.0E-01
XE 133M	7.3E-04
XE 133	1.6E-02
CS 134	4.1E+00
I 135	1.8E-02
XE 135M	8.3E-04
XE 135	2.4E-03
CS 135	7.5E-13
CS 136	5.6E-01
CS 137	4.2E+01
TA 182	1.8E-01
PU 239	2.1E-09

Total	6.7E+01

CHECKLIST FOR PEER REVIEW

Document Reviewed: **EVALUATION OF SELECTED EX-REACTOR ACCIDENTS RELATED TO THE TRITIUM AND MEDICAL ISOTOPE PRODUCTION MISSION AT THE FAST FLUX TEST FACILITY, HNF-SD-FF-CN-013, Rev 0**

Scope of Review: Entire document except Section 3.3 and Attachment 5

Yes	No	NA	
☐	☐	☒	* Previous reviews complete and cover analysis, up to scope of this review, with no gaps.
☒	☐	☐	Problem completely defined.
☒	☐	☐	Accident scenarios developed in a clear and logical manner.
☒	☐	☐	Necessary assumptions explicitly stated and supported.
☒	☐	☐	Computer codes and data files documented.
☒	☐	☐	Data used in calculations explicitly stated in document.
☒	☐	☐	Data checked for consistency with original source information as applicable.
☒	☐	☐	Mathematical derivations checked including dimensional consistency of results.
☒	☐	☐	Models appropriate and used within range of validity or use outside range of established validity justified.
☒	☐	☐	Hand calculations checked for errors. Spreadsheet results should be treated exactly the same as hand calculations.
☒	☐	☐	Software input correct and consistent with document reviewed.
☒	☐	☐	Software output consistent with input and with results reported in document reviewed.
☒	☐	☐	Limits/criteria/guidelines applied to analysis results are appropriate and referenced. Limits/criteria/guidelines checked against references.
☒	☐	☐	Safety margins consistent with good engineering practices.
☒	☐	☐	Conclusions consistent with analytical results and applicable limits.
☒	☐	☐	Results and conclusions address all points required in the problem statement.
☐	☐	☒	Format consistent with appropriate NRC Regulatory Guide or other standards
☐	☒	*	Review calculations, comments, and/or notes are attached.
☒	☐	☐	Document approved.

C. H. Huang. Chin-Pao Huang.
Reviewer (Printed Name and Signature)

11/3/87
Date

* Any calculations, comments, or notes generated as part of this review should be signed, dated and attached to this checklist. Such material should be labeled and recorded in such a manner as to be intelligible to a technically qualified third party.

CHECKLIST FOR PEER REVIEW

Document Reviewed: **EVALUATION OF SELECTED EX-REACTOR ACCIDENTS RELATED TO THE TRITIUM AND MEDICAL ISOTOPE PRODUCTION MISSION AT THE FAST FLUX TEST FACILITY, HNF-SD-FF-CN-013, Rev 0**

Scope of Review: Section 3.3 and Attachment 5

Yes	No	NA	
☐	☐	☒	* Previous reviews complete and cover analysis, up to scope of this review, with no gaps.
☒	☐	☐	Problem completely defined.
☒	☐	☐	Accident scenarios developed in a clear and logical manner.
☒	☐	☐	Necessary assumptions explicitly stated and supported.
☒	☐	☐	Computer codes and data files documented.
☒	☐	☐	Data used in calculations explicitly stated in document.
☒	☐	☐	Data checked for consistency with original source information as applicable.
☒	☐	☐	Mathematical derivations checked including dimensional consistency of results.
☒	☐	☐	Models appropriate and used within range of validity or use outside range of established validity justified.
☒	☐	☐	Hand calculations checked for errors. Spreadsheet results should be treated exactly the same as hand calculations.
☒	☐	☐	Software input correct and consistent with document reviewed.
☒	☐	☐	Software output consistent with input and with results reported in document reviewed.
☒	☐	☐	Limits/criteria/guidelines applied to analysis results are appropriate and referenced. Limits/criteria/guidelines checked against references.
☒	☐	☐	Safety margins consistent with good engineering practices.
☒	☐	☐	Conclusions consistent with analytical results and applicable limits.
☒	☐	☐	Results and conclusions address all points required in the problem statement.
☒	☐	☐	Format consistent with appropriate NRC Regulatory Guide or other standards
☐	☐	☒	* Review calculations, comments, and/or notes are attached.
☒	☐	☐	Document approved.

Robert F. Richard Robert F. Richard
Reviewer (Printed Name and Signature)

10/30/97
Date

* Any calculations, comments, or notes generated as part of this review should be signed, dated and attached to this checklist. Such material should be labeled and recorded in such a manner as to be intelligible to a technically qualified third party.

HEDOP REVIEW CHECKLIST
for
Radiological and Nonradiological Release Calculations

Document reviewed (include title or description of calculation, document number, author, and date, as applicable):

EVALUATION OF SELECTED EX-REACTOR ACCIDENTS RELATED TO THE TRITIUM AND MEDICAL ISOTOPE PRODUCTION MISSION AT THE FAST FLUX TEST FACILITY, HNF-SD-FF-CN-013, Rev 0

Submitted by: D. A. Himes

Date Submitted:

Scope of Review: Entire document

YES NO* N/A

☒	☐	☐	1.	A detailed technical review and approval of the environmental transport and dose calculation portion of the analysis has been performed and documented.
☐	☐	☒	2.	Detailed technical review(s) and approval(s) of scenario and release determinations have been performed and documented.
☒	☐	☐	3.	HEDOP-approved code(s) were used.
☐	☐	☒	4.	Receptor locations were selected according to HEDOP recommendations.
☒	☐	☐	5.	All applicable environmental pathways and code options were included and are appropriate for the calculations.
☒	☐	☐	6.	Hanford site data were used.
☒	☐	☐	7.	Model adjustments external to the computer program were justified and performed correctly.
☐	☐	☒	8.	The analysis is consistent with HEDOP recommendations.
☐	☐	☒	9.	Supporting notes, calculations, comments, comment resolutions, or other information is attached. (Use the "Page 1 of X" page numbering format and sign and date each added page.)
☒	☐	☐	10.	Approval is granted on behalf of the Hanford Environmental Dose Overview Panel.

* All "NO" responses must be explained and use of nonstandard methods justified.

B. + E. Himes HEDOP-Approved Reviewer (Printed Name and Signature)

11/3/97
Date

COMMENTS (add additional signed and dated pages if necessary):

DISTRIBUTION SHEET

To Distribution	From D. A. Himes	Page 1 of 1 Date 10/30/97
Project Title/Work Order Evaluation of Selected Ex-Reactor Accidents Related to the Tritium and Medical Isotope Production Missions at the Fast Flux Test Facility		EDT No. 622302 ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./Appendix Only	EDT/ECN Only

B&W Handord Company

J. E. Baker	N2-57	X
J. D. Briggs	G3-42	X
J. O. Dittmer	N2-02	X
W. A. Dautel	N2-13	X
S. W. Hiller	N2-02	X
D. L. Nielsen	N2-53	X
J. N. Paglieri	N2-57	X
J. E. Parker	N2-11	X
P. R. Prevo	N2-57	X
P. L. Scott	N2-02	X
R. O. Zimmerman	N2-57	X

RFS		
M. T. Jansky	H6-26	X

FDNW		
H. J. Goldberg	H0-35	X
B. E. Hey	H6-26	X
D. A. Himes	A3-34	X
C. H. Huang	A3-34	X
R. F. Richard	H0-35	X
J. C. Van Keuren (2)	A3-34	X

PNNL		
M. D. McKinney	K8-03	X

ANL		
H. Avci		X

Central Files	<i>B1-07</i> ~~A3-88~~	X
Station 22 (EDT, SD Cover only)	<i>N2-12</i>	X

DOES NOT CONTAIN CLASSIFIED OR
UNCLASSIFIED CONTROLLED
NUCLEAR INFORMATION

Reviewing Official / ADC: *J. D. Briggs* *PHMC Classification Officer*

Date: 11/10/97