FPL Energy
Seabrook Station

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AUG 18 2003

Docket No. 50-443

NYN-03066

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Seabrook Station
Supplemental Information
Regarding License Amendment Requests 02-06 and 02-07

References:

1. NYN-02089, "Changes to TS 3.9.4 Containment Building Penetrations," dated October 11, 2002
2. NYN-02103, "Revision to Technical Specifications Associated With Reduction of Decay Time for Core Offload," dated October 11, 2003
3. NYN-03043, "Revision to License Amendment Request 02-07, Changes TS 3.9.4 Containment Building Penetrations," dated May 30, 2003
4. NYN-03049, "Response to Request for Information Regarding License Amendment Requests 02-06 and 02-07," dated July 16, 2003

FPL Energy Seabrook, LLC ("FPLE Seabrook") hereby provides in Enclosure 1 supplemental information pertaining to License Amendment Requests (LARs) 02-06 "Revision to Technical Specifications Associated with Reduction of Decay Time for Core Offload" and 02-07 "Changes to TS 3.9.4 Containment Building Penetrations," dated October 11, 2002. This supplemental information regarding the Control Room Envelope (CRE) design, surveillance programs is being provided as a result of a telephone conference conducted with members of the Nuclear Regulatory Commission (NRC) staff on July 30, 2003.

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Provided in Enclosure 2 is a copy of a calculation (Framatome ANP Calculation No. 32-5030938-00, "SBC-1010-Control Room Limiting Unfiltered Inleakage for a Fuel Handling Accident in Open Containment"), which provides additional assurance that the Seabrook Station CRE will be habitable as a result of a fuel handling accident.

FPLE Seabrook is presently evaluating NRC Generic Letter 2003-01, "Control Room Habitability" and plans to conduct tracer gas testing of the Control Room Envelope during the week of August 25, 2003. If the results of the subject tracer gas test exceed the inleakage limits identified in calculation SBC-1010, FPLE Seabrook will forward the results to the NRC.

Should you have any questions concerning this information, please contact Mr. James M. Peschel, Regulatory Programs Manager, at (603) 773-7194.

Very truly yours,
FPL Energy Seabrook, LLC

Mark E. Warner
Site Vice President

cc: H. J. Miller, NRC Region I Administrator
V. Nerses, NRC Project Manager, Project Directorate I-2
G. T. Dentel, NRC Senior Resident Inspector

Mr. Gary Cheney, Director
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NYN-03066

SUPPLEMENTAL INFORMATION
REGARDING LICENSE AMENDMENT REQUESTS 02-06 AND 02-07

Ross, M. S.	e-mail
Dryden, M. S.	e-mail
Weaver, R. C.	e-mail
Letter Distribution	e-mail
File 0001	01-48
RMD	02-06

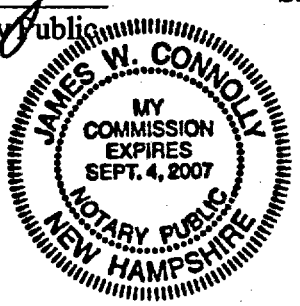
Oath and Affirmation

I, Mark E. Warner, Site Vice President of FPL Energy Seabrook, LLC, hereby affirm that the information and statements contained within this document are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

Sworn and Subscribed
before me this

18th day of August, 2003.

James W. Connolly
Notary Public



Mark E. Warner
Site Vice President

ENCLOSURE 1 TO NYN-03066

Control Room Envelope Supplemental Information

The Seabrook Station Control Room Envelope (CRE) occupies the 75'-0" level of the Control Building, and includes the main control room area, computer room, Technical Support Center, office, conference room and library, emergency storage room, HVAC equipment room, kitchen and sanitary facilities. Two remote air intakes (east and west) are provided to furnish makeup air to the control room complex. The locations were selected to preclude both intakes from being susceptible to accident-generated airborne radioactivity or toxic gases at the same time. The east makeup air intake is located approximately 380 feet northeast from the center of the Unit 1 containment structure. The west intake is located approximately 500 feet southwest of the Unit 1 containment structure.

During normal operations, makeup air is drawn from both remote intakes and delivered to the CRE by one of the two redundant normal makeup air fans. The normal makeup air fans and associated discharge dampers are located outside the CRE on the 50'-0" elevation of the Diesel Generator Building. The air passes through medium efficiency prefilter(s) and electric heater(s) in both emergency filter units prior to discharging through an orifice into the control room HVAC equipment room. The control room HVAC equipment room is maintained at a positive pressure at least 1/8" w.g. greater than the outdoors and cable spreading room. During normal operations, this positive pressure is maintained by the normal makeup air subsystem and the exhaust and static pressure control subsystem. The exhaust control damper modulates to control the HVAC equipment room static pressure.

Under emergency conditions, the positive pressure is maintained by the emergency makeup air and filtration subsystem. The normal makeup air and air exhaust and static pressure control subsystems isolate, and the emergency makeup air and filtration subsystem actuates automatically under accident conditions (high intake radiation, "S" signal). The control room is maintained at a slightly greater pressure than the HVAC equipment room. Control room pressurization precludes the infiltration of hazardous contaminants.

Each emergency makeup air and filtration subsystem has a nominal capacity of 1100 cubic feet per minute (cfm). This capacity is comprised of 600 cfm makeup air and 500 cfm recirculation air. These system flow rates have been calculated assuming both remote intake isolation valves are open to a throttle position allowing for 300 cfm makeup air from each intake. Following an accident, a contaminated remote intake does not have to be manually isolated. Design basis analyses indicate that the makeup air dilution factor (i.e., 50 percent makeup air from "clean" intake, 50 percent air from contaminated intake) and the radioactive particulate and iodine removal capacity of the filters together are adequate to maintain control room doses below allowable limits for the 30-day accident mitigation period. The gross volume of the control room complex is approximately 246,000 cubic feet. Therefore, operation of the emergency makeup air and filtration subsystem at a nominal flow rate of 1100 cfm will effectively filter the entire control room complex air in approximately 224 minutes.

Control room habitability under accident conditions is assured by a continuous supply of makeup air and resultant pressurization of the complex. Active components of the emergency makeup air

and filtration subsystem are redundant, and are independently powered from emergency buses and controlled so that no single failure will impose operational limitations. The operation of emergency makeup air and filtration mechanical equipment is controlled and monitored in the control room complex. The pressurization and filtration fans for the Emergency Mode are located within the CRE. The CRE air conditioning system is a total recirculation system with the equipment located within the CRE. There is no other ventilation system interaction that could contribute to the pressurization of the CRE. Active components in the normal makeup air subsystem, emergency makeup air and filtration subsystem, and exhaust and static pressure control subsystem, except the exhaust fan, are designed ANS Safety Class 3 and seismic Category I. The exhaust fan is designed NNS. The filter trains are fully redundant.

As a result of NRC Generic Letter 2003-01, "Control Room Habitability" FPLE Seabrook is in the process of performing reviews of the CRE boundary, adjacent area ventilation systems, and other unfiltered leakage sources. There are no known external ducting or other system penetrations that contain a pressure source, (i.e.. plumbing, conduit, and floor drains) that enters into or passes through the CRE. It was verified that there are sources of unfiltered instrument air that could leak into the control room complex; however, it was estimated such sources would not be significant.

An evaluation of the CRE and adjacent areas has identified the Cable Spreading Room (CSR) ventilation system is a potential source of inleakage into the CRE. A failure of the belts that drive the cable spreading room exhaust fan, with the supply fans operating would result in an increase in the cable spreading room pressure. This increase in cable spreading room pressure could result in unfiltered inleakage into the CRE if a leakage path in the boundary existed. As a result of this potential condition, the cable spreading room ventilation system has been secured until a design change can be implemented to remedy this condition.

The operation of other ventilation systems such as the Turbine Building and Train A&B Mechanical Equipment Room adjacent to the CRE have also been reviewed. It was identified that neither of these ventilation systems could result in a potential unfiltered inleakage source.

Additionally, the condition of control room doors and penetration seals are monitored and maintained as part of a Technical Requirement Surveillance Program. CRE doors and door seals are inspected at least once every 6 months. As a minimum, at least ten percent of the CRE penetration seals are inspected at least every 18 months. An inspection of the CRE penetration seals has been completed since the startup of the plant. No significant degradation of penetration seals has been found.

If control room pressurization is temporarily lost under normal or non-accident conditions, manual actuation from the control room of the emergency makeup air and filtration subsystem will re-establish positive pressure using the bypass piping.

Conclusion

Based upon the existing CRE and ventilation systems design, combined with the CRE surveillance programs, and the lack of unfiltered inleakage sources, FPLE Seabrook is confident that the scheduled Tracer Gas Testing will demonstrate a lower inleakage than the 124 cfm calculated acceptance limit.

ENCLOSURE 2 TO NYN-03066

FRAMATOME ANP

CALCULATION SUMMARY SHEET (CSS)

Document Identifier 32 - 5030938 - 00

Title SBC-1010 - Control Room Limiting Unfiltered Inleakage for a Fuel Handling Accident in Open Containment

PREPARED BY:	REVIEWED BY:
	METHOD: ☒ DETAILED CHECK ☐ INDEPENDENT CALCULATION
NAME John N. Hamawi	NAME John DiStefano
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TITLE Consulting Radiological Eng. DATE 8/4/03	TITLE Sr. Radiological Eng. DATE 8-4-03
COST CENTER 41648 REF. PAGE(S) 17 &18	TM STATEMENT: REVIEWER INDEPENDENCE DLZM 8/4/03

PURPOSE AND SUMMARY OF RESULTS:

This calculation is in support of a response to an NRC Request for Additional Information (RAI) in conjunction with Seabrook's License Amendment Requests for revisions to the Technical Specifications (LARs 02-06 and 02-07). Specifically, FPL is requesting a reduction in the decay time before fuel movement (from 100 to 80 hrs), and for refueling operations to be carried out with the containment building open. In light of the generic letter which was recently issued with respect to control room habitabilities (Ref. 2), the NRC questioned the CR low unfiltered inleakage (1 cfm) used in the Fuel Handling Accident radiological analyses, even though this inleakage is part of the current licensing basis of the plant. The present calculation documents the scoping analyses carried out to determine the limiting unfiltered inleakage which would yield control room doses equal to the acceptance criteria. The analyses were based on Regulatory Guide 1.195, which relaxes some of the overly conservative assumptions previously associated with FHAs. The results are summarized below. This calculation is only a study and does not change the current licensing basis of the plant; as such, a 10CFR 50.59 is not required.

CR Ventilation Configuration	Atmosph. Dispersion Model	CR Unfiltered Inleakage (cfm)	Filtered Flow via Remote Intake (cfm)	CR Filtered Recirc. Flow (cfm)	Thyroid Dose (rem)	Whole Body Dose (rem)	Skin Dose (rem)
1-fan operation (Calc. of record)	SKIRON-II with Murphy Campe	1	600	500	7.38	0.31 (TEDE)	1.5
1-fan operation		124	600	500	49.94	0.06	1.35
2-fan operation		224	970	1370	49.85	0.06	1.43
1-fan operation	ARCON96	194	600	500	49.87	0.04	0.92
Acceptance Criteria					50	5	50

THE FOLLOWING COMPUTER CODES HAVE BEEN USED IN THIS DOCUMENT:

CODE/VERSION/REV	CODE/VERSION/REV
ELISA2 Version 2.2	

THE DOCUMENT CONTAINS ASSUMPTIONS THAT MUST BE VERIFIED PRIOR TO USE ON SAFETY-RELATED WORK

☐ YES ☒ NO

Table of Contents

1.0 PROBLEM DESCRIPTION

In October 2002, Florida Light and Power (FPL) submitted to the Nuclear Regulatory Commission two License Amendment Request (LARs 02-06 and 02-07) for revisions to the Seabrook Technical Specifications. Specifically, FPL is requesting a reduction in the decay time before fuel movement (from 100 hours to 80 hrs), and for refueling operations to be carried out with the containment building personnel air lock (PAL) and equipment hatch open.

The LAR was based on an updated radiological impact assessment of a postulated Fuel Handling Accident (FHA) documented in SBC-996-D2 (Ref. 1). This reference made use of the FHA scenario in the licensing basis of the plant, with the exceptions of the shorter decay time and the open containment. Included in the licensing-basis assumptions was the control room unfiltered inleakage of 1 cfm. The validity of this low inleakage was questioned by NRC upon review of the LAR, in light of the generic letter that was recently issued with respect to CR habitabilities (Ref. 2). Following discussions between FPL and the NRC, it was agreed that FPL would carry out scoping analyses to determine the CR limiting unfiltered inleakage that would yield the maximum permissible dose to the control room operators, and would provide the results and other additional information to the NRC for their review. It was also agreed that the radiological evaluations will make use of the updated assumptions for FHAs in the new Regulatory Guide 1.195 (Ref. 3).

The objective of the present calculation is to carry out the scoping analyses referred to above. It is emphasized that this calculation is only a study and does not update the licensing basis of the plant. As such, a 10 CFR 50.59 evaluation is not required.

2.0 QUALITY ASSURANCE

This calculation is safety-related and was prepared under the Framatome ANP Assurance Program and Procedures. All computer codes employed in the analyses are on the Computer Software Index (CSI) and meet the requirements of FANP Procedure 0902-21.

3.0 IDENTIFICATION OF KEY ASSUMPTIONS

There are no key assumptions and related limitations that must be verified prior to using the results of the calculation for a safety-related task.

4.0 ACCEPTANCE CRITERIA

For control room operators, the current acceptance criteria applicable to the classical (TID-14844, Ref. 4) methodology are defined in Regulatory Guide 1.195 (Ref. 3). They correspond to 5 rem to the whole body, 50 rem to the thyroid, 50 rem to the skin without protective clothing, and 75 rem to the skin with protective clothing. The exposure interval is 30 days, with partial occupancy credit after the first 24 hours.

The following is noted with respect to showing compliance with the regulatory requirements:

(a) It is standard practice in the application of the classical methodologies for radiological evaluations (see , for instance Ref. 5, Sec. IV), that the whole body and skin dose limits apply to doses received from external radiation only, and that the thyroid dose limit applies only to the inhalation pathway.

(b) In a recent NRC Regulatory Issue Summary (RIS, Ref. 6) the NRC provided guidance on the use of the Effective Dose Equivalent (EDE) in place of the Deep Dose Equivalent (DDE) in situations where doses are calculated rather than measured with personnel dosimetry. Specifically, the RIS states that, in these situations, the Total Effective Dose Equivalent (TEDE), which is defined in 10 CFR Part 20 as the sum of the Committed Effective Dose Equivalent (CEDE, resulting from internal contamination) and the DDE (resulting from external radiation), may be redefined as the sum of the CEDE and the EDE from external radiation.

(c) The dose conversion factors in the computer code employed in the analyses for the radiological impact assessment (namely, ELISA-2, Ref. 7) are from Federal Guidance Report 11 (FGR 11, Ref. 8) for the inhalation pathway and FGR 12 (Ref. 9) for the external-radiation pathways. The EDE conversion factors from FGR 12 for airborne radioactivity will be used as a surrogate for the whole body dose because of the uniform body exposure associated with the semi-infinite-cloud dose modeling (Reg. Guide 1.195, Sec. 4.1.4).

5.0 SOFTWARE USAGE

The analyses documented in the present calculation made use of the ELISA-2 computer code (Ref. 7). This computer code is a descendant of ELISA (the code employed in SBC-669-D2, the calculation of record for an FHA) and incorporates significant improvements and updated data libraries and dose conversion factors. In view of the software change, it was deemed essential to demonstrate that there is a smooth transition between the old and new FHA analyses. This was achieved by rerunning the base-case scenario in SBC-669-D2 and comparing the results. The comparison appears in Table 6.8.

ELISA-2 is installed in the Framatome-ANP DE&S Computer Software Index (Record Center File No. 1123-00-3005.03-452), has been validated for safety-related applications, and has been used in analogous applications at many nuclear power plants. All computer runs were carried out on the HP 9000/785 CPU running HP-UX, Version B.10.20. The ELISA-2 runs used for this calculation are included in Attachment B to this calculation. Refer to these outputs for further details.

6.0 ANALYSIS AND RESULTS

6.1 General

As noted above, the objective of this study is to carry out scoping analyses to determine the control room limiting unfiltered inleakage which would yield doses to control room operators equal to the acceptance criteria. Four different scenarios were evaluated, as summarized in Table 6.1.

Table 6.1

FHA Radiological Impact Assessment - Cases Analyzed

Case	Description	CR Unfiltered Inleakage	Applicable Regulatory Guide	Atmospheric Dispersion Modeling
A	Replication of analysis of record (SBC-669-D2)[a]	1 cfm	1.25	SKIRON-II[b]
B	1 fan CR ventilation configuration	To be determined in present calculation (See Table 6.8)	1.195	SKIRON-II
C	2-fan CR ventilation configuration		1.195	SKIRON-II
D	1 fan CR ventilation configuration		1.195	ARCON96

(a) The only differences between the SBC-669-D2 and the current analyses are as follows:

1. Use of the ELISA computer code in SBC-669-D2 and of ELISA-2 in the current analyses.
2. Use of a puff (instantaneous) release in SBC-669-D2 versus an exponential release in the current analysis (at the rate of 20 air changes per hour), which is more in line with the guidance in Reg. Guide 1.195.

Case A was carried out to demonstrate that there is a smooth transition from the analysis of record to the current approach.

(b) SKIRON-II (Ref. 10) implements the Murphy/Campe methodology in Ref. 5

It is noted that the current analyses make use of the new guidance in Regulatory Guide 1.195, whereas the calculation of record (SBC-669-D2) was based on Regulatory Guide 1.25 (Ref. 11). The differences between these guides that are important in this study, are summarized in Table 6.2.

Table 6.2

Differences between Regulatory Guides 1.25 and 1.195 for a Fuel Handling Accident

No.	Description	Reg. Guide 1.25	Reg. Guide 1.195
1	Gap inventory (fraction of assembly inventory)		
	I131	10 %	8 %
	All other iodines	10 %	5 %
	Kr 85	30 %	10 %
	All other noble gases	10 %	5 %
2	Pool decontamination factor (inverse of fraction of released iodines retained by pool water)		
	Elemental iodines	133	400
	Organic iodines	1	1
	Overall DF	100	200
3	Iodine composition above the pool water		
	Elemental (99.75 % of gap activity)	75 %	50 %
	Organic (0.25 % of gap activity)	25 %	50 %
4	Personnel breathing rate (m^3/sec)	3.47E-04	3.5E-04
5	Control room accident dose criteria (rem) [a]		
	Thyroid	30	50
	Whole body	5	5
	Skin (without protective clothing)	30	50
	Skin (with protective clothing)[b]	75	75

(a) The Reg. Guide 1.25 dose criteria are from Sec. 6.4 of the Standard Review Plan (Ref. 12), which provides a clarification of the criteria in 10 CFR 50, Appendix A, General Design Criteria 19, "Control Room."

(b) Not credited in the current analyses.

6.2 Design Input

The design input employed in the analyses, and the associated references, are presented in Table 6.2 in Sec. 6.2, and in Tables 6.3 through 6.5 which follow. The input values are identical to those employed in calculation SBC-669-D2, with the following exceptions:

(a) Use of the guidance in Regulatory guide 1.195, in lieu of that in Reg. Guide 1.25 (see Table 6.2),

(b) The control room unfiltered inleakage, which is a variable to be determined in the present calculation, and

(c) The additional set of atmospheric dispersion factors based on ARCON96.

Refer to Sec. 6.3 for other data and assumptions.

It is noted that the values of several variables in Table 6.3, such as personnel breathing rates and occupancy factors, are actually assumed values dictated by regulatory guidance. Nonetheless, they are considered as design input.

Table 6.3

DESIGN INPUT - FHA and CR HABITABILITY ANALYSES

Seq.	DESCRIPTION	VALUE	REFERENCE
	A - SOURCE TERM		
A1	Power Level for Design-Basis Calculations (including calorimetric uncertainty)	3654 MWt (not used)	UFSAR Appendix 15B
A2	Radionuclide Inventory in Highest Rated Assembly at Time of Reactor Shutdown	See Table 6.4	UFSAR Table 15.7-20
	B - ATMOSPHERIC DISPERSION FACTORS		
B1	Atmospheric dispersion factors	See Table 6.5	Refs. 13 and 14
	C - FHA SCENARIO		
C1	Fuel assembly gap inventory fractions, pool decontamination factors, and iodine composition above pool water	See Table 6.2	Reg. Guides 1.195 and 1.25 (Refs. 3 and 11)
C2	Number of assumed ruptured fuel rods	264 (1 SB Fuel Assembly)	Industry standard assumption
C3	Decay time prior to fuel movement, and time of postulated FHA accident	80 hrs	Proposed amendment to T/S 3 / 4.9.3
C4	Containment release path	Via open PAL [See Sec. 6.3 (a)]	Proposed amendment
C5	Atmospheric release duration	2 hrs	RGs. 1.195 and 1.25
	D- CONTROL ROOM CHARACTERISTICS		
D1	CR free air volume (including TSC)	2.460E+05 ft^3	UFSAR Sec. 15.6.5.4.e
D2	CR isolation time after the postulated FHA	0 sec	SB Calc.C-S-1-61013 (Ref. 15)
D3	Initiation time for CR recirculation filtration	1 hr	SBC-669-D2, Table 4.1
D4	CBA fan flow rates (cfm) 1 fan operation Intake air Filtered recirculation 2 fan operation Intake air Filtered recirculation	 600 500 970 1370	SB Calc.C-S-1-61036 (Ref. 16)
D5	CR Unfiltered Infiltration Rate	Calculated to yield limiting dose (See Table 6.6)	
D6	Iodine removal efficiency for CR intake/recirculation filters: Elemental iodine Organic iodine Particulates	 95 % 95 % 99%	UFSAR Appendix 15B
D7	Control room occupancy factors: 0 - 24 hrs: 24 - 96 hrs: 96 - 720 hrs:	 100 % 60 % 40 %	Reg. Guide 1.195
D8	CR personnel breathing rate	See Table 6.2	RGs 1.195 and 1.25

Table 6.4

Radionuclide Inventory in Highest Rated Assembly at Time of Reactor Shutdown (Halogens and Noble Gases, from UFSAR Table 15.7-20)

Radionuclide	Assembly Inventory (Ci) at Shutdown
I131	9.0E+05
I132	1.3E+06
I133	1.9E+06
I134	2.1E+06
I135	1.8E+06
Kr85M	2.5E+05
Kr85	7.8E+03
Kr87	4.4E+05
Kr88	6.4E+05
Xe131m	6.4E+03
Xe133m	2.6E+05
Xe133	1.8E+06
Xe135m	3.7E+05
Xe135	3.8E+05
Xe138	1.4E+06

Table 6.5

**Atmospheric Dispersion Factors (χ/Q)
for Containment Releases via the Personnel Air Lock
[See Sec. 6.3, Item (a)]**

Time Period (hr)	Control Room Vestibule Door	Remote Intakes		
		West[a]	East	Limiting Intake Divided by 2
SKIRON-II (1-year met data base, April 1979 - March 1980, Murphy Campe model implementation) (From Ref. 13, SBC-202, Rev. 2, pg 20)				
0 - 1	4.08E-03	1.57E-03	1.42E-03	7.850E-04
1 - 2	3.18E-03	9.81E-04	1.14E-03	5.700E-04
2 - 8	2.04E-03	4.59E-04	6.95E-04	3.475E-04
8 - 24	1.44E-03	2.53E-04	4.67E-04	2.335E-04
24 - 96	9.78E-04	1.49E-04	3.05E-04	1.525E-04
96 - 720	7.51E-04	7.77E-05	2.00E-04	1.000E-04
ARCON96 (5-year met data base, 1998-2002) (From Ref. 14)				
0 - 2	2.84E-03	3.05E-04	5.68E-04	2.840E-04
2 - 8	2.30E-03	2.48E-04	4.95E-04	2.475E-04
8 - 24	8.67E-04	9.58E-05	2.07E-04	1.035E-04
24 - 96	5.87E-04	6.11E-05	1.30E-04	6.500E-05
96 - 720	3.70E-04	3.58E-05	1.02E-04	5.100E-05

(a) The dispersion factors are for the recently relocated West intake.

6.3 Basic Assumptions and Other Data

In addition to the design input presented in Sec. 6.1, the following assumptions and other data were employed in the analyses:

(a) The radioactive material released into the containment atmosphere as a result of the postulated FHA gets released to the environment via the personnel air lock, which is assumed to be open[1]. The release is exponential, arbitrarily set equal to 20 containment air changes per hour. At this rate, 90 % of the activity is released within about 7 minutes, and 99.9 % within 21 min.

(b) Iodine plateout within the containment building is conservatively ignored.

(c) The noble gases produced by the decay of halogens retained by the pool water are released to the environment upon generation (for the entire exposure interval of 30 days), at the same exponential release rate.

(d) The radioactivity released to the environment is transported to the CR vestibule door (where it leaks into the CR), and to the two remote intakes (where it is drawn in by the CR ventilation system). Any inleakage into the CR via the Diesel Generator Building is conservatively assumed to be via the CR vestibule door; this was based on review of the design input in Ref. 14, which shows that the atmospheric dispersion factors from the containment personnel hatch to the DG building are lower than those to the vestibule door.

(e) In-transit decay and depletion, from the containment personnel lock to the control room atmosphere, are conservatively ignored.

(f) The unfiltered inleakage into the control room which would yield the desired dose was determined through iterative analyses. The results are presented in Sec. 6.4.

(g) The CR ventilation configuration is in the emergency mode, triggered by the radiation monitors in the remote intakes, as specified in Table 6.3, Item D2. In addition, two ventilation configurations were assumed, namely single-fan and dual-fan operations, each lasting for the duration of the exposure interval (30 days).

(h) There is no CR operator action to manually isolate the downwind CR air intake. Both intakes are assumed to remain functional for 30 days. In view of the relative location of the intakes with respect to the release point (180 degrees apart), only one of the intakes would be drawing in contaminated air.

(i) The intake flows at the two remotes are assumed to be the same, and use is made of the worst-case atmospheric dispersion factors, though divided by 2 to account for the mixing of

1 Releases to the atmosphere via an open equipment hatch were not analyzed since they are bounded by releases via the personnel air lock (PAL). The equipment hatch is almost diagonally across from the PAL, farther away from the unfiltered inleakage path to the control room.

the contaminated and clean air flows. The total intake flow, through both remotes, is assumed to apply to a single remote.

(j) As a result of the recirculation flows, radionuclide concentrations within the control room pressure envelope are assumed to be uniform.

(k) The noble gases produced by the decay of halogens retained by the CR charcoal filters were accounted for. The noble-gas decay products (Rb and Cs) were also accounted for, and were subject to removal by the charcoal filters.

(l) Thyroid doses due to inhalation were based on the ICRP-30 dose conversion factors as reflected in Federal Guidance Report No. 11 (Ref. 16). It is noted that ELISA-2 also calculates doses to the thyroid as a result of external radiation; in line with the classical methodology, this contributor will be excluded from the final doses reported in the calculation.

(m) The control room operators were assumed to be located at the base of a hemispherical cloud having a volume equal to the free air volume of the control room. Finite-cloud correction to the submersion dose was based on a nuclide-specific model; this is unlike the Murphy/Campe model in Ref. 5 which used a single high-energy photon for all radionuclides. It is noted that ELISA-2 applies finite-cloud correction to all submersion exposures, including the gamma component to the skin dose; the beta component of the skin dose is based on the semi-infinite cloud model. Protective clothing for beta shielding was not considered.

(n) Doses to CR personnel were calculated for a 30-day interval. Occupancy factors were properly applied to all inhalation and submersion exposure pathways.

(o) Direct-shine doses from activity accumulating on the CR charcoal filters and from other sources external to the CR envelope were not considered since the limiting dose is to the thyroid via the inhalation pathway. Even if the direct-shine dose for a Loss of Coolant Accident were to be conservatively assumed to apply to an FHA (3.6 rem, from Ref. 17), the total FHA whole body dose would have still been less than the limit of 5 rem.

6.4 Calculation

6.4.1 Composite Atmospheric Dispersion Factors and Intake Filter Bypass Fractions

The design-basis atmospheric dispersion factors are presented in Table 6.5. Composite χ/Q's (and associated intake-filter bypass fractions), representative of the combined intake and infiltration flows into the control room, are presented in Table 6.6 and were calculated using the following equations:

$$(\chi/Q)_{eff} = [F_{remote}(\chi/Q)_{remote} + F_{local}(\chi/Q)_{local}] / [F_{remote} + F_{local}] \quad \text{(Eq. 1)}$$

$$f_{bypass} = F_{local}(\chi/Q)_{local} / [F_{remote}(\chi/Q)_{remote} + F_{local}(\chi/Q)_{local}] \quad \text{(Eq. 2)}$$

where

$(\chi/Q)_{eff}$ = effective atmospheric dispersion factor (sec/m^3), for air entering the control room through the remote intakes and via local unfiltered infiltration,

$(\chi/Q)_{remote}$ = atmospheric dispersion factor (sec/m^3) for the worst-case remote intake (east or west) divided by 2 to account for the clean air drawn in by one of the remote intakes, during the interval analyzed (see Table 6.5,

$(\chi/Q)_{local}$ = atmospheric dispersion factor (sec/m^3) for local infiltration (CR vestibule door),

F_{remote} = air intake through the remove intakes (m^3/sec) (equal to 600 cfm for the 1-fan operation, drawing 300 cfm from each intake, and equal to 970 cfm for the 2-fan operation),

F_{local} = local infiltration (m^3/sec) (equal to 1 cfm for Case A, and an output variable determined through iterative analyses for Cases B through D), and

f_{bypass} = control room intake filter bypass fraction (fraction of total air intake which bypasses filtration).

These equations were based on the fact that the product of intake flow times the atmospheric dispersion factor [for instance, $F_{local}(\chi/Q)_{local}$], which is unitless, represents that fraction of the atmospheric release of radioactivity which enters the control room via that point.

Application of these equations, along with iterative analyses of the radiological impact to attain the dose limits, leads to the results summarized in Table 6.6. It is noted that the flow rates in Eqs. (1) and (2) may be in any units. In Table 6.6, use was made of the flows in cfm, for simplicity. The listed flow rates for Cases B though D (namely, 124, 224 and 194 cfm respectively) yield CR doses at the acceptance limits. Details appear in Sec. 6.4.3.

Table 6.6

Composite Atmospheric Dispersion Factors and Control Room Intake Filter Bypass Fractions

Time Interval (hours)	Remote Intake			Local Intake (Vestibule Door)			Composite χ/Q (sec/m^3)	Intake Filter Bypass Fraction
	(χ/Q) (sec/m^3)	Flow into CR (cfm)	(χ/Q) x Flow	(χ/Q) (sec/m^3)	Inleakage into CR (cfm)	(χ/Q) x Flow		
	A	B	A*B	C	D	C*D		
Case A - SKIRON-II (χ/Q)s, 1 Fan Operation, and 1 cfm Inleakage - Repeat of SBC-669-D2 analysis								
0 - 1	7.850E-04	6.000E+02	4.710E-01	4.080E-03	1.000E+00	4.080E-03	7.905E-04[a]	8.588E-03[b]
1 - 2	5.700E-04	6.000E+02	3.420E-01	3.180E-03	1.000E+00	3.180E-03	5.743E-04	9.213E-03
2 - 8	3.475E-04	6.000E+02	2.085E-01	2.040E-03	1.000E+00	2.040E-03	3.503E-04	9.689E-03
8 - 24	2.335E-04	6.000E+02	1.401E-01	1.440E-03	1.000E+00	1.440E-03	2.355E-04	1.017E-02
24 - 96	1.525E-04	6.000E+02	9.150E-02	9.780E-04	1.000E+00	9.780E-04	1.539E-04	1.058E-02
96 - 720	1.000E-04	6.000E+02	6.000E-02	7.510E-04	1.000E+00	7.510E-04	1.011E-04	1.236E-02
Case B - SKIRON-II (χ/Q)s, 1 Fan Operation, and 124 cfm Inleakage								
0 - 1	7.850E-04	6.000E+02	4.710E-01	4.080E-03	1.240E+02	5.059E-01	1.349E-03	5.179E-01
1 - 2	5.700E-04	6.000E+02	3.420E-01	3.180E-03	1.240E+02	3.943E-01	1.017E-03	5.355E-01
2 - 8	3.475E-04	6.000E+02	2.085E-01	2.040E-03	1.240E+02	2.530E-01	6.374E-04	5.482E-01
8 - 24	2.335E-04	6.000E+02	1.401E-01	1.440E-03	1.240E+02	1.786E-01	4.401E-04	5.603E-01
24 - 96	1.525E-04	6.000E+02	9.150E-02	9.780E-04	1.240E+02	1.213E-01	2.939E-04	5.700E-01
96 - 720	1.000E-04	6.000E+02	6.000E-02	7.510E-04	1.240E+02	9.312E-02	2.115E-04	6.082E-01
Case C - SKIRON-II (χ/Q)s, 2 Fan Operation, and 224 cfm Inleakage								
0 - 1	7.850E-04	9.700E+02	7.615E-01	4.080E-03	2.240E+02	9.139E-01	1.403E-03	5.455E-01
1 - 2	5.700E-04	9.700E+02	5.529E-01	3.180E-03	2.240E+02	7.123E-01	1.060E-03	5.630E-01
2 - 8	3.475E-04	9.700E+02	3.371E-01	2.040E-03	2.240E+02	4.570E-01	6.650E-04	5.755E-01
8 - 24	2.335E-04	9.700E+02	2.265E-01	1.440E-03	2.240E+02	3.226E-01	4.598E-04	5.875E-01
24 - 96	1.525E-04	9.700E+02	1.479E-01	9.780E-04	2.240E+02	2.191E-01	3.074E-04	5.969E-01
96 - 720	1.000E-04	9.700E+02	9.700E-02	7.510E-04	2.240E+02	1.682E-01	2.221E-04	6.343E-01
Case D - ARCON96 (χ/Q)s, 1 Fan Operation, and 194 cfm Inleakage								
0 - 1	2.840E-04	6.000E+02	1.704E-01	2.840E-03	1.940E+02	5.510E-01	9.085E-04	7.638E-01
1 - 2	2.840E-04	6.000E+02	1.704E-01	2.840E-03	1.940E+02	5.510E-01	9.085E-04	7.638E-01
2 - 8	2.475E-04	6.000E+02	1.485E-01	2.300E-03	1.940E+02	4.462E-01	7.490E-04	7.503E-01
8 - 24	1.035E-04	6.000E+02	6.210E-02	8.670E-04	1.940E+02	1.682E-01	2.900E-04	7.303E-01
24 - 96	6.500E-05	6.000E+02	3.900E-02	5.870E-04	1.940E+02	1.139E-01	1.925E-04	7.449E-01
96 - 720	5.100E-05	6.000E+02	3.060E-02	3.700E-04	1.940E+02	7.178E-02	1.289E-04	7.011E-01

(a) (A*B + C*D) / (B + C): (4.710E-01 + 4.080E-03) / (600 + 1)
(b) C*D / (A*B + C*D): 4.080E-03 / (4.710E-01 + 4.080E-03)

6.4.2 Source Term

The gap inventories for use as input to the radiological analyses were computed through use of the peak assembly inventory in Table 6.4 and the gap fractions from Table 6.2. The results are presented in Table 6.7.

Table 6.7

Gap Inventories in Highest Rated Assembly at Time of Reactor Shutdown

Radionuclide	Total Inventory (Ci) (From Table 6.4)	Reg. Guide 1.25 (Case A)		Reg. Guide 1.195 (Cases B-D)	
		Gap Faction (from Table 6.2)	Gap Inventory (Ci)	Gap Faction (from Table 6.2)	Gap Inventory (Ci)
I131	9.0E+05	0.10	9.00E+04	0.08	7.20E+04[a]
I132	1.3E+06	0.10	1.30E+05	0.05	6.50E+04
I133	1.9E+06	0.10	1.90E+05	0.05	9.50E+04
I134	2.1E+06	0.10	2.10E+05	0.05	1.05E+05
I135	1.8E+06	0.10	1.80E+05	0.05	9.00E+04
Kr85M	2.5E+05	0.10	2.50E+04	0.05	1.25E+04
Kr85	7.8E+03	0.30	2.34E+03	0.10	7.80E+02
Kr87	4.4E+05	0.10	4.40E+04	0.05	2.20E+04
Kr88	6.4E+05	0.10	6.40E+04	0.05	3.20E+04
Xe131m	6.4E+03	0.10	6.40E+02	0.05	3.20E+02
Xe133m	2.6E+05	0.10	2.60E+04	0.05	1.30E+04
Xe133	1.8E+06	0.10	1.80E+05	0.05	9.00E+04
Xe135m	3.7E+05	0.10	3.70E+04	0.05	1.85E+04
Xe135	3.8E+05	0.10	3.80E+04	0.05	1.90E+04
Xe138	1.4E+06	0.10	1.40E+05	0.05	7.00E+04

(a) 9.0E+05 * 0.08

6.4.3 Control Room Doses

The Control Room operator doses following an FHA in an open containment were determined through the use of ELISA-2, along with the design input and other variables presented in the previous subsections. The results, extracted from the ELISA-2 computer outputs in Attachment B (last page of each output), are presented in Table 6.8. As noted earlier, the unfiltered inleakage flows in Cases B through C were determined iteratively to yield the limiting dose of 50 rem to the thyroid.

Table 6.8

Control Room Doses following an FHA in an Open Containment

Run Case[a]	CR Unfiltered Inleakage (cfm)	Thyroid Dose (rem)			TEDE and External-Exposure EDE (rem)			Skin Dose[b] (Beta + Gamma) (rem)
		Inhalation + External	% Inhalation	Inhalation only	Inhalation + External	% Inhalation	External Expo. EDE	
SBC-669-D2	1	7.38			0.31			1.50
A	1	7.34	99.10	7.27[c]	0.2896	76.59	0.068[d]	1.581
B	124	49.99	99.89	49.94	1.581	96.26	0.059	1.348
C	224	49.91	99.88	49.85	1.582	96.04	0.063	1.432
D	194	49.91	99.92	49.87	1.560	97.42	0.040	0.9157
Acceptance Criteria (Reg. Guide 1.195)				50			5	50

(a) Case A: 80-hr decay, SKIRON-II (Murphy/Campe model) dispersion factors, 1 fan operation (600 cfm filtered flow from remote intake, 500 cfm filtered recirc.), 1 cfm unfiltered inleakage (repeat of SBC-669-D2, using ELISA-2 instead of ELISA)
Case B: Similar to A, but with 124 cfm unfiltered inleakage
Case C: Similar to Case A but with 2-fan operation (970 cfm filtered flow from remote intake, 1370 cfm filtered recirc.) and 224 cfm inleakage
Case D: Similar to Case B, but with 194 cfm unfiltered inleakage and ARCON96 dispersion factors

(b) The skin dose is due primarily to beta radiation, which contributes 94 % of the dose in all cases. It is noted that the ELISA-2 model for computation of skin doses assumes submersion in a semi-infinite cloud model for the beta radiation and submersion in a finite cloud for the gamma radiation.

(c) = 7.34 (99.10/100)

(d) = 0.2896 [1 - (76.59/100)]

REFERENCES

1. Framatome ANP Calculation SBC-669, Rev. D2, "Fuel Handling Accident Inside Containment," J. DiStefano (10/4/02)

2. SECY-03-0095, "Issuance of Nuclear Regulatory Commission Generic Letter 2003-01, Control Room Habitability" (6/6/2003)

3. NRC Regulatory Guide 1.195, "Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors" (May 2003)

4. J. DiNunno, F. Anderson, R. Baker and R. Waterfield, "Calculation of Distance Factors for Power and Test Reactor Sites," AEC, Division of Licensing and Regulation, TID-14844 (March 1962)

5. K. G. Murphy and K. W. Campe, "Nuclear Power Plant Control Room Ventilation System Design for Meeting General Design Criterion 19," published in *Proceedings of 13th AEC Air Cleaning Conference*, Atomic Energy Commission (now Nuclear Regulatory Commission) (August 1974)

6. NRC Regulatory Issue Summary (RIS) 2003-04, "Use of Effective Dose Equivalent in Place of the Deep Dose Equivalent in Dose Assessments" (2/13/2003)

7. J. N. Hamawi, "ELISA-2 - A Software Package for the Radiological Evaluation of Licensing and Severe Accidents at Light-Water Nuclear Power Plants Based on The Classical and Alternative-Source-Term Methodologies," ENTECH Engineering, Inc., Technical Report P100-R22A, (Vols. A-G, May 2002), Version 2.2 (5/23/2002).

8. EPA 520/1-88-020, Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration, and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (ORNL, September 1988)

9. EPA 402-R-93-081, Federal Guidance Report No. 12, "External Exposure to Radionuclides in Air, Water, and Soil" (ORNL, September 1993)

10. J. N. Hamawi, SKIRON-II - A Computer Code for the Determination of Atmospheric Dispersion Factors for Potential Accident Consequence Assessments at Nuclear Power Plants," ENTECH Engineering, Inc., Technical Report P100-R07 (December 1981)

11. NRC Regulatory Guide 1.25, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors" (3/23/72)

12. Standard Review Plan 6.4, "Control Room Habitability System," Revision 2, July 1981

13. SBC-202, Rev. 2, "Control Room Accident Atmospheric Diffusion Factors," R. B. Harvey (3/2/1990)

14.* FPL Letter CE 03-59, addressed to J. N. Hamawi, from P. Gurney, Reactor Engineering Manager, titled "ARCON96 Atmospheric Dispersion Factors for Fuel Handling Accident" (8/4/2003) (As extracted from Calculation NAI-1131-002, Rev. 1)

15.* Seabrook Calculation No. C-S-1-61013, Rev. 0, "CBA Makeup Air Duct Transit Time," I. Waters, 05/05/1997.

16.* Seabrook Station Calculation C-S-1-61036, Rev. No. 0, "CBA-Emergency Filter Fans Operating in Parallel," J. Salvo, 11/2/00.

17. Framatome ANP Calculation SBC-226, Rev. 1, "Revised Control Room Dose - CBA Modification," John DiStefano (3/9/1990)

* See Attachment A for a copy of this reference, or excerpts thereof.

ATTACHMENT A

COPIES OF SELECTED REFERENCES

Included in this attachment are copies of the following references, or excerpts thereof:

14. FPL Letter CE 03-59, addressed to J. N. Hamawi, from P. Gurney, Reactor Engineering Manager, titled "ARCON96 Atmospheric Dispersion Factors for Fuel Handling Accident" (8/4/2003) (As extracted for Calculation NAI-1131-002, Rev. 1)

15.* Seabrook Calculation No. C-S-1-61013, Rev. 0, "CBA Makeup Air Duct Transit Time," I. Waters, 05/05/1997.

16.* Seabrook Station Calculation C-S-1-61036, Rev. No. 0, "CBA-Emergency Filter Fans Operating in Parallel," J. Salvo, 11/2/00.

* Excerpts only

Reference 14

AUG-04-2003 13:38 P.02/02

FPL Energy
Seabrook Station

FPL Energy Seabrook Station
P.O. Box 300
Seabrook, NH 03874
(603) 773-7000

Dr. John Hamawi
Framatome ANP
Solomon Pond Park
400 Donald Lynch Boulevard
Marlborough, MA 01752

CE 03-59
August 4, 2003

Subject: ARCON96 Atmospheric Dispersion Factors for Fuel Handling Accident

Reference: NAI Calculation NAI-1131-002 Rev. 1

Dear Dr. Hamawi:

This letter formally transmits the ARCON96 Atmospheric Dispersion Factors (X/Q) to be used in the scoping study for the Design Basis Fuel Handling Accident. The scoping study will determine the maximum unfiltered inleakage to the control room during a Fuel Handling Accident with an open containment for the various scenarios already agreed upon.

The following Atmospheric Dispersion Factors are from NAI Calculation NAI-1131-002 Rev. 1 and should be used for the case using ARCON96:

Release Point	Receptor Point	0-2 hr X/Q	2-8 hr X/Q	8-24 hr X/Q	1-4 Days X/Q	4-30 days X/Q
Personnel Hatch	East Control Room Intake	5.68E-04	4.95E-04	2.07E-04	1.30E-04	1.02E-04
Personnel Hatch	West Control Room Intake	3.05E-04	2.48E-04	9.58E-05	6.11E-05	3.58E-05
Personnel Hatch	Control Room Vestibule Door	2.84E-03	2.30E-03	8.67E-04	5.87E-04	3.70E-04
Personnel Hatch	Diesel Generator Building	1.97E-03	1.60E-03	5.99E-04	4.04E-04	2.58E-04

Please call Mike Ossing at (603) 773-7512 or Dianne Quintero at (603) 773-7414 if you have any questions.

Very Truly Yours,

Paul Gurney
Reactor Engineering Manager

CC:

J. Connolly
P. Gurney
M. O'Keefe
M. Ossing
D. Quintero
RMD

TOTAL P.02

Reference 15

Total number of pages: 8

CBA MAKUP AIR DUCT TRANSIT TIME

TITLE

C-S-1-61013 | 0 | Vendor Calc#
CALCULATION # | REV. #

System CBA Structure Component

Executive Summary

The current radiological analyses for the control room assume that the isolation valves for the remote air intakes do not close quickly enough to prevent contaminated gases from entering the control room unfiltered.

This calculation determines the transit time for contaminated gases, and demonstrates that the makup air isolation dampers are capable of closing in less time, and will prevent contaminated gases from bypassing the emergency cleanup filters.

Does this calculation:		
1.	Support a DCR, MMOD, an independent review method for a DCR ,or confirm test results for an installed DCR? If yes, indicate the DCR, MMOD number and/or Test Procedure number.	Yes ☐ No ☒
2.	Support independent analysis? If yes, indicate the procedure, work control or other reference it supports. ACR 97-0468	Yes ☒ No ☐
3.	Revise, supersede, or void existing calculations? If yes, indicate the calculation number and revisions.	Yes ☐ No ☒
4.	Involve QA or QA-related systems, components or structures?	Yes ☒ No ☐
5.	Impact the Unit licensing basis, including technical specifications, FSAR, procedures or licensing commitments? If yes, identify appropriate change documents.	Yes ☐ No ☒
Approvals (Print/Signature)		
Preparer IAN WATTERS		Date: 5-5-97
Independent Reviewer WF REVIEW		Date: 5-5-97
Supervisor R.A. CLICHE		Date: 5/5/97

North Atlantic

Rev	COMP. BY	CHK'D. BY
0	J.W.	WJ3
	Date 5-1-97.	Date 5-5-97
	Date	Date

Page 5

CALC SET NO. C-S-1-61013 | BOP SYSTEMS ENGINEERING

REF.

Minimum Total Piping Transit Time:

Select The Shortest Transit Times:

East Air Intake:	5.3	Seconds
Common Piping	0.1	Seconds
Piping To DP-27A	0.2	Seconds
Piping To Filter	3	Seconds
Total Time	8.6	Seconds

Conclusion:

The total available air transit time between the radiation detectors and the Control room is 8.6 seconds. This time conservatively neglects the flow reduction that would occur as the isolation valves closed and as the make-up air fans speed reduced after tripping.

Transit time could potentially be reduced due to increased air flow rates as the emergency filter fans started (FN-16A and 16B). However, once the filter fans start, all makeup air flow would pass through the carbon filter beds, and no direct bypass flow to the Control Room would occur.

The total time for closure of the makeup air isolation valves (CBA-DP-27A &27B) is 6 seconds (5 seconds stroke time plus an assumed 1 second for control loop response).

Therefore, it is concluded that bypass of the Control Room Emergency Cleanup Filters will not occur.

Reference 16

Calculation Title Page

Total number of sheets 20
(including attachments)

CBA - EMERGENCY FILTER FANS OPERATING IN PARALLEL
TITLE

C-S-1-61036	0	N/A	CBA
CALCULATION #	REV. #	Vendor Calc#	System

Executive Summary

WHEN BOTH FILTER UNITS (CBA-F-38, CBA-F-38B) ARE OPERATED IN PARALLEL, THE OUTSIDE MAKEUP AIR FLOW RATE IS 970 CFM AND THE RECIRCULATED AIR FLOW FROM THE CONTROL ROOM MECHANICAL EQUIPMENT ROOM IS 1370 CFM.

Does this calculation:		
1.	Support a DCR, MMOD, an independent review method for a DCR, or confirm test results for an installed DCR? If yes, indicate the DCR, MMOD number and/or Test Procedure number.	Yes ☐ No ☒
2.	Support independent analysis? If yes, indicate the procedure, work control or other reference it supports.	Yes ☐ No ☐
3.	Revise, supersede, or void existing calculations? If yes, indicate the calculation number and revisions.	Yes ☐ No ☒
4.	Involve OQAP related systems, components or structures?	Yes ☒ No ☐
5.	Impact the licensing basis, including technical specifications, technical requirements, UFSAR, procedures or licensing commitments? If yes, identify appropriate change documents.	Yes ☐ No ☒

Approvals (Signature)		
Preparer	Joseph N Saba	Date: 11-2-00
Independent Reviewer	Mark O. Ellis	Date: 11-17-00
Supervisor/Manager	Jim Lottes	Date: 11-29-00

NADC FORM 5-1A
Rev. 15
Page 1 of 1

		Rev	COMP. BY	CHK'D. BY
PRELIM.		0	JNH	DAC
FINAL			DATE 11-2-00	DATE 11/17/00
VOID				
SHEET 4 OF			DATE	DATE
DISC				

TITLE CBA-EMERGENCY FILTER FANS OPERATING IN PARALLEL

CALC SET NO C-S-1-61036 DOC. NO N/A

REF

1.0 PURPOSE

THE PURPOSE OF THIS CALCULATION IS TO DETERMINE THE FLOW BREAKDOWN OF OUTSIDE MAKEUP AIR AND RECIRCULATION AIR, WHEN BOTH CBA FILTER UNITS (CBA-F-38 AND CBA-F-8038) ARE OPERATED IN PARALLEL.

2.0 DESIGN INPUTS

THE ORFICE SIZE ASSOCIATED WITH EACH FILTER UNIT HAS BEEN SIZED/BALANCED TO ACHIEVE A 600 CFM MAKEUP AIR AND 500 CFM RECIRCULATED AIR FLOW RATE, WHEN ONE FILTER UNIT, IS IN OPERATION.

THE PRESSURE DROP BETWEEN THE ENTRANCE OF CBA-F-38 AND ITS ASSOCIATED ORFICE CHAMBER, AND THE PRESSURE DROP BETWEEN THE ENTRANCE OF CBA-F-38 AND THE ORFICE CHAMBER IN CBA-F-8038 ARE SLIGHTLY DIFFERENT BECAUSE OF THE DUCTWORK AND DAMPERS LOCATED BETWEEN THE FILTER UNITS, SINCE THE MAJORITY OF THE SYSTEM RESISTANCE IS ASSOCIATED WITH THE FILTER HOUSING AND EACH FILTER TRAIN HAS AN ORFICE PLATE TO SUPPLY FLOW TO THE FILTER UNIT, EACH FILTER UNIT FAN WILL OPERATE INDEPENDENTLY WHEN RUN IN PARALLEL. THE COMMON SUPPLY DUCT WILL BALANCE AS NEEDED TO SATISFY FAN REQUIREMENTS AND EACH SYSTEM RESISTANCE CURVE WILL MOVE UP ALONG ITS APPROPRIATE FAN CURVE TO SATISFY OPERATING CONDITIONS.

ATTACHMENT B

COPIES OF COMPUTER INPUT AND OUTPUT FILES

The various computer runs employed in the radiological analyses are summarized in Table B.1

Table B.1

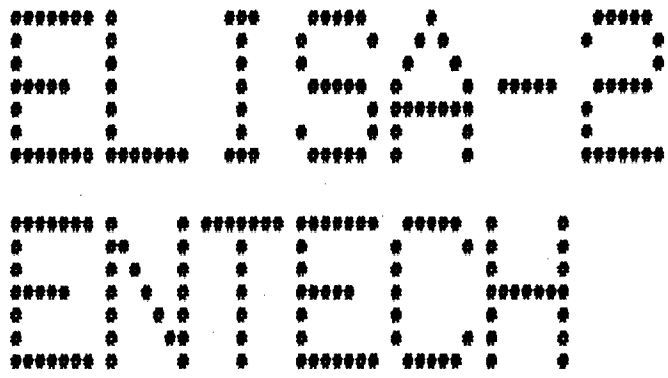
List of Computer Runs for the FHA Analyses

CODE USED	JSN # - JOB NAME	DATE RUN	CASE	CASE DESCRIPTION
ELISA-2 Version 2.2	N/A [See computer outputs in this attachment.]	08/02/2003	A	Case A: 80-hr decay, SKIRON-II (Murphy/Campe model) dispersion factors, 1 fan operation, 1 cfm unfiltered inleakage (repeat of SBC-669-D2, using ELISA-2 instead of ELISA)
			B	Similar to A, but with 124 cfm inleakage
			C	Similar to Case A but with 2-fan operation and 224 cfm inleakage
			D	Similar to Case B, but with 194 cfm inleakage and ARCON96 dispersion factors

The ELISA-2 computer outputs appear in the following sequence:

ELISA-2
Run Case A: Pages 26 - 42
Run Case B: Pages 43 - 60
Run Case C: Pages 61 - 78
Run Case D: Pages 79 - 96

ELISA-2 RUN CASE A



ENTECH ENGINEERING, INC., WESTBOROUGH, MA

RELEASE VERSION/LEVEL..: Version 2.2
RELEASE DATE .....: May 23,2002

PROBLEM SUBMITTED ON ..: 2-Aug-03 17:43:57

INPUT FILE .....: elisa2-A.inp
DATA LIBRARY FILE .....: /SCL/elisa2-2.2/elisa2.lib
OUTPUT FILE .....: elisa2-A.el2
PHOTON SPECTRA FILE #1 : elisa2-A.el3
PHOTON SPECTRA FILE #2 : elisa2-A.el4

INPUT DATA LISTING

```
Line          1         2         3         4         5         6         7         8         9        10        11        12
Seq.  123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

  1   SB - OPEN CONT. FRA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25
  2   10002     4         6         8         1         0           NNYNYY      N          NNNNN          YYYYYY

  3   10003     0         1.0       80.0      0.0       1.000E-02
  4   10004     3         0         0
  5      1      1.000E+00 0.0       0.0       XE        KR
  6      2      7.500E-03 2.500E-03 0.00      I         BR
  7      3      0.0       0.0       0.0       ZZ
  8   10005     4         Filter efficiencies
  9      2      1         0.0       0.0       9.500E-01 0.0       9.500E-01
 10      2      2         0.0       0.0       9.500E-01 0.0       9.500E-01
 11      2      3         0.0       0.0       9.900E-01 0.0       9.900E-01
 12      3      0         0.0       0.0       9.900E-01 0.0       9.900E-01
 13  10006     0.0       0.0       Peak assembly gap activity (Ci), based on UFSAR Table 15.7-20
 14   I131     9.00E+04  I132      1.30E+05  I133      1.90E+05  I134      2.10E+05
 15   I135     1.80E+05  KR85M     2.50E+04  KR85      2.34E+03  KR87      4.40E+04
 16   KR88     6.40E+04  XE131M    6.40E+02  XE133M    2.60E+04  XE133     1.80E+05
 17   XE135M   3.70E+04  XE135     3.80E+04  XE138     1.40E+05
 18  10007     2         0.0       480.0     0.0       0.0       0.0       0.0       CONTAINMENT
 19  10009     2         2.460E+05 601.0     500.0     0.0       0.0       0.0       CONTROL-ROOM
 20  10010     5
 21   0.0      5.000E-01 1.000E+00 2.000E+00 7.200E+02
 22  10017     2  Control room recirc rate multiplier
 23   0.0      0.0       1.0       1.0
 24  10018     6  Control room composite X/Q (sec/m3)
 25   0.0      7.905E-04 1.0       5.743E-04 2.0       3.503E-04 8.0       2.355E-04
 26   24.0     1.539E-04 96.0      1.011E-04
 27  10021     1  Breathing rate  (m3/sec)
 28   0.0      3.470E-04
 29  10023     6  Control room intake filter bypass fraction
 30   0.0      8.588E-03 1.0       9.213E-03 2.0       9.689E-03 8.0       1.017E-02
 31   24.0     1.058E-02 96.0      1.236E-02
 32  10024     3  Occupancy factors
 33   0.0      1.0       24.000    6.000E-01 96.000    4.000E-01
 34  99999
```

DATA LIBRARY PARTIAL LISTING

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Line            1         2         3         4         5         6         7         8         9        10        11        12
Seq.    12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

  1     ELISA-2 DATA LIBRARY - BASED ON ORIGEN-2 AND FEDERAL GUIDANCE REPORTS 11 AND 12  V2L1    1
  2     RELEASE DATE: 1/13/99                                                           V2L1    2
  3     REMARKS (START)                                                                 V2L1    3
  4         Source inventories are in Ci for the power level specified for each plant.  V2L1    4
  5         Decay constants are in inverse hours.                                       V2L1    5
  6         The entry line following the decay chains includes the decay constants      V2L1    6
  7           for each of three members [parent (P), daugher (D) and granddaughter      V2L1    7
  8           (G)], and the branching fractions (P-D), (D-G) and (P-G).                 V2L1    8
  9         Air immersion DCFs are in [((Sv or Gy))/s)/(Bq/m3)], for semi-infinite cloud V2L1    9
 10         Ground-shine  DCFs are in [((Sv or Gy))/s)/(Bq/m2)] (surface contamination). V2L1   10
 11         Inhalation DCFs are in [Sv/Bq)].                                            V2L1   11
 12         The inhalation DCF's are for the Lung Clearance Class which yields the      V2L1   12
 13           highest Effective Dose Equivalent (Eff D.E.); the class is identified.    V2L1   13
 14         Negative DCF entries imply 'data not available'.                            V2L1   14
 15         ORGAN 'TID Thy' = Thyroid inhalation based on TID-14844 - Iodines only.     V2L1   15
 16         ORGAN 'RG1109WB' = Whole body gamma dose using the Reg. Guide 1.109 DCFs.    V2L1   16
 17         Skin DCFs are included along with the organ DCFs, but skin is not           V2L1   17
 18           considered as an organ.                                                   V2L1   18
 19     READ FORMATS FOR THE RADIONUCLIDE DATA BASE                                     V2L1   19
 20     Line    1     Nuclide name and source inventories       (4x,a6,10x,4e12.3)      V2L1   20
 21                   (Note:  Nuclide sequence No. is not used)                         V2L1   21
 22     Line    2     Header                                    (a80)                   V2L1   22
 23     Line    3     Decay chain (3 members)                   (9x,3(a6,6x))           V2L1   23
 24     Line    4     Decay constants & branching fractions     (8x,6e12.3)             V2L1   24
 25     Line    5     Header                                    (a80)                   V2L1   25
 26     Lines  6-9    18 ORIGEN-2 photons and 1 ICRP-38 beta    (8x,6e12.3)             V2L1   26
 27     Line   10     Header                                    (a80)                   V2L1   27
 28     Lines 11-16   Dose conversion factors                   (8x,6e12.3)             V2L1   28
 29     END REMARKS                                                                     V2L1   29
 30     GENERAL DATA BASE                                                               V2L1   30
 31        10       [ORGAN NAMES - READ FORMAT (11x,6(a8,4x))]                          V2L1   31
 32                 Gonads      Breast      Lungs       R.Marrow    Bone Sur    Thyroid V2L1   32
 33                 Remaindr    Eff D.E.    TID Thy     RG1109WB    (Skin)          V2L1   33
 34         4       [Power plants and power levels (MWt) - READ FORMAT (11x,a20,1x,e12.3)] V2L1 34
 35                 PWR (33 GWD/MT 3.2%)    1.000E+00                                 V2L1   35
 36                 PWR (50 GWD/MT 4.2%)    1.000E+00                                 V2L1   36
 37                 BWR (27.5 GWD/MT 3%)    1.000E+00                                 V2L1   37
 38                 BWR (40 GWD/MT 3.4%)    1.000E+00                                 V2L1   38
 39        18       [ORIGEN-2 upper limit energy in each gamma group (MeV) (8x,6e12.3)] V2L1  39
 40                 2.000E-02   3.000E-02   4.500E-02   7.000E-02   1.000E-01   1.500E-01 V2L1 40
 41                 3.000E-01   4.500E-01   7.000E-01   1.000E+00   1.500E+00   2.000E+00 V2L1 41
 42                 2.500E+00   3.000E+00   4.000E+00   6.000E+00   8.000E+00   1.100E+01 V2L1 42
 43         3       Factors to convert data library DCFs to proper units, as shown      V2L1   43
 44                 1.0         Convert air immersion DCF to [((Sv or Gy)/s)/(Bq/m3)]   V2L1   44
 45                 1.0         Convert ground shine  DCF to [((Sv or Gy)/s)/(Bq/m2)]   V2L1   45
 46                 1.0         Convert inhalation DCF to [Sy/Bq]                       V2L1   46
 47        18       Air gamma DCF for semi-infinite monoener. cloud src [(Gy/s)/(Bq/m3)] V2L1   47
 48                 6.676E-16   1.669E-15   2.503E-15   3.839E-15   5.674E-15   8.345E-15 V2L1 48
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DATA LIBRARY PARTIAL LISTING

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Line          1         2         3         4         5         6         7         8         9        10        11        12
Seq.  12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789

 49               1.502E-14 2.503E-14 3.839E-14 5.674E-14 8.345E-14 1.166E-13 V2L1  49
 50               1.502E-13 1.836E-13 2.337E-13 3.338E-13 4.673E-13 6.342E-13 V2L1  50
 51      18       Air gamma DCF for monoenerg. ground-surface source [(Gy/s)/(Bq/m2)]  V2L1  51
 52               1.829E-16 1.493E-16 9.835E-17 8.181E-17 9.767E-17 1.436E-16 V2L1  52
 53               2.760E-16 4.785E-16 7.318E-16 1.050E-15 1.457E-15 1.910E-15 V2L1  53
 54               2.325E-15 2.710E-15 3.243E-15 4.194E-15 5.386E-15 6.759E-15 V2L1  54
 55      18       Skin gamma DCF for semi-infinite monoener. cloud src [(Sv/s)/(Bq/m3)] V2L1  55
 56               1.138E-16 7.690E-16 1.467E-15 2.717E-15 4.416E-15 6.737E-15 V2L1  56
 57               1.239E-14 2.073E-14 3.193E-14 4.754E-14 7.108E-14 1.012E-13 V2L1  57
 58               1.317E-13 1.624E-13 2.089E-13 3.030E-13 4.305E-13 5.922E-13 V2L1  58
 59     RADIONUCLIDE DATA BASE                                                 V2L1  59
 60       1  H  3  (Src Ci)    1.471E+01 2.186E+01 1.744E+01 2.536E+01         V2L1  60
 61              Decay chain, decay constants and branching fractions           V2L1  61
 62               H  3                                                        V2L1  62
 63              6.40320E-06 0.00000E+00 0.00000E+00  0.000E+00  0.000E+00  0.000E+00 V2L1  63
 64              ORIGEN-2 18-group phot/dis, and ICRP-38 betas (MeV/dis)      V2L1  64
 65                0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00 V2L1  65
 66                0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00 V2L1  66
 67                0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00 V2L1  67
 68                5.600E-03                                                  V2L1  68
 69              ICRP-38 Organ DCFs - Air immer, Grnd shine, Inhal/Class V     V2L1  69
 70                0.000E+00  0.000E+00  2.750E-18  0.000E+00  0.000E+00  0.000E+00 V2L1  70
 71                0.000E+00  3.310E-19  0.000E+00  0.000E+00  0.000E+00         V2L1  71
 72                0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00 V2L1  72
 73                0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00         V2L1  73
 74                1.730E-11  1.730E-11  1.730E-11  1.730E-11  1.730E-11  1.730E-11 V2L1  74
 75                1.730E-11  1.730E-11  0.000E+00  0.000E+00                    V2L1  75
 76       2  C 14  (Src Ci)    3.125E-06 4.723E-06 3.772E-06 5.467E-06         V2L1  76
 77              Decay chain, decay constants and branching fractions           V2L1  77
 78               C 14                                                        V2L1  78
 79              1.38016E-08 0.00000E+00 0.00000E+00  0.000E+00  0.000E+00  0.000E+00 V2L1  79
 80              ORIGEN-2 18-group phot/dis, and ICRP-38 betas (MeV/dis)      V2L1  80
 81                0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00 V2L1  81
 82                0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00 V2L1  82
 83                0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00 V2L1  83
 84                4.940E-02                                                  V2L1  84
 85              ICRP-38 Organ DCFs - Air immer, Grnd shine, Inhal/Class c     V2L1  85
 86                2.590E-19  3.520E-19  1.530E-19  1.210E-19  7.060E-19  2.190E-19 V2L1  86
 87                1.540E-19  2.240E-19  0.000E+00  0.000E+00  2.430E-16         V2L1  87
 88                2.220E-20  2.520E-20  8.650E-21  7.250E-21  4.630E-20  1.250E-20 V2L1  88
 89                1.030E-20  1.610E-20  0.000E+00  0.000E+00  7.460E-20         V2L1  89
 90                5.640E-10  5.640E-10  5.640E-10  5.640E-10  5.640E-10  5.640E-10 V2L1  90
 91                5.640E-10  5.640E-10  0.000E+00  0.000E+00                    V2L1  91
 92       3  N 13  (Src Ci)    0.000E+00  0.000E+00  0.000E+00  0.000E+00         V2L1  92
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(.... etc., for a total of 414 radionuclides ....)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

LISTING OF INPUT DATA

PATHWAY OPTION = 4 (COMP. A --> COMP. C)

COMPARTMENT A: CONTAINMENT
FILTERED RECIRCULATION RATE (cfm) = .000E+00
LEAK RATE TO ATMOSPHERE (frac/day) = 4.800E+02

COMPARTMENT C: CONTROL-ROOM
TOTAL FREE AIR VOLUME (cu ft) = 2.460E+05
INTAKE AND EXHAUST RATES (cfm) = 6.010E+02
FILTERED RECIRCULATION RATE (cfm) = 5.000E+02

FILTER REMOVAL EFFICIENCIES AND TIME-DEPENDENT
MULTIPLIERS FOR RECIRCULATION RATES, LEAK RATES,
COMP. A FLOW BETWEEN SPRAYED AND UNSPRAYED AREAS,
AND FILTER BYPASS FRACTIONS ARE GIVEN BELOW.

NO. OF DISCRETE TIME VALUES IN INPUT = 8

INTERMEDIATE RESULTS WILL BE PRINTED AT THE FOLLOWING TIMES (hrs):

.0000E+00

PROBLEM END TIME (hours) = 7.2000E+02

RELEASE RATES AND DOSE RATES ARE PRIOR TO TIME-STEP CHANGES, IF ANY.

ONLY EXACT SOLUTION OF THE DIFFERENTIAL EQUATIONS WAS EMPLOYED IN
THE ANALYSIS.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

RECIRCULATION, EXHAUST AND INTAKE FILTER REMOVAL EFFICIENCIES (fractions)

NUCL.	COMPARTMENT A RECIRC.			COMPARTMENT B RECIRC.			COMPARTMENT C RECIRC.			EXHAUST TO ATMOSPHERE			INTAKE TO COMPART. C		
GROUP	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3
1	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2	.0000	.0000	.0000	.0000	.0000	.0000	.9500	.9500	.9900	.0000	.0000	.0000	.9500	.9500	.9900
3	.0000	.0000	.0000	.0000	.0000	.0000	.9900	.9900	.9900	.0000	.0000	.0000	.9900	.9900	.9900

USER-SPECIFIED CLASSIFICATION OF RADIONUCLIDES AND INSTANTANEOUS FRACTIONAL RELEASES FROM THE SOURCE (AT T=0)

GROUP	E L E M E N T S	FORM 1	FORM 2	FORM 3
1	XE KR	1.000E+00	.000E+00	.000E+00
2	I BR	7.500E-03	2.500E-03	.000E+00
3	ZZ	.000E+00	.000E+00	.000E+00

ELEMENT "ZZ" STANDS FOR THE REMAINING DATA-LIBRARY ELEMENTS/NUCLIDES NOT LISTED ABOVE, IF ANY.

CASE# 1 SB - OPEN CONT. PHA; CR AUTO ISOL; 1 FAN OF; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

TIME INTERVAL (hours)	CONCENTR. X/Q (sec/m3)	GAMMA X/Q (sec/m3)	DEPOSITION D/Q (1/m2)	BREATHING RATE (m3/sec)	EXH.FILT. BYPASS FRACTION	COMPART. C INT.FILTER BYPASS FR.	COMPART. C OCCUPANCY FACTOR
.0000E+00 - 5.0000E-01	7.905E-04	7.905E-04	.000E+00	3.470E-04	.000E+00	8.588E-03	1.000E+00
5.0000E-01 - 1.0000E+00	7.905E-04	7.905E-04	.000E+00	3.470E-04	.000E+00	8.588E-03	1.000E+00
1.0000E+00 - 2.0000E+00	5.743E-04	5.743E-04	.000E+00	3.470E-04	.000E+00	9.213E-03	1.000E+00
2.0000E+00 - 8.0000E+00	3.503E-04	3.503E-04	.000E+00	3.470E-04	.000E+00	9.689E-03	1.000E+00
8.0000E+00 - 2.4000E+01	2.355E-04	2.355E-04	.000E+00	3.470E-04	.000E+00	1.017E-02	1.000E+00
2.4000E+01 - 9.6000E+01	1.539E-04	1.539E-04	.000E+00	3.470E-04	.000E+00	1.058E-02	6.000E-01
9.6000E+01 - 7.2000E+02	1.011E-04	1.011E-04	.000E+00	3.470E-04	.000E+00	1.236E-02	4.000E-01

TIME INTERVAL (hours)	COMPART A MULTIPLIERS (IF APPLICABLE)		COMPART B MULTIPLIERS (IF APPLICABLE)		COMPART C MULTIPLIERS (IF APPLICABLE)		FLOW MULT. SPRAYED AREA TO UNSPRAYED
	LEAK RATE	REC.FILTER	LEAK RATE	REC.FILTER	INTAKE/EXH	REC.FILTER	
.0000E+00 - 5.0000E-01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	.000E+00	1.000E+00
5.0000E-01 - 1.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	.000E+00	1.000E+00
1.0000E+00 - 2.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2.0000E+00 - 8.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
8.0000E+00 - 2.4000E+01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2.4000E+01 - 9.6000E+01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
9.6000E+01 - 7.2000E+02	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

ADJUSTMENTS WERE MADE TO THE INVENTORIES OF RADIONUCLIDES WHICH ARE IN SECULAR EQUILIBRIUM WITH THEIR PARENTS, AND WHOSE INVENTORIES WERE NOT USER-SPECIFIED, AS FOLLOWS, USING THE CONDITIONS:

NUCLIDE HALF-LIFE <= 7.200E+02 (hrs) AND (PRECURSOR HALF-LIFE/NUCLIDE HALF-LIFE) >= 1.000E+01

NUCLIDE	PRECURSOR	NUCLIDE HALF LIFE (hrs)	HALF-LIFE RATIOS (PREC./NUCL)	EQUILIBRIUM FACTOR	PRECURSOR ACTIVITY (Ci)	NUCLIDE ACTIVITY (Ci)

NONE FOUND!

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

USER-SPECIFIED SOURCE INVENTORY

NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)
KR 85M	1	2.5000E+04	I132	2	1.3000E+05	XE133M	1	2.6000E+04
KR 85	1	2.3400E+03	I133	2	1.9000E+05	XE133	1	1.8000E+05
KR 87	1	4.4000E+04	I134	2	2.1000E+05	XE135M	1	3.7000E+04
KR 88	1	6.4000E+04	I135	2	1.8000E+05	XE135	1	3.8000E+04
I131	2	9.0000E+04	XE131M	1	6.4000E+02	XE138	1	1.4000E+05

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

SOURCE INVENTORY FOLLOWING 8.000E+01 HOURS OF RADIOACTIVE GROWTH AND DECAY PRIOR TO RELEASE

NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)
KR 85M	1	1.0546E-01	I131	2	6.7522E+04	XE133M	1	1.0051E+04
KR 85	1	2.3389E+03	I132	2	4.3989E-06	XE133	1	1.4270E+05
KR 87	1	5.0790E-15	I133	2	1.3211E+04	XE135M	1	6.5636E+00
KR 88	1	2.1045E-04	I134	2	7.1090E-23	XE135	1	1.0583E+03
RB 87	3	1.3592E-10	I135	2	4.0978E+01	CS135	3	1.7093E-05
RB 88	3	2.3501E-04	XE131M	1	6.7958E+02	CS138	3	1.4703E-40

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

FINITE-CLOUD CORRECTION FACTORS FOR GAMMA RADIATION EXPOSURES

NUCLIDE	COMPARTMENT A HEMISPHE. CLOUD RADIUS= .00 M	COMPARTMENT B SPHERICAL CLOUD RADIUS= .00 M	COMPARTMENT C HEMISPHE. CLOUD RADIUS= 14.93 M	
KR 85M	.000E+00	.000E+00	5.616E-02	
KR 85	.000E+00	.000E+00	5.288E-02	
KR 87	.000E+00	.000E+00	4.368E-02	
KR 88	.000E+00	.000E+00	4.271E-02	
RB 88	.000E+00	.000E+00	4.394E-02	
I131	.000E+00	.000E+00	5.415E-02	
I132	.000E+00	.000E+00	5.091E-02	
I133	.000E+00	.000E+00	5.208E-02	
I134	.000E+00	.000E+00	4.966E-02	
I135	.000E+00	.000E+00	4.634E-02	
XE131M	.000E+00	.000E+00	3.480E-01	
XE133M	.000E+00	.000E+00	1.995E-01	
XE133	.000E+00	.000E+00	9.405E-02	
XE135M	.000E+00	.000E+00	5.625E-02	
XE135	.000E+00	.000E+00	5.194E-02	
MURPHY/CAMPE	.000E+00	.000E+00	5.660E-02	(0.733 MEV - INFORMATION ONLY)

PURE BETA EMITTERS AND RADIONUCLIDES WITH UNDEFINED GAMMA SPECTRA ARE EXCLUDED FROM THE ABOVE LIST.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SEC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

T = .0000E+00 hrs DISTRIBUTION OF RADIOACTIVITY

NUCLIDE	COMPARTM. A (Ci/m3)	CHEM-SPRAY IN COMP. A (Ci)	REC.FILTER IN COMP. A (Ci)	COMPARTM. B (Ci/m3)	REC.FILTER IN COMP. B (Ci)	EXH.FILTER TO ATMOSP. (Ci)	COMPARTM. C (Ci/m3)	INT.FILTER TO COMP. C (Ci)	REC.FILTER IN COMP. C (Ci)
KR 85M	1.055E-01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 85	2.339E+03	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 87	5.079E-15	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 88	2.105E-04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I131	6.752E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I132	4.399E-08	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I133	1.321E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I134	7.109E-25	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I135	4.098E-01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE131M	6.796E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE133M	1.005E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE133	1.427E+05	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE135M	6.564E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE135	1.058E+03	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
TOTALS									
GROUP 1	1.568E+05	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GROUP 2	8.077E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GROUP 3	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GRND.TOT	1.576E+05	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

THE COMPARTMENT VOLUMES (A, B AND C) IN THIS TABLE ARE: 1.000E+00 .000E+00 6.966E+03 (m3)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

T = .0000E+00 hrs RELEASE RATES TO ATMOSPHERE, INTERVAL RELEASES FROM .0000E+00 TO .0000E+00 hrs,
CUMULATIVE RELEASES FROM 0.0 TO .0000E+00 hrs, AND RADIOACTIVE-CLOUD CONCENTRATIONS

	WITHOUT DECAY IN TRANSIT				WITH .000E+00 hrs IN-TRANSIT DECAY			
NUCLIDE	REL. RATE (Ci/hr)	INTRV REL (Ci)	CUML. REL (Ci)	CLOUD CONC (Ci/m3)	REL. RATE (Ci/hr)	INTRV REL (Ci)	CUML. REL (Ci)	CLOUD CONC (Ci/m3)
KR 85M	2.109E+00	.000E+00	.000E+00	4.631E-07	2.109E+00	.000E+00	.000E+00	4.631E-07
KR 85	4.678E+04	.000E+00	.000E+00	1.027E-02	4.678E+04	.000E+00	.000E+00	1.027E-02
KR 87	1.016E-13	.000E+00	.000E+00	2.231E-20	1.016E-13	.000E+00	.000E+00	2.231E-20
KR 88	4.209E-03	.000E+00	.000E+00	9.242E-10	4.209E-03	.000E+00	.000E+00	9.242E-10
I131	1.350E+04	.000E+00	.000E+00	2.965E-03	1.350E+04	.000E+00	.000E+00	2.965E-03
I132	8.798E-07	.000E+00	.000E+00	1.932E-13	8.798E-07	.000E+00	.000E+00	1.932E-13
I133	2.642E+03	.000E+00	.000E+00	5.802E-04	2.642E+03	.000E+00	.000E+00	5.802E-04
I134	1.422E-23	.000E+00	.000E+00	3.122E-30	1.422E-23	.000E+00	.000E+00	3.122E-30
I135	8.196E+00	.000E+00	.000E+00	1.800E-06	8.196E+00	.000E+00	.000E+00	1.800E-06
XE131M	1.359E+04	.000E+00	.000E+00	2.984E-03	1.359E+04	.000E+00	.000E+00	2.984E-03
XE133M	2.010E+05	.000E+00	.000E+00	4.414E-02	2.010E+05	.000E+00	.000E+00	4.414E-02
XE133	2.854E+06	.000E+00	.000E+00	6.267E-01	2.854E+06	.000E+00	.000E+00	6.267E-01
XE135M	1.313E+02	.000E+00	.000E+00	2.883E-05	1.313E+02	.000E+00	.000E+00	2.883E-05
XE135	2.117E+04	.000E+00	.000E+00	4.648E-03	2.117E+04	.000E+00	.000E+00	4.648E-03
TOTALS								
GROUP 1	3.137E+06	.000E+00	.000E+00	6.888E-01	3.137E+06	.000E+00	.000E+00	6.888E-01
GROUP 2	1.615E+04	.000E+00	.000E+00	3.547E-03	1.615E+04	.000E+00	.000E+00	3.547E-03
GROUP 3	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GRND.TOT	3.153E+06	.000E+00	.000E+00	6.923E-01	3.153E+06	.000E+00	.000E+00	6.923E-01

NOTE: THE ATMOSPHERIC CONCENTRATION OF RADIOACTIVITY IS BASED ON A DISPERSION FACTOR (X/Q) OF 7.905E-04 (sec/m3)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (CONTINUOUS OCCUPANCY)
COMPARTMENT C

T (hours)	Beta Air DOSE RATE (rad/hr)	Beta Air INTVL DOS (rad)	Beta Air CUM. DOSE (rad)	Gamma Air DOSE RATE (rad/hr)	Gamma Air INTVL DOS (rad)	Gamma Air CUM. DOSE (rad)	Tot. Skin DOSE RATE (rem/hr)	Tot. Skin INTVL DOS (rem)	Tot. Skin CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.193E+00	5.554E-01	5.554E-01	1.905E-02	8.871E-03	8.871E-03	2.289E-01	1.066E-01	1.066E-01
1.0000E+00	1.105E+00	5.742E-01	1.130E+00	1.764E-02	9.168E-03	1.804E-02	2.119E-01	1.102E-01	2.168E-01
2.0000E+00	9.486E-01	1.025E+00	2.155E+00	1.513E-02	1.635E-02	3.439E-02	1.816E-01	1.964E-01	4.132E-01
8.0000E+00	3.796E-01	3.726E+00	5.881E+00	6.032E-03	5.934E-02	9.373E-02	7.208E-02	7.107E-01	1.124E+00
2.4000E+01	3.367E-02	2.276E+00	8.159E+00	5.313E-04	3.611E-02	1.298E-01	6.306E-03	4.303E-01	1.554E+00
9.6000E+01	5.728E-05	2.317E-01	8.391E+00	1.050E-06	3.662E-03	1.335E-01	1.108E-05	4.327E-02	1.598E+00
7.2000E+02	1.057E-06	3.446E-03	8.394E+00	2.569E-08	7.621E-05	1.336E-01	2.395E-07	7.388E-04	1.598E+00

T (hours)	Gonads DOSE RATE (rem/hr)	Gonads INTVL DOS (rem)	Gonads CUM. DOSE (rem)	Breast DOSE RATE (rem/hr)	Breast INTVL DOS (rem)	Breast CUM. DOSE (rem)	Lungs DOSE RATE (rem/hr)	Lungs INTVL DOS (rem)	Lungs CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.027E-02	4.782E-03	4.782E-03	1.273E-02	5.927E-03	5.927E-03	1.279E-02	5.959E-03	5.959E-03
1.0000E+00	9.508E-03	4.941E-03	9.724E-03	1.179E-02	6.125E-03	1.205E-02	1.184E-02	6.154E-03	1.211E-02
2.0000E+00	8.137E-03	8.804E-03	1.853E-02	1.007E-02	1.090E-02	2.296E-02	9.755E-03	1.076E-02	2.287E-02
8.0000E+00	3.215E-03	3.178E-02	5.030E-02	3.943E-03	3.914E-02	6.210E-02	3.245E-03	3.520E-02	5.807E-02
2.4000E+01	2.808E-04	1.917E-02	6.948E-02	3.418E-04	2.343E-02	8.553E-02	2.386E-04	1.795E-02	7.602E-02
9.6000E+01	4.872E-07	1.929E-03	7.141E-02	6.045E-07	2.348E-03	8.788E-02	3.714E-07	1.611E-03	7.764E-02
7.2000E+02	8.754E-09	2.883E-05	7.143E-02	1.153E-08	3.716E-05	8.792E-02	5.115E-09	1.877E-05	7.765E-02

T (hours)	R.Marrow DOSE RATE (rem/hr)	R.Marrow INTVL DOS (rem)	R.Marrow CUM. DOSE (rem)	Bone Sur DOSE RATE (rem/hr)	Bone Sur INTVL DOS (rem)	Bone Sur CUM. DOSE (rem)	Thyroid DOSE RATE (rem/hr)	Thyroid INTVL DOS (rem)	Thyroid CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	7.276E-03	3.390E-03	3.390E-03	3.119E-02	1.453E-02	1.453E-02	1.655E+00	7.703E-01	7.703E-01
1.0000E+00	6.736E-03	3.501E-03	6.891E-03	2.890E-02	1.501E-02	2.954E-02	1.534E+00	7.970E-01	1.567E+00
2.0000E+00	5.739E-03	6.224E-03	1.311E-02	2.476E-02	2.677E-02	5.632E-02	1.176E+00	1.347E+00	2.914E+00
8.0000E+00	2.223E-03	2.220E-02	3.532E-02	9.842E-03	9.696E-02	1.533E-01	2.386E-01	3.524E+00	6.439E+00
2.4000E+01	1.903E-04	1.315E-02	4.846E-02	8.663E-04	5.888E-02	2.121E-01	3.571E-03	8.890E-01	7.328E+00
9.6000E+01	3.077E-07	1.303E-03	4.977E-02	1.410E-06	5.954E-03	2.181E-01	4.477E-07	1.422E-02	7.342E+00
7.2000E+02	4.348E-09	1.578E-05	4.978E-02	2.030E-08	7.307E-05	2.182E-01	7.490E-09	2.535E-05	7.342E+00

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (CONTINUOUS OCCUPANCY)
COMPARTMENT C

T (hours)	Remaindr DOSE RATE (rem/hr)	Remaindr INTVL DOS (rem)	Remaindr CUM. DOSE (rem)	Eff D.E. DOSE RATE (rem/hr)	Eff D.E. INTVL DOS (rem)	Eff D.E. CUM. DOSE (rem)	TID Thy DOSE RATE (rem/hr)	TID Thy INTVL DOS (rem)	TID Thy CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	8.357E-03	3.893E-03	3.893E-03	6.000E-02	2.793E-02	2.793E-02	2.298E+00	1.070E+00	1.070E+00
1.0000E+00	7.738E-03	4.022E-03	7.914E-03	5.562E-02	2.889E-02	5.682E-02	2.130E+00	1.106E+00	2.176E+00
2.0000E+00	6.588E-03	7.147E-03	1.506E-02	4.342E-02	4.926E-02	1.061E-01	1.630E+00	1.869E+00	4.045E+00
8.0000E+00	2.548E-03	2.547E-02	4.053E-02	1.028E-02	1.371E-01	2.431E-01	3.278E-01	4.871E+00	8.916E+00
2.4000E+01	2.181E-04	1.506E-02	5.558E-02	3.724E-04	4.505E-02	2.882E-01	4.575E-03	1.210E+00	1.013E+01
9.6000E+01	3.552E-07	1.493E-03	5.708E-02	4.575E-07	2.243E-03	2.904E-01	2.148E-11	1.715E-02	1.014E+01
7.2000E+02	5.191E-09	1.856E-05	5.710E-02	7.451E-09	2.549E-05	2.905E-01	.000E+00	8.072E-11	1.014E+01

T (hours)	RG1109WB DOSE RATE (rem/hr)	RG1109WB INTVL DOS (rem)	RG1109WB CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.625E-02	7.567E-03	7.567E-03
1.0000E+00	1.505E-02	7.821E-03	1.539E-02
2.0000E+00	1.291E-02	1.395E-02	2.934E-02
8.0000E+00	5.148E-03	5.063E-02	7.997E-02
2.4000E+01	4.540E-04	3.083E-02	1.108E-01
9.6000E+01	7.405E-07	3.119E-03	1.139E-01
7.2000E+02	1.072E-08	3.850E-05	1.140E-01

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

OVERALL SUMMARY - TOTAL RADIATION EXPOSURES (AS APPLICABLE) FOR SCENARIO DURATION (7.2000E+02 hrs)

CONTINUOUS OCCUPANCY

RECEPTOR/ORGAN	COMPARTMENT A (Hemispher)	COMPARTMENT B (Spherical)	COMPARTMENT C (Hemispher)	OFFSITE RECEP.
Beta Air (rad)	.000E+00	.000E+00	8.394E+00	.000E+00
Gamma Air (rad)	.000E+00	.000E+00	1.336E-01	.000E+00
Tot. skin (rem)	.000E+00	.000E+00	1.598E+00	.000E+00
[Beta Cont. (%)]	[.00]	[.00]	[94.07]	[.00]
Gonads (rem)	.000E+00	.000E+00	7.143E-02	.000E+00
Breast (rem)	.000E+00	.000E+00	8.792E-02	.000E+00
Lungs (rem)	.000E+00	.000E+00	7.765E-02	.000E+00
[Inhalation (%)]	[.00]	[.00]	[24.97]	[.00]
R.Marrow (rem)	.000E+00	.000E+00	4.978E-02	.000E+00
Bone Sur (rem)	.000E+00	.000E+00	2.182E-01	.000E+00
Thyroid (rem)	.000E+00	.000E+00	7.342E+00	.000E+00
[Inhalation (%)]	[.00]	[.00]	[99.09]	[.00]
Remaindr (rem)	.000E+00	.000E+00	5.710E-02	.000E+00
Eff D.E. (rem)	.000E+00	.000E+00	2.905E-01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[76.40]	[.00]
TID Thy (rem)	.000E+00	.000E+00	1.014E+01	.000E+00
RG1109WB (rem)	.000E+00	.000E+00	1.140E-01	.000E+00

The Dose Conversion Factors (DCFs) employed by ELISA-2 are from EPA 520/1-88-020 and EPA 402-R-93-081 (Federal Guidance Reports 11 and 12), except for TID Thy and RG1109WB, which are as follows:

TID Thy = Classical thyroid inhalation dose based on the TID-14844 DCFs (iodines only)
RG1109WB = Classical whole body immersion dose based on the Reg. Guide 1.109 DCFs (nobles and halogens only)

The beta dose to air is for immersion in an infinite cloud.

The skin dose includes contributions from gamma radiation (finite cloud), beta radiation (semi-infinite cloud) and ground contamination. The skin beta-contribution percentages exclude ground contamination.

Finite-cloud correction, if any, is nuclide specific.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (PARTIAL OCCUPANCY)
COMPARTMENT C

T (hours)	Beta Air DOSE RATE (rad/hr)	Beta Air INTVL DOS (rad)	Beta Air CUM. DOSE (rad)	Gamma Air DOSE RATE (rad/hr)	Gamma Air INTVL DOS (rad)	Gamma Air CUM. DOSE (rad)	Tot. Skin DOSE RATE (rem/hr)	Tot. Skin INTVL DOS (rem)	Tot. Skin CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.193E+00	5.554E-01	5.554E-01	1.905E-02	8.871E-03	8.871E-03	2.289E-01	1.066E-01	1.066E-01
1.0000E+00	1.105E+00	5.742E-01	1.130E+00	1.764E-02	9.168E-03	1.804E-02	2.119E-01	1.102E-01	2.168E-01
2.0000E+00	9.486E-01	1.025E+00	2.155E+00	1.513E-02	1.635E-02	3.439E-02	1.816E-01	1.964E-01	4.132E-01
8.0000E+00	3.796E-01	3.726E+00	5.881E+00	6.032E-03	5.934E-02	9.373E-02	7.208E-02	7.107E-01	1.124E+00
2.4000E+01	3.367E-02	2.278E+00	8.159E+00	5.313E-04	3.611E-02	1.298E-01	6.306E-03	4.303E-01	1.554E+00
9.6000E+01	5.728E-05	2.317E-01	8.391E+00	1.050E-06	3.662E-03	1.335E-01	1.108E-05	2.596E-02	1.580E+00
7.2000E+02	1.057E-06	3.446E-03	8.394E+00	2.569E-08	7.621E-05	1.336E-01	2.395E-07	2.955E-04	1.581E+00

T (hours)	Gonads DOSE RATE (rem/hr)	Gonads INTVL DOS (rem)	Gonads CUM. DOSE (rem)	Breast DOSE RATE (rem/hr)	Breast INTVL DOS (rem)	Breast CUM. DOSE (rem)	Lungs DOSE RATE (rem/hr)	Lungs INTVL DOS (rem)	Lungs CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.027E-02	4.782E-03	4.782E-03	1.273E-02	5.927E-03	5.927E-03	1.279E-02	5.959E-03	5.959E-03
1.0000E+00	9.508E-03	4.941E-03	9.724E-03	1.179E-02	6.125E-03	1.205E-02	1.184E-02	6.154E-03	1.211E-02
2.0000E+00	8.137E-03	8.804E-03	1.853E-02	1.007E-02	1.090E-02	2.296E-02	9.755E-03	1.076E-02	2.287E-02
8.0000E+00	3.215E-03	3.178E-02	5.030E-02	3.943E-03	3.914E-02	6.210E-02	3.245E-03	3.520E-02	5.807E-02
2.4000E+01	2.808E-04	1.917E-02	6.948E-02	3.418E-04	2.343E-02	8.553E-02	2.386E-04	1.795E-02	7.602E-02
9.6000E+01	4.872E-07	1.157E-03	7.063E-02	6.045E-07	1.409E-03	8.694E-02	3.714E-07	9.666E-04	7.699E-02
7.2000E+02	8.754E-09	1.153E-05	7.065E-02	1.153E-08	1.486E-05	8.696E-02	5.115E-09	7.506E-06	7.700E-02

T (hours)	R.Marrow DOSE RATE (rem/hr)	R.Marrow INTVL DOS (rem)	R.Marrow CUM. DOSE (rem)	Bone Sur DOSE RATE (rem/hr)	Bone Sur INTVL DOS (rem)	Bone Sur CUM. DOSE (rem)	Thyroid DOSE RATE (rem/hr)	Thyroid INTVL DOS (rem)	Thyroid CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	7.276E-03	3.390E-03	3.390E-03	3.119E-02	1.453E-02	1.453E-02	1.655E+00	7.703E-01	7.703E-01
1.0000E+00	6.736E-03	3.501E-03	6.891E-03	2.890E-02	1.501E-02	2.954E-02	1.534E+00	7.970E-01	1.567E+00
2.0000E+00	5.739E-03	6.224E-03	1.311E-02	2.476E-02	2.677E-02	5.632E-02	1.176E+00	1.347E+00	2.914E+00
8.0000E+00	2.223E-03	2.220E-02	3.532E-02	9.842E-03	9.696E-02	1.533E-01	2.386E-01	3.524E+00	6.439E+00
2.4000E+01	1.903E-04	1.315E-02	4.846E-02	8.663E-04	5.888E-02	2.121E-01	3.571E-03	8.890E-01	7.328E+00
9.6000E+01	3.077E-07	7.816E-04	4.924E-02	1.410E-06	3.573E-03	2.157E-01	4.477E-07	8.534E-03	7.336E+00
7.2000E+02	4.348E-09	6.310E-06	4.925E-02	2.030E-08	2.923E-05	2.158E-01	7.490E-09	1.014E-05	7.336E+00

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (PARTIAL OCCUPANCY)
COMPARTMENT C

T (hours)	Remaindr DOSE RATE (rem/hr)	Remaindr INTVL DOS (rem)	Remaindr CUM. DOSE (rem)	Eff D.E. DOSE RATE (rem/hr)	Eff D.E. INTVL DOS (rem)	Eff D.E. CUM. DOSE (rem)	TID Thy DOSE RATE (rem/hr)	TID Thy INTVL DOS (rem)	TID Thy CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	8.357E-03	3.893E-03	3.893E-03	6.000E-02	2.793E-02	2.793E-02	2.298E+00	1.070E+00	1.070E+00
1.0000E+00	7.736E-03	4.022E-03	7.914E-03	5.562E-02	2.889E-02	5.682E-02	2.130E+00	1.106E+00	2.176E+00
2.0000E+00	6.586E-03	7.147E-03	1.506E-02	4.342E-02	4.926E-02	1.061E-01	1.630E+00	1.869E+00	4.045E+00
8.0000E+00	2.548E-03	2.547E-02	4.053E-02	1.028E-02	1.371E-01	2.431E-01	3.278E-01	4.871E+00	8.916E+00
2.4000E+01	2.181E-04	1.506E-02	5.558E-02	3.724E-04	4.505E-02	2.882E-01	4.575E-03	1.210E+00	1.013E+01
9.6000E+01	3.552E-07	8.960E-04	5.648E-02	4.575E-07	1.346E-03	2.895E-01	2.148E-11	1.029E-02	1.014E+01
7.2000E+02	5.191E-09	7.426E-06	5.649E-02	7.451E-09	1.020E-05	2.896E-01	.000E+00	3.229E-11	1.014E+01

T (hours)	RG1109WB DOSE RATE (rem/hr)	RG1109WB INTVL DOS (rem)	RG1109WB CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.625E-02	7.567E-03	7.567E-03
1.0000E+00	1.505E-02	7.821E-03	1.539E-02
2.0000E+00	1.291E-02	1.395E-02	2.934E-02
8.0000E+00	5.148E-03	5.063E-02	7.997E-02
2.4000E+01	4.540E-04	3.083E-02	1.108E-01
9.6000E+01	7.405E-07	1.872E-03	1.127E-01
7.2000E+02	1.072E-08	1.540E-05	1.127E-01

CASE# 1 SB - OPEN CONT. PHA; CR AUTO ISOL; 1 FAN OP; 1 CFM LEAKAGE; SBC-669-D2; RG 1.25 (INSTANTANEOUS RELEASE FROM SOURCE)

OVERALL SUMMARY - TOTAL RADIATION EXPOSURES (AS APPLICABLE) FOR SCENARIO DURATION (7.2000E+02 hrs)

PARTIAL OCCUPANCY

RECEPTOR/ORGAN	COMPARTMENT A (Hemispher)	COMPARTMENT B (Spherical)	COMPARTMENT C (Hemispher)	OFFSITE RECEP.
Beta Air (rad)	.000E+00	.000E+00	8.394E+00	.000E+00
Gamma Air (rad)	.000E+00	.000E+00	1.336E-01	.000E+00
Tot. skin (rem)	.000E+00	.000E+00	1.581E+00	.000E+00
[Beta Cont. (%)]	[.00]	[.00]	[94.08]	[.00]
Gonads (rem)	.000E+00	.000E+00	7.065E-02	.000E+00
Breast (rem)	.000E+00	.000E+00	8.696E-02	.000E+00
Lungs (rem)	.000E+00	.000E+00	7.700E-02	.000E+00
[Inhalation (%)]	[.00]	[.00]	[25.17]	[.00]
R.Marrow (rem)	.000E+00	.000E+00	4.925E-02	.000E+00
Bone Sur (rem)	.000E+00	.000E+00	2.158E-01	.000E+00
Thyroid (rem)	.000E+00	.000E+00	7.336E+00	.000E+00
[Inhalation (%)]	[.00]	[.00]	[99.10]	[.00]
Remaindr (rem)	.000E+00	.000E+00	5.649E-02	.000E+00
Eff D.E. (rem)	.000E+00	.000E+00	2.896E-01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[76.59]	[.00]
TID Thy (rem)	.000E+00	.000E+00	1.014E+01	.000E+00
RG1109WB (rem)	.000E+00	.000E+00	1.127E-01	.000E+00

The Dose Conversion Factors (DCFs) employed by ELISA-2 are from EPA 520/1-88-020 and EPA 402-R-93-081 (Federal Guidance Reports 11 and 12), except for TID Thy and RG1109WB, which are as follows:

TID Thy = Classical thyroid inhalation dose based on the TID-14844 DCFs (iodines only)
RG1109WB = Classical whole body immersion dose based on the Reg. Guide 1.109 DCFs (nobles and halogens only)

The beta dose to air is for immersion in an infinite cloud.

The skin dose includes contributions from gamma radiation (finite cloud), beta radiation (semi-infinite cloud) and ground contamination. The skin beta-contribution percentages exclude ground contamination.

Finite-cloud correction, if any, is nuclide specific.

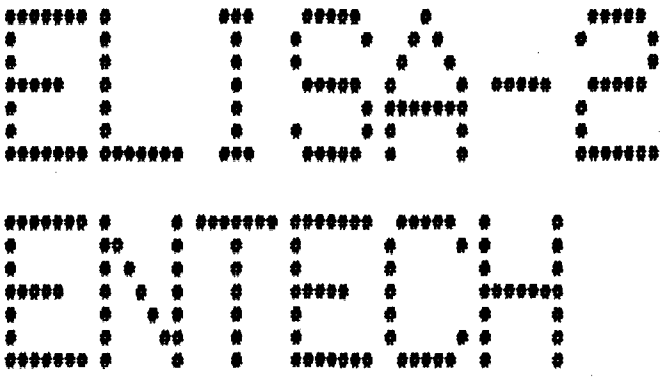
Partial occupancy has been applied only to human exposures in Compartment C.

********** END OF THIS CASE **********

ELISA-2 RUN CASE B

```
**********************************************************************
**            FRAMATOME ANP SOFTWARE CONTROL LIBRARY                **
**********************************************************************
**                                                                  **
**  SCL ITEM           :  elisa2-2                                  **
**  SCL FILE           :  /SCL/elisa2-2.2/elisa2_2.e                **
**  SCL VER/MOD LEVEL  :  02 / 02                                   **
**  DESCRIPTION        :  CSI: ELISA2 02/02 - A computer code for the
**  evaluation of licensing and severe accidents at LWRs.           **
**  INSTALLED DATE     :  04/17/03                                  **
**  SAFETY CODE        :  Y                                         **
**  VALIDATION DOC. #  :                                            **
**  CODE SPONSOR       :  DISTEFANO JOHN                            **
**  TODAY'S DATE       :  08/02/03                                  **
**  CURRENT TIME       :  14:18:53 EDT                              **
**                                                                  **
**  HP-UX alpha1 B.10.20 A 9000/785 2010238544 tw                   **
**                                                                  **
**********************************************************************
**********************************************************************

**********************************************************************
**            FRAMATOME ANP SOFTWARE CONTROL LIBRARY                **
**********************************************************************
**                                                                  **
**  SCL ITEM           :  elisa2.lib                                **
**  SCL FILE           :  /SCL/elisa2_v21/lib/elisa2.lib            **
**  SCL VER/MOD LEVEL  :  01 / 00                                   **
**  DESCRIPTION        :  Elisa2 Data Library   **
**     **
**  INSTALLED DATE     :  06/01/01                                  **
**  SAFETY CODE        :  Y                                         **
**  VALIDATION DOC. #  :                                            **
**  CODE SPONSOR       :  DISTEFANO JOHN                            **
**  TODAY'S DATE       :  08/02/03                                  **
**  CURRENT TIME       :  14:18:53 EDT                              **
**                                                                  **
**  HP-UX alpha1 B.10.20 A 9000/785 2010238544 tw                   **
**                                                                  **
**********************************************************************
**********************************************************************
```



ENTECH ENGINEERING, INC., WESTBOROUGH, MA

RELEASE VERSION/LEVEL..: Version 2.2
RELEASE DATE .....: May 23,2002

PROBLEM SUBMITTED ON ..: 2-Aug-03 14:18:53

INPUT FILE .....: elisa2-B.inp
DATA LIBRARY FILE .....: /SCL/elisa2-2.2/elisa2.lib
OUTPUT FILE .....: elisa2-B.el2
PHOTON SPECTRA FILE #1 : elisa2-B.el3
PHOTON SPECTRA FILE #2 : elisa2-B.el4

INPUT DATA LISTING

```
Line            1         2         3         4         5         6         7         8         9        10        11        12
Seq.    12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

  1     SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195
  2     10002     4         6         8         1         0         NNYNYY    N         NNNN      YYYYYY
  3     10003     0         1.0       80.0      0.0       1.000E-02
  4     10004     3         0         0
  5        1      1.000E+00 0.0       0.0       XE        KR
  6        2      2.500E-03 2.500E-03 0.00      I         BR
  7        3      0.0       0.0       0.0       ZZ
  8     10005     4         Filter efficiencies
  9        2      1         0.0       0.0       9.500E-01 0.0       9.500E-01
 10        2      2         0.0       0.0       9.500E-01 0.0       9.500E-01
 11        2      3         0.0       0.0       9.900E-01 0.0       9.900E-01
 12        3      0         0.0       0.0       9.900E-01 0.0       9.900E-01
 13     10006     0.0       0.0       Peak assembly gap activity (Ci), based on UFSAR Table 15.7-20
 14      I131     7.200E+04 I132      6.500E+04 I133      9.500E+04 I134      1.050E+05
 15      I135     9.000E+04 KR85M     1.250E+04 KR85      7.800E+02 KR87      2.200E+04
 16      KR88     3.200E+04 XE131M    3.200E+02 XE133M    1.300E+04 XE133     9.000E+04
 17      XE135M   1.850E+04 XE135     1.900E+04 XE138     7.000E+04
 18     10007     2         0.0       480.0     0.0       0.0       0.0       0.0       CONTAINMENT
 19     10009     2         2.460E+05 724.0     500.0     0.0       0.0       0.0       CONTROL-ROOM
 20     10010     5
 21      0.0      5.000E-01 1.000E+00 2.000E+00 7.200E+02
 22     10017     2  Control room recirc rate multiplier
 23      0.0      0.0       1.0       1.0
 24     10018     6  Control room composite X/Q (sec/m3)
 25      0.0      1.349E-03 1.0       1.017E-03 2.0       6.374E-04 8.0       4.401E-04
 26      24.0     2.939E-04 96.0      2.115E-04

 27     10021     1  Breathing rate (m3/sec)
 28      0.0      3.500E-04
 29     10023     6  Control room intake filter bypass fraction
 30      0.0      5.179E-01 1.0       5.355E-01 2.0       5.482E-01 8.0       5.603E-01
 31      24.0     5.700E-01 96.0      6.082E-01
 32     10024     3  Occupancy factors
 33      0.0      1.0       24.000    6.000E-01 96.000    4.000E-01
 34     99999
```

DATA LIBRARY PARTIAL LISTING

```
Line            1         2         3         4         5         6         7         8         9        10        11        12
Seq.    1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

  1     ELISA-2 DATA LIBRARY - BASED ON ORIGEN-2 AND FEDERAL GUIDANCE REPORTS 11 AND 12                                    V2L1     1
  2     RELEASE DATE: 1/13/99                                                                                             V2L1     2
  3     REMARKS (START)                                                                                                   V2L1     3
  4         Source inventories are in Ci for the power level specified for each plant.                                    V2L1     4
  5         Decay constants are in inverse hours.                                                                         V2L1     5
  6         The entry line following the decay chains includes the decay constants                                        V2L1     6
  7           for each of three members [parent (P), daugher (D) and granddaughter                                        V2L1     7
  8           (G)], and the branching fractions (P-D), (D-G) and (P-G).                                                   V2L1     8
  9         Air immersion DCFs are in [((Sv or Gy))/s)/(Bq/m3)], for semi-infinite cloud                                  V2L1     9
 10         Ground-shine  DCFs are in [((Sv or Gy))/s)/(Bq/m2)] (surface contamination).                                  V2L1    10
 11         Inhalation DCFs are in [Sv/Bq)].                                                                              V2L1    11
 12         The inhalation DCF's are for the Lung Clearance Class which yields the                                        V2L1    12
 13           highest Effective Dose Equivalent (Eff D.E.); the class is identified.                                      V2L1    13
 14         Negative DCF entries imply 'data not available'.                                                              V2L1    14
 15         ORGAN 'TID Thy' = Thyroid inhalation based on TID-14844 - Iodines only.                                       V2L1    15
 16         ORGAN 'RG1109WB' = Whole body gamma dose using the Reg. Guide 1.109 DCFs.                                     V2L1    16
 17         Skin DCFs are included along with the organ DCFs, but skin is not                                             V2L1    17
 18           considered as an organ.                                                                                     V2L1    18
 19     READ FORMATS FOR THE RADIONUCLIDE DATA BASE                                                                       V2L1    19
 20     Line    1     Nuclide name and source inventories          (4x,a6,10x,4e12.3)                                     V2L1    20
 21                   (Note:  Nuclide sequence No. is not used)                                                           V2L1    21
 22     Line    2     Header                                      (a80)                                                  V2L1    22
 23     Line    3     Decay chain (3 members)                     (9x,3(a6,6x))                                          V2L1    23
 24     Line    4     Decay constants & branching fractions       (8x,6e12.3)                                            V2L1    24
 25     Line    5     Header                                      (a80)                                                  V2L1    25
 26     Lines  6-9    18 ORIGEN-2 photons and 1 ICRP-38 beta      (8x,6e12.3)                                            V2L1    26
 27     Line   10     Header                                      (a80)                                                  V2L1    27
 28     Lines 11-16   Dose conversion factors                     (8x,6e12.3)                                            V2L1    28
 29     END REMARKS                                                                                                       V2L1    29
 30     GENERAL DATA BASE                                                                                                 V2L1    30
 31        10       [ORGAN NAMES - READ FORMAT (11x,6(a8,4x))]                                                           V2L1    31
 32                 Gonads      Breast      Lungs       R.Marrow    Bone Sur    Thyroid                                V2L1    32
 33                 Remaindr    Eff D.E.    TID Thy     RG1109WB    (Skin)                                             V2L1    33
 34          4      [Power plants and power levels (MWt) - READ FORMAT (11x,a20,1x,e12.3)                                V2L1    34
 35                 PWR (33 GWD/MT 3.2%)    1.000E+00                                                                  V2L1    35
 36                 PWR (50 GWD/MT 4.2%)    1.000E+00                                                                  V2L1    36
 37                 BWR (27.5 GWD/MT 3%)    1.000E+00                                                                  V2L1    37
 38                 BWR (40 GWD/MT 3.4%)    1.000E+00                                                                  V2L1    38
 39         18      [ORIGEN-2 upper limit energy in each gamma group (MeV) (8x,6e12.3)]                                  V2L1    39
 40                 2.000E-02   3.000E-02   4.500E-02   7.000E-02   1.000E-01   1.500E-01                              V2L1    40
 41                 3.000E-01   4.500E-01   7.000E-01   1.000E+00   1.500E+00   2.000E+00                              V2L1    41
 42                 2.500E+00   3.000E+00   4.000E+00   6.000E+00   8.000E+00   1.100E+01                              V2L1    42
 43          3      Factors to convert data library DCFs to proper units, as shown                                       V2L1    43
 44                 1.0         Convert air immersion DCF to [((Sv or Gy)/s)/(Bq/m3)]                                  V2L1    44
 45                 1.0         Convert ground shine  DCF to [((Sv or Gy)/s)/(Bq/m2)]                                  V2L1    45
 46                 1.0         Convert inhalation DCF to [Sy/Bq]                                                      V2L1    46
 47         18      Air gamma DCF for semi-infinite monoener. cloud src [(Gy/s)/(Bq/m3)]                                  V2L1    47
 48                 6.676E-16   1.669E-15   2.503E-15   3.839E-15   5.674E-15   8.345E-15                              V2L1    48
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DATA LIBRARY PARTIAL LISTING

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Line            1         2         3         4         5         6         7         8         9        10        11        12
Seq.    12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

 49                1.502E-14 2.503E-14 3.839E-14 5.674E-14 8.345E-14 1.168E-13 V2L1  49
 50                1.502E-13 1.836E-13 2.337E-13 3.338E-13 4.673E-13 6.342E-13 V2L1  50
 51       18       Air gamma DCF for monoenerg. ground-surface source [(Gy/s)/(Bq/m2)]   V2L1  51
 52                1.829E-16 1.493E-16 9.835E-17 8.181E-17 9.767E-17 1.436E-16 V2L1  52
 53                2.760E-16 4.785E-16 7.318E-16 1.050E-15 1.457E-15 1.910E-15 V2L1  53
 54                2.325E-15 2.710E-15 3.243E-15 4.194E-15 5.386E-15 6.759E-15 V2L1  54
 55       18       Skin gamma DCF for semi-infinite monoener. cloud src [(Sv/s)/(Bq/m3)] V2L1  55
 56                1.138E-16 7.690E-16 1.467E-15 2.717E-15 4.416E-15 6.737E-15 V2L1  56
 57                1.239E-14 2.073E-14 3.193E-14 4.754E-14 7.108E-14 1.012E-13 V2L1  57
 58                1.317E-13 1.624E-13 2.089E-13 3.030E-13 4.305E-13 5.922E-13 V2L1  58
 59      RADIONUCLIDE DATA BASE                                                 V2L1  59
 60       1  H  3  (Src Ci)    1.471E+01 2.186E+01 1.744E+01 2.536E+01          V2L1  60
 61              Decay chain, decay constants and branching fractions           V2L1  61
 62               H  3                                                          V2L1  62
 63              6.40320E-06 0.00000E+00 0.00000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1  63
 64              ORIGEN-2 18-group phot/dis, and ICRP-38 betas (MeV/dis)        V2L1  64
 65                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1  65
 66                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1  66
 67                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1  67
 68                5.600E-03                                                    V2L1  68
 69              ICRP-38 Organ DCFs - Air immer, Grnd shine, Inhal/Class V      V2L1  69
 70                0.000E+00 0.000E+00 2.750E-18 0.000E+00 0.000E+00 0.000E+00 V2L1  70
 71                0.000E+00 3.310E-19 0.000E+00 0.000E+00 0.000E+00          V2L1  71
 72                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1  72
 73                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00          V2L1  73
 74                1.730E-11 1.730E-11 1.730E-11 1.730E-11 1.730E-11 1.730E-11 V2L1  74
 75                1.730E-11 1.730E-11 0.000E+00 0.000E+00                    V2L1  75
 76       2  C 14  (Src Ci)    3.125E-06 4.723E-06 3.772E-06 5.467E-06          V2L1  76
 77              Decay chain, decay constants and branching fractions           V2L1  77
 78               C 14                                                          V2L1  78
 79              1.38016E-08 0.00000E+00 0.00000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1  79
 80              ORIGEN-2 18-group phot/dis, and ICRP-38 betas (MeV/dis)        V2L1  80
 81                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1  81
 82                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1  82
 83                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1  83
 84                4.940E-02                                                    V2L1  84
 85              ICRP-38 Organ DCFs - Air immer, Grnd shine, Inhal/Class c      V2L1  85
 86                2.590E-19 3.520E-19 1.530E-19 1.210E-19 7.060E-19 2.190E-19 V2L1  86
 87                1.540E-19 2.240E-19 0.000E+00 0.000E+00 2.430E-16          V2L1  87
 88                2.220E-20 2.520E-20 8.650E-21 7.250E-21 4.630E-20 1.250E-20 V2L1  88
 89                1.030E-20 1.610E-20 0.000E+00 0.000E+00 7.460E-20          V2L1  89
 90                5.640E-10 5.640E-10 5.640E-10 5.640E-10 5.640E-10 5.640E-10 V2L1  90
 91                5.640E-10 5.640E-10 0.000E+00 0.000E+00                    V2L1  91
 92       3  N 13  (Src Ci)    0.000E+00 0.000E+00 0.000E+00 0.000E+00          V2L1  92
```

(.... etc., for a total of 414 radionuclides ....)

CASE# 1 SB - OPEN CONT. PHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

LISTING OF INPUT DATA

PATHWAY OPTION = 4 (COMP. A --> COMP. C)

COMPARTMENT A: CONTAINMENT
FILTERED RECIRCULATION RATE (cfm) = .000E+00
LEAK RATE TO ATMOSPHERE (frac/day) = 4.800E+02

COMPARTMENT C: CONTROL-ROOM
TOTAL FREE AIR VOLUME (cu ft) = 2.460E+05
INTAKE AND EXHAUST RATES (cfm) = 7.240E+02
FILTERED RECIRCULATION RATE (cfm) = 5.000E+02

FILTER REMOVAL EFFICIENCIES AND TIME-DEPENDENT
MULTIPLIERS FOR RECIRCULATION RATES, LEAK RATES,
COMP. A FLOW BETWEEN SPRAYED AND UNSPRAYED AREAS,
AND FILTER BYPASS FRACTIONS ARE GIVEN BELOW.

NO. OF DISCRETE TIME VALUES IN INPUT = 8

INTERMEDIATE RESULTS WILL BE PRINTED AT THE FOLLOWING TIMES (hrs):

.0000E+00

PROBLEM END TIME (hours) = 7.2000E+02

RELEASE RATES AND DOSE RATES ARE PRIOR TO TIME-STEP CHANGES, IF ANY.

ONLY EXACT SOLUTION OF THE DIFFERENTIAL EQUATIONS WAS EMPLOYED IN
THE ANALYSIS.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

RECIRCULATION, EXHAUST AND INTAKE FILTER REMOVAL EFFICIENCIES (fractions)

NUCL.	COMPARTMENT A RECIRC.			COMPARTMENT B RECIRC.			COMPARTMENT C RECIRC.			EXHAUST TO ATMOSPHERE			INTAKE TO COMPART. C		
GROUP	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3
1	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2	.0000	.0000	.0000	.0000	.0000	.0000	.9500	.9500	.9900	.0000	.0000	.0000	.9500	.9500	.9900
3	.0000	.0000	.0000	.0000	.0000	.0000	.9900	.9900	.9900	.0000	.0000	.0000	.9900	.9900	.9900

USER-SPECIFIED CLASSIFICATION OF RADIONUCLIDES AND INSTANTANEOUS FRACTIONAL RELEASES FROM THE SOURCE (AT T=0)

GROUP	E L E M E N T S	FORM 1	FORM 2	FORM 3
1	XE KR	1.000E+00	.000E+00	.000E+00
2	I BR	2.500E-03	2.500E-03	.000E+00
3	ZE	.000E+00	.000E+00	.000E+00

ELEMENT "ZE" STANDS FOR THE REMAINING DATA-LIBRARY ELEMENTS/NUCLIDES NOT LISTED ABOVE, IF ANY.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

TIME INTERVAL (hours)	CONCENTR. X/Q (sec/m3)	GAMMA X/Q (sec/m3)	DEPOSITION D/Q (1/m2)	BREATHING RATE (m3/sec)	EXH.FILT. BYPASS FRACTION	COMPART. C INT.FILTER BYPASS FR.	COMPART. C OCCUPANCY FACTOR
.0000E+00 - 5.0000E-01	1.349E-03	1.349E-03	.000E+00	3.500E-04	.000E+00	5.179E-01	1.000E+00
5.0000E-01 - 1.0000E+00	1.349E-03	1.349E-03	.000E+00	3.500E-04	.000E+00	5.179E-01	1.000E+00
1.0000E+00 - 2.0000E+00	1.017E-03	1.017E-03	.000E+00	3.500E-04	.000E+00	5.355E-01	1.000E+00
2.0000E+00 - 8.0000E+00	6.374E-04	6.374E-04	.000E+00	3.500E-04	.000E+00	5.482E-01	1.000E+00
8.0000E+00 - 2.4000E+01	4.401E-04	4.401E-04	.000E+00	3.500E-04	.000E+00	5.603E-01	1.000E+00
2.4000E+01 - 9.6000E+01	2.939E-04	2.939E-04	.000E+00	3.500E-04	.000E+00	5.700E-01	6.000E-01
9.6000E+01 - 7.2000E+02	2.115E-04	2.115E-04	.000E+00	3.500E-04	.000E+00	6.082E-01	4.000E-01

TIME INTERVAL (hours)	COMPART A MULTIPLIERS (IF APPLICABLE)		COMPART B MULTIPLIERS (IF APPLICABLE)		COMPART C MULTIPLIERS (IF APPLICABLE)		FLOW MULT. SPRAYED AREA TO UNSPRAYED
	LEAK RATE	REC.FILTER	LEAK RATE	REC.FILTER	INTAKE/EXH	REC.FILTER	
.0000E+00 - 5.0000E-01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	.000E+00	1.000E+00
5.0000E-01 - 1.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	.000E+00	1.000E+00
1.0000E+00 - 2.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2.0000E+00 - 8.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
8.0000E+00 - 2.4000E+01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2.4000E+01 - 9.6000E+01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
9.6000E+01 - 7.2000E+02	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

ADJUSTMENTS WERE MADE TO THE INVENTORIES OF RADIONUCLIDES WHICH ARE IN SECULAR EQUILIBRIUM WITH THEIR PARENTS, AND WHOSE INVENTORIES WERE NOT USER-SPECIFIED, AS FOLLOWS, USING THE CONDITIONS:

NUCLIDE HALF-LIFE <= 7.200E+02 (hrs) AND (PRECURSOR HALF-LIFE/NUCLIDE HALF-LIFE) >= 1.000E+01

NUCLIDE	PRECURSOR	NUCLIDE HALF LIFE (hrs)	HALF-LIFE RATIOS (PREC./NUCL)	EQUILIBRIUM FACTOR	PRECURSOR ACTIVITY (Ci)	NUCLIDE ACTIVITY (Ci)

NONE FOUND!

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

USER-SPECIFIED SOURCE INVENTORY

NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)
KR 85M	1	1.2500E+04	I132	2	6.5000E+04	XE133M	1	1.3000E+04
KR 85	1	7.8000E+02	I133	2	9.5000E+04	XE133	1	9.0000E+04
KR 87	1	2.2000E+04	I134	2	1.0500E+05	XE135M	1	1.8500E+04
KR 88	1	3.2000E+04	I135	2	9.0000E+04	XE135	1	1.9000E+04
I131	2	7.2000E+04	XE131M	1	3.2000E+02	XE138	1	7.0000E+04

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SOURCE INVENTORY FOLLOWING 8.000E+01 HOURS OF RADIOACTIVE GROWTH AND DECAY PRIOR TO RELEASE

NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)
KR 85M	1	5.2729E-02	I131	2	5.4018E+04	XE133M	1	5.0257E+03
KR 85	1	7.7967E+02	I132	2	2.1995E-06	XE133	1	7.1351E+04
KR 87	1	2.5395E-15	I133	2	6.6056E+03	XE135M	1	3.2818E+00
KR 88	1	1.0523E-04	I134	2	3.5545E-23	XE135	1	5.2917E+02
RB 87	3	6.7960E-11	I135	2	2.0489E+01	CS135	3	8.5463E-06
RB 88	3	1.1751E-04	XE131M	1	3.8555E+02	CS138	3	7.3517E-41

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

FINITE-CLOUD CORRECTION FACTORS FOR GAMMA RADIATION EXPOSURES

NUCLIDE	COMPARTMENT A HEMISPHE. CLOUD RADIUS= .00 M	COMPARTMENT B SPHERICAL CLOUD RADIUS= .00 M	COMPARTMENT C HEMISPHE. CLOUD RADIUS= 14.93 M	
KR 85M	.000E+00	.000E+00	5.616E-02	
KR 85	.000E+00	.000E+00	5.288E-02	
KR 87	.000E+00	.000E+00	4.368E-02	
KR 88	.000E+00	.000E+00	4.271E-02	
RB 88	.000E+00	.000E+00	4.394E-02	
I131	.000E+00	.000E+00	5.415E-02	
I132	.000E+00	.000E+00	5.091E-02	
I133	.000E+00	.000E+00	5.208E-02	
I134	.000E+00	.000E+00	4.966E-02	
I135	.000E+00	.000E+00	4.634E-02	
XE131M	.000E+00	.000E+00	3.480E-01	
XE133M	.000E+00	.000E+00	1.995E-01	
XE133	.000E+00	.000E+00	9.405E-02	
XE135M	.000E+00	.000E+00	5.625E-02	
XE135	.000E+00	.000E+00	5.194E-02	
MURPHY/CAMPE	.000E+00	.000E+00	5.660E-02	(0.733 MEV - INFORMATION ONLY)

PURE BETA EMITTERS AND RADIONUCLIDES WITH UNDEFINED GAMMA SPECTRA ARE EXCLUDED FROM THE ABOVE LIST.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

T = .0000E+00 hrs DISTRIBUTION OF RADIOACTIVITY

NUCLIDE	COMPARTM. A (Ci/m3)	CHEM-SPRAY IN COMP. A (Ci)	REC.FILTER IN COMP. A (Ci)	COMPARTM. B (Ci/m3)	REC.FILTER IN COMP. B (Ci)	EXH.FILTER TO ATMOSP. (Ci)	COMPARTM. C (Ci/m3)	INT.FILTER TO COMP. C (Ci)	REC.FILTER IN COMP. C (Ci)
KR 85M	5.273E-02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 85	7.797E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 87	2.540E-15	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 88	1.052E-04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I131	2.701E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I132	1.100E-08	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I133	3.303E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I134	1.777E-25	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I135	1.024E-01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE131M	3.856E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE133M	5.026E+03	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE133	7.135E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE135M	3.282E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE135	5.292E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
TOTALS									
GROUP 1	7.807E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GROUP 2	3.032E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GROUP 3	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GRND.TOT	7.838E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

THE COMPARTMENT VOLUMES (A, B AND C) IN THIS TABLE ARE: 1.000E+00 .000E+00 6.966E+03 (m3)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

T = .0000E+00 hrs RELEASE RATES TO ATMOSPHERE, INTERVAL RELEASES FROM .0000E+00 TO .0000E+00 hrs,
CUMULATIVE RELEASES FROM 0.0 TO .0000E+00 hrs, AND RADIOACTIVE-CLOUD CONCENTRATIONS

	WITHOUT DECAY IN TRANSIT				WITH .000E+00 hrs IN-TRANSIT DECAY			
NUCLIDE	REL. RATE (Ci/hr)	INTRV REL (Ci)	CUML. REL (Ci)	CLOUD CONC (Ci/m3)	REL. RATE (Ci/hr)	INTRV REL (Ci)	CUML. REL (Ci)	CLOUD CONC (Ci/m3)
KR 85M	1.055E+00	.000E+00	.000E+00	3.952E-07	1.055E+00	.000E+00	.000E+00	3.952E-07
KR 85	1.559E+04	.000E+00	.000E+00	5.843E-03	1.559E+04	.000E+00	.000E+00	5.843E-03
KR 87	5.079E-14	.000E+00	.000E+00	1.903E-20	5.079E-14	.000E+00	.000E+00	1.903E-20
KR 88	2.105E-03	.000E+00	.000E+00	7.886E-10	2.105E-03	.000E+00	.000E+00	7.886E-10
I131	5.402E+03	.000E+00	.000E+00	2.024E-03	5.402E+03	.000E+00	.000E+00	2.024E-03
I132	2.199E-07	.000E+00	.000E+00	8.242E-14	2.199E-07	.000E+00	.000E+00	8.242E-14
I133	6.606E+02	.000E+00	.000E+00	2.475E-04	6.606E+02	.000E+00	.000E+00	2.475E-04
I134	3.554E-24	.000E+00	.000E+00	1.332E-30	3.554E-24	.000E+00	.000E+00	1.332E-30
I135	2.049E+00	.000E+00	.000E+00	7.678E-07	2.049E+00	.000E+00	.000E+00	7.678E-07
XE131M	7.711E+03	.000E+00	.000E+00	2.889E-03	7.711E+03	.000E+00	.000E+00	2.889E-03
XE133M	1.005E+05	.000E+00	.000E+00	3.766E-02	1.005E+05	.000E+00	.000E+00	3.766E-02
XE133	1.427E+06	.000E+00	.000E+00	5.347E-01	1.427E+06	.000E+00	.000E+00	5.347E-01
XE135M	6.564E+01	.000E+00	.000E+00	2.460E-05	6.564E+01	.000E+00	.000E+00	2.460E-05
XE135	1.058E+04	.000E+00	.000E+00	3.966E-03	1.058E+04	.000E+00	.000E+00	3.966E-03
TOTALS								
GROUP 1	1.561E+06	.000E+00	.000E+00	5.851E-01	1.561E+06	.000E+00	.000E+00	5.851E-01
GROUP 2	6.064E+03	.000E+00	.000E+00	2.272E-03	6.064E+03	.000E+00	.000E+00	2.272E-03
GROUP 3	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GRND.TOT	1.568E+06	.000E+00	.000E+00	5.874E-01	1.568E+06	.000E+00	.000E+00	5.874E-01

NOTE: THE ATMOSPHERIC CONCENTRATION OF RADIOACTIVITY IS BASED ON A DISPERSION FACTOR (X/Q) OF 1.349E-03 (sec/m3)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (CONTINUOUS OCCUPANCY)
COMPARTMENT C

T (hours)	Beta Air DOSE RATE (rad/hr)	Beta Air INTVL DOS (rad)	Beta Air CUM. DOSE (rad)	Gamma Air DOSE RATE (rad/hr)	Gamma Air INTVL DOS (rad)	Gamma Air CUM. DOSE (rad)	Tot. Skin DOSE RATE (rem/hr)	Tot. Skin INTVL DOS (rem)	Tot. Skin CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.203E+00	5.640E-01	5.640E-01	1.950E-02	9.142E-03	9.142E-03	2.295E-01	1.076E-01	1.076E-01
1.0000E+00	1.098E+00	5.749E-01	1.139E+00	1.779E-02	9.315E-03	1.846E-02	2.093E-01	1.096E-01	2.173E-01
2.0000E+00	9.143E-01	1.003E+00	2.142E+00	1.479E-02	1.625E-02	3.470E-02	1.739E-01	1.910E-01	4.083E-01
8.0000E+00	3.054E-01	3.330E+00	5.472E+00	4.911E-03	5.373E-02	8.844E-02	5.749E-02	6.305E-01	1.039E+00
2.4000E+01	1.702E-02	1.589E+00	7.061E+00	2.719E-04	2.548E-02	1.139E-01	3.156E-03	2.975E-01	1.336E+00
9.6000E+01	5.934E-05	1.040E-01	7.165E+00	1.141E-06	1.674E-03	1.156E-01	1.177E-05	1.927E-02	1.356E+00
7.2000E+02	1.683E-06	4.843E-03	7.170E+00	4.093E-08	1.107E-04	1.157E-01	3.815E-07	1.059E-03	1.357E+00

T (hours)	Gonads DOSE RATE (rem/hr)	Gonads INTVL DOS (rem)	Gonads CUM. DOSE (rem)	Breast DOSE RATE (rem/hr)	Breast INTVL DOS (rem)	Breast CUM. DOSE (rem)	Lungs DOSE RATE (rem/hr)	Lungs INTVL DOS (rem)	Lungs CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.152E-02	5.403E-03	5.403E-03	1.601E-02	7.504E-03	7.504E-03	4.005E-02	1.878E-02	1.878E-02
1.0000E+00	1.051E-02	5.505E-03	1.091E-02	1.461E-02	7.648E-03	1.515E-02	3.653E-02	1.913E-02	3.791E-02
2.0000E+00	8.642E-03	9.545E-03	2.045E-02	1.186E-02	1.318E-02	2.834E-02	2.777E-02	3.194E-02	6.985E-02
8.0000E+00	2.732E-03	3.069E-02	5.115E-02	3.550E-03	4.111E-02	6.945E-02	5.670E-03	8.276E-02	1.526E-01
2.4000E+01	1.445E-04	1.391E-02	6.506E-02	1.777E-04	1.767E-02	8.712E-02	1.474E-04	2.278E-02	1.754E-01
9.6000E+01	5.031E-07	8.793E-04	6.593E-02	6.298E-07	1.077E-03	8.820E-02	3.704E-07	8.150E-04	1.762E-01
7.2000E+02	1.394E-08	4.038E-05	6.597E-02	1.837E-08	5.243E-05	8.825E-02	8.147E-09	2.537E-05	1.762E-01

T (hours)	R.Marrow DOSE RATE (rem/hr)	R.Marrow INTVL DOS (rem)	R.Marrow CUM. DOSE (rem)	Bone Sur DOSE RATE (rem/hr)	Bone Sur INTVL DOS (rem)	Bone Sur CUM. DOSE (rem)	Thyroid DOSE RATE (rem/hr)	Thyroid INTVL DOS (rem)	Thyroid CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	9.858E-03	4.622E-03	4.622E-03	3.403E-02	1.596E-02	1.596E-02	1.241E+01	5.816E+00	5.816E+00
1.0000E+00	8.993E-03	4.709E-03	9.332E-03	3.106E-02	1.626E-02	3.222E-02	1.134E+01	5.934E+00	1.175E+01
2.0000E+00	7.245E-03	8.086E-03	1.742E-02	2.563E-02	2.826E-02	6.047E-02	8.429E+00	9.812E+00	2.156E+01
8.0000E+00	2.084E-03	2.469E-02	4.210E-02	8.251E-03	9.179E-02	1.523E-01	1.424E+00	2.363E+01	4.520E+01
2.4000E+01	9.961E-05	1.020E-02	5.230E-02	4.445E-04	4.232E-02	1.946E-01	1.252E-02	4.765E+00	4.996E+01
9.6000E+01	3.079E-07	5.980E-04	5.290E-02	1.413E-06	2.701E-03	1.973E-01	4.576E-07	4.264E-02	5.000E+01
7.2000E+02	6.926E-09	2.141E-05	5.292E-02	3.234E-08	9.938E-05	1.974E-01	1.193E-08	3.518E-05	5.000E+01

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (CONTINUOUS OCCUPANCY)
COMPARTMENT C

T (hours)	Remaindr DOSE RATE (rem/hr)	Remaindr INTVL DOS (rem)	Remaindr CUM. DOSE (rem)	Eff D.E. DOSE RATE (rem/hr)	Eff D.E. INTVL DOS (rem)	Eff D.E. CUM. DOSE (rem)	TID Thy DOSE RATE (rem/hr)	TID Thy INTVL DOS (rem)	TID Thy CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.168E-02	5.478E-03	5.478E-03	3.881E-01	1.819E-01	1.819E-01	1.720E+01	8.059E+00	8.059E+00
1.0000E+00	1.066E-02	5.581E-03	1.106E-02	3.546E-01	1.856E-01	3.674E-01	1.571E+01	8.221E+00	1.628E+01
2.0000E+00	8.562E-03	9.569E-03	2.063E-02	2.644E-01	3.073E-01	6.747E-01	1.167E+01	1.359E+01	2.987E+01
8.0000E+00	2.429E-03	2.900E-02	4.962E-02	4.584E-02	7.472E-01	1.422E+00	1.966E+00	3.270E+01	6.257E+01
2.4000E+01	1.145E-04	1.181E-02	6.144E-02	5.162E-04	1.579E-01	1.580E+00	1.708E-02	6.569E+00	6.913E+01
9.6000E+01	3.568E-07	6.867E-04	6.213E-02	4.660E-07	2.120E-03	1.582E+00	9.324E-12	5.760E-02	6.919E+01
7.2000E+02	8.269E-09	2.530E-05	6.215E-02	1.187E-08	3.525E-05	1.582E+00	.000E+00	3.149E-11	6.919E+01

T (hours)	RG1109WB DOSE RATE (rem/hr)	RG1109WB INTVL DOS (rem)	RG1109WB CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.664E-02	7.801E-03	7.801E-03
1.0000E+00	1.518E-02	7.950E-03	1.575E-02
2.0000E+00	1.262E-02	1.386E-02	2.961E-02
8.0000E+00	4.191E-03	4.585E-02	7.546E-02
2.4000E+01	2.319E-04	2.174E-02	9.720E-02
9.6000E+01	7.428E-07	1.412E-03	9.861E-02
7.2000E+02	1.709E-08	5.241E-05	9.867E-02

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

OVERALL SUMMARY - TOTAL RADIATION EXPOSURES (AS APPLICABLE) FOR SCENARIO DURATION (7.2000E+02 hrs)

CONTINUOUS OCCUPANCY

RECEPTOR/ORGAN	COMPARTMENT A (Hemispher)	COMPARTMENT B (Spherical)	COMPARTMENT C (Hemispher)	OFFSITE RECEP.
Beta Air (rad)	.000E+00	.000E+00	7.170E+00	.000E+00
Gamma Air (rad)	.000E+00	.000E+00	1.157E-01	.000E+00
Tot. skin (rem)	.000E+00	.000E+00	1.357E+00	.000E+00
[Beta Cont. (%)]	[.00]	[.00]	[93.95]	[.00]
Gonads (rem)	.000E+00	.000E+00	6.597E-02	.000E+00
Breast (rem)	.000E+00	.000E+00	8.825E-02	.000E+00
Lungs (rem)	.000E+00	.000E+00	1.762E-01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[71.28]	[.00]
R.Marrow (rem)	.000E+00	.000E+00	5.292E-02	.000E+00
Bone Sur (rem)	.000E+00	.000E+00	1.974E-01	.000E+00
Thyroid (rem)	.000E+00	.000E+00	5.000E+01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[99.88]	[.00]
Remaindr (rem)	.000E+00	.000E+00	6.215E-02	.000E+00
Eff D.E. (rem)	.000E+00	.000E+00	1.582E+00	.000E+00
[Inhalation (%)]	[.00]	[.00]	[96.24]	[.00]
TID Thy (rem)	.000E+00	.000E+00	6.919E+01	.000E+00
RG1109WB (rem)	.000E+00	.000E+00	9.867E-02	.000E+00

The Dose Conversion Factors (DCFs) employed by ELISA-2 are from EPA 520/1-88-020 and EPA 402-R-93-081 (Federal Guidance Reports 11 and 12), except for TID Thy and RG1109WB, which are as follows:

TID Thy = Classical thyroid inhalation dose based on the TID-14844 DCFs (iodines only)
RG1109WB = Classical whole body immersion dose based on the Reg. Guide 1.109 DCFs (nobles and halogens only)

The beta dose to air is for immersion in an infinite cloud.

The skin dose includes contributions from gamma radiation (finite cloud), beta radiation (semi-infinite cloud) and ground contamination. The skin beta-contribution percentages exclude ground contamination.

Finite-cloud correction, if any, is nuclide specific.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (PARTIAL OCCUPANCY)
COMPARTMENT C

T (hours)	Beta Air DOSE RATE (rad/hr)	Beta Air INTVL DOS (rad)	Beta Air CUM. DOSE (rad)	Gamma Air DOSE RATE (rad/hr)	Gamma Air INTVL DOS (rad)	Gamma Air CUM. DOSE (rad)	Tot. Skin DOSE RATE (rem/hr)	Tot. Skin INTVL DOS (rem)	Tot. Skin CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.203E+00	5.640E-01	5.640E-01	1.950E-02	9.142E-03	9.142E-03	2.295E-01	1.076E-01	1.076E-01
1.0000E+00	1.098E+00	5.749E-01	1.139E+00	1.779E-02	9.315E-03	1.846E-02	2.093E-01	1.096E-01	2.173E-01
2.0000E+00	9.143E-01	1.003E+00	2.142E+00	1.479E-02	1.625E-02	3.470E-02	1.739E-01	1.910E-01	4.083E-01
8.0000E+00	3.054E-01	3.330E+00	5.472E+00	4.911E-03	5.373E-02	8.844E-02	5.749E-02	6.305E-01	1.039E+00
2.4000E+01	1.702E-02	1.589E+00	7.061E+00	2.719E-04	2.548E-02	1.139E-01	3.156E-03	2.975E-01	1.336E+00
9.6000E+01	5.934E-05	1.040E-01	7.165E+00	1.141E-06	1.674E-03	1.156E-01	1.177E-05	1.156E-02	1.348E+00
7.2000E+02	1.683E-06	4.843E-03	7.170E+00	4.093E-08	1.107E-04	1.157E-01	3.815E-07	4.235E-04	1.348E+00

T (hours)	Gonads DOSE RATE (rem/hr)	Gonads INTVL DOS (rem)	Gonads CUM. DOSE (rem)	Breast DOSE RATE (rem/hr)	Breast INTVL DOS (rem)	Breast CUM. DOSE (rem)	Lungs DOSE RATE (rem/hr)	Lungs INTVL DOS (rem)	Lungs CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.152E-02	5.403E-03	5.403E-03	1.601E-02	7.504E-03	7.504E-03	4.005E-02	1.878E-02	1.878E-02
1.0000E+00	1.051E-02	5.505E-03	1.091E-02	1.461E-02	7.648E-03	1.515E-02	3.653E-02	1.913E-02	3.791E-02
2.0000E+00	8.642E-03	9.545E-03	2.045E-02	1.186E-02	1.318E-02	2.834E-02	2.777E-02	3.194E-02	6.985E-02
8.0000E+00	2.732E-03	3.069E-02	5.115E-02	3.550E-03	4.111E-02	6.945E-02	5.670E-03	8.276E-02	1.526E-01
2.4000E+01	1.445E-04	1.391E-02	6.506E-02	1.777E-04	1.767E-02	8.712E-02	1.474E-04	2.278E-02	1.754E-01
9.6000E+01	5.031E-07	5.276E-04	6.558E-02	6.298E-07	6.463E-04	8.777E-02	3.704E-07	4.890E-04	1.759E-01
7.2000E+02	1.394E-08	1.615E-05	6.560E-02	1.837E-08	2.097E-05	8.779E-02	8.147E-09	1.015E-05	1.759E-01

T (hours)	R.Marrow DOSE RATE (rem/hr)	R.Marrow INTVL DOS (rem)	R.Marrow CUM. DOSE (rem)	Bone Sur DOSE RATE (rem/hr)	Bone Sur INTVL DOS (rem)	Bone Sur CUM. DOSE (rem)	Thyroid DOSE RATE (rem/hr)	Thyroid INTVL DOS (rem)	Thyroid CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	9.858E-03	4.622E-03	4.622E-03	3.403E-02	1.596E-02	1.596E-02	1.241E+01	5.816E+00	5.816E+00
1.0000E+00	8.993E-03	4.709E-03	9.332E-03	3.106E-02	1.626E-02	3.222E-02	1.134E+01	5.934E+00	1.175E+01
2.0000E+00	7.245E-03	8.086E-03	1.742E-02	2.563E-02	2.826E-02	6.047E-02	8.429E+00	9.812E+00	2.156E+01
8.0000E+00	2.084E-03	2.469E-02	4.210E-02	8.251E-03	9.179E-02	1.523E-01	1.424E+00	2.363E+01	4.520E+01
2.4000E+01	9.961E-05	1.020E-02	5.230E-02	4.445E-04	4.232E-02	1.946E-01	1.252E-02	4.765E+00	4.996E+01
9.6000E+01	3.079E-07	3.588E-04	5.266E-02	1.413E-06	1.620E-03	1.962E-01	4.576E-07	2.558E-02	4.999E+01
7.2000E+02	6.926E-09	8.562E-06	5.267E-02	3.234E-08	3.975E-05	1.962E-01	1.193E-08	1.407E-05	4.999E+01

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (PARTIAL OCCUPANCY)
COMPARTMENT C

T (hours)	Remaindr DOSE RATE (rem/hr)	Remaindr INTVL DOS (rem)	Remaindr CUM. DOSE (rem)	Eff D.E. DOSE RATE (rem/hr)	Eff D.E. INTVL DOS (rem)	Eff D.E. CUM. DOSE (rem)	TID Thy DOSE RATE (rem/hr)	TID Thy INTVL DOS (rem)	TID Thy CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.168E-02	5.478E-03	5.478E-03	3.881E-01	1.819E-01	1.819E-01	1.720E+01	8.059E+00	8.059E+00
1.0000E+00	1.066E-02	5.581E-03	1.106E-02	3.546E-01	1.856E-01	3.674E-01	1.571E+01	8.221E+00	1.628E+01
2.0000E+00	8.562E-03	9.569E-03	2.063E-02	2.644E-01	3.073E-01	6.747E-01	1.167E+01	1.359E+01	2.987E+01
8.0000E+00	2.429E-03	2.900E-02	4.962E-02	4.584E-02	7.472E-01	1.422E+00	1.966E+00	3.270E+01	6.257E+01
2.4000E+01	1.145E-04	1.181E-02	6.144E-02	5.162E-04	1.579E-01	1.580E+00	1.708E-02	6.569E+00	6.913E+01
9.6000E+01	3.568E-07	4.120E-04	6.185E-02	4.660E-07	1.272E-03	1.581E+00	9.324E-12	3.456E-02	6.917E+01
7.2000E+02	8.269E-09	1.012E-05	6.186E-02	1.187E-08	1.410E-05	1.581E+00	.000E+00	1.260E-11	6.917E+01

T (hours)	RG1109WB DOSE RATE (rem/hr)	RG1109WB INTVL DOS (rem)	RG1109WB CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.664E-02	7.801E-03	7.801E-03
1.0000E+00	1.518E-02	7.950E-03	1.575E-02
2.0000E+00	1.262E-02	1.386E-02	2.961E-02
8.0000E+00	4.191E-03	4.585E-02	7.546E-02
2.4000E+01	2.319E-04	2.174E-02	9.720E-02
9.6000E+01	7.428E-07	8.471E-04	9.805E-02
7.2000E+02	1.708E-08	2.096E-05	9.807E-02

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 124 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

OVERALL SUMMARY - TOTAL RADIATION EXPOSURES (AS APPLICABLE) FOR SCENARIO DURATION (7.2000E+02 hrs)

PARTIAL OCCUPANCY

RECEPTOR/ORGAN	COMPARTMENT A (Hemisphere)	COMPARTMENT B (Spherical)	COMPARTMENT C (Hemisphere)	OFFSITE RECEP.
Beta Air (rad)	.000E+00	.000E+00	7.170E+00	.000E+00
Gamma Air (rad)	.000E+00	.000E+00	1.157E-01	.000E+00
Tot. skin (rem)	.000E+00	.000E+00	1.348E+00	.000E+00
[Beta Cont. (%)]	[.00]	[.00]	[93.95]	[.00]
Gonads (rem)	.000E+00	.000E+00	6.560E-02	.000E+00
Breast (rem)	.000E+00	.000E+00	8.779E-02	.000E+00
Lungs (rem)	.000E+00	.000E+00	1.759E-01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[71.40]	[.00]
R.Marrow (rem)	.000E+00	.000E+00	5.267E-02	.000E+00
Bone Sur (rem)	.000E+00	.000E+00	1.962E-01	.000E+00
Thyroid (rem)	.000E+00	.000E+00	4.999E+01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[99.89]	[.00]
Remaindr (rem)	.000E+00	.000E+00	6.186E-02	.000E+00
Eff D.E. (rem)	.000E+00	.000E+00	1.581E+00	.000E+00
[Inhalation (%)]	[.00]	[.00]	[96.26]	[.00]
TID Thy (rem)	.000E+00	.000E+00	6.917E+01	.000E+00
RG1109WB (rem)	.000E+00	.000E+00	9.807E-02	.000E+00

The Dose Conversion Factors (DCFs) employed by ELISA-2 are from EPA 520/1-88-020 and EPA 402-R-93-081 (Federal Guidance Reports 11 and 12), except for TID Thy and RG1109WB, which are as follows:

TID Thy = Classical thyroid inhalation dose based on the TID-14844 DCFs (iodines only)
RG1109WB = Classical whole body immersion dose based on the Reg. Guide 1.109 DCFs (nobles and halogens only)

The beta dose to air is for immersion in an infinite cloud.

The skin dose includes contributions from gamma radiation (finite cloud), beta radiation (semi-infinite cloud) and ground contamination. The skin beta-contribution percentages exclude ground contamination.

Finite-cloud correction, if any, is nuclide specific.

Partial occupancy has been applied only to human exposures in Compartment C.

********* END OF THIS CASE *********

ELISA-2 RUN CASE C

```
**********************************************************************
**            FRAMATOME ANP SOFTWARE CONTROL LIBRARY                **
**********************************************************************
**                                                                  **
**  SCL ITEM            :  elisa2-2                                 **
**  SCL FILE            :  /SCL/elisa2-2.2/elisa2_2.e               **
**  SCL VER/MOD LEVEL   :  02 / 02                                  **
**  DESCRIPTION         :  CSI: ELISA2 02/02 - A computer code for the **
**  evaluation of licensing and severe accidents at LWRs.           **
**  INSTALLED DATE      :  04/17/03                                 **
**  SAFETY CODE         :  Y                                        **
**  VALIDATION DOC. #   :                                           **
**  CODE SPONSOR        :  DISTEFANO JOHN                           **
**  TODAY'S DATE        :  08/02/03                                 **
**  CURRENT TIME        :  14:19:00 EDT                             **
**                                                                  **
**  HP-UX alpha1 B.10.20 A 9000/785 2010238544 tw                   **
**                                                                  **
**********************************************************************
**********************************************************************

**********************************************************************
**            FRAMATOME ANP SOFTWARE CONTROL LIBRARY                **
**********************************************************************
**                                                                  **
**  SCL ITEM            :  elisa2.lib                               **
**  SCL FILE            :  /SCL/elisa2_v21/lib/elisa2.lib           **
**  SCL VER/MOD LEVEL   :  01 / 00                                  **
**  DESCRIPTION         :  Elisa2 Data Library   **
**     **
**  INSTALLED DATE      :  06/01/01                                 **
**  SAFETY CODE         :  Y                                        **
**  VALIDATION DOC. #   :                                           **
**  CODE SPONSOR        :  DISTEFANO JOHN                           **
**  TODAY'S DATE        :  08/02/03                                 **
**  CURRENT TIME        :  14:19:00 EDT                             **
**                                                                  **
**  HP-UX alpha1 B.10.20 A 9000/785 2010238544 tw                   **
**                                                                  **
**********************************************************************
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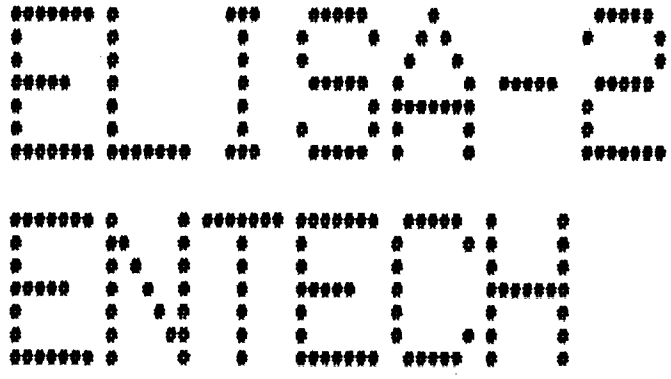
```



ENTECH ENGINEERING, INC., WESTBOROUGH, MA

RELEASE VERSION/LEVEL..: Version 2.2
RELEASE DATE .....: May 23,2002

PROBLEM SUBMITTED ON ..: 2-Aug-03 14:19:01

INPUT FILE .....: elisa2-C.inp
DATA LIBRARY FILE .....: /SCL/elisa2-2.2/elisa2.lib
OUTPUT FILE .....: elisa2-C.el2
PHOTON SPECTRA FILE #1 : elisa2-C.el3
PHOTON SPECTRA FILE #2 : elisa2-C.el4

INPUT DATA LISTING

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Line          1         2         3         4         5         6         7         8         9        10        11        12
Seq.  12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789

  1   SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195
  2   10002     4         6         8         1         0         MMYMYY    N         MMMM          YYYYYY
  3   10003     0         1.0       80.0      0.0       1.000E-02
  4   10004     3         0         0
  5       1     1.000E+00 0.0       0.0       XE        KR
  6       2     2.500E-03 2.500E-03 0.00      I         BR
  7       3     0.0       0.0       0.0       ZE
  8   10005     4         Filter efficiencies
  9       2     1         0.0       0.0       9.500E-01 0.0       9.500E-01
 10       2     2         0.0       0.0       9.500E-01 0.0       9.500E-01
 11       2     3         0.0       0.0       9.900E-01 0.0       9.900E-01
 12       3     0         0.0       0.0       9.900E-01 0.0       9.900E-01
 13   10006     0.0       0.0       Peak assembly gap activity (Ci), based on UFSAR Table 15.7-20
 14    I131     7.200E+04 I132      6.500E+04 I133      9.500E+04 I134      1.050E+05
 15    I135     9.000E+04 KR85M     1.250E+04 KR85      7.800E+02 KR87      2.200E+04
 16    KR88     3.200E+04 XE131M    3.200E+02 XE133M    1.300E+04 XE133     9.000E+04
 17    XE135M   1.850E+04 XE135     1.900E+04 XE138     7.000E+04
 18   10007     2         0.0       480.0     0.0       0.0       0.0       0.0       CONTAINMENT
 19   10009     2         2.460E+05 1194.     1370.0    0.0       0.0       0.0       CONTROL-ROOM
 20   10010     5
 21    0.0      5.000E-01 1.000E+00 2.000E+00 7.200E+02
 22   10017     2  Control room recirc rate multiplier
 23    0.0      0.0       1.0       1.0
 24   10018     6  Control room composite X/Q (sec/m3)
 25    0.0      1.403E-03 1.0       1.060E-03 2.0       6.650E-04 8.0       4.598E-04
 26    24.0     3.074E-04 96.0      2.221E-04


 27   10021     1  Breathing rate (m3/sec)
 28    0.0      3.500E-04
 29   10023     6  Control room intake filter bypass fraction
 30    0.0      5.455E-01 1.0       5.630E-01 2.0       5.755E-01 8.0       5.875E-01
 31    24.0     5.969E-01 96.0      6.343E-01
 32   10024     3  Occupancy factors
 33    0.0      1.0       24.000    6.000E-01 96.000    4.000E-01
 34   99999
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DATA LIBRARY PARTIAL LISTING

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Line            1         2         3         4         5         6         7         8         9        10        11        12
Seq.    12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789

  1     ELISA-2 DATA LIBRARY - BASED ON ORIGEN-2 AND FEDERAL GUIDANCE REPORTS 11 AND 12                                V2L1    1
  2     RELEASE DATE: 1/13/99                                                                                         V2L1    2
  3     REMARKS (START)                                                                                               V2L1    3
  4         Source inventories are in Ci for the power level specified for each plant.                                V2L1    4
  5         Decay constants are in inverse hours.                                                                     V2L1    5
  6         The entry line following the decay chains includes the decay constants                                    V2L1    6
  7           for each of three members [parent (P), daugher (D) and granddaughter                                    V2L1    7
  8           (G)], and the branching fractions (P-D), (D-G) and (P-G).                                               V2L1    8
  9         Air immersion DCFs are in [((Sv or Gy))/s)/(Bq/m3)], for semi-infinite cloud                              V2L1    9
 10         Ground-shine  DCFs are in [((Sv or Gy))/s)/(Bq/m2)] (surface contamination).                              V2L1   10
 11         Inhalation DCFs are in [Sv/Bq)].                                                                          V2L1   11
 12         The inhalation DCF's are for the Lung Clearance Class which yields the                                    V2L1   12
 13           highest Effective Dose Equivalent (Eff D.E.); the class is identified.                                  V2L1   13
 14         Negative DCF entries imply 'data not available'.                                                          V2L1   14
 15         ORGAN 'TID Thy' = Thyroid inhalation based on TID-14844 - Iodines only.                                   V2L1   15
 16         ORGAN 'RG1109WB' = Whole body gamma dose using the Reg. Guide 1.109 DCFs.                                  V2L1   16
 17         Skin DCFs are included along with the organ DCFs, but skin is not                                         V2L1   17
 18           considered as an organ.                                                                                 V2L1   18
 19     READ FORMATS FOR THE RADIONUCLIDE DATA BASE                                                                   V2L1   19
 20     Line    1     Nuclide name and source inventories          (4x,a6,10x,4e12.3)                                 V2L1   20
 21                   (Note:  Nuclide sequence No. is not used)                                                       V2L1   21
 22     Line    2     Header                                      (a80)                                              V2L1   22
 23     Line    3     Decay chain (3 members)                     (9x,3(a6,6x))                                      V2L1   23
 24     Line    4     Decay constants & branching fractions       (8x,6e12.3)                                        V2L1   24
 25     Line    5     Header                                      (a80)                                              V2L1   25
 26     Lines  6-9    18 ORIGEN-2 photons and 1 ICRP-38 beta      (8x,6e12.3)                                        V2L1   26
 27     Line   10     Header                                      (a80)                                              V2L1   27
 28     Lines 11-16   Dose conversion factors                     (8x,6e12.3)                                        V2L1   28
 29     END REMARKS                                                                                                   V2L1   29
 30     GENERAL DATA BASE                                                                                             V2L1   30
 31        10       [ORGAN NAMES - READ FORMAT (11x,6(a8,4x))]                                                        V2L1   31
 32                 Gonads      Breast      Lungs       R.Marrow    Bone Sur    Thyroid                           V2L1   32
 33                 Remaindr    Eff D.E.    TID Thy     RG1109WB    (Skin)                                        V2L1   33
 34          4      [Power plants and power levels (MWt) - READ FORMAT (11x,a20,1x,e12.3)                             V2L1   34
 35                 PWR (33 GWD/MT 3.2%)    1.000E+00                                                             V2L1   35
 36                 PWR (50 GWD/MT 4.2%)    1.000E+00                                                             V2L1   36
 37                 BWR (27.5 GWD/MT 3%)    1.000E+00                                                             V2L1   37
 38                 BWR (40 GWD/MT 3.4%)    1.000E+00                                                             V2L1   38
 39        18       [ORIGEN-2 upper limit energy in each gamma group (MeV) (8x,6e12.3)]                            V2L1   39
 40                 2.000E-02   3.000E-02   4.500E-02   7.000E-02   1.000E-01   1.500E-01                         V2L1   40
 41                 3.000E-01   4.500E-01   7.000E-01   1.000E+00   1.500E+00   2.000E+00                         V2L1   41
 42                 2.500E+00   3.000E+00   4.000E+00   6.000E+00   8.000E+00   1.100E+01                         V2L1   42
 43          3      Factors to convert data library DCFs to proper units, as shown                                    V2L1   43
 44                 1.0         Convert air immersion DCF to [((Sv or Gy)/s)/(Bq/m3)]                             V2L1   44
 45                 1.0         Convert ground shine  DCF to [((Sv or Gy)/s)/(Bq/m2)]                             V2L1   45
 46                 1.0         Convert inhalation DCF to [Sv/Bq]                                                 V2L1   46
 47        18       Air gamma DCF for semi-infinite monoener. cloud src [(Gy/s)/(Bq/m3)]                           V2L1   47
 48                 6.676E-16   1.669E-15   2.503E-15   3.839E-15   5.674E-15   8.345E-15                         V2L1   48
```

DATA LIBRARY PARTIAL LISTING

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Line          1         2         3         4         5         6         7         8         9        10        11        12
Seq.  12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

 49              1.502E-14 2.503E-14 3.839E-14 5.674E-14 8.345E-14 1.168E-13 V2L1   49
 50              1.502E-13 1.836E-13 2.337E-13 3.338E-13 4.673E-13 6.342E-13 V2L1   50
 51       18     Air gamma DCF for monoenerg. ground-surface source [(Gy/s)/(Bq/m2)]  V2L1   51
 52              1.829E-16 1.493E-16 9.835E-17 8.181E-17 9.767E-17 1.436E-16 V2L1   52
 53              2.760E-16 4.785E-16 7.318E-16 1.050E-15 1.457E-15 1.910E-15 V2L1   53
 54              2.325E-15 2.710E-15 3.243E-15 4.194E-15 5.386E-15 6.759E-15 V2L1   54
 55       18     Skin gamma DCF for semi-infinite monoener. cloud src [(Sv/s)/(Bq/m3)] V2L1   55
 56              1.138E-16 7.690E-16 1.467E-15 2.717E-15 4.416E-15 6.737E-15 V2L1   56
 57              1.239E-14 2.073E-14 3.193E-14 4.754E-14 7.108E-14 1.012E-13 V2L1   57
 58              1.317E-13 1.624E-13 2.089E-13 3.030E-13 4.305E-13 5.922E-13 V2L1   58
 59     RADIONUCLIDE DATA BASE                                                 V2L1   59
 60      1  H  3  (Src Ci)    1.471E+01 2.186E+01 1.744E+01 2.536E+01          V2L1   60
 61            Decay chain, decay constants and branching fractions            V2L1   61
 62             H  3                                                           V2L1   62
 63            6.40320E-06 0.00000E+00 0.00000E+00   0.000E+00  0.000E+00  0.000E+00 V2L1   63
 64            ORIGEN-2 18-group phot/dis, and ICRP-38 betas (MeV/dis)         V2L1   64
 65              0.000E+00   0.000E+00   0.000E+00   0.000E+00  0.000E+00  0.000E+00 V2L1   65
 66              0.000E+00   0.000E+00   0.000E+00   0.000E+00  0.000E+00  0.000E+00 V2L1   66
 67              0.000E+00   0.000E+00   0.000E+00   0.000E+00  0.000E+00  0.000E+00 V2L1   67
 68              5.600E-03                                                      V2L1   68
 69            ICRP-38 Organ DCFs - Air immer, Grnd shine, Inhal/Class V       V2L1   69
 70              0.000E+00   0.000E+00   2.750E-18   0.000E+00  0.000E+00  0.000E+00 V2L1   70
 71              0.000E+00   3.310E-19   0.000E+00   0.000E+00  0.000E+00          V2L1   71
 72              0.000E+00   0.000E+00   0.000E+00   0.000E+00  0.000E+00  0.000E+00 V2L1   72
 73              0.000E+00   0.000E+00   0.000E+00   0.000E+00  0.000E+00          V2L1   73
 74              1.730E-11   1.730E-11   1.730E-11   1.730E-11  1.730E-11  1.730E-11 V2L1   74
 75              1.730E-11   1.730E-11   0.000E+00   0.000E+00                     V2L1   75
 76      2  C 14  (Src Ci)    3.125E-06 4.723E-06 3.772E-06 5.467E-06          V2L1   76
 77            Decay chain, decay constants and branching fractions            V2L1   77
 78             C 14                                                           V2L1   78
 79            1.38016E-08 0.00000E+00 0.00000E+00   0.000E+00  0.000E+00  0.000E+00 V2L1   79
 80            ORIGEN-2 18-group phot/dis, and ICRP-38 betas (MeV/dis)         V2L1   80
 81              0.000E+00   0.000E+00   0.000E+00   0.000E+00  0.000E+00  0.000E+00 V2L1   81
 82              0.000E+00   0.000E+00   0.000E+00   0.000E+00  0.000E+00  0.000E+00 V2L1   82
 83              0.000E+00   0.000E+00   0.000E+00   0.000E+00  0.000E+00  0.000E+00 V2L1   83
 84              4.940E-02                                                      V2L1   84
 85            ICRP-38 Organ DCFs - Air immer, Grnd shine, Inhal/Class c       V2L1   85
 86              2.590E-19   3.520E-19   1.530E-19   1.210E-19  7.060E-19  2.190E-19 V2L1   86
 87              1.540E-19   2.240E-19   0.000E+00   0.000E+00  2.430E-16          V2L1   87
 88              2.220E-20   2.520E-20   8.650E-21   7.250E-21  4.630E-20  1.250E-20 V2L1   88
 89              1.030E-20   1.610E-20   0.000E+00   0.000E+00  7.460E-20          V2L1   89
 90              5.640E-10   5.640E-10   5.640E-10   5.640E-10  5.640E-10  5.640E-10 V2L1   90
 91              5.640E-10   5.640E-10   0.000E+00   0.000E+00                     V2L1   91
 92      3  N 13  (Src Ci)    0.000E+00 0.000E+00 0.000E+00 0.000E+00          V2L1   92
```

(.... etc., for a total of 414 radionuclides ....)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

LISTING OF INPUT DATA

PATHWAY OPTION = 4 (COMP. A --> COMP. C)

COMPARTMENT A: CONTAINMENT

FILTERED RECIRCULATION RATE (cfm) =	.000E+00
LEAK RATE TO ATMOSPHERE (frac/day) =	4.800E+02

COMPARTMENT C: CONTROL-ROOM

TOTAL FREE AIR VOLUME (cu ft) =	2.460E+05
INTAKE AND EXHAUST RATES (cfm) =	1.194E+03
FILTERED RECIRCULATION RATE (cfm) =	1.370E+03

FILTER REMOVAL EFFICIENCIES AND TIME-DEPENDENT
MULTIPLIERS FOR RECIRCULATION RATES, LEAK RATES,
COMP. A FLOW BETWEEN SPRAYED AND UNSPRAYED AREAS,
AND FILTER BYPASS FRACTIONS ARE GIVEN BELOW.

NO. OF DISCRETE TIME VALUES IN INPUT = 8

INTERMEDIATE RESULTS WILL BE PRINTED AT THE FOLLOWING TIMES (hrs):

.0000E+00

PROBLEM END TIME (hours) = 7.2000E+02

RELEASE RATES AND DOSE RATES ARE PRIOR TO TIME-STEP CHANGES, IF ANY.

ONLY EXACT SOLUTION OF THE DIFFERENTIAL EQUATIONS WAS EMPLOYED IN
THE ANALYSIS.

CASE# 1 SB - OPEN CONT. PHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

RECIRCULATION, EXHAUST AND INTAKE FILTER REMOVAL EFFICIENCIES (fractions)

NUCL.	COMPARTMENT A RECIRC.			COMPARTMENT B RECIRC.			COMPARTMENT C RECIRC.			EXHAUST TO ATMOSPHERE			INTAKE TO COMPART. C		
GROUP	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3
1	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2	.0000	.0000	.0000	.0000	.0000	.0000	.9500	.9500	.9900	.0000	.0000	.0000	.9500	.9500	.9900
3	.0000	.0000	.0000	.0000	.0000	.0000	.9900	.9900	.9900	.0000	.0000	.0000	.9900	.9900	.9900

USER-SPECIFIED CLASSIFICATION OF RADIONUCLIDES AND INSTANTANEOUS FRACTIONAL RELEASES FROM THE SOURCE (AT T=0)

GROUP	E	L	E	M	E	N	T	S	FORM 1	FORM 2	FORM 3
1	XE	KR							1.000E+00	.000E+00	.000E+00
2	I	BR							2.500E-03	2.500E-03	.000E+00
3	ZZ								.000E+00	.000E+00	.000E+00

ELEMENT "ZZ" STANDS FOR THE REMAINING DATA-LIBRARY ELEMENTS/NUCLIDES NOT LISTED ABOVE, IF ANY.

CASE# 1 SB - OPEN CONT. YHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

TIME INTERVAL (hours)	CONCENTR. X/Q (sec/m3)	GAMMA X/Q (sec/m3)	DEPOSITION D/Q (1/m2)	BREATHING RATE (m3/sec)	EXH.FILT. BYPASS FRACTION	COMPART. C INT.FILTER BYPASS FR.	COMPART. C OCCUPANCY FACTOR
.0000E+00 - 5.0000E-01	1.403E-03	1.403E-03	.000E+00	3.500E-04	.000E+00	5.455E-01	1.000E+00
5.0000E-01 - 1.0000E+00	1.403E-03	1.403E-03	.000E+00	3.500E-04	.000E+00	5.455E-01	1.000E+00
1.0000E+00 - 2.0000E+00	1.060E-03	1.060E-03	.000E+00	3.500E-04	.000E+00	5.630E-01	1.000E+00
2.0000E+00 - 8.0000E+00	6.650E-04	6.650E-04	.000E+00	3.500E-04	.000E+00	5.755E-01	1.000E+00
8.0000E+00 - 2.4000E+01	4.598E-04	4.598E-04	.000E+00	3.500E-04	.000E+00	5.875E-01	1.000E+00
2.4000E+01 - 9.6000E+01	3.074E-04	3.074E-04	.000E+00	3.500E-04	.000E+00	5.969E-01	6.000E-01
9.6000E+01 - 7.2000E+02	2.221E-04	2.221E-04	.000E+00	3.500E-04	.000E+00	6.343E-01	4.000E-01

TIME INTERVAL (hours)	COMPART A MULTIPLIERS (IF APPLICABLE)		COMPART B MULTIPLIERS (IF APPLICABLE)		COMPART C MULTIPLIERS (IF APPLICABLE)		FLOW MULT. SPRAYED AREA TO UNSPRAYED
	LEAK RATE	REC.FILTER	LEAK RATE	REC.FILTER	INTAKE/EXH	REC.FILTER	
.0000E+00 - 5.0000E-01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	.000E+00	1.000E+00
5.0000E-01 - 1.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	.000E+00	1.000E+00
1.0000E+00 - 2.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2.0000E+00 - 8.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
8.0000E+00 - 2.4000E+01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2.4000E+01 - 9.6000E+01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
9.6000E+01 - 7.2000E+02	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

ADJUSTMENTS WERE MADE TO THE INVENTORIES OF RADIONUCLIDES WHICH ARE IN SECULAR EQUILIBRIUM WITH THEIR PARENTS, AND WHOSE INVENTORIES WERE NOT USER-SPECIFIED, AS FOLLOWS, USING THE CONDITIONS:

NUCLIDE HALF-LIFE <= 7.200E+02 (hrs) AND (PRECURSOR HALF-LIFE/NUCLIDE HALF-LIFE) >= 1.000E+01

NUCLIDE	PRECURSOR	NUCLIDE HALF LIFE (hrs)	HALF-LIFE RATIOS (PREC./NUCL)	EQUILIBRIUM FACTOR	PRECURSOR ACTIVITY (Ci)	NUCLIDE ACTIVITY (Ci)

NONE FOUND!

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

USER-SPECIFIED SOURCE INVENTORY

NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)
KR 85M	1	1.2500E+04	I132	2	6.5000E+04	XE133M	1	1.3000E+04
KR 85	1	7.8000E+02	I133	2	9.5000E+04	XE133	1	9.0000E+04
KR 87	1	2.2000E+04	I134	2	1.0500E+05	XE135M	1	1.8500E+04
KR 88	1	3.2000E+04	I135	2	9.0000E+04	XE135	1	1.9000E+04
I131	2	7.2000E+04	XE131M	1	3.2000E+02	XE138	1	7.0000E+04

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SOURCE INVENTORY FOLLOWING 8.000E+01 HOURS OF RADIOACTIVE GROWTH AND DECAY PRIOR TO RELEASE

NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)
KR 85M	1	5.2729E-02	I131	2	5.4018E+04	XE133M	1	5.0257E+03
KR 85	1	7.7967E+02	I132	2	2.1995E-06	XE133	1	7.1351E+04
KR 87	1	2.5395E-15	I133	2	6.6056E+03	XE135M	1	3.2818E+00
KR 88	1	1.0523E-04	I134	2	3.5545E-23	XE135	1	5.2917E+02
RB 87	3	6.7960E-11	I135	2	2.0489E+01	CS135	3	8.5463E-06
RB 88	3	1.1751E-04	XE131M	1	3.8555E+02	CS138	3	7.3517E-41

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OF; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

FINITE-CLOUD CORRECTION FACTORS FOR GAMMA RADIATION EXPOSURES

NUCLIDE	COMPARTMENT A HEMISPHE. CLOUD RADIUS= .00 M	COMPARTMENT B SPHERICAL CLOUD RADIUS= .00 M	COMPARTMENT C HEMISPHE. CLOUD RADIUS= 14.93 M	
KR 85M	.000E+00	.000E+00	5.616E-02	
KR 85	.000E+00	.000E+00	5.288E-02	
KR 87	.000E+00	.000E+00	4.368E-02	
KR 88	.000E+00	.000E+00	4.271E-02	
RB 88	.000E+00	.000E+00	4.394E-02	
I131	.000E+00	.000E+00	5.415E-02	
I132	.000E+00	.000E+00	5.091E-02	
I133	.000E+00	.000E+00	5.208E-02	
I134	.000E+00	.000E+00	4.966E-02	
I135	.000E+00	.000E+00	4.634E-02	
XE131M	.000E+00	.000E+00	3.480E-01	
XE133M	.000E+00	.000E+00	1.995E-01	
XE133	.000E+00	.000E+00	9.405E-02	
XE135M	.000E+00	.000E+00	5.625E-02	
XE135	.000E+00	.000E+00	5.194E-02	
MURPHY/CAMPE	.000E+00	.000E+00	5.660E-02	(0.733 MEV - INFORMATION ONLY)

PURE BETA EMITTERS AND RADIONUCLIDES WITH UNDEFINED GAMMA SPECTRA ARE EXCLUDED FROM THE ABOVE LIST.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

T = .0000E+00 hrs DISTRIBUTION OF RADIOACTIVITY

NUCLIDE	COMPARTM. A (Ci/m3)	CHEM-SPRAY IN COMP. A (Ci)	REC.FILTER IN COMP. A (Ci)	COMPARTM. B (Ci/m3)	REC.FILTER IN COMP. B (Ci)	EXH.FILTER TO ATMOSP. (Ci)	COMPARTM. C (Ci/m3)	INT.FILTER TO COMP. C (Ci)	REC.FILTER IN COMP. C (Ci)
KR 85M	5.273E-02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 85	7.797E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 87	2.540E-15	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 88	1.052E-04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I131	2.701E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I132	1.100E-08	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I133	3.303E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I134	1.777E-25	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I135	1.024E-01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE131M	3.856E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE133M	5.026E+03	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE133	7.135E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE135M	3.282E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE135	5.292E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
TOTALS									
GROUP 1	7.807E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GROUP 2	3.032E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GROUP 3	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GRND.TOT	7.838E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

THE COMPARTMENT VOLUMES (A, B AND C) IN THIS TABLE ARE: 1.000E+00 .000E+00 6.966E+03 (m3)

CASE# 1 SB - OPEN CONT. PHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

T = .0000E+00 hrs RELEASE RATES TO ATMOSPHERE, INTERVAL RELEASES FROM .0000E+00 TO .0000E+00 hrs,
CUMULATIVE RELEASES FROM 0.0 TO .0000E+00 hrs, AND RADIOACTIVE-CLOUD CONCENTRATIONS

	WITHOUT DECAY IN TRANSIT				WITH .000E+00 hrs IN-TRANSIT DECAY			
NUCLIDE	REL. RATE (Ci/hr)	INTRV REL (Ci)	CUML. REL (Ci)	CLOUD CONC (Ci/m3)	REL. RATE (Ci/hr)	INTRV REL (Ci)	CUML. REL (Ci)	CLOUD CONC (Ci/m3)
KR 85M	1.055E+00	.000E+00	.000E+00	4.110E-07	1.055E+00	.000E+00	.000E+00	4.110E-07
KR 85	1.559E+04	.000E+00	.000E+00	6.077E-03	1.559E+04	.000E+00	.000E+00	6.077E-03
KR 87	5.079E-14	.000E+00	.000E+00	1.979E-20	5.079E-14	.000E+00	.000E+00	1.979E-20
KR 88	2.105E-03	.000E+00	.000E+00	8.202E-10	2.105E-03	.000E+00	.000E+00	8.202E-10
I131	5.402E+03	.000E+00	.000E+00	2.105E-03	5.402E+03	.000E+00	.000E+00	2.105E-03
I132	2.199E-07	.000E+00	.000E+00	8.572E-14	2.199E-07	.000E+00	.000E+00	8.572E-14
I133	6.606E+02	.000E+00	.000E+00	2.574E-04	6.606E+02	.000E+00	.000E+00	2.574E-04
I134	3.554E-24	.000E+00	.000E+00	1.385E-30	3.554E-24	.000E+00	.000E+00	1.385E-30
I135	2.049E+00	.000E+00	.000E+00	7.985E-07	2.049E+00	.000E+00	.000E+00	7.985E-07
XE131M	7.711E+03	.000E+00	.000E+00	3.005E-03	7.711E+03	.000E+00	.000E+00	3.005E-03
XE133M	1.005E+05	.000E+00	.000E+00	3.917E-02	1.005E+05	.000E+00	.000E+00	3.917E-02
XE133	1.427E+06	.000E+00	.000E+00	5.561E-01	1.427E+06	.000E+00	.000E+00	5.561E-01
XE135M	6.564E+01	.000E+00	.000E+00	2.558E-05	6.564E+01	.000E+00	.000E+00	2.558E-05
XE135	1.058E+04	.000E+00	.000E+00	4.125E-03	1.058E+04	.000E+00	.000E+00	4.125E-03
TOTALS								
GROUP 1	1.561E+06	.000E+00	.000E+00	6.085E-01	1.561E+06	.000E+00	.000E+00	6.085E-01
GROUP 2	6.064E+03	.000E+00	.000E+00	2.363E-03	6.064E+03	.000E+00	.000E+00	2.363E-03
GROUP 3	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GRND.TOT	1.568E+06	.000E+00	.000E+00	6.109E-01	1.568E+06	.000E+00	.000E+00	6.109E-01

NOTE: THE ATMOSPHERIC CONCENTRATION OF RADIOACTIVITY IS BASED ON A DISPERSION FACTOR (X/Q) OF 1.403E-03 (sec/m3)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (CONTINUOUS OCCUPANCY)
COMPARTMENT C

T (hours)	Beta Air DOSE RATE (rad/hr)	Beta Air INTVL DOS (rad)	Beta Air CUM. DOSE (rad)	Gamma Air DOSE RATE (rad/hr)	Gamma Air INTVL DOS (rad)	Gamma Air CUM. DOSE (rad)	Tot. Skin DOSE RATE (rem/hr)	Tot. Skin INTVL DOS (rem)	Tot. Skin CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.960E+00	9.430E-01	9.430E-01	3.178E-02	1.529E-02	1.529E-02	3.740E-01	1.800E-01	1.800E-01
1.0000E+00	1.689E+00	9.107E-01	1.854E+00	2.738E-02	1.476E-02	3.005E-02	3.221E-01	1.737E-01	3.537E-01
2.0000E+00	1.254E+00	1.461E+00	3.314E+00	2.027E-02	2.365E-02	5.370E-02	2.384E-01	2.781E-01	6.318E-01
8.0000E+00	2.110E-01	3.507E+00	6.821E+00	3.387E-03	5.650E-02	1.102E-01	3.968E-02	6.637E-01	1.296E+00
2.4000E+01	2.457E-03	7.132E-01	7.534E+00	3.990E-05	1.144E-02	1.216E-01	4.582E-04	1.337E-01	1.429E+00
9.6000E+01	5.934E-05	1.971E-02	7.554E+00	1.149E-06	3.353E-04	1.220E-01	1.183E-05	3.715E-03	1.433E+00
7.2000E+02	1.764E-06	4.978E-03	7.559E+00	4.288E-08	1.144E-04	1.221E-01	3.997E-07	1.092E-03	1.434E+00

T (hours)	Gonads DOSE RATE (rem/hr)	Gonads INTVL DOS (rem)	Gonads CUM. DOSE (rem)	Breast DOSE RATE (rem/hr)	Breast INTVL DOS (rem)	Breast CUM. DOSE (rem)	Lungs DOSE RATE (rem/hr)	Lungs INTVL DOS (rem)	Lungs CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.887E-02	9.082E-03	9.082E-03	2.636E-02	1.268E-02	1.268E-02	6.773E-02	3.260E-02	3.260E-02
1.0000E+00	1.626E-02	8.767E-03	1.785E-02	2.271E-02	1.225E-02	2.493E-02	5.834E-02	3.146E-02	6.406E-02
2.0000E+00	1.168E-02	1.384E-02	3.168E-02	1.580E-02	1.902E-02	4.395E-02	3.390E-02	4.495E-02	1.090E-01
8.0000E+00	1.815E-03	3.142E-02	6.310E-02	2.245E-03	4.071E-02	8.466E-02	2.097E-03	6.430E-02	1.733E-01
2.4000E+01	2.093E-05	6.084E-03	6.919E-02	2.546E-05	7.458E-03	9.212E-02	1.718E-05	5.984E-03	1.793E-01
9.6000E+01	5.030E-07	1.687E-04	6.936E-02	6.305E-07	2.065E-04	9.232E-02	3.685E-07	1.352E-04	1.794E-01
7.2000E+02	1.461E-08	4.150E-05	6.940E-02	1.925E-08	5.394E-05	9.238E-02	8.536E-09	2.594E-05	1.794E-01

T (hours)	R.Marrow DOSE RATE (rem/hr)	R.Marrow INTVL DOS (rem)	R.Marrow CUM. DOSE (rem)	Bone Sur DOSE RATE (rem/hr)	Bone Sur INTVL DOS (rem)	Bone Sur CUM. DOSE (rem)	Thyroid DOSE RATE (rem/hr)	Thyroid INTVL DOS (rem)	Thyroid CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.629E-02	7.837E-03	7.837E-03	5.566E-02	2.678E-02	2.678E-02	2.120E+01	1.019E+01	1.019E+01
1.0000E+00	1.403E-02	7.565E-03	1.540E-02	4.797E-02	2.586E-02	5.264E-02	1.829E+01	9.853E+00	2.005E+01
2.0000E+00	9.858E-03	1.163E-02	2.703E-02	3.480E-02	4.101E-02	9.365E-02	9.910E+00	1.367E+01	3.372E+01
8.0000E+00	1.274E-03	2.392E-02	5.096E-02	5.545E-03	9.471E-02	1.884E-01	2.523E-01	1.578E+01	4.949E+01
2.4000E+01	1.415E-05	4.195E-03	5.515E-02	6.403E-05	1.864E-02	2.070E-01	3.353E-05	4.146E-01	4.991E+01
9.6000E+01	3.065E-07	1.117E-04	5.526E-02	1.406E-06	5.064E-04	2.075E-01	4.569E-07	1.800E-04	4.991E+01
7.2000E+02	7.257E-09	2.190E-05	5.529E-02	3.389E-08	1.017E-04	2.076E-01	1.250E-08	3.611E-05	4.991E+01

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (CONTINUOUS OCCUPANCY)
COMPARTMENT C

T (hours)	Remaindr DOSE RATE (rem/hr)	Remaindr INTVL DOS (rem)	Remaindr CUM. DOSE (rem)	Eff D.E. DOSE RATE (rem/hr)	Eff D.E. INTVL DOS (rem)	Eff D.E. CUM. DOSE (rem)	TID Thy DOSE RATE (rem/hr)	TID Thy INTVL DOS (rem)	TID Thy CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.932E-02	9.299E-03	9.299E-03	6.621E-01	3.184E-01	3.184E-01	2.937E+01	1.412E+01	1.412E+01
1.0000E+00	1.665E-02	8.977E-03	1.828E-02	5.712E-01	3.078E-01	6.261E-01	2.533E+01	1.365E+01	2.778E+01
2.0000E+00	1.125E-02	1.375E-02	3.203E-02	3.122E-01	4.287E-01	1.055E+00	1.372E+01	1.894E+01	4.671E+01
8.0000E+00	1.463E-03	2.785E-02	5.987E-02	9.373E-03	5.091E-01	1.564E+00	3.466E-01	2.181E+01	6.853E+01
2.4000E+01	1.618E-05	4.807E-03	6.468E-02	2.066E-05	1.832E-02	1.582E+00	1.911E-05	5.655E-01	6.909E+01
9.6000E+01	3.553E-07	1.281E-04	6.481E-02	4.650E-07	1.623E-04	1.582E+00	1.351E-24	3.119E-05	6.909E+01
7.2000E+02	8.664E-09	2.590E-05	6.484E-02	1.244E-08	3.616E-05	1.582E+00	.000E+00	2.206E-24	6.909E+01

T (hours)	RG1109WB DOSE RATE (rem/hr)	RG1109WB INTVL DOS (rem)	RG1109WB CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	2.712E-02	1.305E-02	1.305E-02
1.0000E+00	2.337E-02	1.260E-02	2.565E-02
2.0000E+00	1.729E-02	2.018E-02	4.582E-02
8.0000E+00	2.889E-03	4.820E-02	9.402E-02
2.4000E+01	3.366E-05	9.754E-03	1.038E-01
9.6000E+01	7.393E-07	2.663E-04	1.040E-01
7.2000E+02	1.790E-08	5.363E-05	1.041E-01

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

OVERALL SUMMARY - TOTAL RADIATION EXPOSURES (AS APPLICABLE) FOR SCENARIO DURATION (7.2000E+02 hrs)

CONTINUOUS OCCUPANCY

RECEPTOR/ORGAN	COMPARTMENT A (Hemispher)	COMPARTMENT B (Spherical)	COMPARTMENT C (Hemispher)	OFFSITE RECEP.
Beta Air (rad)	.000E+00	.000E+00	7.559E+00	.000E+00
Gamma Air (rad)	.000E+00	.000E+00	1.221E-01	.000E+00
Tot. skin (rem)	.000E+00	.000E+00	1.434E+00	.000E+00
[Beta Cont. (%)]	[.00]	[.00]	[93.96]	[.00]
Gonads (rem)	.000E+00	.000E+00	6.940E-02	.000E+00
Breast (rem)	.000E+00	.000E+00	9.238E-02	.000E+00
Lungs (rem)	.000E+00	.000E+00	1.794E-01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[70.22]	[.00]
R.Marrow (rem)	.000E+00	.000E+00	5.529E-02	.000E+00
Bone Sur (rem)	.000E+00	.000E+00	2.076E-01	.000E+00
Thyroid (rem)	.000E+00	.000E+00	4.991E+01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[99.88]	[.00]
Remaindr (rem)	.000E+00	.000E+00	6.484E-02	.000E+00
Eff D.E. (rem)	.000E+00	.000E+00	1.582E+00	.000E+00
[Inhalation (%)]	[.00]	[.00]	[96.03]	[.00]
TID Thy (rem)	.000E+00	.000E+00	6.909E+01	.000E+00
RG1109WB (rem)	.000E+00	.000E+00	1.041E-01	.000E+00

The Dose Conversion Factors (DCFs) employed by ELISA-2 are from EPA 520/1-88-020 and EPA 402-R-93-081 (Federal Guidance Reports 11 and 12), except for TID Thy and RG1109WB, which are as follows:

TID Thy = Classical thyroid inhalation dose based on the TID-14844 DCFs (iodines only)
RG1109WB = Classical whole body immersion dose based on the Reg. Guide 1.109 DCFs (noble and halogens only)

The beta dose to air is for immersion in an infinite cloud.

The skin dose includes contributions from gamma radiation (finite cloud), beta radiation (semi-infinite cloud) and ground contamination. The skin beta-contribution percentages exclude ground contamination.

Finite-cloud correction, if any, is nuclide specific.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (PARTIAL OCCUPANCY)
COMPARTMENT C

T (hours)	Beta Air DOSE RATE (rad/hr)	Beta Air INTVL DOS (rad)	Beta Air CUM. DOSE (rad)	Gamma Air DOSE RATE (rad/hr)	Gamma Air INTVL DOS (rad)	Gamma Air CUM. DOSE (rad)	Tot. Skin DOSE RATE (rem/hr)	Tot. Skin INTVL DOS (rem)	Tot. Skin CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.960E+00	9.430E-01	9.430E-01	3.178E-02	1.529E-02	1.529E-02	3.740E-01	1.800E-01	1.800E-01
1.0000E+00	1.689E+00	9.107E-01	1.854E+00	2.738E-02	1.476E-02	3.005E-02	3.221E-01	1.737E-01	3.537E-01
2.0000E+00	1.254E+00	1.461E+00	3.314E+00	2.027E-02	2.365E-02	5.370E-02	2.384E-01	2.781E-01	6.318E-01
8.0000E+00	2.110E-01	3.507E+00	6.821E+00	3.387E-03	5.650E-02	1.102E-01	3.968E-02	6.637E-01	1.296E+00
2.4000E+01	2.457E-03	7.132E-01	7.534E+00	3.990E-05	1.144E-02	1.216E-01	4.582E-04	1.337E-01	1.429E+00
9.6000E+01	5.934E-05	1.971E-02	7.554E+00	1.149E-06	3.353E-04	1.220E-01	1.183E-05	2.229E-03	1.431E+00
7.2000E+02	1.764E-06	4.978E-03	7.559E+00	4.288E-08	1.144E-04	1.221E-01	3.997E-07	4.366E-04	1.432E+00

T (hours)	Gonads DOSE RATE (rem/hr)	Gonads INTVL DOS (rem)	Gonads CUM. DOSE (rem)	Breast DOSE RATE (rem/hr)	Breast INTVL DOS (rem)	Breast CUM. DOSE (rem)	Lungs DOSE RATE (rem/hr)	Lungs INTVL DOS (rem)	Lungs CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.887E-02	9.082E-03	9.082E-03	2.636E-02	1.268E-02	1.268E-02	6.773E-02	3.260E-02	3.260E-02
1.0000E+00	1.626E-02	8.767E-03	1.785E-02	2.271E-02	1.225E-02	2.493E-02	5.834E-02	3.146E-02	6.406E-02
2.0000E+00	1.168E-02	1.384E-02	3.168E-02	1.580E-02	1.902E-02	4.395E-02	3.390E-02	4.495E-02	1.090E-01
8.0000E+00	1.815E-03	3.142E-02	6.310E-02	2.245E-03	4.071E-02	8.466E-02	2.097E-03	6.430E-02	1.733E-01
2.4000E+01	2.093E-05	6.084E-03	6.919E-02	2.546E-05	7.458E-03	9.212E-02	1.718E-05	5.984E-03	1.793E-01
9.6000E+01	5.030E-07	1.012E-04	6.929E-02	6.305E-07	1.239E-04	9.224E-02	3.685E-07	8.110E-05	1.794E-01
7.2000E+02	1.461E-08	1.660E-05	6.931E-02	1.925E-08	2.157E-05	9.226E-02	8.536E-09	1.038E-05	1.794E-01

T (hours)	R.Marrow DOSE RATE (rem/hr)	R.Marrow INTVL DOS (rem)	R.Marrow CUM. DOSE (rem)	Bone Sur DOSE RATE (rem/hr)	Bone Sur INTVL DOS (rem)	Bone Sur CUM. DOSE (rem)	Thyroid DOSE RATE (rem/hr)	Thyroid INTVL DOS (rem)	Thyroid CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.629E-02	7.837E-03	7.837E-03	5.566E-02	2.678E-02	2.678E-02	2.120E+01	1.019E+01	1.019E+01
1.0000E+00	1.403E-02	7.565E-03	1.540E-02	4.797E-02	2.586E-02	5.264E-02	1.829E+01	9.853E+00	2.005E+01
2.0000E+00	9.558E-03	1.163E-02	2.703E-02	3.480E-02	4.101E-02	9.365E-02	9.910E+00	1.367E+01	3.372E+01
8.0000E+00	1.274E-03	2.392E-02	5.096E-02	5.545E-03	9.471E-02	1.884E-01	2.523E-01	1.578E+01	4.949E+01
2.4000E+01	1.415E-05	4.195E-03	5.515E-02	6.403E-05	1.864E-02	2.070E-01	3.353E-05	4.146E-01	4.991E+01
9.6000E+01	3.065E-07	6.705E-05	5.522E-02	1.406E-06	3.038E-04	2.073E-01	4.569E-07	1.080E-04	4.991E+01
7.2000E+02	7.257E-09	8.760E-06	5.523E-02	3.389E-08	4.068E-05	2.073E-01	1.250E-08	1.444E-05	4.991E+01

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (PARTIAL OCCUPANCY)
COMPARTMENT C

T (hours)	Remaindr DOSE RATE (rem/hr)	Remaindr INTVL DOS (rem)	Remaindr CUM. DOSE (rem)	Eff D.E. DOSE RATE (rem/hr)	Eff D.E. INTVL DOS (rem)	Eff D.E. CUM. DOSE (rem)	TID Thy DOSE RATE (rem/hr)	TID Thy INTVL DOS (rem)	TID Thy CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.932E-02	9.299E-03	9.299E-03	6.621E-01	3.184E-01	3.184E-01	2.937E+01	1.412E+01	1.412E+01
1.0000E+00	1.665E-02	8.977E-03	1.828E-02	5.712E-01	3.078E-01	6.261E-01	2.533E+01	1.365E+01	2.778E+01
2.0000E+00	1.125E-02	1.375E-02	3.203E-02	3.122E-01	4.287E-01	1.055E+00	1.372E+01	1.894E+01	4.671E+01
8.0000E+00	1.463E-03	2.785E-02	5.987E-02	9.373E-03	5.091E-01	1.564E+00	3.466E-01	2.181E+01	6.853E+01
2.4000E+01	1.618E-05	4.807E-03	6.468E-02	2.066E-05	1.832E-02	1.582E+00	1.911E-05	5.655E-01	6.909E+01
9.6000E+01	3.553E-07	7.683E-05	6.476E-02	4.650E-07	9.738E-05	1.582E+00	1.351E-24	1.872E-05	6.909E+01
7.2000E+02	8.664E-09	1.036E-05	6.477E-02	1.244E-08	1.446E-05	1.582E+00	.000E+00	8.824E-25	6.909E+01

T (hours)	RG1109WB DOSE RATE (rem/hr)	RG1109WB INTVL DOS (rem)	RG1109WB CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	2.712E-02	1.305E-02	1.305E-02
1.0000E+00	2.337E-02	1.260E-02	2.565E-02
2.0000E+00	1.729E-02	2.018E-02	4.582E-02
8.0000E+00	2.889E-03	4.820E-02	9.402E-02
2.4000E+01	3.366E-05	9.754E-03	1.038E-01
9.6000E+01	7.393E-07	1.598E-04	1.039E-01
7.2000E+02	1.790E-08	2.145E-05	1.040E-01

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 2 FAN OP; 224 CFM LEAKAGE; RG 1.195 (INSTANTANEOUS RELEASE FROM SOURCE)

OVERALL SUMMARY - TOTAL RADIATION EXPOSURES (AS APPLICABLE) FOR SCENARIO DURATION (7.2000E+02 hrs)

PARTIAL OCCUPANCY

RECEPTOR/ORGAN	COMPARTMENT A (Hemispher)	COMPARTMENT B (Spherical)	COMPARTMENT C (Hemispher)	OFFSITE RECEP.
Beta Air (rad)	.000E+00	.000E+00	7.559E+00	.000E+00
Gamma Air (rad)	.000E+00	.000E+00	1.221E-01	.000E+00
Tot. skin (rem)	.000E+00	.000E+00	1.432E+00	.000E+00
[Beta Cont. (%)]	[.00]	[.00]	[93.96]	[.00]
Gonads (rem)	.000E+00	.000E+00	6.931E-02	.000E+00
Breast (rem)	.000E+00	.000E+00	9.226E-02	.000E+00
Lungs (rem)	.000E+00	.000E+00	1.794E-01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[70.24]	[.00]
R.Marrow (rem)	.000E+00	.000E+00	5.523E-02	.000E+00
Bone Sur (rem)	.000E+00	.000E+00	2.073E-01	.000E+00
Thyroid (rem)	.000E+00	.000E+00	4.991E+01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[99.88]	[.00]
Remaindr (rem)	.000E+00	.000E+00	6.477E-02	.000E+00
Eff D.E. (rem)	.000E+00	.000E+00	1.582E+00	.000E+00
[Inhalation (%)]	[.00]	[.00]	[96.04]	[.00]
TID Thy (rem)	.000E+00	.000E+00	6.909E+01	.000E+00
RG1109WB (rem)	.000E+00	.000E+00	1.040E-01	.000E+00

The Dose Conversion Factors (DCFs) employed by ELISA-2 are from EPA 520/1-88-020 and EPA 402-R-93-081 (Federal Guidance Reports 11 and 12), except for TID Thy and RG1109WB, which are as follows:

TID Thy = Classical thyroid inhalation dose based on the TID-14844 DCFs (iodines only)
RG1109WB = Classical whole body immersion dose based on the Reg. Guide 1.109 DCFs (nobles and halogens only)

The beta dose to air is for immersion in an infinite cloud.

The skin dose includes contributions from gamma radiation (finite cloud), beta radiation (semi-infinite cloud) and ground contamination. The skin beta-contribution percentages exclude ground contamination.

Finite-cloud correction, if any, is nuclide specific.

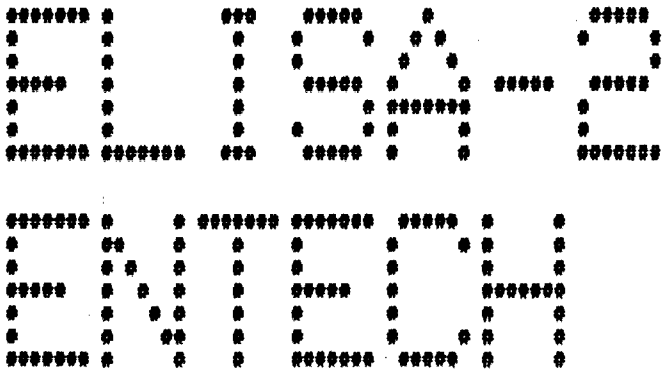
Partial occupancy has been applied only to human exposures in Compartment C.

********** END OF THIS CASE **********

ELISA-2 RUN CASE D

```
**********************************************************************
**            FRAMATOME ANP SOFTWARE CONTROL LIBRARY                **
**********************************************************************
**                                                                  **
**  SCL ITEM            :  elisa2-2                                 **
**  SCL FILE            :  /SCL/elisa2-2.2/elisa2_2.e               **
**  SCL VER/MOD LEVEL   :  02 / 02                                  **
**  DESCRIPTION         :  CSI: ELISA2 02/02 - A computer code for the
**  evaluation of licensing and severe accidents at LWRs.           **
**  INSTALLED DATE      :  04/17/03                                 **
**  SAFETY CODE         :  Y                                        **
**  VALIDATION DOC. #   :                                           **
**  CODE SPONSOR        :  DISTEFANO JOHN                           **
**  TODAY'S DATE        :  08/02/03                                 **
**  CURRENT TIME        :  14:19:07 EDT                             **
**                                                                  **
**  HP-UX alpha1 B.10.20 A 9000/785 2010238544 tw                   **
**                                                                  **
**********************************************************************
**********************************************************************

**********************************************************************
**            FRAMATOME ANP SOFTWARE CONTROL LIBRARY                **
**********************************************************************
**                                                                  **
**  SCL ITEM            :  elisa2.lib                               **
**  SCL FILE            :  /SCL/elisa2_v21/lib/elisa2.lib           **
**  SCL VER/MOD LEVEL   :  01 / 00                                  **
**  DESCRIPTION         :  Elisa2 Data Library   **
**     **
**  INSTALLED DATE      :  06/01/01                                 **
**  SAFETY CODE         :  Y                                        **
**  VALIDATION DOC. #   :                                           **
**  CODE SPONSOR        :  DISTEFANO JOHN                           **
**  TODAY'S DATE        :  08/02/03                                 **
**  CURRENT TIME        :  14:19:07 EDT                             **
**                                                                  **
**  HP-UX alpha1 B.10.20 A 9000/785 2010238544 tw                   **
**                                                                  **
**********************************************************************
**********************************************************************
```



ENTECH ENGINEERING, INC., WESTBOROUGH, MA

RELEASE VERSION/LEVEL..: Version 2.2
RELEASE DATE .....: May 23,2002

PROBLEM SUBMITTED ON ..: 2-Aug-03 14:19:07

INPUT FILE .....: elisa2-D.inp
DATA LIBRARY FILE .....: /SCL/elisa2-2.2/elisa2.lib
OUTPUT FILE .....: elisa2-D.el2
PHOTON SPECTRA FILE #1 : elisa2-D.el3
PHOTON SPECTRA FILE #2 : elisa2-D.el4

INPUT DATA LISTING

```
Line          1         2         3         4         5         6         7         8         9        10        11        12
Seq.  123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

  1   SB - OPEN CONT. PHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96
  2   10002     4           6           8           1           0           NNYNYY      N           NNNN           YYYYYY
  3   10003     0           1.0         80.0        0.0         1.000E-02
  4   10004     3           0           0
  5      1      1.000E+00   0.0         0.0         XE          KR
  6      2      2.500E-03   2.500E-03   0.00        I           BR
  7      3      0.0         0.0         0.0         ZZ
  8   10005     4           Filter efficiencies
  9      2      1           0.0         0.0         9.500E-01   0.0         9.500E-01
 10      2      2           0.0         0.0         9.500E-01   0.0         9.500E-01
 11      2      3           0.0         0.0         9.900E-01   0.0         9.900E-01
 12      3      0           0.0         0.0         9.900E-01   0.0         9.900E-01
 13   10006     0.0         0.0         Peak assembly gap activity (Ci), based on UFSAR Table 15.7-20
 14    I131     7.200E+04   I132        6.500E+04   I133        9.500E+04   I134        1.050E+05
 15    I135     9.000E+04   KR85M       1.250E+04   KR85        7.800E+02   KR87        2.200E+04
 16    KR88     3.200E+04   XE131M      3.200E+02   XE133M      1.300E+04   XE133       9.000E+04
 17    XE135M   1.850E+04   XE135       1.900E+04   XE138       7.000E+04
 18   10007     2           0.0         480.0       0.0         0.0         0.0         0.0         CONTAINMENT
 19   10009     2           2.460E+05   794.0       500.0       0.0         0.0         0.0         CONTROL-ROOM
 20   10010     5
 21    0.0      5.000E-01   1.000E+00   2.000E+00   7.200E+02
 22   10017     2  Control room recirc rate multiplier
 23    0.0      0.0         1.0         1.0
 24   10018     6  Control room composite X/Q  (sec/m3)
 25    0.0      9.085E-04   1.0         9.085E-04   2.0         7.490E-04   8.0         2.900E-04
 26    24.0     1.925E-04   96.0        1.289E-04

 27   10021     1  Breathing rate (m3/sec)
 28    0.0      3.500E-04
 29   10023     6  Control room intake filter bypass fraction
 30    0.0      7.638E-01   1.0         7.638E-01   2.0         7.503E-01   8.0         7.303E-01
 31    24.0     7.449E-01   96.0        7.011E-01
 32   10024     3  Occupancy factors
 33    0.0      1.0         24.000      6.000E-01   96.000      4.000E-01
 34   99999
```

DATA LIBRARY PARTIAL LISTING

```
Line            1         2         3         4         5         6         7         8         9        10        11        12
Seq.    12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789

  1     ELISA-2 DATA LIBRARY - BASED ON ORIGEN-2 AND FEDERAL GUIDANCE REPORTS 11 AND 12                                  V2L1    1
  2     RELEASE DATE: 1/13/99                                                                                           V2L1    2
  3     REMARKS (START)                                                                                                 V2L1    3
  4         Source inventories are in Ci for the power level specified for each plant.                                  V2L1    4
  5         Decay constants are in inverse hours.                                                                       V2L1    5
  6         The entry line following the decay chains includes the decay constants                                      V2L1    6
  7           for each of three members [parent (P), daugher (D) and granddaughter                                      V2L1    7
  8           (G)], and the branching fractions (P-D), (D-G) and (P-G).                                                 V2L1    8
  9         Air immersion DCFs are in [((Sv or Gy))/s)/(Bq/m3)], for semi-infinite cloud                                V2L1    9
 10         Ground-shine  DCFs are in [((Sv or Gy))/s)/(Bq/m2)] (surface contamination).                                V2L1   10
 11         Inhalation DCFs are in [Sv/Bq)].                                                                            V2L1   11
 12         The inhalation DCF's are for the Lung Clearance Class which yields the                                      V2L1   12
 13           highest Effective Dose Equivalent (Eff D.E.); the class is identified.                                    V2L1   13
 14         Negative DCF entries imply 'data not available'.                                                            V2L1   14
 15         ORGAN 'TID Thy' = Thyroid inhalation based on TID-14844 - Iodines only.                                     V2L1   15
 16         ORGAN 'RG1109WB' = Whole body gamma dose using the Reg. Guide 1.109 DCFs.                                    V2L1   16
 17         Skin DCFs are included along with the organ DCFs, but skin is not                                           V2L1   17
 18           considered as an organ.                                                                                   V2L1   18
 19     READ FORMATS FOR THE RADIONUCLIDE DATA BASE                                                                     V2L1   19
 20     Line    1     Nuclide name and source inventories          (4x,a6,10x,4e12.3)                                   V2L1   20
 21                   (Note:  Nuclide sequence No. is not used)                                                         V2L1   21
 22     Line    2     Header                                       (a80)                                               V2L1   22
 23     Line    3     Decay chain (3 members)                      (9x,3(a6,6x))                                       V2L1   23
 24     Line    4     Decay constants & branching fractions        (8x,6e12.3)                                         V2L1   24
 25     Line    5     Header                                       (a80)                                               V2L1   25
 26     Lines  6-9    18 ORIGEN-2 photons and 1 ICRP-38 beta       (8x,6e12.3)                                         V2L1   26
 27     Line   10     Header                                       (a80)                                               V2L1   27
 28     Lines 11-16   Dose conversion factors                      (2x,6e12.3)                                         V2L1   28
 29     END REMARKS                                                                                                     V2L1   29
 30     GENERAL DATA BASE                                                                                               V2L1   30
 31        10       [ORGAN NAMES - READ FORMAT (11x,6(a8,4x))]                                                         V2L1   31
 32                 Gonads      Breast      Lungs       R.Marrow    Bone Sur    Thyroid                               V2L1   32
 33                 Remaindr    Eff D.E.    TID Thy     RG1109WB    (Skin)                                            V2L1   33
 34          4      [Power plants and power levels (MWt) - READ FORMAT (11x,a20,1x,e12.3)                              V2L1   34
 35                 PWR (33 GWD/MT 3.2%)    1.000E+00                                                               V2L1   35
 36                 PWR (50 GWD/MT 4.2%)    1.000E+00                                                               V2L1   36
 37                 BWR (27.5 GWD/MT 3%)    1.000E+00                                                               V2L1   37
 38                 BWR (40 GWD/MT 3.4%)    1.000E+00                                                               V2L1   38
 39        18       [ORIGEN-2 upper limit energy in each gamma group (MeV) (8x,6e12.3)]                              V2L1   39
 40                 2.000E-02   3.000E-02   4.500E-02   7.000E-02   1.000E-01   1.500E-01                           V2L1   40
 41                 3.000E-01   4.500E-01   7.000E-01   1.000E+00   1.500E+00   2.000E+00                           V2L1   41
 42                 2.500E+00   3.000E+00   4.000E+00   6.000E+00   8.000E+00   1.100E+01                           V2L1   42
 43          3      Factors to convert data library DCFs to proper units, as shown                                     V2L1   43
 44                 1.0         Convert air immersion DCF to [((Sv or Gy)/s)/(Bq/m3)]                               V2L1   44
 45                 1.0         Convert ground shine  DCF to [((Sv or Gy)/s)/(Bq/m2)]                               V2L1   45
 46                 1.0         Convert inhalation DCF to [Sy/Bq]                                                   V2L1   46
 47        18       Air gamma DCF for semi-infinite monoener. cloud src [(Gy/s)/(Bq/m3)]                                V2L1   47
 48                 6.676E-16   1.669E-15   2.503E-15   3.839E-15   5.674E-15   8.345E-15                           V2L1   48
```

DATA LIBRARY PARTIAL LISTING

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Line            1         2         3         4         5         6         7         8         9        10        11        12
Seq.    12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789

 49                1.502E-14 2.503E-14 3.839E-14 5.674E-14 8.345E-14 1.168E-13 V2L1   49
 50                1.502E-13 1.836E-13 2.337E-13 3.338E-13 4.673E-13 6.342E-13 V2L1   50
 51       18       Air gamma DCF for monoenerg. ground-surface source [(Gy/s)/(Bq/m2)] V2L1   51
 52                1.829E-16 1.493E-16 9.835E-17 8.181E-17 9.767E-17 1.436E-16 V2L1   52
 53                2.760E-16 4.785E-16 7.318E-16 1.050E-15 1.457E-15 1.910E-15 V2L1   53
 54                2.325E-15 2.710E-15 3.243E-15 4.194E-15 5.386E-15 6.759E-15 V2L1   54
 55       18       Skin gamma DCF for semi-infinite monoener. cloud src [(Sv/s)/(Bq/m3)] V2L1   55
 56                1.138E-16 7.690E-16 1.467E-15 2.717E-15 4.416E-15 6.737E-15 V2L1   56
 57                1.239E-14 2.073E-14 3.193E-14 4.754E-14 7.108E-14 1.012E-13 V2L1   57
 58                1.317E-13 1.624E-13 2.089E-13 3.030E-13 4.305E-13 5.922E-13 V2L1   58
 59     RADIONUCLIDE DATA BASE                                                 V2L1   59
 60       1  H  3  (Src Ci)    1.471E+01 2.186E+01 1.744E+01 2.536E+01         V2L1   60
 61              Decay chain, decay constants and branching fractions          V2L1   61
 62               H  3                                                         V2L1   62
 63              6.40320E-06 0.00000E+00 0.00000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1   63
 64              ORIGEN-2 18-group phot/dis, and ICRP-38 betas (MeV/dis)       V2L1   64
 65                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1   65
 66                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1   66
 67                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1   67
 68                5.600E-03                                                   V2L1   68
 69              ICRP-38 Organ DCFs - Air immer, Grnd shine, Inhal/Class V     V2L1   69
 70                0.000E+00 0.000E+00 2.750E-18 0.000E+00 0.000E+00 0.000E+00 V2L1   70
 71                0.000E+00 3.310E-19 0.000E+00 0.000E+00 0.000E+00           V2L1   71
 72                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1   72
 73                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00           V2L1   73
 74                1.730E-11 1.730E-11 1.730E-11 1.730E-11 1.730E-11 1.730E-11 V2L1   74
 75                1.730E-11 1.730E-11 0.000E+00 0.000E+00                     V2L1   75
 76       2  C 14  (Src Ci)    3.125E-06 4.723E-06 3.772E-06 5.467E-06         V2L1   76
 77              Decay chain, decay constants and branching fractions          V2L1   77
 78               C 14                                                         V2L1   78
 79              1.38016E-08 0.00000E+00 0.00000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1   79
 80              ORIGEN-2 18-group phot/dis, and ICRP-38 betas (MeV/dis)       V2L1   80
 81                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1   81
 82                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1   82
 83                0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 V2L1   83
 84                4.940E-02                                                   V2L1   84
 85              ICRP-38 Organ DCFs - Air immer, Grnd shine, Inhal/Class c     V2L1   85
 86                2.590E-19 3.520E-19 1.530E-19 1.210E-19 7.060E-19 2.190E-19 V2L1   86
 87                1.540E-19 2.240E-19 0.000E+00 0.000E+00 2.430E-16           V2L1   87
 88                2.220E-20 2.520E-20 8.650E-21 7.250E-21 4.630E-20 1.250E-20 V2L1   88
 89                1.030E-20 1.610E-20 0.000E+00 0.000E+00 7.460E-20           V2L1   89
 90                5.640E-10 5.640E-10 5.640E-10 5.640E-10 5.640E-10 5.640E-10 V2L1   90
 91                5.640E-10 5.640E-10 0.000E+00 0.000E+00                     V2L1   91
 92       3  N 13  (Src Ci)    0.000E+00 0.000E+00 0.000E+00 0.000E+00         V2L1   92
```

(.... etc., for a total of 414 radionuclides ....)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

LISTING OF INPUT DATA

PATHWAY OPTION = 4 (COMP. A --> COMP. C)

COMPARTMENT A: CONTAINMENT

FILTERED RECIRCULATION RATE (cfm) =	.000E+00
LEAK RATE TO ATMOSPHERE (frac/day) =	4.800E+02

COMPARTMENT C: CONTROL-ROOM

TOTAL FREE AIR VOLUME (cu ft) =	2.460E+05
INTAKE AND EXHAUST RATES (cfm) =	7.940E+02
FILTERED RECIRCULATION RATE (cfm) =	5.000E+02

FILTER REMOVAL EFFICIENCIES AND TIME-DEPENDENT
MULTIPLIERS FOR RECIRCULATION RATES, LEAK RATES,
COMP. A FLOW BETWEEN SPRAYED AND UNSPRAYED AREAS,
AND FILTER BYPASS FRACTIONS ARE GIVEN BELOW.

NO. OF DISCRETE TIME VALUES IN INPUT = 8

INTERMEDIATE RESULTS WILL BE PRINTED AT THE FOLLOWING TIMES (hrs):

.0000E+00

PROBLEM END TIME (hours) = 7.2000E+02

RELEASE RATES AND DOSE RATES ARE PRIOR TO TIME-STEP CHANGES, IF ANY.

ONLY EXACT SOLUTION OF THE DIFFERENTIAL EQUATIONS WAS EMPLOYED IN
THE ANALYSIS.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

RECIRCULATION, EXHAUST AND INTAKE FILTER REMOVAL EFFICIENCIES (fractions)

NUCL.	COMPARTMENT A RECIRC.			COMPARTMENT B RECIRC.			COMPARTMENT C RECIRC.			EXHAUST TO ATMOSPHERE			INTAKE TO COMPART. C		
GROUP	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3	FORM 1	FORM 2	FORM 3
1	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2	.0000	.0000	.0000	.0000	.0000	.0000	.9500	.9500	.9900	.0000	.0000	.0000	.9500	.9500	.9900
3	.0000	.0000	.0000	.0000	.0000	.0000	.9900	.9900	.9900	.0000	.0000	.0000	.9900	.9900	.9900

USER-SPECIFIED CLASSIFICATION OF RADIONUCLIDES AND INSTANTANEOUS FRACTIONAL RELEASES FROM THE SOURCE (AT T=0)

GROUP	E L E M E N T S	FORM 1	FORM 2	FORM 3
1	XE KR	1.000E+00	.000E+00	.000E+00
2	I BR	2.500E-03	2.500E-03	.000E+00
3	ZE	.000E+00	.000E+00	.000E+00

ELEMENT "ZE" STANDS FOR THE REMAINING DATA-LIBRARY ELEMENTS/NUCLIDES NOT LISTED ABOVE, IF ANY.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

TIME INTERVAL (hours)	CONCENTR. X/Q (sec/m3)	GAMMA X/Q (sec/m3)	DEPOSITION D/Q (1/m2)	BREATHING RATE (m3/sec)	EXH.FILT. BYPASS FRACTION	COMPART. C INT.FILTER BYPASS FR.	COMPART. C OCCUPANCY FACTOR
.0000E+00 - 5.0000E-01	9.085E-04	9.085E-04	.000E+00	3.500E-04	.000E+00	7.638E-01	1.000E+00
5.0000E-01 - 1.0000E+00	9.085E-04	9.085E-04	.000E+00	3.500E-04	.000E+00	7.638E-01	1.000E+00
1.0000E+00 - 2.0000E+00	9.085E-04	9.085E-04	.000E+00	3.500E-04	.000E+00	7.638E-01	1.000E+00
2.0000E+00 - 8.0000E+00	7.490E-04	7.490E-04	.000E+00	3.500E-04	.000E+00	7.503E-01	1.000E+00
8.0000E+00 - 2.4000E+01	2.900E-04	2.900E-04	.000E+00	3.500E-04	.000E+00	7.303E-01	1.000E+00
2.4000E+01 - 9.6000E+01	1.925E-04	1.925E-04	.000E+00	3.500E-04	.000E+00	7.449E-01	6.000E-01
9.6000E+01 - 7.2000E+02	1.289E-04	1.289E-04	.000E+00	3.500E-04	.000E+00	7.011E-01	4.000E-01

TIME INTERVAL (hours)	COMPART A MULTIPLIERS (IF APPLICABLE)		COMPART B MULTIPLIERS (IF APPLICABLE)		COMPART C MULTIPLIERS (IF APPLICABLE)		FLOW MULT. SPRAYED AREA TO UNSPRAYED
	LEAK RATE	REC.FILTER	LEAK RATE	REC.FILTER	INTAKE/EXH	REC.FILTER	
.0000E+00 - 5.0000E-01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	.000E+00	1.000E+00
5.0000E-01 - 1.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	.000E+00	1.000E+00
1.0000E+00 - 2.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2.0000E+00 - 8.0000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
8.0000E+00 - 2.4000E+01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2.4000E+01 - 9.6000E+01	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
9.6000E+01 - 7.2000E+02	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

ADJUSTMENTS WERE MADE TO THE INVENTORIES OF RADIONUCLIDES WHICH ARE IN SECULAR EQUILIBRIUM WITH THEIR PARENTS, AND WHOSE INVENTORIES WERE NOT USER-SPECIFIED, AS FOLLOWS, USING THE CONDITIONS:

NUCLIDE HALF-LIFE <= 7.200E+02 (hrs) AND (PRECURSOR HALF-LIFE/NUCLIDE HALF-LIFE) >= 1.000E+01

NUCLIDE	PRECURSOR	NUCLIDE HALF LIFE (hrs)	HALF-LIFE RATIOS (PREC./NUCL)	EQUILIBRIUM FACTOR	PRECURSOR ACTIVITY (Ci)	NUCLIDE ACTIVITY (Ci)

NONE FOUND!

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

USER-SPECIFIED SOURCE INVENTORY

NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)
KR 85M	1	1.2500E+04	I132	2	6.5000E+04	XE133M	1	1.3000E+04
KR 85	1	7.8000E+02	I133	2	9.5000E+04	XE133	1	9.0000E+04
KR 87	1	2.2000E+04	I134	2	1.0500E+05	XE135M	1	1.8500E+04
KR 88	1	3.2000E+04	I135	2	9.0000E+04	XE135	1	1.9000E+04
I131	2	7.2000E+04	XE131M	1	3.2000E+02	XE138	1	7.0000E+04

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

SOURCE INVENTORY FOLLOWING 8.000E+01 HOURS OF RADIOACTIVE GROWTH AND DECAY PRIOR TO RELEASE

NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)	NUCLIDE	GROUP	(Ci)
KR 85M	1	5.2729E-02	I131	2	5.4018E+04	XE133M	1	5.0257E+03
KR 85	1	7.7967E+02	I132	2	2.1995E-06	XE133	1	7.1351E+04
KR 87	1	2.5395E-15	I133	2	6.6056E+03	XE135M	1	3.2818E+00
KR 88	1	1.0523E-04	I134	2	3.5545E-23	XE135	1	5.2917E+02
RB 87	3	6.7960E-11	I135	2	2.0489E+01	CS135	3	8.5463E-06
RB 88	3	1.1751E-04	XE131M	1	3.8555E+02	CS138	3	7.3517E-41

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

FINITE-CLOUD CORRECTION FACTORS FOR GAMMA RADIATION EXPOSURES

NUCLIDE	COMPARTMENT A HEMISPHE. CLOUD RADIUS= .00 M	COMPARTMENT B SPHERICAL CLOUD RADIUS= .00 M	COMPARTMENT C HEMISPHE. CLOUD RADIUS= 14.93 M	
KR 85M	.000E+00	.000E+00	5.616E-02	
KR 85	.000E+00	.000E+00	5.288E-02	
KR 87	.000E+00	.000E+00	4.368E-02	
KR 88	.000E+00	.000E+00	4.271E-02	
RB 88	.000E+00	.000E+00	4.394E-02	
I131	.000E+00	.000E+00	5.415E-02	
I132	.000E+00	.000E+00	5.091E-02	
I133	.000E+00	.000E+00	5.208E-02	
I134	.000E+00	.000E+00	4.966E-02	
I135	.000E+00	.000E+00	4.634E-02	
XE131M	.000E+00	.000E+00	3.480E-01	
XE133M	.000E+00	.000E+00	1.995E-01	
XE133	.000E+00	.000E+00	9.405E-02	
XE135M	.000E+00	.000E+00	5.625E-02	
XE135	.000E+00	.000E+00	5.194E-02	
MURPHY/CAMPE	.000E+00	.000E+00	5.660E-02	(0.733 MEV - INFORMATION ONLY)

PURE BETA EMITTERS AND RADIONUCLIDES WITH UNDEFINED GAMMA SPECTRA ARE EXCLUDED FROM THE ABOVE LIST.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

T = .0000E+00 hrs DISTRIBUTION OF RADIOACTIVITY

NUCLIDE	COMPARTM. A (Ci/m3)	CHEM-SPRAY IN COMP. A (Ci)	REC.FILTER IN COMP. A (Ci)	COMPARTM. B (Ci/m3)	REC.FILTER IN COMP. B (Ci)	EXH.FILTER TO ATMOSP. (Ci)	COMPARTM. C (Ci/m3)	INT.FILTER TO COMP. C (Ci)	REC.FILTER IN COMP. C (Ci)
KR 85M	5.273E-02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 85	7.797E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 87	2.540E-15	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
KR 88	1.052E-04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I131	2.701E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I132	1.100E-08	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I133	3.303E+01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I134	1.777E-25	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
I135	1.024E-01	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE131M	3.856E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE133M	5.026E+03	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE133	7.135E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE135M	3.282E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
XE135	5.292E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
TOTALS									
GROUP 1	7.807E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GROUP 2	3.032E+02	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GROUP 3	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GRND.TOT	7.838E+04	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00

THE COMPARTMENT VOLUMES (A, B AND C) IN THIS TABLE ARE: 1.000E+00 .000E+00 6.966E+03 (m3)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

T = .0000E+00 hrs RELEASE RATES TO ATMOSPHERE, INTERVAL RELEASES FROM .0000E+00 TO .0000E+00 hrs,
CUMULATIVE RELEASES FROM 0.0 TO .0000E+00 hrs, AND RADIOACTIVE-CLOUD CONCENTRATIONS

	WITHOUT DECAY IN TRANSIT				WITH .000E+00 hrs IN-TRANSIT DECAY			
NUCLIDE	REL. RATE (Ci/hr)	INTRV REL (Ci)	CUML. REL (Ci)	CLOUD CONC (Ci/m3)	REL. RATE (Ci/hr)	INTRV REL (Ci)	CUML. REL (Ci)	CLOUD CONC (Ci/m3)
KR 85M	1.055E+00	.000E+00	.000E+00	2.661E-07	1.055E+00	.000E+00	.000E+00	2.661E-07
KR 85	1.559E+04	.000E+00	.000E+00	3.935E-03	1.559E+04	.000E+00	.000E+00	3.935E-03
KR 87	5.079E-14	.000E+00	.000E+00	1.282E-20	5.079E-14	.000E+00	.000E+00	1.282E-20
KR 88	2.105E-03	.000E+00	.000E+00	5.311E-10	2.105E-03	.000E+00	.000E+00	5.311E-10
I131	5.402E+03	.000E+00	.000E+00	1.363E-03	5.402E+03	.000E+00	.000E+00	1.363E-03
I132	2.199E-07	.000E+00	.000E+00	5.551E-14	2.199E-07	.000E+00	.000E+00	5.551E-14
I133	6.606E+02	.000E+00	.000E+00	1.667E-04	6.606E+02	.000E+00	.000E+00	1.667E-04
I134	3.554E-24	.000E+00	.000E+00	8.970E-31	3.554E-24	.000E+00	.000E+00	8.970E-31
I135	2.049E+00	.000E+00	.000E+00	5.171E-07	2.049E+00	.000E+00	.000E+00	5.171E-07
XE131M	7.711E+03	.000E+00	.000E+00	1.946E-03	7.711E+03	.000E+00	.000E+00	1.946E-03
XE133M	1.005E+05	.000E+00	.000E+00	2.537E-02	1.005E+05	.000E+00	.000E+00	2.537E-02
XE133	1.427E+06	.000E+00	.000E+00	3.601E-01	1.427E+06	.000E+00	.000E+00	3.601E-01
XE135M	6.564E+01	.000E+00	.000E+00	1.656E-05	6.564E+01	.000E+00	.000E+00	1.656E-05
XE135	1.058E+04	.000E+00	.000E+00	2.671E-03	1.058E+04	.000E+00	.000E+00	2.671E-03
TOTALS								
GROUP 1	1.561E+06	.000E+00	.000E+00	3.941E-01	1.561E+06	.000E+00	.000E+00	3.941E-01
GROUP 2	6.064E+03	.000E+00	.000E+00	1.530E-03	6.064E+03	.000E+00	.000E+00	1.530E-03
GROUP 3	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
GRND.TOT	1.568E+06	.000E+00	.000E+00	3.956E-01	1.568E+06	.000E+00	.000E+00	3.956E-01

NOTE: THE ATMOSPHERIC CONCENTRATION OF RADIOACTIVITY IS BASED ON A DISPERSION FACTOR (X/Q) OF 9.085E-04 (sec/m3)

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (CONTINUOUS OCCUPANCY)
COMPARTMENT C

T (hours)	Beta Air DOSE RATE (rad/hr)	Beta Air INTVL DOS (rad)	Beta Air CUM. DOSE (rad)	Gamma Air DOSE RATE (rad/hr)	Gamma Air INTVL DOS (rad)	Gamma Air CUM. DOSE (rad)	Tot. Skin DOSE RATE (rem/hr)	Tot. Skin INTVL DOS (rem)	Tot. Skin CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	8.829E-01	4.155E-01	4.155E-01	1.435E-02	6.755E-03	6.755E-03	1.687E-01	7.943E-02	7.943E-02
1.0000E+00	7.990E-01	4.201E-01	8.357E-01	1.298E-02	6.828E-03	1.358E-02	1.525E-01	8.024E-02	1.597E-01
2.0000E+00	6.541E-01	7.241E-01	1.560E+00	1.061E-02	1.176E-02	2.534E-02	1.246E-01	1.381E-01	2.977E-01
8.0000E+00	1.976E-01	2.287E+00	3.846E+00	3.184E-03	3.698E-02	6.232E-02	3.724E-02	4.335E-01	7.312E-01
2.4000E+01	8.482E-03	9.535E-01	4.800E+00	1.356E-04	1.531E-02	7.763E-02	1.573E-03	1.787E-01	9.099E-01
9.6000E+01	3.831E-05	4.952E-02	4.849E+00	7.379E-07	8.013E-04	7.843E-02	7.610E-06	9.190E-03	9.191E-01
7.2000E+02	1.021E-06	2.939E-03	4.852E+00	2.483E-08	6.723E-05	7.850E-02	2.315E-07	6.426E-04	9.198E-01

T (hours)	Gonads DOSE RATE (rem/hr)	Gonads INTVL DOS (rem)	Gonads CUM. DOSE (rem)	Breast DOSE RATE (rem/hr)	Breast INTVL DOS (rem)	Breast CUM. DOSE (rem)	Lungs DOSE RATE (rem/hr)	Lungs INTVL DOS (rem)	Lungs CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	8.852E-03	4.167E-03	4.167E-03	1.286E-02	6.054E-03	6.054E-03	3.934E-02	1.852E-02	1.852E-02
1.0000E+00	8.008E-03	4.211E-03	8.378E-03	1.164E-02	6.121E-03	1.217E-02	3.557E-02	1.871E-02	3.723E-02
2.0000E+00	6.444E-03	7.196E-03	1.557E-02	9.225E-03	1.038E-02	2.256E-02	2.641E-02	3.076E-02	6.799E-02
8.0000E+00	1.808E-03	2.179E-02	3.736E-02	2.410E-03	3.025E-02	5.281E-02	4.645E-03	7.461E-02	1.426E-01
2.4000E+01	7.230E-05	8.481E-03	4.584E-02	8.931E-05	1.098E-02	6.379E-02	7.954E-05	1.690E-02	1.595E-01
9.6000E+01	3.248E-07	4.201E-04	4.626E-02	4.067E-07	5.162E-04	6.430E-02	2.389E-07	4.068E-04	1.599E-01
7.2000E+02	8.460E-09	2.451E-05	4.629E-02	1.114E-08	3.182E-05	6.434E-02	4.943E-09	1.539E-05	1.599E-01

T (hours)	R.Marrow DOSE RATE (rem/hr)	R.Marrow INTVL DOS (rem)	R.Marrow CUM. DOSE (rem)	Bone Sur DOSE RATE (rem/hr)	Bone Sur INTVL DOS (rem)	Bone Sur CUM. DOSE (rem)	Thyroid DOSE RATE (rem/hr)	Thyroid INTVL DOS (rem)	Thyroid CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	8.132E-03	3.828E-03	3.828E-03	2.582E-02	1.215E-02	1.215E-02	1.301E+01	6.122E+00	6.122E+00
1.0000E+00	7.357E-03	3.869E-03	7.697E-03	2.336E-02	1.229E-02	2.444E-02	1.179E+01	6.196E+00	1.232E+01
2.0000E+00	5.777E-03	6.533E-03	1.423E-02	1.890E-02	2.105E-02	4.548E-02	8.615E+00	1.012E+01	2.244E+01
8.0000E+00	1.439E-03	1.857E-02	3.280E-02	5.425E-03	6.455E-02	1.100E-01	1.313E+00	2.329E+01	4.573E+01
2.4000E+01	5.024E-05	6.419E-03	3.922E-02	2.221E-04	2.568E-02	1.357E-01	8.767E-03	4.163E+00	4.989E+01
9.6000E+01	1.986E-07	2.866E-04	3.951E-02	9.111E-07	1.287E-03	1.370E-01	2.953E-07	2.815E-02	4.992E+01
7.2000E+02	4.202E-09	1.299E-05	3.952E-02	1.962E-08	6.029E-05	1.371E-01	7.238E-09	2.135E-05	4.992E+01

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (CONTINUOUS OCCUPANCY)
COMPARTMENT C

T (hours)	Remaindr DOSE RATE (rem/hr)	Remaindr INTVL DOS (rem)	Remaindr CUM. DOSE (rem)	Eff D.E. DOSE RATE (rem/hr)	Eff D.E. INTVL DOS (rem)	Eff D.E. CUM. DOSE (rem)	TID Thy DOSE RATE (rem/hr)	TID Thy INTVL DOS (rem)	TID Thy CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	9.738E-03	4.584E-03	4.584E-03	4.039E-01	1.900E-01	1.900E-01	1.804E+01	8.485E+00	8.485E+00
1.0000E+00	8.810E-03	4.633E-03	9.217E-03	3.659E-01	1.923E-01	3.823E-01	1.634E+01	8.586E+00	1.707E+01
2.0000E+00	6.894E-03	7.811E-03	1.703E-02	2.679E-01	3.144E-01	6.967E-01	1.193E+01	1.402E+01	3.109E+01
8.0000E+00	1.688E-03	2.201E-02	3.904E-02	4.161E-02	7.284E-01	1.425E+00	1.814E+00	3.223E+01	6.332E+01
2.4000E+01	5.780E-05	7.476E-03	4.651E-02	3.343E-04	1.345E-01	1.560E+00	1.199E-02	5.744E+00	6.906E+01
9.6000E+01	2.301E-07	3.294E-04	4.684E-02	3.007E-07	1.249E-03	1.561E+00	1.915E-12	3.824E-02	6.910E+01
7.2000E+02	5.017E-09	1.535E-05	4.686E-02	7.201E-09	2.139E-05	1.561E+00	.000E+00	6.115E-12	6.910E+01

T (hours)	RG1109WB DOSE RATE (rem/hr)	RG1109WB INTVL DOS (rem)	RG1109WB CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.225E-02	5.767E-03	5.767E-03
1.0000E+00	1.108E-02	5.829E-03	1.160E-02
2.0000E+00	9.058E-03	1.004E-02	2.163E-02
8.0000E+00	2.717E-03	3.156E-02	5.319E-02
2.4000E+01	1.156E-04	1.306E-02	6.626E-02
9.6000E+01	4.790E-07	6.722E-04	6.693E-02
7.2000E+02	1.036E-08	3.179E-05	6.696E-02

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

OVERALL SUMMARY - TOTAL RADIATION EXPOSURES (AS APPLICABLE) FOR SCENARIO DURATION (7.2000E+02 hrs)

CONTINUOUS OCCUPANCY

RECEPTOR/ORGAN	COMPARTMENT A (Hemispher)	COMPARTMENT B (Spherical)	COMPARTMENT C (Hemispher)	OFFSITE RECEP.
Beta Air (rad)	.000E+00	.000E+00	6.852E+00	.000E+00
Gamma Air (rad)	.000E+00	.000E+00	7.850E-02	.000E+00
Tot. skin (rem)	.000E+00	.000E+00	9.198E-01	.000E+00
[Beta Cont. (%)]	[.00]	[.00]	[93.94]	[.00]
Gonads (rem)	.000E+00	.000E+00	4.629E-02	.000E+00
Breast (rem)	.000E+00	.000E+00	6.434E-02	.000E+00
Lungs (rem)	.000E+00	.000E+00	1.599E-01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[78.48]	[.00]
R.Marrow (rem)	.000E+00	.000E+00	3.952E-02	.000E+00
Bone Sur (rem)	.000E+00	.000E+00	1.371E-01	.000E+00
Thyroid (rem)	.000E+00	.000E+00	4.992E+01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[99.92]	[.00]
Remaindr (rem)	.000E+00	.000E+00	4.686E-02	.000E+00
Eff D.E. (rem)	.000E+00	.000E+00	1.561E+00	.000E+00
[Inhalation (%)]	[.00]	[.00]	[97.41]	[.00]
TID Thy (rem)	.000E+00	.000E+00	6.910E+01	.000E+00
RG1109WB (rem)	.000E+00	.000E+00	6.696E-02	.000E+00

The Dose Conversion Factors (DCFs) employed by ELISA-2 are from EPA 520/1-88-020 and EPA 402-R-93-081 (Federal Guidance Reports 11 and 12), except for TID Thy and RG1109WB, which are as follows:

TID Thy = Classical thyroid inhalation dose based on the TID-14844 DCFs (iodines only)
RG1109WB = Classical whole body immersion dose based on the Reg. Guide 1.109 DCFs (nobles and halogens only)

The beta dose to air is for immersion in an infinite cloud.

The skin dose includes contributions from gamma radiation (finite cloud), beta radiation (semi-infinite cloud) and ground contamination. The skin beta-contribution percentages exclude ground contamination.

Finite-cloud correction, if any, is nuclide specific.

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (PARTIAL OCCUPANCY)
COMPARTMENT C

T (hours)	Beta Air DOSE RATE (rad/hr)	Beta Air INTVL DOS (rad)	Beta Air CUM. DOSE (rad)	Gamma Air DOSE RATE (rad/hr)	Gamma Air INTVL DOS (rad)	Gamma Air CUM. DOSE (rad)	Tot. Skin DOSE RATE (rem/hr)	Tot. Skin INTVL DOS (rem)	Tot. Skin CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	8.829E-01	4.155E-01	4.155E-01	1.435E-02	6.755E-03	6.755E-03	1.687E-01	7.943E-02	7.943E-02
1.0000E+00	7.990E-01	4.201E-01	8.357E-01	1.290E-02	6.828E-03	1.358E-02	1.525E-01	8.024E-02	1.597E-01
2.0000E+00	6.541E-01	7.241E-01	1.560E+00	1.061E-02	1.176E-02	2.534E-02	1.246E-01	1.381E-01	2.977E-01
8.0000E+00	1.976E-01	2.287E+00	3.846E+00	3.184E-03	3.698E-02	6.232E-02	3.724E-02	4.335E-01	7.312E-01
2.4000E+01	8.482E-03	9.535E-01	4.800E+00	1.356E-04	1.531E-02	7.763E-02	1.573E-03	1.787E-01	9.099E-01
9.6000E+01	3.831E-05	4.952E-02	4.849E+00	7.379E-07	8.013E-04	7.843E-02	7.610E-06	5.514E-03	9.155E-01
7.2000E+02	1.021E-06	2.939E-03	4.852E+00	2.483E-08	6.723E-05	7.850E-02	2.315E-07	2.571E-04	9.157E-01

T (hours)	Gonads DOSE RATE (rem/hr)	Gonads INTVL DOS (rem)	Gonads CUM. DOSE (rem)	Breast DOSE RATE (rem/hr)	Breast INTVL DOS (rem)	Breast CUM. DOSE (rem)	Lungs DOSE RATE (rem/hr)	Lungs INTVL DOS (rem)	Lungs CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	8.852E-03	4.167E-03	4.167E-03	1.286E-02	6.054E-03	6.054E-03	3.934E-02	1.852E-02	1.852E-02
1.0000E+00	8.008E-03	4.211E-03	8.378E-03	1.164E-02	6.121E-03	1.217E-02	3.557E-02	1.871E-02	3.723E-02
2.0000E+00	6.444E-03	7.196E-03	1.557E-02	9.225E-03	1.038E-02	2.256E-02	2.641E-02	3.076E-02	6.799E-02
8.0000E+00	1.808E-03	2.179E-02	3.736E-02	2.410E-03	3.025E-02	5.281E-02	4.645E-03	7.461E-02	1.426E-01
2.4000E+01	7.230E-05	8.481E-03	4.584E-02	8.931E-05	1.098E-02	6.379E-02	7.954E-05	1.690E-02	1.595E-01
9.6000E+01	3.248E-07	2.521E-04	4.610E-02	4.067E-07	3.097E-04	6.410E-02	2.389E-07	2.441E-04	1.598E-01
7.2000E+02	8.460E-09	9.802E-06	4.611E-02	1.114E-08	1.273E-05	6.411E-02	4.943E-09	6.156E-06	1.598E-01

T (hours)	R.Marrow DOSE RATE (rem/hr)	R.Marrow INTVL DOS (rem)	R.Marrow CUM. DOSE (rem)	Bone Sur DOSE RATE (rem/hr)	Bone Sur INTVL DOS (rem)	Bone Sur CUM. DOSE (rem)	Thyroid DOSE RATE (rem/hr)	Thyroid INTVL DOS (rem)	Thyroid CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	8.132E-03	3.828E-03	3.828E-03	2.582E-02	1.215E-02	1.215E-02	1.301E+01	6.122E+00	6.122E+00
1.0000E+00	7.357E-03	3.869E-03	7.697E-03	2.336E-02	1.229E-02	2.444E-02	1.179E+01	6.196E+00	1.232E+01
2.0000E+00	5.777E-03	6.533E-03	1.423E-02	1.890E-02	2.105E-02	4.548E-02	8.615E+00	1.012E+01	2.244E+01
8.0000E+00	1.439E-03	1.857E-02	3.280E-02	5.425E-03	6.455E-02	1.100E-01	1.313E+00	2.329E+01	4.573E+01
2.4000E+01	5.024E-05	6.419E-03	3.922E-02	2.221E-04	2.568E-02	1.357E-01	8.767E-03	4.163E+00	4.989E+01
9.6000E+01	1.986E-07	1.720E-04	3.939E-02	9.111E-07	7.722E-04	1.365E-01	2.953E-07	1.689E-02	4.991E+01
7.2000E+02	4.202E-09	5.194E-06	3.940E-02	1.962E-08	2.412E-05	1.365E-01	7.238E-09	8.539E-06	4.991E+01

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

SUMMARY TOTAL RADIATION EXPOSURES (AIR IMMERSION PLUS INHALATION) (PARTIAL OCCUPANCY)
COMPARTMENT C

T (hours)	Remaindr DOSE RATE (rem/hr)	Remaindr INTVL DOS (rem)	Remaindr CUM. DOSE (rem)	Eff D.E. DOSE RATE (rem/hr)	Eff D.E. INTVL DOS (rem)	Eff D.E. CUM. DOSE (rem)	TID Thy DOSE RATE (rem/hr)	TID Thy INTVL DOS (rem)	TID Thy CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	9.738E-03	4.584E-03	4.584E-03	4.039E-01	1.900E-01	1.900E-01	1.804E+01	8.485E+00	8.485E+00
1.0000E+00	8.810E-03	4.633E-03	9.217E-03	3.659E-01	1.923E-01	3.823E-01	1.634E+01	8.586E+00	1.707E+01
2.0000E+00	6.894E-03	7.811E-03	1.703E-02	2.679E-01	3.144E-01	6.967E-01	1.193E+01	1.402E+01	3.109E+01
8.0000E+00	1.688E-03	2.201E-02	3.904E-02	4.161E-02	7.284E-01	1.425E+00	1.814E+00	3.223E+01	6.332E+01
2.4000E+01	5.780E-05	7.476E-03	4.651E-02	3.343E-04	1.345E-01	1.560E+00	1.199E-02	5.744E+00	6.906E+01
9.6000E+01	2.301E-07	1.976E-04	4.671E-02	3.007E-07	7.494E-04	1.560E+00	1.915E-12	2.295E-02	6.909E+01
7.2000E+02	5.017E-09	6.141E-06	4.672E-02	7.201E-09	8.555E-06	1.560E+00	.000E+00	2.446E-12	6.909E+01

T (hours)	RG1109WB DOSE RATE (rem/hr)	RG1109WB INTVL DOS (rem)	RG1109WB CUM. DOSE (rem)
.0000E+00	.000E+00	.000E+00	.000E+00
5.0000E-01	1.225E-02	5.767E-03	5.767E-03
1.0000E+00	1.108E-02	5.829E-03	1.160E-02
2.0000E+00	9.058E-03	1.004E-02	2.163E-02
8.0000E+00	2.717E-03	3.156E-02	5.319E-02
2.4000E+01	1.156E-04	1.306E-02	6.626E-02
9.6000E+01	4.790E-07	4.033E-04	6.666E-02
7.2000E+02	1.036E-08	1.272E-05	6.667E-02

CASE# 1 SB - OPEN CONT. FHA; CR AUTO ISOL; 1 FAN OP; 194 CFM LEAKAGE; RG 1.195 & ARCON96 (INSTANTANEOUS RELEASE FROM SOURCE)

OVERALL SUMMARY - TOTAL RADIATION EXPOSURES (AS APPLICABLE) FOR SCENARIO DURATION (7.2000E+02 hrs)

PARTIAL OCCUPANCY

RECEPTOR/ORGAN	COMPARTMENT A (Hemispher)	COMPARTMENT B (Spherical)	COMPARTMENT C (Hemispher)	OFFSITE RECEP.
Beta Air (rad)	.000E+00	.000E+00	4.852E+00	.000E+00
Gamma Air (rad)	.000E+00	.000E+00	7.850E-02	.000E+00
Tot. skin (rem)	.000E+00	.000E+00	9.157E-01	.000E+00
[Beta Cont. (%)]	[.00]	[.00]	[93.94]	[.00]
Gonads (rem)	.000E+00	.000E+00	4.611E-02	.000E+00
Breast (rem)	.000E+00	.000E+00	6.411E-02	.000E+00
Lungs (rem)	.000E+00	.000E+00	1.598E-01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[78.55]	[.00]
R.Marrow (rem)	.000E+00	.000E+00	3.940E-02	.000E+00
Bone Sur (rem)	.000E+00	.000E+00	1.365E-01	.000E+00
Thyroid (rem)	.000E+00	.000E+00	4.991E+01	.000E+00
[Inhalation (%)]	[.00]	[.00]	[99.92]	[.00]
Remaindr (rem)	.000E+00	.000E+00	4.672E-02	.000E+00
Eff D.E. (rem)	.000E+00	.000E+00	1.560E+00	.000E+00
[Inhalation (%)]	[.00]	[.00]	[97.42]	[.00]
TID Thy (rem)	.000E+00	.000E+00	6.909E+01	.000E+00
RG1109WB (rem)	.000E+00	.000E+00	6.667E-02	.000E+00

The Dose Conversion Factors (DCFs) employed by ELISA-2 are from EPA 520/1-88-020 and EPA 402-R-93-081 (Federal Guidance Reports 11 and 12), except for TID Thy and RG1109WB, which are as follows:

TID Thy = Classical thyroid inhalation dose based on the TID-14844 DCFs (iodines only)
RG1109WB = Classical whole body immersion dose based on the Reg. Guide 1.109 DCFs (nobles and halogens only)

The beta dose to air is for immersion in an infinite cloud.

The skin dose includes contributions from gamma radiation (finite cloud), beta radiation (semi-infinite cloud) and ground contamination. The skin beta-contribution percentages exclude ground contamination.

Finite-cloud correction, if any, is nuclide specific.

Partial occupancy has been applied only to human exposures in Compartment C.

********* END OF THIS CASE *********