



Duquesne Light

Health Physics Department

49.621

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|---|------------------------------|----------------|---|--|---|---|
| | | REVISION | 0 | 1 | 2 | 3 |
| Subject Offsite Dose Consequences Of A Locked Rotor Accident At Unit 2 With 18% Failed Fuel | | ERS-MPD-91-022 | | PAGE 1 OF 5 | | |
| Reference RCM RP _____ EPP _____ T/S _____ EM _____ DCP _____ Other _____ RIP _____ | | | | | | |
| Review Category <input checked="" type="checkbox"/> RSC Req'd <input type="checkbox"/> RSC Not Req'd | | | | <input type="checkbox"/> 10 CFR 50.59 Required | | |
| Purpose To calculate the offsite doses (EAB/LPZ) for a locked rotor accident at Unit 2 - using 18% failed fuel and the new fuel for Unit 2. | | | | | | |
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| | epp _____ | date _____ | | | | |
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| 0 | by <i>A. Quasha</i> 8/27/91 | date 8/27/91 | <div style="display: flex; justify-content: space-between;"> <div> Checklist <input checked="" type="checkbox"/> Purpose <input checked="" type="checkbox"/> Assumptions <input checked="" type="checkbox"/> Methodology </div> <div> <input checked="" type="checkbox"/> Input Data <input checked="" type="checkbox"/> Results <input checked="" type="checkbox"/> References </div> <div> Attachments <input type="checkbox"/> Data Sheets <input checked="" type="checkbox"/> Illustrations <input checked="" type="checkbox"/> Printouts <input type="checkbox"/> Code Listings </div> </div> | | | |
| | chk <i>J. Wright</i> 8/30/91 | date 8/30/91 | | | | |
| | epp <i>RSC</i> 9/4/91 | date 9/4/91 | | | | |
| <div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> BV RECORDS CENTER <input checked="" type="checkbox"/> CALCULATION FILE <input checked="" type="checkbox"/> MGR, Health Physics <input checked="" type="checkbox"/> DIR, RadEng </div> <div> <input type="checkbox"/> DIR, RadOps-1 <input type="checkbox"/> DIR, RadOps-2 <input type="checkbox"/> DIR, RadHealth <input type="checkbox"/> DIR, Env Svcs. </div> <div> <input checked="" type="checkbox"/> Trng Dept. <input checked="" type="checkbox"/> Author: _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____ </div> </div> | | | | | | |



DISCUSSION

This analysis is made to document the offsite dose estimate for a Locked Rotor Accident (LRA) at Unit 2.

This analysis is similar to that done for the LRA at Unit 1, documented in Reference 1, except that the dose calculations for the Control Room will be documented in a separate calculation. Reference 1 should be consulted for greater details concerning the background for this calculation.

METHODOLOGY

This analysis will be performed using the TRAILS code documented in ERS-SFL-89-020 [Ref: 2]. TRAILS is a simple FORTRAN program that mechanizes the solution of first order linear equations and dose calculations. Although the code is documented in detail in Reference 2, the more significant methodologies, constants, and assumptions incorporated into the code are listed below:

The code implements a model of the release that incorporates one or two compartments (or nodes) prior to the release to the environment. The transport of radioactive material through the system is governed by simple first order linear equations based on the postulated flow rates and the radionuclide decay constants.

The offsite dose calculational methods are those provided in Regulatory Guide 1.4 [Ref: 3]. Thyroid dose conversion factors and breathing rates are those provided in TID14844 [Ref: 4] and Regulatory Guide 1.4. The average energy per disintegration for included isotopes (Kr, Xe, I) were calculated from the spectra data provided in the DRALIST data library [Ref: 5], which is a subset of the ORNL Evaluated Nuclear Structure Data File, and which is available in hardcopy as DOE/TIC-11026 [Ref: 6]. This data source was used in lieu of the suggested 6th Edition, Table Of Isotopes, which is no longer in print.

The 0-2 hour isotopic releases and EAB doses and the 0-8 hour isotopic releases and LPZ doses will be evaluated. The release modeling that will be utilized is similar to that used by SWEC in the evaluation in References 7 and 8 and by PLC in Reference 1.

The analyses address the following release components:

1. Release of iodine activity from the three steam generators due to technical specification primary-to-secondary leakage. Iodine partitioning is assumed. The activity is based on 18% fuel clad failure, with the fuel clad activity based on Standard Review Plan assumptions (i.e., 30% Kr-85, 10% all others), with the exception of I-131, which is assumed to be 12% in keeping with the conclusions of NUREG/CR-5009 [Ref: 11].
2. Same as #1, but for noble gases with no credit for partitioning.
3. Release of activity released into the RCS and hence to the three steam generators by an iodine spike that occurs concurrent with the locked rotor RCS leak rate based on technical specifications.



4. Release of the initial activity contained in the steam in all three steam generators at time=0. This activity based on technical specifications.
5. Release of the initial activity of iodine contained in the secondary liquid in all three steam generators at time=0. (Noble gases are assumed to be in the steam space). This activity based on technical specifications.

Releases from steam generators are based on the steam mass releases described in Reference 10.

INPUT DATA/ASSUMPTIONS

1. General Methodology Based On SRP 15.3.3-15.3.4 [9]
2. Core Inventory From Table 11.1-1 Based On 2766 MWt [10]
3. Core-Gap Fractions [10]
 - Kr-85 0.30 [11]
 - I-131 0.12 [10]
 - Others 0.10

The assumptions of References 10 and 11 are included, even though they are not specifically applicable to a locked rotor accident. This is conservative.
4. Fraction Of Rods In DNB = 18% [12]
5. Fraction Of Rods Assumed Failed = 18% (Section 15.3.3) [9]
6. Concurrent Spike Appearance Rates, uCi/sec (Tbl. 15.0-10) [10]
 - I-131 1.36E6
 - I-132 2.52E6
 - I-133 3.08E6
 - I-134 3.68E6
 - I-135 2.81E6
7. Concurrent Spike Duration 0-4 Hours (Tbl. 15.3-3) [10]

Assume appearance rates are 1/500 for 4-8 hours.
8. RCS Volume = 4.2E5 lbs. (Tbl. 11.1-3) [10]
9. RCS Primary-To-Secondary Leakage = 1 gpm Total (Tbl. 15.3-3) [10]
10. Steam Generator Mass (Tbl. 15.3-3) [10]
 - Liquid = 99300 lbs.
 - Steam = 8700 lbs.
11. Steam Generator Mass Release (Tbl. 15.3-3) [10]
 - 0-2 hours = 443,878 lbs.
 - 2-8 hours = 793,644 lbs.
12. Iodine Partitioning In Steam Generators = 0.01 (Tbl. 15.3-3) [10]
13. Duration Of Plant Cooldown By Secondary System (Tbl. 15.3-3) [10]

i.e., duration of release = 8 hours
14. Receptor Distances (Tbl. 15.0-11) [10]
 - EAB = 547 meters
 - LPZ = 3.6 mi (5794 meters)
15. X/Q Values EAB And LPZ (Tbl. 15.0-11) [10]
 - 0-2 hours EAB = 1.44E-3 sec/m³
 - 0-8 hours LPZ = 7.07E-5
 - 8-24 hours LPZ = 5.16E-5
 - 1-4 days LPZ = 2.59E-5
 - 4-30 days LPZ = 9.36E-6



CALCULATIONS

1. Source Term Development

Attachment 1 documents the development of the source terms used for the different cases involved with the locked rotor accident.

The gap activity is calculated from the core inventory values provided in Table 11.1-1 of the Unit 2 UFSAR [Ref: 10], using the core-gap fractions provided as input Item #3. The gap activity is used as the basis for RCS activity rather than UFSAR Table 11.1-2 as the latter is based on equilibrium activity (i.e., credit for letdown cleanup). The instantaneous increase is modeled herein.

The 18% failed fuel gap release is determined from the gap activity as follows:

$$18\% \text{ F.F. gap release, } Ci = \text{gap activity, } Ci \times 0.18$$

This analysis assumes that the gap release is instantaneously and homogeneously dispersed throughout the RCS. The initial technical specification concentration (uCi/gm) in the RCS is converted to added activity in Ci and added to the gap release activity to obtain the total activity available for release via a primary-to-secondary leak.

NOTE: In this analysis, reference is made to technical specification concentrations in the RCS and the steam generators. The BVPS-2 technical specifications [Ref: 14] do not provide isotopic limits, but rather specify dose equivalent iodine of 1.0 uCi/gm in the RCS and 0.1 uCi/gm in the steam generator. Isotopic values that equate to these limits were developed by SWEC for the control room habitability effort in References 15 and 16. These isotopic values will be referred to as the "technical specification concentrations" in this package.

The activity, Ci, in the liquid phase of the three steam generators is based on the technical specification concentrations determined from the uCi/gm data provided in References 15 and 16 as follows:

$$Ci = (\text{Sec Conc, uCi/gm})(3 \text{ SG})(99300 \text{ \#/SG})(453.59 \text{ gm/\#})(1E-6 \text{ Ci/uCi})$$

The activity, Ci, in the steam phase of the three steam generators is based on the technical specification concentrations determined from the uCi/gm data provided in References 15 and 16 as follows:

$$Ci = (\text{Sec Conc, uCi/gm})(3 \text{ SG})(8700 \text{ \#/SG})(453.59 \text{ gm/\#})(1E-6 \text{ Ci/uCi})$$

2. Determine Transfer Lambdas

The RCS leak rate lambda is obtained from:

$$\frac{1.0 \text{ gal}}{\text{min}} \times \frac{\text{min}}{60 \text{ sec}} \times \frac{8.34 \text{ lbs}}{\text{gal}} = 3.309 \cdot 10^{-7} \text{ sec}^{-1}$$

4.2E5#

The 0-2 hour steam generator release lambda is obtained from:

$$\frac{443878 \text{ #}}{2 \text{ hr}} \times \frac{\text{hr}}{3600 \text{ sec}} = 2.069 \cdot 10^{-4} \text{ sec}^{-1}$$

(3)(99300)#

The 2-8 hour steam generator release lambda is obtained from:

$$\frac{793644 \text{ #}}{6 \text{ hr}} \times \frac{\text{hr}}{3600 \text{ sec}} = 1.233 \cdot 10^{-4} \text{ sec}^{-1}$$

(3)(99300)#

The 0-2 hour value will be used as the base value. The multiplier for the 2-8 hour period is:

$$1.233 \cdot 10^{-4} / 2.069 \cdot 10^{-4} = 0.596$$

To model the iodine partitioning in the steam generators, the transfer lambda will be reduced by a factor of 100 to $2.069 \cdot 10^{-6}$ for those cases involving iodines (other than initial steam). The reduction in transfer lambda is proper in this case, since the partitioned iodine remains in the steam generator.

To model the initial steam release as a puff, the release lambda for this case was taken as $1.28 \cdot 10^{-3} \text{ sec}^{-1}$. This was based on an SWEC assumption of 99.99% of the release being complete by 2 hours (0.0833 days). However, it was subsequently decided to increase this by a factor of 100, since initial code runs showed significant activity remaining in the steam generator at time = 2 hours. The original value was based on:

$$N_t = N^0 e^{-\lambda t}$$

$$\ln \frac{N_t}{N^0} = -\lambda t$$

$$\ln \frac{(1 - .9999)}{1} = - (0.833)$$

$$= 111 \text{ d}^{-1} = 1.285 \cdot 10^{-3} \text{ s}^{-1} = 1.285 \cdot 10^{-1} \text{ s}^{-1}$$

3. Release Models

The release models are illustrated in Attachment 2. These models are described briefly below.



In all cases, the offsite X/Q values are set to the values for the LPZ. The 0-2 hour EAB doses will be calculated from the 0-2 hour LPZ value by ratioing the applicable X/Q values.

The total calculation is broken down into parts or cases which correspond to different source and release parameters. These cases are:

1. Tech. Spec. leakage of iodines into the three steam generators (SG) from the RCS. The RCS is modeled as compartment 1 and the three SGs together are modeled as compartment 2. Transfer lambdas determined above are used. SG lambdas were reduced by a factor of 100 to account for partitioning. The RCS release is modeled at a constant rate for 720 hours, while the steam generator release is halted at eight hours. The source term was taken from Column J of Attachment 1.
2. This case evaluates the technical specification leakage of noble gases from the RCS to the three steam generators. Since no holdup of noble gases is assumed in the steam generators, the release is modeled as being from the RCS directly to the environment. The RCS is modeled as compartment two (compartment one not used). RCS transfer lambda determined above is the basis of the release. The release is halted at eight hours. The source terms are taken from Column J of Attachment 1.
3. Case 3 evaluates the release of concurrent iodine spike activity via primary-to-secondary leakage. The modeling is similar to that of Case 1 with the following exceptions: (1) there is no initial activity; (2) the iodine spike is introduced into the RCS as an independent production equal to the isotopic appearance rates for 0-4 hours; (3) the production rate is reduced to 1/500 for the period of 4-8 hours. (The concurrent iodine spike is based on the assumption of a 500 times increase in the iodine appearance rate.)
4. This case evaluates the release of the initial activity in the steam space of all three steam generators. The steam generators are modeled as compartment two (compartment one is not used). The activity in the steam space is as shown in Column F of Attachment 1. The release duration is two hours.
5. This final case evaluates the release of the initial activity in the secondary liquid in all three steam generators. The steam generators are modeled as compartment two (compartment one is not used). The activity in the steam space is as shown in Column E of Attachment 1. The release duration is eight hours. S/G transfer lambdas reduced by a factor of 100 to account for partitioning.

4. Calculation Of EAB Dose

All of the cases are evaluated at the LPZ, using the appropriate X/Q. The EAB 0-2 hour dose is calculated from the 0-2 hour LPZ dose by ratioing the X/Q values and multiplying by the 0-2 hour LPZ doses. The ratio is:

$$\frac{1.44\text{E}-3}{7.07\text{E}-5} = 20.37$$

RESULTS

The print outs from the cases are shown in Attachment 3. The results at the LPZ follow:

| Case | Beta Dose(mrem) | Gamma Dose(mrem) | Thyroid Dose(mrem) |
|-----------------|-----------------|------------------|--------------------|
| 1 | 6.15E 0 | 1.84E+1 | 1.43E+4 |
| 2 | 2.11E 2 | 3.29E+2 | 0 |
| 3 | 6.04E-2 | 1.93E-1 | 1.16E+2 |
| 4 | 1.15E-4 | 3.60E-4 | 3.26E-1 |
| 5 | 5.79E-3 | 1.45E-2 | 1.89E+1 |
| Total (mrem) | 2.17E+2 | 3.48E+2 | 1.44E+4 |

The 0-2 hour EAB doses are calculated in Attachment 4. The results are:

| | Beta Dose | Gamma Dose | Thyroid Dose |
|--------|-----------|------------|--------------|
| (mrem) | 2.09E3 | 3.41E3 | 3.25E4 |

The isotopic releases are totaled as shown in Attachment 5. The totals are:

| Isotope | 0-2 hr *Ci | 0-8 hr *Ci |
|---------|---------------|---------------|
| Kr-83m | 3.60E8 | 6.45E8 |
| Kr-85m | 1.11E9 | 2.94E9 |
| Kr-85 | 8.88E7 | 3.54E8 |
| Kr-87 | 1.54E9 | 2.28E9 |
| Kr-88 | 2.80E9 | 6.22E9 |
| Kr-89 | 1.79E8 | 1.79E8 |
| Xe-131m | 1.80E7 | 7.11E7 |
| Xe-133m | 1.57E8 | 6.01E8 |
| Xe-133 | 6.82E9 | 2.67E10 |
| Xe-135m | 3.31E8 | 3.33E8 |
| Xe-135 | 1.63E9 | 5.25E9 |
| Xe-137 | 2.76E8 | 2.77E8 |
| Xe-138 | 1.02E9 | 1.02E9 |
| I-131 | 2.64E7 | 2.56E8 |
| I-132 | 2.13E7 | 8.08E7 |
| I-133 | 4.89E7 | 4.26E8 |
| I-134 | 2.16E7 | 3.59E7 |
| I-135 | 3.89E7 | 2.64E8 |

These values are intended to be used in Table 15.3.4 of the U2 UFSAR.

CONCLUSIONS

Both the EAB and the LPZ doses are a fraction of the allowable doses in 10CFR100. Therefore, the new fuel is acceptable in accordance with 10CFR100.

REFERENCES

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2. DLC, Calculation ERS-SFL-089-020, TRAILS: Transport Of Radioactive Material In Linear Systems, 1989
3. NRC, Assumptions Used For Evaluating The Potential Radiological Consequences Of A Loss Of Coolant Accident For Pressurized Water Reactors, Regulatory Guide 1.4, 1974
4. USAEC, Calculation Of Distance Factors For Power And Test Reactor Sites, TID-14844, 1962
5. ORNL, DRALIST: Radioactive Decay Data For Application To Radiation Dosimetry And Radiological Assessments, DLC-80, 1981
6. D. C. Kocher, Radioactive Decay Data Tables, DOE/TIC-11026, 1981
7. SWEC, Calculation 12241-UR(B)-449, Doses In The BV1 And BV2 Combined Control Room Due To A Locked Rotor Accident And A Loss Of Non-Emergency AC Power To Station Auxiliaries Accident At Unit 1 With 500 cfm Normal Ventilation, 1987
8. SWEC, Calculation 12241-UR(B)-456, Combined BV1-BV2 Control Room Habitability Due To Design Basis Accidents (Except LOCA) At BV1, 1987
9. NRC, Standard Review Plan For The Review Of Safety Analysis Reports For Nuclear Power Plants, LWR Edition, NUREG-0800, 1984
10. DLC, Unit 2 Updated Final Safety Analysis Report
11. NRC, Assessment Of The Use Of Extended Burnup Fuel In Light Water Power Reactors, NUREG/CR-5009, 1988
12. We house, ltr 89DL*-G-0055, dtd 7/13/89, Rods In DNB For Locked Rotor Ev.
13. DLC, ltr ND1NEM:1144, dtd 4/7/87
14. DLC, Unit 1 Technical Specifications



15. SWEC, Calculation 12241-UR(B)-233-1, BV2 Tech Spec Primary Coolant And Secondary Side Concentrations - Using TID 14844 Iodine Dose Conversion Factors, 1983
16. SWEC, Calculation 12241-UR(B)-451, Technical Specification And Pre-Accident Iodine Spike Concentrations For BVPS-1, 1987

ATTACHMENTS

1. Source Term Development
2. LRA Modeling
3. Printouts
4. Calculation Of EAB Doses
5. 0-2 Hr And 0-8 Hr Isotopic Releases

UNIT 2 LOCKED ROTOR ACCIDENT SOURCE TERM DEVELOPMENT
Development for 18% Failed Fuel

| ISOTOPE | (A) CORE ACTIVITY Ci | (B) GAP ACTIVITY Ci | (C) SEC LID CONC uCi/gm | (D) SEC STM CONC uCi/gm | (E) SEC LID 3 SG Ci | (F) SEC STM 3 SG Ci | (G) 18% GAP RELEASE Ci | (H) RCS T.S. CONC uCi/gm | (I) RCS T.S. ACT Ci | (J) TOTAL RCS ACT Ci(18%) |
|---------|-------------------------------|------------------------------|----------------------------------|----------------------------------|------------------------------|------------------------------|---------------------------------|-----------------------------------|------------------------------|------------------------------------|
| Kr-83m | 1.20E+07 | 1.20E+06 | | 4.87E-06 | | 5.77E-05 | 2.16E+05 | 1.13E-01 | 2.15E+01 | 2.16E+05 |
| Kr-85m | 3.00E+07 | 3.00E+06 | | 2.37E-05 | | 2.81E-04 | 5.40E+05 | 5.51E-01 | 1.05E+02 | 5.40E+05 |
| Kr-85 | 6.80E+05 | 2.04E+05 | | 1.25E-04 | | 1.48E-03 | 3.67E+04 | 2.91E+00 | 5.54E+02 | 3.73E+04 |
| Kr-87 | 5.90E+07 | 5.90E+06 | | 1.36E-05 | | 1.61E-04 | 1.06E+06 | 3.15E-01 | 6.00E+01 | 1.06E+06 |
| Kr-88 | 8.30E+07 | 8.30E+06 | | 3.62E-05 | | 4.29E-04 | 1.49E+06 | 8.40E-01 | 1.60E+02 | 1.49E+06 |
| Kr-89 | 1.10E+08 | 1.10E+07 | | 1.14E-06 | | 1.35E-05 | 1.98E+06 | 2.65E-02 | 5.05E+00 | 1.98E+06 |
| Ie-131m | 4.20E+05 | 4.20E+04 | | 1.22E-06 | | 1.44E-05 | 7.56E+03 | 2.83E-02 | 5.39E+00 | 7.57E+03 |
| Ie-132m | 3.70E+06 | 3.70E+05 | | 3.49E-05 | | 4.13E-04 | 6.66E+04 | 8.09E-01 | 1.54E+02 | 6.66E+04 |
| Ie-133 | 1.60E+08 | 1.60E+07 | | 2.97E-04 | | 3.52E-03 | 2.88E+06 | 6.89E+00 | 1.31E+03 | 2.88E+06 |
| Ie-135m | 4.20E+07 | 4.20E+06 | | 1.23E-05 | | 1.46E-04 | 7.56E+05 | 2.86E-01 | 5.45E+01 | 7.56E+05 |
| Ie-135 | 4.10E+07 | 4.10E+06 | | 3.64E-05 | | 4.31E-04 | 7.38E+05 | 8.45E-01 | 1.61E+02 | 7.38E+05 |
| Ie-137 | 1.40E+08 | 1.40E+07 | | 1.85E-06 | | 2.19E-05 | 2.52E+06 | 4.29E-02 | 8.17E+00 | 2.52E+06 |
| Ie-138 | 1.40E+08 | 1.40E+07 | | 7.63E-06 | | 9.03E-05 | 2.52E+06 | 1.77E-01 | 3.37E+01 | 2.52E+06 |
| I-131 | 6.90E+07 | 8.28E+06 | 6.87E-02 | 6.87E-04 | 9.28E+00 | 8.13E-03 | 1.49E+06 | 6.60E-01 | 1.26E+02 | 1.49E+06 |
| I-132 | 9.90E+07 | 9.90E+06 | 2.03E-02 | 2.03E-04 | 2.74E+00 | 2.40E-03 | 1.78E+06 | 2.30E-01 | 4.38E+01 | 1.78E+06 |
| I-133 | 1.60E+08 | 1.60E+07 | 9.84E-02 | 9.84E-04 | 1.33E+01 | 1.16E-02 | 2.82E+06 | 1.03E+00 | 1.96E+02 | 2.82E+06 |
| I-134 | 1.80E+08 | 1.80E+07 | 4.53E-04 | 4.53E-06 | 6.12E-02 | 5.36E-05 | 3.24E+06 | 1.44E-01 | 2.74E+01 | 3.24E+06 |
| I-135 | 1.40E+08 | 1.40E+07 | 4.40E-02 | 4.40E-04 | 5.95E+00 | 5.21E-03 | 2.52E+06 | 5.54E-01 | 1.06E+02 | 2.52E+06 |

Column A from U2 UFSAR Table 11.1-1

Column B converts the Core Activity in Column A to Gap Activity using the factors in Assumption 3

Columns C,D from SNEC Calculation # 12241-UR(B)-233-1 (Reference 15)

Column E = Column C x (3 SG)x(99300 lb/SG)x(453.59 gm/lb)x(1E-6)

Column F = Column D x (3 SG)x(8700 lb/SG)x(453.59 gm/lb)x(1E-6)

Column G = Column B x 0.18

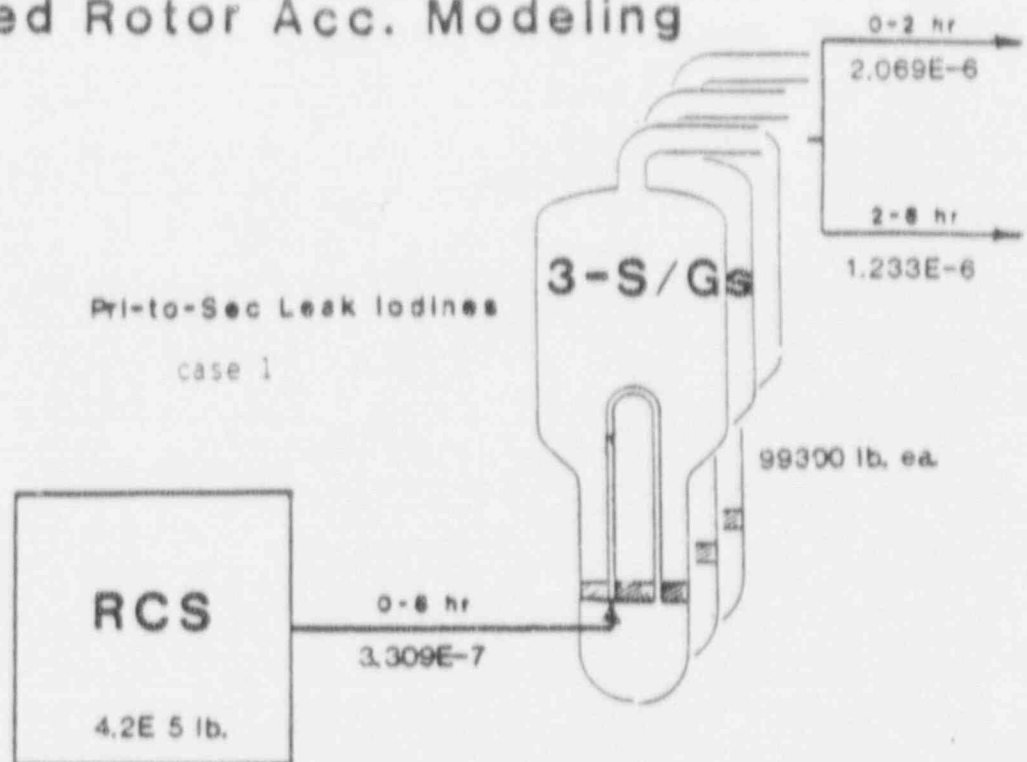
Column H from SNEC calculations in References 15 & 16

Column I = Column H x 420000 x 453.59 x 1E-6

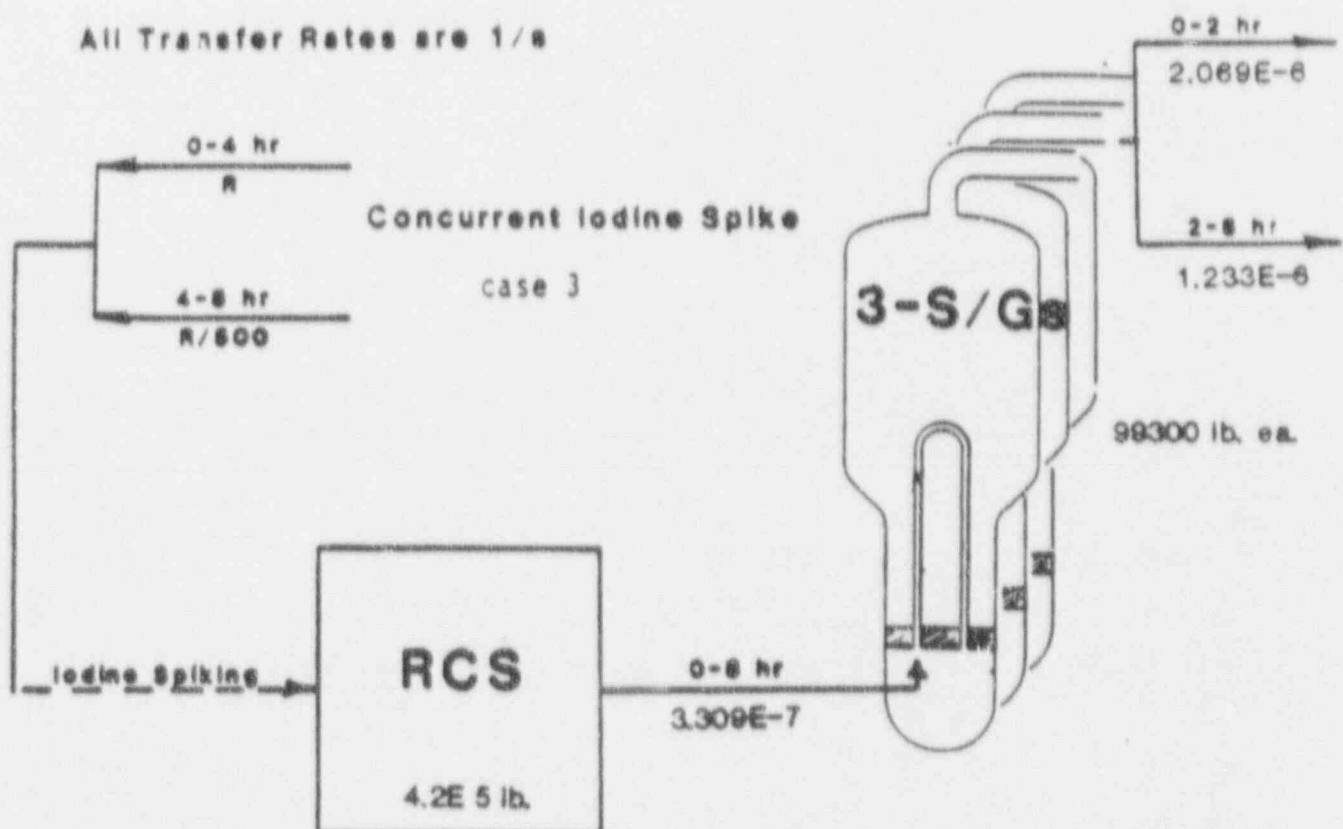
Column J = Column G + Column I



U2 Locked Rotor Acc. Modeling

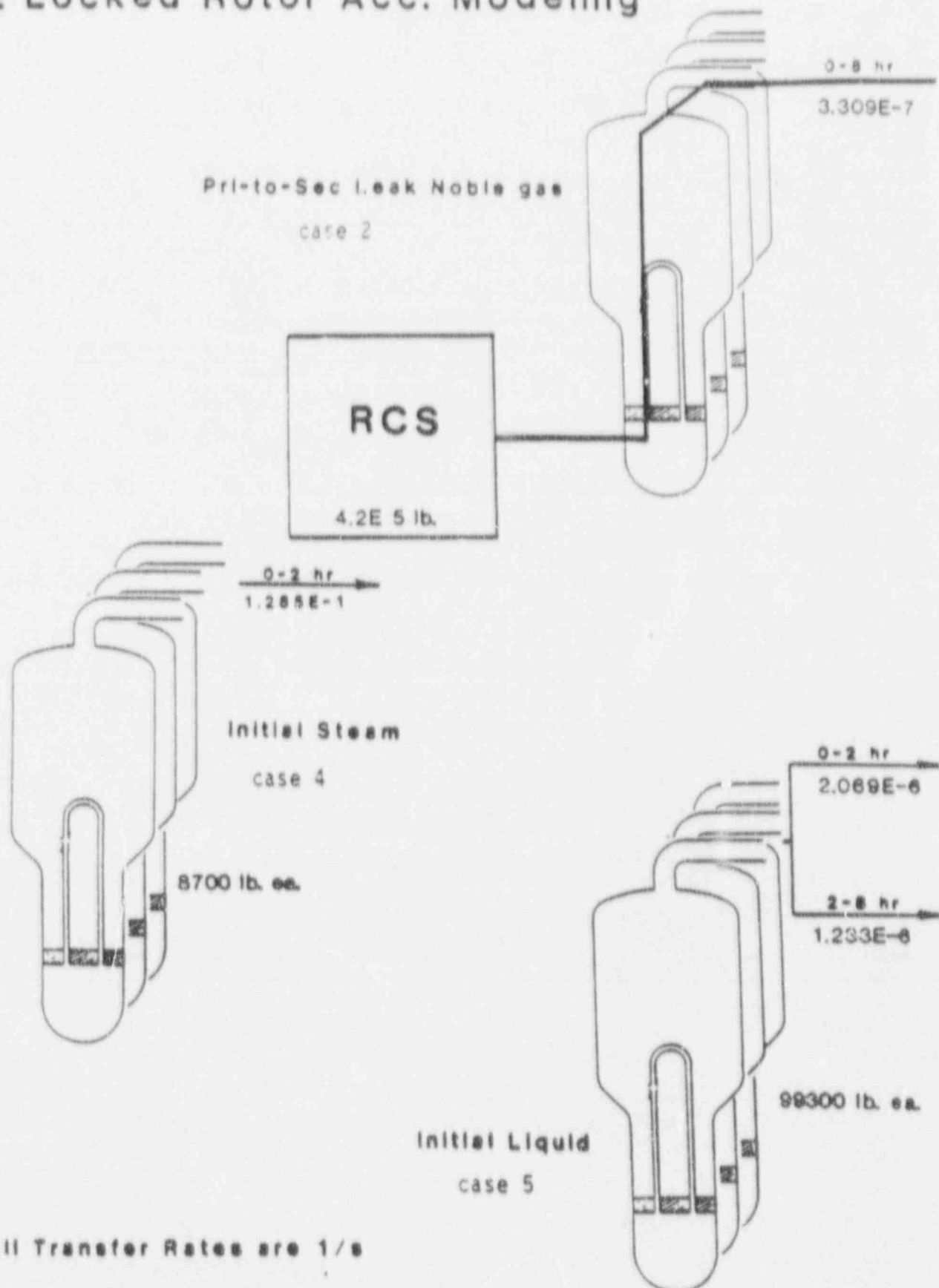


All Transfer Rates are 1/s





U2 Locked Rotor Acc. Modeling



All Transfer Rates are 1/s

TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
1 18% F F P-S Iodines

COMP RCS

COMP 3 SGs

| | | |
|-------------------|---------------------|-------------------|
| INITIAL | 0 000E+00 KR-83m C1 | 0 000E+00 KR-83m |
| | 0 000E+00 KR-85m | 0 000E+00 KR-85m |
| | 0 000E+00 KR-85 | 0 000E+00 KR-85 |
| | 0 000E+00 KR-87 | 0 000E+00 KR-87 |
| | 0 000E+00 KR-88 | 0 000E+00 KR-88 |
| | 0 000E+00 KR-89 | 0 000E+00 KR-89 |
| | 0 000E+00 KR-90 | 0 000E+00 KR-90 |
| | 0 000E+00 XE-131M | 0 000E+00 XE-131M |
| | 0 000E+00 XE-133M | 0 000E+00 XE-133M |
| | 0 000E+00 XE-133 | 0 000E+00 XE-133 |
| | 0 000E+00 XE-135M | 0 000E+00 XE-135M |
| | 0 000E+00 XE-135 | 0 000E+00 XE-135 |
| | 0 000E+00 XE-137 | 0 000E+00 XE-137 |
| | 0 000E+00 XE-138 | 0 000E+00 XE-138 |
| | 1 490E+06 I-131 | 0 000E+00 I-131 |
| | 1 780E+06 I-132 | 0 000E+00 I-132 |
| | 2 880E+06 I-133 | 0 000E+00 I-133 |
| | 3 240E+06 I-134 | 0 000E+00 I-134 |
| | 2 520E+06 I-135 | 0 000E+00 I-135 |
| ACT MULT (to UC1) | 1 000E+06 | 1 000E+00 |
| PRODUCTION UC1/s | 0 000E+00 KR-83m | 0 000E+00 KR-83m |
| | 0 000E+00 KR-85m | 0 000E+00 KR-85m |
| | 0 000E+00 KR-85 | 0 000E+00 KR-85 |
| | 0 000E+00 KR-87 | 0 000E+00 KR-87 |
| | 0 000E+00 KR-88 | 0 000E+00 KR-88 |
| | 0 000E+00 KR-89 | 0 000E+00 KR-89 |
| | 0 000E+00 KR-90 | 0 000E+00 KR-90 |
| | 0 000E+00 XE-131M | 0 000E+00 XE-131M |
| | 0 000E+00 XE-133M | 0 000E+00 XE-133M |
| | 0 000E+00 XE-133 | 0 000E+00 XE-133 |
| | 0 000E+00 XE-135M | 0 000E+00 XE-135M |
| | 0 000E+00 XE-135 | 0 000E+00 XE-135 |
| | 0 000E+00 XE-137 | 0 000E+00 XE-137 |
| | 0 000E+00 XE-138 | 0 000E+00 XE-138 |
| | 0 000E+00 I-131 | 0 000E+00 I-131 |
| | 0 000E+00 I-132 | 0 000E+00 I-132 |
| | 0 000E+00 I-133 | 0 000E+00 I-133 |
| | 0 000E+00 I-134 | 0 000E+00 I-134 |
| | 0 000E+00 I-135 | 0 000E+00 I-135 |
| REMOVAL | 3.309E-07 1/sec | 2.069E-06 1/sec |
| NUC 1-14 REL FR | 0 000E+00 | 0 000E+00 |
| NUC 15-20 REL FR | 0 000E+00 | 0 000E+00 |



Duquesne
Light

HEALTH PHYSICS DEPARTMENT

ERS-MPD-91-022

ATTACHMENT 3

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TRAILS -- Transport of Radioactive Material in Linear Systems. v1 1
1 18% F F P-S Iodines

MULTIPLIERS====>

| STEP | TIME | XPR | XREM | XRF | XPR | XREM | XRF |
|------|-----------|-----------|------|-----------|-----------|-----------|-----------|
| 1 | 9 000E+02 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 2 | 4 500E+03 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 3 | 7 200E+03 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 4 | 1 440E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 596 | 0 000E+00 |
| 5 | 2 880E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 596 | 0 000E+00 |
| 6 | 3 060E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 8 640E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 3 456E+05 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 2 592E+06 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |

--- ENVIRONMENT ---

| X/G | Breathing |
|-----------|-----------|
| s/M3 | M3/s |
| 1 000E-03 | 3 470E-04 |

MULTIPLIERS====>

| STEP | TIME s | | |
|------|-----------|-----------|------|
| 1 | 9 000E+02 | 7 070E-02 | 1 00 |
| 2 | 4 500E+03 | 7 070E-02 | 1 00 |
| 3 | 7 200E+03 | 7 070E-02 | 1 00 |
| 4 | 1 440E+04 | 7 070E-02 | 1 00 |
| 5 | 2 880E+04 | 7 070E-02 | 1 00 |
| 6 | 3 060E+04 | 5 160E-02 | 1 00 |
| 7 | 8 640E+04 | 5 160E-02 | 1 00 |
| 8 | 3 456E+05 | 2 590E-02 | 1 00 |
| 9 | 2 592E+06 | 9 630E-03 | 1 00 |



TRAILS -- Transport of Radioactive Material in Linear Systems. v1 1
1 10% P P P-S Iodines

| | | RCS | | 3 SGs | | AVERAGE | |
|-------|------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| | | UC1 | UC1-sec | UC1 | UC1-sec | UC1 | UC1-sec |
| STEP | TIME | | | | | | |
| 1-131 | INITIAL | 1 490E+12 | | 0 000E+00 | | | |
| 1 | 0 2500 h | 1 488E+12 | 1 340E+15 | 4 429E+08 | 1 994E+11 | 4 126E+05 | 4 585E+02 |
| 2 | 1 2500 h | 1 481E+12 | 5 345E+15 | 2 197E+09 | 4 760E+12 | 9 848E+06 | 2 736E+03 |
| 3 | 2 0000 h | 1 476E+12 | 3 992E+15 | 3 494E+09 | 7 686E+12 | 1 590E+07 | 5 890E+03 |
| 4 | 4 0000 h | 1 462E+12 | 1 058E+16 | 6 910E+09 | 3 751E+13 | 4 625E+07 | 6 424E+03 |
| 5 | 8 0000 h | 1 434E+12 | 2 085E+16 | 1 348E+10 | 1 472E+14 | 1 815E+08 | 1 261E+04 |
| 6 | 8 5000 h | 1 431E+12 | 2 578E+15 | 1 431E+10 | 2 501E+13 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 1 328E+12 | 7 694E+16 | 3 829E+10 | 1 482E+15 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 9 414E+11 | 2 913E+17 | 1 139E+11 | 2 086E+16 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 4 759E+10 | 6 727E+17 | 6 459E+10 | 2 725E+17 | 0 000E+00 | 0 000E+00 |
| 1-131 | TOTALS | | 1 086E+18 | | 2 950E+17 | 2 540E+08 | |
| 1-132 | INITIAL | 1 780E+12 | | 0 000E+00 | | | |
| 1 | 0 2500 h | 1 650E+12 | 1 543E+15 | 4 911E+08 | 2 267E+11 | 4 691E+05 | 5 212E+02 |
| 2 | 1 2500 h | 1 219E+12 | 5 127E+15 | 1 809E+09 | 4 415E+12 | 9 134E+06 | 2 537E+03 |
| 3 | 2 0000 h | 9 719E+11 | 2 946E+15 | 2 301E+09 | 5 624E+12 | 1 164E+07 | 4 309E+03 |
| 4 | 4 0000 h | 5 307E+11 | 5 250E+15 | 2 509E+09 | 1 801E+13 | 2 221E+07 | 3 085E+03 |
| 5 | 8 0000 h | 1 582E+11 | 4 432E+15 | 1 487E+09 | 2 929E+13 | 3 612E+07 | 2 508E+03 |
| 6 | 8 5000 h | 1 360E+11 | 2 643E+14 | 1 360E+09 | 2 562E+12 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 1 250E+09 | 1 603E+15 | 3 603E+07 | 2 216E+13 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 4 330E+01 | 1 488E+13 | 5 238E+02 | 4 893E+11 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 5 153E+03 | 0 000E+00 | 6 461E+02 | 0 000E+00 | 0 000E+00 |
| 1-132 | TOTALS | | 2 118E+16 | | 8 277E+13 | 7 956E+07 | |
| 1-133 | INITIAL | 2 880E+12 | | 0 000E+00 | | | |
| 1 | 0 2500 h | 2 855E+12 | 2 581E+15 | 8 497E+08 | 3 836E+11 | 7 936E+05 | 8 818E+02 |
| 2 | 1 2500 h | 2 758E+12 | 1 010E+16 | 4 091E+09 | 8 968E+12 | 1 856E+07 | 5 154E+03 |
| 3 | 2 0000 h | 2 688E+12 | 7 352E+15 | 6 364E+09 | 1 414E+13 | 2 926E+07 | 1 084E+04 |
| 4 | 4 0000 h | 2 509E+12 | 1 870E+16 | 1 186E+10 | 6 611E+13 | 8 152E+07 | 1 132E+04 |
| 5 | 8 0000 h | 2 185E+12 | 3 374E+16 | 2 054E+10 | 2 367E+14 | 2 919E+08 | 2 027E+04 |
| 6 | 8 5000 h | 2 148E+12 | 3 899E+15 | 2 148E+10 | 3 782E+13 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 1 258E+12 | 9 281E+16 | 3 626E+10 | 1 722E+15 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 1 048E+11 | 1 203E+17 | 1 268E+10 | 6 846E+15 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 4 638E+01 | 1 093E+16 | 6 296E+01 | 1 760E+15 | 0 000E+00 | 0 000E+00 |
| 1-133 | TOTALS | | 3 004E+17 | | 1 069E+16 | 4 220E+08 | |
| 1-134 | INITIAL | 3 240E+12 | | 0 000E+00 | | | |
| 1 | 0 2500 h | 2 658E+12 | 2 646E+15 | 7 910E+08 | 3 807E+11 | 7 877E+05 | 8 753E+02 |
| 2 | 1 2500 h | 1 204E+12 | 6 611E+15 | 1 786E+09 | 5 378E+12 | 1 113E+07 | 3 091E+03 |
| 3 | 2 0000 h | 6 650E+11 | 2 452E+15 | 1 575E+09 | 4 615E+12 | 9 549E+06 | 3 537E+03 |
| 4 | 4 0000 h | 1 365E+11 | 2 403E+15 | 6 452E+08 | 7 809E+12 | 9 630E+06 | 1 337E+03 |
| 5 | 8 0000 h | 5 751E+09 | 5 945E+14 | 5 406E+07 | 3 568E+12 | 4 400E+06 | 3 055E+02 |
| 6 | 8 5000 h | 3 871E+09 | 8 548E+12 | 3 871E+07 | 8 275E+10 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 1 812E+04 | 1 760E+13 | 5 222E+02 | 2 028E+11 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 3 167E-21 | 8 237E+07 | 3 831E-22 | 2 502E+06 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 1 440E-17 | 0 000E+00 | 1 766E-18 | 0 000E+00 | 0 000E+00 |
| 1-134 | TOTALS | | 1 473E+16 | | 2 204E+13 | 3 549E+07 | |
| 1-135 | INITIAL | 2 520E+12 | | 0 000E+00 | | | |
| 1 | 0 2500 h | 2 454E+12 | 2 238E+15 | 7 303E+08 | 3 316E+11 | 6 862E+05 | 7 624E+02 |
| 2 | 1 2500 h | 2 207E+12 | 8 382E+15 | 3 274E+09 | 7 381E+12 | 1 527E+07 | 4 242E+03 |
| 3 | 2 0000 h | 2 038E+12 | 5 728E+15 | 4 826E+09 | 1 100E+13 | 2 275E+07 | 8 428E+03 |
| 4 | 4 0000 h | 1 649E+12 | 1 322E+16 | 7 794E+09 | 4 638E+13 | 5 719E+07 | 7 943E+03 |
| 5 | 8 0000 h | 1 079E+12 | 1 935E+16 | 1 014E+10 | 1 336E+14 | 1 647E+08 | 1 144E+04 |
| 6 | 8 5000 h | 1 023E+12 | 1 891E+15 | 1 023E+10 | 1 834E+13 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 1 977E+11 | 2 802E+16 | 5 698E+09 | 4 739E+14 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 9 540E+07 | 6 706E+15 | 1 154E+07 | 2 714E+14 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 1 728E-21 | 3 238E+12 | 2 345E-21 | 4 329E+11 | 0 000E+00 | 0 000E+00 |
| 1-135 | TOTALS | | 8 554E+16 | | 9 627E+14 | 2 606E+08 | |

ALL NUCLIDES
STEP 9

4 759E+10

6 459E+10

TRAILS -- Transport of Radioactive Material in Linear Systems, v1 :
1 18% F F P-S Issues

| - - - - - E N V I R O N M E N T - - - - - | | | | | | | |
|---|-----------|----------|-----------|------------|-----------|---------------|-----------|
| PHOTON-SUBMG | | | | BETA-SUBMG | | THYROID-INHAL | |
| DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| I-131 | | | | | | | |
| 0 2500 h | 2 78E-03 | 1 11E-02 | 1 28E-03 | 5 11E-03 | 1 50E+01 | 5 99E+01 | |
| 1 2500 h | 6 63E-02 | 6 63E-02 | 3 05E-02 | 3 05E-02 | 3 58E+02 | 3 58E+02 | |
| 2 0000 h | 1 07E-01 | 1 43E-01 | 4 93E-02 | 6 57E-02 | 5 77E+02 | 7 70E+02 | |
| 4 0000 h | 3 12E-01 | 1 56E-01 | 1 43E-01 | 7 16E-02 | 1 68E+03 | 8 40E+02 | |
| 8 0000 h | 1 22E+00 | 3 06E-01 | 5 62E-01 | 1 41E-01 | 6 59E+03 | 1 65E+03 | |
| 8 5000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 24 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 96 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 720 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| TOTALS | 1 71E+00 | | 7 87E-01 | | 9 22E+03 | | |
| I-132 | | | | | | | |
| 0 2500 h | 1 90E-02 | 7 60E-02 | 3 74E-03 | 1 50E-02 | 6 16E-01 | 2 46E+00 | |
| 1 2500 h | 3 70E-01 | 3 70E-01 | 7 28E-02 | 7 28E-02 | 1 20E+01 | 1 20E+01 | |
| 2 0000 h | 4 71E-01 | 6 28E-01 | 9 28E-02 | 1 24E-01 | 1 53E+01 | 2 04E+01 | |
| 4 0000 h | 8 99E-01 | 4 50E-01 | 1 77E-01 | 8 85E-02 | 2 91E+01 | 1 46E+01 | |
| 8 0000 h | 1 46E+00 | 3 66E-01 | 2 88E-01 | 7 20E-02 | 4 74E+01 | 1 19E+01 | |
| 8 5000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 24 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 96 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 720 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| TOTALS | 3 22E+00 | | 6 34E-01 | | 1 04E+02 | | |
| I-133 | | | | | | | |
| 0 2500 h | 8 51E-03 | 3 40E-02 | 5 29E-03 | 2 12E-02 | 7 79E+00 | 3 12E+01 | |
| 1 2500 h | 1 99E-01 | 1 99E-01 | 1 24E-01 | 1 24E-01 | 1 82E+02 | 1 82E+02 | |
| 2 0000 h | 3 14E-01 | 4 18E-01 | 1 95E-01 | 2 60E-01 | 2 87E+02 | 3 83E+02 | |
| 4 0000 h | 8 74E-01 | 4 37E-01 | 5 43E-01 | 2 72E-01 | 8 00E+02 | 4 00E+02 | |
| 8 0000 h | 3 13E+00 | 7 82E-01 | 1 95E+00 | 4 86E-01 | 2 86E+03 | 7 16E+02 | |
| 8 5000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 24 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 96 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 720 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| TOTALS | 4 53E+00 | | 2 81E+00 | | 4 11E+03 | | |
| I-134 | | | | | | | |
| 0 2500 h | 3 66E-02 | 1 46E-01 | 7 78E-03 | 3 11E-02 | 4 83E-01 | 1 97E+00 | |
| 1 2500 h | 5 16E-01 | 5 16E-01 | 1 10E-01 | 1 10E-01 | 6 82E+00 | 6 82E+00 | |
| 2 0000 h | 4 43E-01 | 5 91E-01 | 9 44E-02 | 1 26E-01 | 5 86E+00 | 7 81E+00 | |
| 4 0000 h | 4 47E-01 | 2 23E-01 | 9 52E-02 | 4 76E-02 | 5 91E+00 | 2 95E+00 | |
| 8 0000 h | 2 04E-01 | 5 10E-02 | 4 35E-02 | 1 09E-02 | 2 70E+00 | 6 75E-01 | |
| 8 5000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 24 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 96 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 720 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| TOTALS | 1 65E+00 | | 3 51E-01 | | 2 18E+01 | | |



TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
1 18% F F P-S Iodines

| - - - - - E N V I R O N M E N T - - - - - | | | | | | | |
|---|--|--------------|-----------|------------|-----------|---------------|-----------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| | | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| I-135 | | | | | | | |
| 0 2500 h | | 1 91E-02 | 7 64E-02 | 4 11E-03 | 1 63E-02 | 2 09E+00 | 8 35E+00 |
| 1 2500 h | | 4 25E-01 | 4 25E-01 | 9 16E-02 | 9 16E-02 | 4 65E+01 | 4 65E+01 |
| 2 0000 h | | 6 33E-01 | 8 43E-01 | 1 36E-01 | 1 82E-01 | 6 92E+01 | 9 23E+01 |
| 4 0000 h | | 1 59E+00 | 7 96E-01 | 3 43E-01 | 1 71E-01 | 1 74E+02 | 8 70E+01 |
| 8 0000 h | | 4 59E+00 | 1 15E+00 | 9 88E-01 | 2 47E-01 | 5 01E+02 | 1 25E+02 |
| 8 5000 h | | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 |
| 24 0000 h | | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 |
| 96 0000 h | | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 |
| 720 0000 h | | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 |
| TOTALS | | 7 26E+00 | | 1 56E+00 | | 7 93E+02 | |

ALL NUCLIDES

| | | | | | | | |
|------------|--|----------|----------|----------|----------|----------|----------|
| 0 2500 h | | 8 59E-02 | 3 44E-01 | 2 22E-02 | 8 88E-02 | 2 60E+01 | 1 04E+02 |
| 1 2500 h | | 1 58E+00 | 1 58E+00 | 4 29E-01 | 4 29E-01 | 6 05E+02 | 6 05E+02 |
| 2 0000 h | | 1 97E+00 | 2 63E+00 | 5 68E-01 | 7 57E-01 | 9 55E+02 | 1 27E+03 |
| 4 0000 h | | 4 12E+00 | 2 06E+00 | 1 30E+00 | 6 51E-01 | 2 69E+03 | 1 34E+03 |
| 8 0000 h | | 1 06E+01 | 2 65E+00 | 3 83E+00 | 9 57E-01 | 1 00E+04 | 2 50E+03 |
| 8 5000 h | | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 |
| 24 0000 h | | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 |
| 96 0000 h | | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 |
| 720 0000 h | | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 |
| TOTALS | | 1 84E+01 | | 6 15E+00 | | 1 43E+04 | |

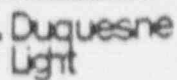


TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
 1.1.1. F.F. P-S Noble Gases in 3 SGs

COMP NOT USED IN THIS CASE

COMP 3 SGs

| | | |
|-------------------|-------------------|---------------------|
| INITIAL | 0.000E+00 KR-87m | 2.110E+05 KR-83m C1 |
| | 0.000E+00 KR-85m | 5.400E+05 KR-85m |
| | 0.000E+00 KR-87 | 3.730E+04 KR-85 |
| | 0.000E+00 KR-87 | 1.060E+06 KR-87 |
| | 0.000E+00 KR-88 | 1.490E+06 KR-88 |
| | 0.000E+00 KR-89 | 1.980E+06 KR-89 |
| | 0.000E+00 KR-90 | 0.000E+00 KR-90 |
| | 0.000E+00 XE-131M | 7.570E+03 XE-131M |
| | 0.000E+00 XE-133M | 6.680E+04 XE-133M |
| | 0.000E+00 XE-133 | 2.880E+06 XE-133 |
| | 0.000E+00 XE-135M | 7.560E+05 XE-135M |
| | 0.000E+00 XE-135 | 7.380E+05 XE-135 |
| | 0.000E+00 XE-137 | 2.520E+06 XE-137 |
| | 0.000E+00 XE-138 | 2.520E+06 XE-138 |
| | 0.000E+00 I-131 | 0.000E+00 I-131 |
| | 0.000E+00 I-132 | 0.000E+00 I-132 |
| | 0.000E+00 I-133 | 0.000E+00 I-133 |
| | 0.000E+00 I-134 | 0.000E+00 I-134 |
| | 0.000E+00 I-135 | 0.000E+00 I-135 |
| ACT MULT (to UC1) | 1.000E+00 | 1.000E+06 |
| PRODUCTION UC1/s | 0.000E+00 KR-83m | 0.000E+00 KR-83m |
| | 0.000E+00 KR-85m | 0.000E+00 KR-85m |
| | 0.000E+00 KR-85 | 0.000E+00 KR-85 |
| | 0.000E+00 KR-87 | 0.000E+00 KR-87 |
| | 0.000E+00 KR-88 | 0.000E+00 KR-88 |
| | 0.000E+00 KR-89 | 0.000E+00 KR-89 |
| | 0.000E+00 KR-90 | 0.000E+00 KR-90 |
| | 0.000E+00 XE-131M | 0.000E+00 XE-131M |
| | 0.000E+00 XE-133M | 0.000E+00 XE-133M |
| | 0.000E+00 XE-133 | 0.000E+00 XE-133 |
| | 0.000E+00 XE-135M | 0.000E+00 XE-135M |
| | 0.000E+00 XE-135 | 0.000E+00 XE-135 |
| | 0.000E+00 XE-137 | 0.000E+00 XE-137 |
| | 0.000E+00 XE-138 | 0.000E+00 XE-138 |
| | 0.000E+00 I-131 | 0.000E+00 I-131 |
| | 0.000E+00 I-132 | 0.000E+00 I-132 |
| | 0.000E+00 I-133 | 0.000E+00 I-133 |
| | 0.000E+00 I-134 | 0.000E+00 I-134 |
| | 0.000E+00 I-135 | 0.000E+00 I-135 |
| REMOVAL | 0.000E+00 1/sec | 3.309E-07 1/sec |
| NUC 1-14 REL FR | 0.000E+00 | 0.000E+00 |
| NUC 15-20 REL FR | 0.000E+00 | 0.000E+00 |



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ATTACHMENT 3

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| EP | TIME | XPR | XREM | XRF | XPR | XREM | XRF |
|----|---------|-----------|------|-----------|-----------|-----------|-----------|
| 1 | 000E+02 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 2 | 500E+03 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 3 | 200E+03 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 4 | 440E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 5 | 880E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 6 | 050E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 640E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 456E+05 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 592E+06 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |

| | | |
|---|---|---------|
| 1 | 1 | 000E+02 |
| 2 | 2 | 500E+03 |
| 3 | 3 | 200E+03 |
| 4 | 4 | 440E+04 |
| 5 | 5 | 880E+04 |
| 6 | 6 | 060E+04 |
| 7 | 7 | 640E+04 |
| 8 | 8 | 486E+05 |
| 9 | 9 | 582E+06 |

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7 070E-02 1 00
7 070E-02 1 00
7 070E-02 1 00
7 070E-02 1 00
7 070E-02 1 00
5 160E-02 1 00
5 160E-02 1 00
2 590E-02 1 00
9 630E-03 1 00

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Duquesne
Light

Health Physics Department

ERS-MPD-91-022

ATTACHMENT 3

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TRAILT -- Transport of Radioactive Material in Linear Systems. v1.1
1.00, P. P. P-S Noble Gases in 3 SGs

| | | NOT USED IN THIS CAS | | 3 SGs | | AVERAGE | |
|-------|------------|----------------------|-----------|-----------|-----------|-----------|-----------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| | | UCI | UCI-sec | UCI | UCI-sec | UCI | UCI/SEC |
| KR-82 | INITIAL | 0 000E+00 | | 2 160E+11 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 1 964E+11 | 1 855E+14 | 6 137E+07 | 6 819E+04 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 1 343E+11 | 5 883E+14 | 1 947E+08 | 5 408E+04 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 1 010E+11 | 3 156E+14 | 1 044E+08 | 3 860E+04 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 4 726E+10 | 5 096E+14 | 1 686E+08 | 2 342E+04 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 1 034E+10 | 3 498E+14 | 1 158E+08 | 8 039E+03 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 8 556E+09 | 1 696E+13 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 2 415E+07 | 8 110E+13 | 0 000E+00 | 0 000E+00 |
| 8 | 36 0000 h | 0 000E+00 | 0 000E+00 | 3 472E+05 | 2 295E+11 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 3 301E+01 | 0 000E+00 | 0 000E+00 |
| KR-82 | TOTALS | | 0 000E+00 | | 2 047E+15 | 6 449E+08 | |
| KR-83 | INITIAL | 0 000E+00 | | 5 400E+11 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 5 194E+11 | 4 766E+14 | 1 577E+08 | 1 752E+05 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 4 444E+11 | 1 731E+15 | 5 729E+08 | 1 591E+05 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 3 953E+11 | 1 132E+15 | 3 747E+08 | 1 388E+05 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 2 894E+11 | 2 445E+15 | 8 092E+08 | 1 124E+05 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 1 551E+11 | 3 101E+15 | 1 026E+09 | 7 126E+04 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 1 436E+11 | 2 687E+14 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 1 305E+10 | 3 037E+15 | 0 000E+00 | 0 000E+00 |
| 8 | 36 0000 h | 0 000E+00 | 0 000E+00 | 1 894E+05 | 3 036E+14 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 4 406E+09 | 0 000E+00 | 0 000E+00 |
| KR-83 | TOTALS | | 0 000E+00 | | 1 250E+16 | 2 941E+09 | |
| KR-85 | INITIAL | 0 000E+00 | | 3 730E+10 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 3 729E+10 | 3 356E+13 | 1 111E+07 | 1 234E+04 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 3 724E+10 | 1 342E+14 | 4 439E+07 | 1 233E+04 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 3 721E+10 | 1 005E+14 | 3 326E+07 | 1 232E+04 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 3 712E+10 | 2 676E+14 | 8 855E+07 | 1 230E+04 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 3 694E+10 | 5 333E+14 | 1 765E+08 | 1 225E+04 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 3 694E+10 | 6 650E+13 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 3 694E+10 | 2 061E+15 | 0 000E+00 | 0 000E+00 |
| 8 | 36 0000 h | 0 000E+00 | 0 000E+00 | 3 692E+10 | 9 572E+15 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 3 675E+10 | 8 275E+16 | 0 000E+00 | 0 000E+00 |
| KR-85 | TOTALS | | 0 000E+00 | | 9 552E+16 | 3 538E+08 | |
| KR-87 | INITIAL | 0 000E+00 | | 1 060E+12 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 9 247E+11 | 8 917E+14 | 2 951E+08 | 3 279E+05 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 5 355E+11 | 2 565E+15 | 8 487E+08 | 2 358E+05 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 3 555E+11 | 1 186E+15 | 3 926E+08 | 1 454E+05 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 1 192E+11 | 1 557E+15 | 5 153E+08 | 7 157E+04 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 1 341E+10 | 6 974E+14 | 2 308E+08 | 1 603E+04 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 1 021E+10 | 2 113E+13 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 2 189E+06 | 6 744E+13 | 0 000E+00 | 0 000E+00 |
| 8 | 36 0000 h | 0 000E+00 | 0 000E+00 | 1 982E+11 | 1 446E+10 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 1 309E+07 | 0 000E+00 | 0 000E+00 |
| KR-87 | TOTALS | | 0 000E+00 | | 6 986E+15 | 2 282E+09 | |



TABLE 1 - Transport of Radioactive Material in Linear Systems - v1.1
TABLE 2 - Gas Noble Gases in 3 SGs

| | | NOT USED IN THIS CAS | | 3 SGs | | AVERAGE | |
|---------|------------|----------------------|-----------|-----------|-----------|-----------|-----------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| | | UCI | UCI-SEC | UCI | UCI-SEC | UCI | UCI-SEC |
| TIME | INITIAL | 0.000E+00 | 0.000E+00 | 1.490E+12 | | | |
| 1 | 0.2500 h | 0.000E+00 | 0.000E+00 | 1.401E+12 | 1.001E+15 | 4.004E+08 | 4.782E+05 |
| 2 | 1.2500 h | 0.000E+00 | 0.000E+00 | 1.097E+12 | 4.474E+15 | 1.480E+09 | 4.112E+05 |
| 3 | 2.0000 h | 0.000E+00 | 0.000E+00 | 9.123E+11 | 2.704E+15 | 8.949E+08 | 3.314E+05 |
| 4 | 4.0000 h | 0.000E+00 | 0.000E+00 | 5.586E+11 | 5.192E+15 | 1.718E+09 | 2.386E+05 |
| 5 | 8.0000 h | 0.000E+00 | 0.000E+00 | 2.094E+11 | 5.125E+15 | 1.696E+09 | 1.178E+05 |
| 6 | 8.5000 h | 0.000E+00 | 0.000E+00 | 1.854E+11 | 3.549E+14 | 0.000E+00 | 0.000E+00 |
| 7 | 24.0000 h | 0.000E+00 | 0.000E+00 | 4.217E+09 | 2.672E+15 | 0.000E+00 | 0.000E+00 |
| 8 | 76.0000 h | 0.000E+00 | 0.000E+00 | 9.836E+01 | 5.219E+13 | 0.000E+00 | 0.000E+00 |
| 9 | 720.0000 h | 0.000E+00 | 0.000E+00 | 0.000E+00 | 1.451E+06 | 0.000E+00 | 0.000E+00 |
| WR-99 | TOTALS | | 0.000E+00 | | 2.188E+16 | 6.220E+09 | |
| WR-99 | INITIAL | 0.000E+00 | | 1.980E+12 | | | |
| 1 | 0.2500 h | 0.000E+00 | 0.000E+00 | 7.371E+10 | 5.214E+14 | 1.725E+08 | 1.917E+05 |
| 2 | 1.2500 h | 0.000E+00 | 0.000E+00 | 1.416E+05 | 2.016E+13 | 6.671E+06 | 1.953E+03 |
| 3 | 2.0000 h | 0.000E+00 | 0.000E+00 | 7.305E+00 | 3.872E+07 | 1.281E+01 | 4.745E-03 |
| 4 | 4.0000 h | 0.000E+00 | 0.000E+00 | 2.695E-11 | 1.998E+03 | 6.611E-04 | 9.182E-08 |
| 5 | 8.0000 h | 0.000E+00 | 0.000E+00 | 3.668E-34 | 7.371E-09 | 2.439E-15 | 1.694E-18 |
| 6 | 8.5000 h | 0.000E+00 | 0.000E+00 | 5.087E-37 | 1.002E-31 | 0.000E+00 | 0.000E+00 |
| 7 | 24.0000 h | 0.000E+00 | 0.000E+00 | 0.000E+00 | 1.391E-34 | 0.000E+00 | 0.000E+00 |
| 8 | 76.0000 h | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| 9 | 720.0000 h | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| WR-99 | TOTALS | | 0.000E+00 | | 5.415E+14 | 1.792E+08 | |
| VE-131M | INITIAL | 0.000E+00 | | 7.570E+09 | | | |
| 1 | 0.2500 h | 0.000E+00 | 0.000E+00 | 7.563E+09 | 6.810E+12 | 2.253E+06 | 2.504E+03 |
| 2 | 1.2500 h | 0.000E+00 | 0.000E+00 | 7.536E+09 | 2.718E+13 | 8.993E+06 | 2.498E+03 |
| 3 | 2.0000 h | 0.000E+00 | 0.000E+00 | 7.515E+09 | 2.032E+13 | 6.723E+06 | 2.490E+03 |
| 4 | 4.0000 h | 0.000E+00 | 0.000E+00 | 7.461E+09 | 5.391E+13 | 1.784E+07 | 2.478E+03 |
| 5 | 8.0000 h | 0.000E+00 | 0.000E+00 | 7.353E+09 | 1.067E+14 | 3.529E+07 | 2.451E+03 |
| 6 | 8.5000 h | 0.000E+00 | 0.000E+00 | 7.344E+09 | 1.323E+13 | 0.000E+00 | 0.000E+00 |
| 7 | 24.0000 h | 0.000E+00 | 0.000E+00 | 7.072E+09 | 4.022E+14 | 0.000E+00 | 0.000E+00 |
| 8 | 76.0000 h | 0.000E+00 | 0.000E+00 | 5.933E+09 | 1.681E+15 | 0.000E+00 | 0.000E+00 |
| 9 | 720.0000 h | 0.000E+00 | 0.000E+00 | 1.295E+09 | 6.845E+15 | 0.000E+00 | 0.000E+00 |
| VE-131M | TOTALS | | 0.000E+00 | | 9.156E+15 | 7.110E+07 | |
| VE-131M | INITIAL | 0.000E+00 | | 6.680E+10 | | | |
| 1 | 0.2500 h | 0.000E+00 | 0.000E+00 | 6.656E+10 | 6.001E+13 | 1.986E+07 | 2.206E+04 |
| 2 | 1.2500 h | 0.000E+00 | 0.000E+00 | 6.561E+10 | 2.379E+14 | 7.872E+07 | 2.187E+04 |
| 3 | 2.0000 h | 0.000E+00 | 0.000E+00 | 6.491E+10 | 1.762E+14 | 5.830E+07 | 2.159E+04 |
| 4 | 4.0000 h | 0.000E+00 | 0.000E+00 | 6.307E+10 | 4.607E+14 | 1.524E+08 | 2.117E+04 |
| 5 | 8.0000 h | 0.000E+00 | 0.000E+00 | 5.954E+10 | 8.825E+14 | 2.920E+08 | 2.028E+04 |
| 6 | 8.5000 h | 0.000E+00 | 0.000E+00 | 5.915E+10 | 1.068E+14 | 0.000E+00 | 0.000E+00 |
| 7 | 24.0000 h | 0.000E+00 | 0.000E+00 | 4.822E+10 | 2.985E+15 | 0.000E+00 | 0.000E+00 |
| 8 | 76.0000 h | 0.000E+00 | 0.000E+00 | 1.866E+10 | 8.070E+15 | 0.000E+00 | 0.000E+00 |
| 9 | 720.0000 h | 0.000E+00 | 0.000E+00 | 4.980E+06 | 5.092E+15 | 0.000E+00 | 0.000E+00 |
| VE-131M | TOTALS | | 0.000E+00 | | 1.807E+16 | 6.014E+08 | |

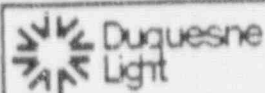


TRAILE -- Transport of Radioactive Material in Linear Systems, v1
2.000E+00 0.000E+00 0.000E+00 0.000E+00

| | | NOT USED IN THIS CASE | | 3 SGs | | AVERAGE | |
|----------------|------------|-----------------------|-----------|-----------|-----------|-----------|-----------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| | | UC1 | UC1-SEC | UC1 | UC1-SEC | UC1 | UC1-SEC |
| 1E-127 INITIAL | | 0 000E+00 | | 2 880E+12 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 2 875E+12 | 2 590E+15 | 8 570E+08 | 9 522E+05 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 2 856E+12 | 1 032E+16 | 3 414E+09 | 9 482E+05 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 2 842E+12 | 7 692E+15 | 2 545E+09 | 9 427E+05 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 2 804E+12 | 2 032E+16 | 6 725E+09 | 9 340E+05 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 2 730E+12 | 3 984E+16 | 1 318E+10 | 9 155E+05 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 2 722E+12 | 4 907E+15 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 2 499E+12 | 1 456E+17 | 0 000E+00 | 0 000E+00 |
| 8 | 76 0000 h | 0 000E+00 | 0 000E+00 | 1 681E+12 | 5 348E+17 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 5 407E+10 | 1 063E+18 | 0 000E+00 | 0 000E+00 |
| 1E-127 TOTALS | | | 0 000E+00 | | 1 830E+18 | | 2 672E+10 |
| 1E-128 INITIAL | | 0 000E+00 | | 7 560E+11 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 3 841E+11 | 4 943E+14 | 1 636E+08 | 1 817E+05 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 2 559E+10 | 4 764E+14 | 1 577E+08 | 4 379E+04 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 3 355E+09 | 2 955E+13 | 9 777E+06 | 3 621E+03 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 1 489E+07 | 4 439E+12 | 1 469E+06 | 2 040E+02 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 2 933E+02 | 1 979E+10 | 6 549E+03 | 4 548E-01 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 7 576E+01 | 2 893E+05 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 4 501E-17 | 1 007E+05 | 0 000E+00 | 0 000E+00 |
| 8 | 76 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 5 984E-14 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 1E-128 TOTALS | | | 0 000E+00 | | 1 005E+15 | | 3 325E+08 |
| 1E-129 INITIAL | | 0 000E+00 | | 7 380E+11 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 7 239E+11 | 6 578E+14 | 2 177E+08 | 2 419E+05 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 6 700E+11 | 2 508E+15 | 8 298E+08 | 2 305E+05 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 6 323E+11 | 1 758E+15 | 5 816E+08 | 2 154E+05 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 5 417E+11 | 4 218E+15 | 1 396E+09 | 1 939E+05 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 3 977E+11 | 6 710E+15 | 2 220E+09 | 1 542E+05 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 3 828E+11 | 7 023E+14 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 1 177E+11 | 1 254E+16 | 0 000E+00 | 0 000E+00 |
| 8 | 76 0000 h | 0 000E+00 | 0 000E+00 | 4 909E+08 | 5 543E+15 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 1 166E-12 | 2 322E+13 | 0 000E+00 | 0 000E+00 |
| 1E-129 TOTALS | | | 0 000E+00 | | 3 466E+16 | | 5 245E+09 |
| 1E-137 INITIAL | | 0 000E+00 | | 2 520E+12 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 1 669E+11 | 7 801E+14 | 2 581E+08 | 2 868E+05 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 3 210E+06 | 5 533E+13 | 1 831E+07 | 5 085E+03 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 9 323E+02 | 1 064E+09 | 3 520E+02 | 1 304E-01 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 3 449E-07 | 3 091E+05 | 1 023E-01 | 1 421E-05 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 4 722E-26 | 1 144E-04 | 3 784E-11 | 2 629E-15 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 2 072E-28 | 1 559E-23 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 6 870E-26 | 0 000E+00 | 0 000E+00 |
| 8 | 76 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 1E-137 TOTALS | | | 0 000E+00 | | 8 355E+14 | | 2 765E+08 |
| 1E-138 INITIAL | | 0 000E+00 | | 2 320E+12 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 1 207E+12 | 1 603E+15 | 5 312E+08 | 5 902E+05 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 6 352E+10 | 1 398E+15 | 4 626E+08 | 1 285E+05 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 6 979E+09 | 6 912E+13 | 2 287E+07 | 8 472E+03 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 1 933E+07 | 8 509E+12 | 2 816E+06 | 3 911E+02 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 1 482E+02 | 2 363E+10 | 7 819E+03 | 5 430E-01 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 3 403E+01 | 1 397E+05 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 5 229E-19 | 4 162E+04 | 0 000E+00 | 0 000E+00 |
| 8 | 76 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 6 396E-16 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 1E-138 TOTALS | | | 0 000E+00 | | 3 081E+15 | | 1 019E+09 |
| ALL NUCLIDES | | 0 000E+00 | | 9 212E+10 | | | |
| 3 STEP | | 9 | | | | | |

TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
2. 19% F F P-S Noble Gases in 3 SGs

| ENVIRONMENT | | | | | | | |
|-------------|--|--------------|----------------------|--------------|----------------------|---------------|----------------------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE mrem | DOSE RATE mrem/hr | DOSE mrem | DOSE RATE mrem/hr | DOSE mrem | DOSE RATE mrem/hr |
| KR-B3m | | | | | | | |
| 0.2500 h | | 2.82E-03 | 1.13E-02 | 3.81E-02 | 1.52E-01 | 0.00E+00 | 0.00E+00 |
| 1.2500 h | | 8.95E-03 | 8.95E-03 | 1.21E-01 | 1.21E-01 | 0.00E+00 | 0.00E+00 |
| 2.0000 h | | 4.80E-03 | 5.40E-03 | 5.49E-02 | 8.65E-02 | 0.00E+00 | 0.00E+00 |
| 4.0000 h | | 7.75E-03 | 3.87E-03 | 1.05E-01 | 5.24E-02 | 0.00E+00 | 0.00E+00 |
| 8.0000 h | | 5.32E-03 | 1.33E-03 | 7.19E-02 | 1.80E-02 | 0.00E+00 | 0.00E+00 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.96E-02 | | 4.01E-01 | | 0.00E+00 | |
| KR-B5m | | | | | | | |
| 0.2500 h | | 4.40E-01 | 1.76E+00 | 6.55E-01 | 2.62E+00 | 0.00E+00 | 0.00E+00 |
| 1.2500 h | | 1.60E+00 | 1.60E+00 | 2.38E+00 | 2.38E+00 | 0.00E+00 | 0.00E+00 |
| 2.0000 h | | 1.04E+00 | 1.39E+00 | 1.56E+00 | 2.07E+00 | 0.00E+00 | 0.00E+00 |
| 4.0000 h | | 2.76E+00 | 1.13E+00 | 3.36E+00 | 1.68E+00 | 0.00E+00 | 0.00E+00 |
| 8.0000 h | | 2.36E+00 | 7.15E-01 | 4.26E+00 | 1.06E+00 | 0.00E+00 | 0.00E+00 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 8.20E+00 | | 1.22E+01 | | 0.00E+00 | |
| KR-B5 | | | | | | | |
| 0.2500 h | | 4.32E-04 | 1.73E-03 | 4.53E-02 | 1.81E-01 | 0.00E+00 | 0.00E+00 |
| 1.2500 h | | 1.73E-03 | 1.73E-03 | 1.81E-01 | 1.81E-01 | 0.00E+00 | 0.00E+00 |
| 2.0000 h | | 1.29E-03 | 1.72E-03 | 1.36E-01 | 1.81E-01 | 0.00E+00 | 0.00E+00 |
| 4.0000 h | | 3.44E-03 | 1.72E-03 | 3.61E-01 | 1.81E-01 | 0.00E+00 | 0.00E+00 |
| 8.0000 h | | 6.66E-03 | 1.72E-03 | 7.20E-01 | 1.80E-01 | 0.00E+00 | 0.00E+00 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 1.38E-02 | | 1.44E+00 | | 0.00E+00 | |
| KR-B7 | | | | | | | |
| 0.2500 h | | 4.14E+00 | 1.65E+01 | 6.35E+00 | 2.54E+01 | 0.00E+00 | 0.00E+00 |
| 1.2500 h | | 1.19E+01 | 1.19E+01 | 1.83E+01 | 1.83E+01 | 0.00E+00 | 0.00E+00 |
| 2.0000 h | | 5.50E+00 | 7.34E+00 | 8.45E+00 | 1.13E+01 | 0.00E+00 | 0.00E+00 |
| 4.0000 h | | 7.22E+00 | 3.61E+00 | 1.11E+01 | 5.55E+00 | 0.00E+00 | 0.00E+00 |
| 8.0000 h | | 3.24E+00 | 8.09E-01 | 4.97E+00 | 1.24E+00 | 0.00E+00 | 0.00E+00 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 3.20E+01 | | 4.91E+01 | | 0.00E+00 | |



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ATTACHMENT 3

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TABLE -- Transport of Radioactive Material in Linear Systems, v1.1
2-105 K F P-S Noble Gases in 3 SGs

| ENVIRONMENT | | | | | | | |
|-------------|--|--------------|-----------|------------|-----------|---------------|-----------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| | | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| VR-SG | | | | | | | |
| 0 2500 h | | 1.49E+01 | 5.95E+01 | 2.55E+00 | 1.02E+01 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 5.11E+01 | 5.11E+01 | 8.78E+00 | 8.78E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 3.09E+01 | 4.12E+01 | 5.31E+00 | 7.08E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 5.93E+01 | 2.97E+01 | 1.02E+01 | 5.10E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 5.86E+01 | 1.46E+01 | 1.01E+01 | 2.52E+00 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.15E+02 | | 3.69E+01 | | 0.00E+00 | |
| KR-SG | | | | | | | |
| 0 2500 h | | 5.59E+00 | 2.24E+01 | 3.82E+00 | 1.53E+01 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 2.16E-01 | 2.16E-01 | 1.48E-01 | 1.48E-01 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 4.15E-07 | 5.54E-07 | 2.84E-07 | 3.78E-07 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 2.14E-11 | 1.07E-11 | 1.46E-11 | 7.32E-12 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 7.91E-23 | 1.98E-23 | 5.40E-23 | 1.35E-23 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 5.81E+00 | | 3.97E+00 | | 0.00E+00 | |
| XE-131M | | | | | | | |
| 0 2500 h | | 8.01E-04 | 3.20E-03 | 5.21E-03 | 2.08E-02 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 3.19E-03 | 3.19E-03 | 2.08E-02 | 2.08E-02 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 2.39E-03 | 3.18E-03 | 1.55E-02 | 2.07E-02 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 6.34E-03 | 3.17E-03 | 4.13E-02 | 2.06E-02 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 1.25E-02 | 3.13E-03 | 8.16E-02 | 2.04E-02 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.53E-02 | | 1.64E-01 | | 0.00E+00 | |
| XE-132M | | | | | | | |
| 0 2500 h | | 1.46E-02 | 5.83E-02 | 6.14E-02 | 2.46E-01 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 5.77E-02 | 5.77E-02 | 2.43E-01 | 2.43E-01 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 4.28E-02 | 5.70E-02 | 1.80E-01 | 2.40E-01 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 1.12E-01 | 5.59E-02 | 4.71E-01 | 2.36E-01 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 2.14E-01 | 5.36E-02 | 9.03E-01 | 2.26E-01 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 4.41E-01 | | 1.86E+00 | | 0.00E+00 | |

TRAJLS -- Transport of Radioactive Material in Linear Systems, v1.1
2. 10% F F P-S Noble Gases in 3 SGs

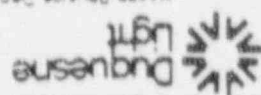
| - - - - - E N V I R O N M E N T - - - - - | | | | | | | |
|---|--|--------------|-----------|------------|-----------|---------------|-----------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| | | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| XE-133 | | | | | | | |
| 0.2500 h | | 6.86E-01 | 2.74E+00 | 1.89E+00 | 7.55E+00 | 0.00E+00 | 0.00E+00 |
| 1.2500 h | | 2.73E+00 | 2.73E+00 | 7.52E+00 | 7.52E+00 | 0.00E+00 | 0.00E+00 |
| 2.0000 h | | 2.14E+00 | 2.72E+00 | 5.61E+00 | 7.48E+00 | 0.00E+00 | 0.00E+00 |
| 4.0000 h | | 5.18E+00 | 2.69E+00 | 1.48E+01 | 7.41E+00 | 0.00E+00 | 0.00E+00 |
| 8.0000 h | | 1.06E+01 | 2.64E+00 | 2.90E+01 | 7.26E+00 | 0.00E+00 | 0.00E+00 |
| 8.5000 h | | 0.03E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.14E+01 | | 5.89E+01 | | 0.00E+00 | |
| XE-135M | | | | | | | |
| 0.2500 h | | 1.25E+00 | 4.98E+00 | 2.55E-01 | 1.02E+00 | 0.00E+00 | 0.00E+00 |
| 1.2500 h | | 1.20E+00 | 1.20E+00 | 2.46E-01 | 2.46E-01 | 0.00E+00 | 0.00E+00 |
| 2.0000 h | | 7.44E-02 | 9.92E-02 | 1.52E-02 | 2.03E-02 | 0.00E+00 | 0.00E+00 |
| 4.0000 h | | 1.12E-02 | 5.59E-03 | 2.29E-03 | 1.14E-03 | 0.00E+00 | 0.00E+00 |
| 8.0000 h | | 4.99E-05 | 1.25E-05 | 1.02E-05 | 2.55E-06 | 0.00E+00 | 0.00E+00 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.53E+00 | | 5.18E-01 | | 0.00E+00 | |
| XE-135 | | | | | | | |
| 0.2500 h | | 9.54E-01 | 3.82E+00 | 1.13E+00 | 4.50E+00 | 0.00E+00 | 0.00E+00 |
| 1.2500 h | | 3.64E+00 | 3.64E+00 | 4.29E+00 | 4.29E+00 | 0.00E+00 | 0.00E+00 |
| 2.0000 h | | 2.55E+00 | 3.40E+00 | 3.01E+00 | 4.01E+00 | 0.00E+00 | 0.00E+00 |
| 4.0000 h | | 6.12E+00 | 3.06E+00 | 7.22E+00 | 3.61E+00 | 0.00E+00 | 0.00E+00 |
| 8.0000 h | | 9.73E+00 | 2.43E+00 | 1.15E+01 | 2.87E+00 | 0.00E+00 | 0.00E+00 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.30E+01 | | 2.71E+01 | | 0.00E+00 | |
| XE-137 | | | | | | | |
| 0.2500 h | | 8.56E-01 | 3.43E+00 | 7.46E+00 | 2.99E+01 | 0.00E+00 | 0.00E+00 |
| 1.2500 h | | 6.07E-02 | 6.07E-02 | 5.29E-01 | 5.29E-01 | 0.00E+00 | 0.00E+00 |
| 2.0000 h | | 1.17E-06 | 1.56E-06 | 1.02E-05 | 1.36E-05 | 0.00E+00 | 0.00E+00 |
| 4.0000 h | | 3.39E-10 | 1.70E-10 | 2.96E-09 | 1.48E-09 | 0.00E+00 | 0.00E+00 |
| 8.0000 h | | 1.26E-19 | 3.14E-20 | 1.09E-18 | 2.74E-19 | 0.00E+00 | 0.00E+00 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 9.17E-01 | | 7.99E+00 | | 0.00E+00 | |



TRAILS -- Transport of Radioactive Material in Linear Systems: v1.1
2 18% F F P-S Noble Gases in 3 SGs

| - - - - - E N V I R O N M E N T - - - - - | | | | | | | |
|---|--------|--------------|-----------|------------|-----------|---------------|-----------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| | | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| KE-138 | | | | | | | |
| 0 | 2500 h | 1.06E+01 | 4.23E+01 | 5.45E+00 | 2.18E+01 | 0.00E+00 | 0.00E+00 |
| 1 | 2500 h | 9.20E+00 | 9.20E+00 | 4.75E+00 | 4.75E+00 | 0.00E+00 | 0.00E+00 |
| 2 | 0000 h | 4.55E-01 | 6.07E-01 | 2.35E-01 | 3.13E-01 | 0.00E+00 | 0.00E+00 |
| 4 | 0000 h | 5.60E-02 | 2.80E-02 | 2.89E-02 | 1.45E-02 | 0.00E+00 | 0.00E+00 |
| 8 | 0000 h | 1.56E-04 | 3.89E-05 | 8.03E-05 | 2.01E-05 | 0.00E+00 | 0.00E+00 |
| 8 | 5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 | 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 | 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 | 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.03E+01 | | 1.05E+01 | | 0.00E+00 | |

| | | | | | | | |
|--------------|--------|----------|----------|----------|----------|----------|----------|
| ALL NUCLIDES | | | | | | | |
| 0 | 2500 h | 3.94E+01 | 1.57E+02 | 2.97E+01 | 1.19E+02 | 0.00E+00 | 0.00E+00 |
| 1 | 2500 h | 8.18E+01 | 8.18E+01 | 4.75E+01 | 4.75E+01 | 0.00E+00 | 0.00E+00 |
| 2 | 0000 h | 4.26E+01 | 5.68E+01 | 2.46E+01 | 3.28E+01 | 0.00E+00 | 0.00E+00 |
| 4 | 0000 h | 8.05E+01 | 4.03E+01 | 4.77E+01 | 2.38E+01 | 0.00E+00 | 0.00E+00 |
| 8 | 0000 h | 8.52E+01 | 2.13E+01 | 6.16E+01 | 1.54E+01 | 0.00E+00 | 0.00E+00 |
| 8 | 5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 | 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 | 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 | 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 3.29E+02 | | 2.11E+02 | | 0.00E+00 | |



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TRAILS - Transport of Radioactive Material in Linear Systems, Vol. 1
3-189, P. 8, Concurrent Loading Spike

COMP RCS

COMP 3 SG4

INITIAL

0 000E+00 KR-B3M

0 000E+00 KR-B3M

0 000E+00 KR-B3M

0 000E+00 KR-B3M

0 000E+00 KR-B3M

0 000E+00 KR-B3M

0 000E+00 KR-B3M

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ACT MULT (to UCL)

PRODUCTION UCL/4

REMOVAL

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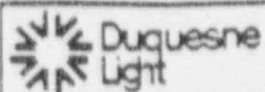
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0 000E+00

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ATTACHMENT 3

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TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
3.18% F.F. Concurrent Iodine Spike

MULTIPLIERS****

| STEP | TIME | XPR | XREM | XRF | XPR | XREM | XRF |
|------|-----------|-----------|------|-----------|-----------|-----------|-----------|
| 1 | 9 000E+02 | 1 00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 2 | 4 500E+03 | 1 00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 3 | 7 200E+03 | 1 00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 4 | 1 440E+04 | 1 00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 596 | 0 000E+00 |
| 5 | 2 880E+04 | 2 000E-03 | 1 00 | 0 000E+00 | 0 000E+00 | 0 596 | 0 000E+00 |
| 6 | 3 060E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 8 640E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 3 456E+05 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 2 592E+06 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |

--- ENVIRONMENT ---

| X/G | Breathing |
|-----------|-----------|
| s/M3 | M3/s |
| 1 000E-03 | 3 470E-04 |

MULTIPLIERS****

| STEP | TIME, s | | |
|------|-----------|-----------|------|
| 1 | 9 000E+02 | 7 070E-02 | 1 00 |
| 2 | 4 500E+03 | 7 070E-02 | 1 00 |
| 3 | 7 200E+03 | 7 070E-02 | 1 00 |
| 4 | 1 440E+04 | 7 070E-02 | 1 00 |
| 5 | 2 880E+04 | 7 070E-02 | 1 00 |
| 6 | 3 060E+04 | 5 160E-02 | 1 00 |
| 7 | 8 640E+04 | 5 160E-02 | 1 00 |
| 8 | 3 456E+05 | 2 590E-02 | 1 00 |
| 9 | 2 592E+06 | 9 630E-03 | 1 00 |



TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
3-18; F.F. Concurrent Iodine Spike

| | | RCS | | 3 SG4 | | AVERAGE | |
|---------------|------------|----------------|--------------------|----------------|--------------------|-----------------|--------------------|
| STEP | TIME | CURRENT UC1 | INTEGRD UC1-sec | CURRENT UC1 | INTEGRD UC1-sec | RELEASED UC1 | RELEASE UC1/sec |
| I-131 INITIAL | | | | | | | |
| 1 | 0 2500 h | 0 000E+00 | | 0 000E+00 | | | |
| 2 | 1 2500 h | 1 223E+09 | 5 506E+11 | 1 820E+05 | 4 820E+07 | 9 973E+01 | 1 106E-01 |
| 3 | 2 0000 h | 6 102E+09 | 1 719E+13 | 4 527E+06 | 6 721E+09 | 1 391E+04 | 3 863E+00 |
| 4 | 4 0000 h | 9 745E+09 | 2 140E+13 | 1 154E+07 | 2 099E+10 | 4 344E+04 | 1 609E+01 |
| 5 | 8 0000 h | 1 940E+10 | 1 050E+14 | 4 585E+07 | 1 930E+11 | 2 379E+05 | 3 305E+01 |
| 6 | 8 5000 h | 1 907E+10 | 2 770E+14 | 1 346E+08 | 1 304E+12 | 1 608E+06 | 1 117E+02 |
| 7 | 24 0000 h | 1 902E+10 | 3 428E+13 | 1 457E+08 | 2 522E+11 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 1 766E+10 | 1 023E+15 | 4 670E+08 | 1 709E+13 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 1 252E+10 | 3 073E+15 | 1 482E+09 | 2 677E+14 | 0 000E+00 | 0 000E+00 |
| I-131 | TOTALS | 6 328E+08 | 8 945E+15 | 8 554E+08 | 3 594E+15 | 0 000E+00 | 0 000E+00 |
| | | | 1 429E+16 | | 3 881E+15 | 1 904E+06 | |
| I-132 INITIAL | | | | | | | |
| 1 | 0 2500 h | 0 000E+00 | | 0 000E+00 | | | |
| 2 | 1 2500 h | 2 184E+09 | 9 953E+11 | 3 210E+05 | 9 759E+07 | 2 019E+02 | 2 244E-01 |
| 3 | 2 0000 h | 9 442E+09 | 2 159E+13 | 6 571E+06 | 1 040E+10 | 2 152E+04 | 5 979E+00 |
| 4 | 4 0000 h | 1 361E+10 | 3 134E+13 | 1 453E+07 | 2 807E+10 | 5 807E+04 | 2 151E+01 |
| 5 | 8 0000 h | 2 105E+10 | 1 275E+14 | 4 010E+07 | 1 956E+11 | 2 411E+05 | 3 349E+01 |
| 6 | 8 5000 h | 6 317E+09 | 1 761E+14 | 4 158E+07 | 6 686E+11 | 8 244E+05 | 5 725E+01 |
| 7 | 24 0000 h | 5 430E+09 | 1 055E+13 | 3 900E+07 | 7 255E+10 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 4 991E+07 | 6 402E+13 | 1 295E+06 | 7 035E+11 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 1 729E+02 | 5 939E+11 | 2 037E+03 | 1 782E+10 | 0 000E+00 | 0 000E+00 |
| I-132 | TOTALS | 0 000E+00 | 2 057E+02 | 0 000E+00 | 2 515E+01 | 0 000E+00 | 0 000E+00 |
| | | | 4 327E+14 | | 1 697E+12 | 1 145E+06 | |
| I-133 INITIAL | | | | | | | |
| 1 | 0 2500 h | 0 000E+00 | | 0 000E+00 | | | |
| 2 | 1 2500 h | 2 760E+09 | 1 244E+12 | 4 102E+05 | 1 216E+08 | 2 515E+02 | 2 795E-01 |
| 3 | 2 0000 h | 1 357E+10 | 2 950E+13 | 1 000E+07 | 1 499E+10 | 3 101E+04 | 8 615E+00 |
| 4 | 4 0000 h | 2 143E+10 | 4 729E+13 | 2 513E+07 | 4 594E+10 | 9 506E+04 | 3 521E+01 |
| 5 | 8 0000 h | 4 143E+10 | 2 271E+14 | 9 597E+07 | 4 106E+11 | 5 063E+05 | 7 032E+01 |
| 6 | 8 5000 h | 3 617E+10 | 5 578E+14 | 2 535E+08 | 2 575E+12 | 3 175E+06 | 2 205E+02 |
| 7 | 24 0000 h | 3 555E+10 | 6 454E+13 | 8 705E+08 | 4 717E+11 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 2 082E+10 | 1 536E+15 | 5 494E+08 | 2 479E+13 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 1 734E+09 | 1 991E+15 | 2 052E+08 | 1 083E+14 | 0 000E+00 | 0 000E+00 |
| I-133 | TOTALS | 7 677E-01 | 1 809E+14 | 1 038E+00 | 2 863E+13 | 0 000E+00 | 0 000E+00 |
| | | | 4 635E+15 | | 1 653E+14 | 3 808E+06 | |
| I-134 INITIAL | | | | | | | |
| 1 | 0 2500 h | 0 000E+00 | | 0 000E+00 | | | |
| 2 | 1 2500 h | 3 005E+09 | 1 397E+12 | 4 324E+05 | 1 342E+08 | 2 777E+02 | 3 085E-01 |
| 3 | 2 0000 h | 1 051E+10 | 2 610E+13 | 6 541E+06 | 1 140E+10 | 2 359E+04 | 6 551E+00 |
| 4 | 4 0000 h | 1 330E+10 | 3 252E+13 | 1 178E+07 | 2 489E+10 | 5 150E+04 | 1 907E+01 |
| 5 | 8 0000 h | 1 603E+10 | 1 081E+14 | 2 069E+07 | 1 216E+11 | 1 499E+05 | 2 083E+01 |
| 6 | 8 5000 h | 7 073E+08 | 7 014E+13 | 4 098E+06 | 1 802E+11 | 2 222E+05 | 1 543E+01 |
| 7 | 24 0000 h | 4 761E+08 | 1 051E+12 | 3 044E+06 | 6 386E+09 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 2 228E+03 | 2 165E+12 | 5 604E+01 | 1 712E+10 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 3 895E-22 | 1 013E+07 | 4 556E-23 | 2 704E+05 | 0 000E+00 | 0 000E+00 |
| I-134 | TOTALS | 0 000E+00 | 1 771E-18 | 0 000E+00 | 2 101E-19 | 0 000E+00 | 0 000E+00 |
| | | | 2 414E+14 | | 3 618E+11 | 4 475E+05 | |
| I-135 INITIAL | | | | | | | |
| 1 | 0 2500 h | 0 000E+00 | | 0 000E+00 | | | |
| 2 | 1 2500 h | 2 496E+09 | 1 128E+12 | 3 698E+05 | 1 113E+08 | 2 303E+02 | 2 559E-01 |
| 3 | 2 0000 h | 1 184E+10 | 2 611E+13 | 8 600E+06 | 1 308E+10 | 2 707E+04 | 7 520E+00 |
| 4 | 4 0000 h | 1 823E+10 | 4 071E+13 | 2 086E+07 | 3 872E+10 | 8 012E+04 | 2 967E+01 |
| 5 | 8 0000 h | 3 298E+10 | 1 862E+14 | 7 269E+07 | 3 226E+11 | 3 977E+05 | 5 524E+01 |
| 6 | 8 5000 h | 2 164E+10 | 3 875E+14 | 1 492E+08 | 1 702E+12 | 2 099E+06 | 1 458E+02 |
| 7 | 24 0000 h | 2 052E+10 | 3 794E+13 | 1 538E+08 | 2 729E+11 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 3 966E+09 | 5 620E+14 | 1 042E+08 | 8 089E+12 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 1 914E+06 | 1 345E+14 | 2 262E+05 | 5 097E+12 | 0 000E+00 | 0 000E+00 |
| I-135 | TOTALS | 3 466E-23 | 6 496E+10 | 4 685E-23 | 8 502E+09 | 0 000E+00 | 0 000E+00 |
| | | | 1 376E+15 | | 1 554E+13 | 2 604E+06 | |
| ALL NUCLIDES | | 6 328E+08 | | 8 554E+08 | | | |
| * STEP 9 | | | | | | | |



TABLE -- Transport of Radioactive Material in Linear Systems, v1
3.18% F F Concurrent Iodine Spike

| ENVIRONMENT | | | | | | | |
|-------------|--|--------------|-----------|------------|-----------|---------------|-----------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| | | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| I-131 | | | | | | | |
| 0.2500 h | | 6.72E-07 | 2.69E-06 | 3.09E-07 | 1.24E-06 | 3.62E-03 | 1.45E-02 |
| 1.2500 h | | 9.37E-05 | 9.37E-05 | 4.31E-05 | 4.31E-05 | 5.05E-01 | 5.05E-01 |
| 2.0000 h | | 2.93E-04 | 3.90E-04 | 1.35E-04 | 1.79E-04 | 1.58E+00 | 2.10E+00 |
| 4.0000 h | | 1.60E-03 | 8.01E-04 | 7.37E-04 | 3.69E-04 | 8.64E+00 | 4.32E+00 |
| 8.0000 h | | 1.08E-02 | 2.71E-03 | 4.98E-03 | 1.25E-03 | 5.84E+01 | 1.46E+01 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 1.28E-02 | | 5.90E-03 | | 6.91E+01 | |
| I-132 | | | | | | | |
| 0.2500 h | | 8.18E-06 | 3.27E-05 | 1.61E-06 | 6.44E-06 | 2.65E-04 | 1.06E-03 |
| 1.2500 h | | 8.72E-04 | 8.72E-04 | 1.72E-04 | 1.72E-04 | 2.82E-02 | 2.82E-02 |
| 2.0000 h | | 2.35E-03 | 3.14E-03 | 4.63E-04 | 6.17E-04 | 7.62E-02 | 1.02E-01 |
| 4.0000 h | | 9.77E-03 | 4.88E-03 | 1.92E-03 | 9.61E-04 | 3.17E-01 | 1.58E-01 |
| 8.0000 h | | 3.34E-02 | 8.35E-03 | 6.57E-03 | 1.64E-03 | 1.08E+00 | 2.71E-01 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 4.64E-02 | | 9.13E-03 | | 1.50E+00 | |
| I-133 | | | | | | | |
| 0.2500 h | | 2.70E-06 | 1.08E-05 | 1.68E-06 | 6.71E-06 | 2.47E-03 | 9.87E-03 |
| 1.2500 h | | 3.33E-04 | 3.33E-04 | 2.07E-04 | 2.07E-04 | 3.04E-01 | 3.04E-01 |
| 2.0000 h | | 1.02E-03 | 1.36E-03 | 6.34E-04 | 8.45E-04 | 9.33E-01 | 1.24E+00 |
| 4.0000 h | | 5.43E-03 | 2.71E-03 | 3.37E-03 | 1.69E-03 | 4.97E+00 | 2.48E+00 |
| 8.0000 h | | 3.41E-02 | 8.51E-03 | 2.12E-02 | 5.29E-03 | 3.12E+01 | 7.79E+00 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 4.08E-02 | | 2.54E-02 | | 3.74E+01 | |
| I-134 | | | | | | | |
| 0.2500 h | | 1.29E-05 | 5.15E-05 | 2.74E-06 | 1.10E-05 | 1.70E-04 | 6.81E-04 |
| 1.2500 h | | 1.09E-03 | 1.09E-03 | 2.33E-04 | 2.33E-04 | 1.45E-02 | 1.45E-02 |
| 2.0000 h | | 2.39E-03 | 3.19E-03 | 5.09E-04 | 6.79E-04 | 3.16E-02 | 4.21E-02 |
| 4.0000 h | | 6.96E-03 | 3.48E-03 | 1.48E-03 | 7.41E-04 | 9.20E-02 | 4.60E-02 |
| 8.0000 h | | 1.03E-02 | 2.58E-03 | 2.20E-03 | 5.49E-04 | 1.36E-01 | 3.41E-02 |
| 8.5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.08E-02 | | 4.42E-03 | | 2.74E-01 | |



TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
3-18% F.F. Concurrent Iodine Spike

| ENVIRONMENT | | | | | | | |
|--------------|-----------|----------|-----------|------------|-----------|---------------|-----------|
| PHOTON-SUBMG | | | | BETA-SUBMG | | THYROID-INHAL | |
| DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| I-135 | | | | | | | |
| 0 2500 h | 6 41E-06 | 2 56E-05 | 1 38E-06 | 5 52E-06 | 7 01E-04 | 2 80E-03 | |
| 1 2500 h | 7 54E-04 | 7 54E-04 | 1 62E-04 | 1 62E-04 | 8 24E-02 | 8 24E-02 | |
| 2 0000 h | 2 23E-03 | 2 97E-03 | 4 80E-04 | 6 40E-04 | 2 44E-01 | 3 25E-01 | |
| 4 0000 h | 1 11E-02 | 5 54E-03 | 2 38E-03 | 1 19E-03 | 1 21E+00 | 6 05E-01 | |
| 8 0000 h | 5 84E-02 | 1 46E-02 | 1 26E-02 | 3 15E-03 | 6 38E+00 | 1 60E+00 | |
| 8 5000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 24 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 96 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 720 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| TOTALS | 7 25E-02 | | 1 56E-02 | | 7 92E+00 | | |

ALL NUCLIDES

| | | | | | | | |
|------------|----------|----------|----------|----------|----------|----------|--|
| 0 2500 h | 3 08E-05 | 1 23E-04 | 7 72E-06 | 3 09E-05 | 7 23E-03 | 2 89E-02 | |
| 1 2500 h | 3 15E-03 | 3 15E-03 | 8 17E-04 | 8 17E-04 | 9 34E-01 | 9 34E-01 | |
| 2 0000 h | 8 28E-03 | 1 10E-02 | 2 22E-03 | 2 96E-03 | 2 86E+00 | 3 82E+00 | |
| 4 0000 h | 3 48E-02 | 1 74E-02 | 9 90E-03 | 4 95E-03 | 1 52E+01 | 7 61E+00 | |
| 8 0000 h | 1 47E-01 | 3 68E-02 | 4 75E-02 | 1 19E-02 | 9 72E+01 | 2 43E+01 | |
| 8 5000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 24 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 96 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| 720 0000 h | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | 0 00E+00 | |
| TOTALS | 1 93E-01 | | 6 04E-02 | | 1 16E+02 | | |



Duquesne
Light

Health Physics Department

ERS-MPD-91-022

ATTACHMENT 3

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TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
4.19. F.F. 3SGs-S Initial Steam Release

COMP NOT USED IN THIS CASE

COMP 3 SGs Init Stm

| | | |
|-------------------|-------------------|---------------------|
| INITIAL | 0 000E+00 KR-83m | 5 770E-05 KR-83m Ci |
| | 0 000E+00 KR-85m | 2 810E-04 KR-85m |
| | 0 000E+00 KR-85 | 1 480E-03 KR-85 |
| | 0 000E+00 KR-87 | 1 610E-04 KR-87 |
| | 0 000E+00 KR-88 | 4 290E-04 KR-88 |
| | 0 000E+00 KR-89 | 1 350E-05 KR-89 |
| | 0 000E+00 KR-90 | 0 000E+00 KR-90 |
| | 0 000E+00 XE-131M | 1 440E-05 XE-131M |
| | 0 000E+00 XE-133M | 4 130E-04 XE-133M |
| | 0 000E+00 XE-133 | 3 520E-03 XE-133 |
| | 0 000E+00 XE-135M | 1 460E-04 XE-135M |
| | 0 000E+00 XE-135 | 4 310E-04 XE-135 |
| | 0 000E+00 XE-137 | 2 190E-05 XE-137 |
| | 0 000E+00 XE-138 | 9 030E-05 XE-138 |
| | 0 000E+00 I-131 | 8 130E-03 I-131 |
| | 0 000E+00 I-132 | 2 400E-03 I-132 |
| | 0 000E+00 I-133 | 1 160E-03 I-133 |
| | 0 000E+00 I-134 | 5 360E-04 I-134 |
| | 0 000E+00 I-135 | 5 210E-03 I-135 |
| ACT MULT (to uCi) | 1 000E+00 | 1 000E+06 |
| PRODUCTION: uCi/s | 0 000E+00 KR-83m | 0 000E+00 KR-83m |
| | 0 000E+00 KR-85m | 0 000E+00 KR-85m |
| | 0 000E+00 KR-85 | 0 000E+00 KR-85 |
| | 0 000E+00 KR-87 | 0 000E+00 KR-87 |
| | 0 000E+00 KR-88 | 0 000E+00 KR-88 |
| | 0 000E+00 KR-89 | 0 000E+00 KR-89 |
| | 0 000E+00 KR-90 | 0 000E+00 KR-90 |
| | 0 000E+00 XE-131M | 0 000E+00 XE-131M |
| | 0 000E+00 XE-133M | 0 000E+00 XE-133M |
| | 0 000E+00 XE-133 | 0 000E+00 XE-133 |
| | 0 000E+00 XE-135M | 0 000E+00 XE-135M |
| | 0 000E+00 XE-135 | 0 000E+00 XE-135 |
| | 0 000E+00 XE-137 | 0 000E+00 XE-137 |
| | 0 000E+00 XE-138 | 0 000E+00 XE-138 |
| | 0 000E+00 I-131 | 0 000E+00 I-131 |
| | 0 000E+00 I-132 | 0 000E+00 I-132 |
| | 0 000E+00 I-133 | 0 000E+00 I-133 |
| | 0 000E+00 I-134 | 0 000E+00 I-134 |
| | 0 000E+00 I-135 | 0 000E+00 I-135 |
| REMOVAL | 0 000E+00 1/sec | 1 285E-01 1/sec |
| NUC 1-14 REL FR | 0 000E+00 | 0 000E+00 |
| NUC 15-20 REL FR | 0 000E+00 | 0 000E+00 |



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ATTACHMENT 3

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TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
4 18% F F 35G4-S Initial Steam Release

MULTIPLIERS====

| STEP | TIME | XPR | XREM | XRF | XPR | XREM | XRF |
|------|-----------|-----------|------|-----------|-----------|-----------|-----------|
| 1 | 9 000E+02 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 2 | 4 500E+03 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 3 | 7 200E+03 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 4 | 1 440E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 2 880E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 3 060E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 3 640E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 3 456E+05 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 2 592E+06 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |

---- ENVIRONMENT ----

| X/G | Breathing |
|-----------|-----------|
| s/M3 | M3/s |
| 1 000E-03 | 3 470E-04 |

MULTIPLIERS====>

| STEP | TIME, s | X/G | Breathing |
|------|-----------|-----------|-----------|
| | | s/M3 | M3/s |
| 1 | 9 000E+02 | 7 070E-02 | 1 00 |
| 2 | 4 500E+03 | 7 070E-02 | 1 00 |
| 3 | 7 200E+03 | 7 070E-02 | 1 00 |
| 4 | 1 440E+04 | 7 070E-02 | 1 00 |
| 5 | 2 880E+04 | 7 070E-02 | 1 00 |
| 6 | 3 060E+04 | 5 160E-02 | 1 00 |
| 7 | 3 640E+04 | 5 160E-02 | 1 00 |
| 8 | 3 456E+05 | 2 590E-02 | 1 00 |
| 9 | 2 592E+06 | 9 630E-03 | 1 00 |



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ATTACHMENT 3

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TRAILS - Transport of Radioactive Material in Linear Systems - v1.1
4.131.F.F. 3SG4-S Initial Steam Release

| | | NOT USED IN THIS CAS | | 3 SGs Initial | | AVERAGE | |
|--------|------------|----------------------|-----------|---------------|-----------|-----------|-----------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| | | UCI | UCI-sec | UCI | UCI-sec | UCI | UCI/sec |
| STEP | TIME | | | | | | |
| KR-93m | INITIAL | 0 000E+00 | | 5 770E+01 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 4 487E+02 | 5 765E+01 | 6 406E-02 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| KR-93m | TOTALS | | 0 000E+00 | | 4 487E+02 | 5 765E+01 | |
| KR-95m | INITIAL | 0 000E+00 | | 2 810E+02 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 2 186E+03 | 2 809E+02 | 3 121E-01 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| KR-95m | TOTALS | | 0 000E+00 | | 2 186E+03 | 2 809E+02 | |
| KR-95 | INITIAL | 0 000E+00 | | 1 480E+03 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 1 152E+04 | 1 480E+03 | 1 644E+00 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| KR-95 | TOTALS | | 0 000E+00 | | 1 152E+04 | 1 480E+03 | |
| KR-97 | INITIAL | 0 000E+00 | | 1 610E+02 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 1 251E+03 | 1 608E+02 | 1 787E-01 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| KR-97 | TOTALS | | 0 000E+00 | | 1 251E+03 | 1 608E+02 | |



TRAILS -- Transport of Radioactive Material in Linear Systems. VI.1
4.131.F.F. 3SGs-S Initial Steam Release

| | | NOT USED IN THIS CAS | | 3 SGs Init | | Stm | | AVERAGE | |
|---------|------------|----------------------|-----------|------------|-----------|-----------|-----------|----------|---------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| | | UC1 | UC1/sec | UC1 | UC1/sec | UC1 | UC1/sec | UC1 | UC1/sec |
| 4-88 | INITIAL | 0 000E+00 | | 4 290E+02 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 3 337E+03 | 4 288E+02 | 4 764E-01 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4-88 | TOTALS | | 0 000E+00 | | 3 337E+03 | 4 288E+02 | | | |
| 4-89 | INITIAL | 0 000E+00 | | 1 350E+01 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 1 022E+02 | 1 313E+01 | 1 459E-02 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4-89 | TOTALS | | 0 000E+00 | | 1 022E+02 | 1 313E+01 | | | |
| 4E-131M | INITIAL | 0 000E+00 | | 1 440E+01 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 1 121E+02 | 1 440E+01 | 1 600E-02 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4E-131M | TOTALS | | 0 000E+00 | | 1 121E+02 | 1 440E+01 | | | |
| 4E-133M | INITIAL | 0 000E+00 | | 4 130E+02 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 3 214E+03 | 4 130E+02 | 4 589E-01 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4E-133M | TOTALS | | 0 000E+00 | | 3 214E+03 | 4 130E+02 | | | |



TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
4.18% F.F. 3SGs-5 Initial Steam Release

| STEP | TIME | NOT USED IN THIS CAS | | 3 SGs Init | | AVERAGE | |
|---------|------------|----------------------|-----------|------------|-----------|-----------|-----------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| | | UC1 | UC1-sec | UC1 | UC1-sec | UC1 | UC1/sec |
| XE-133 | INITIAL | 0 000E+00 | | 3 520E+03 | | 3 520E+03 | 3 911E+00 |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 2 739E+04 | 0 000E+00 | 0 000E+00 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| XE-133 | TOTALS | | 0 000E+00 | | 2 739E+04 | 3 520E+03 | |
| XE-135M | INITIAL | 0 000E+00 | | 1 460E+02 | | 1 452E+02 | 1 613E-01 |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 1 130E+03 | 0 000E+00 | 0 000E+00 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| XE-135M | TOTALS | | 0 000E+00 | | 1 130E+03 | 1 452E+02 | |
| XE-135 | INITIAL | 0 000E+00 | | 4 310E+02 | | 4 309E+02 | 4 788E-01 |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 3 354E+03 | 0 000E+00 | 0 000E+00 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| XE-135 | TOTALS | | 0 000E+00 | | 3 354E+03 | 4 309E+02 | |
| XE-137 | INITIAL | 0 000E+00 | | 2 190E+01 | | 2 140E+01 | 2 378E-02 |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 1 665E+02 | 0 000E+00 | 0 000E+00 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| XE-137 | TOTALS | | 0 000E+00 | | 1 665E+02 | 2 140E+01 | |



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ATTACHMENT 3

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TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
4.18% F.F. 350% S Initial Steam Release

| | | NOT USED IN THIS CAS | | 3 50% Init | | 50% Init | | AVERAGE | |
|--------|------------|----------------------|-----------|------------|-----------|-----------|-----------|----------|---------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| | | UC1 | UC1-sec | UC1 | UC1-sec | UC1 | UC1-sec | UC1 | UC1/sec |
| 1E-138 | INITIAL | 0 000E+00 | | 9 030E+01 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 6 983E+02 | 8 973E+01 | 9 970E+02 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 1E-138 | TOTALS | | 0 000E+00 | | 6 983E+02 | 8 973E+01 | | | |
| 1-131 | INITIAL | 0 000E+00 | | 8 130E+03 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 6 327E+04 | 8 130E+03 | 9 033E+00 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 1-131 | TOTALS | | 0 000E+00 | | 6 327E+04 | 8 130E+03 | | | |
| 1-132 | INITIAL | 0 000E+00 | | 2 400E+03 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 1 866E+04 | 2 398E+03 | 2 665E+00 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 1-132 | TOTALS | | 0 000E+00 | | 1 866E+04 | 2 398E+03 | | | |
| 1-133 | INITIAL | 0 000E+00 | | 1 160E+03 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 9 027E+03 | 1 160E+03 | 1 289E+00 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | | |
| 1-133 | TOTALS | | 0 000E+00 | | 9 027E+03 | 1 160E+03 | | | |



TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
4 18% F F 3SGs-5 Initial Steam Release

| | | NO1 USED IN THIS CAS | | 3 SGs Init Stm | | AVERAGE | |
|--------------|------------|----------------------|-----------|----------------|-----------|-----------|-----------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| STEP | TIME | UC1 | UC1/sec | UC1 | UC1/sec | UC1 | UC1/sec |
| I-134 | INITIAL | 0 000E+00 | | 5 360E+02 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 4 164E+03 | 5 351E+02 | 5 945E+01 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| I-134 | TOTALS | | 0 000E+00 | | 4 164E+03 | 5 351E+02 | |
| I-135 | INITIAL | 0 000E+00 | | 5 210E+03 | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 4 054E+04 | 5 209E+03 | 5 788E+00 |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| I-135 | TOTALS | | 0 000E+00 | | 4 054E+04 | 5 209E+03 | |
| ALL NUCLIDES | | 0 000E+00 | | 0 000E+00 | | | |
| # STEP 9 | | | | | | | |



TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
4 18% F F DSGs-5 Initial Steam Release

| - - - - - E N V I R O N M E N T - - - - - | | | | | | | |
|---|--|--------------|-----------|------------|-----------|---------------|-----------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| | | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| KR-B3m | | | | | | | |
| 0 2500 h | | 2.65E-09 | 1.06E-08 | 3.58E-08 | 1.43E-07 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 16 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.65E-09 | | 3.58E-08 | | 0.00E+00 | |
| KR-B5m | | | | | | | |
| 0 2500 h | | 7.83E-07 | 3.13E-06 | 1.17E-06 | 4.66E-06 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 16 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 7.83E-07 | | 1.17E-06 | | 0.00E+00 | |
| KR-B5 | | | | | | | |
| 0 2500 h | | 5.75E-08 | 2.30E-07 | 6.04E-06 | 2.42E-05 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 16 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 5.75E-08 | | 6.04E-06 | | 0.00E+00 | |
| KR-B7 | | | | | | | |
| 0 2500 h | | 2.25E-06 | 9.02E-06 | 3.46E-06 | 1.38E-05 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 16 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.25E-06 | | 3.46E-06 | | 0.00E+00 | |

TRAILC -- Transport of Radioactive Material in Linear Systems, v1.1
4.18% F F 350s-B Initial Steam Release

| ENVIRONMENT 1 | | | | | | | |
|---------------|---|--------------|-----------|------------|-----------|---------------|-----------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| | | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| KR-88 | | | | | | | |
| 0.2500 | h | 1.48E-05 | 5.93E-05 | 2.54E-06 | 1.02E-05 | 0.00E+00 | 0.00E+00 |
| 1.2500 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8.5000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 1.48E-05 | | 2.54E-06 | | 0.00E+00 | |
| KR-89 | | | | | | | |
| 0.2500 | h | 4.26E-07 | 1.70E-06 | 2.91E-07 | 1.16E-06 | 0.00E+00 | 0.00E+00 |
| 1.2500 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8.5000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 4.26E-07 | | 2.91E-07 | | 0.00E+00 | |
| XE-131M | | | | | | | |
| 0.2500 | h | 5.12E-09 | 2.03E-08 | 3.33E-08 | 1.33E-07 | 0.00E+00 | 0.00E+00 |
| 1.2500 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8.5000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 5.12E-09 | | 3.33E-08 | | 0.00E+00 | |
| XE-133M | | | | | | | |
| 0.2500 | h | 3.03E-07 | 1.21E-06 | 1.28E-06 | 5.11E-06 | 0.00E+00 | 0.00E+00 |
| 1.2500 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8.5000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 3.03E-07 | | 1.28E-06 | | 0.00E+00 | |

TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
4.18% F F 3504-S Initial Steam Release

| ENVIRONMENT | | | | | | | |
|-------------|--|--------------|-----------|------------|-----------|---------------|-----------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| | | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| XE-133 | | | | | | | |
| 0 2500 h | | 2.82E-06 | 1.13E-05 | 7.76E-06 | 3.10E-05 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.82E-06 | | 7.76E-06 | | 0.00E+00 | |
| XE-135M | | | | | | | |
| 0 2500 h | | 1.10E-06 | 4.42E-06 | 2.26E-07 | 9.04E-07 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 1.10E-06 | | 2.26E-07 | | 0.00E+00 | |
| XE-135 | | | | | | | |
| 0 2500 h | | 1.89E-06 | 7.55E-06 | 2.23E-06 | 8.92E-06 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 1.89E-06 | | 2.23E-06 | | 0.00E+00 | |
| XE-137 | | | | | | | |
| 0 2500 h | | 7.10E-08 | 2.84E-07 | 6.19E-07 | 2.47E-06 | 0.00E+00 | 0.00E+00 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 7.10E-08 | | 6.19E-07 | | 0.00E+00 | |



TRAILS -- Transport of Radioactive Material in Linear Systems: v1.1
4.10% F.F. BSGs-S Initial Steam Release

| ENVIRONMENT | | | | | | | |
|--------------|-----------|----------|-----------|------------|-----------|---------------|-----------|
| PHOTON-SUBMG | | | | BETA-SUBMG | | THYROID-INHAL | |
| DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| I-138 | | | | | | | |
| 0.2500 h | 1.79E-06 | 7.14E-06 | 9.21E-07 | 3.69E-06 | 0.00E+00 | 0.00E+00 | |
| 1.2500 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 2.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 4.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 8.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 8.5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 24.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 96.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 720.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| TOTALS | 1.79E-06 | | 9.21E-07 | | 0.00E+00 | | |
| I-131 | | | | | | | |
| 0.2500 h | 5.48E-05 | 2.19E-04 | 2.52E-05 | 1.01E-04 | 2.95E-01 | 1.18E+00 | |
| 1.2500 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 2.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 4.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 8.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 8.5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 24.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 96.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 720.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| TOTALS | 5.48E-05 | | 2.52E-05 | | 2.95E-01 | | |
| I-132 | | | | | | | |
| 0.2500 h | 9.71E-05 | 3.89E-04 | 1.91E-05 | 7.65E-05 | 3.15E-03 | 1.26E-02 | |
| 1.2500 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 2.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 4.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 8.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 8.5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 24.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 96.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 720.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| TOTALS | 9.71E-05 | | 1.91E-05 | | 3.15E-03 | | |
| I-133 | | | | | | | |
| 0.2500 h | 1.24E-05 | 4.98E-05 | 7.73E-06 | 3.09E-05 | 1.14E-02 | 4.55E-02 | |
| 1.2500 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 2.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 4.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 8.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 8.5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 24.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 96.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 720.0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| TOTALS | 1.24E-05 | | 7.73E-06 | | 1.14E-02 | | |

TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
4.18% F.F. BSGs-S Initial Steam Release

| ENVIRONMENT | | | | | | | |
|--------------|--|--------------|-----------|------------|-----------|---------------|-----------|
| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
| | | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE |
| | | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr |
| I-134 | | | | | | | |
| 0 2500 h | | 2.48E-05 | 9.93E-05 | 5.29E-06 | 2.12E-05 | 3.28E-04 | 1.31E-03 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 2.48E-05 | | 5.29E-06 | | 3.28E-04 | |
| I-135 | | | | | | | |
| 0 2500 h | | 1.45E-04 | 5.80E-04 | 3.12E-05 | 1.25E-04 | 1.58E-02 | 6.34E-02 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 1.45E-04 | | 3.12E-05 | | 1.58E-02 | |
| ALL NUCLIDES | | | | | | | |
| 0 2500 h | | 3.60E-04 | 1.44E-03 | 1.15E-04 | 4.61E-04 | 3.26E-01 | 1.30E+00 |
| 1 2500 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 8 5000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720 0000 h | | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 3.60E-04 | | 1.15E-04 | | 3.26E-01 | |



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TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
S. 18% F F JSGs-S Initial Secondary Liquid Iodines

COMP NOT USED IN THIS CASE

COMP J SGs Init Sec Liq

| | | |
|-------------------|-------------------|---------------------|
| INITIAL | 0 000E+00 KR-83m | 0 000E+00 KR-83m C1 |
| | 0 000E+00 KR-85m | 0 000E+00 KR-85m |
| | 0 000E+00 KR-85 | 0 000E+00 KR-85 |
| | 0 000E+00 KR-87 | 0 000E+00 KR-87 |
| | 0 000E+00 KR-88 | 0 000E+00 KR-88 |
| | 0 000E+00 KR-89 | 0 000E+00 KR-89 |
| | 0 000E+00 KR-90 | 0 000E+00 KR-90 |
| | 0 000E+00 XE-131M | 0 000E+00 XE-131M |
| | 0 000E+00 XE-133M | 0 000E+00 XE-133M |
| | 0 000E+00 XE-133 | 0 000E+00 XE-133 |
| | 0 000E+00 XE-135M | 0 000E+00 XE-135M |
| | 0 000E+00 XE-135 | 0 000E+00 XE-135 |
| | 0 000E+00 XE-137 | 0 000E+00 XE-137 |
| | 0 000E+00 XE-138 | 0 000E+00 XE-138 |
| | 0 000E+00 I-131 | 9 280E+00 I-131 |
| | 0 000E+00 I-132 | 2 740E+00 I-132 |
| | 0 000E+00 I-133 | 1 330E+01 I-133 |
| | 0 000E+00 I-134 | 6 120E+02 I-134 |
| | 0 000E+00 I-135 | 5 950E+00 I-135 |
| ACT MULT (to UC1) | 1 000E+00 | 1 000E+06 |
| PRODUCTION UC1/s | 0 000E+00 KR-83m | 0 000E+00 KR-83m |
| | 0 000E+00 KR-85m | 0 000E+00 KR-85m |
| | 0 000E+00 KR-85 | 0 000E+00 KR-85 |
| | 0 000E+00 KR-87 | 0 000E+00 KR-87 |
| | 0 000E+00 KR-88 | 0 000E+00 KR-88 |
| | 0 000E+00 KR-89 | 0 000E+00 KR-89 |
| | 0 000E+00 KR-90 | 0 000E+00 KR-90 |
| | 0 000E+00 XE-131M | 0 000E+00 XE-131M |
| | 0 000E+00 XE-133M | 0 000E+00 XE-133M |
| | 0 000E+00 XE-133 | 0 000E+00 XE-133 |
| | 0 000E+00 XE-135M | 0 000E+00 XE-135M |
| | 0 000E+00 XE-135 | 0 000E+00 XE-135 |
| | 0 000E+00 XE-137 | 0 000E+00 XE-137 |
| | 0 000E+00 XE-138 | 0 000E+00 XE-138 |
| | 0 000E+00 I-131 | 0 000E+00 I-131 |
| | 0 000E+00 I-132 | 0 000E+00 I-132 |
| | 0 000E+00 I-133 | 0 000E+00 I-133 |
| | 0 000E+00 I-134 | 0 000E+00 I-134 |
| | 0 000E+00 I-135 | 0 000E+00 I-135 |
| REMOVAL | 0 000E+00 1/sec | 2 069E-06 1/sec |
| NUC 1-14 REL FR | 0 000E+00 | 0 000E+00 |
| NUC 15-20 REL FR | 0 000E+00 | 0 000E+00 |



TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
S-105 F F 350s-S Initial Secondary Liquid Iodine

MULTIPLIERS****

| STEP | TIME | xPR | xREM | xRF | xPR | xREM | xRF |
|------|-----------|-----------|------|-----------|-----------|-----------|-----------|
| 1 | 7 000E+02 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 2 | 4 500E+03 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 3 | 7 200E+03 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 1 00 | 0 000E+00 |
| 4 | 1 440E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 596 | 0 000E+00 |
| 5 | 2 880E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 596 | 0 000E+00 |
| 6 | 3 060E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 7 | 8 640E+04 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 8 | 3 456E+05 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |
| 9 | 2 592E+06 | 0 000E+00 | 1 00 | 0 000E+00 | 0 000E+00 | 0 000E+00 | 0 000E+00 |

--- ENVIRONMENT ---

| X/G | Breathing |
|-----------|-----------|
| s/M3 | M3/s |
| 1 000E-03 | 3 470E-04 |

MULTIPLIERS****

| STEP | TIME, s | | |
|------|-----------|-----------|------|
| 1 | 7 000E+02 | 7 070E-02 | 1 00 |
| 2 | 4 500E+03 | 7 070E-02 | 1 00 |
| 3 | 7 200E+03 | 7 070E-02 | 1 00 |
| 4 | 1 440E+04 | 7 070E-02 | 1 00 |
| 5 | 2 880E+04 | 7 070E-02 | 1 00 |
| 6 | 3 060E+04 | 5 160E-02 | 1 00 |
| 7 | 8 640E+04 | 5 160E-02 | 1 00 |
| 8 | 3 456E+05 | 2 590E-02 | 1 00 |
| 9 | 2 592E+06 | 9 630E-03 | 1 00 |



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TRAILS -- Transport of Radioactive Material in Liquid Systems, v. 1
5.101.F.F. 3304-S Initial Secondary Liquid Inventory

| STEP | TIME | NOT USED IN THIS CAS | | 2 504 In11 | | SM L19 | | AVERAGE | |
|--------------|------------|----------------------|-----------|------------|-----------|-----------|-----------|----------|---------|
| | | CURRENT | INTEGRD | CURRENT | INTEGRD | CURRENT | INTEGRD | RELEASED | RELEASE |
| | | UCI | UCI-SEC | UCI | UCI-SEC | UCI | UCI-SEC | UCI | UCI-SEC |
| 1-131 | INITIAL | 0E+00 | | 9 280E+06 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 9 254E+06 | 8 340E+09 | 1 726E+04 | 1 917E+01 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 9 153E+06 | 3 310E+10 | 6 855E+04 | 1 904E+01 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 9 0 7E+06 | 2 461E+10 | 5 092E+04 | 1 886E+01 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 8 933E+06 | 6 483E+10 | 7 995E+04 | 1 110E+01 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 8 650E+06 | 1 266E+11 | 1 561E+05 | 1 084E+01 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 8 635E+06 | 1 556E+10 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 8 167E+06 | 4 687E+11 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 6 306E+06 | 1 865E+12 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 6 703E+05 | 5 648E+12 | 0 000E+00 | 0 000E+00 | | |
| 1-131 | TOTALS | | 0 000E+00 | | 8 255E+12 | 3 728E+05 | | | |
| 1-132 | INITIAL | 0 000E+00 | | 2 740E+06 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 2 536E+06 | 2 373E+09 | 4 910E+03 | 5 456E+00 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 1 863E+06 | 7 856E+09 | 1 625E+04 | 4 515E+00 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 1 477E+06 | 4 489E+09 | 9 288E+03 | 3 440E+00 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 8 015E+05 | 7 958E+09 | 9 813E+03 | 1 363E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 2 359E+05 | 6 659E+09 | 8 211E+03 | 5 702E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 2 029E+05 | 3 941E+08 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 1 900E+03 | 2 401E+09 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 7 170E-07 | 2 269E+07 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 8 565E-03 | 0 000E+00 | 0 000E+00 | | |
| 1-132 | TOTALS | | 0 000E+00 | | 3 215E+10 | 4 949E+04 | | | |
| 1-133 | INITIAL | 0 000E+00 | | 1 330E+07 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 1 317E+07 | 1 191E+10 | 2 464E+04 | 2 738E+01 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 1 264E+07 | 4 644E+10 | 9 609E+04 | 2 669E+01 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 1 226E+07 | 3 361E+10 | 6 954E+04 | 2 575E+01 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 1 137E+07 | 8 501E+10 | 1 048E+05 | 1 456E+01 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 9 773E+06 | 1 519E+11 | 1 873E+05 | 1 301E+01 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 9 612E+06 | 1 745E+10 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 5 734E+06 | 4 139E+11 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 5 205E+05 | 5 632E+11 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 4 845E-04 | 5 623E+10 | 0 000E+00 | 0 000E+00 | | |
| 1-133 | TOTALS | | 0 000E+00 | | 1 385E+12 | 4 824E+05 | | | |
| 1-134 | INITIAL | 0 000E+00 | | 6 120E+06 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 5 013E+04 | 4 993E+07 | 1 033E+02 | 1 148E-01 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 2 257E+04 | 1 243E+08 | 2 572E+02 | 7 146E-02 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 1 241E+04 | 4 586E+07 | 9 488E+01 | 3 514E-02 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 2 530E+03 | 4 472E+07 | 5 514E+01 | 7 659E-03 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 1 052E+02 | 1 098E+07 | 1 354E+01 | 9 402E-04 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 7 085E+01 | 1 564E+05 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 3 378E-04 | 3 226E+05 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 6 434E-29 | 1 538E+00 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 0 000E+00 | 2 930E-25 | 0 000E+00 | 0 000E+00 | | |
| 1-134 | TOTALS | | 0 000E+00 | | 2 763E+08 | 5 241E+02 | | | |
| 1-135 | INITIAL | 0 000E+00 | | 5 950E+06 | | | | | |
| 1 | 0 2500 h | 0 000E+00 | 0 000E+00 | 5 785E+06 | 5 281E+09 | 1 093E+04 | 1 214E+01 | | |
| 2 | 1 2500 h | 0 000E+00 | 0 000E+00 | 5 171E+06 | 1 970E+10 | 4 076E+04 | 1 132E+01 | | |
| 3 | 2 0000 h | 0 000E+00 | 0 000E+00 | 4 753E+06 | 1 339E+10 | 2 770E+04 | 1 026E+01 | | |
| 4 | 4 0000 h | 0 000E+00 | 0 000E+00 | 3 820E+06 | 3 074E+10 | 3 790E+04 | 5 265E+00 | | |
| 5 | 8 0000 h | 0 000E+00 | 0 000E+00 | 2 467E+06 | 4 455E+10 | 5 494E+04 | 3 815E+00 | | |
| 6 | 8 5000 h | 0 000E+00 | 0 000E+00 | 2 341E+06 | 4 326E+09 | 0 000E+00 | 0 000E+00 | | |
| 7 | 24 0000 h | 0 000E+00 | 0 000E+00 | 4 607E+05 | 6 454E+10 | 0 000E+00 | 0 000E+00 | | |
| 8 | 96 0000 h | 0 000E+00 | 0 000E+00 | 2 423E+02 | 1 581E+10 | 0 000E+00 | 0 000E+00 | | |
| 9 | 720 0000 h | 0 000E+00 | 0 000E+00 | 9 028E-27 | 8 317E+06 | 0 000E+00 | 0 000E+00 | | |
| 1-135 | TOTALS | | 0 000E+00 | | 1 983E+11 | 1 722E+05 | | | |
| ALL NUCLIDES | | 0 000E+00 | | 6 703E+05 | | | | | |
| # STEP | 9 | | | | | | | | |

TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
5.18% F F 250g-S Initial Secondary Liquid Iodines

| E N V I R O N M E N T | | | | | | | |
|-----------------------|--------------|-----------|------------|-----------|---------------|-----------|--|
| | PHOTON-SUBMG | | DETA-SUBMG | | THYROID-INHAL | | |
| | DOSE | DOSE RATE | DOSE | DOSE RATE | DOSE | DOSE RATE | |
| | mrem | mrem/hr | mrem | mrem/hr | mrem | mrem/hr | |
| I-131 | | | | | | | |
| 0 2500 h | 1.16E-04 | 4.65E-04 | 5.35E-05 | 2.14E-04 | 6.27E-01 | 2.51E+00 | |
| 1 2500 h | 4.62E-04 | 4.62E-04 | 2.12E-04 | 2.12E-04 | 2.49E+00 | 2.49E+00 | |
| 2 0000 h | 3.43E-04 | 4.57E-04 | 1.58E-04 | 2.10E-04 | 1.85E+00 | 2.47E+00 | |
| 4 0000 h | 5.39E-04 | 2.69E-04 | 2.48E-04 | 1.24E-04 | 2.90E+00 | 1.45E+00 | |
| 8 0000 h | 1.05E-03 | 2.63E-04 | 4.84E-04 | 1.21E-04 | 5.67E+00 | 1.42E+00 | |
| 8 5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 24 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 96 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 720 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| TOTALS | 2.51E-03 | | 1.14E-03 | | 1.35E+01 | | |
| I-132 | | | | | | | |
| 0 2500 h | 1.99E-04 | 7.95E-04 | 3.92E-05 | 1.57E-04 | 6.44E-03 | 2.58E-02 | |
| 1 2500 h | 6.58E-04 | 6.58E-04 | 1.30E-04 | 1.30E-04 | 2.13E-02 | 2.13E-02 | |
| 2 0000 h | 3.76E-04 | 1.02E-04 | 7.41E-05 | 9.88E-05 | 1.22E-02 | 1.63E-02 | |
| 4 0000 h | 3.97E-04 | 1.99E-04 | 7.83E-05 | 3.91E-05 | 1.29E-02 | 6.44E-03 | |
| 8 0000 h | 3.33E-04 | 8.31E-05 | 6.55E-05 | 1.64E-05 | 1.08E-02 | 2.69E-03 | |
| 8 5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 24 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 96 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 720 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| TOTALS | 1.96E-03 | | 3.87E-04 | | 6.36E-02 | | |
| I-133 | | | | | | | |
| 0 2500 h | 2.64E-04 | 1.06E-03 | 1.64E-04 | 6.57E-04 | 2.42E-01 | 9.67E-01 | |
| 1 2500 h | 1.03E-03 | 1.03E-03 | 6.40E-04 | 6.40E-04 | 9.43E-01 | 9.43E-01 | |
| 2 0000 h | 7.46E-04 | 9.94E-04 | 4.63E-04 | 6.18E-04 | 6.82E-01 | 9.10E-01 | |
| 4 0000 h | 1.12E-03 | 5.62E-04 | 6.99E-04 | 3.49E-04 | 1.03E+00 | 5.14E-01 | |
| 8 0000 h | 2.01E-03 | 5.02E-04 | 1.25E-03 | 3.12E-04 | 1.84E+00 | 4.60E-01 | |
| 8 5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 24 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 96 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 720 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| TOTALS | 5.17E-03 | | 3.22E-03 | | 4.73E+00 | | |
| I-134 | | | | | | | |
| 0 2500 h | 4.79E-06 | 1.92E-05 | 1.02E-06 | 4.08E-06 | 6.34E-05 | 2.53E-04 | |
| 1 2500 h | 1.19E-05 | 1.19E-05 | 2.54E-06 | 2.54E-06 | 1.58E-04 | 1.58E-04 | |
| 2 0000 h | 4.40E-06 | 5.87E-06 | 9.38E-07 | 1.25E-06 | 5.82E-05 | 7.76E-05 | |
| 4 0000 h | 2.56E-06 | 1.28E-06 | 5.45E-07 | 2.72E-07 | 3.38E-05 | 1.69E-05 | |
| 8 0000 h | 6.28E-07 | 1.57E-07 | 1.34E-07 | 3.34E-08 | 8.30E-06 | 2.08E-06 | |
| 8 5000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 24 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 96 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| 720 0000 h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | |
| TOTALS | 2.43E-05 | | 5.18E-06 | | 3.21E-04 | | |



TRAILS -- Transport of Radioactive Material in Linear Systems: v1.1
5.18% F F CSQs-S Initial Secondary Liquid Loading

----- ENVIRONMENT -----

| | | PHOTON-SUBMG | | BETA-SUBMG | | THYROID-INHAL | |
|----------|---|--------------|----------------------|--------------|----------------------|---------------|----------------------|
| | | DOSE mrem | DOSE RATE mrem/hr | DOSE mrem | DOSE RATE mrem/hr | DOSE mrem | DOSE RATE mrem/hr |
| 1-125 | | | | | | | |
| 0.2500 | h | 3.04E-04 | 1.22E-03 | 6.55E-05 | 2.62E-04 | 3.32E-02 | 1.33E-01 |
| 1.2500 | h | 1.13E-03 | 1.13E-03 | 2.44E-04 | 2.44E-04 | 1.24E-01 | 1.24E-01 |
| 2.0000 | h | 7.71E-04 | 1.03E-03 | 1.66E-04 | 2.21E-04 | 8.43E-02 | 1.12E-01 |
| 4.0000 | h | 1.06E-03 | 5.28E-04 | 2.27E-04 | 1.14E-04 | 1.15E-01 | 5.77E-02 |
| 8.0000 | h | 1.53E-03 | 3.82E-04 | 3.29E-04 | 8.23E-05 | 1.67E-01 | 4.18E-02 |
| 8.5000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 4.79E-03 | | 1.03E-03 | | 5.24E-01 | |

ALL NUCLIDES

| | | | | | | | |
|----------|---|----------|----------|----------|----------|----------|----------|
| 0.2500 | h | 8.88E-04 | 3.55E-03 | 3.23E-04 | 1.29E-03 | 9.08E-01 | 3.63E+00 |
| 1.2500 | h | 3.30E-03 | 3.30E-03 | 1.23E-03 | 1.23E-03 | 3.58E+00 | 3.58E+00 |
| 2.0000 | h | 2.24E-03 | 2.99E-03 | 8.62E-04 | 1.15E-03 | 2.63E+00 | 3.50E+00 |
| 4.0000 | h | 3.12E-03 | 1.56E-03 | 1.25E-03 | 6.26E-04 | 4.06E+00 | 2.03E+00 |
| 8.0000 | h | 4.92E-03 | 1.23E-03 | 2.13E-03 | 5.32E-04 | 7.68E+00 | 1.92E+00 |
| 8.5000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 24.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 96.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 720.0000 | h | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TOTALS | | 1.45E-02 | | 5.79E-03 | | 1.89E+01 | |



This attachment shows the summation of the .25 hr, 1.25 hr, and 2 hr dose increments developed in Attachment 3 to obtain the 0-2 hr LPZ dose. The total 0-2 hr LPZ dose is shown towards the bottom of the right column.

The conversion to the 0-2 hr EAB dose uses the method and factor discussed on Page 7 to determine the 0-2 hr EAB dose which is shown at the bottom of the right column.

CALCULATION OF EAB DOSES - TWO HOUR (area)

0-2 Hour LPZ Doses

| CASE | PHOTON | BETA | THYROID |
|-----------|----------|----------|----------|
| 1: .25hr | 8.59E-02 | 2.22E-02 | 2.60E+01 |
| 1: 1.25hr | 1.58E+00 | 4.29E-01 | 6.05E+02 |
| 1: 2.00hr | 1.97E+00 | 5.68E-01 | 9.55E+02 |
| 1: TOTAL | 3.64E+00 | 1.02E+00 | 1.59E+03 |

| CASE | PHOTON | BETA | THYROID |
|-----------|----------|----------|----------|
| 3: .25hr | 3.08E-05 | 7.72E-06 | 7.23E-03 |
| 3: 1.25hr | 3.15E-03 | 8.17E-04 | 9.34E-01 |
| 3: 2.00hr | 8.28E-03 | 2.22E-03 | 2.86E+00 |
| 3: TOTAL | 1.15E-02 | 3.04E-03 | 3.80E+00 |

| CASE | PHOTON | BETA | THYROID |
|-----------|----------|----------|----------|
| 5: .25hr | 1.88E-04 | 3.23E-04 | 9.08E-01 |
| 5: 1.25hr | 3.30E-03 | 1.23E-03 | 3.58E+00 |
| 5: 2.00hr | 2.24E-03 | 8.62E-04 | 2.63E+00 |
| 5: TOTAL | 6.43E-03 | 2.42E-03 | 7.12E+00 |

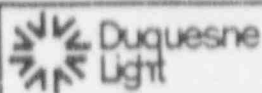
| CASE | PHOTON | BETA | THYROID |
|-----------|----------|----------|----------|
| 2: .25hr | 3.94E+01 | 2.97E+01 | 0.00E+00 |
| 2: 1.25hr | 8.18E+01 | 4.75E+01 | 0.00E+00 |
| 2: 2.00hr | 4.26E+01 | 2.46E+01 | 0.00E+00 |
| 2: TOTAL | 1.64E+02 | 1.02E+02 | 0.00E+00 |

| CASE | PHOTON | BETA | THYROID |
|-----------|----------|----------|----------|
| 4: .25hr | 3.60E-04 | 1.15E-04 | 3.26E-01 |
| 4: 1.25hr | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4: 2.00hr | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 4: TOTAL | 3.60E-04 | 1.15E-04 | 3.26E-01 |

| TOTAL LPZ DOSE (0-2 hr) | | | |
|-------------------------|----------|----------|----------|
| area | PHOTON | BETA | THYROID |
| | 1.67E+02 | 1.03E+02 | 1.60E+03 |

$$EAB (0-2 \text{ hr}) = 20.37 \times LPZ(0-2 \text{ hr})$$

| TOTAL EAB DOSE (0-2 hr) | | | |
|-------------------------|----------|----------|----------|
| area | PHOTON | BETA | THYROID |
| | 3.41E+03 | 2.09E+03 | 3.25E+04 |



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ATTACHMENT 5

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0-2 Hour Isotopic Release - Locked Rotor Accident

| ISOTOPE | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 | Total-uCi |
|---------|----------|----------|----------|----------|----------|-----------|
| Kr-83m | | 3.60E+08 | | 5.77E+01 | | 3.60E+08 |
| Kr-85m | | 1.11E+09 | | 2.81E+02 | | 1.11E+09 |
| Kr-85 | | 8.88E+07 | | 1.48E+03 | | 8.88E+07 |
| Kr-87 | | 1.54E+09 | | 1.61E+02 | | 1.54E+09 |
| Kr-88 | | 2.80E+09 | | 4.29E+02 | | 2.80E+09 |
| Kr-89 | | 1.79E+08 | | 1.31E+01 | | 1.79E+08 |
| Ie-131m | | 1.80E+07 | | 1.44E+01 | | 1.80E+07 |
| Ie-133m | | 1.57E+08 | | 4.13E+02 | | 1.57E+08 |
| Ie-133 | | 6.82E+09 | | 3.52E+03 | | 6.82E+09 |
| Ie-135m | | 3.31E+08 | | 1.45E+02 | | 3.31E+08 |
| Ie-135 | | 1.63E+09 | | 4.31E+02 | | 1.63E+09 |
| Ie-137 | | 2.76E+08 | | 2.14E+01 | | 2.76E+08 |
| Ie-138 | | 1.02E+09 | | 8.97E+01 | | 1.02E+09 |
| I-131 | 2.62E+07 | | 5.75E+04 | 8.13E+03 | 1.37E+05 | 2.64E+07 |
| I-132 | 2.12E+07 | | 7.98E+04 | 2.40E+03 | 3.04E+04 | 2.13E+07 |
| I-133 | 4.86E+07 | | 1.26E+05 | 1.16E+03 | 1.90E+05 | 4.89E+07 |
| I-134 | 2.15E+07 | | 7.54E+04 | 5.35E+02 | 4.55E+02 | 2.16E+07 |
| I-135 | 3.87E+07 | | 1.07E+05 | 5.21E+03 | 7.94E+04 | 3.89E+07 |

0-8 Hour Isotopic Release - Locked Rotor Accident

| ISOTOPE | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 | Total-uCi |
|---------|----------|----------|----------|----------|----------|-----------|
| Kr-83m | | 6.45E+08 | | 5.77E+01 | | 6.45E+08 |
| Kr-85m | | 2.94E+09 | | 2.81E+02 | | 2.94E+09 |
| Kr-85 | | 3.54E+08 | | 1.48E+03 | | 3.54E+08 |
| Kr-87 | | 2.28E+09 | | 1.61E+02 | | 2.28E+09 |
| Kr-88 | | 6.22E+09 | | 4.29E+02 | | 6.22E+09 |
| Kr-89 | | 1.79E+08 | | 1.31E+01 | | 1.79E+08 |
| Ie-131m | | 7.11E+07 | | 1.44E+01 | | 7.11E+07 |
| Ie-133m | | 6.01E+08 | | 4.13E+02 | | 6.01E+08 |
| Ie-133 | | 2.67E+10 | | 3.52E+03 | | 2.67E+10 |
| Ie-135m | | 3.33E+08 | | 1.45E+02 | | 3.33E+08 |
| Ie-135 | | 5.25E+09 | | 4.31E+02 | | 5.25E+09 |
| Ie-137 | | 2.77E+08 | | 2.14E+01 | | 2.77E+08 |
| Ie-138 | | 1.02E+09 | | 8.97E+01 | | 1.02E+09 |
| I-131 | 2.54E+08 | | 1.90E+06 | 8.13E+03 | 3.73E+05 | 2.56E+08 |
| I-132 | 7.56E+07 | | 1.15E+06 | 2.40E+03 | 4.85E+04 | 8.08E+07 |
| I-133 | 4.22E+08 | | 3.81E+06 | 1.16E+03 | 4.82E+05 | 4.26E+08 |
| I-134 | 3.55E+07 | | 4.48E+05 | 5.35E+02 | 5.24E+02 | 3.59E+07 |
| I-135 | 2.61E+08 | | 2.60E+06 | 5.21E+03 | 1.72E+05 | 2.64E+08 |