



Duquesne Light

Health Physics Department

A9.621

REVISION		0	1	2	3
Subject Assessment Of The Doses In The Unit 2 Control Room Due To A Locked Rotor Accident At Unit 2 Assuming 18% Failed Fuel				PAGE 1 OF <div style="font-size: 2em; text-align: center;">56</div>	
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 doses to the control room personnel resulting from the Locked Rotor Accident at Unit 2. Assumption of 18% fuel damage and the use of the new fuel is made.					
3	by _____	date _____			
	chk _____	date _____			
	app _____	date _____			
2	by _____	date _____			
	chk _____	date _____			
	app _____	date _____			
1	by _____	date _____			
	chk _____	date _____			
	app _____	date _____			
0	by <i>Mark Duranko</i>	date <i>10/22/91</i>	<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>Ken Lunn</i>	date <i>10/24/91</i>			
	app <i>Ch BSC 10-9</i>	date <i>11/6/91</i>			
<div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"> <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 style="width: 33%;"> <input checked="" type="checkbox"/> DIR, RadOps-1 <input checked="" type="checkbox"/> DIR, RadOps-2 <input type="checkbox"/> DIR, RadHealth <input checked="" type="checkbox"/> DIR, Env Svcs. </div> <div style="width: 33%;"> <input checked="" type="checkbox"/> Trng Dept. <input checked="" type="checkbox"/> Author: <u>M. Duranko</u> <input checked="" type="checkbox"/> <u>R. Ireland</u> </div> </div>					

RE 1.103-1

9.90

9202040291 920127
 PDR ADOCK 05000412
 PDR



DISCUSSION

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

This analysis is similar to that done for the Unit 1 LRA, documented in Reference [1], except that the offsite doses are not included in this analysis. They were documented in Calculation ERS-MPD-91-022, Reference [2]. References [1] and [2] should be consulted for further information concerning the background for this calculation.

METHODOLOGY

This analysis will be performed using the TRAILS code documented in Reference [3]. 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 [3], 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: 4]. Thyroid dose conversion factors and breathing rates are those provided in TID14844 [Ref: 5] 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: 6], which is a subset of the ORNL Evaluated Nuclear Structure Data File, and which is available in hardcopy as DOE/TIC-11026 [Ref: 7]. This data source was used in lieu of the suggested 6th Edition, Table Of Isotopes, which is no longer in print.

The Control Room is treated as a compartment with variable (by time step) intake, filtration, X/Q, breathing rate, and exhaust rates.

For this analysis the duration Control Room doses (30 days) will be analyzed.

The release modeling that will be utilized is similar to that used by SWEC in the evaluation of the combined Control Room habitability in 1987 [Ref: 8,9]. In that analysis, SWEC performed an evaluation of Control Room doses due to a locked rotor accident at Unit 1 in order to meet Unit 2 licensing commitments, assuming no fuel failures.

Since the Control Room doses are sensitive to the timing of Control Room isolation initiated by area radiation monitors, an evaluation of the Control Room dose rate at various times post-accident is assessed first.

Based on these results, an isolation time is postulated and included as an analysis assumption during evaluation of Control Room dose over the duration of the accident.



The analyses address the following release components:

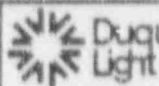
1. Release of iodine activity from the three steam generators due to technical specification primary-to-secondary leakage. Iodine partitioning is assumed. The activity is based on 18% fuel clad failure, with the fuel clad activity based on St. Jarr Review Plan assumptions (i.e., 30% Kr-85, 10% all others), with the exception of I-131, which is assumed to be 12% in keeping with the conclusions of NUREG/CR-5009 [Ref: 10].
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 11.

INPUT DATA/ASSUMPTIONS

1. General Methodology Based On SRP 15.3.3-15.3.4 [10]
2. Core Inventory From Table 11.1-1 Based On 2766 MWt [11]
3. Core-Gap Fractions [11]
 - Kr-85 0.30 [11]
 - I-131 0.12 [12]
 - Other 0.10 [11]

The assumptions of References 11 and 12 are included, even though they are not specifically applicable to a locked rotor accident. This is conservative.
4. Fraction Of Rods In DNB = 18% [13]
5. Fraction of Rods Assumed Failed = 18% (Section 15.3.3) [10]
6. Concurrent Spike Appearance Rates, uCi/sec (Tbl. 15.0-10) [11]
 - 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) [11]
 - Assume appearance rates are 1/500 for 4-8 hours
8. RCS Volume = 4.2E5 lbs. (Tbl. 11.1-3) [11]
9. RCS Primary-To-Secondary Leakage = 1 gpm Total (Tbl. 15.3-3) [11]
10. Steam Generator Mass (Tbl. 15.3-3) [11]
 - Liquid = 99300 lbs.
 - Steam = 8700 lbs.



11. Steam Generator Mass Release (Tbl. 15.3-3) [11]
0-2 hours = 443,878 lbs.
2-8 hours = 793,644 lbs.
12. Iodine Partitioning In Steam Generators = 0.01 (Tbl. 15.3-3) [11]
13. Duration Of Plant Cooldown By Secondary System (Tbl. 15.3-3) [11]
i.e., duration of release = 8 hours
14. X/Q Values For The Control Room (Sec/M³) [14]
0-8 hr - 1.59E-4 24-96 hr - 5.96E-5
8-24 hr - 7.86E-5 96-720 hr - 3.76E-5
15. Control Room Volume: 1.73E5 cu.ft. (Sec. 6.4) [11]
16. Control Room Normal Intake: 500 cu.ft./min. (Sec. 6.4) [11]
300 cu.ft./min. From Unit 1 And 200 cu.ft./min. From Unit 2
17. Control Room Pressurization Rate: 690 cu.ft./min. (Sec. 6.4) [11]
18. Control Room Infiltration: 10 cu.ft./min. (Sec. 6.4) [11]
19. Control Room Filter Efficiency: 95% [15]
To account for the filter bypass indicated in Item 18, this
is modified by:
$$\frac{690(.95) + 10(0)}{690 + 10} = .936$$
20. Control Room Purge Flow: 19800 cu.ft./min. (based on the [11]
recirculation fan flow rate which can be used to purge the CR)
21. Purge Initiation At 8 Hours [11]
22. Purge Duration .5 Hours [9]

CONTROL ROOM MODELING, DOSE RATE EVALUATION

For the dose rate evaluation, the Control Room intake and exhaust are set to 500 cu.ft./min., with no filtration. Time steps selected were based on trial calculations which identified the most likely times for the dose rate to reach the safety limit of 1 mR/hr. Note that this value is different than the alarm setpoint of the Control Room monitors. This is explained in Reference [17].

A chart showing the dose rate versus time was prepared. It is included as Attachment 1. The print outs from the TRAILS runs are included as Attachment 2.

The chart shows that the safety limit of 1 mrem/hour is reached at about 2320 seconds (~40 minutes) after the start of the accident. Since it is reasonable to assume operator manual actions after 30 minutes, it will be assumed that the operators will manually initiate isolation at T = 30 minutes.

CONTROL ROOM MODELING, DOSE EVALUATION

In order to be consistent with the results above, the Control Room isolation was assumed to occur at 1800 seconds or 30 minutes.

For the one hour period after isolation the only intake is the unfiltered 10 cu.ft./min. infiltration. The exhaust is equal to the pressurization rate of 690 cu.ft./min. plus the infiltration for a total of 700 cu ft./min.



At one hour following isolation, the Control Room ventilation realigns for filtered intake up to 1000 cu.ft./min. In accordance with the U2 UFSAR, the clean-up rate is 690 cu.ft./min. This is added to the 10 cu.ft./min. infiltration to yield 700 cu.ft./min. exfiltration. The air intake necessary to maintain this is the same 700 cu.ft./min. This ventilation continues until eight hours after the start of the accident.

At eight hours a Control Room purge is initiated. It continues until 8.5 hours at which time the normal system arrangement is restored.

CALCULATION

Source term development, determination of transfer lambdas, and release modeling is the same as in Reference [1] and are not repeated here.

The addition of the CR to the calculation is accomplished by insertion of suitable parameters for the flows, volumes, filtration rates, and X/Q values.

The X/Q parameters were determined by NUS Corporation using the methodology in Reference [14].

The print outs from the cases are included as Attachment 3.

RESULTS

The results and total from the five cases are as follows:

	<u>Gamma Dose</u> <u>(mrem)</u>	<u>Beta Dose</u> <u>(mrem)</u>	<u>Thyroid Dose</u> <u>(mrem)</u>
Case 1	6.23E-2	4.31E-1	1.07E+3
2	1.07E+1	1.48E+2	0
3	5.16E-4	3.41E-3	7.39E0
4	1.74E-5	1.23E-4	4.44E-1
5	1.34E-4	1.08E-3	3.58E0
Total (mrem)	1.08E+1	1.48E+2	1.08E+3

CONCLUSION

The dose limits in GDC 19, Reference [16] and the Standard Review Plan, Reference [10] are : Whole Body gamma - 5 rem

Thyroid - 30 rem

Beta Skin dose - 30 rem



The doses developed in this package are:

Whole Body gamma	-	1.08E-2	rem
Thyroid	-	1.08	rem
Beta Skin dose	-	1.48E-1	rem

The analysis of the Locked Rotor Accident shows that the Control Room doses are acceptable and the new fuel can be used, but requires that manual isolation of the Control Room occur at 30 minutes after the start of the accident.

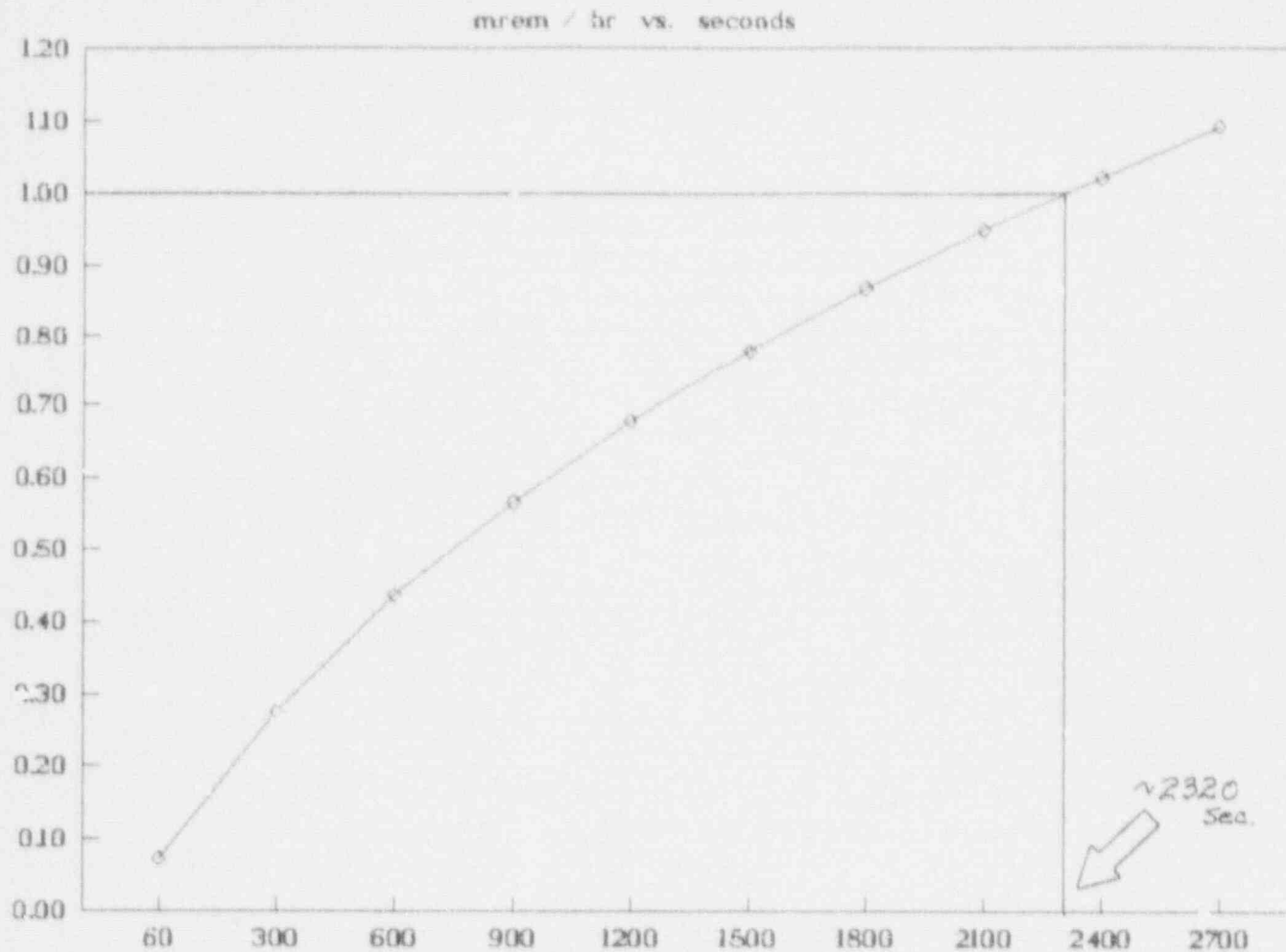


REFERENCES

1. ERS-SFL-89-021, Safety Analysis Of The Dose Consequences Of A Locked Rotor Accident At BVPS-1 With 18% Fuel Failure -- EAB, LPZ, Control Room, 1989
2. ERS-MPD-91-022, Offsite Dose Consequences Of A Locked Rotor Accident At Unit 2 With 18% Failed Fuel
3. DLC, Calculation ERS-SFL-089-020, TRAILS: Transport Of Radioactive Material In Linear Systems, 1989
4. NRC, Assumptions Used For Evaluating The Potential Radiological Consequences Of A Loss Of Coolant Accident For Pressurized Water Reactors, Regulatory Guide 1.4, 1974
5. USAEC, Calculation Of Distance Factors For Power And Test Reactor Sites, TID-14844, 1962
6. ORNL, DRALIST: Radioactive Decay Data For Application To Radiation Dosimetry And Radiological Assessments, DLC-80, 1981
7. D. C. Kocher, Radioactive Decay Data Tables, DOE/TIC-11026, 1981
8. 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
9. SWEC, Calculation 12241-UR(VB)-456, Combined BV1-BV2 Control Room Habitability Due To Design Basis Accidents (Except LOCA) At BV1, 1987
10. NRC, Standard Review Plan For The Review Of Safety Analysis Reports For Nuclear Power Plants, LWR Edition, NUREG-0800, 1984
11. DLC, Unit 2 Updated Final Safety Analysis Report
12. NRC, Assessment Of The Use Of Extended Burnup Fuel In Light Water Power Reactors, NUREG/CR-5009, 1988
13. Westinghouse, ltr 89DL*-G-0055, dtd 7/13/89, Rods In DNB For Locked Rotor Event
14. Halliburton NUS Environmental Corporation ltr ARP-91-444, dtd 10/8/91, Control Room X/Q Values For BVPS (Attachment 4)
15. USNRC, Safety Evaluation Report, related to the operation of BVPS, Unit 2



CONTROL ROOM ALARM RESPONSE



Total from all cases for times shown.

CONTROL ROOM ALARM RESPONSE TABLE

Doses obtained from the calculations shown in Attachment 2.
Units are mrem/hr and seconds.

TIME	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	TOTAL
60	7.97E-06	7.19E-02	3.12E-10	7.04E-06	1.17E-06	7.19E-02
300	1.92E-04	2.74E-01	2.31E-08	6.86E-06	5.79E-06	2.74E-01
600	7.39E-04	4.36E-01	1.78E-07	6.64E-06	1.14E-05	4.37E-01
900	1.60E-03	5.63E-01	5.82E-07	6.44E-06	1.68E-05	5.65E-01
1200	2.73E-03	6.74E-01	1.34E-06	6.24E-06	2.20E-05	6.77E-01
1500	4.11E-03	7.72E-01	2.54E-06	6.05E-06	2.70E-05	7.76E-01
1800	5.69E-03	8.60E-01	4.27E-06	5.88E-06	3.19E-05	8.66E-01
2100	7.47E-03	9.40E-01	6.59E-06	5.70E-06	3.66E-05	9.48E-01
2400	9.40E-03	1.01E+00	9.57E-06	5.54E-06	4.11E-05	1.02E+00
2700	1.15E-02	1.08E+00	1.33E-05	5.38E-06	4.55E-05	1.09E+00



Duquesne
Light

Health Physics Department

ERS-MPD-91-035

ATTACHMENT 2

Page 10 of 56

8:50 AM DAI 1 15 OCT 1991 11 06 Page 2
DAI 1 Transport of Radioactive Material in Linear Systems, v1:
4.5.1 P to 5.1eas, 100000, 187, F F, CR Dose Rate w/o 1501

MR FPLIERS000

TIME	KPR	KREM	KRF	KPR	KREM	KRF	KPR	KREM	KRF
1 0.000E+01	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
2 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
3 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
4 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
5 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
6 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
7 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
8 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
9 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
10 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00


CONTROL ROOM		ENVIRONMENT	
X/G	Breathing	X/G	Breathing
M3/s	M3/s	M3/s	M3/s
1.000E+00	3.470E-04	1.000E+00	3.470E-04

MR FPLIERS000

TIME	KPR	KREM	KRF	KPR	KREM	KRF	KPR	KREM	KRF
1 0.000E+01	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
2 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
3 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
4 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
5 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
6 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
7 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
8 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
9 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
10 0.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00

Transport of Radioactive Material in Linear Systems, v1
 p to 5 Leak, Iodines, 102 F CR Dose Rate w/o 1991

ENVIRONMENT									
PHOTON SUBMS					BETA SUBMS				
DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE RATE
mrem	mrem/hr	mrem	mrem/hr	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem/hr
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-04	1.09E-03	1.29E+01		
TOTALS									
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.24E-04	2.83E-03	4.67E-01		
TOTALS									
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-04	4.45E-03	6.56E+00		
TOTALS									
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-03	4.88E-03	3.03E-01		
TOTALS									
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.86E-04	3.37E-03	1.71E+00		
TOTALS									
ALL ISOTOPES									
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.66E-08	7.97E-06	3.38E-07	4.06E-05	3.77E-04
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.72E-06	1.92E-04	3.43E-05	9.83E-04	3.90E-02
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E-05	7.39E-04	2.00E-04	3.80E-03	2.33E-01
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.77E-05	3.0E-03	5.04E-04	8.27E-03	6.00E-01
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-04	2.73E-03	9.39E-04	1.42E-02	1.14E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-04	4.11E-03	1.49E-03	2.15E-02	1.80E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.09E-04	5.69E-03	2.15E-03	3.00E-02	2.71E+01
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-04	7.47E-03	2.90E-03	3.96E-02	3.60E+01
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.03E-04	9.40E-03	3.74E-03	5.02E-02	5.01E+01
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.70E-04	1.15E-02	4.66E-03	6.17E-02	6.38E+00
TOTALS					3.14E-07		1.66E-02		2.10E+01



Duquesne
Light

Health Physics Department

ERS-MPD-91-035

ATTACHMENT 2

Page 12 of 56



Duquesne
Light

Health Physics Department

ERS-MPO-91-035

ATTACHMENT 2

Page 13 of 56

ERS-008 DAT-3

15 OCT 1991 11 05

Page 1

115 Transport of Radioactive Material in Linear Systems, v11
C P to S less Nbl Cases 182 F F non-equil CR Dose Rate w/o isol

CUMP Not used for 2A		CUMP RCS 182 F F .3 SGs		VOL UPM		CUMP Control Room	
INITIAL			CI				
0 000E+00 WR-B3m	2 160E+05 WR-B3m					0 000E+00 WR-B3m	
0 000E+00 WR-B5m	5 400E+05 WR-B5m					0 000E+00 WR-B5m	
0 000E+00 WR-B5	3 730E+04 WR-B5					0 000E+00 WR-B5	
0 000E+00 WR-B7	1 060E+06 WR-B7					0 000E+00 WR-B7	
0 000E+00 WR-B8	1 490E+06 WR-B8					0 000E+00 WR-B8	
0 000E+00 WR-B9	1 980E+06 WR-B9					0 000E+00 WR-B9	
0 000E+00 WR-90	0 000E+00 WR-90					0 000E+00 WR-90	
0 000E+00 XE-131M	7 570E+03 XE-131M					0 000E+00 XE-131M	
0 000E+00 XE-133M	6 680E+04 XE-133M					0 000E+00 XE-133M	
0 000E+00 XE-133	2 880E+06 XE-133					0 000E+00 XE-133	
0 000E+00 XE-135M	7 560E+05 XE-135M					0 000E+00 XE-135M	
0 000E+00 XE-135	7 380E+05 XE-135					0 000E+00 XE-135	
0 000E+00 XE-137	2 520E+06 XE-137					0 000E+00 XE-137	
0 000E+00 XE-138	2 520E+06 XE-138					0 000E+00 XE-138	
0 000E+00 I-131	0 000E+00 I-131					0 000E+00 I-131	
0 000E+00 I-132	0 000E+00 I-132					0 000E+00 I-132	
0 000E+00 I-133	0 000E+00 I-133					0 000E+00 I-133	
0 000E+00 I-134	0 000E+00 I-134					0 000E+00 I-134	
0 000E+00 I-135	0 000E+00 I-135					0 000E+00 I-135	
1 000E+00	1 000E+06					1 000E+00	
ACT MULT 110 uCi/s							
PRODUCTION uCi/s							
0 000E+00 Y9-B3m	0 000E+00 WR-B3m						
0 000E+00 WR-B5m	0 000E+00 WR-B5m						
0 000E+00 WR-B5	0 000E+00 WR-B5						
0 000E+00 WR-B7	0 000E+00 WR-B7						
0 000E+00 WR-B8	0 000E+00 WR-B8						
0 000E+00 WR-B9	0 000E+00 WR-B9						
0 000E+00 WR-90	0 000E+00 WR-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							
NUC 1-14 REL FR	0 000E+00 1/sec	3 309E-07 1/sec				1 000E+01 CFM	
NUC 15-20 REL FR	0 000E+00	0 000E+00				INTAKE REDUCT 0 000E+00	
	0 000E+00	0 000E+00				INTAKE FILTER 0 000E+00	

170000 DAT 3

15 OCT 1991 11 02

Page 2

Final Report: Transport of Radioactive Material in Linear Systems, v1
Case 3: P to S leak, 100 Cases, 100 F, non-equal, CR Dose Rate w/o isol

MULTIPLIFRS=

STEP	TIME	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF
1	0.00E+01	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
2	3.00E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
3	6.00E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
4	9.00E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
5	1.20E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
6	1.50E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
7	1.80E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
8	2.10E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
9	2.40E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
10	2.70E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00

CONTROL ROOM			ENVIRONMENT		
X/G	Breathing	Occupancy	X/G	Breathing	Occupancy
s/M3	M3/s		s/M3	M3/s	
1.000E+00	3.470E-04	1.000E+00	1.000E+00	3.470E-04	

MULTIPLIFRS=

STEP	TIME	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF
1	0.00E+01	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
2	3.00E+02	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
3	6.00E+02	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
4	9.00E+02	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
5	1.20E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
6	1.50E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
7	1.80E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
8	2.10E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
9	2.40E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
10	2.70E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00

TRAILS - Transport of Radioactive Material in Linear Systems, v1.1
 Case 2 P to S leak, NBI Cases, 1B% F F non-equil, CR Dose Rate w/o isol

STEP	TIME	Not used for 2A		RCS 1B% F F .3 SGs		AVERAGE		CONTROL ROOM		
		CURRENT	INTEGRD	CURRENT	INTEGRD	RELEASED	RELEASE	CURRENT	CURRENT	INTEGRD
		uCi	uCi-sec	uCi	uCi-sec	uCi	uCi/sec	uCi	uCi/sec	uCi-sec
KR-B3m	INITIAL	0.000E+00		2.160E+11						
KR-B3m	TOTALS		0.000E+00		5.073E+14	1.679E+08				7.769E+06
KR-B5m	INITIAL	0.000E+00		5.400E+11						
KR-B5m	TOTALS		0.000E+00		1.376E+15	4.553E+08		0.000E+00		2.167E+07
KR-B5	INITIAL	0.000E+00		3.730E+10						
KR-B5	TOTALS		0.000E+00		1.007E+14	3.331E+07		0.000E+00		1.617E+06
KR-B7	INITIAL	0.000E+00		1.060E+12						
KR-B7	TOTALS		0.000E+00		2.348E+15	7.770E+08		0.000E+00		3.518E+07
KR-B7	INITIAL	0.000E+00		1.490E+12						
KR-B8	TOTALS		0.000E+00		3.675E+15	1.216E+09		0.000E+00		5.723E+07
KR-B9	INITIAL	0.000E+00		1.980E+12						
KR-B9	TOTALS		0.000E+00		5.415E+14	1.792E+08		0.000E+00		1.814E+06
XE-131M	INITIAL	0.000E+00		7.570E+09						
XE-131M	TOTALS		0.000E+00		2.041E+13	6.754E+06		0.000E+00		3.277E+05
XE-133M	INITIAL	0.000E+00		6.680E+10						
XE-133M	TOTALS		0.000E+00		1.794E+14	5.936E+07		0.000E+00		2.876E+06
XE-133	INITIAL	0.000E+00		2.880E+12						
XE-133	TOTALS		0.000E+00		7.756E+15	2.567E+09		0.000E+00		1.245E+08
XE-135M	INITIAL	0.000E+00		7.560E+11						
XE-135M	TOTALS		0.000E+00		8.730E+14	2.889E+08		0.000E+00		9.631E+06
XE-135	INITIAL	0.000E+00		7.380E+11						
XE-135	TOTALS		0.000E+00		1.936E+15	6.406E+08		0.000E+00		3.080E+07
XE-137	INITIAL	0.000E+00		2.520E+12						
XE-137	TOTALS		0.000E+00		8.352E+14	2.764E+08		0.000E+00		3.176E+06
XE-138	INITIAL	0.000E+00		2.520E+12						
XE-138	TOTALS		0.000E+00		2.742E+15	9.075E+08		0.000E+00		2.922E+07
ALL NUCLEIDS		0.000E+00		6.636E+12				2.087E+05	4.261E-05	
# STEP	10									

LIBRARY

ATTACHMENT 2

ERS-MPO-91-035

Page 15 of 56

TRANSIT of Radioactive Material in Linear Systems, v. 1
Case 2: P to S leak, Nbl Gates, 18% F, non-equil, CR Dose Rate w/p 1501

ENVIRONMENT

	PHOTON-SUBMG			BETA-SUBMG			THYROID-INHAL			PHOTON-SUBMG			BETA-SUBMG			THYROID-INHAL		
	DOSE mrem	RATE mrem/hr	DOSE mrem	DOSE mrem	RATE mrem/hr	DOSE mrem	DOSE mrem	RATE mrem/hr	DOSE mrem	DOSE mrem	RATE mrem/hr	DOSE mrem	DOSE mrem	RATE mrem/hr	DOSE mrem	DOSE mrem	RATE mrem/hr	DOSE mrem
WR-B5m TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.18E-05	1.39E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WR-B5m TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.77E-03	2.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WR-B5 TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.12E-06	1.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WR-B7 TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.16E-02	2.19E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WR-BB TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-01	9.80E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WR-B9 TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.54E-03	1.16E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XE-131M TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-05	2.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XE-131M TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.06E-04	2.57E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XE-131 TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-02	7.92E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XE-135M TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-02	4.33E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XE-135 TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E-02	4.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XE-137 TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-03	2.82E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XE-138 TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.44E-02	8.66E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ALL NUCLIDES

0.0167 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.08E-04	7.19E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.0833 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-02	2.74E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.1667 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-02	4.36E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.2500 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-02	5.63E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.3333 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-02	6.74E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.4167 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.32E-02	7.72E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.90E-02	8.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.5833 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-02	9.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.6667 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.14E-02	1.01E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.7500 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.72E-02	1.15E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-01	6.04E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00



Duquesne
Light

Health Physics Department

ERS-MPO-94035

ATTACHMENT 2

Page 16 of 56



Duquesne
Light

Health Physics Department

ERS-MPO-91-035

ATTACHMENT 2

Page 17 of 56

FOR000 DAT.5 15-OCT-1991 11:04 Page 1

IRAILS -- Transport of Radioactive Material in Linear Systems. v1
Case 3 CONCURRENT SPIKE Iodines only CR Dose Rate w/o 1 vol

COMP RCS		COMP 3 SGs		COMP Control Room	
INITIAL		VOLUME		1.730E+05 Cu F	
0.000E+00	WR-B3m	0.000E+00	WR-B3m	0.000E+00	WR-B3m
0.000E+00	WR-B5m	0.000E+00	WR-B5m	0.000E+00	WR-B5m
0.000E+00	WR-B5	0.000E+00	WR-B5	0.000E+00	WR-B5
0.000E+00	WR-B7	0.000E+00	WR-B7	0.000E+00	WR-B7
0.000E+00	WR-B8	0.000E+00	WR-B8	0.000E+00	WR-B8
0.000E+00	WR-B9	0.000E+00	WR-B9	0.000E+00	WR-B9
0.000E+00	WR-90	0.000E+00	WR-90	0.000E+00	WR-90
0.000E+00	XE-131M	0.000E+00	XE-131M	0.000E+00	XE-131M
0.000E+00	XE-133M	0.000E+00	XE-133M	0.000E+00	XE-133M
0.000E+00	XE-133	0.000E+00	XE-133	0.000E+00	XE-133
0.000E+00	XE-135M	0.000E+00	XE-135M	0.000E+00	XE-135M
0.000E+00	XE-135	0.000E+00	XE-135	0.000E+00	XE-135
0.000E+00	XE-137	0.000E+00	XE-137	0.000E+00	XE-137
0.000E+00	XE-138	0.000E+00	XE-138	0.000E+00	XE-138
0.000E+00	I-131	0.000E+00	I-131	0.000E+00	I-131
0.000E+00	I-132	0.000E+00	I-132	0.000E+00	I-132
0.000E+00	I-133	0.000E+00	I-133	0.000E+00	I-133
0.000E+00	I-134	0.000E+00	I-134	0.000E+00	I-134
0.000E+00	I-135	0.000E+00	I-135	0.000E+00	I-135
1.000E+00		1.000E+00		1.000E+00	
ACT MULT (to uCi)					
PRODUCTION uCi/s					
0.000E+00	WR-B3m	0.000E+00	WR-B3m	0.000E+00	WR-B3m
0.000E+00	WR-B5m	0.000E+00	WR-B5m	0.000E+00	WR-B5m
0.000E+00	WR-B5	0.000E+00	WR-B5	0.000E+00	WR-B5
0.000E+00	WR-B7	0.000E+00	WR-B7	0.000E+00	WR-B7
0.000E+00	WR-B8	0.000E+00	WR-B8	0.000E+00	WR-B8
0.000E+00	WR-B9	0.000E+00	WR-B9	0.000E+00	WR-B9
0.000E+00	WR-90	0.000E+00	WR-90	0.000E+00	WR-90
0.000E+00	XE-131M	0.000E+00	XE-131M	0.000E+00	XE-131M
0.000E+00	XE-133M	0.000E+00	XE-133M	0.000E+00	XE-133M
0.000E+00	XE-133	0.000E+00	XE-133	0.000E+00	XE-133
0.000E+00	XE-135M	0.000E+00	XE-135M	0.000E+00	XE-135M
0.000E+00	XE-135	0.000E+00	XE-135	0.000E+00	XE-135
0.000E+00	XE-137	0.000E+00	XE-137	0.000E+00	XE-137
0.000E+00	XE-138	0.000E+00	XE-138	0.000E+00	XE-138
1.360E+06	I-131	0.000E+00	I-131	0.000E+00	I-131
2.520E+06	I-132	0.000E+00	I-132	0.000E+00	I-132
3.080E+06	I-133	0.000E+00	I-133	0.000E+00	I-133
3.600E+06	I-134	0.000E+00	I-134	0.000E+00	I-134
2.810E+06	I-135	0.000E+00	I-135	0.000E+00	I-135
REMOVAL					
NUC 1-14 REL FR	3.309E-07 1/s	0.000E+00	2.069E-06 1/s	0.000E+00	1.000E+01 cfm
NUC 15-20 REL FR	0.000E+00	0.000E+00	0.000E+00	0.000E+00	INTAKE REDUCT 0.000E+00
					INTAKE FILTER 0.000E+00

TRAJLS Transport of Radioactive Material in Linear Systems, v1.1
Case 3: CONCURRENT SPIKE, Iodines only, Dose Rate w/o 1501

MULTIPLYERS=====

STEP	TIME	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF
1	6.000E+01	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
2	3.000E+02	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
3	6.000E+02	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
4	9.000E+02	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
5	1.200E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
6	1.500E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
7	1.800E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
8	2.100E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
9	2.400E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
10	2.700E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00

CONTROL ROOM			ENVIRONMENT		
X/G	Breathing	Occupancy	X/G	Breathing	
/M3	M3/s		/M3	M3/s	
1.000E+00	3.470E-04	1.000E+00	1.000E+00	3.470E-04	

MULTIPLYERS=====

STEP	TIME	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF
1	6.000E+01	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
2	3.000E+02	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
3	6.000E+02	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
4	9.000E+02	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
5	1.200E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
6	1.500E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
7	1.800E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
8	2.100E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
9	2.400E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00
10	2.700E+03	1.00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00



Duquesne
Light

Health Physics Department

ERS-MPD-91-035

ATTACHMENT 2

Page 18 of 56

15-OCT-1991 11:04

Page 3

TABLE 3. Transport of Radioactive Material in Linear Systems - v1.1
Case 3. CONCURRENT SPIKE, Iodines only, CR Dose Rate w/o Isot

STEP	TIME	RCS			3 SDs			AVERAGE		CURRENT		CONTROL ROOM	
		CURRENT uCi	INTEGR uCi-sec	INTEGR uCi-sec	CURRENT uCi	INTEGR uCi-sec	INTEGR uCi-sec	RELEASED uCi	RELEASE uCi/sec	CURRENT uCi	INTEGR uCi-sec	CURRENT uCi	INTEGR uCi-sec
1-131	INITIAL	0.000E+00	4.951E+12	1.461E+09	0.000E+00	1.461E+09	3.022E+03			0.000E+00	7.520E+01		
1-131	TOTALS	0.000E+00	4.951E+12	1.461E+09	0.000E+00	1.461E+09	3.022E+03			0.000E+00	7.520E+01		
1-132	INITIAL	0.000E+00	8.528E+12	2.443E+09	0.000E+00	2.443E+09	5.054E+03			0.000E+00	1.233E+02		
1-132	TOTALS	0.000E+00	8.528E+12	2.443E+09	0.000E+00	2.443E+09	5.054E+03			0.000E+00	1.233E+02		
1-133	INITIAL	0.000E+00	1.113E+13	3.299E+09	0.000E+00	3.299E+09	6.826E+03			0.000E+00	1.701E+02		
1-133	TOTALS	0.000E+00	1.113E+13	3.299E+09	0.000E+00	3.299E+09	6.826E+03			0.000E+00	1.701E+02		
1-134	INITIAL	0.000E+00	1.111E+13	2.991E+09	0.000E+00	2.991E+09	6.189E+03			0.000E+00	1.453E+02		
1-134	TOTALS	0.000E+00	1.111E+13	2.991E+09	0.000E+00	2.991E+09	6.189E+03			0.000E+00	1.453E+02		
1-135	INITIAL	0.000E+00	9.976E+12	2.931E+09	0.000E+00	2.931E+09	6.064E+03			0.000E+00	1.504E+02		
1-135	TOTALS	0.000E+00	9.976E+12	2.931E+09	0.000E+00	2.931E+09	6.064E+03			0.000E+00	1.504E+02		
ALL NUCLIDES		3.275E+10		1.412E+07						9.384E-01	1.916E-10		
8 STEP	10												

Duquesne
Light

Health Physics Department

RS-MPO-91-035

ATTACHMENT 2

Page 19 of 56

FURNISH DAT 5

15-OCT-1991 11:04


Page 4

TRAIL 5 Transport of Radioactive Material in Linear Systems, v1.1
 *** COMPONENT SPICE: Includes only CR Dose Rate w/o isol

	E N V I R O N M E N T				T H Y R O I D - I N T A L				P H O T O N - S U B M G				B E T A - S U B M G				T H Y R O I D - I N T A L			
	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE
	mm	mm/hr	mm	mm/hr	mm	mm/hr	mm	mm/hr	mm	mm/hr	mm	mm/hr	mm	mm/hr	mm	mm/hr	mm	mm/hr	mm	mm/hr
1-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.35E-08	6.72E-07							7.98E-03			
TOTALS																				
1-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.25E-07	2.84E-06							4.67E-04			
TOTALS																				
1-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-07	3.27E-06							4.82E-03			
TOTALS																				
1-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.78E-07	4.14E-06							2.57E-04			
TOTALS																				
1-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.08E-07	2.60E-06							1.32E-03			
TOTALS																				

ALL ISOTOPES

0.0167 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-12	3.12E-10	1.44E-11	1.72E-09	7.72E-08	4.27E-06						
0.0033 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.87E-10	2.31E-08	3.88E-09	1.14E-07	5.24E-06	1.48E-04						
0.1667 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.43E-09	1.78E-07	4.20E-08	8.88E-07	4.29E-05	8.79E-04						
0.2500 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.18E-08	5.82E-07	1.59E-07	2.92E-06	1.59E-04	2.92E-03						
0.1333 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.04E-08	1.34E-06	4.05E-07	6.76E-06	4.10E-04	6.41E-03						
0.4167 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-07	2.54E-06	8.20E-07	1.29E-05	8.49E-04	1.35E-02						
0.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-07	4.27E-06	1.44E-06	2.17E-05	1.53E-03	2.32E-02						
0.5033 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-07	6.59E-06	2.31E-06	3.37E-05	2.49E-03	3.64E-02						
0.6667 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.75E-07	9.57E-06	3.47E-06	4.91E-05	3.79E-03	5.43E-02						
0.7500 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.53E-07	1.33E-05	4.89E-06	6.83E-05	5.47E-03	7.69E-02						
TOTALS									2.65E-06		1.35E-05		1.47E-02							



Duquesne
Light

Health Physics Department

ERS-MPO-91-035

ATTACHMENT 2

Page 20 of 56



Duquesne
Light

Health Physics Department

ERS-MPO-91-035

ATTACHMENT 2

Page 21 of 56

15-DEC-1991 11:04

Page 1

TRANSPORT OF RADIOACTIVE MATERIAL IN LINEAR SYSTEMS, v1
-v1-4 Initial Steam Release Noble Gases & Iodines CR Dose Rate w/o cool

COMP Not used for 4		COMP 3 Sus. Initial Steam Rel		COMP Control Room	
		VOLUME		1 7.30E+05 C-S FT	
INITIAL					
0 000E+00 MR-B3m	5 770E-05 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m
0 000E+00 MR-B5m	2 810E-04 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m
0 000E+00 MR-B7	1 480E-03 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7
0 000E+00 MR-B8	1 610E-04 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8
0 000E+00 MR-B9	1 350E-05 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9
0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90
0 000E+00 KE-131M	1 440E-05 KE-131M	0 000E+00 KE-131M	0 000E+00 KE-131M	0 000E+00 KE-131M	0 000E+00 KE-131M
0 000E+00 KE-133M	4 13E-04 KE-133M	0 000E+00 KE-133M	0 000E+00 KE-133M	0 000E+00 KE-133M	0 000E+00 KE-133M
0 000E+00 KE-133	3 520E-03 KE-133	0 000E+00 KE-133	0 000E+00 KE-133	0 000E+00 KE-133	0 000E+00 KE-133
0 000E+00 KE-135M	1 460E-04 KE-135M	0 000E+00 KE-135M	0 000E+00 KE-135M	0 000E+00 KE-135M	0 000E+00 KE-135M
0 000E+00 KE-135	4 310E-04 KE-135	0 000E+00 KE-135	0 000E+00 KE-135	0 000E+00 KE-135	0 000E+00 KE-135
0 000E+00 KE-137	2 190E-05 KE-137	0 000E+00 KE-137	0 000E+00 KE-137	0 000E+00 KE-137	0 000E+00 KE-137
0 000E+00 KE-138	9 030E-05 KE-138	0 000E+00 KE-138	0 000E+00 KE-138	0 000E+00 KE-138	0 000E+00 KE-138
0 000E+00 1-131	8 130E-03 1-131	0 000E+00 1-131	0 000E+00 1-131	0 000E+00 1-131	0 000E+00 1-131
0 000E+00 1-132	2 400E-03 1-132	0 000E+00 1-132	0 000E+00 1-132	0 000E+00 1-132	0 000E+00 1-132
0 000E+00 1-133	1 160E-03 1-133	0 000E+00 1-133	0 000E+00 1-133	0 000E+00 1-133	0 000E+00 1-133
0 000E+00 1-134	5 360E-04 1-134	0 000E+00 1-134	0 000E+00 1-134	0 000E+00 1-134	0 000E+00 1-134
0 000E+00 1-135	5 210E-03 1-135	0 000E+00 1-135	0 000E+00 1-135	0 000E+00 1-135	0 000E+00 1-135
1 000E+00	1 000E+00	1 000E+00	1 000E+00	1 000E+00	1 000E+00
ACT W/LT (to w/LT)					
PROJ W/LT (to w/LT)					
0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m
0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m
0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7
0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8
0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9
0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90
0 000E+00 KE-131M	0 000E+00 KE-131M	0 000E+00 KE-131M	0 000E+00 KE-131M	0 000E+00 KE-131M	0 000E+00 KE-131M
0 000E+00 KE-133M	0 000E+00 KE-133M	0 000E+00 KE-133M	0 000E+00 KE-133M	0 000E+00 KE-133M	0 000E+00 KE-133M
0 000E+00 KE-133	0 000E+00 KE-133	0 000E+00 KE-133	0 000E+00 KE-133	0 000E+00 KE-133	0 000E+00 KE-133
0 000E+00 KE-135M	0 000E+00 KE-135M	0 000E+00 KE-135M	0 000E+00 KE-135M	0 000E+00 KE-135M	0 000E+00 KE-135M
0 000E+00 KE-135	0 000E+00 KE-135	0 000E+00 KE-135	0 000E+00 KE-135	0 000E+00 KE-135	0 000E+00 KE-135
0 000E+00 KE-137	0 000E+00 KE-137	0 000E+00 KE-137	0 000E+00 KE-137	0 000E+00 KE-137	0 000E+00 KE-137
0 000E+00 KE-138	0 000E+00 KE-138	0 000E+00 KE-138	0 000E+00 KE-138	0 000E+00 KE-138	0 000E+00 KE-138
0 000E+00 1-131	0 000E+00 1-131	0 000E+00 1-131	0 000E+00 1-131	0 000E+00 1-131	0 000E+00 1-131
0 000E+00 1-132	0 000E+00 1-132	0 000E+00 1-132	0 000E+00 1-132	0 000E+00 1-132	0 000E+00 1-132
0 000E+00 1-133	0 000E+00 1-133	0 000E+00 1-133	0 000E+00 1-133	0 000E+00 1-133	0 000E+00 1-133
0 000E+00 1-134	0 000E+00 1-134	0 000E+00 1-134	0 000E+00 1-134	0 000E+00 1-134	0 000E+00 1-134
0 000E+00 1-135	0 000E+00 1-135	0 000E+00 1-135	0 000E+00 1-135	0 000E+00 1-135	0 000E+00 1-135
REMOVAL					
NUC 1-14 REL FR	0 000E+00 1/sec	0 000E+00 1/sec	0 000E+00 1/sec	0 000E+00 1/sec	0 000E+00 1/sec
NUC 15-20 REL FR	0 000E+00	0 000E+00	0 000E+00	0 000E+00	0 000E+00

TRAIN -- Transport of Radioactive Material in Linear Systems, v1.1
 Case 4, Initial Steam Release, Noble Gases & Iodines, CN Dose Rate w/o Isol

MURTIPIIERS=...

STEP TIME

STEP	TIME	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF
1	6.000E+01	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
2	3.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
3	6.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
4	9.000E+02	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
5	1.200E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
6	1.500E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
7	1.800E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
8	2.100E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
9	2.400E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
10	2.700E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00

CONTROL ROOM

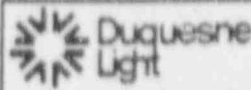
ENVIRONMENT

X/G Breathing Occupancy X/G Breathing
 s/M3 M3/s s/M3 M3/s

MURTIPIIERS=...

STEP TIME

STEP	TIME	X/G	Breathing	Occupancy	X/G	Breathing
1	6.000E+01	1.000E+00	3.470E-04	1.000E+00	1.000E+00	3.470E-04
2	3.000E+02	1.590E-04	1.00	1.00	0.000E+00	1.00
3	6.000E+02	1.590E-04	1.00	1.00	0.000E+00	1.00
4	9.000E+02	1.590E-04	1.00	1.00	0.000E+00	1.00
5	1.200E+03	1.590E-04	1.00	1.00	0.000E+00	1.00
6	1.500E+03	1.590E-04	1.00	1.00	0.000E+00	1.00
7	1.800E+03	1.590E-04	1.00	1.00	0.000E+00	1.00
8	2.100E+03	1.590E-04	1.00	1.00	0.000E+00	1.00
9	2.400E+03	1.590E-04	1.00	1.00	0.000E+00	1.00
10	2.700E+03	1.590E-04	1.00	1.00	0.000E+00	1.00



Health Physics Department

ERS-MPD-91-035

ATTACHMENT 2

Page 22 of 56



ATTACHMENT 2

Page 23 of 56

FOLLOW-UP DATA: 6

[illegible]

STEP TIME		Not used for 4		3 SCs, Initial State		AVERAGE		CONTROL ROOM	
		CURRENT uCi	INTEGRD uCi-sec	CURRENT uCi	INTEGRD uCi-sec	RELEASED uCi	RELEASE uCi/sec	CURRENT uCi	INTEGRD uCi-sec
RR-B3m	INITIAL	0	0.000E+00	0	0.000E+00	0	0.000E+00	0	0.000E+00
RR-B3m	TOTALS	0	0.000E+00	0	0.000E+00	0	0.000E+00	0	0.000E+00
RR-B5m	INITIAL	0	0.000E+00	2	8.10E+02	0	0.000E+00	0	0.000E+00
RR-B5m	TOTALS	0	0.000E+00	0	0.000E+00	2	8.09E+02	0	0.000E+00
RR-B5	INITIAL	0	0.000E+00	1	4.80E+03	0	0.000E+00	0	0.000E+00
RR-B5	TOTALS	0	0.000E+00	0	0.000E+00	1	4.80E+03	0	0.000E+00
RR-B7	INITIAL	0	0.000E+00	1	6.10E+02	0	0.000E+00	0	0.000E+00
RR-B7	TOTALS	0	0.000E+00	0	0.000E+00	1	6.08E+02	0	0.000E+00
RR-B9	INITIAL	0	0.000E+00	4	2.90E+02	0	0.000E+00	0	0.000E+00
RR-B9	TOTALS	0	0.000E+00	0	0.000E+00	4	2.88E+02	0	0.000E+00
RR-B9	INITIAL	0	0.000E+00	1	3.50E+01	0	0.000E+00	0	0.000E+00
RR-B9	TOTALS	0	0.000E+00	0	0.000E+00	1	3.13E+01	0	0.000E+00
RE-131M	INITIAL	0	0.000E+00	1	4.40E+01	0	0.000E+00	0	0.000E+00
RE-131M	TOTALS	0	0.000E+00	0	0.000E+00	1	4.40E+01	0	0.000E+00
RE-131M	INITIAL	0	0.000E+00	4	1.30E+02	0	0.000E+00	0	0.000E+00
RE-131M	TOTALS	0	0.000E+00	0	0.000E+00	4	1.30E+02	0	0.000E+00
RE-131	INITIAL	0	0.000E+00	3	5.20E+03	0	0.000E+00	0	0.000E+00
RE-131	TOTALS	0	0.000E+00	0	0.000E+00	3	5.20E+03	0	0.000E+00
RE-131M	INITIAL	0	0.000E+00	1	4.60E+02	0	0.000E+00	0	0.000E+00
RE-131M	TOTALS	0	0.000E+00	0	0.000E+00	1	4.52E+02	0	0.000E+00
RE-131	INITIAL	0	0.000E+00	4	3.10E+02	0	0.000E+00	0	0.000E+00
RE-131	TOTALS	0	0.000E+00	0	0.000E+00	4	3.09E+02	0	0.000E+00
RE-137	INITIAL	0	0.000E+00	2	1.90E+01	0	0.000E+00	0	0.000E+00
RE-137	TOTALS	0	0.000E+00	0	0.000E+00	2	1.80E+01	0	0.000E+00
RE-13B	INITIAL	0	0.000E+00	9	0.30E+01	0	0.000E+00	0	0.000E+00
RE-13B	TOTALS	0	0.000E+00	0	0.000E+00	9	0.27E+01	0	0.000E+00
1-131	INITIAL	0	0.000E+00	8	1.30E+03	0	0.000E+00	0	0.000E+00
1-131	TOTALS	0	0.000E+00	0	0.000E+00	8	1.30E+03	0	0.000E+00
1-132	INITIAL	0	0.000E+00	2	4.00E+03	0	0.000E+00	0	0.000E+00
1-132	TOTALS	0	0.000E+00	0	0.000E+00	2	3.98E+03	0	0.000E+00
1-133	INITIAL	0	0.000E+00	1	1.60E+03	0	0.000E+00	0	0.000E+00
1-133	TOTALS	0	0.000E+00	0	0.000E+00	1	1.60E+03	0	0.000E+00
1-134	INITIAL	0	0.000E+00	5	3.60E+02	0	0.000E+00	0	0.000E+00
1-134	TOTALS	0	0.000E+00	0	0.000E+00	5	3.51E+02	0	0.000E+00
1-135	INITIAL	0	0.000E+00	5	2.10E+03	0	0.000E+00	0	0.000E+00
1-135	TOTALS	0	0.000E+00	0	0.000E+00	5	2.09E+03	0	0.000E+00

FIGURE DAI.6

15-OCT-1991 11 04

Page 4

TABLE 7 Transport of Radioactive Material in Linear Systems, v1 1
 Case 4. Initial Steam Release Noble Gases & Iodines, CR Dose Rate w/o isol

STEP	TIME	Not used for 4		3 SGs, Initial Steam		AVERAGE		CONTROL ROOM	
		CURRENT	INTEGRD	CURRENT	INTEGRD	RELEASED	RELEASE	CURRENT	INTEGRD
ALL	INCLIDES	uCi	uCi-sec	uCi	uCi-sec	uCi	uCi/sec	uCi	uCi-sec
R	STEP 10	0.000E+00	0.000E+00	0.000E+00	0.000E+00			7.549E-01	1.541E-10

Health Physics Department
 Ugh

ERS-MPO-91-035
 ATTACHMENT 2


Page 24 of 56

TRANS - Transport of Radioactive Material in Linear Systems, v1 1
 Case 4: Initial Steam Release Noble Gases & Iodines, CR Data Rate w/o iso1

Duquesne Light Beach Physics Department										ERS-MPO-91-035		Page 25 of 56	
										ATTACHMENT 2			
E N V I R O N M E N T										C O N T R O L		T H Y R O I D - I N I T I A L	
PHOTON SUBMG		BETA SUBMG		THYROID-INITIAL		PHOTON SUBMG		DOSE RATE		DOSE RATE		DOSE RATE	
DOSE	RATE	DOSE	RATE	DOSE	RATE	DOSE	RATE	DOSE	RATE	DOSE	RATE	DOSE	RATE
mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-11	8.50E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-08	2.99E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.85E-10	1.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-09	7.76E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-07	6.32E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.26E-10	8.50E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-11	9.03E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.11E-09	3.45E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.84E-08	2.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.63E-09	2.70E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-08	5.88E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-10	2.19E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-08	1.04E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.46E-07	6.82E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-06	4.66E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-07	2.67E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.58E-07	1.09E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Transport of Radioactive Material in Linear Systems, v1
Case 4. Initial Steam Release Noble Gases & Iodine, CR Dose Rate w/o Isol

	E N V I R O N M E N T				C O N T R O L				N U C L E A R			
	PHOTON SUBMG	BETA SUBMG	THYROID-INITIAL	THYROID-INITIAL	PHOTON SUBMG	BETA SUBMG	THYROID-INITIAL	THYROID-INITIAL	PHOTON SUBMG	BETA SUBMG	THYROID-INITIAL	THYROID-INITIAL
	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE
	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr
1-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-06	8.16E-06	4.16E-03	4.16E-03	1.90E-06	8.16E-06	4.16E-03	4.16E-03
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-06	8.16E-06	4.16E-03	4.16E-03	1.90E-06	8.16E-06	4.16E-03	4.16E-03
ALL 50 CLINES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-08	7.04E-06	3.73E-07	4.47E-05	5.87E-08	7.04E-06	3.73E-07	4.47E-05
0.0167 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E-07	6.86E-06	2.94E-06	4.36E-05	4.63E-07	6.86E-06	2.94E-06	4.36E-05
0.0423 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	6.44E-06	3.58E-06	4.23E-05	5.62E-07	6.44E-06	3.58E-06	4.23E-05
0.1667 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.45E-07	6.44E-06	3.47E-06	4.11E-05	5.45E-07	6.44E-06	3.47E-06	4.11E-05
0.2500 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.28E-07	6.24E-06	3.38E-06	4.00E-05	5.28E-07	6.24E-06	3.38E-06	4.00E-05
0.3333 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E-07	6.05E-06	3.29E-06	3.90E-05	5.12E-07	6.05E-06	3.29E-06	3.90E-05
0.4167 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.97E-07	5.88E-06	3.20E-06	3.80E-05	4.97E-07	5.88E-06	3.20E-06	3.80E-05
0.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-07	5.70E-06	3.12E-06	3.70E-05	4.83E-07	5.70E-06	3.12E-06	3.70E-05
0.5833 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-07	5.54E-06	3.04E-06	3.61E-05	4.69E-07	5.54E-06	3.04E-06	3.61E-05
0.6667 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-07	5.38E-06	2.97E-06	3.52E-05	4.55E-07	5.38E-06	2.97E-06	3.52E-05
0.7500 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.57E-06	2.94E-05	2.94E-05	2.94E-05	4.57E-06	2.94E-05	2.94E-05	2.94E-05
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.57E-06	2.94E-05	2.94E-05	2.94E-05	4.57E-06	2.94E-05	2.94E-05	2.94E-05



Duquesne
Light

Health Physics Department

ERS-MPO-91-035

ATTACHMENT 2

Page 26 of 56

TRAIL - Transport of Radioactive Material in Linear Systems, v1
Case 5. Initial Set Liquid Iodines. CR Dose Rate w/o isol

COMP Not used for 5		COMP 3 SCS. Initial Set L1q		COMP Control Room	
		VOLUME		1 730E+05 Co Ft	
INITIAL					
0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m
0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m
0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7
0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8
0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9
0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90
0 000E+00 XE-131M	0 000E+00 XE-131M	0 000E+00 XE-131M	0 000E+00 XE-131M	0 000E+00 XE-131M	0 000E+00 XE-131M
0 000E+00 XE-133M	0 000E+00 XE-133M	0 000E+00 XE-133M	0 000E+00 XE-133M	0 000E+00 XE-133M	0 000E+00 XE-133M
0 000E+00 XE-133	0 000E+00 XE-133	0 000E+00 XE-133	0 000E+00 XE-133	0 000E+00 XE-133	0 000E+00 XE-133
0 000E+00 XE-135M	0 000E+00 XE-135M	0 000E+00 XE-135M	0 000E+00 XE-135M	0 000E+00 XE-135M	0 000E+00 XE-135M
0 000E+00 XE-135	0 000E+00 XE-135	0 000E+00 XE-135	0 000E+00 XE-135	0 000E+00 XE-135	0 000E+00 XE-135
0 000E+00 XE-137	0 000E+00 XE-137	0 000E+00 XE-137	0 000E+00 XE-137	0 000E+00 XE-137	0 000E+00 XE-137
0 000E+00 XE-138	0 000E+00 XE-138	0 000E+00 XE-138	0 000E+00 XE-138	0 000E+00 XE-138	0 000E+00 XE-138
0 000E+00 I-131	0 000E+00 I-131	0 000E+00 I-131	0 000E+00 I-131	0 000E+00 I-131	0 000E+00 I-131
0 000E+00 I-132	0 000E+00 I-132	0 000E+00 I-132	0 000E+00 I-132	0 000E+00 I-132	0 000E+00 I-132
0 000E+00 I-133	0 000E+00 I-133	0 000E+00 I-133	0 000E+00 I-133	0 000E+00 I-133	0 000E+00 I-133
0 000E+00 I-134	0 000E+00 I-134	0 000E+00 I-134	0 000E+00 I-134	0 000E+00 I-134	0 000E+00 I-134
0 000E+00 I-135	0 000E+00 I-135	0 000E+00 I-135	0 000E+00 I-135	0 000E+00 I-135	0 000E+00 I-135
1 000E+00	1 000E+00	1 000E+00	1 000E+00	1 000E+00	1 000E+00
ACT MBLT (to uCi)					
PRODUCTION uCi/s					
0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m	0 000E+00 MR-B3m
0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m	0 000E+00 MR-B5m
0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7	0 000E+00 MR-B7
0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8	0 000E+00 MR-B8
0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9	0 000E+00 MR-B9
0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90	0 000E+00 MR-90
0 000E+00 XE-131M	0 000E+00 XE-131M	0 000E+00 XE-131M	0 000E+00 XE-131M	0 000E+00 XE-131M	0 000E+00 XE-131M
0 000E+00 XE-133M	0 000E+00 XE-133M	0 000E+00 XE-133M	0 000E+00 XE-133M	0 000E+00 XE-133M	0 000E+00 XE-133M
0 000E+00 XE-133	0 000E+00 XE-133	0 000E+00 XE-133	0 000E+00 XE-133	0 000E+00 XE-133	0 000E+00 XE-133
0 000E+00 XE-135M	0 000E+00 XE-135M	0 000E+00 XE-135M	0 000E+00 XE-135M	0 000E+00 XE-135M	0 000E+00 XE-135M
0 000E+00 XE-135	0 000E+00 XE-135	0 000E+00 XE-135	0 000E+00 XE-135	0 000E+00 XE-135	0 000E+00 XE-135
0 000E+00 XE-137	0 000E+00 XE-137	0 000E+00 XE-137	0 000E+00 XE-137	0 000E+00 XE-137	0 000E+00 XE-137
0 000E+00 XE-138	0 000E+00 XE-138	0 000E+00 XE-138	0 000E+00 XE-138	0 000E+00 XE-138	0 000E+00 XE-138
0 000E+00 I-131	0 000E+00 I-131	0 000E+00 I-131	0 000E+00 I-131	0 000E+00 I-131	0 000E+00 I-131
0 000E+00 I-132	0 000E+00 I-132	0 000E+00 I-132	0 000E+00 I-132	0 000E+00 I-132	0 000E+00 I-132
0 000E+00 I-133	0 000E+00 I-133	0 000E+00 I-133	0 000E+00 I-133	0 000E+00 I-133	0 000E+00 I-133
0 000E+00 I-134	0 000E+00 I-134	0 000E+00 I-134	0 000E+00 I-134	0 000E+00 I-134	0 000E+00 I-134
0 000E+00 I-135	0 000E+00 I-135	0 000E+00 I-135	0 000E+00 I-135	0 000E+00 I-135	0 000E+00 I-135
REMOVAL					
NUC 1-14 REL FR	0 000E+00 1/sec	2 029E-06 1/sec	0 000E+00	1 000E+00 1/sec	0 000E+00
NUC 15-20 REL FR	0 000E+00	0 000E+00	0 000E+00	INTAKE RE DUCT	0 000E+00
				INTAKE FILTER	0 000E+00

Trail 5 - Transport of Radioactive Material in Linear Systems. v1
Case 7. Initial Ser Liquid Iodine. (M Dose Rate w/o x50)

MULTIPLIERS====

STEP	TIME	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF
1	6 000E+01	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
2	3 000E+02	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
3	6 000E+02	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
4	9 000E+02	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
5	1 200E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
6	1 500E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
7	1 800E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
8	2 100E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
9	2 400E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
10	2 700E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00

ENVIRONMENT

X/G Breathing
s/M3 M3/s

1 000E+00 3 470E-04

CONTROL ROOM

X/G Breathing Occupancy
s/M3 M3/s

1 000E+00 3 470E-04 1 000E+00

MULTIPLIERS====

STEP	TIME	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF
1	6 000E+01	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
2	3 000E+02	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
3	6 000E+02	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
4	9 000E+02	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
5	1 200E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
6	1 500E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
7	1 800E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
8	2 100E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
9	2 400E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
10	2 700E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00



Duquesne
Light

Health Physics Department

ERS-MPO-91-035

ATTACHMENT 2

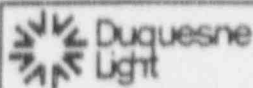
Page 28 of 56

15 OCT 1991 11:03

Page 3

TRAIL: -- Transport of Radioactive Material in Linear Systems. v1.1
Case 5. Initial Sec Liquid Iodines. CR Dose Rate w/o Iso1

STEP	TIME	Mat used for 5				3 SGs- Initial Sec L				AVERAGE		CONTINOR		INTEGRD
		CURRENT	INTEGRD	uCi	uCi-sec	CURRENT	INTEGRD	uCi	uCi-sec	RELEASED	uCi/sec	CURRENT	uCi/sec	
1-131	INITIAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.280E+06	2.495E+10	5.163E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.506E+03
1-131	TOTALS	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.280E+06	2.495E+10	5.163E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.506E+03
1-132	INITIAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.740E+06	6.604E+09	1.366E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.389E+02
1-132	TOTALS	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.740E+06	6.604E+09	1.366E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.389E+02
1-133	INITIAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.330E+07	3.537E+10	7.317E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.539E+03
1-133	TOTALS	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.330E+07	3.537E+10	7.317E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.539E+03
1-134	INITIAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.120E+04	1.243E+08	2.573E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.128E+01
1-134	TOTALS	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.120E+04	1.243E+08	2.573E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.128E+01
1-135	INITIAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.950E+06	1.541E+10	3.188E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.526E+03
1-135	TOTALS	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.950E+06	1.541E+10	3.188E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.526E+03
ALL NUCLEIDES		0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.978E+07						5.869E+00	1.158E-09	
STEP 10														



Health Physics Department


ERS-MPO-91-035

ATTACHMENT 2

Page 29 of 56

WAL-1 -- Transport of Radioactive Material in Linear Systems, v11
Case -- Initial Set Liquid Iodines, (H Dose Rate w/o isol)

ENVIRONMENT									
PHOTON-SUBMC		BETA-SUBMC		THYROID-INITIAL		PHOTON-SUBMC		BETA-SUBMC	
DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE
rem	rem/hr	rem	rem/hr	rem	rem/hr	rem	rem/hr	rem	rem/hr
1-131									
TOTAL S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-06	2.24E-05	2.63E-01	
1-132									
TOTAL S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.75E-06	1.47E-05	2.42E-03	
1-133									
TOTAL S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.51E-06	6.81E-05	1.00E-01	
1-134									
TOTAL S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.60E-08	3.22E-07	2.00E-05	
1-135									
TOTAL S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.17E-06	2.64E-05	1.34E-02	
ALL FACILITIES									
0.0167 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.80E-09	1.17E-06	7.05E-08	1.97E-04
0.0833 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-07	5.79E-06	1.68E-06	4.19E-05
0.1667 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.17E-07	1.14E-05	5.19E-06	8.26E-05
0.2500 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-06	1.68E-05	8.54E-06	1.22E-04
0.3333 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-06	2.20E-05	1.18E-05	1.61E-04
0.4167 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-06	2.70E-05	1.50E-05	1.98E-04
0.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-06	3.19E-05	1.80E-05	2.35E-04
0.5833 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-06	3.66E-05	2.10E-05	2.70E-04
0.6667 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-06	4.11E-05	2.39E-05	3.04E-04
0.7500 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.61E-06	4.55E-05	2.68E-05	3.38E-04
TOTAL S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-05	1.32E-04	1.32E-04	3.79E-01



Duquesne
Light

Health Physics Department

EHS-MPO-91-035

ATTACHMENT 2

Page 30 of 56

COMP RCS		COMP 3 S2s		COMP Control Room	
INITIAL		C1		VOLUME 1 730E+05 Cu F+	
0 000E+00	NR-B3m	0 000E+00	NR-B3m	0 000E+00	NR-B3m
0 000E+00	NR-B5m	0 000E+00	NR-B5m	0 000E+00	NR-B5m
0 000E+00	NR-B5	0 000E+00	NR-B5	0 000E+00	NR-B5
0 000E+00	NR-B7	0 000E+00	NR-B7	0 000E+00	NR-B7
0 000E+00	NR-B8	0 000E+00	NR-B8	0 000E+00	NR-B8
0 000E+00	NR-B9	0 000E+00	NR-B9	0 000E+00	NR-B9
0 000E+00	NR-90	0 000E+00	NR-90	0 000E+00	NR-90
0 000E+00	XE-131M	0 000E+00	XE-131M	0 000E+00	XE-131M
0 000E+00	XE-133M	0 000E+00	XE-133M	0 000E+00	XE-133M
0 000E+00	XE-133	0 000E+00	XE-133	0 000E+00	XE-133
0 000E+00	XE-135M	0 000E+00	XE-135M	0 000E+00	XE-135M
0 000E+00	XE-135	0 000E+00	XE-135	0 000E+00	XE-135
0 000E+00	XE-137	0 000E+00	XE-137	0 000E+00	XE-137
0 000E+00	XE-138	0 000E+00	XE-138	0 000E+00	XE-138
1 490E+06	I-131	0 000E+00	I-131	0 000E+00	I-131
1 780E+06	I-132	0 000E+00	I-132	0 000E+00	I-132
2 880E+06	I-133	0 000E+00	I-133	0 000E+00	I-133
3 240E+06	I-134	0 000E+00	I-134	0 000E+00	I-134
2 520E+06	I-135	0 000E+00	I-135	0 000E+00	I-135
1 000E+06		1 000E+00		1 000E+00	
ACT MUL.7 (to uCi)					
PRODUCTION, uCi/s					
0 000E+00	NR-B3m	0 000E+00	NR-B3m	0 000E+00	NR-B3m
0 000E+00	NR-B5m	0 000E+00	NR-B5m	0 000E+00	NR-B5m
0 000E+00	NR-B5	0 000E+00	NR-B5	0 000E+00	NR-B5
0 000E+00	NR-B7	0 000E+00	NR-B7	0 000E+00	NR-B7
0 000E+00	NR-B8	0 000E+00	NR-B8	0 000E+00	NR-B8
0 000E+00	NR-B9	0 000E+00	NR-B9	0 000E+00	NR-B9
0 000E+00	NR-90	0 000E+00	NR-90	0 000E+00	NR-90
0 000E+00	XE-131M	0 000E+00	XE-131M	0 000E+00	XE-131M
0 000E+00	XE-133M	0 000E+00	XE-133M	0 000E+00	XE-133M
0 000E+00	XE-133	0 000E+00	XE-133	0 000E+00	XE-133
0 000E+00	XE-135M	0 000E+00	XE-135M	0 000E+00	XE-135M
0 000E+00	XE-135	0 000E+00	XE-135	0 000E+00	XE-135
0 000E+00	XE-137	0 000E+00	XE-137	0 000E+00	XE-137
0 000E+00	XE-138	0 000E+00	XE-138	0 000E+00	XE-138
0 000E+00	I-131	0 000E+00	I-131	0 000E+00	I-131
0 000E+00	I-132	0 000E+00	I-132	0 000E+00	I-132
0 000E+00	I-133	0 000E+00	I-133	0 000E+00	I-133
0 000E+00	I-134	0 000E+00	I-134	0 000E+00	I-134
0 000E+00	I-135	0 000E+00	I-135	0 000E+00	I-135
REMOVAL					
NUC 1-14 REL FR		3 309E-07 1/s		2 049E-06 1/s	
NUC 15-20 REL FR		1 000E+00		1 000E+00	
		1 000E+00		1 000E+00	
				1 000E+01 CFM	
				1 000E+01 CFM	
				INTAKE REDUCT 0 000E+00	
				INTAKE FILTER 9 360E-01	

MULTIPLIERS====>

STEP	TIME	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF	XPR	XREM	XRF
1	1 1800E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
2	5 400E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	1 00	70 0	0 000E+00	1 00	70 0	0 000E+00
3	7 200E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	1 00
4	9 000E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	1 00
5	1 440E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	1 00
6	2 880E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	1 00
7	3 060E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	1 980E+03	1 980E+03	0 000E+00	1 980E+03	1 980E+03	0 000E+00
8	8 640E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
9	3 456E+05	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
10	2 592E+06	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00

CONTROL ROOM		ENVIRONMENT	
X/G	Breathing	X/G	Breathing
s/M3	M3/s	s/M3	M3/s
1 000E+00	3 470E-04	1 000E+00	3 470E-04

MULTIPLIERS====>

STEP	TIME, s	XPR	XREM	XRF	XPR	XREM	XRF
1	1 1800E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00
2	5 400E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00
3	7 200E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00
4	9 000E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00
5	1 440E+04	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00
6	2 880E+04	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00
7	3 060E+04	7 860E-05	1 00	1 00	0 000E+00	1 00	0 000E+00
8	8 640E+04	7 860E-05	1 00	1 00	0 000E+00	1 00	0 000E+00
9	3 456E+05	5 960E-05	1 00	1 00	0 000E+00	1 00	0 000E+00
10	2 592E+06	3 760E-05	1 00	1 00	0 000E+00	1 00	0 000E+00

TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
1 181 F F P-5 Iodines

STEP		TIME	RCS			3 SGs			AVERAGE		CONTROL ROOM	
			CURRENT uCi	INTEGRD uCi-sec	INTEGRD uCi-sec	CURRENT uCi	INTEGRD uCi-sec	RELEASED uCi	RELEASE uCi/sec	CURRENT uCi	CURRENT uCi/sec	
1-131	INITIAL		1.490E+12			0.000E+00						
1-131	TOTALS			1.086E+18			2.950E+17			2.540E+08		6.708E+06
1-132	INITIAL		1.780E+12			0.000E+00						
1-132	TOTALS			2.118E+16			8.277E+13			7.956E+07		1.647E+06
1-133	INITIAL		2.880E+12			0.000E+00						
1-133	TOTALS			3.004E+17			1.064E+16			4.220E+08		1.078E+07
1-134	INITIAL		3.240E+12			0.000E+00						
1-134	TOTALS			1.473E+16			2.204E+13			3.549E+07		6.261E+05
1-135	INITIAL		2.520E+12			0.000E+00						
1-135	TOTALS			8.554E+16			9.627E+14			2.606E+08		6.209E+06
ALL NUCLIDES			4.759E+10			6.459E+10				0.000E+00	0.000E+00	
STEP 10												



Duquesne
Light

Health Physics Department

ERS-AP0-91-035

ATTACHMENT 3

Page 33 of 56

TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
 1 182 F F P-S Iodines

	ENVIRONMENT				CONTAINER				ROOM			
	PHOTON-SUBMG	BETA-SUBMG	THYROID-INHAL	THYROID-INHAL	PHOTON-SUBMG	BETA-SUBMG	THYROID-INHAL	THYROID-INHAL	PHOTON-SUBMG	BETA-SUBMG	THYROID-INHAL	THYROID-INHAL
	DOSE	DOSE	DOSE	DOSE	DOSE	DOSE	DOSE	DOSE	DOSE	DOSE	DOSE	DOSE
	mrem/hr	mrem/hr	mrem/hr	mrem/hr	mrem/hr	mrem/hr	mrem/hr	mrem/hr	mrem/hr	mrem/hr	mrem/hr	mrem/hr
I-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.54E-03	6.00E-04	7.03E+02					
TOTALS												
I-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.68E-03	3.79E-02	6.24E+00					
TOTALS												
I-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-02	2.07E-01	3.03E+02					
TOTALS												
I-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.22E-03	1.79E-02	1.11E+00					
TOTALS												
I-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-02	1.07E-01	5.45E+01					
TOTALS												

ALL NUCLIDES

0 5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-03	5.47E-03	7.54E-03	2.90E-02	9.70E+00	3.81E+01		
5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.43E-03	3.64E-03	2.43E-02	2.08E-02	3.61E+01	3.44E+01		
0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.15E-03	4.93E-03	1.25E-02	2.91E-02	2.18E+01	2.73E+01		
4 5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-03	5.30E-03	1.53E-02	3.23E-02	2.88E+01	6.26E+01		
4 0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.28E-03	6.99E-03	5.94E-02	4.61E-02	1.27E+02	1.05E+02		
8 0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-02	1.18E-02	2.86E-01	8.95E-02	7.67E+02	2.54E+02		
8 5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-03	3.55E-04	1.25E-02	2.80E-03	3.57E+01	8.13E+00		
24 0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-03	1.04E-05	1.22E-02	1.01E-04	4.08E+01	4.51E-01		
96 0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E-05	1.8E-11	5.03E-04	1.10E-11	2.44E+00	1.07E-06		
720 0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.29E-11	0.00E+00	6.02E-10	0.00E+00	6.01E-06	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-02	4.31E-01	1.07E+03					



ATTACHMENT

Page 35 of 56

TRAILS—Transport of Radioactive Material in Linnet Spectacles
 1988—Mobile Center in CSOs

COMP	NOT USED IN THIS CASE	COMP	3 SGs	COMP	Control Room
					1 730E+05 Cu Ft
INITIAL	0 000E+00 KR-B3m	2 160E+05 KR-B3m	0 000E+00 KR-B3m	0 000E+00 KR-B3m	
	0 000E+00 KR-B5m	5 400E+05 KR-B5m	0 000E+00 KR-B5m	0 000E+00 KR-B5m	
	0 000E+00 KR-B5	3 730E+04 KR-B5	0 000E+00 KR-B5	0 000E+00 KR-B5	
	0 000E+00 KR-B7	1 062E+06 KR-B7	0 000E+00 KR-B7	0 000E+00 KR-B7	
	0 000E+00 KR-B8	1 490E+06 KR-B8	0 000E+00 KR-B8	0 000E+00 KR-B8	
	0 000E+00 KR-B9	1 980E+06 KR-B9	0 000E+00 KR-B9	0 000E+00 KR-B9	
	0 000E+00 KR-	0 000E+00 KR-90	0 000E+00 KR-90	0 000E+00 KR-90	
	0 000E+00 KR-131M	7 570E+03 KR-131M	0 000E+00 KR-131M	0 000E+00 KR-131M	
	0 000E+00 KR-133M	6 680E+04 KR-133M	0 000E+00 KR-133M	0 000E+00 KR-133M	
	0 000E+00 KR-133	2 880E+06 KR-133	0 000E+00 KR-133	0 000E+00 KR-133	
	0 000E+00 KR-135M	7 560E+05 KR-135M	0 000E+00 KR-135M	0 000E+00 KR-135M	
	0 000E+00 KR-135	7 380E+05 KR-135	0 000E+00 KR-135	0 000E+00 KR-135	
	0 000E+00 KR-137	2 520E+06 KR-137	0 000E+00 KR-137	0 000E+00 KR-137	
	0 000E+00 KR-138	2 520E+06 KR-138	0 000E+00 KR-138	0 000E+00 KR-138	
	0 000E+00 KR-131	0 000E+00 KR-131	0 000E+00 KR-131	0 000E+00 KR-131	
	0 000E+00 KR-132	0 000E+00 KR-132	0 000E+00 KR-132	0 000E+00 KR-132	
	0 000E+00 KR-133	0 000E+00 KR-133	0 000E+00 KR-133	0 000E+00 KR-133	
	0 000E+00 KR-134	0 000E+00 KR-134	0 000E+00 KR-134	0 000E+00 KR-134	
	0 000E+00 KR-135	0 000E+00 KR-135	0 000E+00 KR-135	0 000E+00 KR-135	
ACT MULT (to vCi)	1 000E+00	1 000E+00	1 000E+00	1 000E+00	
PRODUCTION, vCi/s	0 000E+00 KR-B3m	0 000E+00 KR-B3m	0 000E+00 KR-B3m	0 000E+00 KR-B3m	
	0 000E+00 KR-B5m	0 000E+00 KR-B5m	0 000E+00 KR-B5m	0 000E+00 KR-B5m	
	0 000E+00 KR-B5	0 000E+00 KR-B5	0 000E+00 KR-B5	0 000E+00 KR-B5	
	0 000E+00 KR-B7	0 000E+00 KR-B7	0 000E+00 KR-B7	0 000E+00 KR-B7	
	0 000E+00 KR-B8	0 000E+00 KR-B8	0 000E+00 KR-B8	0 000E+00 KR-B8	
	0 000E+00 KR-B9	0 000E+00 KR-B9	0 000E+00 KR-B9	0 000E+00 KR-B9	
	0 000E+00 KR-90	0 000E+00 KR-90	0 000E+00 KR-90	0 000E+00 KR-90	
	0 000E+00 KR-131M	0 000E+00 KR-131M	0 000E+00 KR-131M	0 000E+00 KR-131M	
	0 000E+00 KR-133M	0 000E+00 KR-133M	0 000E+00 KR-133M	0 000E+00 KR-133M	
	0 000E+00 KR-133	0 000E+00 KR-133	0 000E+00 KR-133	0 000E+00 KR-133	
	0 000E+00 KR-135M	0 000E+00 KR-135M	0 000E+00 KR-135M	0 000E+00 KR-135M	
	0 000E+00 KR-135	0 000E+00 KR-135	0 000E+00 KR-135	0 000E+00 KR-135	
	0 000E+00 KR-137	0 000E+00 KR-137	0 000E+00 KR-137	0 000E+00 KR-137	
	0 000E+00 KR-138	0 000E+00 KR-138	0 000E+00 KR-138	0 000E+00 KR-138	
	0 000E+00 KR-131	0 000E+00 KR-131	0 000E+00 KR-131	0 000E+00 KR-131	
	0 000E+00 KR-132	0 000E+00 KR-132	0 000E+00 KR-132	0 000E+00 KR-132	
	0 000E+00 KR-133	0 000E+00 KR-133	0 000E+00 KR-133	0 000E+00 KR-133	
	0 000E+00 KR-134	0 000E+00 KR-134	0 000E+00 KR-134	0 000E+00 KR-134	
	0 000E+00 KR-135	0 000E+00 KR-135	0 000E+00 KR-135	0 000E+00 KR-135	
REMOVAL	0 000E+00 1/sec	0 000E+00 1/sec	0 000E+00 1/sec	0 000E+00 1/sec	
NUC 1-14 REL FR	0 000E+00	0 000E+00	0 000E+00	0 000E+00	
NUC 15-20 REL FR	0 000E+00	0 000E+00	0 000E+00	0 000E+00	



ATTACHMENT

Page 36 of 56

2102 E. E. TRAIL—Transport of Redundant Information in Linear Systems, by

MULTIPLIERS (continued)

STEP	TIME	XPR	XREM	XRF	XPR	XREM	XRF	XPRM	XRFM	XPRC
1	1.57E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	0.000E+00	0.000E+00
2	5.400E+03	0.000E+03	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	0.000E+00	0.000E+00
3	2.00E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	70.0	0.000E+00	1.00
4	9.000E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	70.0	0.000E+00	1.00
5	1.44E+04	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	70.0	0.000E+00	1.00
6	2.880E+04	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	70.0	0.000E+00	1.00
7	3.06E+04	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	70.0	0.000E+00	1.00
8	5.40E+04	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	1.980E+03	0.000E+00	0.000E+00
9	3.456E+05	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	0.000E+00	0.000E+00
10	2.592E+06	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	0.000E+00	0.000E+00

CONTROL ROOM		ENVIRONMENT	
X/G	Breathing Occupancy	X/G	Breathing
s/H ³	M ³ /s	s/H ³	M ³ /s
1.000E+00	3.470E-04	1.000E+00	3.470E-04

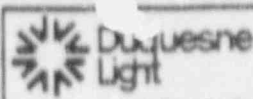
MULTIPLIERS www.oxfordjournals.org

STEP	TIME, s						
1	1	800E+03	1	590E-04	1	00	0 000E+00
2	5	400E+03	1	590E-04	1	00	0 000E+00
3	7	20.5E+03	1	590E-04	1	00	0 000E+00
4	9	000E+03	1	590E-04	1	00	0 000E+00
5	1	440E+04	1	590E-04	1	00	0 000E+00
6	2	880E+04	1	590E-04	1	00	0 000E+00
7	3	060E+04	7	860E-05	1	00	0 000E+00
8	6	640E+04	7	860E-05	1	00	0 000E+00
9	5	456E+03	5	960E-05	1	00	0 000E+00
10	2	592E+06	3	60E-05	1	00	0 000E+00

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

STEP	TIME	NOT USED IN THIS CAS	3 SGs	AVERAGE	CURRENT	INTEGR	INTEGR	INTEGR	INTEGR
		CURRENT	CURRENT	RELEASED	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT
		uCi	uCi	uCi/sec	uCi	uCi	uCi	uCi	uCi
NR-83m	INITIAL	0.000E+00	2.160E+11	6.489E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.192E+08
NR-83m	TOTALS	0.000E+00	2.160E+11	6.489E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.192E+08
NR-85m	INITIAL	0.000E+00	5.400E+11	2.941E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.158E+08
NR-85m	TOTALS	0.000E+00	5.400E+11	2.941E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.158E+08
NR-85	INITIAL	0.000E+00	3.730E+10	3.938E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.314E+08
NR-85	TOTALS	0.000E+00	3.730E+10	3.938E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.314E+08
NR-87	INITIAL	0.000E+00	1.060E+12	2.282E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.129E+08
NR-87	TOTALS	0.000E+00	1.060E+12	2.282E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.129E+08
NR-88	INITIAL	0.000E+00	1.490E+12	6.420E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.464E+09
NR-88	TOTALS	0.000E+00	1.490E+12	6.420E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.464E+09
NR-89	INITIAL	0.000E+00	1.980E+12	1.792E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.811E+06
NR-89	TOTALS	0.000E+00	1.980E+12	1.792E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.811E+06
XE-131m	INITIAL	0.000E+00	7.570E+09	7.17E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.628E+07
XE-131m	TOTALS	0.000E+00	7.570E+09	7.17E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.628E+07
XE-133m	INITIAL	0.000E+00	6.680E+10	6.014E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.176E+08
XE-133m	TOTALS	0.000E+00	6.680E+10	6.014E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.176E+08
XE-133	INITIAL	0.000E+00	2.880E+12	2.672E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.819E+09
XE-133	TOTALS	0.000E+00	2.880E+12	2.672E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.819E+09
XE-135m	INITIAL	0.000E+00	7.560E+11	3.325E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.186E+07
XE-135m	TOTALS	0.000E+00	7.560E+11	3.325E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.186E+07
XE-125	INITIAL	0.000E+00	7.380E+11	5.243E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.684E+09
XE-125	TOTALS	0.000E+00	7.380E+11	5.243E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.684E+09
XE-137	INITIAL	0.000E+00	2.520E+12	2.763E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.367E+06
XE-137	TOTALS	0.000E+00	2.520E+12	2.763E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.367E+06
XE-138	INITIAL	0.000E+00	2.520E+12	1.019E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.429E+07
XE-138	TOTALS	0.000E+00	2.520E+12	1.019E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.429E+07
ALL NUCLIDES		0.000E+00	9.212E+10		0.000E+00	0.000E+00	0.000E+00	0.000E+00	

STEP 10



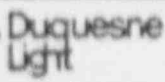
Health Physics Department

ERS-AP0-91-035

ATTACHMENT 3

PAGE 37 of 56

TRAILS -- Transport of Radioactive Materials
2 10: F F P-5 Noble Gases in 3.50s



Health Physics Department

ERS-MPO-91-035

ATTACHMENT 3

Page 38

of 53

ENVIRONMENT										THYROID-INHAL				PHOTON-SUBMG				BETA-SUBMG				THYROID-INHAL			
DOSE RATE		DOSE		DOSE RATE		DOSE		DOSE RATE		DOSE		DOSE RATE		DOSE		DOSE RATE		DOSE		DOSE RATE		DOSE			
mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr	mrem	mrem/hr		
KR-83m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-85m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-87	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-91	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-133M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-133M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-139	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-139	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
KR-139	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
ALL NUCLIDES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
1.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
1.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00</														



Duquesne
Light

Health Physics Department

ERS-AP0-91-035

ATTACHMENT

3

Page 39 of 56

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

COMP. Control Room
VER. 1.7.30E+05 (v1.1)

COMP. 3 SCs

COMP. RCS

INITIAL

0.000E+00	MR-B3m	0.000E+00	MR-B3m
0.000E+00	MR-B5m	0.000E+00	MR-B5m
0.000E+00	MR-B5	0.000E+00	MR-B5
0.000E+00	MR-B7	0.000E+00	MR-B7
0.000E+00	MR-B8	0.000E+00	MR-B8
0.000E+00	MR-B9	0.000E+00	MR-B9
0.000E+00	MR-90	0.000E+00	MR-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
1.000E+00		1.000E+00	

ACT. MULT (to uCi)

PRODUCTION, uCi/s

0.000E+00	MR-B3m	0.000E+00	MR-B3m
0.000E+00	MR-B5m	0.000E+00	MR-B5m
0.000E+00	MR-B5	0.000E+00	MR-B5
0.000E+00	MR-B7	0.000E+00	MR-B7
0.000E+00	MR-B8	0.000E+00	MR-B8
0.000E+00	MR-B9	0.000E+00	MR-B9
0.000E+00	MR-90	0.000E+00	MR-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
1.360E+06	I-131	0.000E+00	I-131
2.520E+06	I-132	0.000E+00	I-132
3.080E+06	I-133	0.000E+00	I-133
3.680E+06	I-134	0.000E+00	I-134
2.810E+06	I-135	0.000E+00	I-135

REMOVAL
NUC 1-14 REL FR
NUC 15-20 REL FR

INTAKE 1.000E+01 CFM
INTAKE 1.000E+00
INTAKE 1.000E+00
INTAKE 1.000E+01 CFM
INTAKE REDUCT 0.000E+00
INTAKE FILTER 9.360E-01

2.069E-06 1/sec
0.000E+00
0.000E+00

3.309E-07 1/sec
0.000E+00
0.000E+00

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

MULTIPLIERS=====

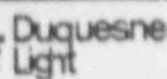
STEP	TIME	KPR	KREM	KRF	KPR	KREM	KRF	KPR	KREM	KRF	KPR	KREM	KRF
1	1 800E+03	1 00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
2	5 400E+03	1 00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	1 00	70 0	0 000E+00	1 00	70 0	0 000E+00
3	7 200E+03	1 00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	0 000E+00
4	9 000E+03	1 00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	0 000E+00
5	1 440E+04	1 00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	0 000E+00
6	2 880E+04	2 000E-03	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	0 000E+00
7	3 060E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	1 980E+03	1 980E+03	0 000E+00	1 980E+03	1 980E+03	0 000E+00
8	6 400E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
9	3 456E+05	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
10	2 592E+06	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00

----- ENVIRONMENT -----

K/g	Breathing	Occupancy	K/g	Breathing
s/M3	M3/s		s/M3	M3/s
1 000E+00	3 470E-04	1 000E+00	1 000E+00	3 470E-04

MULTIPLIERS=====

STEP	TIME	KPR	KREM	KRF	KPR	KREM	KRF	KPR	KREM	KRF
1	1 800E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00
2	5 400E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00
3	7 200E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00
4	9 000E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00
5	1 440E+04	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00
6	2 880E+04	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00
7	3 060E+04	7 860E-05	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00
8	6 400E+04	7 860E-05	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00
9	3 456E+05	5 960E-05	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00
10	2 592E+06	3 760E-05	1 00	1 00	0 000E+00	1 00	0 000E+00	1 00	1 00	0 000E+00



Health Physics Department

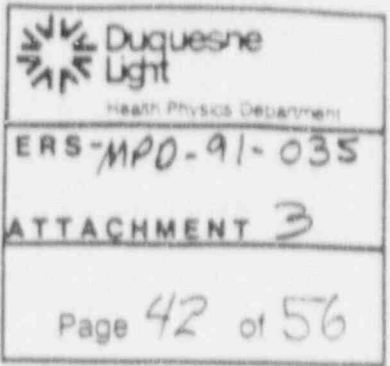
ATTACHMENT 3

Page 41 of 56

TRAILS
NUMBER
3
PUBLISHED BY THE
SOUTHERN
PACIFIC
COAST
RAILROAD
AT
SAN
FRANCISCO
CALIF.

[illegible]

TRAILS - Temples of
2-182 E. CONSTRUCTION
TO THE TOP OF THE
US NATIONAL MONUMENT

[illegible]



ATTACHMENT 3

Page 12 of 56

TRANSITION FROM THE
350-500 MHz BAND
TO THE 700 MHz BAND

COMP. NOT USED IN THIS CASE	COMP. 3	50s	Init	Stm	VALUUM	1	730E+05	Co	Fe	FT	COMP	Control Room
INITIAL	0 000E+00	WR-B3m	5 770E-05	WR-B3m	C:	0 000E+00	WR-B3m				0 000E+00	WR-B3m
	0 000E+00	WR-B5m	2 810E-04	WR-B5m		0 000E+00	WR-B5m				0 000E+00	WR-B5m
	0 000E+00	WR-B5	1 480E-03	WR-B5		0 000E+00	WR-B5				0 000E+00	WR-B5
	0 000E+00	WR-B7	1 610E-04	WR-B7		0 000E+00	WR-B7				0 000E+00	WR-B7
	0 000E+00	WR-B8	4 290E-04	WR-B8		0 000E+00	WR-B8				0 000E+00	WR-B8
	0 000E+00	WR-B9	1 350E-05	WR-B9		0 000E+00	WR-B9				0 000E+00	WR-B9
	0 000E+00	WR-90	0 000E+00	WR-90		0 000E+00	WR-90				0 000E+00	WR-90
	0 000E+00	XE-131M	1 440E-05	XE-131M		0 000E+00	XE-131M				0 000E+00	XE-131M
	0 000E+00	XE-133M	4 130E-04	XE-133M		0 000E+00	XE-133M				0 000E+00	XE-133M
	0 000E+00	XE-133	3 520E-03	XE-133		0 000E+00	XE-133				0 000E+00	XE-133
	0 000E+00	XE-135M	1 460E-04	XE-135M		0 000E+00	XE-135M				0 000E+00	XE-135M
	0 000E+00	XE-135	4 310E-04	XE-135		0 000E+00	XE-135				0 000E+00	XE-135
	0 000E+00	XE-137	2 190E-05	XE-137		0 000E+00	XE-137				0 000E+00	XE-137
	0 000E+00	XE-138	9 030E-05	XE-138		0 000E+00	XE-138				0 000E+00	XE-138
	0 000E+00	1-131	8 130E-03	1-131		0 000E+00	1-131				0 000E+00	1-131
	0 000E+00	1-132	2 400E-03	1-132		0 000E+00	1-132				0 000E+00	1-132
	0 000E+00	1-133	1 160E-03	1-133		0 000E+00	1-133				0 000E+00	1-133
	0 000E+00	1-134	5 360E-04	1-134		0 000E+00	1-134				0 000E+00	1-134
	0 000E+00	1-135	5 210E-03	1-135		0 000E+00	1-135				0 000E+00	1-135
ACT. MULT. (to uCi)	1 000E+00		1 000E+00			1 000E+00					1 000E+00	
PRODUCTION, uCi/s	0 000E+00	WR-B3m	0 000E+00	WR-B3m		0 000E+00	WR-B3m				0 000E+00	WR-B3m
	0 000E+00	WR-B5m	0 000E+00	WR-B5m		0 000E+00	WR-B5m				0 000E+00	WR-B5m
	0 000E+00	WR-B5	0 000E+00	WR-B5		0 000E+00	WR-B5				0 000E+00	WR-B5
	0 000E+00	WR-B7	0 000E+00	WR-B7		0 000E+00	WR-B7				0 000E+00	WR-B7
	0 000E+00	WR-B8	0 000E+00	WR-B8		0 000E+00	WR-B8				0 000E+00	WR-B8
	0 000E+00	WR-B9	0 000E+00	WR-B9		0 000E+00	WR-B9				0 000E+00	WR-B9
	0 000E+00	WR-90	0 000E+00	WR-90		0 000E+00	WR-90				0 000E+00	WR-90
	0 000E+00	XE-131M	0 000E+00	XE-131M		0 000E+00	XE-131M				0 000E+00	XE-131M
	0 000E+00	XE-133M	0 000E+00	XE-133M		0 000E+00	XE-133M				0 000E+00	XE-133M
	0 000E+00	XE-133	0 000E+00	XE-133		0 000E+00	XE-133				0 000E+00	XE-133
	0 000E+00	XE-135M	0 000E+00	XE-135M		0 000E+00	XE-135M				0 000E+00	XE-135M
	0 000E+00	XE-135	0 000E+00	XE-135		0 000E+00	XE-135				0 000E+00	XE-135
	0 000E+00	XE-137	0 000E+00	XE-137		0 000E+00	XE-137				0 000E+00	XE-137
	0 000E+00	XE-138	0 000E+00	XE-138		0 000E+00	XE-138				0 000E+00	XE-138
	0 000E+00	1-131	0 000E+00	1-131		0 000E+00	1-131				0 000E+00	1-131
	0 000E+00	1-132	0 000E+00	1-132		0 000E+00	1-132				0 000E+00	1-132
	0 000E+00	1-133	0 000E+00	1-133		0 000E+00	1-133				0 000E+00	1-133
	0 000E+00	1-134	0 000E+00	1-134		0 000E+00	1-134				0 000E+00	1-134
	0 000E+00	1-135	0 000E+00	1-135		0 000E+00	1-135				0 000E+00	1-135
RENEWAL	3 770E+00	1/sec	1 285E-01	1/sec		1 000E+01	CFM				1 000E+01	cfm
NUC 1-14 REL FR	0 000E+00					INTAKE REDUCT					0 000E+00	
NUC 15-20 REL FR	0 000E+00					INTAKE FILTER					9 360E-01	



Duquesne
Light

Health Physics Department

ERS-AP0-91-035

ATTACHMENT 3

Page 44 of 56

TRAILS --- Transport of Radioactive Material in Linear Systems. v1.1
4 182 F. F. 350s-S Initial Steam Release

MULTIPLIERS====>

STEP	TIME	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF
1	1 800E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
2	5 400E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	1 00	70 0	0 000E+00	1 00	70 0	0 000E+00
3	7 200E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	0 000E+00
4	9 000E+03	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	0 000E+00
5	1 440E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	70 0	70 0	0 000E+00	70 0	70 0	0 000E+00
6	2 880E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	1 980E+03	1 980E+03	0 000E+00	1 980E+03	1 980E+03	0 000E+00
7	3 060E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
8	8 640E+04	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
9	3 456E+05	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00
10	2 592E+06	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	50 0	50 0	0 000E+00	50 0	50 0	0 000E+00

ENVIRONMENT

X/G Breathing
s/M3 M3/s

1 000E+00 3 470E-04

CONTROL ROOM

X/G Breathing
s/M3 M3/s

1 000E+00 3 470E-04

MULTIPLIERS====>

STEP	TIME	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF
1	1 800E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
2	5 400E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
3	7 200E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
4	9 000E+03	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
5	1 440E+04	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
6	2 880E+04	1 590E-04	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
7	3 060E+04	7 860E-05	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
8	8 640E+04	7 860E-05	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
9	3 456E+05	3 960E-05	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00
10	2 592E+06	3 760E-05	1 00	1 00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00	0 000E+00	1 00	0 000E+00

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

STEP TIME	NOT USED IN THIS CAS			3 SGs Init			Stm			AVERAGE			CURRENT			CURRENT			CURRENT		
	INITIAL	INTEGR	INTEGR	uCi	uCi-sec	uCi	uCi-sec	uCi	uCi-sec	RELEASED	RELEASE	uCi	uCi	uCi	uCi	uCi	uCi	uCi	uCi	uCi	uCi
MR-83m INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR-83m TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR-85m INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR-85m TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR-87 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR-87 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR-88 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR-88 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR-89 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR-89 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-131m INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-131m TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-133m INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-133m TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-135 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-135 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-137 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-137 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-138 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XE-138 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-131 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-131 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-132 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-132 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-133 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-133 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-134 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-134 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-135 INITIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-135 TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Duquesne
Light

Health Physics Department

ERS-AP0-91-035

ATTACHMENT

3

Page 45 of 56



Duquesne
Light

Health Physics Department

ERS-AP0-91-035

ATTACHMENT ✓

Page 46 of 56

TRAILS -- Transport of Radioactive Material in Linear Systems. v1.1
4 182 F F 350s-S Initial Steam Release

STEP	TIME	ALL NUCLIDES	★ STEP	10
NOT USED IN THIS CAS 3 50s Init Ste				
CURRENT	INTEGR	INTEGR	Stm	
uCi	uCi-sec	uCi	uCi-sec	
0 000E+00	0 000E+00	0 000E+00		

AVERAGE	RELEASE
uCi	uCi/sec

CONTR	REGR
CURRENT	CURRENT
uCi	uCi/sec
0 000E+00	0 000E+00

INTEGR
uCi-sec



ATTACHMENT

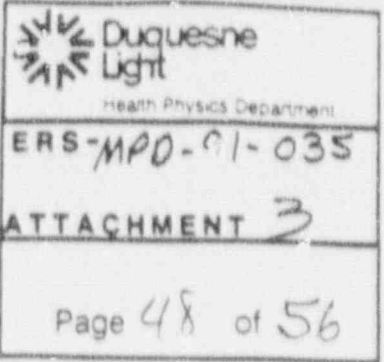
Page 47 of 56

TRAILS -- Transport of Radioactive Material in Linear Systems. Vol. 182 F. JCSG-5 Initial Steam Release

[illegible]

TRAILS --
Transport & Education
350 W-9
A 182 E

PHOTON-SUBMC			BETA-SUBMC			THYROID-INHAL			PHOTON-SUBMC			BETA-SUBMC			THYROID-ING		
DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE	DOSE	DOSE RATE
rem	rem/hr	rem	rem/hr	rem	rem/hr	rem	rem/hr	rem	rem/hr	rem	rem/hr	rem	rem/hr	rem	rem/hr	rem	rem/hr
I-135																	
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.80E-06	3.34E-05	1.70E-02							
ALL NUCLIDES																	
0.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-06	6.43E-06	4.11E-05	3.06E-02	1.21E-01					
1.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-06	4.23E-06	3.84E-05	1.07E-01	9.41E-02					
2.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-06	3.48E-06	1.30E-05	4.42E-02	8.29E-02					
2.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-06	2.87E-06	2.01E-05	3.89E-02	7.30E-02					
4.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.31E-06	1.66E-06	2.39E-05	9.11E-02	5.00E-02					
8.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-06	4.53E-07	2.89E-05	1.25E-01	1.83E-02					
8.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.08E-08	1.35E-08	5.33E-07	2.58E-03	5.90E-04					
24.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.73E-08	4.75E-10	5.66E-07	5.77E-09	3.68E-03					
96.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-09	1.04E-15	3.14E-08	1.46E-14	2.07E-04					
720.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.85E-15	0.00E+00	8.28E-14	0.00E+00	5.95E-10					
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-05	0.00E+00	4.44E-04	4.44E-01	0.00E+00					



```

1 000E+01 c fm
INTAKE REDUCT 0 000E+00
INTAKE FILTER 7 360E-01

```

TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
 5182 F.F. 350s-B Initial Secondary Liquid Iodines

MULTIPLIERS====>

STEP	TIME	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF	XPR	KREM	XRF
1	1.800E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	50.0	50.0	0.000E+00
2	5.400E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	1.00	70.0	0.000E+00
3	7.200E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	70.0	70.0	1.00
4	9.000E+03	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	0.596	0.000E+00	70.0	70.0	1.00
5	1.440E+04	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	0.596	0.000E+00	70.0	70.0	1.00
6	2.880E+04	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	0.596	0.000E+00	70.0	70.0	1.00
7	3.060E+04	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	0.596	0.000E+00	70.0	70.0	1.00
8	8.640E+04	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	0.596	0.000E+00	1.980E+03	1.980E+03	0.000E+00
9	3.456E+05	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	0.596	0.000E+00	50.0	50.0	0.000E+00
10	2.592E+06	0.000E+00	1.00	0.000E+00	0.000E+00	1.00	0.000E+00	0.000E+00	0.596	0.000E+00	50.0	50.0	0.000E+00

CONTROL ROOM			ENVIRONMENT		
X/G	Breathing	Occupancy	X/G	Breathing	
s/M3	M3/s		s/M3	M3/s	
1.000E+00	3.470E-04	1.000E+00	1.000E+00	3.470E-04	

MULTIPLIERS====>

STEP	TIME	XPR	KREM	XRF	XPR	KREM	XRF
1	1.800E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00
2	5.400E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00
3	7.200E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00
4	9.000E+03	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00
5	1.440E+04	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00
6	2.880E+04	1.590E-04	1.00	1.00	0.000E+00	1.00	0.000E+00
7	3.060E+04	7.860E-05	1.00	1.00	0.000E+00	1.00	0.000E+00
8	8.640E+04	7.860E-05	1.00	1.00	0.000E+00	1.00	0.000E+00
9	3.456E+05	5.960E-05	1.00	1.00	0.000E+00	1.00	0.000E+00
10	2.592E+06	3.760E-05	1.00	1.00	0.000E+00	1.00	0.000E+00

TRAILS -- Transport of Radioactive Material in Linear Systems, v1.1
 3 182 F F 3SGs-B Initial Secondary Liquid Iodines

STEP TIME	INITIAL TOTALS	NOT USED IN THIS CAS		3 SGs Init		Sec Liq		AVERAGE		CONTROL ROOM		INTEGRD uCi/sec
		CURRENT uCi	INTEGRD uCi-sec	CURRENT uCi	INTEGRD uCi-sec	CURRENT uCi	INTEGRD uCi-sec	RELEASED uCi	uCi/sec	CURRENT uCi	uCi/sec	
I-131 I-131	TOTALS	0.000E+00	0.000E+00	9.280E+06	8.255E+12	3.728E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.460E+04	
I-132 I-132	TOTALS	0.000E+00	0.000E+00	2.740E+06	3.215E+10	4.848E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.876E+03	
I-133 I-133	TOTALS	0.000E+00	0.000E+00	1.330E+07	1.385E+12	4.824E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.141E+04	
I-134 I-134	TOTALS	0.000E+00	0.000E+00	6.120E+04	2.763E+08	5.241E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.691E+01	
I-135 I-135	TOTALS	0.000E+00	0.000E+00	5.950E+06	1.983E+11	1.722E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.091E+04	
ALL NUCLIDES # STEP 10		0.000E+00		6.703E+05								



Duquesne
Light

Health Physics Department

ERS-AP0-91-035

ATTACHMENT 3

Page 51 of 56

	ENVIRONMENT				PHOTON-SUBMC				BETA-SUBMC				R O D I N			
	DOSE mrem	DOSE RATE mrem/hr	DOSE mrem	DOSE RATE mrem/hr	DOSE mrem	DOSE RATE mrem/hr	DOSE mrem	DOSE RATE mrem/hr	DOSE mrem	DOSE RATE mrem/hr	DOSE mrem	DOSE RATE mrem/hr	DOSE mrem	DOSE RATE mrem/hr		
I-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-05	2.20E-04	2.58E+00									
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-05	6.62E-05	1.09E-02									
I-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.89E-05	6.04E-04	8.90E-01									
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-07	7.68E-07	4.76E-05									
I-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-05	1.89E-04	9.58E-02									
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-05	5.99E-05	2.35E-04									
ALL NUCLIDES	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.18E-06	5.99E-05	2.35E-04									
0.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E-05	2.06E-04	1.30E-04									
1.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-05	8.80E-05	1.73E-04									
2.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-05	8.27E-05	1.59E-04									
2.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.84E-05	2.13E-04	1.28E-04									
4.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.73E-05	4.06E-04	8.45E-05									
8.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-06	2.98E-07	2.67E-06									
8.5000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-06	1.11E-08	1.13E-07									
24.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.59E-08	1.55E-14	1.47E-13									
96.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.59E-14	0.00E+00	0.00E+00									
720.0000 h	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-04	1.08E-03	3.58E+00									
TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-04	1.08E-03	3.58E+00									

ALL NUCLIDES

[illegible]

Duquesne
Light

Health Physics Department

ERS-MPO-91-035

ATTACHMENT 3

Page 52 of 56



Duquesne
Light
Health Physics Department

ERS-MPD-91-031

ATTACHMENT

4

Page 53 of 56



HALLIBURTON NUS
Environmental Corporation

ARP-91-444
October 8, 1991

Mr. Steve La Vie
Duquesne Light Company
Beaver Valley Power Station
P. O. Box 4
Shippingport, PA 15077

Subject: Control Room X/Q Values for BVPS

References:

- 1) HALLIBURTON NUS Proposal No. PS808127
- 2) Duquesne Light Company Purchase Order No. D068239
- 3) Telecon From S. La Vie to M. Septoff August 9, 1991
- 4) Letter from J. Ramsdell to M. Septoff August 15, 1991

Dear Steve:

This letter presents the X/Q values suitable for design basis accident releases from selected plant vents to the BVPS common control room intake. The methodology used is presented by Ramsdell in NUREG/CR-5055 as modified by NUREG/CP-0116, by discussions with Ramsdell in September 1991 (Reference 4) and a paper presented in Atmospheric Environment, Volume 24B, No. 3, pp 377-388, 1990. The work was performed in accordance with the description contained in Reference 3 as approved by reference 2. It is noted that all work was performed using approved project procedures in accordance with the HALLIBURTON NUS ESD Quality Assurance Manual, Revision 6.

Tables 1 and 2 presents the X/Q values for the selected plant vents for Unit 1 and Unit 2, respectively, for averaging periods of 0-8 hours, 8-24 hours, 1-4 days, and 4-30 days. The release points, distances and directions to the common control room intake, and building cross sectional areas were those provided in an analysis performed by Stone and Webster Corporation using the Murphy and Campe methodology. Duquesne Light Company provided this information to us on September 6, 1991. Five years of meteorological data for the period January 1986 through December 1990 were used. Results of the Murphy and Campe methodology are also presented in the tables for comparison. It is seen that, for the 0-8 hr averaging period reductions in X/Q values as compared to those obtained using the Murphy and Campe methodology range from a factor of 2 to over an order of magnitude.



Duquesne
Light

Health Physics Department

ERS-MPD-91-035

ATTACHMENT 4

Page 54 of 56

Mr. Steve La Vie
ARP-91-444
October 8, 1991
Page 2

A report describing the methodology and results with a comparison with the Murphy and Campe methodology suitable for presentation to the NRC will be prepared. The computer code and its documentation will be provided with the report. Further, as we discussed, a scientific paper could also be prepared suitable for presentation at a DOE/NRC Nuclear Air Cleaning Conference.

As part of HALLIBURTON NUS Quality Assurance procedures a Division Quality Assurance Review Board (DQARB) was convened to review the technical and quality aspects of the analysis. The results of the DQARB indicate that (1) the documentation for the computer code generated for the analysis should be revised to provide additional information related to code identification and its use, and (2) the need to clarify the relationship between the test cases and the hand calculations used to verify the correct operation of the code. Therefore, the results provided in the tables should be considered as preliminary until the DQARB approves the documentation, receives the clarification, and completes its review. It is expected that this will be completed early next week.

If you have any questions please call me.

Sincerely,

Michael Septoff
Project Manager

Enclosures
cc: A. Toblin
W. McIntire

HALLIBURTON NUS

TABLE 1 DESIGN BASIS ACCIDENT X/Q VALUES (sec/ml) FOR SELECTED
BVPS PLANT VENTS TO THE COMMON CONTROL ROOM INTAKE - UNIT 1

Release Point Methodology 0-8 hr 8-24 hr 1-4 day 4-30 day

Containment Edge	Ramsdell	4.33E-4	2.04E-4	1.46E-4	8.84E-5
	Murphy-Campe	2.88E-3	1.90E-3	6.62E-4	1.41E-4
Containment Top	Ramsdell	2.73E-4	1.28E-4	9.17E-5	5.57E-5
	Murphy-Campe	2.51E-3	1.66E-3	5.77E-4	1.23E-4
Auxiliary Building	Ramsdell	4.30E-3	2.01E-3	1.49E-3	9.25E-4
	Murphy-Campe	8.24E-3	6.01E-3	2.32E-3	6.18E-4
Main Steamvalve	Ramsdell	7.60E-4	3.51E-4	2.59E-4	1.58E-4
	Murphy-Campe	2.97E-3	1.94E-3	6.92E-4	1.54E-4
Service Building	Ramsdell	6.25E-4	3.04E-4	2.36E-4	1.57E-4
	Murphy-Campe	7.47E-3	5.09E-3	1.88E-3	4.93E-4
Turbine Building	Ramsdell	2.43E-3	1.22E-3	8.90E-4	6.26E-4
	Murphy-Campe	7.81E-3	5.55E-3	2.11E-3	7.11E-4
Gas Waste Storage Vault	Ramsdell	5.11E-4	2.15E-4	1.65E-4	1.14E-4
	Murphy-Campe	2.03E-2	1.51E-2	5.99E-3	1.32E-3

TABLE 2 DESIGN BASIS ACCIDENT X/Q VALUES (sec/m3) FOR SELECTED
BVPS PLANT VENTS TO THE COMMON CONTROL ROOM INTAKE - UNIT 2

Release Point Methodology 0-8 hr 8-24 hr 1-4 day 4-30 day

Containment Edge	Ramsdell	1.88E-4	9.32E-5	7.06E-5	4.18E-5
	Murphy-Campe	4.16E-3	2.81E-3	1.09E-3	1.58E-4
Containment Top	Ramsdell	1.20E-4	5.91E-5	4.45E-5	2.64E-5
	Murphy-Campe	3.65E-3	2.47E-3	9.56E-4	1.39E-4
Auxiliary Building	Ramsdell	1.04E-3	5.15E-4	4.04E-4	2.46E-4
	Murphy-Campe	1.33E-2	9.30E-3	3.94E-3	1.20E-3
Main Steamvalve	Ramsdell	1.59E-4	7.86E-5	5.96E-5	3.76E-5
	Murphy-Campe	7.75E-3	5.63E-3	1.99E-3	3.26E-4
Service Building	Ramsdell	2.21E-4	1.11E-4	8.51E-5	5.17E-5
	Murphy-Campe	5.42E-3	3.62E-3	1.43E-3	3.31E-4
Turbine Building	Ramsdell	2.72E-4	1.43E-4	1.10E-4	6.30E-5
	Murphy-Campe	6.46E-3	4.90E-3	2.00E-3	5.75E-4
Gas Waste Storage Vault	Ramsdell	1.74E-3	9.06E-4	7.69E-4	5.55E-4
	Murphy-Campe	1.23E-1	1.04E-1	5.08E-2	2.00E-2

ATTACHMENT B

Beaver Valley Power Station, Unit No.2

Additional Information - Proposed Technical Specification Change No. 57

Information copy of the UFSAR changes
to address the radiological
consequences of a locked rotor accident

of a HEPA filter and carbon adsorber with effective iodine removal efficiency of 93 percent. These emergency supply filtration units and associated air handling equipment are designed to Seismic Category 1 and Safety Class 3 requirements.

A control room air manifold system which consists of flexible hose connections to air storage bottles is provided to ensure chlorine-free air for up to six (6) hours. The manifold system is located within the common control room and is provided with sufficient lengths of flexible hoses to reach all vital areas of the common control room.

In addition, a sufficient quantity of portable self-contained breathing apparatus and protective clothing are provided for the operators who are located in the control room. This equipment is located in the locker rooms near the control room.

The evaluation of radiation exposure to personnel in the main control room envelope examined the contribution from the four LOCA sources defined in Section 6.4.2.5. In addition, the inhalation dose from inleakage into the main control room of radionuclides in the external cloud was also examined for each of the DBAs considered in Chapter 15. Dose calculations are based on the source terms and pertinent parameters defined in Chapter 15 for each DBA, the flux-to-dose conversion factors given in Table 6.4-2 and the appropriate inhalation dose conversion factors described in TID 14844 by Di Nunno (et al 1962).

The limiting design basis accident for the main control room personnel whole body gamma and beta skin dose is the LOCA. The small line break outside containment (SLB) is the limiting DBA for the thyroid dose.

Exposure from inhalation is principally attributable to airborne radioactivity in the main control room envelope due to:

1. Intake prior to main control room isolation,
2. Inleakage during main control room isolation, or
3. Post-isolation ventilation intake.

AND THE LOCKED ROTOR
ACCIDENT (LRA)

The CIB signal isolates the control room almost immediately after a LOCA. For DBAs that do not cause a CIB signal, control room isolation is initiated by a high radiation signal from redundant Category 1 area monitors centrally located in the BVPS-2 control room except for the main steamline break (MSLB) which does not initiate a high radiation signal. For the MSLB, manual operator action by $t=30$ min post-accident is needed to maintain habitability.

AND THE LOCKED ROTOR ACCIDENT

The analyses considers a conservative selection of parameters to calculate the thyroid dose. Ventilation intake prior to control room

isolation and an assumed 10 cfm unfiltered inleakage are the main contributors to the thyroid dose. The maximum normal ventilation intake rate of 500 cfm (for both BVPS-1 and BVPS-2 intakes) prior to isolation and an minimum clean up rate of 690 cfm post-isolation are used to maximize the dose estimate. The post-isolation clean-up rate is based on BVPS-1 control room pressurization test data adjusted for the combined control room volume. The analysis also assumes coincident loss of offsite power.

For Condition IV DBAs which do not initiate a CIB signal, the accident duration is 8 hours (except for the fuel handling accident (FHA) for which releases are assumed to continue over a 30-day period). Control room doses for those DBAs that do not initiate a CIB signal (except for the FHA) are therefore based on purging the control room 8 hours after accident initiation.

The information and data required to develop the radiological consequences for the main control room are presented in the respective sections describing the design basis accident analysis.

The main control room dose presented in Table 15.0-13 has been calculated to be less than the limit specified in General Design Criterion 19 and the main control room may, therefore, be safely occupied during any condition of operation.

6.4.4.3 Toxic Gas Protection

The main control room design provides protection of the personnel in the main control room from any toxic effects from spills of chemicals stored onsite. The effects of spills of chemicals along transportation routes are evaluated in Section 2.2.3.

In the event of a toxic gas release, main control room habitability is maintained by isolating the air intake, recirculating air conditioned air, and by maintaining a positive pressure using compressed air for 1 hour, after which, the main control room will remain isolated for the duration of the accident.

Redundant, sensitive, and automatic Seismic Category I detection and isolation equipment is provided for the detection of chlorine gas.

The storage areas of toxic gases and chemicals that could produce toxic gases are shown in Table 6.4-3 and on Figure 6.4-5.

6.4.5 Inspection and Testing Requirements

The major items of equipment that maintain the habitability of the main control room are the emergency supply filtration units, their fans,

~~6.4.8a~~

- PROPOSED -

AND THE LOCKED ROOM ACCIDENT (LRA)

15.0.9.2 Activities in the Fuel Pellet Clad Gap

For accident analysis, the core gap activities are based on the guidance provided in Regulatory Guides 1.25 and 1.27. The noble gas and iodine inventory in the fuel gap region is assumed to be 10 percent (30 percent for Kr-85 and 12 percent for I-131) for the fuel handling accident of the core inventory. The values are presented in Table 15.0-7.

AND THE LOCKED ROTOR ACCIDENT

~~15.0-11a~~

- PROPOSED -

the environment resulting from each accident are presented in the respective sections.

Accident atmospheric dispersion coefficients (X/Q) for the exclusion area boundary and low population zone were used to calculate the potential offsite doses. The 0.5 percent sector-dependent X/Q values, presented in Table 15.0-11, were determined as described in Section 2.3.4. Main control room X/Q values for the LOCA are also given in Table 15.0-11.

The atmospheric releases given in each accident section are used in conjunction with the appropriate X/Q values of Table 15.0-11 to calculate the potential offsite doses for the corresponding accidents and the potential control room dose due to a LOCA. The methodology for determining the doses is discussed in Appendix 15A. The resulting EAB and LPZ doses are presented in Table 15.0-12 for all postulated accidents. The potential dose to main control room personnel due to a LOCA is presented in Table 15.0-13.

For all cases the potential offsite doses are within the limits of 10 CFR 100, while the potential doses for the main control room due to a LOCA are within the limits of GDC 19 of Appendix A to 10 CFR 50.

15.0.13 References for Section 15.0

Bordelon F.M. et al 1974a. SATAN-VI Program: Comprehensive Space Time Dependent Analysis of Loss-of-Coolant. WCAP-8302 (Proprietary) and WCAP-8306.

Bordelon F.M. et al 1974b. LOCTA-IV Program: Loss-of-Coolant Transient Analysis. WCAP-8305.

Burnett, T.W.T. et al 1972. LOFTRAN Code Description. WCAP-7907, June 1972. (Also supplementary information in letter from T.M. Anderson, NS-TMS-1802, May 26, 1978 and NS-TMS-1824, June 16, 1978.)

Hunin C. 1972. FACTRAN, A FORTRAN IV Code Thermal Transients in a UO_2 Fuel Rod. WCAP-7908.

Risher, Jr. D.H. and Barry R.F. 1975. TWINKLE - A Multi-Dimensional Neutron Kinetics Computer Code. WCAP-7979-P-A (Proprietary) and WCAP-8028-A, (Non-Proprietary).

U.S. Nuclear Regulatory Commission (USNRC) 1972. Assumptions Used for Evaluating the Potential Radiological Consequence of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors. Safety Guide 25.

USNRC 1974. Assumption Used for Evaluating a Control Rod Ejection Accident for Pressurized Water Reactors. Regulatory Guide 1.77.

⊙ INSERT
(ATTACHED)

~~15.0-15~~

- PROPOSED -

PROPOSED INSERT FOR PAGE 150-15 REFERENCE
SECTION

DURANKO, M.P. 1991. OFFSITE DOSE CONSEQUENCES
OF A LOCKED ROTOR ACCIDENT AT UNIT 2 WITH 17%
FAILED FUEL, ERS-MPD-91-022.

DURANKO, M.P. 1991. ASSESSMENT OF THE DOSES IN
THE UNIT 2 CONTROL ROOM DUE TO A LOCKED ROTOR
ACCIDENT AT UNIT 2 ASSUMING 18% FAILED
FUEL.

-PROPOSED-

BVPS-2 UFSAR

TABLE 15.0-12

POTENTIAL DOSES DUE TO POSTULATED ACCIDENTS
(Rem)

Postulated Accident	FSAR Section	Exclusion Area Boundary			Low Population Zone*		
		Thyroid	Whole Body Gamma	Beta Skin	Thyroid	Whole Body Gamma	Beta Skin
Main steam line break	15.1.5						
Pre-accident iodine spike		10.5	1.2×10^{-2}	4.6×10^{-3}	1.5	1.4×10^{-3}	1×10^{-4}
Concurrent iodine spike		9.1	2.2×10^{-2}	6.7×10^{-3}	3.2	6.8×10^{-3}	2.2×10^{-3}
Loss of nonemergency ac power to the station auxiliaries	15.2.6	1.5×10^{-1}	5.2×10^{-4}	4.1×10^{-4}	2.1×10^{-2}	6.5×10^{-5}	6.8×10^{-5}
Locked rotor	15.3.3	<u>3.25E+1</u>	<u>3.41</u>	<u>2.09</u>	<u>1.44E+1</u>	<u>3.48E-1</u>	<u>2.17E-1</u>
Rod ejection	15.4.8	2.6×10^{-1}	9.8×10^{-4}	5.2×10^{-4}	1.7×10^{-1}	4.2×10^{-4}	1.7×10^{-4}
Containment leakage Secondary side		4.1×10^{-1}	1.9×10^{-1}	6.5×10^{-2}	2.0	9.2×10^{-3}	3.2×10^{-3}
Small line break - loss-of- coolant	15.6.2	1.6×10^{-1}	7.0×10^{-2}	2.4×10^{-2}	8.2×10^{-1}	3.4×10^{-3}	1.2×10^{-3}
Steam generator tube rupture	15.6.3						
Pre-accident iodine spike		11.7	6.8×10^{-2}	5.2×10^{-2}	1.0	3.6×10^{-3}	2.7×10^{-3}
Concurrent iodine spike		6.0	7.3×10^{-2}	5.2×10^{-2}	1.0	4.6×10^{-3}	3.0×10^{-3}
Loss-of-coolant Containment leakage ECCS leakage	15.6.5	2.7×10^{-2}	5.3	2.5	1.3×10^{-1}	2.6×10^{-1}	1.2×10^{-1}
Waste gas system rupture	15.7.1						
Line rupture		-	3.1×10^{-1}	1.9×10^{-1}			
Tank rupture		-	1.6×10^{-1}	1.5			
Fuel handling	15.7.4	2.9×10^{-1}	2.33	6.58	1.4	1.1×10^{-1}	3.2×10^{-1}

NOTE:

*For duration of accident

2. Locked Rotor with Two Loops Operating

The transient results for this case are shown on Figure 15.3-21 through 15.3-24. The results of these calculations are also summarized in Table 15.3-2. The peak RCS pressure is slightly higher than for the previous case, but is still less than that which would cause stresses to exceed the faulted condition stress limits. The cladding temperature transient is still well below the 2,700°F limit.

3. Locked Rotor with Three Loops Operating, Loss of Power to the Remaining Pumps

The transient results for this case are shown on Figures 15.3-17 through 15.3-20. The results of these calculations are summarized in Table 15.3-2b. The peak RCS pressure reached during the transient is less than that which would cause stresses to exceed the faulted condition stress limits. Also, the peak cladding surface temperature is considerably less than 2,700°F. Both the peak RCS pressure and the peak cladding surface temperature for this case are similar to the 3-loop transient with power available as discussed on the previous page.

The calculated sequence of events for the three cases analyzed is shown in Table 15.3-1. Figures 15.3-17 and 15.3-21 show that the core flow reaches a new equilibrium value by 10 seconds. With the reactor tripped, a stable plant condition will eventually be attained. Normal plant shutdown may then proceed.

Following reactor trip, Beaver Valley Power Station - Unit 2 (BVPS-2) will approach a stabilized condition at hot standby; normal plant operating procedures may then be followed to maintain a hot condition or to cool the plant to cold shutdown. The operating procedures would call for operator action to control RCS boron concentration and pressurizer level using the CVCS, and to maintain steam generator level through control of the main feedwater system or AFWS. Any action required of the operator to maintain BVPS-2 in a stabilized condition will be in a time frame in excess of ten minutes following reactor trip.

ASSUMING 100% FAILED FUEL

15.3.3.3 Radiological Consequences

The radiological consequences of a postulated locked rotor accident are analyzed ~~with the primary and secondary coolant concentrations assumed to be at Technical Specification limits. The primary to secondary system leakage rate is at the Technical Specification value of 1 gpm. No gap activity is assumed to be released into the primary coolant since there is no fuel failure postulated.~~ The primary coolant and secondary side iodine and noble gas concentrations are presented in Table 15.0-8.

15.3-10

PRIOR TO THE START OF
THE ACCIDENT

— PROPOSED —

BVPS-2 UFSAR

TABLE 15.3-3

PARAMETERS USED FOR THE LOCKED
ROTOR ACCIDENT

<u>Parameter</u>	<u>Expected</u>	<u>Technical Specification</u>
Power (MWt)	2,766	2,766
Fraction of fuel with defects PRIOR TO ACCIDENTS	0.0012	.0026
Primary coolant concentrations PRIOR TO ACCIDENTS	Table 11.1-2	Table 15.0-8
Secondary coolant concentrations PRIOR TO ACCIDENTS	Table 11.1-6	Table 15.0-8
Primary to secondary leak rate (gpm)	0.009	1.0
Iodine partition factor in all steam generators prior to and during the accident	0.01	0.01
Duration of plant cooldown by secondary system after accident (hr)	8	8
Steam release from steam generators (lb)		
0-2 hr	443,878	443,878
2-8 hr	793,664	793,664
Feedwater flow to steam generators (lb)		
0-2 hr	527,063	527,063
2-8 hr	874,470	874,470
Steam generator fluid content/SG (lb)		
Liquid	99,300	99,300
Steam	8,700	8,700
Concurrent iodine spiking		
Release rates into primary coolant	Table 15.0-10	Table 15.0-10
Duration (hr)	4	4

- 1 of 1 -

- PROPOSED -

TABLE 15.3-4

LOCKED ROTOR ACCIDENT RELEASES
TO THE ENVIRONMENT

Nuclide	Total Releases (Ci)	
	0-2 Hr	0-8 Hr
Kr-83m	3.60E+2	3.7x10 ⁻²
Kr-85m	1.11E+3	2.3x10 ⁻¹
Kr-85	8.88E+1	1.3
Kr-87	1.54E+3	8.7x10 ⁻²
Kr-88	2.80E+3	3.0x10 ⁻¹
Kr-89	1.79E+2	4.8x10 ⁻⁴
Xe-131m	1.80E+1	1.3x10 ⁻²
Xe-133m	1.57E+2	3.5x10 ⁻¹
Xe-133	6.82E+3	3.1
Xe-135m	3.31E+2	7.9x10 ⁻²
Xe-135	1.63E+3	3.7x10 ⁻¹
Xe-137	2.76E+2	9.2x10 ⁻⁴
Xe-138	1.02E+3	1.5x10 ⁻²
I-131	2.64E+1	2.2x10 ⁻¹
I-132	2.13E+1	3.3x10 ⁻¹
I-133	4.89E+1	3.5x10 ⁻¹
I-134	2.16E+1	9.1x10 ⁻²
I-135	3.89E+1	2.2x10 ⁻¹

1 of 1
— PROPOSED —