

**From:** Jason Schaperow *RES*  
**To:** George Hubbard  
**Date:** Thu, Jul 6, 2000 2:30 PM  
**Subject:** Spent Fuel Pool Accident Consequences

In our June 28 meeting, we agreed to provide tables of consequence results by July 7. This e-mail message forwards those tables. I am now directing my effort to preparing Appendix 4A to the Spent Fuel Pool Accident Risk Study.

**CC:** Charles Tinkler, John Flack, Mark Rubin

*I-96*

July 6, 2000

**Spent Fuel Pool Accident Consequences**

**Table 1 Representative Results  
(99.5% evacuation, Surry Population Density)**

Decay Time Prior to Accident	Mean Consequences (within 100 miles)		
	Early Fatalities	Societal Dose (person-rem)	Cancer Fatalities
30 days	1.75	$4.77 \times 10^6$	2,460
1 year	1.01	$4.54 \times 10^6$	2,320
1 year <sup>a</sup>	.0048	$4.18 \times 10^6$	1,990

<sup>a</sup> Based on evacuation before release.

**Table 2 Results of Ruthenium Release Sensitivities  
(99.5% evacuation)**

Case	Population Density <sup>b</sup>	Ruthenium release fraction	Mean Consequences (within 100 miles)		
			Prompt Fatalities	Societal Dose (person-rem)	Cancer Fatalities
Base Case	Surry	$2 \times 10^{-5}$	1.01	$4.54 \times 10^6$	2,320
11	Surry	1	95.3	$9.53 \times 10^6$	9,150
21	uniform	$2 \times 10^{-5}$	9.33	$5.05 \times 10^6$	2,490
22	uniform	1	134	$9.46 \times 10^6$	6,490
13 <sup>a</sup>	Surry	$2 \times 10^{-5}$	.0048	$4.18 \times 10^6$	1,990
14 <sup>a</sup>	Surry	1	.132	$6.75 \times 10^6$	6,300
15 <sup>a</sup>	uniform	$2 \times 10^{-5}$	.045	$4.65 \times 10^6$	2,170
16 <sup>a</sup>	uniform	1	.277	$6.38 \times 10^6$	4,940

<sup>a</sup>Based on evacuation before release.

<sup>b</sup>The uniform population density site has a population density of 100 people/mi<sup>2</sup> with an Exclusion Area Boundary of .75 miles.

**Table 3 Results of Release Fraction Sensitivities  
(99.5% evacuation, Surry Population Density)**

Case	Release Fraction							Mean Consequences (within 100 miles)		
	I,Cs	Ru	Te	Ba	Sr	Ce	La	Early Fatalities	Societal Dose (person-rem)	Cancer Fatalities
Base	1	2x10 <sup>-5</sup>	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	1.01	4.54x10 <sup>6</sup>	2,320
11	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	95.3	9.53x10 <sup>6</sup>	9,150
96	1	1	.02	.01	.01	.01	.01	106	1.33x10 <sup>7</sup>	11,700
95	.75	.75	.02	.01	.01	.01	.01	57.0	1.17x10 <sup>7</sup>	10,400
94	.75	.75	.02	.002	.002	.001	.001	50.2	8.35x10 <sup>6</sup>	7,850
14 <sup>a</sup>	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	.132	6.75x10 <sup>6</sup>	6,300
97 <sup>a</sup>	1	1	.02	.01	.01	.01	.01	.154	8.74x10 <sup>6</sup>	7,990

<sup>a</sup>Based on evacuation before release.

**Table 4 Results of Release Fraction Sensitivities  
(95% evacuation, Surry Population Density)**

Case	Release Fraction							Mean Consequences (within 100 miles)		
	I,Cs	Ru	Te	Ba	Sr	Ce	La	Early Fatalities	Societal Dose (person-rem)	Cancer Fatalities
1	1	2x10 <sup>-5</sup>	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	1.01	4.54x10 <sup>6</sup>	2,320
45	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	92.2	9.50x10 <sup>6</sup>	9,150
45a	1	1	.02	.01	.01	.01	.01	103	1.33x10 <sup>7</sup>	11,700
45b	.75	.75	.02	.01	.01	.01	.01	54.9	1.17x10 <sup>7</sup>	10,300
46 <sup>a</sup>	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	1.32	6.84x10 <sup>6</sup>	6,430
46a <sup>a</sup>	1	1	.02	.01	.01	.01	.01	1.54	8.89x10 <sup>6</sup>	8,160
46b <sup>a</sup>	.75	.75	.02	.01	.01	.01	.01	.543	7.94x10 <sup>6</sup>	6,880
46c <sup>a</sup>	.75	.75	.75	.01	.01	.01	.01	.544	7.94x10 <sup>6</sup>	6,880
46d <sup>a</sup>	.75	.75	.75	.75	.01	.01	.01	.544	7.94x10 <sup>6</sup>	6,880
46e <sup>a</sup>	.75	.75	.75	.75	.75	.01	.01	.644	1.01x10 <sup>7</sup>	8,350

<sup>a</sup>Based on evacuation before release.

**Table 5 Sensitivities on Amount of Fuel Assemblies Releasing Fission Products  
(99.5% evacuation)**

Case	Population Density	Ruthenium Release Fraction	# of cores	Mean Consequences (within 100 miles)		
				Prompt Fatalities	Societal Dose (person-rem)	Cancer Fatalities
Base Case	Surry	$2 \times 10^{-5}$	3.5	1.01	$4.54 \times 10^6$	2,320
31	Surry	$2 \times 10^{-5}$	1	.014	$3.23 \times 10^6$	1,530
11	Surry	1	3.5	95.3	$9.53 \times 10^6$	9,150
32	Surry	1	1	50.5	$7.25 \times 10^6$	7,360
21	uniform	$2 \times 10^{-5}$	3.5	9.33	$5.05 \times 10^6$	2,490
33	uniform	$2 \times 10^{-5}$	1	.177	$3.10 \times 10^6$	1,480
22	uniform	1	3.5	134	$9.46 \times 10^6$	6,490
34	uniform	1	1	103	$6.59 \times 10^6$	4,960

**Table 6 Results of Plume Energy Sensitivities  
(95% evacuation, Surry Population Density)**

Case	Release Fraction							Plume Energy (MW)	Mean Consequences (within 100 miles)		
	I,Cs	Ru	Te	Ba	Sr	Ce	La		Early Fatalities	Societal Dose (person-rem)	Cancer Fatalities
1	1	2x10 <sup>-5</sup>	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	3.7	1.01	4.54x10 <sup>6</sup>	2,320
45	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	3.7	92.2	9.50x10 <sup>6</sup>	9,150
47	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	83.0	57.3	9.24x10 <sup>6</sup>	9,280
49	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	256.0	18.3	8.24x10 <sup>6</sup>	8,380
46 <sup>a</sup>	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	3.7	1.32	6.84x10 <sup>6</sup>	6,430
48 <del>46a<sup>a</sup></del>	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	83.0	.00509	7.28x10 <sup>6</sup>	7,060
50 <del>46b<sup>a</sup></del>	1	1	.02	.002	.002	1x10 <sup>-6</sup>	1x10 <sup>-6</sup>	256.0	.00357	6.96x10 <sup>6</sup>	6,650

<sup>a</sup>Based on evacuation before release.

**Table 7 Results of Plume-Spreading Model Sensitivity  
(99.5% evacuation, Surry Population Density)**

Plume-Spreading Model	Point in Distribution	Early Fatalities	Societal Dose (rem)	Cancer Fatalities
default	not applicable	95.3	$9.53 \times 10^6$	9,150
NUREG/CR-6244	10 <sup>th</sup> percentile	.527	$9.04 \times 10^6$	8,343
	50 <sup>th</sup> percentile	8.89	$1.26 \times 10^7$	10,100
	mean	54.1	$1.28 \times 10^7$	10,100
	90 <sup>th</sup> percentile	171	$1.66 \times 10^7$	11,900

**Table 8 Results of Plume-Spreading Model Sensitivity - Evacuation Before Release  
(99.5% evacuation, Surry Population Density)**

Plume-Spreading Model	Point in Distribution	Early Fatalities	Societal Dose (rem)	Cancer Fatalities
default	not applicable	.132	$6.75 \times 10^6$	6,300
NUREG/CR-6244	10 <sup>th</sup> percentile	.00197	$7.00 \times 10^6$	6,010
	50 <sup>th</sup> percentile	.00855	$1.03 \times 10^7$	7,730
	mean	.118	$1.07 \times 10^7$	7,810
	90 <sup>th</sup> percentile	.0637	$1.46 \times 10^7$	9,590