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To: George Hubbard , *NPR*
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

R/11/0

March 5, 2001

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	4.77×10^6	2,460
1 year	1.01	4.54×10^6	2,320
1 year ^a	.0048	4.18×10^6	1,990

^a Based on evacuation before release.

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

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

^aBased on evacuation before release.

^bThe uniform population density site has a population density of 100 people/mi² 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 ⁻⁵	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	1.01	4.54x10 ⁶	2,320
11	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	95.3	9.53x10 ⁶	9,150
96	1	1	.02	.01	.01	.01	.01	106	1.33x10 ⁷	11,700
95	.75	.75	.02	.01	.01	.01	.01	57.0	1.17x10 ⁷	10,400
94	.75	.75	.02	.002	.002	.001	.001	50.2	8.35x10 ⁶	7,850
14 ^a	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	.132	6.75x10 ⁶	6,300
97 ^a	1	1	.02	.01	.01	.01	.01	.154	8.74x10 ⁶	7,990

^aBased 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 ⁻⁵	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	1.01	4.54x10 ⁶	2,320
45	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	92.2	9.50x10 ⁶	9,150
45a	1	1	.02	.01	.01	.01	.01	103	1.33x10 ⁷	11,700
45b	.75	.75	.02	.01	.01	.01	.01	54.9	1.17x10 ⁷	10,300
46 ^a	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	1.32	6.84x10 ⁶	6,430
46a ^a	1	1	.02	.01	.01	.01	.01	1.54	8.89x10 ⁶	8,160
46b ^a	.75	.75	.02	.01	.01	.01	.01	.543	7.94x10 ⁶	6,880
46c ^a	.75	.75	.75	.01	.01	.01	.01	.544	7.94x10 ⁶	6,880
46d ^a	.75	.75	.75	.75	.01	.01	.01	.544	7.94x10 ⁶	6,880
46e ^a	.75	.75	.75	.75	.75	.01	.01	.644	1.01x10 ⁷	8,350

^aBased 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	2×10^{-5}	3.5	1.01	4.54×10^6	2,320
31	Surry	2×10^{-5}	1	.014	3.23×10^6	1,530
11	Surry	1	3.5	95.3	9.53×10^6	9,150
32	Surry	1	1	50.5	7.25×10^6	7,360
21	uniform	2×10^{-5}	3.5	9.33	5.05×10^6	2,490
33	uniform	2×10^{-5}	1	.177	3.10×10^6	1,480
22	uniform	1	3.5	134	9.46×10^6	6,490
34	uniform	1	1	103	6.59×10^6	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 ⁻⁵	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	3.7	1.01	4.54x10 ⁶	2,320
45	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	3.7	92.2	9.50x10 ⁶	9,150
47	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	83.0	57.3	9.24x10 ⁶	9,280
49	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	256.0	18.3	8.24x10 ⁶	8,380
46 ^a	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	3.7	1.32	6.84x10 ⁶	6,430
46a ^a	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	83.0	.00509	7.28x10 ⁶	7,060
46b ^a	1	1	.02	.002	.002	1x10 ⁻⁶	1x10 ⁻⁶	256.0	.00357	6.96x10 ⁶	6,650

^aBased 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	9.53×10^6	9,150
NUREG/CR-6244	10 th percentile	.527	9.04×10^6	8,343
	50 th percentile	8.89	1.26×10^7	10,100
	mean	54.1	1.28×10^7	10,100
	90 th percentile	171	1.66×10^7	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	6.75×10^6	6,300
NUREG/CR-6244	10 th percentile	.00197	7.00×10^6	6,010
	50 th percentile	.00855	1.03×10^7	7,730
	mean	.118	1.07×10^7	7,810
	90 th percentile	.0637	1.46×10^7	9,590