Release Fractions

NUREG/CR-4982 also provided the fission product release fractions assumed for a severe spent fuel pool accident. These fission product release fractions are shown in Table 3. NUREG/CR-6451 provided an updated estimate of fission product release fractions. The release fractions in NUREG/CR-6451 (also shown in Table 3) are the same as those in NUREG/CR-4982, with the exception of lanthanum and cerium. NUREG/CR-6451 stated that the release fraction of lanthanum and cerium should be increased from $1x10^{-6}$ in NUREG/CR-4982 to $6x10^{-6}$, because fuel fines could be released offsite from fuel with high burnup. While RES believes that it is unlikely that fuel fines would be released offsite in any substantial amount, a sensitivity was performed using a release fraction of $6x10^{-6}$ for lanthanum and cerium to determine whether such an increase could even impact offsite consequences.

Radionuclide Group	Release Fractions	
	NUREG/CR-4982	NUREG/CR-6451
noble gases	1	1
iodine	1	1
cesium	1	1
tellurium	$2x10^{-2}$	$2x10^{-2}$
strontium	$2x10^{-3}$	$2x10^{-3}$
ruthenium	$2x10^{-5}$	$2x10^{-5}$
lanthanum	$1x10^{-6}$	$6x10^{-6}$
cerium	$1x10^{-6}$	$6x10^{-6}$
barium	$2x10^{-3}$	$2x10^{-3}$

Table 3. Release fractions for a severe spent fuel pool accident.

Modeling of Emergency Response Actions and Other Areas

Modeling of emergency response actions was essentially the same as that used for Surry in NUREG-1150. The timing of events is given in Table 4. Evacuation begins exactly two hours after emergency response officials receive notification to take protective measures. This results in the evacuation beginning approximately .8 hours after the offsite release ends. Only people within 10 miles of the spent fuel pool evacuate, and, of those people, .5% do not evacuate. Details of the evacuation modeling are given in Table 5.

People outside of 10 miles are relocated to uncontaminated areas after a specified period of time depending on the dose they are projected to receive in the first week. There are two relocation criteria. The first criterion is that, if the dose to an individual is projected to be greater that 50 rem in one week, then the individual is relocated outside of the affected area after 12

3/31/00

Look at impact of 1 year half-life of Ru-106 on SFP consequences.

Cases 32 + 34

At 1 year ⇒ 4.59×10^{17} Bq Ru-106

Run Cases 32x and 34x with 2.30×10^{17} Bq Ru-106

		Early Fatalities	
Surry (late evacuation)	3.5 cores @ 1yr	95.3	
	1 core @ 1 year	50.5	
	1 core @ 2 years	7.7	← Case 32x
	1 core (no Ru) @ 1 year	.014	
100 people/mile² (late evacuation)	3.5 cores @ 1yr	134	
	1 core @ 1yr	103	
	1 core @ 2yrs	41	← Case 34x
	1 core (no Ru) @ 1 year	.177	

4/5/00

We looked at early evacuation, because spent fuel pool accidents are slowly evolving accidents.

Ba Ba-140 has a 13 day half-life
Mo Mo-99 has a 3 day half-life

Are largely influenced by the long term relocation criterion which is the same in all of the calcs shown here.
Our relocation assumptions are the same as those used in NUREG-1150.

Are influenced by the higher inventory as well as the early and late relocation criteria.
Our relocation assumptions are the same as those used in NUREG-1150.