

#### 4. TRANSPORTATION OF LIQUID RADIOACTIVE WASTE

Liquid radioactive waste generated in the process development facilities of the Savannah River Laboratory is collected in small hold tanks at SRL for weekly shipments to 200-F Area. A trailer-mounted shielded tank is used to transport the waste over plant roads. The transfer operation includes precautions to minimize an accident in transit. The heavily shielded tank truck is driven at speeds less than 20 mph with an escort. Only experienced heavy equipment operators are used in transfer operations.

An analysis of an extreme case is presented to illustrate the maximum potential dose that could be associated with an on-plant transportation accident involving plant waste.

It is assumed that the trailer overturns on the bridge over Upper Three Runs, and an entire load of 4000 gallons of waste is emptied into the creek at a rate of 25 gpm. The waste is assumed to have the following quantities of radioactive materials:

$^{244}\text{Cm}$	73 Ci
$^{238,239}\text{Pu}$	23 Ci
$^{137}\text{Cs}$	27 Ci

Based on a flow of 200 ft<sup>3</sup>/sec, the concentration of the nuclides listed above in Upper Three Runs would be as follows:

<i>Nuclide</i>	<i>Concentration,</i> <i>μCi/ml</i>
$^{244}\text{Cm}$	0.0013
$^{238,239}\text{Pu}$	0.0004
$^{137}\text{Cs}$	0.0005

When diluted by the Savannah River with a nominal flow of 10,400 cfs, the concentrations would drop considerably as shown below.

Calculations have been made to determine the dose commitment to an individual who obtains drinking water from the Savannah River immediately downstream of Upper Three Runs during the period of the spill. These calculations are based on the following:

a. Concentrations of nuclides in the river:

<i>Nuclide</i>	<i>Concentration,</i> <i>μCi/ml</i>
$^{244}\text{Cm}$	0.000026
$^{238,239}\text{Pu}$	0.000008
$^{137}\text{Cs}$	0.000010

- b. Consumption of water = 1200 ml/day/person.
- c. Duration of contamination = 3 hr.
- d. No extraction of nuclides by filtration, flocculation, or adsorption in streambeds.
- e. All nuclides are soluble and enter the metabolic process of the consumer.

The calculated maximum lifetime (70 yr) dose commitments are as follows:

<i>Nuclide</i>	<i>Dose, mrem</i>	
	<i>Whole Body</i>	<i>Bone</i>
<sup>244</sup> Cm	1.0	17.0
<sup>238,239</sup> Pu	0.24	10.3
<sup>137</sup> Cs	<u>0.70</u>	<u>-</u>
<i>Total</i>	1.94	27.3