

modification of the Order addresses the revisions to the table in Condition 1, to include criticality-based concentration limits without magnesium oxide. Phase two will be subject to a separate evaluation and revision of the Order.

A principal emphasis of 10 CFR part 70 is criticality safety and safeguarding SNM against diversion or sabotage. The staff considers that criticality safety can be maintained by relying on concentration limits, under the

conditions specified below. Safeguarding SNM against diversion or sabotage is not considered a significant issue because of the diffuse form of the SNM in waste meeting the conditions specified. These conditions are considered an acceptable alternative to the criticality definition provided in 10 CFR 150.11, thereby assuring the same level of protection. The staff reviewed safety aspects of the proposed action (*i.e.*, granting Envirocare's request) in

the Safety Evaluation Report, dated September 23, 2003. The staff concluded that additional conditions were required to maintain sufficient protection of health, safety, and the environment. The exemption conditions would be revised as follows:

1. Concentrations of SNM in individual waste containers must not exceed the following values at time of receipt:

Radionuclide	Maximum concentration with MgO (g SNM/g waste)	Maximum concentration without MgO (g SNM/g waste)
U-235 ^a	8.6E-4	9.9E-4
U-235 ^b	5.4E-4	6.2E-4
U-235 ^c	1.2E-5	1.2E-5
U-235 ^d	3.1E-4	3.1E-4
U-235 ^e	7.3E-5	7.3E-5
U-233	7.7E-6	4.7E-4
Pu-239	1.6E-7	2.8E-4
Pu-241	3.5E-9	2.2E-4

^aFor uranium below 10 percent enrichment. Column 1 considers a maximum of 20 percent of the weight of the waste of materials listed in Condition 2. Column 2 considers that materials in condition 2 are not present in bulk quantities.

^bFor uranium at or above 10 percent enrichment. Column 1 considers a maximum of 20 percent of materials listed in Condition 2 of the weight of the waste of materials listed in Condition 2

^cFor uranium at any enrichment with unlimited quantities of materials listed in Conditions 2 and 3

^dFor uranium at any enrichment with sum of materials listed in Conditions 2 and 3 not exceeding 45 percent of the weight of the waste

^eFor uranium at any enrichment with unlimited MgO or beryllium

Plutonium isotopes other than Pu-239 and Pu-241 do not need to be considered in demonstrating

compliance with this condition. When mixtures of these SNM isotopes are present in the waste, the sum-of-the-

fractions rule, as illustrated below, should be used.

$$\frac{\text{U-233 conc}}{\text{U-233 limit}} + \frac{100\text{wt}\% \text{U-235 conc}}{100\text{wt}\% \text{U-235 limit}} + \frac{10\text{wt}\% \text{U-235 conc}}{10\text{wt}\% \text{U-235 limit}} + \frac{\text{Pu-239 conc}}{\text{Pu-239 limit}} + \frac{\text{Pu-241 conc}}{\text{Pu-241 limit}} \leq 1$$

The concentration values in Condition 1 are operational values to ensure criticality safety. Where the values in Condition 1 exceed concentration values in the corresponding conditions of the State of Utah Radioactive Material License (RML), the concentration values in the RML, which are averaged over the container, may not be exceeded. Higher concentration values are included in Condition 1 to be used in establishing the maximum mass of SNM for non-homogeneous solid waste and liquid waste. The measurement uncertainty values should be less than or equal to 15 percent of the concentration limit, and represent the maximum one-sigma uncertainty associated with the measurement of the concentration of the particular radionuclide.

The SNM must be homogeneously distributed throughout the waste. If the SNM is not homogeneously distributed, then the limiting concentrations must not be exceeded on average in any contiguous mass of 600 kilograms of waste.

2. Except as allowed by notes a, b, c, and d in Condition 1, waste must not contain "pure forms" of chemicals containing carbon, fluorine, magnesium, or bismuth in bulk quantities (*e.g.*, a pallet of drums, a B-25 box). By "pure forms," it is meant that mixtures of the above elements such as magnesium oxide, magnesium carbonate, magnesium fluoride, bismuth oxide, etc., do not contain other elements. These chemicals would be added to the waste stream during processing, such as at fuel facilities or treatment such as at mixed waste treatment facilities. The presence of the above materials will be determined by the generator, based on process knowledge or testing.

3. Except as allowed by notes c, d, and e in Condition 1, waste accepted must not contain total quantities of beryllium, hydrogenous material enriched in deuterium, or graphite above one percent of the total weight of the waste. The presence of the above materials will be determined by the generator, based on process knowledge, physical observations, or testing.

4. Waste packages must not contain highly water soluble forms of uranium greater than 350 grams of uranium-235 or 200 grams of uranium-233. The sum of the fractions rule will apply for mixtures of U-233 and U-235. Highly soluble forms of uranium include, but are not limited to: uranium sulfate, uranyl acetate, uranyl chloride, uranyl formate, uranyl fluoride, uranyl nitrate, uranyl potassium carbonate, and uranyl sulfate. The presence of the above materials will be determined by the generator, based on process knowledge or testing.

5. Waste processing of waste containing SNM will be limited to stabilization (mixing waste with reagents), micro-encapsulation, macro-encapsulation using low-density and high-density polyethylene and thermal desorption.

When waste is processed using the thermal desorption process, Envirocare shall confirm the SNM concentration following processing and prior to returning the waste to temporary storage.