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## Nuclear Information and Resource Service

1616 P Street, N.W., Suite 160, Washington, D.C. 20036 (202) 328-0002

June 27, 1987

Secretary  
US NRC  
Washington, DC 20555

Dear Secretary Chalk:

Enclosed are the comments of the Nuclear Information and Resource Service on the Definition of "High-Level Radioactive Waste" advance notice of proposed rulemaking published in the Federal Register February 27, 1987, 52 FR 39:5992.

Sincerely,

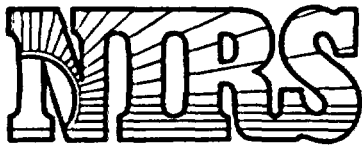
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Acknowledged by card



## **Nuclear Information and Resource Service**

1616 P Street, N.W., Suite 160, Washington, D.C. 20036 (202) 328-0002

**Comments on Nuclear Regulatory Commission 10 CFR Part 60  
Advance Notice of Proposed Rulemaking  
Definition of "High-Level Radioactive Waste"**

**Nuclear Information and Resource Service  
Diane D'Arrigo  
June 27, 1987**

### **Keep All Waste Currently Considered "High-Level" in that Category**

"High-Level Radioactive Waste" should continue to encompass irradiated reactor fuel, liquid and sludge from reprocessing that fuel, the solid that is intended to result from the solidification of the reprocessing liquid and sludge. No waste that is currently considered "high-level" under any of the various regulatory and legislative definitions should be recategorized as less than "high-level."

### **Redefine Some "Low-Level" Waste as "High-Level"**

"High-level radioactive waste" should include some of what is currently considered "low-level radioactive waste." Waste Greater-Than-Class-C (GTCC) is one obvious portion of the "low-level" waste stream that should be in the "high-level" category. GTCC is currently a federal responsibility and some preliminary planning to accept it at the federal high-level waste repository has begun.

Any material which will remain hazardous for longer than 100 years "requires permanent isolation" from the environment. Thus, there are portions of classes A, B, and C that need to be reclassified as "high-level." The long-lived portion of these wastes account for a relatively small volume of the entire "low-level" waste volume thus could practically be treated as "high-level" waste.

**"High-Level" Waste Should Include ALL Waste That Is EITHER Long-Lived OR Intensely Radioactive OR Both.**

NRC should change its requirement that "high-level" waste must be both long-lived AND intensely radioactive (requiring permanent isolation and containing fission products in sufficient concentrations). Either one of these criteria alone is sufficient to deem the waste "high-level."

Waste that will remain hazardous for three hundred years is considered "short-lived" according to the NRC. Since the capability to isolate waste from the environment for even 20 years has not been demonstrated, we should not presume to be able to engineer structures, especially below ground structures, that will last hundreds of years or thousands of years. We should put forth a major effort to develop the technology to isolate waste for as long as it is radioactive and until such technology is proven, maintain waste under human institutional control, and minimize its production. It is preposterous to assume we can engineer a facility for 300 to 600 years and another for 10,000 to 100,000 years when the best efforts to isolate "low-level" waste have been largely unsuccessful in less than 20 years.

#### **Prohibit Waste Separation to Avoid "High-Level" Classification**

Wastes that contain both long-lived and highly radioactive components should not be chemically separated, to allow each of the components to be excluded from the "high-level" category. The process of separation will generate more waste. The wastes should be treated to guarantee the isolation of the longest-lived and most intensely radioactive components. It is generally true that individual radionuclides are either long-lived (half-lives in the thousands of years) or intensely radioactive. Thus, few radionuclides would fit the NRC's current requirements for "high-level" by themselves. In combination, however, the requirement is met. This fact could encourage unnecessary separation of radionuclides for disposal as other than "high-level" waste. Either requirement alone should be sufficient criteria for classification as "high-level" waste. The concept of "long-lived" and "requiring permanent isolation" should be considered in practical terms, thereby including such elements as cesium-137 and strontium-90 as "high-level."

#### **Prohibit Dilution**

Furthermore, waste that is in the "high-level" category should not be diluted to allow its exclusion from that class. In the same vein, dilution should be prohibited to reduce any waste to a lower class -- GTCC to C, C to B, B to A, or "low-level" to "below regulatory concern."

Thus, waste requiring isolation from the environment for longer than 100 years belongs in a facility that will isolate it for that period. The only facility intended to do so in this country is the high-level radioactive waste repository. Plans must be made for that facility to accommodate the comparatively small volume of waste that is currently considered "low-level" which is hazardous longer than the institutional control period of "low-level" waste dumps, 100 years. Redefining that waste as

"low-level" waste dumps, 100 years. Redefining that waste as "high-level" will clarify that it requires greater isolation than the rest of the "low-level" waste stream.

#### Examples of "Low-Level" Waste Needing Redefinition as "High-Level"

Activated Metals (contaminated with such long-lived activation products such as Niobium-94, Nickel-59, Nickel-63) from operation and decommissioning of nuclear reactors. For example: irradiated primary system components and piping, steam generators, core shroud, reactor internals, reactor vessel, control rods, crud, and irradiated fuel assembly hardware. Tanks containing high-level waste should also be considered "high-level" waste.

Cesium-137 and Strontium-90 -contaminated waste such as resins, sludges, evaporator bottoms, and filter cartridges from cleansing reactor and irradiated fuel pool water.

Materials bound to chelating agents will be especially problematic because the chelating agents may accelerate radionuclide migration from a "high-level" or "low-level" radioactive waste dump if burial is the chosen method. Until this problem is resolved, it is unacceptable to consider wastes bound to chelating agents as "low-level" waste.

#### Comments on Numerically Specifying Concentrations of Fission Products

1. One method of defining "high-level radioactive waste" would set numerical fission product concentration limits to separate high-level from "low-level" waste.

This method could allow some of what is now in the high-level waste category to be moved into the "low-level" category, depending on the numbers NRC chooses to adopt. NIRS opposes this method because it would use verbal gymnastics to reduce regulatory concern over a potentially large volume and number of curies. According to the Department of Energy's Waste Management Division, only two (2) of the 149 single shell tanks at Hanford would be considered "high-level" waste under the NRC's proposed definition. In addition to reducing the level of isolation required for the large number of curies in this waste, DOE would be relieved of the requirement to meet NRC regulatory requirements in dealing with this waste.

If this method is selected, the concentration limits must be set at a level that includes all wastes that are radioactive longer than "low-level" dumps are actively

maintained.

If irradiated fuel assemblies are disassembled for rod consolidation or reprocessing, the hardware that is removed should not be reclassified as "low-level" waste. It is currently considered high-level because it is part of the fuel assembly. This metal contains long-lived activation products which will be released into the environment as the metal rust and corrodes. It is less likely, also, that intruders will inadvertently find and reuse the metal if it is in a high-level repository.

If numerical concentration limits are set, they should be set low enough that long-lived materials now in the "low-level" category would be reclassified as high-level waste. The NRC should not consider the potentially greater up-front cost of managing high-level waste a deterrent to including more waste in that category.

Another concern is that waste generators will misuse set numerical limits by diluting high-level materials until they are below the concentration limit. Long-lived wastes could then be treated as "low-level" or "below regulatory concern." This is dangerous because it increases the number of curies that are less regulated and could be released into the environment.

2. The second method of defining "high-level radioactive waste" would accept the current concept of high-level waste (irradiated fuel, liquid and sludge from reprocessing, solidified reprocessing waste). This method would assume that all of this traditional high-level waste contains fission products in "sufficient concentrations" to "require permanent isolation."

NRC suggests that if the second method is adopted, some material will remain in the high-level category unnecessarily. It is NIRS belief that these wastes should continue to be classified as "high-level," NRC-regulated, and a federal responsibility.

Concerned citizens and states have argued that this method leaves out wastes that should be included in the high-level waste category, as described in these comments under "Redefine Some 'Low-Level' Waste as 'High-Level.'"

#### Comments on NRC's "High-Level" Waste Criteria

"Fission products in sufficient concentrations" should mean any concentrations that will be radioactive longer than "low-level" repositories can guarantee isolation, the active control period of "low-level" waste repositories. Likewise, waste "requiring

permanent isolation" should be any waste that is radioactive longer than it can be actively maintained by human institutions.

A serious problem with both of the NRC's definitions is that they require all high-level wastes to be both long-lived (thousands of years hazardous life) AND intensely radioactive. Intensely radioactive materials such as Cesium-137 (half-life 30 years) and Strontium-90 (half-life 28 years) are not considered high-level waste even though they require isolation for hundreds of years. Either one of these characteristics alone, highly radioactive or long-lived, should be sufficient for waste to be considered high-level and therefore, require permanent isolation.

### State Responsibilities

States are responsible for most commercial "low-level" radioactive waste generated within their boundaries. "Low-level" waste is any radioactive waste that is not high-level or above a debatable transuranic concentration. The "low-level" category is divided into Classes A, B, C, and Above Class C, based on the concentration of radioactive elements. Class A, the least concentrated, contains the same very long-lived and highly toxic materials as Classes B, C, Above Class C, and as High Level Radioactive Waste, but in lower concentrations.

The 1985 Low-Level Radioactive Waste Policy Amendments Act (Section 3) confirmed that states are responsible for Classes A, B, and C "low-level" waste but that the federal government will be responsible for the Above Class C "low-level" waste. As with high-level radioactive waste, the US Department of Energy, licensed by the Nuclear Regulatory Commission, is responsible for waste Above Class C.

If portions of the "low-level" waste category are redefined as high-level waste, states' responsibilities would be significantly reduced. This is justifiable because states have no authority over the production of the vast majority of the long-lived radioactive waste produced within their boundaries i.e. the waste generated by nuclear power plants which are federally licensed with minimal state approval or control. Most states are not able to effectively and economically isolate materials from the environment for hundreds to hundreds of thousands of years. Even the federal government has not succeeded -- many dumps have leaked in less than 20 years. A unified national effort is needed to completely isolate long-lived material from the environment with zero-leakage.

The institutional control period is the time when monitoring and some maintenance continue after a dump is no longer actively accepting radioactive waste. Even though wastes that are currently considered "low-level" contain long-lived radionuclides

such as Tritium (half-life=12.3 years), Cesium-137 (half-life=30 years), Strontium-90 (half-life=28 years), Niobium-94 (half-life=20,000 years), and Nickel-59 (half-life= 76,000 years), they are monitored for only 100 years. After that time the land legally can be returned to unrestricted use. It is feasible that our grandchildren could suffer directly from this plan, in the same way that people from Love Canal have.

If the NRC's "low-level" waste regulations are to be accepted, then the definition of what goes into a "low-level" waste facility must be limited to that which will be hazardous for less than 100 years. Since many "low-level" waste facilities have not isolated the waste from the environment for nearly as long as planned, it would be prudent to plan for several extra half-lives for the waste to completely decay before returning the site to unrestricted use.

It makes sense at this time to shift long-lived components of the "low-level" waste stream into the "high-level" category and consider each type based on its individual characteristics.

#### Potential State Responsibilities

If the US Department of Energy is successful in its attempts to sell or give nuclear wastes and byproduct material to private industry for commercial use, states will eventually have responsibility for that which is currently a federal responsibility.

#### Conclusion

1. All of the radioactive waste that is currently considered "high-level" should remain in that category.
2. Some of the radioactive waste currently considered "low-level" should be redefined as "high-level radioactive waste."
3. NRC should consider materials that are either long-lived or highly radioactive or both, "high-level radioactive waste." They should not need to be both.
4. Whether it is termed "high-level," "low-level," transuranic, or some other designation, all waste should be isolated for as long as it remains hazardous. Current law and regulations do not require all "high-level" waste to go to the high-level waste repository that may some day be established. Nor is it necessary that waste be classified as "high-level" in order to be placed there. It does seem logical, however to categorize all long-lived waste as high-level so as not to minimize its hazard.