



UNITED STATES  
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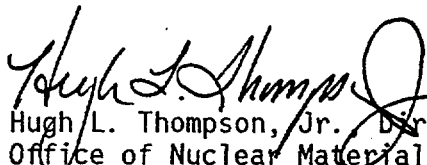
MAR 23 1988

MEMORANDUM FOR: Guy A. Arlotto, Director  
Division of Engineering  
Office of Nuclear Regulatory Research

FROM: Hugh L. Thompson, Jr., Director  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: PART 61 PROPOSED AMENDMENTS: ANALYSIS OF PUBLIC COMMENTS

Your memorandum of March 7, 1988 requested my comments/concurrence on the subject analysis of public comments. Enclosed you will find a rewritten version of your analysis, which has been coordinated with your staff. This rewritten version resolves the concerns of my staff, and I concur in its content.

  
Hugh L. Thompson, Jr., Director  
Office of Nuclear Material Safety  
and Safeguards

Enclosure:  
Rewritten version of  
Analysis of Public  
Comments.

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APPROPRIATENESS OF CLASS C LIMITS  
FOR DEFINING HIGHLY RADIOACTIVE MATERIAL

In the ANPR, the Commission used the Class C concentration limits of 10 CFR Part 61 to illustrate its conceptual definition of HLW, and requested comment on the appropriateness of those limits for identifying wastes to be classified as "highly radioactive." Some comments supported this general approach, but argued that additional technical support would be needed to determine whether the Class C limits are appropriate for identifying HLW. Other comments supported use of the Class C limits (or, in some cases, Class B limits), arguing that all wastes with concentrations greater than Class C (or Class B) should be classified as HLW. Opposition to use of the Class C limits generally fell into two categories: those who feel that there is inadequate technical support for use of the Class C limits to identify HLW, and those who feel more broadly that the Class C limits are inappropriate for their current use within Part 61.

The concern expressed about use of the Class C limits to define HLW is moot since the Commission is no longer proposing to develop a numerical definition of HLW. Instead, the proposed rule refers to methods of waste disposal without altering existing waste classifications.

The second category of comments urged the Commission to reclassify all current Class C wastes as HLW. Reasons cited included perceived inadequacies in the technical basis for the Class C limits, presumed inability of state governments to provide the technical expertise necessary for safe disposal of Class C wastes, or a perception that the federal government is better able to provide long-term institutional control over Class C waste disposal sites than are state governments.

These comments did not convince the Commission that there is any need to revise its current Class C limits. Part 61 regulations recognize the different characteristics of Class C waste (compared to Classes A and B) and require special treatment for disposal of Class C wastes (deeper burial or use of engineered barriers). The technical support for Part 61 received extensive scrutiny, both by the public and by independent technical reviewers, during the Part 61 rulemaking. No substantive technical flaws were identified during that rulemaking, nor were any demonstrated in the comments on the ANPR.

Alleged difficulties in handling Class C wastes during disposal operations seem overstated. Current LLW disposal site operators have routinely handled high-activity Class C wastes without causing excessive worker radiation exposures or incurring excessive costs, and the Commission believes that future Class C wastes can also be safely disposed of as LLW.

Regarding institutional control, many comments held the erroneous view that LLW site isolation capability depends entirely on institutional control. This is not the case. In fact, a fundamental feature of Part 61 is its limitation of the time during which institutional controls may be relied on (100 years), and its requirement that LLW site isolation capability for longer times be based on the geologic conditions and engineered barriers of the disposal facility.

Finally, the Commission notes that the 1985 amendments to the Low-Level Radioactive Waste Policy Act (Pub. L. 99-240) establish a federal government responsibility only for disposal of LLW with concentrations greater than Class C. Disposal of low-level wastes with concentrations below the Class C limits remains the responsibility of state governments.

Because no substantive argument was presented opposing current use of the Class C limits in Part 61, the Commission will not alter that use.

## MINIMUM QUANTITY

In the ANPR, comments were requested on the desirability of giving consideration to the total quantity of activity in a waste, in addition to concentration, in defining HLW. Comments were divided on this issue. However, the Commission is no longer proposing development of a concentration-based definition of HLW, so explicit specification of a total quantity criterion as part of a definition of HLW is not appropriate. Instead, under the proposed amendments, the ability of disposal facilities to accommodate specific wastes, considering both radionuclide concentrations and total quantities, will be evaluated in the course of licensing reviews for these facilities.

## DETERMINATION OF MATERIAL NEEDING PERMANENT ISOLATION

The ANPR proposed technical studies to determine which highly radioactive wastes required permanent isolation. The studies would have focused on hypothetical "greater confinement facilities," i.e., more secure than near-surface disposal. Modeling studies would have assessed which waste types could not be safely isolated from the environment by these facilities. These waste types would require a geologic repository to assure permanent isolation. Accordingly, they would have been classified as HLW.

Many comments generally supported this type of analysis. It seemed to be a reasonable way of determining which wastes need permanent isolation. However, such analyses would, by necessity, be extensive and time consuming. The Commission believes that the effort required to conduct generic waste classification analyses for "above Class C" LLW would not be justified in view of the small amount of commercially-generated waste of this type.

Generic waste classification analyses are useful when there is a large amount of waste to be disposed of, possibly in a number of different disposal facilities in different environmental settings. But, projections of commercial "above Class C" waste volumes indicate that only about 2,000 m<sup>3</sup> of such waste will be generated by the year 2020. Because this amount of waste is so small, no more than one facility dedicated to disposal of "above Class C" wastes would be needed, and even a single such facility may prove difficult to justify on economic grounds. Thus, it appears that generic waste classification analyses for such wastes would serve little useful purpose. Instead, it would be more appropriate to carry out site-specific analyses for any disposal facility that might someday be developed.

Because of these considerations, additional waste classification analyses are no longer contemplated. Instead, the Commission proposes to require disposal of all commercial above-Class-C LLW in a deep geologic repository unless an alternative disposal facility has been developed (presumably by DOE) and has been approved by the Commission.

The Commission wishes to emphasize that the proposed amendments do allow for the possibility that new types of intermediate disposal facilities may be developed, which could be approved for disposal of suitable above-Class-C LLW. In such cases, it is expected that technical studies similar to those originally contemplated by the Commission would be necessary for an applicant to demonstrate that an intermediate disposal facility was suitable for isolation of certain above-Class-C LLW.

## LEGAL AND ADMINISTRATIVE PROBLEMS

The ANPR asked commenters to identify any potential legal or administrative problems in defining HLW. Many comments were directed at the options for Clause (A), and are addressed in the analysis of comments on options for classifying reprocessing waste. (See page 11 of this analysis.) The approach used in the proposed rule, requiring geologic repository disposal of all above-Class-C LLW unless an alternative is approved, would appear to resolve most of the concerns expressed on this issue.

One particular problem which was discussed in the ANPR, and was the subject of further comment, deals with the contractual and financial arrangements for waste generators to dispose of waste in a repository. Under the NHPA, DOE has generally entered into contracts solely with reactor licensees, with fees from these licensees being used to fund waste disposal for them. By the provisions of the NHPA, any newly-designated HLW generated by other licensees (who have not entered into contracts with DOE) would be ineligible for disposal in the repository. The potential disqualification of such wastes from repository disposal is not an issue under the proposed rule, since the material would not be classified in the first instance as HLW. It would therefore be eligible for disposal in a repository and presumably would be disposed of in this manner where warranted by technical and financial considerations. (The NHPA provision that required contracts to be entered into by a set date would not be applicable to those wastes, since they would not be classified as HLW. The licensees who generate those wastes could enter into contracts with DOE, separate from the NHPA provisions, governing financial and other arrangements for transfer of those wastes to DOE for disposal in a repository or other facility.)

## REQUIREMENT FOR DISPOSAL OF WASTES BY SPECIFIC METHODS

The ANPR asked if the Commission should specify particular means of disposal for any waste type, such as geologic repository disposal for all HLW. Many comments argued that such a requirement should be adopted. Comments, particularly from the State of Washington, argued that the NWPA requires geologic repository disposal for all HLW. Similarly, many of these comments argued that the primary reason for defining HLW and other categories of waste should be to guarantee that appropriate disposal methods are used. Other comments were against this type of requirement. Reasons cited were to encourage the development of new disposal technologies and to retain flexibility in the waste management system.

Comments opposed to NRC specifying disposal methods for various types of waste stressed that the emphasis should be on ensuring that waste types meet performance criteria, rather than overly prescriptive regulations. Also emphasized in these comments was the fear that by prescribing specified disposal methods for each type of waste, NRC would discourage the development of new technologies for waste disposal. However, one commenter did recognize that, for reasons of practicality, there probably would never be a wide enough range of disposal alternatives so that each method would be exactly suited for a certain type of waste. Thus, as a next best alternative, some wastes would have to be disposed of in facilities designed for more hazardous types of waste.

The proposed amendments to 10 CFR Part 61 are a compromise between these two views. On the one hand, a specific disposal method, by geologic repository, is specified for above-Class-C LLW unless an alternative means of disposal has been approved. These amendments recognize that only two types of disposal facilities are currently in operation or under development for commercially-generated wastes: near-surface disposal and a deep geologic repository. On the other hand, the proposed amendments leave open the possibility that other disposal facilities may become available which could be used for suitable above-Class-C LLW, subject to Commission approval. Thus, the approach proposed would not discourage the development of new technologies for waste disposal.



## WASTE DILUTION AND FRACTIONATION

Many comments were critical of the concentration based approach outlined in the ANPR. Much of the criticism focused on the possibility that, under this approach, waste could be diluted or fractionated to escape classification as HLW. The ANPR approach would have classified material as HLW if it contained certain concentrations of radionuclides having high initial radioactivity as well as certain concentrations of long-lived radionuclides. Commenters were concerned that by fractionating a high-level waste stream into components, one highly radioactive and one containing mainly long-lived radionuclides, a waste stream could be classified as LLW. This was viewed as an inappropriate classification for a waste stream which, in the absence of fractionation, would be considered HLW. A similar concern existed over the potential for dilution of a waste stream to concentrations below those required for classification as HLW.

The approach suggested by the Commission in this proposed rule largely makes these concerns moot. By retaining existing waste classifications, there will be no increased incentive to fractionate or dilute wastes solely to alter their classification. The Commission notes, however, that there may be legitimate reasons for diluting or fractionating wastes. For example, fabrication of reprocessing wastes into glass effectively dilutes the waste by the volume of the glass matrix, but may significantly increase the long-term stability and leach resistance of the waste. Similarly, fractionation of reprocessing wastes for removal of salts (resulting from neutralization of acidic wastes) may substantially reduce the volume of the waste, reducing transportation and other impacts associated with transfer of the wastes to a geologic repository. Since there may be beneficial reasons for diluting or fractionating wastes, the Commission will not adopt a rigid prohibition of such processing. Instead, the Commission will review proposals for such processing on a case-by-case basis.

## COMMENTS ON ENVIRONMENTAL IMPACTS

Most letters did not identify any need to address environmental consequences from a revision of the definition of HLW. Those comments that did foresee potential environmental consequences thought that such consequences would result from revised waste disposal requirements implicit in revisions of waste classifications.

The action being proposed by the Commission makes such concerns moot. The approach outlined in the proposed rule is one which does not create any significant adverse environmental impacts since it would not result in any changes in classifications of existing waste inventories, nor in the alternatives available for disposal of those wastes. The proposed amendments merely make explicit what is now implicit -- if no "intermediate" disposal facility is developed for above-Class-C LLW, then the only facility capable of providing safe disposal for those wastes would be a deep geologic repository. DOE retains a full range of flexibility to develop any type of disposal facility that may be appropriate for disposal of the wastes within its purview. Environmental impacts associated with specific disposal facilities will, of course, be evaluated in the course of licensing reviews for those facilities.

MATERIAL WHICH IS EITHER HIGHLY RADIOACTIVE OR NEEDS  
PERMANENT ISOLATION SHOULD BE HLW

Many comments opposed the approach in the ANPR, which held that to be considered HLW, material must be both highly radioactive and require permanent isolation. In their view, either of these characteristics by itself should be sufficient to classify any material as HLW. Cesium-137 and strontium-90 were cited as examples of radionuclides with relatively short half-lives, but which were nonetheless viewed as extremely hazardous for a long time and in need of permanent isolation. One comment argued that the NWPA does not authorize the Commission to establish such a two-part classification system.

The proposed rule accommodates the basic point raised here. Waste material which is either highly radioactive or long-lived, even if not classified as HLW, would have to be disposed of in a geologic repository, unless an alternative had been approved by the Commission. Requiring geologic repository disposal, or an approved alternative, of all above-Class-C LLW ensures that all waste not suitable for disposal by near-surface disposal is safely isolated from the environment. Waste with concentrations of highly radioactive short-lived material exceeding the concentration limits for Class C LLW in Table 2 of Part 61 would be above-Class-C LLW and require geologic repository disposal unless an alternative was approved by the Commission.<sup>1</sup> The same requirements would hold for long-lived radionuclides in Table 1.

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1 Tables 1 and 2, giving concentration limits for determining above Class C LLW, can be found in §61.55 of 10 CFR Part 61.

CHANGING BASIS FOR CLASSIFICATION OF REPROCESSING  
WASTES FROM SOURCE TO CONCENTRATION OF WASTE

The ANPR asked for comments on the two options laid out for classifying reprocessing waste; retaining the source-based definition, or using a concentration-based approach.

Comments supporting the concentration-based approach rested largely on the desirability of establishing a waste classification system based on risk or hazard of the waste. The source of the waste should be irrelevant, only the degree of risk or hazard it posed should be considered. Most favored a comprehensive classification system based on risk or hazard. Some comments emphasized the need for consistency between classification of wastes under Clauses (A) and (B) of the NWPA.

Some comments also noted the economic advantages of this option; there would be no need to utilize expensive repository space for wastes not needing this degree of isolation. Society could manage these wastes in a less costly manner.

Those comments favoring retention of a source based definition argued that this was consistent with past statutory usage of the term "HLW", and that Congress intended this interpretation when it passed the NWPA. These comments argued that Congress did not intend NRC interpretation of the term "sufficient concentrations" (in Clause (A) of the NWPA) in the manner suggested in the ANPR. They were especially critical of using the same type of two-part, concentration-based approach suggested for classifying waste under Clause (B), as the basis for classifying reprocessing wastes under Clause (A).

Some comments accused NRC of attempting to set up a classification system which would allow much of the defense reprocessing wastes at Hanford and Savannah River to be classified as LLW, and escape NRC licensing. A number of comments were generally opposed to any option which would result in material presently defined as HLW being redefined as LLW.

Some comments agreed with the additional views of Commissioner Asselstine that changing to a concentration-based definition would result in problems because some material would be classified HLW under one statute (the Energy Reorganization Act) but not under another (the NWPA).

Both views have merit. From a technical standpoint, basing the classification system on the degree of risk posed by a waste is certainly the preferred approach. However, the issues of continuity with past usage and conformity with other existing statutes are important ones, and cannot be ignored. The Commission is convinced that Congress directed the NRC to license disposal of defense reprocessing wastes when it enacted the Energy Reorganization Act in 1974. The Commission also finds no explicit indication that Congress meant to change that direction in 1982, when the NWPA was enacted. Thus, if the Commission were to develop a risk-based definition of HLW under the NWPA, that definition might cause some materials to be classified as HLW under one statute but not under the other. Such a situation could lead to confusion regarding the specific materials subject to the NRC's licensing authority under the Energy Reorganization Act.

The NRC staff has examined the comments that support reclassification of some defense reprocessing wastes as non-HLW. These comments argue, following the wording of the HLW definition in the NWPA, that radionuclide concentrations in some defense reprocessing wastes are not sufficient to continue to classify those wastes as HLW. The Commission is not convinced that radionuclide concentration is the sole criterion for judging the hazard of defense reprocessing wastes. Rather, the Commission agrees with comments that pointed out that, in addition to concentration of radionuclides, the risk or hazard of a waste depends on the total inventory of radioactive material present in the waste. Defense reprocessing wastes contain much larger radionuclide inventories than do either commercial or defense low-level wastes, and many of the radionuclides present are longer-lived and/or more hazardous than those typical of low-level wastes. Thus, there are legitimate technical concerns that would argue that these wastes should continue to be classified as HLW. In the absence of a clear Congressional intent to alter the classification of those wastes, the Commission considers it most appropriate to continue to classify them as HLW.

The decision to drop the approach outlined in the ANPR means that the classification of HLW will continue to be based on source, as is now the case. The possibility, held out in one option offered in the ANPR, that some reprocessing waste now considered HLW would be reclassified due to low concentrations of radionuclides, would be eliminated. Salts separated from reprocessing wastes would be classified as non-HLW only to the extent that those salts could be considered to be "incidental" wastes of the type discussed when the Commission originally developed its Appendix F definition of HLW (34 FR 8712, June 3, 1969).

NATURALLY-OCCURRING AND ACCELERATOR-PRODUCED WASTE  
(NARM)

The ANPR asked if the Commission should include NARM in its analyses of waste which should be classified as HLW, even though it has no legal authority over NARM. Almost all comments supported the Commission's doing so.

The only NARM wastes likely to be candidates for geologic repository or approved alternative means of disposal are sealed sources containing radium and ion exchange resins used to remove radium from drinking water. Since comparable NRC regulated materials will not be classified as HLW under the Commission's proposed rule, the NARM wastes ought not to be so classified even if the jurisdictional limitations were not present. If NARM wastes are presented at an NRC-licensed facility for disposal, requirements for such disposal will be applied as necessary to ensure that such disposal is carried out safely, just as would be the case for any comparable NRC-regulated materials not classified as HLW.

Environmental standards currently under development by the U. S. Environmental Protection Agency reportedly will apply to NARM wastes, and thus may influence the specific means of disposal which must be used. The Commission's regulations permit disposal of NARM wastes in either a repository or in a near-surface disposal facility, as appropriate.

## DEPARTMENT OF ENERGY COMMENTS

The Department of Energy (DOE) was concerned about the effects of inclusion of additional waste types in the HLW definition on its planning and development of a geologic repository. DOE argued that if waste types other than spent fuel or reprocessing waste would be sent to the repository, this would be an additional burden on its program. Firstly, DOE noted its concern that the need to revise its HLW emplacement scheme and waste processing operations would lead to increased costs, and a new funding mechanism would have to be developed to cover costs. Secondly, DOE argued that putting additional waste types in the repository might affect the technical aspects of licensing and could delay the schedule for repository development. It could complicate demonstrations of the repository's performance, and could make it difficult to show compliance with the EPA HLW standards (to be codified in 40 CFR 191).

The problems cited by DOE may be overstated. While different waste types may have characteristics unlike spent fuel and reprocessing waste, the relatively small amount of additional commercially-generated waste for which geologic repository disposal would be required (unless an alternative had been approved by the Commission), and its relatively low hazard (compared to spent fuel and reprocessing waste), make it unlikely that there would be a major impact on repository performance. It is difficult to envision how this could significantly delay DOE's schedule or lead to greatly increased costs. However, it is important to emphasize that the proposed amendments allow DOE virtually unlimited flexibility to design disposal facilities as appropriate for the wastes to be disposed of. There would be no requirement for deep geologic repository disposal, except as a "last resort" disposal method to be used if no other disposal facility had been made available.

Regarding legal considerations, DOE disagreed with the ANPR as to NRC licensing authority over defense reprocessing wastes. In DOE's opinion waste is HLW for licensing purposes only if so defined by NRC under NWPA. Thus, some of the Hanford tank wastes would not be considered HLW and subject to NRC licensing authority if, as DOE recommended, a hazard-based definition were to apply under Clause (A).



NRC continues to adhere to its position expressed in the ANPR. Its authority to license DOE HLW disposal facilities is based on the meaning of the term "HLW" when the Energy Reorganization Act was enacted in 1974, and would not be altered by any definition adopted under the NHPA. However, as no revision of the definition of HLW in 10 CFR Part 60 is being proposed, the proposed amendments would not involve this issue.

#### OTHER COMMENTS

Concerns were expressed that NRC's proposed approach to defining HLW would encourage reprocessing of spent fuel and thus could lead to nuclear proliferation. This concern seems unwarranted as there would have been no change in current policies regarding disposal of spent fuel in geologic repositories. Nevertheless, the concern is moot since the Commission is proposing no changes to existing HLW definitions.

A commenter suggested that the definition of HLW apply only to materials that have been declared to be waste and to waste materials that are in the form intended for final disposal. This comment is mooted since, under the proposed rule, the only material (other than spent fuel) classified at present as HLW is reprocessing waste which is HLW from the time of reprocessing.

DOE was concerned that irradiated fuel assemblies intended for re-insertion into the reactor would be considered waste, and recommended that spent fuel be categorized separately from HLW, as is done in the NWPA. The Commission sees no need to do so. In the Commission's view, nuclear fuel is "spent" only when it is no longer usable as fuel, i.e., when it is waste.

Another commenter noted that spent fuel should be considered synonymously with HLW in terms of concentration limits. The concern is moot since no numerical definition of HLW is being proposed by the Commission.

There were several comments which questioned the States' capability for safely managing some LLW, with the implication being that it should be a Federal responsibility. As discussed previously, this alleged lack of capability on the part of States is not obvious, and the issue of Federal/State responsibility for managing radioactive waste was resolved by the Low Level Radioactive Waste Policy Amendments Act of 1985. As was stated in the ANPR, it is not affected by this rulemaking.

There was a comment that every effort should be made to reconcile the definitions of HLW in various statutes and any proposed NRC definition. The avoidance of conflicting or ambiguous definitions of HLW is certainly a worthy objective and is one reason no change in the Part 60 definition is being proposed. However, there is nothing that can be done through the present rulemaking to reconcile the language of past legislation.

The need to avoid leaving categories of waste undefined was pointed out by several commenters. If some material fell between HLW and LLW classifications, it should be addressed. The proposed rule would not leave open an undefined class of waste. As in the past, HLW would be defined by source (reprocessing wastes) and LLW would be a "default" category consisting of non-HLW.