



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DEC 17 1987

MEMORANDUM FOR: Hugh L. Thompson, Director
Office of Nuclear Material Safety and Safeguards

William C. Parler, General Counsel
Office of the General Counsel

FROM: Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

SUBJECT: COMMISSION PAPER TRANSMITTING PROPOSED AMENDMENTS TO PART 60
TO REVISE THE DEFINITION OF HLW

Enclosed for your review and concurrence is a Commission Paper which would transmit proposed amendments to Part 60 on revision of the definition of high level radioactive waste. These proposed amendments were developed in coordination with staff from your office. The approach to revising the definition recommended here has been modified from that outlined in the advance notice of proposed rulemaking published on February 27, 1987 (52 FR 5992). These modifications mainly result from the staff's resolution of the public comments on the advance notice.

I would like to have your concurrence/comments within two weeks of the date of this memorandum. Please contact Clark Prichard (x23855) of my staff if you need any additional information.

A handwritten signature in cursive script, reading "Eric S. Beckjord", is positioned above the typed name.

Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

Enclosure: Commission Paper

Document Name:
HLW DRAFT 2

Requestor's ID:
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Author's Name:
PRICHARD

Document Comments:
SPE 12/7/87 - Return this sheet when submitting corrections

For: The Commissioners

From: Victor Stello, Jr.,
Executive Director for Operations

Subject: 10 CFR 60 AND 66-- REVISION OF THE DEFINITION OF HIGH LEVEL
RADIOACTIVE WASTE

Category: This paper involves a policy question of interest to other
Federal agencies.

Purpose: To obtain Commission approval for a notice of proposed rulemaking
to be published in the Federal Register.

Summary: On February 27, 1987 the Commission published an advance notice
of proposed rulemaking (ANPR) on revising the definition of high
level radioactive waste (HLW) in Part 60. This action was in
response to the Nuclear Waste Policy Act of 1982 which contains a
definition of HLW which differs from that in Part 60. The
advance notice contained an approach to revising the definition
of HLW based in part on concentrations of radionuclides rather
than on source of the waste alone. After reviewing public com-
ments on the advance notice, the staff is now recommending that
all reprocessing waste, and all non-reprocessing waste with
concentrations greater than Class C LLW be classified as HLW.

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11/20/87

HLW DRAFT 2

Background:

The Nuclear Waste Policy Act of 1982 (NWPAA), Pub. L. 97-425, contains a definition of high-level radioactive waste which differs from that in 10 CFR 60. The NWPAA defines HLW as:

- (a) The highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and
- (b) Other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation (NWPAA, Section 2 [12]).

In May, 1983 the Commission directed the staff to review the need to revise the definition of HLW in Part 60 to conform to that in the NWPAA.¹ The staff's response to the Commission was contained in SECY-85-309, which recommended publication of an ANPR. The Commission decided not to proceed with publication, but to await the anticipated passage of relevant legislation (The Low Level Radioactive Waste Policy Amendments Act of 1985). This legislation resolved one issue which had been involved in the revision of the definition of HLW, that of State vs. Federal responsibility for certain radioactive wastes. As a result of the legislation, States were made responsible only for wastes classed as A, B, and C low level waste (LLW) by the classification system in the Commission's LLW regulation, 10 CFR 61. Subsequently, the staff prepared a revised ANPR, to reflect the implications of the new legislation (SECY-86-328), which the Commission approved for publication.²

¹Staff requirements memorandum to William J. Dircks and Herzel H. E. Plaine from Samuel J. Chilk, May 27, 1983.

²Staff requirements memorandum from Samuel J. Chilk to Victor Stello, Jr. dated January 21, 1987.

permanent isolation (such as provided by a geologic repository) it would be classified as HLW.

Public Comments

The change from a purely source-based definition for HLW, such as now exists, to one based on risk or hazard was generally supported by the public comments. However, there was a wide range of viewpoints on how this should be implemented in a waste classification system. Some comments found the approach outlined in the ANPR too simplistic; consideration of a wider variety of waste characteristics, such as heat generation and toxicity, was suggested. Many wanted HLW to include material either highly radioactive or which required permanent isolation. Comments were divided as to whether the suggested limits for HLW in the ANPR were too conservative or not. Some commentators wanted more conservative limits, even reclassification of some or all current Class C LLW to the HLW category. In opposition were comments pointing out the excessive cost burden on the waste management system of classifying material not needing permanent isolation as HLW.

Many comments expressed concern over how a concentration-based classification system for reprocessing wastes would impact current waste inventories, particularly the Hanford tank wastes. In general, there was opposition to reclassifying any present HLW to LLW. It was strongly urged that any system that was adopted should not leave any categories of waste undefined or with no available disposal "home." The possibility of dilution and/or fractionation of waste streams to escape classification as HLW was cited as a potential problem.

Most comments were opposed to NRC requiring specific means of disposal for any waste category. Reasons cited were to retain

flexibility in the waste management system and to encourage the development of new waste disposal technologies. Generally favored was some type of special provision for highly concentrated but minimum volume wastes, such as sealed sources, enabling them to be classified and treated as LLW.

The Proposed Rule

The analysis of the public comments has led the staff to revise the general approach for defining HLW presented in the ANPR.

For reprocessing waste, the staff is recommending the option which would retain the current source-based definition. When total activity as well as concentrations of reprocessing wastes is taken into account, it seems reasonable to include all direct wastes from this source in the HLW category. Only very low concentration byproducts, such as some salt cake, which are not now considered HLW, would be excluded. No waste which is now classified as HLW would be reclassified as LLW, a policy many comments supported.

For non-reprocessing waste, all waste material with concentrations greater than the Class C limits would be classified as HLW. This represents a change from the approach set forth in the ANPR, and the staff is recommending this change for the following reasons:

(1) The analysis of the public comments showed that there was no widely accepted method for determining appropriate concentration limits for defining HLW. Establishment of a new set of limits for this rulemaking would be a complex and controversial task. The expenditure of the substantial resources necessary to accomplish this task does not appear to offer commensurate benefits. The approach used in the proposed rule is the

conservative one, setting the limit at the upper bound for routinely disposed of LLW.

(2) No intermediate disposal facilities for the disposal of LLW above Class C have been proposed or planned by DOE, who is responsible for such wastes under the LLWPAA of 1985. Hence, it is very likely that as a practical matter, above Class C waste, whether defined as HLW or LLW, would be disposed of in a repository. The staff has previously noted the advantages of repository disposal of above Class C waste in its comments to DOE.³

The proposed rule does contain a provision for case-by-case reclassification of material defined as HLW. This recognizes that new types of "intermediate" disposal facilities may become available which may be suitable for disposal of some HLW. Requests for reclassification would have to be supported by technical studies demonstrating the isolation capability of facilities. Spent fuel would be a separate category of waste, as would trans-uranic waste.

With the ANPR the staff had anticipated amending the Commission's HLW regulation, 10 CFR Part 60. The staff now believes that the definition of HLW should be contained in a new Part 66, rather than in Part 60. Part 60 was developed to establish a licensing framework for disposal of material in geologic repositories. The classification of material as HLW would have a broader scope, involving other aspects of the waste management system. For this reason, the staff is recommending that the definition of HLW be contained in a new Part 66.

Resource needs for implementing this rulemaking have already been factored into current budget planning.

³ Letter for Mr. A. David Rossin, Assistant Secretary for Nuclear Energy, US DOE dated 4/30/87 from Hugh L. Thompson, Director, NMSS

Recommendation: That the Commission:

- (1) Approve for publication in the Federal Register the proposed amendments to 10 CFR 60 which would revise the definition of high-level radioactive waste.
- (2) Certify that this rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. This certification is necessary in order to satisfy the requirements of the Regulatory Flexibility Act, 5 U.S.C. 605(a).
- (3) Note:
 - (a) That the notice of proposed rulemaking in Enclosure A will be published in the Federal Register allowing 60 days for public comment.
 - (b) That the Chief Counsel for Advocacy of the Small Business Administration will be informed of the certification by the Division of Rules and Records.
 - (c) As provided by the Nuclear Waste Policy Act of 1982, no environmental assessment is being prepared in connection with this action.
 - (d) The Subcommittee on Energy and the Environment of the House Interior and Insular Affairs Committee, the Subcommittee on Nuclear Regulation of the Senate Committee on the Environment and Public Works, the Subcommittee on Energy, Nuclear Proliferation and Federal Services of the Senate Committee on Government Affairs, and the Subcommittee on Energy and Power of the House

Interstate and Foreign Commerce Committee will be informed by a letter similar to Enclosure C.

- (e) This rule contains no new or amended recordkeeping, reporting, or application requirement, or any other type of information collection requirement, subject to the Paperwork Reduction Act (Pub. L. 96-511).
- (f) A regulatory analysis is presented in Enclosure E.
- (g) The Office of Public Affairs has determined that it is necessary to issue a public announcement similar to Enclosure D in connection with these proposed amendments.
- (h) The conforming changes proposed to be made in 10 CFR Part 60 are provided in comparative text as Enclosure G.
- (i) The draft Federal Register Notice states that provisions of 10 CFR 50.109 on backfitting do not apply to this rulemaking because the rule is not a generic requirement applicable to production and utilization facilities licensed under 10 CFR Part 50.
- (j) The analysis of public comments on the ANPR issued February 27, 1987 is provided as Enclosure F.

Victor Stello, Jr.
Executive Director for Operations

Enclosures

- A. Federal Register Notice
- B. ANPR (52 FR 5992)
- C. Draft Congressional Letter
- D. Draft Public Announcement
- E. Regulatory Analysis
- F. Public Comment Analysis
- G. Comparative Text

ENCLOSURE A

NUCLEAR REGULATORY COMMISSION

10 CFR Parts 2, 60 and 66

Classification of Radioactive Wastes

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The NRC is publishing proposed amendments which revise the existing definition of the term "high-level radioactive waste." Reprocessing wastes, previously classified as high-level wastes, would retain that classification. The proposed revision also adds to the high-level waste category other radioactive wastes (except transuranic wastes) with concentrations exceeding the current Class C concentration limits of 10 CFR Part 61. The proposed amendments contain a provision for future reclassification of certain wastes as non-high-level if and when suitable disposal facilities become available.

DATE: Comments received after [] will be considered if it is practical to do so, but assurance of consideration cannot be given except for comments received on or before this date.

ADDRESS: Written comments or suggestions on the proposed amendments should be sent to the Secretary of the Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Docketing and Service Branch. Copies of comments may be examined in the U. S. Nuclear Regulatory Commission Public Document Room, 1717 H Street NW, Washington, D. C., between 7:30 a.m. and 4:15 p.m.

FOR FURTHER INFORMATION CONTACT: W. Clark Prichard, Division of Engineering, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, D. C. 20555, telephone (301) 443-7668.

schedule for the siting, construction, and operation of repositories to provide protection from the hazards posed by HLW and spent nuclear fuel disposed of therein and it established a Nuclear Waste Fund to ensure that the costs of carrying out activities related to the disposal of such HLW and spent fuel in repositories would be borne by the persons responsible for generating them. 42 U.S.C. 10131. In essence, NHPA recognized that certain wastes should be disposed of in repositories, and it authorized the Commission to identify such wastes, using statutory criteria. Wastes so identified as HLW would have to be disposed of by the Federal Government, with the expenses borne by the waste generators.

As outlined in the ANPR, however, the statutory scheme presents a number of complications. It will be best to examine these once again by focusing separately on the two clauses of the statutory definition.

REPROCESSING WASTES

The NHPA first labels as HLW, under Clause (A), the "highly radioactive material" resulting from the reprocessing of spent fuel, including not only the liquid wastes but also any solid material derived from such liquid waste that contains fission products "in sufficient concentrations." Clause (A) wastes have little significance for purposes of NHPA, since the Federal Government was already responsible for the disposal of all reprocessing wastes at the time the statute was passed. (The only commercially-generated reprocessing wastes were made a Federal Government responsibility in 1980 pursuant to the West Valley Demonstration Project Act. Pub.L. 96-368, 42 U.S.C. 2021a note.) In light of this fact, the Commission believes that the preferable construction of the statute is to conform to the traditional definition. Under this approach, materials that are HLW for purposes of the licensing-jurisdiction provisions of the Energy Reorganization Act of 1974 (ERA) will also be HLW under NHPA.

It might be argued that some defense reprocessing wastes (particularly those in the single-shell tanks at Hanford) do not contain "fission products in sufficient concentrations" and that accordingly they should not be classified, under NHPA, as HLW. Whatever the merits of this argument may be in the

abstract, the Commission believes they are outweighed by the potential confusion that would result. That is, materials classified as non-HLW under such a standard would still be HLW within the meaning of the ERA. It is instructive, in this regard, to refer to the 1975 Final Environmental Statement for waste management operations at the Hanford Reservation (ERDA-1538), in which the Energy Research and Development Administration (now DOE) defined high-level liquid waste at Hanford as:

fluid materials, disposed of (by storage in underground tanks) from Hanford operations, which are contaminated by greater than 100 $\mu\text{Ci/ml}$ of mixed fission products or more than 2 $\mu\text{Ci/ml}$ of Cs-137, Sr-90 or long-lived alpha emitters.

This definition is indicative of the radionuclide concentrations considered to be HLW when, in 1974, Congress provided for NRC to license ERDA (now DOE) disposal of both commercial and defense HLW. Since that time, the nature of the Hanford HLW has changed little except for completion of cesium and strontium removal and evaporation operations. Most or all of the reprocessing wastes at Hanford were classified as HLW in 1975 based on the definition cited above, and today these wastes still have concentrations exceeding the limits of the definition. Because NWPA was not intended to affect the types of wastes subject to NRC licensing authority, the traditional meaning of HLW will continue for purposes of the application of ERA. Adopting some other standard under NWPA could only lead to confusion.

Several comments on the ANPR suggested that the total radionuclide inventory of reprocessing wastes is so large that such wastes should be classified as HLW even if radionuclide concentrations within those wastes are relatively low. The Commission believes that this argument has merit.

Table 1 presents a summary of the volumes and radioactive inventories of several types of radioactive wastes. As Table 1 indicates, a low-level waste disposal facility would typically contain, at most, a few million curies of radioactive material, while the inventories of reprocessing wastes are measured in hundreds of millions of curies. Even after removal of cesium and strontium, the single-shell tank wastes at Hanford contain more than 100

Table 1. Comparisons of volumes and activities of various wastes (ref. DOE/RW-0006, Rev. 3, except where noted).

<u>Waste Type</u>	<u>Volume (millions of m³)</u>	<u>Activity (millions of Ci)</u>
Commercial LLW (thru 1986, 6 sites)	1.2	5
Commercial LLW (thru 2020)	5	15
Defense LLW (thru 1986, several sites)	2.3	12
Defense LLW (thru 2020)	6	22
Stored defense TRU (thru 2020, some or all to be shipped to WIPP)	0.2	16
Commercial GTCC (thru 2020)*	0.002	40
SRP reprocessing (thru 1986)	0.1	790
Hanford reprocessing (thru 1986)	0.2	550**
Spent nuclear fuel (thru 2020, no new power plant orders)	0.05	50,000

*GTCC refers to commercial "greater than Class C" wastes. Volume estimate is from DOE/NE-0077. Activity estimate is for reactor decommissioning wastes, which are expected to be the dominant source of GTCC waste activity.

**Includes 210 million curies in Cs & Sr capsules. Single-shell tank wastes currently contain about 125 million curies.

million curies, an inventory substantially exceeding the total of all commercial and defense low-level wastes at a dozen or more sites. The radioactive inventory of the Waste Isolation Pilot Plant (to be used for disposal of defense transuranic wastes) is similarly much smaller than that of reprocessing wastes. Further, as comments noted, the radionuclides present in reprocessing wastes generally have longer half-lives than do typical low-level wastes. Thus, the difference in radioactive inventories at the end of an institutional control period would be even greater than indicated in Table 1. It is apparent, then, that reprocessing wastes represent a source of radioactive material very much larger than other wastes which have previously been classified as non-HLW. This further convinces the Commission that reprocessing wastes should continue to be classified as HLW regardless of the radionuclide concentrations present in those wastes.

As noted in the ANPR, certain "incidental" wastes resulting from reprocessing plant operations or further treatment of the reprocessing waste stream have not been, and would not be, regarded as HLW. Within the meaning of Clause (A), these incidental wastes would be considered not to be "highly radioactive"; they would also be characterized as not having "sufficient concentrations" of fission products to be included within the definition of HLW.

The materials that might be regarded as "incidental" wastes were first described in the Federal Register notice that proposed 10 CFR Part 50, Appendix F, including the current HLW definition (34 FR 8712, June 3, 1969). There, a clear distinction was drawn between the primary reprocessing waste stream, which contains virtually all the fission products originally present in spent nuclear fuel, and other miscellaneous wastes produced in reprocessing. That notice listed a number of incidental wastes that were not included within the HLW category.

Other incidental wastes not specifically named in the 1969 Federal Register notice may be associated with production, processing, storage, or solidification of reprocessing wastes. For example, acidic reprocessing wastes have often been neutralized, by addition of alkaline materials, to permit storage in carbon steel tanks. This neutralization forms large amounts of non-radioactive salts which are commingled with the radioactive reprocessing wastes. DOE has indicated (in environmental statements for waste management at Savannah River, DOE/EIS-0023, 1979 and at Hanford, DOE/EIS-0113, 1986) its intent to separate these salts from defense reprocessing wastes before fabrication of the wastes into glass. Such salts are not the same wastes referred to in the current definition of HLW and, according to information presented in DOE's environmental statements, would contain only very low levels of radioactive contaminants. For these reasons, the Commission stated (in the ANPR) its view that these salts would be considered incidental wastes outside the current definition of HLW. In this notice, the Commission proposes to explicitly classify all such salts as incidental wastes. Similarly, the Commission proposes to classify as incidental wastes any facilities, components, equipment, or storage tanks associated with production, processing

or solidification of reprocessing wastes. As proposed in this notice, certain incidental wastes might still be classified as HLW under Clause (B) if radionuclide concentrations are sufficiently high.

The Commission anticipates, based on information contained in the environmental statements cited above, that incidental wastes will contain no more than one or two percent of the radioactive material originally present in reprocessing wastes. Since radionuclide concentrations are also expected to be much lower for incidental wastes than for the original reprocessing wastes, the Commission considers it appropriate to classify incidental wastes as non-HLW within the meaning of NWPA. However, an exception might arise at the Hanford site. There DOE is considering retrieval of the single-shell tank wastes for transfer to a deep geologic repository. Should DOE decide to do so, as much as five percent of the reprocessing wastes might be unrecoverable from the tanks. The Commission solicits public comments on the merits of classifying a residual of this magnitude as incidental waste within the letter and spirit of 10 CFR Part 50, Appendix F.

OTHER WASTES

Virtually all comments on the ANPR agreed with the Commission on one point: use of the term "high-level radioactive waste" in the NWPA serves to identify those wastes which require the degree of isolation afforded by a deep geologic repository. Thus, the Commission remains convinced that the ideal way to distinguish HLW from non-HLW would be by examination of the disposal capability of other, less secure facilities. Wastes which could not be safely disposed in such facilities would be classified as HLW.

Following publication of the ANPR, a technical report (Kocher, D. C. and A. G. Croff, A Proposed Classification System for High-Level and Other Radioactive Wastes, ORNL/TM-10289, Oak Ridge National Laboratory, 1987) was published which provided a technical basis for classification of wastes as HLW or non-HLW. This report described a number of conceptual "greater confinement disposal" (GCD) facilities, and attempted an analysis of the waste isolation capability of such facilities. Emphasizing the site-specific nature

of such analyses and the very large uncertainties involved, Kocher and Croff concluded that "[a]t the present time . . . GCD is not sufficiently developed to provide a basis for defining waste classes, and disposal of any wastes using GCD must be considered on a case-by-case basis." Kocher and Croff then presented an alternative approach for defining HLW which, in essence, is based solely on the short-term storage and handling risks associated with the heat and external radiation levels generated by a waste. The Commission could not accept this alternative approach since it bears no correlation to the need for permanent waste isolation in a repository or equivalent disposal facility.

The Commission's review of Kocher and Croff's study leads it to the same conclusion regarding the impracticability of waste classification based on analyses of GCD facility performance. If waste classification is to be at all realistic, an actual disposal facility must be developed which will provide a supportable basis for such classification. Until that has been done, the Commission believes that an alternative, technically conservative approach should be taken, as described below.

Clause (B) authorizes the Commission to categorize wastes other than reprocessing wastes as HLW. The Commission proposes to implement this authority by, first, establishing a "transuranic waste" class, to be differentiated from HLW and from low-level waste, and, second, by classifying all remaining nonreprocessing wastes (other than the Class A, B, and C low-level radioactive wastes classified in 10 CFR Part 61) as HLW, subject to such exceptions as may be deemed warranted in response to specific requests.

This approach is grounded firmly in the policies underlying NWPA - namely, to provide a Federal Government responsibility for disposal of especially hazardous long-lived wastes generated by Commission licensees and to establish appropriate funding mechanisms that would require the waste generators to assume the costs of such disposal. More particularly, it was the purpose of the statute to deal with wastes generated by the operators of utilization facilities (nuclear reactors). See Sec. 302(b), 42 U.S.C. 10222(b). In addition to spent nuclear fuel, wastes of concern might include structural components of the reactor, ion exchange resins, and other materials containing fission products or activation products resulting from operation of

the facility. Apart from material contained in the spent fuel, no transuranic nuclides would be generated, and there would accordingly be no need to provide for the disposal of such nuclides under the provisions of NWPA. The Commission is therefore proposing to exclude transuranic wastes altogether from the HLW category. A further reason for doing so is that NWPA itself differentiates the category of "high-level radioactive waste" from the category of "transuranic waste." (In this regard, see the definition of the term "low-level radioactive waste." Sec. 2(16), 42 U.S.C. 10101.) Moreover, this approach avoids the confusion that might result if the transuranic waste which DOE contemplates disposing of at the Waste Isolation Pilot Plant were to be characterized as HLW by the Commission. In this notice, the Commission proposes a definition of the term "transuranic waste" consistent with that previously used internally by the Department of Energy and with that used by the Environmental Protection Agency in its environmental standards for disposal of HLW and transuranic wastes (40 CFR Part 191).

The Commission's thinking with respect to Clause (B) wastes is influenced to some degree by the enactment, subsequent to passage of NWPA, of the Low-Level Radioactive Waste Policy Amendments Act of 1985, Pub.L. 99-240, 42 U.S.C. 2021b et seq. This later statute established a Federal Government responsibility for the disposal of commercially generated wastes with radionuclide concentrations exceeding the limits established in 10 CFR Part 61 for Class C radioactive waste. In view of this development, the Commission finds little practical importance or significance in proceeding with a precise definition of HLW; to do so would not advance the objectives of NWPA.

The alternative approach that might be taken is to define, on the basis of careful technical review, specific physical criteria (pertaining to half-life, radionuclide concentration, etc.) that could be used to differentiate materials that require isolation in a repository or other facility affording equivalent protection from materials that might be disposed of safely in some less elaborate facility. In the ANPR, the Commission in fact suggested some preliminary criteria that might be used for this purpose. It now appears, in the light of comments received as well as the NRC staff's analysis, that the particular values ought not to be applied generically and that the many

variables of facility design, waste specifications, and physical characteristics of the geologic setting make it difficult, if not impossible, to fix any firm criteria at this time.

The approach being suggested by the Commission reflects the fact that under existing law the only facility that has been authorized for the disposal of above-Class-C wastes is a geologic repository. The Commission anticipates that economic and institutional factors will warrant the disposal of all such waste in the repository or repositories described in NWPA, so that further differentiation would serve no purpose. Nevertheless, the Commission recognizes that the Department of Energy might conclude that, for some of the above-Class-C wastes, the isolation afforded by a geologic repository is not required; if the Commission were to find that such wastes are not HLW within the limits of the NWPA definition (i.e., because they are not "highly radioactive" or because they do not require "permanent isolation"), DOE should be enabled to proceed to make other arrangements for disposal in another appropriate facility. The Commission proposes, in this regard, to act responsively; that is, upon receipt of a petition for rulemaking from DOE (or other persons whose interest may be affected), a determination would be made that defined classes of materials either are or are not HLW. The Commission would not, however, entertain merely speculative proposals: it would act only upon a prima facie showing that if the material in question were to be excluded from the classification of HLW, there would be a specific alternative facility available for its disposal.

The Commission wishes to emphasize two important matters associated with its proposed amendments.

First, there would be no change in existing Federal and State Government responsibilities for disposal of radioactive wastes. Prior to enactment of the Low-Level Radioactive Waste Policy Amendments Act of 1985, States were responsible for disposal of low-level wastes irrespective of their radionuclide concentrations. This Act, however, established a Federal Government responsibility for wastes with radionuclide concentrations greater than the Class C limits of 10 CFR Part 61. The amendments proposed in this notice would

make no change whatsoever in the respective disposal responsibilities of the State and Federal Governments.

Second, the Commission seriously doubts whether an "intermediate" disposal facility will ever be available for commercially-generated wastes. The substantial development costs for such a facility and the very small volume of above-Class C waste suggest that it would be more economical to dispose of above-Class C wastes in a repository. In fact, if no alternative disposal facility is available, as is now the case, above-Class C wastes do require the degree of isolation provided by a repository, and these wastes are properly classified as HLW. If an alternative disposal facility should be made available at some future time, the Commission will reclassify wastes as appropriate, upon petition, based on the disposal capabilities of that facility.

SPENT NUCLEAR FUEL

Some comments on the ANPR recommended that the Commission distinguish spent nuclear fuel from high-level radioactive wastes, consistent with use of those terms in the NWPA. In this notice, the Commission proposes to do so, although such changes are without practical significance for application of the Commission's regulations. When final amendments are promulgated, additional changes will be needed beyond those explicitly proposed here (e.g., in Parts 2 and 51 of 10 CFR). These changes consist of substituting "spent nuclear fuel and high-level radioactive waste" or "spent nuclear fuel and solidified reprocessing waste," as appropriate, for the current term "high-level radioactive waste."

NATURALLY-OCCURRING AND ACCELERATOR-PRODUCED WASTES

In the ANPR, the Commission discussed its lack of legal authority to classify naturally-occurring and accelerator-produced (NARM) wastes as HLW or non-HLW. It now appears that the U.S. Environmental Protection Agency will address disposal of such wastes as part of its efforts to develop environmental radiation protection standards for radioactive waste disposal. There is,

therefore, no need at this time for the Commission to develop regulatory requirements for disposal of NARM wastes.

RESPONSES TO PUBLIC COMMENTS

This section presents the Commission's views on several subjects raised in public comments on the ANPR.

Minimum quantity. In the ANPR, the Commission requested comments on the desirability of requiring the presence of a minimum total quantity of radioactive material, in addition to a minimum concentration, before a waste would be classified as HLW. Comments were divided on this issue. In this notice, the Commission is proposing that the radionuclide concentrations in a waste be averaged over the volume of the waste package or over 1 m³, whichever is smaller. This provision precludes any need to explicitly establish an additional criterion for a minimum total quantity of radioactive material before a waste could be classified as HLW.

Legal and administrative problems. The Commission considers that the classifications proposed in this notice minimize any potential legal or administrative problems. In particular, this proposal classifies reprocessing wastes exactly as those wastes were classified previously, eliminating any potential conflicts regarding waste classification or Commission licensing authority under differing statutes. The main remaining problem involves the need for DOE and the owners of wastes now to be classified as HLW to enter into contracts for transfer of those wastes to DOE and for payment of appropriate fees for disposal. As discussed in the ANPR, legislation may be needed to remedy any legal obstacles related to the contracts.

Disposal methods. Many comments (particularly those of the State of Washington) argued that the NWA effectively requires disposal of all HLW in a deep geologic repository. The Commission was not convinced by these arguments, and does not propose to require disposal of HLW by such means. Rather, the Commission will leave open the possibility that another means of disposal may be developed for some or all HLW which would provide equivalent waste isolation. In particular, the Commission does not object to DOE studies

related to in place disposal of the single-shell tank wastes at Hanford. As discussed in the ANPR, the Commission does interpret the Energy Reorganization Act of 1974 to require Commission licensing of any facility (repository or other) used for disposal of HLW.

Appropriateness of Class C limits. Several comments criticized the Commission's current Class C limits for LLW as being overly lenient, and argued that Class C wastes should be classified as HLW. Other comments characterized the Class C limits as overly restrictive. However, none of these comments presented any substantive basis for the criticisms. Thus, the Commission will retain the current Class C limits unaltered.

Dilution or fractionation. Many comments criticized the ANPR arguing that the classification approach proposed there would permit a high-level waste to be diluted or separated into non-HLW components. The Commission considers this to be a valid concern. The approach proposed in this notice would largely moot such concerns by retaining the source-based classification for reprocessing wastes. Those wastes would remain classified as HLW regardless of any dilution or fractionation that might occur. The Commission does not anticipate significant problems with dilution or fractionation of wastes from other sources. However, should the need arise, the Commission will address such problems on a case-by-case basis (e.g., through license conditions imposed on waste generators).

DOE comments. The Department of Energy is the owner of the largest volume of wastes now classified as HLW, and presumably will be responsible for disposal of other, commercially-generated HLW. Thus, some of the comments on the ANPR offered by DOE deserve particular attention here.

First, DOE supported a hazard-based, rather than source-based classification for reprocessing wastes. As discussed previously in this notice, the Commission considers that altering the current source-based classification would have little, if any, practical benefit and would have the disadvantage of classifying reprocessing wastes differently for purposes of different statutes. Thus, the Commission is proposing that all reprocessing wastes remain in the HLW category regardless of the radionuclide concentrations in the wastes.

DOE also urged the Commission to "avoid any potentially destabilizing effects on the present repository disposal program." The Commission notes that the Federal government (presumably DOE) is responsible for disposal of all commercially-generated wastes with concentrations exceeding the Class C limits of 10 CFR Part 61. The Commission sees no reason why classification of some of those wastes as HLW should "destabilize" DOE's repository program. In fact, disposal of those wastes in a repository removes the need for DOE to develop a separate disposal facility, and may well be the most economical means for disposal. For this reason, the Commission strongly recommends that DOE design its repository to accommodate disposal of commercially-generated, greater-than-Class C wastes. Nevertheless, if DOE prefers to use a separate facility, the proposal in this notice would allow DOE to do so. Thus, this proposal allows DOE a maximum degree of flexibility in planning for waste disposal.

DOE urged the Commission to remove spent nuclear fuel from the definition of high-level waste, analogous to treatment of spent fuel in the Nuclear Waste Policy Act. While such a change has no relevance for the substantive requirements of Part 60, the Commission is proposing to make this change so that Part 60 will conform more closely with the NWPA.

Environmental Impact

Pursuant to Section 121(c) of the Nuclear Waste Policy Act of 1982, this proposed rule does not require the preparation of an environmental impact statement under section 102(2)(C) of the National Environmental Policy Act of 1969 or any environmental review under subparagraph (E) or (F) of section 102(2) of this Act.

The Commission does not anticipate that the amendments proposed in this notice would cause any significant adverse environmental impact. These amendments would maintain the status quo regarding regulatory requirements for disposal of reprocessing wastes and, therefore, no changes in environmental impacts would result. Some additional wastes from other sources would also be classified as high-level, ensuring that at least one adequately safe disposal facility would be available for such wastes. Thus, any environmental

impacts would be favorable compared to the possible alternative of indefinite storage of those wastes.

Paperwork Reduction Act Statement

The information collection requirements contained in this proposed rule, of limited applicability, affect fewer than ten respondents. Therefore, Office of Management and Budget clearance is not required pursuant to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.).

Regulatory Flexibility Act Certification

In accordance with the Regulatory Flexibility Act of 1980 (5 U.S.C. 605(b)) and NRC Size Standards (December 9, 1985, 50 FR 50241), the Commission certifies that this proposed rule will not have a significant economic impact on a substantial number of small entities. The only entity subject to regulation under this proposed rule would be the U.S. Department of Energy, which does not fall within the scope of the definition of "small entities" set forth in the Regulatory Flexibility Act.

List of Subjects in 10 CFR Part 60

High-level waste, Nuclear power plants and reactors, Nuclear materials, Penalty, Reporting and recordkeeping requirements, Waste treatment and disposal.

Backfitting Requirements

The provisions of 10 CFR 50.109 on backfitting do not apply to this rulemaking because the rule is not applicable to production and utilization facilities licensed under 10 CFR Part 50.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, the Nuclear Waste Policy Act of 1982, and 5 U.S.C. 553, notice is

hereby given that adoption of the following amendments to Title 10, Chapter I, Part 60, Code of Federal Regulations is contemplated.

PART 2 -- RULES OF PRACTICE

1. Part 2 is amended by substituting "high-level radioactive waste or spent nuclear fuel" for "high-level radioactive waste" throughout.

PART 60 -- DISPOSAL OF HIGH-LEVEL RADIOACTIVE

WASTES IN GEOLOGIC REPOSITORIES

2. The authority citation for Part 60 continues to read as follows:
Secs. 51, 53, 62, 63, 65, 81, 161, 182, 183, 68 Stat. 929, 930, 932, 933, 935, 948, 953, 954, as amended (42 U.S.C. 2071, 2073, 2092, 2093, 2095, 2111, 2201, 2232, 2233); secs. 202, 206, 88 Stat. 1244, 1246 (42 U.S.C. 5842, 5846); secs. 10 and 14, Pub. L. 95-601, 92 Stat. 2951 (42 U.S.C. 2021a and 5851); sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332); sec. 121, Pub. L. 97-425, 96 Stat. 2228 (42 U.S.C. 10141).

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273), § § 60.71 to 60.75 are issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

3. Section 60.2 is amended by revising the definitions of "high-level radioactive waste" and "radioactive waste," by deleting the current definition of "HLW facility," and by adding new definitions of "licensable facility," "reprocessing waste" and "spent nuclear fuel" to read as follows:

§ 60.2 Definitions.

* * * * *

"High-level radioactive waste" or "HLW" means waste material defined as "high-level radioactive waste" in Part 66 of this chapter.

* * * * *

"Licensable facility" means a facility subject to the licensing and related regulatory authority of the Commission pursuant to Sections 202(3) and 202(4) of the Energy Reorganization Act of 1974 (88 Stat 1244).¹

* * * * *

"Radioactive waste" or "waste" means HLW, spent nuclear fuel and other radioactive materials other than HLW or spent nuclear fuel that are received for emplacement in a geologic repository.

* * * * *

"Reprocessing waste" means waste material defined as "reprocessing waste" in Part 66 of this chapter.

* * * * *

"Spent nuclear fuel" means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

* * * * *

4. Section 60.17 is revised to read as follows:

§ 60.17 Contents of site characterization plan.

* * * *

(a) * * *

(2) * * *

(iii) Plans for any investigation activities that may affect the capability of such area to isolate high-level radioactive waste and spent nuclear fuel;

* * * *

(b) A description of the possible waste form or waste package for the high-level radioactive waste and spent nuclear fuel to be emplaced in such geologic repository, a description (to the extent practicable) of the relationship between such waste form or waste package and the host rock at such area, and a description of the activities being conducted by DOE with respect to such possible waste form or waste package or their relationship; and

* * * *

5. Section 60.21 is revised to read as follows:

§ 60.21 Content of application.

* * * *

(b) * * *

(4) A description of the physical security plan for protection against radiological sabotage. Since the radiation hazards associated with high-level wastes and spent nuclear fuel make them inherently unattractive as a target for theft or diversion, no detailed information need be submitted on protection against theft or diversion.

* * * *

6. Section 60.46 is revised to read as follows:

§ 60.46 Particular activities requiring license amendment.

(a) * * *

(1) Any action which would make emplaced radioactive waste irretrievable or which would substantially increase the difficulty of retrieving such emplaced waste.

* * * * *

7. Section 60.63 is revised to read as follows:

§ 60.63 Participation in license reviews.

(a) State and local governments and affected Indian Tribes may participate in license reviews as provided in Subpart G of Part 2 of this chapter. A State in which a repository for high-level radioactive waste or spent nuclear fuel is proposed to be located and any affected Indian Tribe shall have an unquestionable legal right to participate as a party in such proceedings.

* * * * *

8. Section 60.102 is revised to read as follows:

§ 60.102 Concepts.

* * * * *

(a) The licensable facility. NRC exercises licensing and related regulatory authority over those facilities described in section 202(3) and (4) of the Energy Reorganization Act of 1974. Any of these facilities is designated a licensable facility.

(b) The geologic repository operations area.

(1) This part deals with the exercise of authority with respect to a particular class of licensable facility -- namely a geologic repository operations area.

* * * * *

(2) * * *

(3) The exercise of Commission authority requires that the geologic repository operations area be used for storage (which includes disposal) of spent nuclear fuel or of high-level radioactive wastes (HLW) resulting from the reprocessing of spent nuclear fuel.

(4) For purposes of the Nuclear Waste Policy Act of 1982, HLW includes additional radioactive materials, as defined in Part 66 of this chapter. If DOE proposes to luse the geologic repository operations area for storage of these or any other radioactive wastes, the storage of such wastes is subject to the requirements of this part.

* * * * *

(e) Isolation of waste.

(1) During the first several hundred years following permanent closure of a geologic repository, when radiation and thermal levels are high and the uncertainties in assessing repository performance are large, special emphasis is placed upon the ability to contain spent nuclear fuel and reprocessing wastes by waste packages within an engineered barrier system. This is known as the containment period. The engineered barrier system includes the waste packages and the underground facility. A waste package is composed of the waste form and any containers, shielding, packing, and absorbent materials immediately surrounding an individual waste container. The underground facility means the underground structure, including openings and backfill materials, but excluding shafts, boreholes, and their seals.

* * * * *

9. Section 60.113 is revised to read as follows:

§ 60.113 Performance of particular barriers after permanent closure.

(a) * * *

(1) * * *

(i) * * *

(A) Containment of spent nuclear fuel and of reprocessing wastes will be substantially complete during the period when radiation and thermal conditions in the engineered barrier system are dominated by fission product decay; and

* * * * *

(ii) * * *

(A) Containment of spent nuclear fuel and of reprocessing wastes within the waste packages will be substantially complete for a period to be determined by the Commission taking into account the factors specified in § 60.113(b) provided, that such period shall be not less than 300 years nor more than 1,000 years after permanent closure of the geologic repository; and

* * * * *

(b) * * *

(c) * * *

(d) Performance objectives for containment of radioactive wastes other than spent nuclear fuel and reprocessing wastes will be addressed on an individual basis if and when they are proposed for disposal in a geologic repository.

10 CFR PART 66 - CLASSIFICATION OF RADIOACTIVE WASTES

10. A new Part 66 is added to this chapter to read as follows:

Sec.

66.1 Purpose and scope.

66.11 High-level radioactive waste.

66.12 Reprocessing waste.

66.13 Other highly radioactive material that requires permanent isolation.

66.14 Spent nuclear fuel.

66.15 Low-level radioactive waste.

66.16 Transuranic waste.

Authority: Sec. 161, Pub.L. 83-703, as amended, 68 Stat. 948, as amended (42 U.S.C. 2201); Sec. 2, Pub.L. 97-425, 96 Stat. 2202.

§ 66.1 Purpose and scope.

This part classifies as high-level radioactive waste for purposes of the Nuclear Waste Policy Act of 1982 certain radioactive waste materials disposed of hereafter. Other radioactive wastes are classified as low-level radioactive wastes or as transuranic wastes.

§ 66.11 High-level radioactive waste.

"High-level radioactive waste" means "reprocessing waste" and "other highly radioactive material that requires permanent isolation," as defined in § 66.12 and § 66.13.

§ 66.12 Reprocessing waste.

(a) Except as noted in paragraph (b) of this section, "reprocessing waste" means the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste.

(b) "Reprocessing waste" does not include incidental waste consisting of:

(1) ion exchange beds, asphalted sludges, vermiculited sludges, contaminated laboratory items, clothing, tools and equipment, radioactive cladding hulls, other irradiated and contaminated fuel structural hardware, and similar radioactive waste materials, the production of which is incidental to the production of reprocessing waste in a facility for reprocessing spent nuclear fuel, and

(2) salts or other solids, separated from liquid reprocessing waste, or disused facilities, components, equipment and storage tanks, associated with the production, processing or solidification of liquid reprocessing wastes.

§ 66.13 Other highly radioactive material that requires permanent isolation.

(a) "Other highly radioactive material that requires permanent isolation" means radioactive waste, including incidental waste but excluding reprocessing and transuranic waste, if that waste contains radionuclide concentrations, averaged over the volume of the waste package or over 1 m³, whichever is smaller, exceeding the Class C concentration limits of Part 61 of this chapter.

(b) Exception: Upon petition, the Commission will by rule exclude from classification under paragraph (a) any class or classes of materials which it finds not to require permanent isolation. Material will only be excluded under this provision upon a prima facie showing that an existing or authorized facility could be employed for disposal in a manner that protects public health and safety.

§ 66.14 Spent nuclear fuel.

"Spent nuclear fuel" means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

§ 66.15 Low-level radioactive waste.

"Low-level radioactive waste" means radioactive material that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, or by-product material as defined in section 11e(2) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2014(e)(2)).

§ 66.16 Transuranic waste.

"Transuranic waste" means radioactive waste, other than reprocessing waste, which:

(a) contains more than 100 nanocuries of alpha-emitting transuranic radionuclides, with half-lives greater than 20 years, per gram of waste material, and

(b) contains other radionuclides in concentrations less than the Class C concentration limits of Part 61 of this chapter.

Dated at Washington, D.C. this _____ day of _____, 199X.

For the Nuclear Regulatory Commission.

Samuel J. Chilk,
Secretary of the Commission.

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ENCLOSURE B

Maintaining this requirement was an oversight since the revised standard indirectly controls the use of all added substances. Thus, specific restrictions on the use of these added substances is unnecessary, and the Agency proposes to rescind § 319.105(d) of the regulations.

A second change would amend § 319.104(b) of the regulations (9 CFR 319.104(b)). Under the present regulations, cured pork products for which a qualifying statement is required (e.g., "water added" or "with natural juices") must bear that statement in lettering at least $\frac{3}{8}$ inch in height. The Administrator, however, may approve smaller lettering for labels of packages of 1 pound or less, provided the lettering is at least one-third the size and of the same color and style as the product name.

The meat processing industry has advised FSIS that processors are experiencing problems in printing labels to comply with the $\frac{3}{8}$ -inch type size requirement for qualifying statements. This requirement appears impractical, in some cases, because of the length of some of the qualifying statements required under § 319.104(a) of the regulations (9 CFR 319.104(a)). Additionally, some product packages cannot easily accommodate labeling statements of the size now required. Thus, it appears appropriate to provide an alternative to the $\frac{3}{8}$ -inch lettering required for qualifying statements. It is proposed that qualifying statements may be in lettering not less than one-third the size of the largest letter in the product name if they are in the same color and style of print and on the same color background as the product name. This option would assure that the qualifying statements are sufficiently prominent and conspicuous to clearly indicate the nature of products. The approach being proposed is consistent with the size of many qualifying statements found presently on labels and reflects general Agency policy as set forth in Policy Memo 087A for words within a product name.¹

Another problem encountered by industry is the requirement that cured pork products be labeled the full length of the product. Cured pork products not placed in consumer-size packages must be marked repeatedly with any qualifying statement on the full length of the product. This requirement was imposed to assure continued

identification of product at the retail level when the product is subdivided. However, the usefulness of this requirement is questionable. Often, these products do not remain in their original, fully labeled packages when offered for sale. Some products are sliced and repackaged while others are placed in delicatessen cases with no packaging. Additionally, other similar delicatessen products (e.g., cured beef products with additional moisture) are not subject to the requirement of repeating the qualifying statement the full length of the product. By deleting the full length requirement, cured pork products would remain accurately labeled and their marking would be comparable to that of other products. The third proposed change would delete the requirement that qualifying statements be marked the full length of the product in § 319.104(b) of the regulations (9 CFR 319.104(b)).

Proposed Rule

List of Subjects in 9 CFR Part 319

Meat and meat food products,
Standards of identity, Food labeling.

1. The authority citation for Part 319 continues to read as follows:

Authority: 34 Stat. 1260, 81 Stat. 584, as amended (21 U.S.C. 601 *et seq.*); 72 Stat. 862, 92 Stat. 1069, as amended (7 U.S.C. 1901 *et seq.*); 76 Stat. 663 (7 U.S.C. 450 *et seq.*), unless otherwise noted.

2. Section 319.104 (9 CFR 319.104) would be amended by revising paragraph (b) to read as follows:

§ 319.104 Cured pork products.

(b) Cured pork products for which there is a qualifying statement required in paragraph (a) of this section shall bear that statement as part of the product name in lettering not less than $\frac{3}{8}$ inch in height, or in lettering not less than one-third the size of the largest letter in the product name if it is in the same color and style of print and on the same color background as the product name. However, the Administrator may approve smaller lettering for labeling of packages of 1 pound or less, provided such lettering is at least one-third the size and of the same color and style as the product name.

§ 319.105 [Amended]

3. Section 319.105 (9 CFR 319.105) would be amended by removing paragraph (d) and redesignating paragraph (e) as (d).

Done at Washington DC, on February 24, 1987.

Donald L. Houston,
Administrator, Food Safety and Inspection Service.

[FR Doc. 87-4185 Filed 2-26-87; 6:45 am]

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NUCLEAR REGULATORY COMMISSION

10 CFR Part 60

Definition of "High-Level Radioactive Waste"

AGENCY: Nuclear Regulatory Commission.

ACTION: Advance notice of proposed rulemaking.

SUMMARY: The Commission has previously adopted regulations for disposal of high-level radioactive wastes (HLW) in geologic repositories (10 CFR Part 60). The Commission intends to modify the definition of HLW in those regulations so as to follow more closely the statutory definition in the Nuclear Waste Policy Act of 1982 (NWPAA). In this advance notice of proposed rulemaking (notice), the Commission identifies legal and technical considerations that are pertinent to the definition of HLW and solicits public comment on alternative approaches for developing a revised definition.

DATES: Comment period expires April 29, 1987. Comments received after this date will be considered if it is practical to do so, but assurance of consideration can be given only for comments received on or before this date.

ADDRESSES: Send comments or suggestions to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Docketing and Service Branch. Copies of comments received and of documents referenced in this notice may be examined at the NRC Public Document Room, 1717 H Street NW., Washington, DC. Copies of NUREG documents may be purchased through the U.S. Government Printing Office by calling (202) 275-2060 or by writing to the U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20013-7082. Copies of NUREG and DOE documents may also be purchased from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

FOR FURTHER INFORMATION CONTACT: W. Clark Prichard, Division of Engineering Safety, Office of Nuclear Regulatory

¹ This policy memo is available for public inspection in the office of the FSIS Hearing Clerk. Copies of the memo may be obtained free upon request from the Standards and Labeling Division, Meat and Poultry Inspection Technical Services, Food Safety and Inspection Service, U.S. Department of Agriculture, Washington, DC 20250.

U.S. Nuclear Regulatory Commission, Washington, DC 20555, phone (301) 443-7608.

PLEMENTARY INFORMATION:

Introduction and Background

Radioactive wastes contain a wide variety of radionuclides, each with its own half-life and other radiological characteristics. These radionuclides are present in concentrations varying from extremely high to barely detectable. One type of waste, generated by reprocessing spent nuclear fuel, contains both long-lived radionuclides which pose a long-term hazard to human health and other, shorter-lived nuclides which produce intense levels of radiation. This combination of highly-concentrated, short-lived nuclides together with other very long-lived nuclides has historically been described by the term "high-level radioactive wastes" (HLW). There has long been a recognition that such waste materials require long-term isolation from man's biological environment and that, in view of public health and safety considerations, disposal of such wastes should be accomplished by the Federal government on Federally owned land. This policy was codified by the Atomic Energy Commission (AEC) in 1970 in Appendix F to 10 CFR Part 50.

A. *Previous use of the term "HLW."* In Appendix F, HLW was defined in terms of the source of the material rather than its hazardous characteristics. Specifically, HLW was defined as "those aqueous wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuels." As used in Appendix F, "high-level waste" thus refers to the highly concentrated (and hazardous) waste containing virtually all the fission product and transuranic elements (except plutonium) present in irradiated reactor fuel. The term does not include incidental wastes resulting from reprocessing plant operations such as ion exchange beds, sludges, and contaminated laboratory items, clothing, tools, and equipment. Neither are radioactive hulls and other irradiated and contaminated fuel structural hardware within the Appendix F definition.¹

¹ See 34 FR 8712, June 3, 1969 (notice of proposed rulemaking), 35 FR 17530 at 17532, November 14, 1970 (final rule). Incidental wastes generated in further treatment of HLW (e.g., decontaminated salt with residual activities on the order of 1,500 nCi/g Cs-137, 30 nCi/g Sr-90, 2 nCi/g Pu, as described in the Department of Energy's FEIS on long-term management of defense HLW at the Savannah River

The first statutory use of the term "high-level radioactive waste" occurs in the Marine Protection, Research, and Sanctuaries Act of 1972 (Marine Sanctuaries Act). Congress adopted the Appendix F definition, but broadened it to include unprocessed spent fuel as well.² Two years later, the AEC was abolished and its functions were divided between the Energy Research and Development Administration (ERDA, now the Department of Energy, DOE) and the Nuclear Regulatory Commission (NRC or Commission) by the Energy Reorganization Act of 1974, Pub. L. 93-438, 42 U.S.C. 5811. Under this legislation, certain activities of ERDA were to be subject to the Commission's licensing and regulatory authority. Specifically, NRC was to exercise licensing authority as to certain nuclear reactors and the following waste facilities:

(1) Facilities used primarily for the receipt and storage of high-level radioactive wastes resulting from activities licensed under the [Atomic Energy] Act.

(2) Retrievable Surface Storage Facilities and other facilities authorized for the express purpose of subsequent long-term storage of high-level radioactive waste generated by the Administration [now DOE], which are not used for, or are part of, research and development activities.³

Although neither the statute nor the legislative history defines the term "high-level radioactive waste," earlier usage of the term in Appendix F and the Marine Sanctuaries Act is indicative of the meaning. The Commission so construed the statute when it declared spent nuclear fuel to be a form of HLW and, by the same token, when it found transuranic-contaminated wastes not to be HLW.⁴

A different statutory formula appears in the West Valley Demonstration Project Act (West Valley Act), enacted in 1980. This legislation authorizes the Department of Energy (DOE) to carry out a high-level radioactive waste management demonstration project for the purpose of demonstrating solidification techniques which can be

Plant. DOE/EIS-0023, 1979) would also, under the same reasoning, be outside the Appendix F definition.

² Sec. 3, Pub. L. 92-532, as amended by Pub. L. 93-254 (1974), 33 U.S.C. 1402.

³ Sec. 202, Pub. L. 93-438, 42 U.S.C. 5842. Nuclear waste management responsibilities were subsequently transferred to the Department of Energy, Secs. 203(a)(8), 301(a), Pub. L. 95-61, 42 U.S.C. 7133(a)(8), 7151(a).

⁴ Proposed General Statement of Policy, "Licensing Procedures for Geologic Repositories for High-Level Radioactive Wastes," 43 FR 53869, 53870, November 17, 1978; Report to Congress, "Regulation of Federal Radioactive Waste Activities," NUREG-0527 (1979), 2-1, 2-2, Appendix C.

used for preparing HLW for disposal. It includes the following definition:

The term "high level radioactive waste" means the high level radioactive waste which was produced by the reprocessing at the Center of spent nuclear fuel. Such term includes both liquid wastes which are produced directly in reprocessing, dry solid material derived from such liquid waste and such other material as the Commission designates as high level radioactive waste for purposes of protecting the public health and safety.⁵

The Commission has not yet designated any "other material" as HLW under the West Valley Act. Rather, it has construed the term in a manner equivalent to the 10 CFR 50, Appendix F definition. That is, it is the liquid wastes in storage at West Valley and the dry solid material derived from solidification activities that are regarded as HLW, and it is DOE's plans with respect to such wastes that are subject to the Commission's review.

B. *Current NRC regulations.* The Commission has adopted regulations that govern the licensing of DOE activities at geologic repositories for the disposal of HLW. The regulations define HLW in the jurisdictional sense. That is, if the facility is for the "storage" of "HLW" as contemplated by the Energy Reorganization Act, the prescribed procedures and criteria would apply.⁶ The appropriate definition for this purpose draws upon the understanding in 1974, as reflected in Appendix F and the Marine Sanctuaries Act, rather than the words of the West Valley Act of more limited purpose and scope.

It should be emphasized that NRC's existing regulations in Part 60 do not require that any radioactive materials, whether HLW or not, be stored or disposed of in a geologic repository.⁷

⁵ Sec. 6(4), Pub. L. 96-368, 42 U.S.C. 2021a note.

⁶ NRC regulations are codified in 10 CFR Part 60 (Part 60). DOE is required to have a license to receive source, special nuclear or byproduct material at a geologic repository operations area. § 60.3. A geologic repository operations area is defined to refer to a "HLW facility" which in turn is defined as a facility subject to NRC licensing authority under the Energy Reorganization Act of 1974, note 3, *supra*. § 60.2 The Part 60 definition of HLW, *ibid.*, is as follows:

"High-level radioactive waste" or "HLW" means: (1) Irradiated reactor fuel, (2) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, and (3) solids into which such liquid wastes have been converted.

⁷ In the event that commercial reprocessing of irradiated reactor fuel is pursued, Appendix F of 10 CFR Part 50 would require that the resulting reprocessing wastes be transferred to a Federal repository.

Nor do they provide that radioactive materials must be HLW in order to be eligible for disposal in a geologic repository. Part 60 expressly provides for NRC review and licensing with respect to any radioactive materials that may be emplaced in a geologic repository authorized for disposal of HLW. The term "high-level radioactive waste" in Part 60 identifies the class of facilities subject to NRC jurisdiction.

The Commission has also adopted regulations related to land disposal of low-level radioactive wastes (10 CFR Part 61). Based on analyses of potential human health hazards, these regulations identify three classes of low-level radioactive wastes which are routinely acceptable for near-surface disposal, with "Class C" denoting the highest radionuclide concentrations of the three. Class C does not, however, denote a maximum concentration limit for low-level wastes. The low-level waste category includes all wastes not otherwise classified, while HLW is currently defined by source (rather than concentration or hazard) and is limited to reprocessing wastes and spent fuel. Thus, there is no regulatory limit on the concentrations of LLW, and some LLW (exceeding Class C concentrations) may have concentrations approaching those of HLW. These are the wastes which the Commission wishes to evaluate for possible classification as HLW. The Appendix to this notice presents information on the volumes and characteristics of wastes with radionuclide concentrations exceeding the Class C concentration limits. (This Appendix was prepared in 1985. DOE is currently carrying out a study of "above Class C" wastes which will update the information presented here.)

C. Nuclear Waste Policy Act of 1982. The Nuclear Waste Policy Act of 1982 (NWP), Pub. L. 97-425, provides for the development of repositories for the disposal of high-level radioactive waste and establishes a program of research, development, and demonstration regarding the disposal of high-level radioactive waste.⁸ The NWP follows, with some modification, the text of the West Valley Act. For purposes of the NWP, the term "high-level radioactive waste" means:

(A) The highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission

products in sufficient concentrations; and

(B) Other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation.⁹

It should be noted that the NWP does not require that materials regarded as HLW pursuant to this definition be disposed of in a geologic repository. Indeed, the NWP directs the Secretary (of DOE) to continue and accelerate a program of research, development and investigation of alternative means and technologies for the permanent disposal of HLW.¹⁰ Part 60 and the changes discussed in this notice would allow for consideration of such alternatives by the Commission. Nevertheless, the NWP does not specifically authorize DOE to construct or operate facilities for disposal by alternative means, and new legislative authorization might be needed in order to dispose of HLW by means other than emplacement in a deep geologic repository.

II. Considerations for Defining "High-Level Radioactive Waste"

Wastes which have historically been referred to as HLW (i.e., reprocessing wastes) are initially both intensely radioactive and long-lived. These wastes contain a wide variety of radionuclides. Some (principally Sr-90 and Cs-137) are relatively short-lived and represent a large fraction of the radioactivity for the first few centuries after the wastes are produced. These nuclides produce significant amounts of heat and radiation, both of which are of concern when disposing of such wastes. Other nuclides, including C-14, Tc-99, I-129 and transuranic nuclides, have very long half-lives and thus constitute the longer-term hazard of the wastes. Some of these nuclides pose a hazard for sufficiently long periods of time that the term "permanent isolation" is used to describe the type of disposal required to isolate them from man's environment. The Commission considers that these two characteristics, intense radioactivity for a few centuries followed by a long-term hazard requiring permanent isolation, are key features which can be used to distinguish high-level wastes from other waste categories.

The NWP identifies two sources of HLW, each of which is discussed separately in the following sections.

A. Clause (A)

Clause (A) of the NWP definition of HLW refers to wastes produced by reprocessing spent nuclear fuel and thus is essentially identical to the Commission's current HLW definition in 10 CFR Part 60. Clause (A) is, however, different in one respect. The NWP wording would classify solidified reprocessing waste as HLW only if such waste "contains fission products in sufficient concentrations"—a phrase that may reflect the possibility that liquid reprocessing wastes may be partitioned or otherwise treated so that some of the solidified products will contain substantially reduced concentrations of radionuclides.

The question, then, is whether Commission should (1) numerically specify the concentrations of fission products which it would consider "sufficient" to distinguish HLW from non-HLW under Clause (A); or (2) define HLW so as to equate the Clause (A) wastes with those which have traditionally been regarded as HLW.

1. Numerically Specifying Concentrations of Fission Products

The first option considered is to numerically define "sufficient concentrations" of fission products. Liquid reprocessing wastes may contain significant amounts of non-radioactive salts, and removal of these salts prior to waste solidification may be desirable for both economic and public health and safety reasons. Removal of salts in this way would result in a smaller volume of highly radioactive wastes, which might reduce the cost and radiological impacts associated with transportation and occupational handling of those wastes. Nevertheless, any salts removed from liquid HLW would retain residual amounts of radioactive contaminants. By establishing numerical limits on the concentrations of fission products, the Commission would be identifying those wastes from reprocessing that require disposal in a deep geologic repository or its equivalent. The proper classification of the salts discussed above would then be made on the basis of the numerical limits on radionuclide concentrations and the salts would be disposed of accordingly. In other cases, certain radionuclides may be removed from the bulk liquid reprocessing waste (as has been done in removing cesium and strontium from wastes at Hanford), raising similar questions about the classification of the remaining waste and acceptable methods of disposal. For these reasons, there would be merit in numerically specifying the

⁸ For purposes of the NWP, "spent nuclear fuel" is distinguished from "high-level radioactive waste," but the provisions of the statute dealing with such spent nuclear fuel are not of present concern.

⁹ Sec. 2(12), Pub. L. 97-425, 42 U.S.C. 10101(12). Sec. 2(16) also authorizes the Commission to classify certain radioactive material as low-level radioactive waste.

¹⁰ Sec. 222, Pub. L. 97-425, 42 U.S.C. 10202.

concentrations of radionuclides in solidified reprocessing wastes which would distinguish HLW from non-HLW.

(Clause (A) refers to solidified waste "that contains fission products in sufficient concentrations." No mention is made of the long-lived transuranic radionuclides which are also present in liquid reprocessing wastes but, since the transuranics constitute the predominant long-term hazard of reprocessing wastes, such nuclides must be considered as well in defining reprocessing wastes that should be regarded as HLW. With this view, a numerical classification of solidified wastes under Clause (A) could be derived in the same manner, and contain the same concentration limits, as the numerical definitions developed under Clause (B). Derivation of concentration limits under Clause (B) is discussed in the following section of this notice.)

2. Traditional Definition

The alternate approach is to define HLW so as to equate the category of Clause (A) wastes with those wastes which have traditionally been regarded as HLW under Appendix F to 10 CFR Part 50 and the Energy Reorganization Act. The advantage of this option is that the term HLW retains its utility in defining the facilities that are subject to NRC licensing. That is, all materials that have traditionally been considered HLW for purposes of the Energy Reorganization Act would also be regarded as HLW under the Nuclear Waste Policy Act. The disadvantage is that some materials might continue to fall within the HLW classification even though they do not require the degree of isolation afforded by a repository. They would be called "HLW" even though the technical community might not so regard them.

3. Other Considerations Regarding Clause (A) Options

The Commission would add two observations regarding the options discussed above.

a. Development of a definition under Clause (A), as suggested by the first option, would not alter the Commission's existing authority to license DOE waste facilities, including defense wastes facilities, under the Energy Reorganization Act of 1974 (ERA). Any classification of wastes as non-HLW on the basis that they do not contain "sufficient concentrations" of fission products would be irrelevant in determining whether such wastes must be disposed of in licensed disposal facilities. For example, if DOE were to pursue its proposal for in-place

stabilization of the Hanford "tank" wastes (see DOE/EIS-0113, March, 1986), most or all of the disposal "facilities" for those wastes would need to be licensed by the NRC.

b. Retaining the traditional definition for purposes of Clause (A) does not limit the Commission's ability to establish at some later date criteria to define wastes that require the isolation afforded by a deep geologic repository or its equivalent. That is, wastes requiring such isolation could be identified by terms other than "high-level".

B. Clause (B)

Clause (B) of the NWPA authorizes the Commission to classify "other highly radioactive material" (other than reprocessing wastes) as HLW if that material "requires permanent isolation." The Commission considers that both characteristics (highly radioactive and requiring permanent isolation) must be present simultaneously in order to classify a material as HLW.¹¹ Each of these characteristics is discussed in turn in the following sections.

1. Highly Radioactive

The Commission proposes¹² to consider a material "highly radioactive" if it contains concentrations of short-lived radionuclides in excess of the Class C limits of Table 2 of 10 CFR Part 61. Such concentrations are sufficient to produce significant radiation levels and to generate substantial amounts of heat. Moreover, the Class C concentration limits for short-lived nuclides approximate the actual concentrations of those nuclides present in some existing reprocessing wastes (see NUREG-0946, Table 4).

2. Permanent Isolation

The phrase "permanent isolation" in NWPA is much less subjective than is "highly radioactive." Within the context of NWPA, "permanent isolation" clearly implies the degree of isolation afforded by a deep geologic repository.¹³ Thus, a

¹¹ The Commission would not find tenable the argument that a material requires permanent isolation because it is highly radioactive. The need for permanent isolation correlates with the length of time a material will remain hazardous. Long half-lives, in turn, correlate with low rather than high levels of radioactivity.

¹² All references to "proposals" by the Commission refer only to its tentative views. No formal proposals will be developed until comments are received in response to this notice.

¹³ The NWPA includes the following definition: The term "disposal" means the emplacement in a repository of high-level radioactive waste, spent nuclear fuel, or other highly radioactive material with no foreseeable intent of recovery, whether or not such emplacement permits the recovery of such waste.

waste "requires permanent isolation" if it cannot be safely disposed of in a facility less secure than a repository. The Commission will determine which wastes require permanent isolation by evaluating the disposal capabilities of alternative, less secure, disposal facilities.¹⁴ Any wastes which cannot be safely disposed of in such facilities will be deemed to require permanent isolation and, if also highly radioactive, would be classified as high-level wastes.

The approach which the Commission proposes to pursue to determine which wastes require permanent isolation will be an extension of the 10 CFR Part 61 waste classification analyses and will consist of the following steps.

a. *Establish acceptance criteria.* 10 CFR Part 61 currently contains performance objectives for disposal of radioactive wastes in a land disposal facility. These performance objectives will serve as acceptance criteria for waste classification analyses, but might need to be supplemented for specific types of facilities or wastes. The Part 61 performance objectives may also need to be supplemented to accommodate any environmental standards for non-HLW which may be promulgated by the U.S. Environmental Protection Agency pursuant to its authority under the Atomic Energy Act of 1954, as amended.

b. *Define disposal facility.* The hazard which a radioactive waste poses to public health depends, in part, on the nature of the facility used for its disposal. Thus, a reference disposal facility, less secure than a repository, needs to be defined in terms of the characteristics which contribute to isolation of wastes from the environment. For land disposal facilities, such characteristics might include depth of disposal, use of engineered barriers, and the geologic, hydrologic and geochemical features of a disposal site.

c. *Characterize wastes.* Wastes will be characterized in terms of the factors which determine their hazard and behavior after disposal, including

The term "repository" means any system licensed by the Commission that is intended to be used for, or may be used for, the permanent deep geologic disposal of high-level radioactive waste and spent nuclear fuel, whether or not such system is designed to permit the recovery, for a limited period during initial operation, of any materials placed in such system. Such term includes both surface and subsurface areas at which high-level radioactive waste and spent nuclear fuel handling activities are conducted.

¹⁴ These facilities might make use of intermediate depth burial or various engineering measures, such as intruder barriers, to accommodate wastes with radionuclide concentrations unsuitable for disposal by shallow land burial.

physical and chemical forms of the waste, the radionuclide concentrations and associated radiological characteristics, the waste volumes, and the heat generation rates. The wide range of types and characteristics of wastes arising from industrial, biomedical and nuclear fuel cycle sources makes this a particularly critical step in the waste classification process—especially for wastes to be generated in the future (e.g., decommissioning wastes).

d. Develop assessment methodology. Analytical methods (including mathematical models and computer codes) for projecting disposal system performance will be acquired or developed. For land disposal facilities, such methods include models of groundwater flow and contaminant transport. An assessment methodology also includes descriptions of the natural and human-initiated disruptive events or processes which could significantly affect disposal system performance as well as the analytical means for evaluating the impacts of such events or processes.

e. Evaluate disposal system performance. The performance of the alternative disposal facility will be evaluated to estimate the public health hazards from disposal of various types and concentrations of wastes. Hazards below the acceptance criteria of item (a) above indicate an acceptable match of waste type and disposal option. Wastes which cannot be safely disposed of in the alternative facility will be classified as requiring permanent isolation.

A practical difficulty with classifying wastes as described here is that alternative disposal facilities are currently unavailable. Thus, classification of wastes in this manner requires many assumptions about the performance of nonexistent disposal facilities. Such analyses will inevitably involve substantial uncertainties.

It is also possible that no alternative disposal facility will ever be needed for commercially-generated "above Class C" wastes. (Disposal of such wastes is a Federal, rather than State, responsibility.) Because of the overhead costs of developing and licensing new facilities, the relatively small volumes of such wastes, and the low heat generation rates of some of these wastes, it might prove most economical to dispose of all such wastes in a repository. Nevertheless, the Commission recognizes a "chicken-and-egg" problem here. Until wastes are classified as HLW or non-HLW, it may be difficult for the DOE to make decisions regarding appropriate types of disposal facilities. Therefore, despite the

uncertainties involved, the Commission proposes to select a hypothetical alternative disposal facility which will serve as the basis for carrying out waste classification analyses.

Previous analyses by the NRC (NUREG-0782, draft EIS for 10 CFR Part 61) suggest that disposal facilities with characteristics intermediate between shallow land burial and geologic repository disposal may be most effective in protecting against short-term radiological impacts associated with inadvertent intrusion into a disposal facility. These "intermediate" facilities may be much less effective in providing enhanced long-term isolation of very long-lived radionuclides. If this preliminary view is supported by subsequent analyses, wastes with concentrations above the Commission's current Class C limits for long-lived nuclides (Table 1 of 10 CFR Part 61) would require permanent isolation. In the following sections, the Commission will assume, for the sake of illustration, that Table 1 is an appropriate interpretation of the term "requires permanent isolation."

3. Conceptual Definition of "High-Level Waste"

The Commission proposes to Classify wastes as HLW under Clause (B) of the NWSA definition only if they are both highly radioactive and in need of permanent isolation. As discussed above, the Commission considers that wastes should be considered to be highly radioactive if they contain concentrations of short-lived radionuclides which exceed the Class C limits of Table 2 of 10 CFR Part 61. The Commission also assumes, for illustrative purposes, that the radionuclide concentrations of Table 1 of Part 61 are appropriate for identifying the concentrations of long-lived radionuclides requiring permanent isolation. Solidified reprocessing wastes would similarly be classified as HLW only if they contain both short- and long-lived radionuclides in concentrations exceeding Tables 2 and 1, respectively.

It is assumed that a revised definition of HLW would appear in the definitions section of Part 60, and that the materials encompassed by the definition would be subject to the containment requirements of that regulation. It would also serve incidentally to define the materials covered by DOE's waste disposal contracts. This definition would apply only to wastes disposed of in a facility licensed under Part 60. As discussed elsewhere in this notice, there would be no alteration of the Commission's authority to license disposal of HLW

under provisions of the Energy Reorganization Act. Some technical amendments would be needed to preserve the jurisdictional provisions of existing Part 60—i.e., to indicate that Part 60 applies to the DOE facilities described in sections 202(3) and (4) of the Energy Reorganization Act, and for that purpose the proposed definition of HLW would not be controlling.

A conceptual, revised definition of HLW could be stated as follows:

"High-level radioactive waste" or "HLW" means: (1) Irradiated reactor fuel, (2) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, (3) solids into which such liquid wastes have been converted, and solid radioactive wastes from other sources, provided such solid materials contain both long-lived radionuclides in concentrations exceeding the values of Table 1 and short-lived radionuclides with concentrations exceeding the values of Table 2.

TABLE 1

Radionuclide	Concentration ¹ (Ci/m ³)
C-14.....	8
C-14 in act. metal.....	80
Ni-59 in act. metal.....	220
Nb-94 in act. metal.....	0.2
Tc-99.....	3
I-129.....	0.08
Alpha emitting TRU, t _{1/2} > 5 yr.....	*100
Pu-241.....	*3,500
Cm-242.....	*20,000

¹ If a mixture of radionuclides is present, a sum of the fractions rule is to be applied for each table. The concentration of each nuclide is to be divided by its limit, and the resulting fractions are to be summed. If the sum exceeds one for both tables, the waste is classified as HLW.

* Units are nanocuries per gram.

TABLE 2

Radionuclide	Concentration ¹ (Ci/m ³)
Ni-63.....	700
Ni-63 in act. metal.....	7,000
Sr-90.....	7,000
Cs-137.....	4,600

¹ If a mixture of radionuclides is present, a sum of the fractions rule is to be applied for each table. The concentration of each nuclide is to be divided by its limit, and the resulting fractions are to be summed. If the sum exceeds one for both tables, the waste is classified as HLW.

4. Status of wastes not classified as HLW

The NWPA, the Low-Level Radioactive Waste Policy Act, and the Commission's regulations in 10 CFR Part 61 currently classify wastes as "low-level" if they are not otherwise classified as high-level wastes or certain other types of materials (e.g., uranium mill tailings). Classification of certain wastes as HLW, under Clause (B) of the NWPA definition, would reduce the amount of waste classified (by default) as LLW and, more importantly, would establish a distinct, concentration-based boundary between the two classes of waste.

If this conceptual definition of Clause (B) were adopted, certain wastes with radionuclide concentrations above the Class C limits of 10 CFR Part 61 would not be classified as HLW because they do not contain the requisite combination of short- and long-lived nuclides. These wastes would continue to be classified as special types of low-level wastes analogous to DOE's "transuranic" waste category. Any such wastes generated by defense programs would continue to fall under DOE's responsibility for disposal, and no NRC licensing of facilities intended solely for their disposal, such as the Waste Isolation Pilot Plant (WIPP), would be authorized.

As provided by the amendments to the Low-Level Radioactive Waste Policy Act,¹⁶ the Federal government is responsible for disposal of all commercially-generated "above Class C" wastes; it is contemplated, under the amendments, that the NRC would be responsible for licensing the facilities for their disposal. The Commission would continue to permit disposal of wastes containing naturally-occurring or accelerator-produced materials in licensed facilities provided there was no unreasonable risk to public health and safety.

III. Legal Considerations Related to the Nuclear Waste Policy Act

The exercise of NWPA Clause (B) authority may give rise to a number of legal questions which are discussed below.

A. Disposal of waste generated by materials licensees. The NWPA established a Nuclear Waste Fund composed of payments made by the generators and owners of "high-level radioactive waste" (including spent fuel) that will ensure that the costs of disposal will be borne by the persons

responsible for generating such waste. The Nuclear Waste Fund is to be funded with moneys obtained pursuant to contracts entered into between the Secretary of Energy and persons who generate or hold title to high-level radioactive waste.

The statute addresses the particulars of contracts with respect to spent nuclear fuel and solidified high-level radioactive waste derived from spent nuclear fuel used to generate electricity in a civilian nuclear power reactor. It further limits the authority of the Commission to issue or renew licenses for utilization and production facilities—i.e., for present purposes, nuclear reactors and reprocessing plants—unless the persons using such facilities have entered into contracts with the Secretary of Energy.

The absence of any reference to materials licensees (e.g., fuel fabricators, some research laboratories) suggests that the Nuclear Waste Fund was not intended to apply to their activities. As a result, there could be a question if the Commission were to define materials licensees' waste as high-level waste, because the waste might thereby become ineligible for disposal in a repository. The reason is that the law prohibits disposal of HLW in a repository unless such waste was covered by a contract entered into by June 30, 1983 (or the date the generator or owner commences generation of or takes title to the waste, if later). Few contracts have been entered into with materials licensees except those who are also facility licensees. Thus, it can be argued that the Commission should refrain from designating as HLW, under Clause (B),¹⁶ materials generated by materials licensees.

The Commission is not persuaded by such an argument. The statutory language dealing with the Commission's classification of materials as HLW refers solely to considerations relating to the nature of the wastes, and the character of the licensee generating or owning the waste is simply not relevant. If there are good reasons to treat that waste from materials licensees as HLW, the Commission regards it as likely that any statutory impediment to the acceptance of such waste at a geologic repository could be modified.

B. Confidence regarding disposal capacity for power reactors. The availability of waste disposal facilities for wastes generated at commercial power reactors has been the subject of

controversy and litigation. The NWPA addresses these concerns by establishing a Federal responsibility to provide for the construction and operation of a geologic repository, leaving undefined (i.e., to the discretion of the Commission) the classes of materials that require permanent isolation in such a facility. Whatever materials they may be, however, they must be transferred to DOE for disposal; and the persons responsible for generating the waste must enter into contracts with DOE which provide for payment of fees sufficient to offset DOE's costs of disposal. Existing facility licensees were required to enter into such contracts by June 30, 1983.

The Commission believes that the purpose of the NWPA can best be accomplished if all the highly radioactive wastes generated by facility licensees (reactors and reprocessing plants) which require permanent isolation are covered by waste disposal contracts with DOE. This would assure that DOE can and will accept possession of such wastes when necessary. Further, in the absence of such assurance, the basis for Commission confidence that these wastes will be safely stored and disposed of would be subject to question even if concerns about the disposal of the licensees' spent nuclear fuel had been laid to rest. Accordingly, if there are any highly radioactive materials (other than those previously regarded as HLW) that are generated by facility licensees and that require permanent isolation, the Commission believes that, for purposes of the NWPA, they should be regarded as "high-level waste." The Commission has reviewed the terms of DOE's standard waste disposal contract and believes that classifying such additional materials as HLW would require no changes to the contract terms.

C. Implications with respect to disposal methods. Under the Atomic Energy Act of 1954, the Commission is authorized to establish such standards to govern the possession of licensed nuclear materials as it may deem necessary or desirable to protect health.¹⁷ Under this authority, the Commission may classify materials according to their hazards and may prescribe requirements for the long-term management or disposal thereof. It is not necessary to label materials as HLW under the NWPA in order to require their disposal in a geologic repository or other suitably permanent facility.

The Commission exercised this authority with respect to concentrated

¹⁶ Low-Level Radioactive Waste Policy Amendments Act of 1980, Pub. L. 96-240, Sec. 2, 42 U.S.C. 2021c.

¹⁶ The Nuclear Waste Fund is governed by Sec. 302, Pub. L. 97-425, 42 U.S.C. 10222. The prohibition of disposal of HLW not covered by timely contracts is set out in sec. 302(b)(2).

¹⁷ Sec. 161b, Pub. L. 83-703, 42 U.S.C. 2201(b).

reprocessing wastes by specifying, in Appendix F to 10 CFR Part 50, that any such wastes generated at licensed facilities are to be transferred to a Federal repository for disposal. More recently, the Commission classified certain low-level wastes as being generally acceptable for near-surface disposal (10 CFR Part 61). On the basis of further consideration, the Commission could specify appropriate disposal means for wastes exhibiting radionuclide concentrations greater than those defined in Part 61. Thus, the Commission need not exercise NAWPA Clause (B) authority in order to assure that radioactive wastes from licensed activities are disposed of properly. Moreover, the identification of material as HLW under Clause (B) would not by itself mandate that such material must be disposed of in a geologic repository. Since the NAWPA authorizes only a single method of permanently isolating HLW—geologic repositories—classification of materials as HLW may effectively preclude disposal of such wastes by other means. Nevertheless, the Commission's regulations will continue to leave open the prospect of disposal by other means if Congress should so authorize.

D. Relationship to State role. Section 3 of the Low-level Radioactive Waste Policy Act (LLRWA), Pub. L. 96-573, 42 U.S.C. 2021b., enacted in 1980, defines a State responsibility to provide, pursuant to regional compacts, for the disposal of "low-level radioactive waste" (LLW).¹⁰ Such waste is defined to mean "radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or by-product material as defined in section 11.e.(2) of the Atomic Energy Act of 1954."

The Low-Level Radioactive Waste Policy Amendments Act of 1985, Pub. L. 99-240, 42 U.S.C. 2021c., limited the range of LLW for which the States must provide disposal capacity. Specifically, the States are not responsible for wastes with radionuclide concentrations in excess of the Class C limits of 10 CFR Part 61. Instead, the Federal government now assumes responsibility for providing disposal capacity for such wastes. Thus, classification of "above Class C" wastes as HLW or non-HLW will have no impact on State government responsibilities.

E. Impact on existing technical criteria. NRC's regulations in Part 60 include technical criteria to be applied in licensing DOE's receipt and

possession of source, special nuclear, and byproduct material at a geological repository. The regulations would accommodate the disposal of any radioactive materials, including spent fuel, reprocessing wastes, or any other materials which could be disposed of in accordance with the specified performance objectives.

Materials categorized as high-level waste are subject to a containment requirement (§ 60.113(a)(1)(i)(A)) and to specified waste package design criteria and waste form criteria (§ 60.135 (a-c)). These criteria apply to wastes characterized by the presence of fission products generating substantial amounts of heat at the time of emplacement, but with much reduced heat generation after decades or a few centuries.¹⁰ The rule also explicitly provides that design criteria for waste types other than HLW will be addressed on an individual basis if and when they are proposed for disposal in a geologic repository (§ 60.135(d)).

If additional materials were to be designated as high-level waste, the Commission would need to consider whether the existing repository design criteria are appropriate with respect to such materials.

F. Applicability of HLW definition to naturally-occurring and accelerator-produced radioactive materials. Clause (B) of the NAWPA provides that the Commission may extend the definition of the term "high-level radioactive waste" to include material requiring permanent isolation only where this is "consistent with existing law." The applicable existing law is the Atomic Energy Act of 1954, under which the Commission has authority to regulate the possession and use of "source material," "special nuclear material," and "byproduct material." There are other radioactive materials, however: naturally-occurring radionuclides, such as radium, and accelerator-produced radionuclides. These are not covered by the Atomic Energy Act and hence there would be no statutory basis, consistent with existing law, for the Commission to require that they be disposed of at facilities licensed by the Commission or otherwise to regulate their possession or use. Accordingly, no legal basis exists for the Commission to classify such materials as HLW or non-HLW.

¹⁰ The Commission's expectation that HLW would generate significant amounts of heat is reflected in the discussion of transuranic waste in the notice of proposed rulemaking on the Part 60 technical criteria, 48 FR 35284, July 8, 1983. Reduction of the heat load, for example by removal of cesium-137 and strontium-90, could result in different containment requirements. 48 FR 28196, June 21, 1983 (final rule).

Nevertheless, as already noted, 10 CFR Part 60 contemplates that "other radioactive materials other than HLW" may be received for emplacement in a geologic repository. This provision of Part 60 would not be altered by expanding the definition of HLW. Part 60 provides that waste package requirements for such wastes will be determined on a case-by-case basis when these wastes are proposed for disposal. Thus, it might be determined, on the basis of technical considerations, that certain naturally-occurring or accelerator-produced radioactive waste materials present hazards similar to licensed materials that are defined as high-level waste and that such material should be disposed of in a geologic repository developed under NAWPA. If so, plans for such disposal can be reviewed under Part 60 and the Commission could impose such packaging or other requirements as appropriate to protect public health and safety.

IV. Issues on Which Public Comments are Particularly Sought.

The Commission invites comments on all the issues identified in this notice and any other issues that might be identified. However, comments (with supportive rationale) in response to the following would be particularly helpful.

1. Two options are presented for defining reprocessing wastes under Clause (A) of NAWPA. The first option proposes to define the "sufficiency" of fission product concentrations in solidified reprocessing wastes in a manner analogous to its treatment of "highly radioactive" and "requires permanent isolation" under Clause (B) (i.e., by examining the hazards posed by wastes if disposed of in facilities other than a repository). The second option interprets Clause (A) as encompassing all those wastes which have heretofore been considered high-level waste under Appendix F to 10 CFR Part 50 and the Energy Reorganization Act. Which of these two approaches is preferable?

2. The Commission proposes that the current Class C concentration limits of 10 CFR Part 61 serve to identify radionuclide concentrations which are "highly radioactive" for purposes of Clause (B) of the NAWPA definition. Would an alternative set of concentration limits be preferable? If so, how should such limits be derived?

3. The Commission proposes to equate the "requires permanent isolation" wording of the NAWPA definition with a level of long-term radiological hazard requiring disposal in a geologic repository. Are the Commission's

¹⁰ States are not responsible for disposal of LLW from atomic energy defense activities or Federal research and development activities.

proposed analyses appropriate for identification of concentrations requiring permanent isolation?

4. Although, under section 121 of NWPA, no environmental review is required with respect to the definition of HLW, the Commission would welcome identification of any environmental consequences associated with the matters discussed in this notice.

5. Some waste materials, such as certain laboratory wastes or some sealed sources, may be highly concentrated, yet contain only relatively small total quantities of radioactive materials. Is there a need for a special provision (e.g., a minimum total quantity of activity) before a waste should be classified as HLW?

6. What difficulties (legal, administrative, financial, or other) would an expanded definition of HLW cause in implementing the provisions of the NWPA?

7. The Commission's regulations do not generally require that any particular type of waste be disposed of in any specified type of facility. Would such a requirement be appropriate?

8. As discussed in this notice, the Commission has no legal authority to classify naturally-occurring or accelerator-produced radioactive materials (NARM) as HLW or non-HLW. Nevertheless, such materials may be presented for disposal at facilities licensed by the Commission. When the Commission carries out its proposed analyses to identify "other highly radioactive material that . . . requires permanent isolation," should NARM be included in the analyses?

9. Are there issues other than those identified in this notice which the Commission should consider in developing approaches to implement its authority?

Separate Views of Commissioner Assestine

Commissioner Assestine is concerned about the potential for creating a confusing situation if the Commission were to adopt the first option under Clause (A). The first option is to numerically specify concentrations of fission products in defining high-level wastes. Under this approach, it is conceivable that material considered high-level waste for the purposes of licensing under the Energy Reorganization Act of 1974 will also be considered low-level waste for the purposes of the Nuclear Waste Policy Act (NWPA) of 1982. Wastes presently being stored at the Hanford waste tanks, which have traditionally been classified as high-level wastes, would likely be reclassified as above Class C low-level

waste under the first option.

Commissioner Assestine requests public comment on how this reclassification would affect the NRC's licensing authority over the long-term storage or *in situ* disposal of the Hanford waste tanks. Commissioner Assestine also requests comments on whether there are alternative approaches to achieving the stated purpose of this advanced notice of proposed rulemaking of identifying wastes subject to the provisions of the NWPA without altering the traditional definition of high-level waste and thus creating this potential for confusion.

List of Subjects in 10 CFR Part 60

High-level waste, Nuclear power plants and reactors, Nuclear materials, Penalty, Reporting requirements, Waste treatment and disposal.

Authority: The authority citation for this document is Sec. 161, Pub. L. 83-703, 68 Stat. 948, as amended (42 U.S.C. 2201).

Dated at Washington, DC, this 20th day of February 1987.

For the Nuclear Regulatory Commission,
Samuel J. Chilk,
Secretary of the Commission.

Appendix—Volumes and Characteristics of Wastes Exceeding Class C Concentration Limits

For a number of years NRC has had an ongoing program to develop regulations and criteria for disposal of low-level radioactive waste. At the time this program was initiated, there was a well-documented need for comprehensive national standards and technical criteria for the disposal of low-level waste. The absence of sufficient technical standards and criteria was seen to be a major deterrent to the siting of new disposal facilities by states and compacts.

A significant milestone in this program was the promulgation of the regulation 10 CFR Part 61 ("Licensing Requirements for Land Disposal of Radioactive Waste") on December 27, 1982 (47 FR 57446). This regulation establishes procedural requirements, institutional and financial requirements, and overall performance objectives for land disposal of radioactive waste, where land disposal may include a number of possible disposal methods such as mined cavities, engineered bunkers, or shallow land burial. This regulation also contains technical criteria (on site suitability, design, operation, closure, and waste form) which are applicable to near-surface disposal, which is a subset of the broader range of land disposal methods. Near-surface disposal is defined as disposal in or within the upper 30 meters of the earth's surface, and may include a range of possible techniques such as concrete bunkers or shallow land burial. The Part 61 regulation is intended to be performance-oriented rather than prescriptive, with the result that the Part 61 technical criteria are written in relatively general terms, allowing applicants to

demonstrate how their proposals meet these criteria for various specific near-surface disposal methods.

A waste classification system was also instituted in the regulation which establishes three classes of waste suitable for near-surface disposal: Class A, Class B, and Class C. Limiting concentrations for particular radionuclides were established for each waste class, with the highest limits being for Class C. The concentration limits were established based on NRC's understanding (at the time of the rulemaking) of the characteristics and volumes of low-level waste that would be reasonably expected to the year 2000, as well as potential disposal methods.

The Class C concentration limits are applicable to all potential near-surface disposal systems; however, the calculations performed to establish the limits are based on postulated use of one near-surface disposal method: shallow land burial. The Class C limits are therefore conservative since there may be other near-surface disposal methods that have greater confinement capability (and higher costs) than shallow land burial.

The regulation states that waste exceeding Class C concentration limits is considered to be "not generally acceptable for near-surface disposal," where this is defined in § 61.55(a) as "waste for which waste form and disposal methods must be different, and in general more stringent, than those specified for Class C waste." Thus, waste exceeding Part 61 concentrations generally has been excluded from near-surface disposal and is being held in storage by licensees. (This amounts to less than 1% of the approximately 3,000,000 ft³ of commercial low-level waste annually being generated.) Given the current absence of prescriptive requirements for disposal of waste exceeding Class C concentration limits, the regulation allows for evaluation of specific proposals for disposal of such waste on a case-by-case basis. The general criteria to be used in evaluating specific proposals are the Part 61 performance objectives contained in Subpart C of the regulation.

Current NRC activities include analyses of low-level waste that exceeds Class C concentration limits to determine the extent to which alternative near-surface disposal systems (e.g. concrete bunkers, augered holes, deeper disposal) may be suitable for safe disposal of such waste. These analyses include a more detailed characterization of physical, chemical, and radiological characteristics of wastes that may be close to or exceed Class C concentration limits as well as development of improved methods for modeling the radiological and economic impact of disposal of these wastes. A related activity is development of more specific guidance for design and operation of alternative near-surface and other land disposal systems. These activities represent a continuation of the Part 61 rulemaking process as discussed in the December 27, 1982 notice of the final Part 61 regulation (47 FR 57446).

Wastes exceeding Class C concentrations are projected to be generated by nuclear power reactors and other supporting nuclear fuel cycle facilities, and also generated by

radioisotope product manufacturers and other facilities and licensees outside of the nuclear fuel cycle. Such wastes can be grouped as follows:

- Plutonium-contaminated nuclear fuel cycle wastes
- Activated metals
- Sealed sources
- Radioisotope product manufacturing wastes
- Other waste

Plutonium-contaminated nuclear fuel cycle wastes. These wastes are being generated from two principal sources. One source of waste arises from operations supporting the nuclear fuel cycle—i.e., post-irradiation radiochemical and other performance analyses of spent fuel rods from nuclear reactors (e.g., "burnup" studies). These operations generate about 200 ft³ of plutonium-contaminated waste per year, much of which is believed to exceed Class C concentration limits. This waste consists of solidified liquids and other solid material such as scrap, trash, and contaminated equipment. Eventual decommissioning of the three facilities currently performing these analyses is expected to generate additional waste volumes, a portion of which is expected to exceed Class C concentration limits.

The second source of waste arises from fuel cycle licensees who have previously been authorized to use plutonium in research and development of advanced reactor fuels. None of these licensees is using plutonium now, and there is no prospect in the foreseeable future for such activities. In fact, each of the licensees in this category has either decommissioned, or is in the process of decommissioning, its facility. Some of the licensees have made contractual arrangements to transfer their decommissioning waste to DOE for retrievable storage. Approximately 5,000 to 10,000 ft³ of waste, however, is projected to be generated on a one-time basis that will not be covered by contract.

Activated metals. Activated metals are typically generated as a result of long-term neutron bombardment of metals forming the structure or internal components of a nuclear reactor used for power production, radioisotope production, or other purpose (e.g., education, testing, research). Activated metal wastes are unlike most other wastes being generated in that the radionuclides form part of the actual metal matrix rather than being mixed with large volumes of other, nonradioactive material such as paper, cloth or resins. Radionuclide release is principally governed by the material corrosion rate, and for most reactor metals of concern (e.g., stainless steel), the corrosion rate is quite low.

To date, only a small fraction (about 200 ft³/yr) of the activated metal waste currently being generated by nuclear power reactors has been identified as exceeding Class C concentration limits. Such waste appears to primarily consist of in-core instrumentation which is no longer serviceable. An example of this waste is a reactor flux wire which is physically small but may be high in activity. (A flux wire is a wire that is inserted into a tube running the length of the reactor core

and used to make neutron flux measurements.)

Large quantities of activated metal wastes are projected to be generated in the future as a part of reactor decommissioning. Studies by NRC (NUREG/CR-0130, addendum 3 and NUREG/CR-0672, addendum 2) indicate that over 99% of the waste volume that is projected to result from nuclear power reactor decommissioning will not exceed Class C concentration limits and the 1% that is projected to exceed these limits will be almost all activated metals from core structure. Conservative estimates presented in these studies indicate that packaged quantities of decommissioning wastes exceeding Class C concentration limits will total about 4700 ft³ for a large (1175 MWe) pressurized water reactor (PWR) and about 1660 ft³ for a large (1155 MWe) boiling water reactor (BWR). Much smaller quantities of wastes exceeding Class C concentration limits may also be generated from future decommissioning of test, research, and education reactors.

Another source of activated metal waste is expected to arise as part of consolidation of spent fuel assemblies for storage and/or disposal. Spent fuel assemblies now being periodically discharged from nuclear power reactors are stored in on-site fuel storage pools. Each assembly is composed of a large number of fuel rods arranged in a rectangular array, and held in place by spacer grids, tie rods, metal end fittings, and other miscellaneous hardware. One option under consideration, for long-term waste storage and eventual disposal is to remove this hardware from the fuel rods. This allows the fuel rods, which contain the fission products which are of primary interest in terms of geologic repository disposal, to be consolidated into a smaller volume. This enables more economical storage and easier handling for transport and disposal. The hardware, which is composed of various types of corrosion-resistant metal such as Inconel or zircalloy, becomes a second waste stream which could potentially be safely disposed by a less expensive method than a geologic repository.

Based on information from DOE (DOE/RW-0006, September, 1984) about 12 kg of waste hardware would be generated per BWR fuel assembly, and about 26 kg per PWR fuel assembly. Assuming 200 fuel assemblies are replaced per year per large (1000 MWe) BWR, roughly 2400 kg of activated metal hardware would be generated per year per large BWR, and about 1700 kg per PWR. An approximate compacted volume is on the order of 50 ft³/yr per large reactor, or about 4,000 ft³/yr over the entire industry. Depending upon parameters such as the fuel irradiation history and the hardware elemental composition, particular pieces of separated hardware may or may not exceed Class C concentration limits.

Other than perhaps a few isolated cases, all of the spent fuel assemblies are being stored by licensees with the hardware still attached. Under the provisions of the NWPA, operators of nuclear power plants have entered into contracts with DOE for acceptance by DOE of the spent fuel for storage and eventual disposal. (See 48 FR

16590, April 18, 1983 for the terms of the contract.) Acceptance of the spent fuel by DOE implies acceptance of the activated hardware along with the fuel rods, with the result that disposal of the hardware would intrinsically be a Federal rather than a State responsibility. Disposal responsibility becomes less clear if licensees, seeking more efficient onsite storage, consolidated fuel themselves.

Sealed sources. A number of discrete sealed sources have been fabricated for a variety of medical and industrial applications, including irradiation devices, moisture and density gauges, and well-logging gauges. Each source contains only one or a limited number of radioisotopes. Sealed sources can range in activity from a few millionths of a curie for sources used in home smoke detectors to several thousand curies for sources used in radiotherapy irradiators. Sealed sources are produced in several physical forms, including metal foils, metal spheres, and metal cylinders clamped onto cables. The larger activity sealed sources typically consist of granules of radioactive materials encapsulated in a metal such as stainless steel.

Sealed sources are generally quite small physically. Even sources containing several curies of activity have physical dimensions which are normally less than an inch or two in diameter and 6 inches in length. These dimensions are such that, like activated metals, sealed sources may be considered to be a unique form of low-level waste. Characterizing sealed sources in terms of radionuclide concentration certainly appears to be of less utility than characterizing sealed sources in terms of source activity.

Depending upon the application, sealed sources may be manufactured using a variety of different radioisotopes. A review of the NRC sealed source registry was conducted to identify those source designs which may contain radioisotopes in quantities that might exceed Class C concentration limits. The principal possibilities appear to be those containing cesium-137, plutonium-238, plutonium-239, and americium-241. Large cesium-137 sources are generally used in irradiators, and while some large sources can range up to a few thousand curies, most which are sold appear to contain in the neighborhood of 500 curies. Cesium-137 is a beta/gamma emitter having a half-life of 30 years, which suggests that special packaging and disposal techniques can be readily developed for safe near-surface disposal of sources containing this isotope.

The remaining three isotopes are alpha emitters and are longer lived. Sources manufactured using these isotopes can range up to a few tens of curies, although most that have been sold appear to be much less than one curie in strength. Plutonium-239 sources are not commonly manufactured. Plutonium-238 sources have been manufactured for use as nuclear batteries for applications such as heart pacemakers. Plutonium-238 has also been used in neutron sources, although neutron sources currently being manufactured generally contain americium-241. Americium-241 is also used in a wide

variety of other industrial applications such as fill level gauges.

Neutron sources produce neutrons for applications such as reactor startup, well logging, mineral exploration, and clinical calcium measurements. These sources contain alpha-emitting radionuclides such as americium-241 plus a target material (generally beryllium) which generates neutrons when bombarded by alpha particles. Neutron sources can contain up to approximately 20 curies of activity.

It is difficult to project potential waste sealed source quantities and activities, since sealed sources as wastes are not routinely generated as part of licensed operations. In addition, sealed sources only become waste when a decision is made by a licensee to treat them as such. In many instances sources held by licensees may be recycled back to the manufacturer when they are no longer usable, and the radioactive material recovered and fabricated into new sources. Finally, source manufacturers are licensed by the NRC and NRC Agreement States to manufacture a particular source design up to a specified radioisotope curie limit. Most actual sources, however, contain activities considerably less than the design limit.

NRC staff estimates that licensees currently possess approximately 10,000 encapsulated sources having activities above a few thousandths of a curie and containing americium-241 or plutonium-238. Given the hypothetical case that all these sources were candidates for disposal, the total consolidated source volume would be only about 35 ft³. After packaging for shipment, however, the total disposed waste volume would be significantly increased. The total activity contained in the sources is estimated to be approximately 70,000 curies.

Radioisotope product manufacturing wastes. Wastes exceeding Class C concentration limits are occasionally generated as part of manufacture of sealed sources, radiopharmaceutical products, and other materials used for industrial, educational, and medical applications. Volumes and characteristics of such wastes are difficult to project. However, it is believed that the largest volume of this waste consists of sealed sources which cannot be recycled, plutonium-238 and americium-241 source manufacturing scrap, and waste contaminated with carbon-14.

Sealed sources as a waste form are discussed above. Manufacture of large plutonium-238 and americium-241 sources is concentrated in only a few facilities, from which the generation of waste exceeding Class C concentration limits is believed to total only a few hundred ft³ per year. Approximately 10 ft³ per year of carbon-14 waste is generated as a result of radiopharmaceutical manufacturing.

Other wastes. Although the above discussed wastes are believed to be the principal wastes that are expected to exceed Class C concentration limits, other wastes may occasionally also be generated. For example, relatively small quantities of such wastes are currently being generated as part of decontamination of the Three Mile Island, Unit 2, nuclear power plant. However, these wastes are being generated as a result of an

accident, are therefore considered abnormal, and are being transferred to DOE under a memorandum of understanding with NRC. Wastes exceeding Class C concentration limits and generated as part of the West Valley Demonstration Project are also being transferred to DOE for storage pending disposal.

Sealed sources and other waste containing discrete quantities of radium-226 may also exceed Class C concentration limits. Products containing radium-226 have been manufactured in the past for a variety of industrial and medical applications. Such wastes are not regulated by NRC but occasionally have been disposed at licensed low-level waste disposal facilities. NRC is currently investigating the impacts of disposal of such waste in order to provide guidance to States and other interested parties on safe disposal methods and any concentration limitations.

[FR Doc. 87-4129 Filed 2-26-87; 8:45 am]

BILLING CODE 7590-01-M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. 86-CE-10-AD]

Airworthiness Directives; Cessna Model T303 Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This Notice proposes to amend Airworthiness Directive (AD) 86-01-01R1, Amendment 39-5316, published in the Federal Register on May 21, 1986 (51 FR 18573), applicable to Cessna Model T303 airplanes. The AD removed approval for flight into known icing conditions for those Model T303 airplanes with flight is known icing approval. The manufacturer has developed a modification for the airplane which eliminates the unsafe condition when operating in icing conditions. This proposed amendment restores approval for flight in known icing conditions for those airplanes which install the modification.

DATE: Comments must be received on or before April 15, 1987.

ADDRESS: Cessna Service Bulletins MEB86-17, dated October 1, 1986, and MEB86-18, dated October 1, 1986, applicable to this AD may be obtained from Cessna Aircraft Company, Customer Services, P.O. Box 1521, Wichita, Kansas 67201; or may be examined in the Rules Docket at the address below. Send comments on the proposal in duplicate to Federal Aviation Administration, Central

Region, Office of the Regional Counsel, Attention: Rules Docket No. 86-CE-10-AD, Room 1558, 601 East 12th Street, Kansas City, Missouri 64106. Comments may be inspected at this location between 8 a.m. and 4 p.m., Monday through Friday, holidays excepted.

FOR FURTHER INFORMATION CONTACT:

Mr. Bennett L. Sorensen, Aerospace Engineer, Wichita Aircraft Certification Office, ACE-160W, FAA Central Region, 1801 Airport Road, Room 100, Mid-Continent Airport, Wichita, Kansas; Telephone (316) 946-4433.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in the making of the proposed rule by submitting such written data, views or arguments as they may desire. Communications should identify the regulatory docket or notice number and be submitted in duplicate to the address specified above. All communications received on or before the closing date for comments specified above will be considered by the Director before taking action on the proposed rule. The proposals contained in this notice may be changed in the light of comments received. Comments are specifically invited on the overall regulatory, economic, environmental and energy aspects of the proposed rule. All comments submitted will be available both before and after the closing date for comments in the Rules Docket for examination by interested persons. A report summarizing each FAA public contact concerned with the substance of this proposal will be filed in the Rules Docket.

Availability of NPRMs

Any person may obtain a copy of this Notice of Proposed Rulemaking (NPRM) by submitting a request to the Federal Aviation Administration, Central Region, Office of the Regional Counsel, Attention: Airworthiness Rules Docket No. 86-CE-10-AD, Room 1558, 601 East 12th Street, Kansas City, Missouri 64106.

Discussion

AD 86-01-01R1, Amendment 39-5316, was published in the Federal Register (51 FR 18573) on May 21, 1986. The AD removed approval for flight into known icing conditions for Cessna Model T303 airplanes. The AD was written because there were several reported occurrences of rudder/rudder pedal oscillations, pitch oscillations and uncommanded nose down pitch changes when conducting flight in icing conditions. AD 86-01-01 and AD 86-01-01R1 were sent

ENCLOSURE C

Document Name:
LETTER HLW

Requestor's ID:
PRICHARD

Author's Name:

Document Comments:
draft Cong. letter HLW def. 11/12/87

DRAFT CONGRESSIONAL LETTER

Dear Mr. Chairman:

Enclosed for your information is a copy of a notice of proposed rulemaking to be published in the Federal Register.

The enactment of the Nuclear Waste Policy Act of 1982, Pub. L. 97-425, led the Commission to reexamine some of the provisions of 10 CFR 60 in order to conform with the new law. As a result of this review, the Commission is planning to revise the definition of high-level radioactive wastes in Part 60. An advance notice of proposed rulemaking was published on February 27, 1987 (52 FR 5992). The Commission has considered the public comments on that notice in preparing the enclosed proposed rule.

Sincerely,

Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

Enclosure: As stated

ENCLOSURE D

NOTE:

Public Affairs is drafting an announcement, which will be circulated for concurrence within several days.

ENCLOSURE E

Document Name:
10 CFR 60 REG ANAL HLW

Requestor's ID:
3617

Author's Name:
PRICHARD

Document Comments:
SS-12/15 - 12/14/87 - PLEASE KEEP THIS SHEET WITH DOCUMENT

REGULATORY ANALYSIS
HLW DEFINITION PROPOSED RULE

I. STATEMENT OF THE PROBLEM

10 CFR Part 60 is the basis for NRC regulation of high level radioactive waste (HLW) in geologic repositories. Part 60 contains a definition of what constitutes high level waste for the purposes of the rule. The Nuclear Waste Policy Act of 1982 (NWPA) also contains a definition of high level waste, one that differs from the Part 60 definition. The NWPA definition is as follows;

- a. The highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and
- b. Other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation.

The issue at hand is whether or not to revise the definition in Part 60 to conform with that in the NWPA. Adoption of the NWPA definition would involve Commission action to decide if and how "sufficient concentrations" in clause a. of the NWPA definition should be interpreted; and in regard to clause b., how to determine what "other highly radioactive material" requires "permanent isolation."

The waste classification system presently defines HLW by source; waste generated from reprocessing spent fuel is basically HLW. Low level radioactive waste (LLW) is defined as any waste not considered HLW. There is no upper limit to what constitutes LLW. The Commission's regulations for disposal of waste in 10 CFR 61 classify some LLW as either Class A, Class B, or Class C. However, some LLW has radionuclide concentrations which are greater than the

The public comment letters generally support the idea of revision, although there is wide disagreement over exactly how to make the revision.

II. OBJECTIVE

This rulemaking would clarify the system of radioactive waste management by defining what is "high level waste" (HLW) for the purposes of NRC regulation of nuclear waste under the Nuclear Waste Policy Act of 1982 (NWPAA). Although specification of particular means of disposal of HLW is not a part of this rulemaking, the definition of HLW does have major impacts on how waste is disposed. Since DOE is not presently authorized to develop any facilities for disposal of HLW other than geologic repositories, material classified as HLW would be disposed of in geologic repositories.

Revision of the definition of HLW would not affect the responsibilities of States for managing radioactive waste. The Low Level Radioactive Waste Policy Amendments Act of 1985 established the responsibilities of States and the Federal government for waste management. States are only responsible for Class A, B, and C low level waste, as defined in Part 61. With the exception of NARM, the Federal government is responsible for all other wastes, whether they are classified as high level waste or low level waste. Revision of the definition of HLW would also not alter the authority, previously established by the Energy Reorganization Act of 1974, for NRC licensing of DOE defense waste facilities. As NRC is not presently authorized to regulate naturally occurring or accelerator produced materials (NARM), there would be no effect on these wastes.

Spent fuel is to be defined separately, following the example of the NWPAA. Transuranic waste is also a separate category. The options discussed below do not apply to these categories.

III. ALTERNATIVES

(1) MAKE NO CHANGE IN THE DEFINITION OF HLW

This alternative would continue the status quo, so that Part 60 kept the original definition of HLW. This definition would differ from the definition of HLW in the Nuclear Waste Policy Act (NWPA). There would be no Commission guidance given as to Clause B of the NWPA definition, which empowers the Commission to add to reprocessing waste and spent fuel such other highly radioactive waste which requires permanent isolation.

DOE would have responsibility for management and disposal of all HLW in the Part 60 definition plus an amount of above Class C waste, which would be classified as LLW. DOE would have to develop special facilities to dispose of this above Class C LLW, or decide to place it in the geologic repository along with HLW. DOE has stated in its recent report to Congress on management of above Class C LLW that it needs an NRC decision on how much of this above Class C waste, if any, will be classified as HLW. DOE maintains that its plans for management of radioactive wastes cannot proceed apace without an NRC decision on this point.

Other interests as well seem to desire regulatory guidance on this issue. In its evaluation of public comments on the ANPR the staff found that the Public does not generally like uncertainty as to classification of wastes. Revision of the definition of HLW was generally supported.

(2) PROCEED WITH DEFINING HLW USING THE APPROACH OUTLINED IN THE ANPR

Establish a waste classification system like that advanced in the ANPR; Carry out technical studies to determine by concentration limits on radio-nuclides which other non-reprocessing highly radioactive waste requires permanent isolation. Highly radioactive would be defined by the Commission's Part 61 upper limits for Class C LLW. The technical studies to determine which of these wastes needs permanent isolation would assume a reference type of "inter-mediate" waste facility, and consist of performance modeling of this facility combined with a variety of waste streams. Waste types which were determined to

exceed postulated release limits through performance assessment modeling would be classified as HLW. Disposal of these wastes would be in a geologic repository or equivalent in terms of permanently isolating the waste from the environment.

Waste types which, through the same type of modeling, were determined not to exceed the postulated release limits would be classified as LLW. However, as the Federal government is responsible for management of above Class C LLW, DOE would have to dispose of this above Class C LLW in an appropriate facility.

For reprocessing waste, the ANPR offered two options; (1) Treat Clause A of the NWA definition as if it referred to all reprocessing wastes which have historically been considered HLW (a so-called "source based" definition), or (2) interpret the language of Clause A to call for Commission determination of what concentrations reprocessing waste must have to be determined to be HLW.

The advantage of this alternative is that, when option (2) for Clause A is chosen, waste classification across the board would be based on risk. This type of definition reflects the preferred methodology of waste classification when viewed from a theoretical approach.

The major disadvantage, when this alternative is considered in the context of the waste management system, is the lack of any currently available disposal facility for disposal of above Class C LLW. This raises a number of concerns. Performance assessment modeling referred to above would have to be based upon some arbitrary theoretical "intermediate" facility, which may never be built. Any facility that is developed may have completely different characteristics, invalidating the results of the modeling. The waste classification question would thus come open again.

(3) DEFINE HLW AS ALL REPROCESSING WASTE, AND ALL NON-REPROCESSING WASTE ABOVE CLASS C, BUT RETAINING FLEXIBILITY FOR FUTURE RECLASSIFICATION

Alternative (3) is to consider all non-reprocessing waste with concentrations greater than Class C LLW as HLW. All reprocessing waste now classified as HLW would remain HLW. However, this alternative would retain the flexibility to reclassify some of this waste in the face of future developments.

For reprocessing waste, keep all waste presently considered HLW in the HLW category. Incidental wastes from reprocessing, now considered non-HLW, would remain in that category. For non-reprocessing waste, waste presently classified as above Class C LLW would be HLW. The Commission's regulations would allow for case-by-case reclassification of some waste. Those seeking reclassification to dispose of wastes using technologies which are newly developed would have to justify their requests with technical studies which clearly demonstrate that the isolation capability of the chosen technology is adequate.

The argument can be made that this alternative would result in some waste not needing permanent isolation to be disposed of in a repository. This may be true, but would not necessarily result in an additional cost burden. The total volume of above Class C LLW is expected to be approximately 2,000 cubic meters from now through the year 2020, an amount of waste which is very small relative to the total volume of LLW generated. The choice to be made among disposal options is between emplacing above Class C material in a geologic repository, or developing a new facility to dispose of these wastes. The latter could be very costly. For the present and immediate future, it seems most effective from the viewpoint of public policy to utilize geologic repository disposal.

One drawback is the lack of any mechanism to charge generators of above Class C LLW for disposal in a repository. However, public comments on the ANPR reinforce the Commission's opinion that this point can be remedied by legislation, and should not be the sole reason for not proceeding with this alternative.

This alternative is the recommended one.

IV. IMPACTS OF THE RECOMMENDED ALTERNATIVE

The recommended approach would have essentially no major impacts on the management of reprocessing wastes as it retains the status quo. Some positive impacts on the public and DOE could accrue from promulgating the rulemaking, as it should reduce uncertainty as to classification of reprocessing wastes.

For non-reprocessing waste, any present LLW which would be defined as HLW could incur added costs of disposal. However, as most of these wastes could not be managed as ordinary LLW, i.e., in shallow land burial, the extent of cost impacts is not clear. There are no operational reference case intermediate disposal facilities to base a comparison on. There should be no adverse radiological impacts from this action.

ENCLOSURE F

12/15/ PM

Document Name:
OTHER COMMENTS HLW

Requestor's ID:
PRICHARD

Author's Name:
Prichard

Document Comments:
Appropriateness of class c limits

APPROPRIATENESS OF CLASS C LIMITS
FOR DEFINING HIGHLY RADIOACTIVE MATERIAL

Some comments criticized the use of the upper limits for Class C LLW in Part 61 as a basis for classifying material as HLW. These comments favored a more conservative approach, and urged that some or all of what now constitutes Class C LLW be reclassified as HLW. They favored having the Federal government and not States take responsibility for this waste. Reasons cited were that Class C waste had characteristics more similar to HLW than to Class A and B LLW. In addition, the Federal government was seen as better able to exercise long term institutional control than could States.

These comments did not present adequate reasons for including Class C LLW within the HLW definition. Part 61 regulations recognize the different characteristics of Class C waste and require special treatment for Class C waste disposal, albeit in shallow land burial facilities. Regarding institutional control, many comments held the erroneous view that LLW site isolation capability depended entirely upon institutional control. LLW site isolation capability is based on the geology and engineering of the site. No benefit to public health and safety is apparent as a result of reclassifying Class C LLW to the HLW category. Finally, the Low Level Waste Policy Amendments Act of 1985 clearly established Class A, B, and C LLW as a State responsibility.

A completely different view was expressed by other comments on this issue. They stressed that the Class C limits were too conservative, and that using them would result in material not needing the permanent isolation capability of a repository being sent there. This would be an excessive cost burden on the waste management system.

Some comments did not believe the Class C limits were applicable to anything other than Part 61. They saw no basis in the usage to which they were put in the ANPR. In particular, many waste characteristics, such as toxicity,

stability, heat rate, solubility, and external radiation hazard, should be considered in arriving at a set of concentration limits.

While there were comments criticizing the use of the Class C limits for determining highly radioactive waste, comments were fairly evenly divided among those wanting more stringent limits, and those in favor of less stringent limits. Many of the former types of comments also favored defining HLW as waste which was either highly radioactive or needed permanent isolation. The proposed rule uses this criterion.

The latter types of comments, which considered the Class C limits too conservative, have not been accommodated in the proposed rule. The Class C limits have been used to define HLW in part due to the complexity of the problems involved in establishing new limits, and to the lack of availability of any intermediate disposal facility. It therefore seems very likely that the means for disposal of this above Class C waste, whether defined as HLW or LLW, would be in a geologic repository.

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, it is clear that risk is determined by total quantity of activity present in the waste as well as concentration, and the proposed rule takes this into account. This is one reason that all direct reprocessing wastes are being retained in the HLW classification. By the same type of reasoning, wastes with high concentrations, but small total quantity of activity, could be candidates for treatment as non HLW. Sealed sources are likely candidates.

The proposed rule would implement the concentration limits by averaging radionuclide concentrations over the volume of a waste package, or over 1 cubic meter, whichever is smaller. This should allow for safe disposal of these minimum quantity wastes as LLW.

DETERMINATION OF MATERIAL NEEDING PERMANENT ISOLATION

The ANPR proposed technical studies to determine which highly radioactive wastes required permanent isolation. the studies would focus on hypothetical "greater confinement facilities", i.e. more secure than shallow land burial. Modeling studies would assess which waste types could not be isolated from the environment by these facilities. These waste types would require a geologic repository to insure permanent isolation. Thus they would be defined as HLW. Many comments generally supported this type of analysis. It seemed to be a reasonable way of determining which wastes need permanent isolation. Potential problems noted in the comments were; (1) The absence of currently available greater confinement facilities. This would mean that studies on hypothetical facilities might not be applicable to real future disposal options, and (2) that just considering the half life of waste types was not comprehensive enough, waste form should be considered. Activated metals and sealed sources were cited as long lived materials which, because of their stability, would not result in off site releases. Cesium and strontium were mentioned as nuclides where half life was not indicative of high hazard. In general, comments wanted the studies to be as comprehensive as possible, including all waste types and radionuclides.

The arguments that no greater confinement facilities now exist or are planned, and the difficulties in using hypothetical cases are persuasive. For the present, the studies noted in the ANPR will not be carried out. This does not indicate a lack of confidence in this methodology in general. However, for the present, shallow land burial is the only alternative to a repository. Wastes needing the degree of isolation greater than shallow land burial must be isolated in a repository. The Class C limits are appropriate at this time for determining waste classification. The proposed rule uses them in establishing the need for permanent isolation.

LEGAL AND ADMINISTRATIVE PROBLEMS

The ANPR asked for commentors 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. The approach used in the proposed rule, classifying all reprocessing waste now considered HLW as HLW, would appear to resolve most of the concerns expressed on this issue. One remaining 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 HLW in a repository. The NWPA authorizes DOE to contract for HLW from reactor licensees only, and fees from reactor licensees are the sole method set up for charging for waste disposal. Thus, any additional material classified as HLW under Clause (b) generated by non reactor licensees would not be covered by DOE contracts for disposal. By the provisions of the NWPA, such material would be ineligible for disposal in the repository.

This could be a problem. However, it should not be the sole reason for not classifying material as HLW. This obstacle could be removed by legislation providing for means of funding disposal costs of HLW generated by non-power reactor sources.

REQUIREMENT FOR DISPOSAL OF WASTES BY SPECIFIC METHODS

The ANPR asked if the Commission should specify particular means of disposal as being required for any waste type, such as geologic repository disposal for all HLW. Many comments argued that this requirement should be adopted. Comments, particularly from the State of Washington, argued that the NWPA requires geologic repository disposal for all HLW. 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.

The proposed rule is in keeping with the latter viewpoint in not specifying in Part 60 what disposal means are to be used for HLW. References in the NWPA to conducting research on alternative technologies for HLW disposal indicate that Congress did not mean to rule out all other disposal technologies. The development of new methods for waste disposal is an ongoing process, and one which should not be discouraged by regulation that is overly prescriptive.

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 classified material as HLW if it contained certain concentrations of radionuclides having high initial radioactivity as well as certain concentrations of long lived radionuclides. Commentors were concerned that by fractioning a waste stream into components; one highly radioactive and one containing mainly long lived radionuclides, a waste stream could be classified as LLW. This would not be an appropriate 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 for HLW.

These concerns are valid; the possibility of dilution or fractionation would be a potential problem for a concentration based system. However, there are instances where waste treatment processes would involve dilution or fractionation. These instances would be considered legitimate activities when carried out to enhance public health and safety and should not be prohibited. Neither the comments nor other sources of information cite actual instances where dilution or fractionation is a problem. If it should become a problem in the future, it can be dealt with by regulation. At present, the disadvantages of including this issue in the rulemaking outweigh any advantages.

COMMENTS ON ENVIRONMENTAL IMPACTS

Most letters did not identify any environmental consequences from a revision of the definition of HLW which should be addressed.

One comment related to the situation, noted in the ANPR, where additional material that may be classified as HLW under Clause (b) might not be accepted for disposal at a geologic repository because current Federal law prohibits disposal of waste generated by entities not having a waste disposal contract with DOE in a repository. The commentor suggested that the environmental consequences of having HLW not eligible for repository disposal should be considered.

Another comment advocated consideration of how a revision of the definition would affect the management of wastes at West Valley. There was also a comment focusing on similar effects at Savannah River.

EPA said that it would be necessary for the Commission to analyze what wastes would change classification as a result of the revision, and to present an assessment of the impacts of such changes and related changes in means of disposal. Other comments on this point stressed the impacts of reclassification on volumes of waste generated.

The approach outlined in the proposed rule is one which does not appear to create any significant adverse environmental impacts. It would not result in large changes in classification of existing waste inventories. There would be no reclassification of HLW to LLW, and some present LLW would become HLW. The one comment suggesting consideration of waste not eligible for DOE disposal contracts does not address the alternatives. This waste is not now eligible, and would not be sent to a repository. Classifying it as HLW would not have any adverse impact, relative to the status quo.

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 the range of options being considered for a HLW definition require the disposal of spent fuel in geologic repositories. Adequate safeguards also exist for the pre-disposal management of spent fuel. A commentor 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 commentor noted that concentrations can change between the time waste is generated and final disposal. The definition of HLW is intended to apply when a waste stream enters the waste management systems. For any waste streams even being considered for classification as HLW, regulations are not going to rely solely on any possible decrease in hazard between generation and final disposal.

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. This suggestion has been followed in the proposed rule. Another commentor noted that spent fuel would be considered synonymously with HLW in terms of concentration limits. This is not the case; no concentration limits are proposed for classifying spent fuel as anything other than HLW.

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. This alledged 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 Waste Policy Amendments Act of 1985. As was stated in the ANPR, it not directly affected by this rulemaking.

Several comments generally stressed the need to base the definition on risk or hazard, although specific classification limits were not suggested. The proposed rule follows this principle as far as practical.

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 an objective of this rulemaking. 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 commentors. 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.

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 which had relatively short half lives, but were nonetheless extremely hazardous for a long time and required permanent isolation. One comment noted that the NWPA did not authorize the Commission to establish such a two part classification system.

The proposed rule accommodates these comments for the most part. By including all non-reprocessing waste with concentrations above class C limits, essentially all waste which is either highly radioactive or long lived is classified as HLW.

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. Congress did not intend for NRC to interpret the term "sufficient concentrations" in Clause (A) of the NWPA. 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 to be 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 but not under the NWPA.

The approach to classification of reprocessing waste contained in the proposed rule takes note of both views. From a technical standpoint, basing the classification system on degree of risk 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.

In addition to concentration of waste, total risk or hazard of a waste is determined by total inventories of activity. While defense reprocessing wastes contain smaller radioactive inventories than are present in commercial spent fuel, compared to commercial LLW, total inventories of these reprocessing wastes are much larger. Furthermore, reprocessing wastes are more hazardous and longer-lived than is commercial LLW.

The classification of all reprocessing waste as HLW would mean that this interpretation of HLW under Clause (a) of the NWPA definition is consistent with past legislative treatment of HLW. Thus potential problems from conflicting statutory definitions should be minimized by this approach. Regarding defense reprocessing wastes at Hanford and Savannah River, this waste remains under NRC licensing authority granted by the Energy Reorganization Act of 1974 regardless of how it is classified for purposes of the NWPA.

Regarding comments directed at economic effects, if as is stated above, reprocessing waste requires the permanent isolation offered by a repository, then the cost of this must be incurred.

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 HLW classification are sealed sources containing radium and ion exchange resins used to remove radium from drinking water.

EPA is addressing NARM wastes in its current environmental standards work, so there is no need for NRC to develop regulatory requirements at this time. When promulgated the EPA LLW standard may require additional amendments to NRC regulations.

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 pointed out 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, the necessity 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, putting additional waste types in the repository would affect the technical aspects of licensing and could delay the schedule for repository development. It would complicate demonstrations of the repository's performance, and could make it difficult to show compliance with the EPA HLW Standard (40 CFR 191).

The problems cited by DOE appear considerably overstated. While different waste types may have characteristics unlike spent fuel and reprocessing waste, the relatively minor amount of additional waste which would be classified as HLW, and its hazard compared to spent fuel and reprocessing waste, would not have 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.

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 if so defined by NRC at the time of authorization of facilities for long term storage of the waste. Thus, the Hanford tank wastes, which in DOE's view are not in long term storage, would not be considered HLW and subject to NRC licensing authority.

NRC continues to adhere to its position expressed in the ANPR. Its authority to license DOE HLW disposal facilities is based on the definition of HLW contained in the Energy Reorganization Act of 1974, and is not altered by any definition adopted under the NWPA.

ENCLOSURE G

COMPARATIVE TEXT

PART 2: Part 2 is amended by adding "or spent nuclear fuel" to each reference to high level radioactive waste.

PART 60:

60.2

"High level radioactive waste" or "HLW" means: Irradiated reactor fuel, (2) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, and (3) solids into which such liquid wastes have been converted.

waste material defined as "high level radioactive waste" in Part 66 of this chapter.

"Licensable facility" means a facility subject to the licensing and related regulatory authority of the Commission pursuant to Sections 202(3) and 202(4) of the Energy Reorganization Act of 1974 (88 Stat 1244).

"Radioactive waste" or "waste" means HLW, spent nuclear fuel and other radioactive materials other than HLW or spent nuclear fuel that are received for emplacement at a geologic repository.

"Reprocessing waste" means waste material defined as "reprocessing waste" in Part 66 of this chapter.

"Spent nuclear fuel" means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

60.17

(a)2(iii) *** to isolate high level radioactive waste and spent nuclear fuel***

(b) A description of the possible waste form or waste package for the high level radioactive waste or spent nuclear fuel***

60.21

b(4) ***Since the radiation hazards associated with high level radioactive waste and spent nuclear fuel***

60.46

~~high-level~~

(a)1 Any action which would make emplaced radioactive waste irretrievable or which would substantially increase the difficulty of retrieving such emplaced waste.

60.63

(a)1 ***A State in which a repository for high level radioactive waste or spent nuclear fuel***

60.102

(a) The licensable facility. NRC exercises licensing and related regulatory authority over those facilities described in section 202(3) and (4) of the Energy Reorganization Act of 1974. Any of these facilities is designated a licensable facility.

(b) The geologic repository operations area.

(1) This part deals with the exercise of authority with respect to a particular class of licensable facility-- namely a geologic repository operations area.

(b)3. The exercise of Commission authority requires that the geologic repository operations area be used for storage(which includes disposal) of high level radioactive waste (HLW) and spent nuclear fuel.

(b)4. For the purposes of the Nuclear Waste Policy Act of 1982 HLW includes additional radioactive materials, as defined in Part 66 of this chapter. If DOE proposes to use the geologic repository operations area for storage of these or any other radioactive wastes, the storage of such waste is subject to the requirements of this part.

(e) Isolation of waste.

(1) During the first several hundred years following permanent closure of a geologic repository, when radiation and thermal levels are high and the uncertainties in assessing repository performance are large, special emphasis is placed upon the ability to contain spent nuclear fuel and reprocessing waste by waste packages within an engineered barrier system. This is known as the containment period. The engineered barrier system includes the waste packages and the underground facility. A waste package is composed of the waste form and any containers, shielding, packing, and absorbent materials immediately surrounding an individual waste canister. The underground facility means the underground structure, including openings and backfill materials, but excluding shafts, boreholes, and their seals.

60.113

(a)1,(i)A. Containment of HLW spent nuclear fuel and reprocessing waste will be substantially complete during the period when radiation and thermal conditions in the engineered barrier system are dominated by fission product decay; and***

(ii)A. Containment of spent nuclear fuel and HLW within the waste packages will be substantially complete for a period to be determined by the Commission***

(THE ENTIRE PART 66 IS ADDED)

10 CFR PART 66 - CLASSIFICATION OF RADIOACTIVE WASTES

10. A new Part 66 is added to this chapter to read as follows:

Sec.

66.1 Purpose and scope.

66.11 High-level radioactive waste.

66.12 Reprocessing waste.

66.13 Other highly radioactive material that requires permanent isolation.

66.14 Spent nuclear fuel.

66.15 Low-level radioactive waste.

66.16 Transuranic waste.

Authority: Sec. 161, Pub.L. 83-703, as amended, 68 Stat. 948, as amended (42 U.S.C. 2201); Sec. 2, Pub.L. 97-425, 96 Stat. 2202.

§ 66.1 Purpose and scope.

This part classifies as high-level radioactive waste for purposes of the Nuclear Waste Policy Act of 1982 certain radioactive waste materials disposed of hereafter. Other radioactive wastes are classified as low-level radioactive wastes or as transuranic wastes.

§ 66.11 High-level radioactive waste.

"High-level radioactive waste" means "reprocessing waste" and "other highly radioactive material that requires permanent isolation," as defined in § 66.12 and § 66.13.

§ 66.12 Reprocessing waste.

(a) Except as noted in paragraph (b) of this section, "reprocessing waste" means the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste.

(b) "Reprocessing waste" does not include incidental waste consisting of:

(1) ion exchange beds, asphalted sludges, vermiculited sludges, contaminated laboratory items, clothing, tools and equipment, radioactive cladding hulls, other irradiated and contaminated fuel structural hardware, and similar radioactive waste materials, the production of which is incidental to the production of reprocessing waste in a facility for reprocessing spent nuclear fuel, and

(2) salts or other solids, separated from liquid reprocessing waste, or disused facilities, components, equipment and storage tanks, associated with the production, processing or solidification of liquid reprocessing wastes.

§ 66.13 Other highly radioactive material that requires permanent isolation.

(a) "Other highly radioactive material that requires permanent isolation" means radioactive waste, including incidental waste but excluding reprocessing and transuranic waste, if that waste contains radionuclide concentrations, averaged over the volume of the waste package or over 1 m³, whichever is smaller, exceeding the Class C concentration limits of Part 61 of this chapter.

(b) Exception: Upon petition, the Commission will by rule exclude from classification under paragraph (a) any class or classes of materials which it finds not to require permanent isolation. Material will only be excluded under this provision upon a prima facie showing that an existing or authorized facility could be employed for disposal in a manner that protects public health and safety.

§ 66.14 Spent nuclear fuel.

"Spent nuclear fuel" means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

§ 66.15 Low-level radioactive waste.

"Low-level radioactive waste" means radioactive material that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, or by-product material as defined in section 11e(2) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2014(e)(2)).

§ 66.16 Transuranic waste.

"Transuranic waste" means radioactive waste, other than reprocessing waste, which:

(a) contains more than 100 nanocuries of alpha-emitting transuranic radionuclides, with half-lives greater than 20 years, per gram of waste material, and

(b) contains other radionuclides in concentrations less than the Class C concentration limits of Part 61 of this chapter.

Dated at Washington, D.C. this _____ day of _____, 199X.

For the Nuclear Regulatory Commission.

Samuel J. Chilk,
Secretary of the Commission.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AB89-1

CF

JAN 22 1988

MEMORANDUM FOR: Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

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

SUBJECT: CONCURRENCE FOR PROPOSED AMENDMENTS TO PART 61

On December 17, 1987 you transmitted for my review and concurrence draft amendments to 10 CFR Part 60 regarding the definition of the term "high-level radioactive waste." Citing the lack of any "intermediate" disposal facility on which to base defensible waste classification analyses, the draft amendments would have taken a conservative approach by classifying as HLW all above Class C wastes unless a facility other than a repository had specifically been approved for disposal of those wastes.

I agree with the general approach identified in the draft amendments, i.e., requiring repository disposal of above Class C wastes unless an alternative means of disposal has specifically been approved. Nevertheless, trying to accomplish this by classifying those wastes as HLW raises some problems. For example, the existing provisions of 10 CFR Part 60 require containment of all wastes classified as HLW within waste packages for 300 to 1,000 years, even though such containment might not be necessary for many above Class C wastes. Further, as a practical matter, once a waste has been classified as HLW it may be very difficult to ever classify that waste as non-HLW. Thus, the approach of the draft amendments may have the unintended consequence of discouraging development of "intermediate" disposal facilities.

Because of these potential difficulties, our staffs, working with OGC, have developed another approach. By amending Part 61, rather than the HLW definition of Part 60, this approach would codify our previous guidance to DOE regarding disposal of above Class C wastes in a repository, but would not classify those wastes as HLW. This approach would accomplish our goal of finding a disposal "home" for above Class C wastes, but would avoid problems of the type discussed above. This approach would also eliminate any need to revise the existing definition of HLW.

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I have reviewed the enclosed rulemaking package which would amend Part 61 in the manner discussed above, and suggest a few changes.

1. The draft Federal Register notice should explicitly state that, as noted in the ANPR, additional legislation may be needed by DOE to provide for payment of disposal costs for above Class C wastes, or to authorize receipt of such wastes for disposal at a repository.
2. The third paragraph on page 6 of the Commission paper would read more clearly if the text "Requiring repository disposal for these wastes subject to review of specific alternatives later would accomplish essentially . . ." were revised to read: "Requiring repository disposal for these wastes unless an alternative means of disposal is approved would accomplish essentially . . ."
3. The resource statement on page 7 of the Commission paper might more properly refer to NRC resource needs rather than NMSS resource needs alone.
4. In the first recommendation of the Commission paper, the words "revise the definition of high-level radioactive waste" should be replaced with "require repository disposal for above Class C wastes unless an alternative means of disposal has been approved."
5. On pages 3 and 4 of the draft Federal Register notice, the discussion of incidental wastes seems to detract from the overall thrust of the proposed rulemaking. I recommend deleting the second paragraph under the heading REPROCESSING WASTES.
6. On page 5 of the draft Federal Register notice, insert after the first partial sentence: . . . classification. Such disposal facility development is more properly the responsibility of DOE rather than NRC. However . . .
7. The regulatory analysis seems to need additional updating, as indicated in the enclosed, marked-up copy.
8. Add to the Regulatory Flexibility Act Certification: "All waste generators, some of which might be classified as small entities, must pay the costs associated with management and disposal of the wastes they generate. This proposed rule would not affect those costs since it preserves all options currently available for waste disposal. Only DOE's selection of a specific

disposal technology from the full range of alternatives available would potentially have an economic impact on small entities."

With these changes, I concur in the content of the rulemaking package.


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

Enclosure: Marked-up copy of
rulemaking package.