UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555

February 28, 1991

The Honorable Kenneth M. Carr
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Chairman Carr:

SUBJECT: REGULATION OF MIXED WASTES

In response to a request from Commissioner James R. Curtiss, the Advisory Committee on Nuclear Waste (ACNW) has reviewed the problems and issues associated with the disposal of mixed wastes. One focus of this review was the comparability of protection afforded by NRC and EPA regulations when applied to the disposal of mixed wastes. This matter was the subject of an ACNW Working Group meeting held on December 11, 1990, and also a matter for discussion during the 24th, 25th, 26th, 27th and 28th meetings of the Committee. Interacting with the Committee during these meetings were representatives from the California Radioactive Materials Management Forum; Chem-Nuclear Systems, Inc.; the Edison Electric Institute; the Nuclear Management and Resources Council, Inc.; the National Institutes of Health; New England Nuclear (du Pont); the State of Nebraska; the Lawrence Livermore National Laboratory; the Oak Ridge National Laboratory; the Savannah River Laboratory; the U.S. Environmental Protection Agency; the U.S. Department of Energy; and the U.S. Nuclear Regulatory Commission. The Committee also had the benefit of a wide range of documents, some of which are listed at the end of this report.

As you know, the subject of regulation of mixed wastes involves a wide range of issues and has the potential for having an impact on NRC and Agreement-State licensees. Further, the regulatory process will have a significant economic impact on the disposal of these wastes. We provide herein a summary of our findings and our recommendations. We have included some background information as well as highlights of recent and relevant studies and assessments conducted by the NRC staff and other groups.

1. Nature of the Problem

Mixed wastes (i.e., those wastes that contain radioactive materials at concentrations equivalent to low-level wastes and

also contain hazardous waste materials) are subject to regulation by both the NRC and the EPA as a result of congressional actions. Complicating this dual regulation are fundamental differences between the requirements of the two agencies. For example:

a. The EPA regulations [pursuant to the Resource Conservation and Recovery Act (RCRA)] require that a disposal facility for hazardous wastes be equipped with a dual liner and leachate collection system; the NRC regulations for low-level waste disposal discourage the use of trench liners because of the concern that infiltrating water will be retained and create a "bathtub" effect.

b. The EPA regulations place primary reliance on active systems (e.g., the leachate collection system) to control releases of the waste; the NRC regulations place primary emphasis on the protection afforded by the waste form and the location and design of the disposal facility.

c. Treatment and packaging of radioactive wastes are generally performed by the generator prior to shipment of the wastes to the disposal facility; in contrast, hazardous wastes are generally treated at offsite facilities or at the disposal site. In addition, the EPA regulations prohibit the disposal of hazardous wastes that have not been treated in accordance with EPA standards. However, EPA has not published standards for the treatment of mixed wastes.

d. The EPA regulations require that radioactive wastes containing hazardous materials be subject to sampling and analysis and that mixed wastes in storage be periodically inspected. These requirements were developed without taking into account the risks associated with radioactive wastes and could add to occupational exposures and costs when applied to mixed wastes.

e. Whereas the NRC regulations for low-level wastes are incorporated into 10 CFR Part 61 and represent a fairly stable set of requirements, the EPA regulations are based on the RCRA, which has been subject to periodic amendment by the Congress and includes an ever-increasing number of substances that the EPA has classified as hazardous.

f. The NRC regulations for Class C low-level wastes require the construction and operation of a facility designed to retain these wastes for up to 500 years; the EPA regulations for hazardous wastes provide for institutional protection and surveillance for only a maximum of 30

years beyond closure of the disposal facility and appear to require no inherent waste retention beyond that period.

These observations summarize the major differences between the EPA regulations for the disposal of hazardous wastes and the NRC regulations for the disposal of low-level radioactive wastes.

2. Protection Provided by EPA and NRC Regulations

Commissioner Curtiss specifically requested that the ACNW compare the protection provided for public health and safety by NRC and EPA regulations. Unfortunately, only minimal direct information appears to be available on this important comparison.

a. A relevant study conducted by the Nuclear Management and Resources Council, Inc. (NUMARC, 1990) contains a comparison of the doses associated with the disposal of mixed wastes in a generic above-grade or below-grade facility and in a conventional shallow land burial facility. The above-grade facility represented the NRC/EPA conceptual design for a mixed waste disposal facility. To provide a full range of assessments, the facilities were assumed to have been located at two distinctly different sites -- a humid impermeable site (typical of the northeastern United States) and a humid permeable site (typical of the southeastern United States). Although NUMARC stated that its data should be interpreted with caution, NUMARC found that the performance of a shallow land burial facility, designed and constructed in accordance with the NRC regulations, was superior by a small margin. NUMARC concluded that, in general, inclusion of EPA regulation 40 CFR Part 264 design features neither demonstrates nor guarantees that the environmental performance of the mixed waste disposal facility will be superior to a disposal facility based on the requirements of 10 CFR Part 61.

b. The NRC staff, in apparent contrast, has stated (NRC, 1989) that certain features of the disposal facility based on EPA regulations, such as the double liner and the leachate collection and retention provisions, "appear to offer enhanced protection of groundwater, at least temporarily." In view of the proposed EPA "subsystem requirement" that groundwater contamination be limited so that no offsite person will receive an effective dose rate greater than 0.04 mSv (4 mrem) per year, this potential attribute of the EPA regulations may be important.

c. A study conducted by the U.S. Department of Energy (DOE, 1987) was designed to provide a comparative evaluation of the predicted performance of a full range of low-level radioactive waste disposal facilities constructed and operated in accordance with the NRC regulations. Six types of disposal facilities were evaluated: shallow land burial, intermediate-depth disposal, below-ground vaults, above-ground vaults, modular concrete canister disposal, and earth-mounded concrete bunkers. One of the conclusions of the DOE study, relevant to the comparative performance of facilities constructed and operated in accordance with EPA and NRC regulations, is that the dominant exposure pathway for an above-ground vault is "through release of radionuclides to surface water, and this results in a peak dose which is approximately one order of magnitude higher than the peak dose for the other (five) concepts." In fact, under the conditions assumed in the study, the above-ground vault concept did not meet the licensing requirements of 10 CFR Part 61 that the maximum effective (whole-body) dose rate to a member of the public be less than 0.25 mSv (25 mrem) per year and that the dose rate to the thyroid be less than 0.75 mSv (75 mrem) per year.

d. Although one conclusion of the NUMARC study was that all three types of disposal facilities could meet the effective dose rate limit of 0.25 mSv (25 mrem) per year, this was not the case in terms of the protection of the groundwater pathway. That is, for the conditions used to characterize the humid impermeable site and for the assumed design features, all three disposal facilities were projected to exceed EPA's draft proposed environmental protection standards for low-level waste disposal [0.04 mSv (4 mrem) per year if groundwater is involved].

3. Possible Solutions

In evaluating possible solutions to these problems, we have focused our attention on the difficulties of managing dual regulations and on the adequacy of either set of regulations in meeting the requirements of the other agency. Staff members of EPA and NRC have been attempting for some time to develop an approach through which dual regulation of mixed wastes can be made more practical. As a result of these efforts, three joint guidance reports have been issued pertaining to (a) the definition of mixed wastes, (b) siting requirements for a mixed waste disposal facility, and (c) a conceptual design for a mixed waste disposal facility that will meet both EPA and NRC regulations. The efficacy of these joint guidance reports is not entirely clear and discussions with State representatives indicate that additional guidance

is needed. Examples of areas needing to be addressed include joint guidance on the sampling and analysis of wastes in storage, on methods for integrating the administrative licensing procedures in the two sets of regulations, and on procedures for the consultative review and preapproval of State conceptual designs by Federal agencies (LLRWF, 1988). The joint guidance reports do not alleviate the dual regulation burden. Other developments also have bearing on the question posed by Commissioner Curtiss.

a. In response to technical considerations and concerns of the public, some State compacts have received proposals to build concrete bunker facilities for the disposal of low-level wastes. These facilities appear to be readily adaptable to meet EPA requirements for the disposal of hazardous wastes. It is our belief that such a facility, when slightly modified, would provide adequate protection of the public health and safety and meet the requirements of both agencies as they apply to mixed wastes. The projected unit costs for the disposal of mixed wastes in such a modified facility would be relatively high compared to those for the disposal of low-level wastes. This high cost is primarily a result of the unusually low volumes of mixed wastes anticipated to be sent to such facilities, and could be exacerbated by difficulties and delays in obtaining the necessary RCRA permits.

b. Dual jurisdiction of the regulatory process for mixed wastes appears to be wasteful of resources and lacks justification on the basis of benefit to the public. Some groups have urged strongly that the responsibility for regulating mixed wastes be assigned to a single Federal agency. One approach would be to request Congress to resolve this issue, but comments provided to the Committee indicate that this avenue is not likely to be viable at present. A second approach would be for the NRC to exercise the option provided under Section 1006(a) of the RCRA, which allows the Atomic Energy Act to "take precedence in the event provisions or requirements of the two acts are found to be inconsistent." Inquiry by the Committee indicates that the definition of "inconsistent" is subject to considerable controversy and hence exercise of this option would be difficult.

c. During its review, the Committee learned that most of the mixed wastes present or being produced in the United States result from DOE activities. Although the capability of DOE or its contractors to treat, store, and dispose of such wastes is still limited, the Department is developing plans to manage them. It has been suggested that problems associated with disposal of mixed

wastes generated commercially could be resolved if Congress were to assign DOE the responsibility for managing these wastes, similar to the responsibility assigned DOE for managing greater-than-Class-C wastes. Even though this approach may be difficult, we believe it should be explored.

4. Summary and Recommendations

The Committee concludes that at present neither set of regulations alone satisfies the requirements of the other agency. We make the following comments and recommendations that we believe represent possible steps for resolving the problems of regulating mixed waste disposal and also address the question posed by Commissioner Curtiss.

a. One action that could lead to a useful result would be for NRC to establish, in accordance with its recently announced policy, a category of mixed waste that is below regulatory concern (BRC). Mixed wastes that are so designated could then be reclassified as hazardous wastes and regulated only by EPA. Information provided to the Committee indicates that more than 90 percent of biomedical wastes would meet the BRC criteria.

b. In a concurrent action, EPA should be encouraged to develop and implement de minimis criteria for hazardous wastes and for mixed wastes. Further, EPA should reconsider and revise the analysis and sampling requirements for mixed wastes to reduce the risk in such operations due to the presence of radioactivity. Also, EPA should be encouraged to modify its regulations to permit interim storage of mixed wastes awaiting disposal and to develop standards for the treatment of such wastes.

c. The Committee is convinced that a method for disposal of low-level waste that incorporates enhanced confinement (e.g., concrete bunker disposal for Class B or Class C waste) and adds provisions for groundwater protection (e.g., a leachate collection system in place for at least as long as would be required by EPA regulations) can meet the combination of disposal requirements for mixed wastes specified by NRC and EPA. Such enhanced confinement methodology appears to be within the scope of the currently proposed designs for low-level radioactive waste disposal facilities.

The Committee concludes also that disposal of mixed wastes can be accomplished under the umbrella of NRC requirements for low-level wastes if these requirements are modified to provide for enhanced groundwater protection. Further, if Items 4a and 4b, above, are implemented, the volumes of wastes classified as "mixed" will be significantly reduced and the cost for the disposal of the exempted wastes could be similarly affected. Another benefit of cost reduction and regulatory simplification could be the reversal of debilitating trends by scientists to avoid the use of radioactive and hazardous materials in important research.

We trust these comments are helpful. We plan to continue to review developments in this field as they arise and will keep the Commission informed about the relevance and consequences of these developments.

Sincerely,

Dade W. Moeller

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Chairman

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