January 5, 2000

COMMISSION VOTING RECORD

DECISION ITEM: SECY-99-272

TITLE: AGREEMENT STATE COMPATIBILITY FOR CRITICALITY REQUIREMENTS APPLICABLE TO LOW-LEVEL WASTE DISPOSAL FACILITIES

The Commission (with Commissioners Dicus, Diaz, and Merrifield agreeing and Chairman Meserve and Commissioner McGaffigan disagreeing) disapproved the subject paper as recorded in the Staff Requirements Memorandum (SRM) of January 5, 2000.

This Record contains a summary of voting on this matter together with the individual vote sheets, views and comments of the Commission, and the SRM of January 5, 2000.

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Annette Vietti-Cook
Secretary of the Commission

Attachments: 1. Voting Summary
2. Commissioner Vote Sheets
3. Final SRM

cc: Chairman Meserve
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan
Commissioner Merrifield
OGC
EDO

VOTING SUMMARY - SECY-99-272

RECORDED VOTES

	APRVD	DISAPRVD	ABSTAIN	NOT PARTICIP	COMMENTS	DATE
CHRM. MESERVE	X				X	12/20/99
COMR. DICUS		X			X	12/21/99
COMR. DIAZ		X			X	12/14/99
COMR. McGAFFIGAN	X					12/9/99
COMR. MERRIFIELD		X			X	12/22/99

COMMENT RESOLUTION

In their vote sheets, Commissioners Dicus, Diaz, and Merrifield disapproved the staff's recommendation because the proposed staff actions are not necessary for the adequate protection of the public health and safety. Chairman Meserve and Commissioner McGaffigan approved the staff's recommendation. Chairman Meserve commented that although the likelihood of an emplacement criticality event from SNM is small, it does not appear that the burden associated with addressing the risk is very significant. Subsequently, the comments of the Commission were incorporated into the guidance to staff as reflected in the SRM issued on January 5, 2000.

Commissioner Comments on SECY-99-272

Chairman Meserve

Although the likelihood of an emplacement criticality event from SNM is small, it does not appear that the burden associated with addressing the risk is very significant. The three states with LLW disposal facilities have addressed emplacement criticality as part of their LLW regulatory programs and no state submitted comments opposing the staff's proposed compatibility designation. In light of these facts, I approve the staff's plan to change the compatibility designation of 10 CFR 61.16(b)(2) from category "NRC" to category "Health and Safety" and I approve the issuance of the guidance document.

Commissioner Dicus

SRM 98-010 directed staff to develop guidance on emplacement criticality safety which could be used by Agreement States for existing and proposed LLW disposal facilities and to investigate whether emplacement criticality requirements should be an item of compatibility, in accordance with the Commission's policy on adequacy and compatibility, and ***based on realistic scenarios***. Additionally, SRM 99-059 recommended that staff stay consistent with SRM 98-010, and further emphasized that a technical basis needed to include realistic scenarios, as well as ***realistic*** public health and safety issues ***which demonstrate*** emplacement criticality concerns.

Because 10 CFR Part 61.55 waste classification requirements are designated as Category B Compatibility, specifically applying to activities that have direct and significant transboundary implications, all Agreement States must adopt program elements essentially identical to those of the NRC. Since Part 61.55 encompasses Part 61.56 waste characteristics, which are minimum acceptance requirements for LLW containers and packages, and since 10 CFR Part 71 packaging and transportation requirements provide additional and complementary safety requirements, I believe that we have reasonable assurance that any new LLW site now or in the future would only accept waste with these characteristics. With respect to the aforementioned and as discussed below, I believe that staff did not provide a credible technical basis allowing for the development of realistic scenarios, where similar LLW disposal characteristics, configurations, or conditions would present a credible risk of a potential emplacement criticality event. Therefore, I do not approve changing the Compatibility designation from Category NRC to Category Health & Safety for 10 CFR Part 61.16(b)(2) or issuance of the related guidance document.

1. CHANGING THE COMPATIBILITY DESIGNATION FROM CATEGORY NRC TO CATEGORY HEALTH & SAFETY FOR 10 CFR PART 61.16(B)(2)
With respect to the precise ratios of SNM mass, enrichment, concentrations, and isotopics needed, and the necessary forms, conditions, and array configurations required, I believe that the technical basis and postulated scenarios presented in the FRN are not technically sound or realistic, especially with the additional level of safety controls that are already imposed on LLW disposal licensees as a result of 10 CFR Parts 61 and 71. Instead of using Part 61 and 71 characteristics and limits to further emphasize the defense-in-depth factored into ensuring emplacement criticality safety, staff challenged the safety profile and credibility of these specific regulatory requirements, and then essentially deferred to these same characteristics and safety limits ***(mass, enrichment, moderation, concentration, and absorbing materials)*** when modeling the criticality scenarios in the three proposed graded approaches.

Based on the demonstrated effectiveness of regulatory requirements the NRC currently has in-place that pertain to Agreement State LLW regulation, including packaging and transportation requirements (Part 71 or DOT), I believe that realistic and technically sound scenarios have been adequately addressed and modeled, and that effective emplacement requirements already exist. For example, the requirements under 10 CFR Part 61.13(c) **(Technical Analysis)** are currently an Agreement State Health & Safety designation and states the following:

> **"**Analysis of the protection of individuals during operations must include assessments of expected exposures due to routine operations and likely accidents during handling, storage, and disposal of waste. The analysis must provide reasonable assurance that exposures will be controlled to meet the requirements of 10 CFR Part 20 of this chapter.**"**

Additionally, the LLW facility design, operating, monitoring, and stability requirements, as well as the material characteristic and labeling requirements identified in Parts 61.51 through 61.57 are designated Agreement State category Health & Safety, with Part 61.55 **(Waste Classification)** being a category B designation. The comprehensiveness and completeness of these requirements, complemented with the Packaging and Transportation requirements in 10 CFR Part 71, ensure adequate health and safety protection of the shipper, receiver, facility operator, the public, and the environment during LLW packaging, shipping, receipt, handling, storage, emplacement, and disposal. As identified in section 2.1.4 of the draft Emplacement Guidance, disposal of SNM in an Agreement State can still require an NRC license if the Commission determines that it should, based on "hazards or potential hazards thereof. This provision provides the Commission with the necessary flexibility, when necessary, to review an application and issue a license for any new LLW disposal facility.

The FRN challenges the credibility of our current regulations and practices without providing a sound and sufficient technical basis. If our LLW disposal situation is truly as uncertain as described, than our HLW situation may present an even bigger question. Additionally, and from a public confidence standpoint, the FRN presents a level of uncertainty surrounding our LLW program that actually decreases the confidence that one should have and may raise questions as to how operator and public health and safety are being reasonably assured. In light of the recent Tokaimura criticality incident in Japan, we should be particularly careful of promulgating any unsubstantiated information or unrealistic scenarios that could lead the public to believe that the NRC or our Agreement States have not appropriately addressed criticality safety concerns, regardless of the type of operation. To add appropriate perspective, the scenarios presented for LLW emplacement criticality are as conservative as those used for fresh fuel assembly storage at our fuel-cycle facilities, where SNM mass, enrichments, forms, concentrations, and configurations present a higher criticality concern, due to greater probabilities and consequence potential. In evaluating operational risks and potential consequences, one must first develop an appropriate hazards analysis, which identifies and assesses the unmitigated operating conditions and the **credible** sequence of events necessary to cause the accident scenario. Subsequent to analyzing the unmitigated event, safety parameters and controls that prevent the sequence of events or mitigate the consequences if an accident should occur, are then factored into the evaluation. A consequence analysis is also provided so that on-site and off-site public health, safety, and environmental impacts can be reasonably assessed, and so that the licensee and off-site responders can adequately prepare for and respond to an event. No analysis of this type was addressed or provided with respect to LLW emplacement criticality.

2. EMPLACEMENT GUIDANCE FOR CRITICALITY SAFETY IN LOW-LEVEL WASTE DISPOSAL

As I previously stated, instead of using Part 61 and 71 characteristics and limits to further emphasize the defense-in-depth factored into ensuring emplacement criticality safety, staff challenged the safety profile and credibility of these specific regulatory requirements, and then deferred to specific characteristics and safety limits ***(mass, enrichment, moderation, concentration, and absorbing materials)*** when modeling the criticality scenarios in the three proposed graded approaches. Additionally, the safety limits regarding unusual moderators and bulk chemicals are referenced in the Emplacement Guidance as specific guidance thresholds, specifically, that the guidance document does not apply to conditions exceeding these limits.

Even if a majority of the Commission decides to approve revising the Agreement State Compatibility status from Category NRC to Category Health & Safety for 10 CFR Part 61.16(b)(2), this guidance document should not be issued without the following changes.

- Remove all references addressing Post-Disposal, specifically, Section 3.2, **"**SNM Migration and Concentration**"** and Section 7.2, **"**LLW Emplacement Good Practices**"**.
- Section 2, REGULATORY BACKGROUND section, 10 CFR Part 61. Identify all Agreement State Compatibility Parts and their applicability in ensuring operator and public health and safety in meeting Part 20 requirements (i.e., 10 CFR Parts 61.41 through 61.57).
- Section 6, GRADED APPROACH TO EMPLACEMENT GUIDANCE, first paragraph. Delete the second sentence. This being a guidance document and not a legally binding requirement, disposal facilities would not have to show and/or demonstrate compliance with the document's contents.
- Conduct a bounding analysis using **all** 10 CFR Part 61 and 71 characteristics and limits that are applicable to LLW disposal facilities and operations, so that modeling scenarios can be appropriately designed.

As I recommend disapproval to changing the compatibility designation of 10 CFR Part 61.16(b)(2) from category NRC to category Health & Safety for emplacement criticality safety requirements at existing and future Agreement State LLW disposal facilities, as well as the issuance of the Emplacement Guidance, " I want to reiterate my views regarding post-disposal criticality safety concerns at LLW disposal facilities. In SECY 98-239, "Post Disposal Criticality Research," I reluctantly approved staff's recommendation to halt further post-disposal criticality research at LLW disposal facilities. At that time, the Commission was faced with making some tough decisions in light of budget constraints and the Office of Research was facing a time of intense competition of resources. In my vote, I stated that I believe that additional research on post-disposal criticality should be delayed to accommodate higher priority work and I commended staff for its work to date. I continue to support further research in the area of post-disposal criticality safety **(i.e., migration and reconcentration)**, specifically, under the conditions outlined in Section 7.2, "LLW Emplacement Good Practices" of the draft Emplacement Guidance.

Commissioner Diaz

I disapprove the staff's proposal to revise the compatibility of 10 CFR 61.16(b)(2) from category *NRC* to category *Health and Safety* and disapprove finalizing the draft guidance document on the grounds that such actions are unnecessary for adequate protection of public health and safety. Instead, the staff should retain the current compatibility requirement for 10 CFR 61.16(b)(2). In addition, the staff should terminate all analysis of accidental criticality resulting from waste emplacement for disposal at waste sites regulated by Agreement States since these sites are only authorized to possess above ground enriched uranium not exceeding 350 grams, uranium-233 not exceeding 200 grams, and plutonium not exceeding 200 grams.

The staff has not identified realistic scenarios that could occur at waste sites regulated by Agreement States and that could result in accidental criticalities as a result of emplacement of waste. Considering the above ground possession limits for the sites, the licensing requirements in 10 CFR Part 61 (other than 61.16(b)(2)), the transportation packaging requirements in 10 CFR Part 71, and the assumptions made as part of the analysis, the likelihood of occurrence of the scenarios identified is extremely low. Further, even if such scenarios were to occur, the probability of a resulting criticality accident is extremely unlikely.

Neither has the staff identified realistic health and safety concerns that could result from accidental criticalities as a result of emplacement of waste at sites regulated by Agreement States. The staff simply states that a nuclear criticality accident could result in radiation doses, an undeniable but insufficient statement. In reality, it is the sustained criticality or supercriticality having a substantial number of total fission events and a high fissioning rate that is the potential public health and safety concern. Yet, the staff fails to make a compelling case that this is a probable occurrence. Fission, after all, is a natural everyday occurrence whenever there are fissile materials and is not restricted to criticality events. The staff has not provided a rough estimate of the magnitude of the radiation doses that could result from the criticality accidents that they have identified. It would be very difficult to estimate the doses without having the controlling factor, i.e., the power level. Obviously, the radiation from a "zero" power criticality is "zero," the radiation from a milliwatt level criticality is very small, and so on .... For such unprobable criticality accidents, the staff has not provided rough estimates of the potential duration of the criticality accident, the total number of fissions that would occur, nor the resulting dose rates in the areas that would be occupied by workers. Even if one were to assume that such an unlikely criticality accident could result from a dispersed fissile mass such as that found at a low-level waste site, the kinetics of the occurrence would severely limit its duration, the number of fission events, and, therefore, the radiological consequences.

While the staff has not quantified the risk, including probabilities and consequences, associated with disposal of special nuclear material by persons regulated by Agreement States, I believe both the probabilities and consequences associated with disposal as is currently done are so low as to preclude additional and continuing expenditure of resources in this area. I do not see a compelling need to intrude into the Agreement States' authority in this area.

Commissioner Merrifield

On the basis that the proposed staff actions are not necessary for the adequate protection of the public health and safety, I disapprove the staff's proposal to revise the compatibility of 10 CFR 61.16(b)(2) from category *NRC* to category *Health and Safety* and disapprove finalizing the draft guidance document. I do not believe there is a need for staff to continue to analyze the potential for accidental criticality resulting from waste emplacement at a low level waste repository which meets the requirements for 10 CFR Part 61.

In previous directions to the staff (SRM 98-010 and SRM 99-059), the Commission directed the staff to develop guidance on emplacement criticality safety for use by Agreement States. However, this guidance was to be developed only if the staff could provide realistic scenarios based on realistic public health and safety issues which demonstrate emplacement criticality concerns. In SECY-99-272, the staff responded to the Commission direction by developing theoretically plausible scenarios for which a criticality could occur. Although theoretically plausible, these scenarios represent highly unlikely events and are therefore not realistic. They are not realistic because they do not take into account other regulatory limits in 10 CFR Parts 61, 71, and 150 or standard operating procedures of a business which needs to dispose of material received as soon as possible. I believe the staff did the best job they could in providing theoretical scenarios; but since I do not believe they are realistic scenarios, I do not believe we or the Agreement States should devote our limited resources on an event of low risk significance. I fully agree with the staff analysis that the impact of implementing the proposals of SECY-99-272 on the existing sites and existing Agreement States would be minimal. But it would require some action at least on the part of the Agreement States. There are other more important areas where we need to devote our limited resources.

A more realistic scenario, in my opinion, involves the receipt on the surface of special nuclear material in quantities in excess of the limits of 10 CFR Part 150.11. Under this scenario, criticality is of concern not only on the surface but also in the immediate disposal area. However, this scenario is a case which requires specific NRC approval, our procedures will address criticality concerns, and there is no need for independent Agreement State action.