COMMENTS ON USDOE
DEFENSE WASTE COMMINGLING STUDY
(DOE/DP-0020)

SUBMITTED BY

NUCLEAR WASTE BOARD OF WASHINGTON

SEPTEMBER 24, 1984

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1. MAGNITUDES OF DEFENSE AND COMMERCIAL WASTE

The Commingling Study implies that the defense wastes represent a very minor addition to a commercial repository with the statement that "15% of the radioactivity in spent fuel and high-level waste in this country originated from atomic energy defense activities...[and] by 2000...the radioactivity in defense high-level waste will be 3% of the total" (pp E-3 and 1-5). This statement may create a misleading impression, considering the waste volumes involved. The Defense Waste Management Plan states that those same wastes represent 98% of the total volume of high-level waste and spent fuel today and 92% of that projected for 2000.

Once vitrified and packaged, the defense waste will also represent a relatively large proportion of the waste considered in the comparative evaluation in the Commingling Study. The 10,000 MTHM defense waste would require approximately 20,000 packages, in contrast to about 27,000 packages to contain 70,000 MTHM commercial waste. (Based on data in Table 1-2, p.1-10). Thus, defense waste would account for about 43% of the waste shipped to a commingled repository. These numbers give a somewhat different impression of the magnitude of defense waste to be handled and lead to a different perception of potential transportation impacts.

An expanded discussion of Hanford wastes to be considered for placement in a geologic repository should include clarification of planned use or disposition of cesuim and strontium salts which have been separated from the stored wastes. The study merely notes that this material "will be stored in water basins pending use" (p. 1-7).

2. PROJECTED QUANTITIES OF DEFENSE WASTE

A. Proportions of Waste From Each Defense High-Level Site

The analysis of the commingled and defense-only repository options is based upon the projected shipments of defense high-level waste shown in Table 1-1 of the report. The projected quantities of defense waste to be shipped do not appear to correspond well with the current and projected inventories of high-level waste at each of the three defense sites. Table 1-1 indicates that less than 6% of the waste shipments will originate at Hanford. However, the two reference documents for this table (DOE/DP-0015, "The Defense Waste Management Plan", and DOE/NE0017/2, "Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics") state that 58.7% of the volume and 36% of the radioactivity in defense high-level waste is contained in the inventory at Hanford. This implies that USDOE plans to leave a substantial amount (95%) of the Hanford wastes in place. Such an unstated intent may create a bias toward the commingling option by understating the potential impact of defense wastes on a commercial waste repository.

B. Definition of Readily Retrievable Waste

Table 1-1 indicates that the "Hanford shipments are based on vitrification of high-level waste [from]...N-reactor spent fuel and readily retrievable stored high-level waste". The definition of "readily retrievable" appears to be the primary explanation for the discrepancies noted above. The amount and nature of waste not "readily retrievable" or not retrievable at all should be specified, and the impacts on the commingling and defense-only options of also disposing of these wastes should be examined, perhaps as a "worst case" analysis. The need to handle this very large additional volume of defense waste at a repository cannot be overlooked. An Environmental Impact Statement on alternative defense waste strategies is currently being conducted by USDOE to determine whether "the short-term risks and costs of retrieval and transportation outweigh the environmental benefits of disposal in a geologic mined repository". (Defense Waste Management Plan, pp. 12, 18.) Data defining the retrievable waste volumes and characteristics at Hanford developed for this Environmental Impact Statement must be contained in the revised commingling report since it provides the basis for determining the wastes from Hanford that require geologic disposal. That data may, in turn, change the cost analysis that USDOE states is the primary factor in the commingling recommendation.

The Commingling Study should contain a full disclosure of USDOE policy and intent with respect to the Hanford wastes and an explicit identification of the volume and radioactivity of defense wastes at each storage location.

The statement of projected defense high-level waste should clearly indicate whether strontium and cesium will be removed from the waste to be generated from Purex reprocessing of N-reactor fuels. If not, the impact on radioactivity and heat content of Hanford wastes should be identified. In addition, it is not clear whether the projected waste shipments include any wastes to be generated from reprocessing of fuel from the New Production Reactor. The study should also explain the termination of shipments from Hanford in 2007.

3. CONSIDERATION OF TRANSURANIC WASTES

A. Commercial Transuranic Wastes

The design for the commingled repository (p. 2-3) includes commercial transuranic (TRU) wastes, although these are not included in the waste volume assumptions (p. 1-11). An estimate of the quantity of TRU to be handled under different scenarios and an analysis of the implications of including this in a commingled repository should be provided.

B. Defense Transuranic Wastes

The Defense Waste Management Plan indicates that defense transuranic wastes will be either stabilized on-site or processed and sent to the Waste Isolation Pilot Project (WIPP) (pp. 26-27). The Commingling Study should make clear this assumption. Moreover, the Plan indicates such wastes will be accepted at WIPP on a retrievable basis and the decision of whether to convert WIPP to a permanent repository will occur after five years of operation (DWMP, p. 31; p. 32). The Commingling Study should discuss the implications for commingling if a decision against permanent disposal of transuranic defense wastes in the WIPP is made.

4. IMPACT OF TOTAL NUCLEAR WASTE PROJECTION ON AUGMENTED REPOSITORY DESIGN

There are several potential difficulties created with the "augmented repository" concept (p. 1-11) and the final version of the study document should contain a detailed treatment of them, proposals for resolution, and evaluation of the unmitigable impacts.

An augmented repository will contain an additional 10,000 MTHM, and up to 75% more waste packages compared to a commercial-only repository. This is because defense high-level waste is much bulkier per unit of equivalent heavy metal content, by an average factor of about five to one (Table 1-2). Following is a page by page listing of the statements that need correction or amplification as a result of this condition.

E-3 <u>"If defense high-level waste is emplaced in a commercial repository, defense high-level waste is expected to require approximately 10 percent of the underground area".</u>

This would be true if the amount of mining required is proportional to the number of MTHM of waste disposed. As is explained subsequently (p. 2-32), this is a valid assumption for a repository containing only one type of waste. Since there is a very significant difference in the volume of the defense and commercial waste per MTHM, this assumption and the above quotation based on it are not valid and should be revised. If the volume of the waste determines repository space required for defense waste, then an increase in repository volume of up to 70% would be required for the commingling option. If, however, heat content of defense waste determines required repository space, the lower heat content of such waste could result in a smaller increase in repository volume.

Thermal considerations would permit closer packing, if it is contemplated that defense high-level waste containers will be subject to the same rock temperature regime as commercial waste (p. 2-48) at the crest of the thermal pulse, but <u>in our view structural requirements for safety in mined openings</u> could limit the amount of concentration allowable. At the Hanford site there may in fact be limited allowable concentration because of the very high, highly anisotropic forces known to be present at repository depth.

E-4 <u>"The D&E costs for the commercial repository will not change if defense waste is disposed of in the repository".</u>

This statement is incorrect. Even if the USDOE allocated costs for defense wastes cover all of the development and evaluation costs of the defense wastes, there will be a very substantial increase in development and evaluation costs of the civilian portion, stemming from the volumetric increase as well as materials handling underground, ventilation and other house-keeping requirements.

The volumetric increase creates a real design problem in fractured and/or jointed hard rock, since the block defining the disturbed area must be larger, making it that much more difficult to find and confirm that there are no disqualifying structures or other avenues of radionuclide escape.

Calculation of costs for a commingled repository reflect simple extrapolation of costs for a commercial repository to account for increased excavation volumes for defense wastes. Underground engineering requires consideration of the uncertainty of the availability of qualified basalt or tuff flows for a repository; in salt, the uncertainty issue is not as great. At Hanford, for example, just one exploratory hole over a year ago caused BWIP to change the target horizon in the basalt sequence because the thickness of the Umtanum flow was less at that spot than antipated. At the tuff site, consideration is being given to having a multi-level repository because of the space limits of the site which are controlled by faults and flow thicknesses. Adding defense waste to commercial waste could reduce the margin for error at a selected site and make a site that is good enough for a 70,000 MTHM repository unsatisfactory for an 80,000 MTHM repository. Thus, adding defense waste to commercial waste could delay and add technical difficulties to an already complex problem.

5. COST COMPARISONS OF OPTIONS

In view of the importance of cost considerations in the decision to recommend commingling of defense and commercial wastes, the Commingling Study should discuss in greater detail the basis for the projected costs (pp. 2-7 to 2-15; Table 2-2). No references are given, nor is the confidence to be assigned to such estimates indicated. If these projections are based on preliminary projections for the BWIP site, the Study should reflect analysis currently being conducted for the draft Environmental Assessment on the effect of increasing the conceptual design capacity of the BWIP site from 47,400 MTHM to 72,000 MTHM. The commingling decision should reflect data from this study on the cost, impacts, and feasibility of a larger repository. The decision should also reflect data on the cost, impacts, and feasibility of increasing repository capacity from 70,000 MTHM to 80,000 MTHM, as discussed above.

Calculation of the costs attributable to commingling should reflect the disproportionate development and evaluation costs resulting from the increased capacity required by such a repository, as noted above. Moreover, it should include both the cost of buying development and evaluation data developed under the commercial program and the cost of performing a detailed process of site selection and characterization as required under 10 CFR 60.116 and 10 CFR 51.40 if the two remaining sites from the commercial program are not suitable. Failure to do so would impact adversely on utility and consumer power costs.

6. USE OF FIRST REPOSITORY

A. Limiting Sites Under Consideration

The Commingling Study does not provide a rationale for limiting the analysis of impacts from a commingled repository to those sites under consideration for the first repository (pp.2-50 ff and 3-14). The Nuclear Waste Policy Act does not require this. Neither the study nor the Defense Waste Management Plan provides any indication of a need for placement of defense wastes in a geologic repository immediately upon completion of such a repository. Similarly, no rationale is given for assuming that all defense waste must go to one repository. Consideration of a crystalline rock site for at least part of the defense waste (e.g., that from the Savannah River Plant) could offer significant advantages in terms of transportation cost and risk. Evaluation of all geologic media under examination in the high-level waste program would remove any appearance of bias toward sites in the Commingling Study.

B. Implications of 70,000 MTHM Limit

The implications for a commingled repository of limiting waste receipts to 70,000 MTHM until a second repository opens is unclear (pp. E-2, and 1-11). Would the repository accept only commercial high-level waste up to 70,000 MTHM and then receive defense waste after the second repository opens? Would defense wastes have priority at the repository, limiting commercial waste receipts to 60,000 MTHM until the second repository starts operations? The shipment schedule shown in Table 1-1 does not indicate how this issue is to be addressed.

To date, the commercial waste repository schedules have not dealt with the commingled repository (see State of Washington response to the draft Mission Plan, August 6, 1984). However, receipt of defense wastes at a commercial repository could potentially impact on other aspects of the commercial program such as the need for, and timing of, a Monitored Retrievable Storage facility, or the need to accelerate schedules for the second repository. The Commingling Study implies (Table A-1) that defense waste will be shipped to the repository as it is processed and packaged, without considering the potential impacts on the commercial waste program. This carries potential cost implications for a commingled repository that are not addressed in the evaluation of the commingling and defense-only options.

7. REPOSITORY START-UP DATE IN 1998

The states have consistently argued that USDOE is being unrealistic in maintaining that there will be an operational repository in 1998. Even the Mission Plan speaks now of at best a token operation by that date, and it is certain that utilities hard pressed for waste storage space would claim priority over defense high-level waste for the first few years of token operation. Therefore, it is a virtual certainty that $35 million or more will be spent on storage of waste at Savannah River Plant (p. 2-10). This cost should be factored into this Commingling Study and its recommendations. The impacts on Hanford and INEL should also be presented and a realistic scenario developed for the first movement of defense high-level waste to a commingled repository, as under these conditions there could be a stronger case for a defense-only facility developed on a more streamlined procedural path.

8. DEFENSE WASTE TRANSPORTATION

A. Transportation Risks

The Commingling Study concludes that "The total risks associated with shipping defense high-level waste to a defense-only or commercial repository are estimated to be significantly smaller than predicted for the United State from other transportation activities" (p. E-8). This is an unfortunate and misleading statement. It really only says (p. 2-55) that nonradiological risks, e.g., accidents, are proportional to the waste traffic as a fraction of all traffic. Regarding radiological accidents, the conclusion (p. 2-57) is that "Because transportation casks are designed to survive extremely severe accidents without serious consequences, the probability that release of material will occur due to an accident is very small, as shown in Table 2-15".

Table 2-15 does not allow for one breach of containment accident except as a vanishingly small probability.

The summary conclusion (p. E-9) is that costs and risks are independent of commingling and that "therefore the transportation considerations are not a basis for the selection of one of the two disposal options". This conclusion is incorrect. Waste transportation is a significant factor in selecting the disposal option.

A defense-only repository could be sited to minimize total road or rail mileage, while other considerations determine the site of a larger, commingled facility. Both cost and risks are partly determined by mileage in a comparison between two sites. Risks of a radiological release accident are related to not only container design but total exposure--miles, hours, and the actions of other users of the right-of-way. Even container design is predicated on standards such as the 30-foot drop test which may not be realistic, particularly for the western states and their climatic conditions.

All of these factors must be considered, with at least the amount of site-specificity that is being employed at Battelle in its studies of civilian waste transport to potential sites. However, the Battelle data are not directly transferable because of the increased total exposure per unit HM shipped, different containers and different chemistry of the contaminants in commercial high-level waste. Because some 20,000 containers of defense waste are involved, transportation impacts are a non-trivial consideration in the commingling decision.

B. <u>Transportation Costs</u>

The conclusion that transport costs to Hanford are high relative to other sites despite the fact that a high percentage of defense wastes are already at Hanford, requires elaboration (p. 2-54). That conclusion assumes only a small portion of Hanford wastes are to go to geologic disposal, an assumption that requires documentation.

C. State Role in Regulation of Defense Waste Transportation

The draft study refers to the regulatory authority for transportation of the commercial radioactive wastes of the DOE and the NRC (p. 2-48), but states that DOE has authority for design and certification of packaging of defense wastes. It fails, however, to discuss authority for route selection or responsibility for accident response. Moreover, it fails to acknowledge any role of state and local government in regulating transportation.

9. HYDROGEOLOGIC ASSUMPTIONS

A. Groundwater

We are pleased to see in the record the statement that "The groundwater flux in repository host formations is expected to be quite low; however, it is not appropriate to use a velocity typical of the host rock to represent the entire flow path to the accessible environment because associated geologic units may support much larger flows" (p. 2-22). At Hanford there have been severe disagreements between the state, USGS and NRC, on the one hand, and USDOE/Rockwell, on the other, over this point. Clearly, at Hanford the volumetric increase necessary for a commingled repository could increase the chances of encountering such a "geologic unit", specifically faults or shears. Thus, in at least this case, there is a real, if perhaps small, impact of DHLW commingling on the groundwater question which is of great concern to the state.

B. Geochemical and Groundwater Transport Assumptions

While the assumptions used to evaluate the long-term effects of a commingled repository appear to be relatively conservative, these are sufficient only for comparing disposal options. They should not be used to make site-specific evaluations.

10. WASTE IMMOBILIZATION TECHNOLOGY

The Commingling Study inadequately defines the technology of waste immobilization. Table 1-2 does indicate the waste form for both defense and civilian wastes is borosilicate glass. While no program to confirm the suitability of this approach to immobilization is noted, the draft indicates NRC will review all DOE plans to immobilize defense wastes (p. 2-63). This is of particular interest in view of the cautions expressed by NRC in the review of the draft Mission Plan regarding the performance of borosilicate glass. The final Evaluation should discuss the consequences for high-level defense waste management of potential problems with the planned immobilization technology.

OTHER RELATED COMMENTS ON THE DRAFT COMMINGLING STUDY

1. The final study should include appendices containing the basic data, calculations, and models used to develop the findings so that the reader can check the validity of the conclusions. For example, it would be helpful to better describe the models used to calculate radiologic releases from the repository or evaluate transportation impacts. It would also be helpful if reference citations included the page(s), since many of the references are rather voluminous.

2. Although the study compares the combined cost impacts for a commingled repository with those for defense-only plus commercial-only repositories, other impact analyses address only the contribution from defense wastes. This assumes that the impacts of defense and commercial waste are strictly additive. However, some impacts (e.g., land required, transportation risk) may be a more complciated function of total waste quantity.

3. The study should also compare the options in terms of land use and socioeconomic impacts. Land-use impacts could potentially be higher for the defense-only option because of the amount of land disrupted for both defense and commercial repositories. On the other hand, the commingled repository could have greater socioeconomic impacts on a small community with limited ability to absorb the increased work force.

4. (Table E-1) The conclusion that a commingled repository may be more publicly acceptable than 2 separate repositories is not supported by the discussions in Sections 2.3.5 and 3.3.5. A reluctance to shoulder the burdens for both the

commercial and defense programs may cause the opposite effect in many locations.

5. (p.1-11) What is the basis of the assumption that 50% of the commercial waste will be high-level waste and spent fuel? The West Valley high-level waste is a very small quantity and there are no other current plans for re-processing that would produce other high-level waste.

6. (Sections 2.3.3 and 3.3.3) This study should address the issue of whether NRC will also license defense waste processing facilities, an issue with DOE since 1979.

7. (pp. 2-2, 2-30, and Table 2-7) What is the justification for assuming a lower release rate (factor of 10) for defense wastes than for commercial wastes? The reference that is cited on p. 2-26 does not appear in the list of references so we are unable to review this assumption. Why are the release rates shown in Table 3-3 (p. 3-10) for a defense-only repository lower than those from defense wastes in a commingled repository (Table 2-8)?

8. (pp. 2-52, 2-53, 2-58) How many rail casks are assumed on each train? The calculations of the number of casks needed for truck transport appear to assume 24 hours/day of travel. However, many states limit overweight shipments to 8 hours/day or daylight hours. Thus, a larger number of casks and higher transportation costs for truck shipments than shown will be required. What is the rationale for the conclusion that rail accident health effects for Hanford are lower than those for trucks?

9. (p. 2-61) A key issue that is not addressed is the potential impact on the options if the public perceives a close association between the repository proposals and nuclear weapons production. For example, if the public

develops an attitude that weapons production can be halted if a repository for defense wastes is prevented, inclusion of those wastes in a commercial repository proposal could lead to major delays or even total inability to site a commingled repository.

FROM
David W. Stevens
Department of Ecology
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TO
Cathy Russell

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Ticket for Mike due 11/12

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Ms. Cathy Russell
U.S. Nuclear Regulatory Commission
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Washington, D.C. 20555

Dear Cathy:

Enclosed is a copy of the comments of the Washington State Nuclear Waste Board made in response to the draft USDOE Commingling Report.

Best regards.

Sincerely,

David W. Stevens
Program Director
High-Level Nuclear Waste
Management Office

DWS:hlt

Enclosure

Bunting — (1) Have we seen other (state) comments? (2) How similar/different are our comments? Any major issues coming between us & Wash on this?
REB 11/13/84