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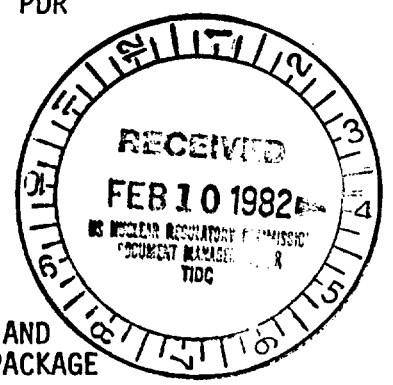

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MEMORANDUM FOR: Michael J. Bell, Chief
High-Level Waste Licensing
Management Branch
Division of Waste Management

FROM: F. Robert Cook
High-Level Waste Licensing
Management Branch
Division of Waste Management

SUBJECT: REPORT OF MEETING WITH DOE, ONWI, ONI, BNL, AND WESTINGHOUSE REPRESENTATIVES TO REVIEW HLW PACKAGE DESIGNS

On January 27, 1982, I met with representatives of ONWI, ONI, BNL and Westinghouse Corp. to review and comment on the conceptual designs of waste packages which have been prepared by Westinghouse Corp. for ONWI. A DOE representative from the Columbus office was also present. A list of attendees is attached to this report. The following summarizes the major discussion topics and conclusions of the meeting.

Discussion and Conclusions:

1. NRC (Cook) noted the importance of the function of ONI to assure the coordination of the design issues affecting the waste form, the waste package, the underground facility and site selection. However, there is a question as to whether or not there is adequate authority in ONI to affect the necessary integrating function. For example, the size of the waste forms from reprocessed waste, (both commercial and defense waste) greatly affect the waste package and repository designs. From the Westinghouse evaluations large diameter waste forms substantially reduce costs associated with fabricating waste packages as well as the repository handling and treatment, mining and emplacement. However, in discussing the reasons why a 32 inch diameter form was the largest being considered for defense waste it appeared the reasons all reflect criteria established by SRL. Specifically, sizing to allow transportation by

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truck, sizing of hoists in yet-to-be-built waste form fabrication facilities and issues associated with potential devitrification of waste glass during cooling following melting operations are such criteria. It was agreed that these as well as other issues should be weighed against performance of large waste forms and waste packages and repository costs by ONI to arrive at an overall system conceptual design reflecting overall economics.

2. BNL (Schweitzer) pointed out a major technical concern BNL has with each of the two conceptual waste package designs developed by Westinghouse. They are as follows:

   a) Self Shielded Cast Iron Design.
   BNL considers a major failure mode in cast iron is graphite matrix galvanic corrosion with the cast iron. BNL considers this must be investigated before commitment to cast iron is made. BNL also noted they consider low carbon steel did not have this problem and appeared to be a better, although more costsly, alternative to cast iron. The question arose as to whether or not BNL consdiers nodular cast iron also to be susceptable to the "graphite matrix/iron" galvanic corrosion failure modes. BNL indicated they were concerned about nodular cast iron, also. However, it may perform adequately dependening upon the conditions in the environment.

   b) Unshielded Ticode-12 Package
   BNL noted that they did not consider it possible to design an unshielded waste package for a salt environment because of the radiotytic decomposition of the salt and salt brine which could be expected. BNL noted that Na, O_2, NaOH and H_2 would be formed which would produce an unacceptable environment for the Ticode-12 containers. They emphasized their concern with the effects of hydrogen on the Ticode-12 material.

   Westinghouse and ONWI indicated these issues (a and b above) regarding two current designs would be considered in further evaluations of the respective waste package designs.

3. NRC (Cook) made the following comments for ONWI and Westinghouse consideration in their continuing waste package design efforts.

   a) NRC noted that in several instances in setting design criteria and incorporating design features it appeared potentially

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unconservative assumptions were being made which could lead to significant design changes and delays at a later date if found to be invalid. These assumptions, which NRC identified, are listed below:

1) Elimination of the incorporation of backfill in the waste package/engineered system design for a salt repository. Related to this item it was noted that the Westinghouse assumption of small brine pockets, low brine movement and insignificant communications with groundwater systems are leading to the conclusion that a backfill component is not needed to exclude brine from the waste packages and subsequently, to retard migration of radioisotopes away from the waste packages. NRC noted these assumptions are not widely accepted in the technical community and may not be verified by site investigations.

2) The omission of significant mechanical closure mechanisms backing-up weldments in waste package designs. For example, a tight mechanical seal at the Ticode-12 joints in the unshielded design and a threaded or breech-lock closure feature in the shielded design would not only back-up the weldments as an alternative closure device, but potentially prove sufficient in the long run, eliminating the need for weldments, a significant cost in the package fabrication.

   The need for a backup closure feature suggested above for the cast iron packages was emphasized since both ONWI and Westinghouse recognize the thick-weldment in this design is a major development issue. It appeared to NRC prudent to incorporate a backup design feature to assure the basic design being considered could be pursued to an acceptable final design should the weldment development prove unsatisfactory.

3) Use of high design temperature limits for waste glass center line temperatures (500^{0} early in package lifetime); high areal (150KW/acre for salt) for repository loadings, and low leach rates for the reference glass, particularly those associated with long-term releases (2×10^{-9} gm/cm 2/day).

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4) No design limits for radiation fields in the unshielded design.

4. NRC indicated agreement with the Westinghouse conclusion that the shelf-shielded waste package design appeared to have substantial advantages over the unshielded design. In particular the advantages associated with:

   a) Ease of interim storage, including potential long term storage to allow cooling.

   b) Ease and safety of handling.

   c) Elimination of concerns about radiolysis in the repository.

   d) The provision of a large mass of iron or steel to provide long-term corrosion resistance as well as substantial hydraulic impedance following loss of containment.

   e) Availability of a hundred or more years of experience and knowledge of cast iron and steel corrosion performance to verify long term performance.

   f) Simplified repository handling.

   g) Simplified repository design.

5. BNL (Schweitzer) summarized the role BNL plays for NRC, both past and current. BNL noted that work prior to the current proposed rule of July, 1981, reflected the requirement for "zero" release for containment. BNL stated that they consider 10 CFR 60 allows a wide range of design possibilities for DOE to meet the current performance objectives. BNL continued to describe how BNL plans to prepare a Staff Technical Position (STP) for waste package performance after closure. He made the pont that a single conceptual design would simplify their work to prepare this STP. BNL also noted that they are obliged to say what they believe is reasonable assurance. BNL noted that they are no longer assessing waste forms which have been discarded by DOE, e.g., coated particles. However, BNL proceeded to describe the desirable characteristics of coated particles.

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6. ONWI (Carr) described the Westinghouse documents containing HLW waste package conceptual designs. He stated that a major objective is to propose research goals and interface with other design groups in the program. He discussed the Summary of Waste Package Functions (Table 2-1 of AESD-TME-3113).

7. The group discussed draft EPA criteria and the multiple barrier approach in the philosophy of the waste disposal system design.

8. The group discussed the issue of removal of the TRU waste provisions from 10 CFR 60. NRC (Cook) indicated that he thought public comments to remove TRU from the scope of the document would be reflected in the final version.

9. NRC described the Staff's objective to develop requirements for a reliability analysis for waste package performance and urged ONWI and Westinghouse to incorporate plans for such an analysis in waste package design and assessment activities hence forth. NRC requested and Westinghouse agreed to provide a document AESD-TME-3040A of December 1980, "Quality Assurance Program Plan for Waste Package Design Studies." Westinghouse also agreed to forward AESD-TME-3055 of November 1980, "Engineered Waste Package Design Specifications," for the staff's information.

10) The group discussed changes in the rule stemming from public comments including DOE's comments. ONI questioned how the staff planned to resolve comments concerning the specification of requirements on the entire system, including the geology, in lieu of selected components of the system. I noted there was no answer to the question at this time.

ORIGINAL SIGNED BY

F. Robert Cook
High-Level Waste Licensing
Management Branch
Division of Waste Management

Enclosure:
List of Attendees

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LIST OF ATTENDEES

NAME	COMPANY
S. Basham	ONI-WPPO
C. Bolmgren	AESD
J. A. Carr	ONWI
L. A. Casey	DOE/NPO
F. R. Cook	NRC
R. Cudnik	ONI-WPPO
M. S. Davis	BNL
J. Kircher	ONWI
R. W. Klingensmith	ONI-LPO
D. Moak	ONWI
J. Parry	ONI-LPO
J. Schornhorst	AESD
D. Schweitzer	BNL
P. Soo	BNL