

ENCLOSURE

SUMMARY OF SRP/NRC WASTE PACKAGE MEETING

DATE/LOCATION

January 22-24, 1986

Battelle Columbus Laboratory

Columbus, Ohio

ATTENDEES/ORGANIZATIONAL AFFILIATION

A list of attendees and their organizational affiliation is attached as Enclosure 1.

BACKGROUND/FACTS

The Salt Repository Project Office letter of agreement (Enclosure 2) gives meeting objectives and listings of DOE and NRC reports exchanged prior to the meeting. The meeting objectives and final agenda (Enclosure 3) were developed in response to questions (Enclosure 4) provided by the NRC. Enclosures 5-14 consist of all of the handouts and copies of viewgraphs presented.

OBSERVATIONS

The NRC had the following observations:

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NRC OBSERVATIONS

- 1) The NRC staff appreciates the effort of the DOE in making available at this meeting the key personnel involved in the salt waste package program. Although final resolution to questions prepared by the NRC staff was not achieved nor expected in many cases, essentially all of these questions were addressed during the presentations. NRC also found the identification of SRPO concerns useful in identifying areas where future NRC guidance is needed. The NRC staff wishes to thank all DOE participants for their effort.

- 2) The NRC is concerned that the SRP may be unable to show compliance with the 300-1000 year containment requirement for the reference waste package design by demonstrating that the hermeticity of the waste package container is preserved for the duration of the containment period. In light of this concern, SRP has not documented viable alternatives to the current waste package design either in terms of alternative materials or supporting data.

- 3) For the current waste package design, NRC considers that localized corrosion must continue to be regarded as a mechanism by which the container may be breached. Data supporting the analysis of long-term, localized corrosion behavior need to be developed, and future test plans need to be described.

4) Release of information is not timely. For example, the Westinghouse waste package conceptual design report (WTSD-TME-001) was prepared in 1982, yet is only now being released as ONWI-517.

5) The SRP's description of waste package behavior under expected conditions is informative and should be a useful starting point in assessing data needs. However, plausible variations in assumed conditions to reflect data uncertainties should be given consideration in both the testing program and in the treatment of variability in the performance assessment. An envelope of environmental parameters within which the waste package testing programs may be performed should be provided to NRC. Actual site properties may fall outside of the design range. As a result, waste package design changes and additional supportive testing may be required that could significantly affect DOE's ability to meet the licensing schedules in the Mission Plan.

6) While SRP investigators expressed interest in WIPP related information, at this time full utilization of this source of salt information is not apparent.

* 7) The peer review program at Argonne National Laboratory appears to be developing in an appropriate direction. However, -during several ^{presentations} presentations, peer review was referenced as a method to reach conclusions on subjects where data are unavailable. The NRC believes that

extrapolation of limited data over long periods of time should not only be based on the peer review process and expert opinion, but also include: (a) an experimental program based on conservative conditions, (b) a thorough understanding of the fundamental processes involved, and (c) a confirmatory test program extending over a moderate period of time (30-50 years). The peer review process should be expanded to consider review of testing goals and procedures, possibly from a source not directly related to the SRP (e.g., MRB).

- 8) Design approaches to container failure based on limited brine availability are inadequate to demonstrate containment in cases where failure by localized corrosion cannot be excluded.
- 9) The rationale for selecting the material of the waste package container is unclear. This makes it very difficult to establish conformance with performance criteria that can be related to the regulatory requirements.
- 10) The NRC staff considers discussion of irradiation effects to be an acceptable approach to acquisition and application in assessing waste package environment.

The NRC is concerned that the high pH brines produced by heating salt, as observed by BNL, have not been considered adequately in the matrix of experiments for the waste package.

- 11) It is unclear how information (including data and analyses) developed by PNL prior to corrections to the PNL QA Program will be used, and if it is to be used as information to support a license application, how that information will be qualified. While NRC staff realizes that qualification of existing information is an issue for which policy/guidance is currently being developed, the staff is concerned that the function of and deficiencies related to the existing information has not been evaluated and documented so that it can be considered in future program work.
- 12) SRP indicated that a waste package program plan is under development. A program plan should be prepared which states the objectives of the waste package and how these objectives will be met through the analytical and experimental efforts to be performed, and how the information will be used to demonstrate compliance with the regulatory requirements. For example, the program plan should: (a) state the regulatory requirements which must be met, (b) state the function and design objectives of the waste package which ensure the regulatory requirements will be met, (c) identify the design and the technical considerations and concerns affecting the design's ability to meet those objectives, and (d) explain the information needed and the analytical and experimental programs to be performed to obtain the information and resolve the technical considerations and concerns. Schedules should also be presented.

Based on the presentations, it is not clear that several testing programs under way and planned have been developed with the above logic in mind. For example, spent fuel leach testing appears to be under way without clear understanding of how it will be ultimately used to demonstrate compliance with the regulatory requirements.

- 13) The fugacity of hydrogen should be assessed for the metal/environment systems proposed, and the effects of hydrogen can be assessed. These effects include embrittlement (ductility loss, cracking), and hydrogen damage/attack.
- 14) Test plans for corrosion and embrittlement studies should always include assessments of the relative behavior of the weld metal, the heat affected zone, and the base metal.
- 15) In view of the very limited structural analysis performed to date, NRC believes more detail is required concerning what structural failure modes will eventually be considered and how the project will analyze them.
- 16) Although SRP intends to add use of probability distribution functions to later WAPPA analysis to account for variabilities and uncertainties in parameters, such analysis is yet to be performed. It is unclear how the analysis will be accomplished, how experimental data will be turned into probability distribution functions, and which parameters will be applied in the form of pdf's (as opposed to single values or ranges).

- 17) NRC understands that SRPO/ONWI would like to have PNL test data presently being collected released as unanalyzed data reports, NRC would like to receive from SRPO a specific commitment for release and a description of how and in what time frame PNL test data and analyses results will be documented and released.
- 18) The NRC regards the subject of brine migration and other sources of water as an area that requires a much greater emphasis.
- 19) The NRC continues to regard the use of the Jenks equation for brine migration inappropriate. There are a number of limitations (with which ONWI/SRP appear to agree).

These include:

- (a) the equation is empirical rather than mechanistic
- (b) the equation was developed for intracrystalline migration, and was not intended to model intercrystalline migration
- (c) the equation is not properly dimensionally balanced
- (d) there are concerns that the Salt Block 2 data used to validate BRINEMIG is limited in applicability

The NRC does not believe BRINEMIG has been validated and may be inappropriate for use in modeling brine migration as expected under repository conditions.

- 20) It appears that brine migration test plans should include studies of combined effects. For example, experiments should include the effects of radiation, pressure, clay seams, and repository construction (e.g., fracturing) in addition to thermal effects.

- 21) The issue of radionuclide source term characterization has begun to be addressed by complex engineering type experiments by McVay. Simpler experiments which isolate single variables need to be undertaken so that the complex experiments may be understood. For example, technetium/iron experiments are needed to determine why technetium is being removed from solution in the whole system type experiments. The reaction products in all experiments need to be characterized to the extent possible. The effects of varying oxygen levels on the radionuclide source term needs to be determined experimentally.

- 22) It appears that an initial performance allocation for components of the

waste package, in accordance with the September 26-27, 1985 agreement between NRC and DOE/HQ, has not been included in the salt waste package program. Such a performance allocation should be incorporated into the SCP to provide a systematic way of giving the information needed to determine whether testing will adequately support licensing. It would be a tentative technical management decision and subject to revision as tests are run and refined.

OPEN ITEMS AND AGREEMENTS

- 1) During the presentations, SRP indicated that a program plan is currently under development. Considering the HRC-SRPO understanding of the advantages in providing NRC with key documents early in their development and the importance of a waste package program plan, it would be useful for NRC to obtain copies of this draft document at the earliest possible time.
- * 2) NRC would like to receive ^{and} an evaluation of ^{the} any limitations in the PNL data that resulted from deficiencies in the PNL QA Program.
- 3) NRC understands that test plans and procedures are prepared and approved prior to the initiation of laboratory testing. NRC has an interest in reviewing these plans and procedures. To facilitate NRC planning for possible review, we would appreciate receiving a schedule of tests that are planned that is updated periodically. We would also like to know what SRPO's plans are to make plans and procedures available for review.

- 4) NRC's preliminary topics for future meetings include 1) corrosion, 2) waste package performance assessment, 3) performance confirmation, 4) waste package program plan, 5) an annual meeting on other selected waste package topics for timely discussion, and 6) data revenues at PNL of corrosion data, test plans and procedures.
- 5) NRC would appreciate a response to the NRC observations in this meeting summary.
- 6) The representatives from the States of Mississippi and Louisiana did not provide observations for this meeting summary.

DOE OBSERVATIONS

- 1) DOE believes that the objectives of this meeting as documented have been achieved.
- 2) DOE observed that the NRC felt that the bulk of their questions were addressed during the meeting. They were impressed with the organization of the meeting, the presentations, and the level of the discussions.

- 3) DOE and NRC recognize the presence of State representatives in the meeting and appreciate their participation in discussions and responses to pertinent topics of interest.

- 4) DOE observes that NRC has a concern with the level of parallel effort on alternatives to the reference waste package design. A low level of effort on the alternatives may result in an insufficient database at the time of expected license application.

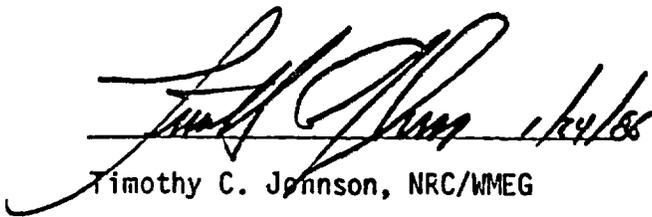
DOE discussed the uncertainties associated with the current reference design concept and discussed design modifications which would be employed if necessary. DOE has carried and intends to continue to carry on a program of testing and analysis supporting the potential use of those modifications.

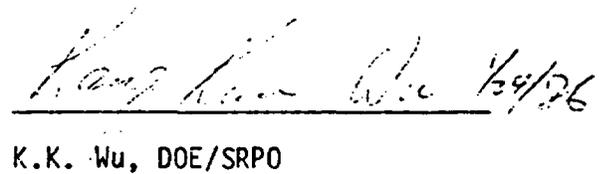
- 5) DOE observes NRC is concerned about DOE utilization of sufficient conservatism in their waste package program. DOE believes that its approach to considerations of waste package design and expected behavior, including uncertainties, will prove to be sufficiently conservative.

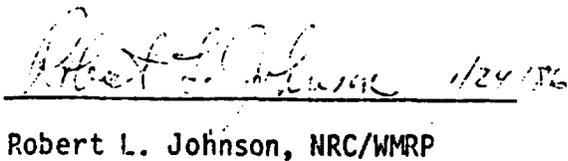
ACTION LIST - Open Issues

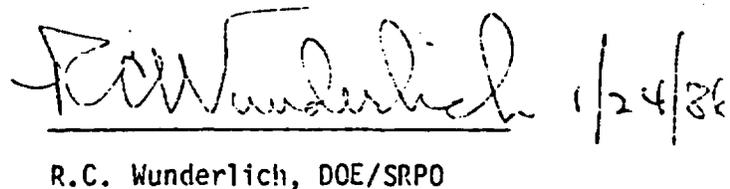
- 1) DOE observes that NRC is interested in waste package monitoring and performance confirmation plans and would like to meet on this topic. DOE/HQ is embarking on the development of a common project (SRP, NNWSI, BWIP) position on monitoring and performance confirmation. NRC should interface with DOE/HQ regarding this topic and a potential meeting.
- 2) DOE recognizes the desire of NRC to shorten the time between the performance of testing, analysis, etc. in the DOE program and its availability to non-DOE elements. DOE will attempt steps in its SRP waste package program to reduce this time, particularly with regard to test data.
- 3) SRP believes that a more precise and timely definition of the engineered barrier system is extremely important to their program. SRP intends to interface with DOE/HQ on this matter with the intention of obtaining resolution and definition of this subject.
- 4) DOE observed that the NRC asked that SRPO describe the definition of the EBS it would consider useful. NRC offered to review and comment on the DOE definition of the EBS in salt.

- 5) DOE would like to understand the applicability of NRC Research programs as they relate to their licensing concerns for the salt repository waste package. A meeting and/or documentation on the relevance of the Research program to licensing concerns would be desirable.
- 6) DOE inquired as to whether testing on controlled release rates would be required if the DOE could demonstrate 10,000 years of containment. NRC agreed to consider the request.


Timothy C. Johnson, NRC/WMEG


K.K. Wu, DOE/SRPO


Robert L. Johnson, NRC/WMRP


R.C. Wunderlich, DOE/SRPO

ENCLOSURES

1. Final attendee list.
2. J.O. Neff (DOE/SRPO) letter to J.J. Linehan (NRC) dated December 23, 1985.
3. Final agenda.
4. NRC handout E1 (NRC/WMEG/JCV/01/22/1985).
5. SRP/NRC Waste Package Meeting, Volume 1.
6. SRP/NRC Waste Package Meeting, Volume 2.
7. Technical Focus, Waste Package Environment, J. Cunnane and L. Peterson.
8. BMI/ONWI-517.
9. NRC handout #2 (NRC/WMEG/JCV/01/24/1985).
10. Magnesium concentration figures.
11. NRC organization.
12. John Carr's flowchart.
13. McNeil's viewgraphs.
14. Quality Assurance/Peer Review viewgraphs and handouts.