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SUMMARY OF THE NRC/DOE MEETING ON THE  
DOE WASTE ACCEPTANCE PROCESS AND  
WASTE ACCEPTANCE PRELIMINARY  
SPECIFICATIONS

DATE AND LOCATION OF MEETING

July 31, 1986  
Forrestal Building, Room BE069  
1000 Independence Ave., SW  
Washington, D.C. 20585

WM Record File

*109-1*

WM Project

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(Return to WMA, 627-88)

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A list of attendees and their organizational affiliations is attached as Attachment 1.

BACKGROUND

The Waste Acceptance Process has been developed by DOE to outline the documentation and activities required to ensure that high-level waste forms produced, including the Defense Waste Processing Facility (DWPF) at Savannah River, SC and the West Valley Demonstration Project (WVDP) at West Valley, NY, will be acceptable at any of the potential repositories. A geologic repository for disposal of high level nuclear waste is required to be licensed by the NRC. The requirements for licensing set limits on cumulative releases of radionuclides to the accessible environment from the repository. Therefore, DWPF and WVDP waste forms must have specifications and tests that demonstrate compliance with these regulations. A waste form which cannot be shown to be in compliance with regulatory requirements with reasonable assurance will not be acceptable for disposal in a repository. Thus, waste acceptance is intimately and inseparably related to repository licensing.

The DWPF and WVDP waste forms are to be produced before a repository site is selected. Therefore, the waste must be acceptable for any site under consideration. In view of these conditions it is necessary for the NRC and others to review the Waste Acceptance Process and preliminary Waste Acceptance Specifications to minimize the risk that these wastes will be unacceptable for disposal.

The meeting objectives were as follows:

1. to provide an opportunity for DOE to present the Waste Acceptance Process and Waste Acceptance Preliminary Specifications for the DWPF and WVDP,
2. provide an opportunity for NRC, States, and Indian Tribes to discuss their comments with DOE, and
3. to identify possible future interactions with NRC on waste acceptance.

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*Rec'd with Summary  
of DOE/NRC's Mtg.  
dtd 7/2/86*

DOE's description of the waste acceptance process was transmitted to the NRC on August 19, 1985 for review and comment (Attachment 2). The NRC response was transmitted to DOE on December 16, 1985, recommending a meeting to discuss the WAP in further detail and establish a mechanism for NRC involvement in the process (Attachment 3). DOE transmitted the draft WAPS for DWPF and WVDP to NRC on April 16, 1986 for information and review (Attachment 4). DOE received NRC comments on the WAPS in a telephone call on June 10 and by telefax on June 30 (Attachment 5).

A copy of the meeting agenda is attached as Attachment 6. The DOE presentations are attached as Attachment 7. Discussions were held on the WAP and WAPS. The DOE response to the NRC comments are included in Attachment 8. A list of generic issues proposed for discussion in future waste package meetings is included in Attachment 9.

DOE OBSERVATION

DOE-RW intends to provide the NRC with a certification of the quality assurance program for the waste producers and the basis for the RW certification. NRC would be provided with the waste producers' quality assurance plans (following DOE review and approval) and administrative procedures, the documentation of the RW review of these plans and procedures, and the basis for RW's endorsement of them. NRC would also be provided copies of reports of audits conducted by DOE of the waste producers and their principal contractors and documentation of corrective action taken in response to audit findings. DOE believes this certification, together with the documentation supporting the certification, would provide a sufficient basis for an NRC licensing board to determine that an adequate quality assurance program is in effect for the waste producers. Therefore, an NRC audit of the waste producers would not be required.

NRC OBSERVATIONS

1. NRC staff observed that several key specification items have yet to be resolved by the DOE. The most critical of these items is specification 1.3 (Radionuclide Release Properties). The test procedures and acceptance criteria for specification 1.3 represent important aspects for demonstrating compliance with the release rate requirements in 10 CFR Part 60. DOE intends to resolve these open specification items as well as performance allocation issues and the correlation of waste glass producer testing and repository testing in future revisions to the WAPS and in the WCP, WQR and SCPs. NRC staff believes early consultation (prior to SCP issuance) will be needed on performance allocation test plans and procedures in order for the staff to identify and resolve issues early. DOE should propose interaction with the staff to accomplish this objective.
2. DWPF staff indicated that provisions for the sampling of radioactive production glass are provided in the design of the DWPF. DWPF staff also indicated that the sampling frequency has not been determined but is expected to be minimal. WVDP staff indicated that no radioactive production sampling of glass is planned. Instead of production sampling both the DWPF and the WVDP would place primary reliance on demonstrating

compliance with waste form specifications on their process control programs. These process control programs would be developed based on pre-operational and qualification testing. These test programs would be described in the Waste Compliance Plans.

Based on the experiences in using process control programs in low-level waste (LLW) solidification systems, NRC staff considers that the DWPF and WVDP staff could be underestimating the difficulties in relying solely on process control procedures to demonstrate that the actual production glass will meet the desired waste form specifications. In the LLW areas, process control programs and solidification systems are less complex than what is planned for producing production glass at the DWPF and the WVDP. Despite the simpler systems, process control problems are common and result in the generation of waste products which do not meet technical requirements. In order to ensure that the actual production glass will meet the desired specifications, NRC staff considers that sampling of production glass is expected to be needed. The frequency for production glass sampling should be based on the results of pre-operational and qualification testing programs and could be modified based on the results of initial production sample testing. DOE indicated that they would consider actual production sampling in the development of the WCPs.

3. During the meeting, the involvement of the NRC in QA program implementation reviews at WVDP and DWPF was discussed. DOE proposed an approach whereby OCRWM will conduct audits of WVDP and DWPF and will participate in selected audits that WVDP & DWPF perform of major contractors. OCRWM will certify the adequacy of the waste producers' QA programs. The staff commented that early NRC involvement through its own independent audits or reviews of these facilities would be beneficial to DOE in licensing. Although the NRC will be independently auditing the Office of Geologic Repositories and individual repository projects and could, therefore, have a basis for judging and finding acceptable the overall adequacy of the OGR QA program, without independent NRC oversight in audits at WVDP and DWPF, the DOE alone will have to provide the rationale as to why their program meets the licensing requirements. There will be a risk that a QA program will be found unacceptable or new issues raised late in the formal licensing process by the NRC or others with the approach proposed by DOE.

With respect to OCRWM participation in selected audits of major contractors (as opposed to performing its own independent audits), a comment similar to the above applies. Independent OCRWM audits would be beneficial in licensing for demonstrating the adequacy of the QA program.

#### STATE/TRIBAL OBSERVATIONS

The State and Indian tribe representative present made no observations.

#### AGREEMENTS

1. The NRC staff agrees that the QA program criteria in the WAPS presentation are acceptable for this program.
2. The NRC staff agrees that the general approach for QA program reviews by DOE & NRC appears acceptable with the exception of those items in NRC observation 3.

3. The NRC staff agrees that the WAP and draft WAPS have no apparent gaps or deficiencies except as indicated in the NRC comments and appear to consider the appropriate technical concerns relative to waste acceptance at a repository. NRC agreed with the DOE responses to the NRC comments on the WAPS (see Attachment 8). DOE plans to revise the draft WAPS accordingly and issue the WAPS in the near future. DOE intends to address the reserved items (in particular, specification 1.3) on the schedule presented during the meeting and revise the WAPS.

OPEN ITEMS

1. DOE/RW will provide the following Waste Acceptance Process documents to the NRC for review when they are completed:
  - a) Waste Acceptance Requirements (WAR)
  - b) Waste Compliance Plans (WCP)
  - c) Waste Qualification Reports (WQR)
  - d) Preliminary Specifications<sup>a</sup> <sup>WITHOUT THE RESERVED ITEMS RESOLVED</sup> as revised as per NRC comments, 6/30/86
  - e) Waste Form Descriptions for DWPF (DP-1606, Rev 1) and WVDP.

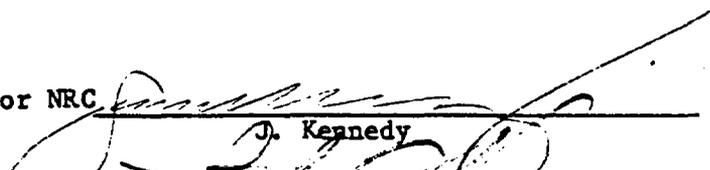
(DOE/RW is the NRC contact point for the Waste Acceptance Process)

2. DOE/ID will meet with the NRC at West Valley to exchange technical information relevant to the WVDP. DOE/SR will explore mechanisms to exchange technical information with the NRC and contact the NRC by 8/8/86.
3. DOE/RW agrees to consider the NRC's list of proposed issues for discussion at a DOE/NRC Generic Waste Package Meeting and get back to NRC by the end of August 1986.

4. DOE/RW will provide the NRC with an updated copy of "Generic Requirements for Mined Geologic Disposal Systems" (GR-MGDS) when available.

5. NRC will consult with the NRC Office of General Counsel regarding the DOE proposal to submit the WAPS with the reserved items resolved <sup>BASED ON</sup> NRC's ~~CONCURRENCE~~ <sup>CONCURRENCE</sup> will concur, including NRC the Office of General Counsel, on the approach and testing program for qualifying glass for disposal in the repository. The NRC review of the approach and testing program would include consideration of the information provided in the SCPs, the performance allocation to be proposed by DOE and the qualification programs described in the WCPs.

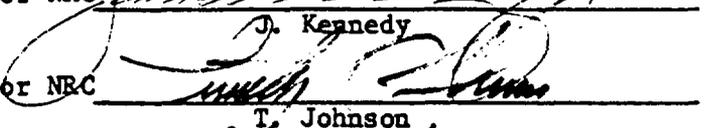
For NRC

  
J. Kennedy

Date

5/1/86

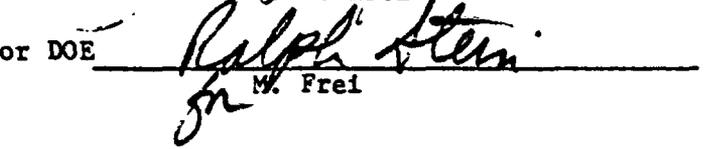
For NRC

  
T. Johnson

Date

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For DOE

  
M. Frei

Date

8/1/86

NRC/DOE MEETING  
 - WAP / WAPS -  
 JULY 31, 1986

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Department of Energy  
Washington, D.C. 20585

AUG 19 1985

Mr. Robert E. Browning  
Director, Division of Waste  
Management  
Mail Stop 623-SS  
Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Browning:

The attached Waste Acceptance Process (WAP) has been developed to formalize the activities within the Office of Civilian Radioactive Waste Management (OCRWM) to ensure waste forms will be acceptable at any potential repository. Initial efforts will be focused on providing consistent and cohesive acceptance specifications for high level waste forms which are compatible with each repository and satisfy the data requirements for the licensing process; disposal of spent fuel will be addressed later.

The WAP was developed due to the complexity of qualifying waste forms on a schedule that, in some cases, has repository site selection and licensing subsequent to initial waste form production. As you may know, waste form production from the Defense Waste Processing Facility (DWPF) and the West Valley Demonstration Project (WVDP) will occur prior to selection of the first repository site and submission of the license application to the NRC. Thus, OCRWM is in the process of developing in the near-term Waste Acceptance Preliminary Specifications (WAPS) for those two waste form producers. The WAPS for DWPF and WVDP should be available in draft form by mid-September 1985.

The WAPS will be prepared by the Waste Acceptance Committee (WAC) which is composed of both repository site and waste producer technical contractor personnel under the direction of a DDE-OCRWM chairman. The purpose of the WAC is to focus the repository project and waste producer resources on the development of waste acceptance documentation, as identified in the WAP.

We plan to interact with NRC at appropriate points as we move through the process. We are available to discuss the attached material with you if you so desire. Also, it is planned to make the draft preliminary specifications for DWPF and WVDP available for NRC

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information and review in October 1985, and, if appropriate, have the NRC provide comments prior to issuance in late December 1985. These documents will provide valuable information to the repository projects and waste producers, and we are looking forward to interacting with you in their development.

If you have any questions, please contact me on 252-5355.

Sincerely,

A handwritten signature in cursive script that reads "Ralph Stein".

Ralph Stein, Director  
Engineering & Licensing  
Division  
Office of Geologic Repositories  
Office of Civilian Radioactive  
Waste Management

## DESCRIPTION OF THE WASTE ACCEPTANCE PROCESS

### Introduction

Geologic repositories for disposal of high level nuclear wastes are required to be licensed by the NRC. Requirements for licensing are contained in 10CFR60 which sets specific performance requirements on the waste package and on the engineered barrier system. Draft EPA regulation 40CFR191 sets requirements on the cumulative release of radionuclides to the accessible environment from the repository system. As a subelement of the waste package, the engineered barrier system, and the overall repository system, the waste form plays a role in satisfying these regulatory requirements, and consequently, the regulatory requirements result in derivative requirements on the waste forms and indicate the need for waste form specifications and tests to demonstrate compliance. A waste form which cannot be shown to be in compliance with regulatory requirements with reasonable assurance will not be acceptable for disposal in a geologic repository. Thus, waste acceptance is intimately and inseparably related to repository licensing.

The Waste Acceptance Process has been developed to outline the documentation and activities required to ensure that waste forms, other than spent fuel, will be acceptable at any of the potential repositories. The motivations behind the development of the process are the waste sources other than spent fuel, and the complexity of developing and qualifying waste forms on a schedule that, in some cases, has repository site selection and licensing subsequent to initial waste form production.

The attached time line schedule shows that both high-level waste from the West Valley Demonstration Project (WVDP) and defense waste from the Defense Waste Processing Facility (DWPF) will be under production before the repository site is selected. The importance of this is that waste form performance requirements cannot be considered final until the NRC issues a license. This will not occur until several years after the site is selected for the repository, and the repository license application, which will include waste form performance requirements, is submitted to and approved by the NRC. Thus, in some cases, significant quantities of waste forms are likely to be produced prior to final assurance of their acceptability for disposal. In view of the potential problems that could arise as a result of the forecasted production schedule the preliminary Waste Acceptance Specifications for WVDP and DWPF will be provided to the NRC for review prior to their issuance.

The DOE has legislated and contractual obligations to accept for disposal commercial high-level waste from possible future reprocessing of spent fuel, commercial TRU wastes, and wastes from other defense-related sources. In the cases of the WVDP and DWPF, the production processes are well developed. Each of the repository projects has prepared a draft Waste Acceptance Specification for the DWPF wastes. In regard to WVDP, MNWSI has identified the same set of specifications for WVDP as was identified for the DWPF wastes; however, BWIP and SRPO have issued specifications for CHLW wastes but these exclude the WVDP wastes. Other producers, such as Hanford and the Idaho National Engineering Laboratory, are at intermediate stages in the selection and development of waste forms. Use of the WAS's prepared for WVDP and DWPF may be inappropriate for waste forms of potentially diverse compositions and configurations. Although no domestic commercial spent fuel reprocessing venture is currently planned, the DOE is required by its contract with nuclear utilities (10 CFR 961, Appendix E, Subpart D) to identify requirements for acceptance of a

commercial high-level waste form at the time of submittal of the license application for the first repository to the NRC. Thus, there is a need for the OCRWM to provide guidance to waste producers in the early stages of the development of waste forms, as well as to those with fairly well-defined waste form characteristics. There is also a need for the waste producers to identify and provide the required documentation and information on the waste form that will assure acceptance of the waste at a repository. A key element of this process is to provide consistent and cohesive acceptance requirements for high-level waste forms which ensure compatibility of the waste forms with each of the candidate repository sites, while satisfying the data requirements of the licensing process.

#### WAP Description

With reference to the attached conceptual diagram of the Waste Acceptance Process, Step 1 refers to a site-specific, generic waste form, waste acceptance requirements\* document (SS-GWF WAR). In this document, each repository project would identify requirements for an unspecified waste form for its candidate site. Topics considered in developing the SS-GWF WAR would include regulatory constraints and limitations created by the host geologic environment and repository design. Examples of such limitations might be rock thermal limits or waste form solubility. The dashed lines in the diagram for Step 1 indicate that actual issuance of SS-GWF WAR's is not necessary but that identification of WAR by each project must be completed for use in Step 2.

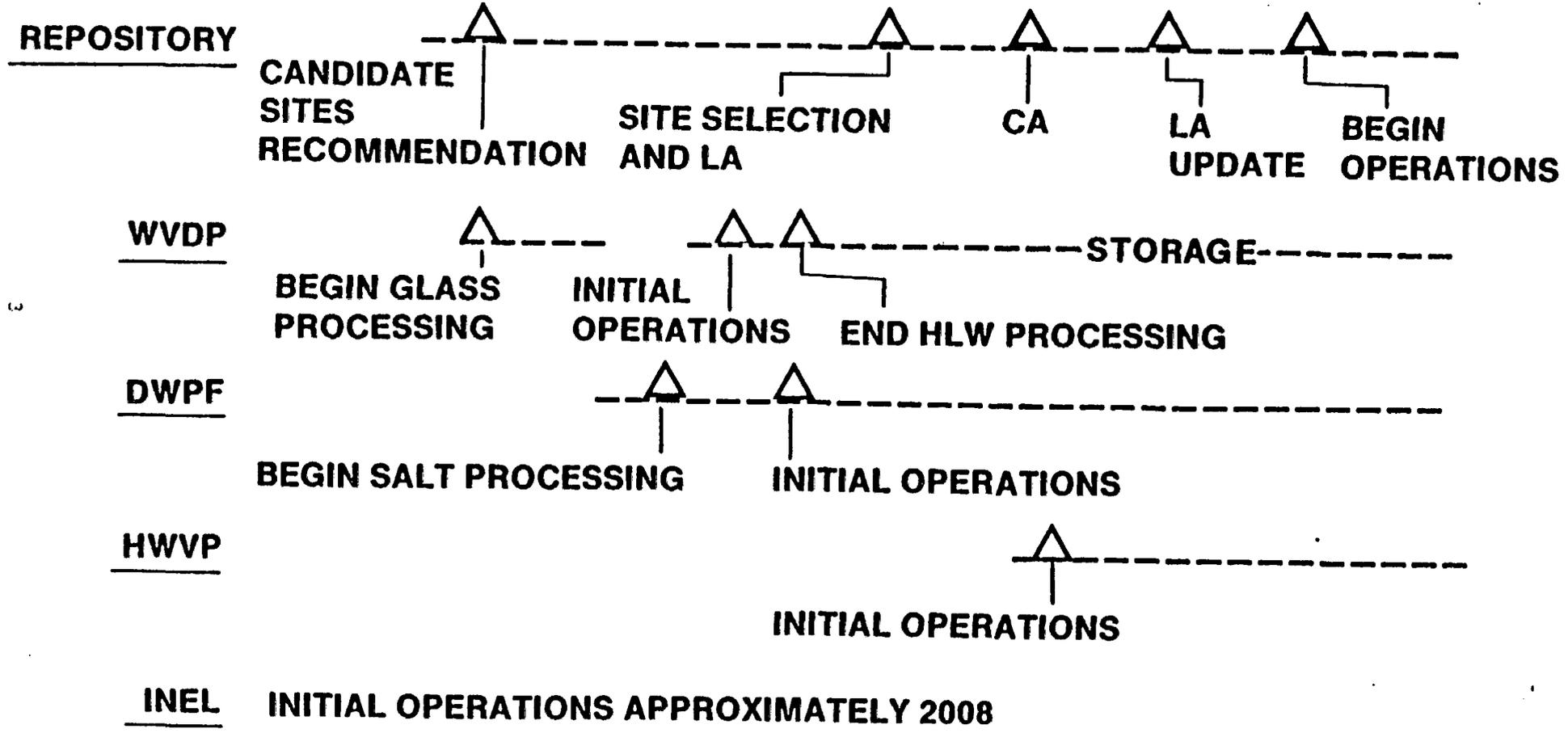
The multiple SS-GWF WAR's will be combined into a single generic site, generic waste form, waste acceptance requirements\* document (GS-GWF WAR, Step 2). The contents of this document would envelope the requirements of the SS-GWF WAR's, with some parallel site-specific requirements. The purpose of this GS-GWF WAR would be to provide uniform early guidance (prior to development of waste acceptance specifications) to future high-level waste producers on the minimum requirements for a waste form for it to be acceptable at any of the candidate repository sites. This document would be the vehicle for compliance with the 10 CFR 961, Appendix E, Subpart D requirement for identification of the minimum requirements for a CHLW form. It would also provide guidance for selection of waste forms to such potential generators as INEL and for the determination of processing activities required for such miscellaneous waste forms as HTGR fuel, TMI rubble, etc. It will also provide requirements for an acceptable TRU waste form (if disposal is required in a repository). It is highly desirable to develop the GS-GWF WAR to a quality sufficient for inclusion in the license application as the basis for accepting future waste forms for repository disposal without further regulatory review. This may not be practicable, and it may be necessary to present some lower level, more specific document such as the WAS to serve this function.

Using the GS-GWF WAR, the waste form producers would prepare a Waste Form Description (generic site, specific waste form, Step 3). This WFD would be the waste form producers proposal for meeting the requirement of the

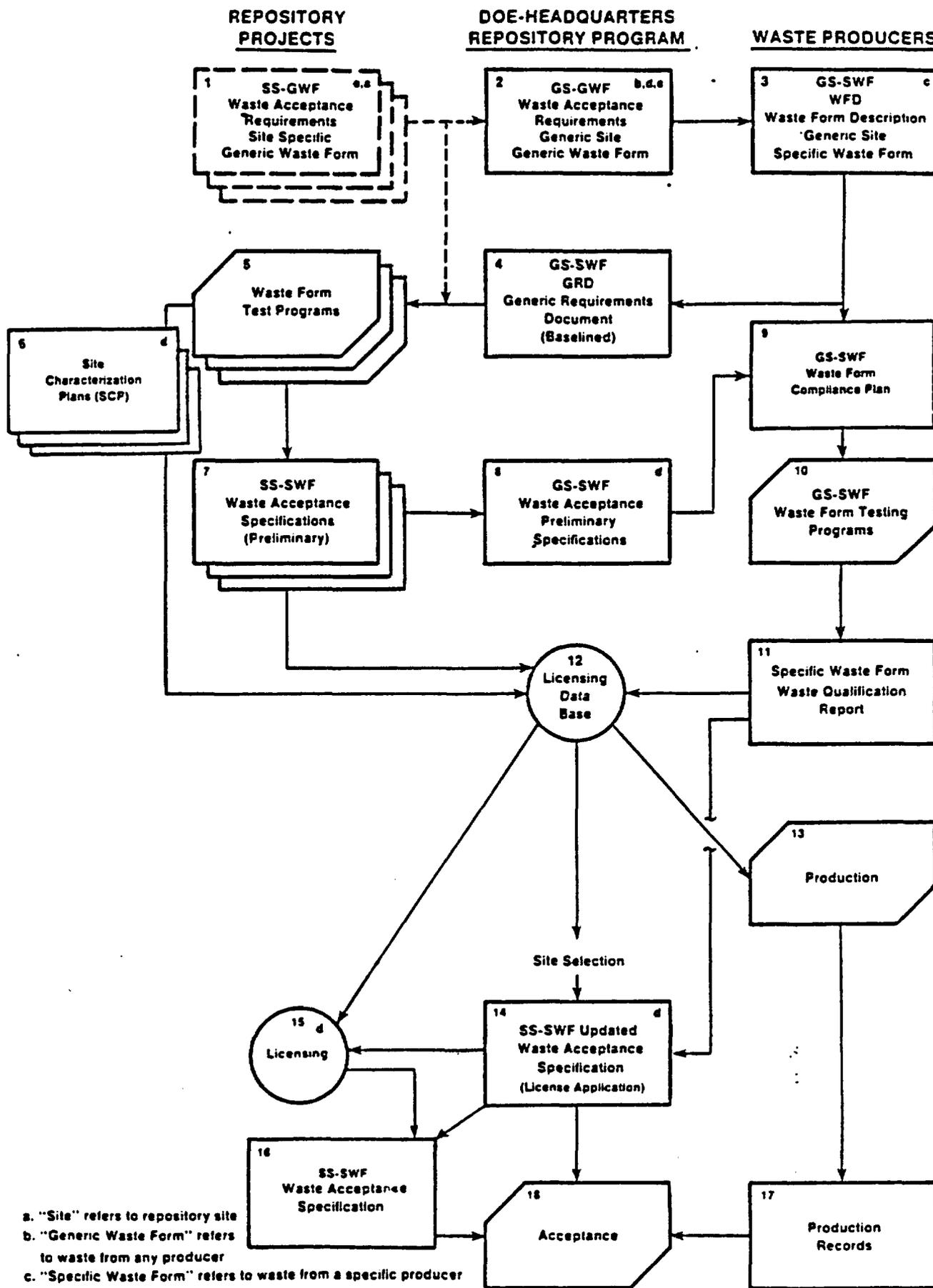
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\* Waste Acceptance Requirements - A compilation of generally applicable criteria which specify the minimum conditions for acceptability of a waste form at one (specific-site) or all (generic-site) repository sites. The requirements will include identification of repository environmental conditions, constraints imposed by the geologic media, packaging and handling limitations, regulatory requirements, and minimum levels of acceptable performance for candidate waste forms.

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8	8	8	8	8	8	9	9	9	9	9	9	9	9	9	9	0
4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0



# WASTE ACCEPTANCE PROCESS



- a. "Site" refers to repository site
- b. "Generic Waste Form" refers to waste from any producer
- c. "Specific Waste Form" refers to waste from a specific producer
- d. "NRC" indicates currently planned interaction point with NRC
- e. Steps not required for DWPF/WVDP as prerequisites to steps 7 & 8

GS-GWF-WAR, and would address each of the GS-GWF requirements and the proposed means of compliance. The WFD should also identify waste form limits (e.g., maximum temperature) to assure waste form adequacy. For purposes of comparison, the WFD would be similar to the "Description of Defense Waste Processing Facility Waste Form and Canister", DP-1606.

Portions of the WFD will be baselined by OCRWM in the Generic Requirements document (OGR/B-2) as generic site, specific waste form (GS-SWF GRD, Step 4) information. (The WFD will also be the source of information for developing waste management system interface information in the "OCRWM Systems Requirements Document"). The repository projects use the GR document as the generic basis for site-specific design requirements. Information on spent fuel, West Valley high-level waste and defense high-level waste currently appears in Appendix B of the GR document, "Waste Source System Interface". As more waste producers reach the point where a WFD can be written, there will be information on additional waste forms added to the GR document.

Information in the GR document and the waste package performance requirements of 10 CFR 60 are used to generate the repository projects' site-specific, specific waste form testing programs (Step 5). Tests described in these programs will provide data relevant to waste form performance in the repository environment for use in waste package performance assessments and licensing. These test programs as they become developed are fully described in the repository projects' Site Characterization Plans (Step 6).

Each of the sites' test programs along with the information in the WFD, GRD and GS-GWF WAR will be used by the repository projects to produce site-specific, specific waste form preliminary Waste Acceptance Specifications\* (SS-SWF WAS, Step 7). These site-specific specifications will feature a more extensive level of detail than the SS-GWF WAR because they are targeted to a particular waste form (e.g., borosilicate glass) from a specified producer (e.g., DWPF). Included in the specifications are constraints and data requirements to be supplied by the producer which will ensure that performance expectations derived from repository test program results are applicable to the actual product. Also, design features and details for handling, storage, packaging, and placement will be specified to ensure compatibility with repository design. Examples of these documents are the Interim WAS's issued by BWIP, NNWSI, and SRPO for borosilicate glass from the DWPF. The SS-GWF WAS will include a discussion of the bases for each of the specifications and the rationale used in developing them.

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\* Waste Acceptance Specifications - A compilation of quantitative, detailed criteria which define specific waste form materials, acceptable ranges for various properties of the waste forms and its container (if applicable) which ensure that each individual waste form produced will perform satisfactorily in a repository environment, and will be within limits of operation of the repository facility. Requirements for documentation which must be provided by the waste producer on a one time basis, for each production lot and for each individual waste form, will also be specified. The Waste Acceptance Preliminary Specifications will be developed based on the best currently available information and will be revised as necessary from time to time. As the repository program proceeds through the site selection and licensing steps, the preliminary specification (Step 8) will evolve into the Updated (License Application) WAS (Step 14) and ultimately into the final WAS (Step 16).

The SS-SWF WAS from each of the repository sites will be compiled to produce the repository program Waste Acceptance Preliminary Specification for a generic site, specific waste form (GS-SWF WAPS, Step 8). This document is produced to provide a single unified source for use by the specific waste form producers and repository designers. Where appropriate, the GS-SWF WAPS will incorporate envelope or "worst case" specifications. Repository site-specific specifications may also be included where an envelope approach is not effective. The GS-SWF WAPS will identify the minimum specifications and data requirements to ensure that the waste is acceptable at any of the repository sites. This document will include a discussion of the rationale used in developing the individual specifications from the project-specific specifications. In developing the preliminary GS-SWF WAPS, reconciliation of conflicting or inconsistent requirements from the site-specific WAS's will be undertaken.

Based on the GS-SWF WAPS, the specific waste producer will develop a Waste Form Compliance Plan (Step 9). This plan will identify the specific tests and procedures including specific tests as outlined by the repository projects to be used to demonstrate compliance with the WAPS. The waste producers will undertake waste form testing programs (Step 10) to produce the data necessary to show compliance with the WAS. A compilation of results from these tests and related analyses will be compiled in the generic site-specific waste form Waste Qualification Report (GS, SWF WQR, Step 11). The WQR will contain information on the waste form itself and on the processes used to produce it, such as process controls, limits on ranges of variability, quality assurance, and demonstration that the actual waste product meets the product specifications, is represented by waste forms tested in repository test programs, and will be consistently and verifiably produced by the reference process.

The supporting information in the WQR along with the repository licensing data from the waste form test program and SS-SWF WAS will all become a part of the Licensing Data Base (Step 12). At some time, prior to repository site selection in the cases of the DWPF and WVDP, the available data base may be used as the basis to support the start of production (Step 13). For the DWPF and WVDP, start-up prior to repository licensing involves a degree of risk that the waste will indeed be acceptable for disposal. The start-up decision will thus be an important milestone decision within the DOE. It is expected that OCRWM input on the acceptability of the product to the repository program will be provided to the appropriate waste producer program as part of the DOE start-up decision. This emphasizes the need to carefully plan the content of the licensing data base and the execution of the requisite testing to ensure the timely availability of data of sufficient quantity and quality to enable this decision to be made with minimum residual risk.

After site selection, the specific waste form updated Waste Acceptance Specifications (SS-SWF WAS, Step 14) for the License Application (LA) can be prepared. This LA WAS will likely not be largely different from the earlier GS-SWF WAPS, but the selection of one site, or elimination of others, may allow for the relaxation of some requirement or set of requirements that were included because of one of the unchosen sites.

Following completion of licensing (Step 15) the SS-SWF WAS will be upgraded to incorporate any additional specifications or modifications generated during licensing to its final form (Step 16). The final WAS and production records

(Step 17) from the waste producers will provide the basis for acceptance (Step 18) of the production waste forms at the repository for disposal.

#### Application of the WAP

The Waste Acceptance Process described above is intended to be general and to address a wide variety of potential waste sources. As noted, two major waste producers (DWPF and WVDP) are well-advanced in the development of waste forms, and the development of waste acceptance documentation is also well-advanced for these producers. Repository site-specific waste acceptance specifications have been drafted for each of the candidate first repository media for DWPF waste forms (ONWI-464, 1983; SD-BWI-CR-018, 1983; UCID-20165, 1984). NNWSI has issued the same set of specifications for WVDP and DWPF waste forms (UCID-20165, 1984). BWIP and SRPO have issued specifications for CHLW waste forms (SD-BWI-CR-018, 1983; BMI/ONWI-521, 1983), which, however, do not apply to WVDP waste forms. These are essentially equivalent to the SS-SWF WAS's (Step 6) of the WAP but do not apply to WVDP waste forms. DWPF has also issued DP-1606, which is considered to be essentially equivalent to a WFD (Step 3). The repository-specific waste acceptance specifications provided for DWPF and WVDP waste forms are being used to develop a preliminary GS-SWF-WAS (Step 8) for these two producers. The repository projects and DWPF and WVDP are developing waste acceptance tests (Steps 9 & 10) which will be used to show compliance with the WAS's and which will generate data for the WQR (Step 11).

In the implementation of the WAP, it is not intended to delay the more advanced waste form producers (DWPF and WVDP) while generic documentation is developed (although a WFD similar to DP-1606 is required from WVDP). Rather, it is the intent to build upon the experience gained in developing the documentation for these two producers to produce the more generic documentation for less advanced waste producers. In parallel, it is intended to continue an aggressive advancement of the development of waste acceptance specifications, compliance tests, and waste form testing to ensure that necessary information is available to allow product approval and meet repository licensing needs in a timely fashion with minimum risk.

Although the emphasis of the WAP is on acceptance of waste at the repository, it is clear that there are important potential implications on other elements of the waste management system (e.g., the MRS, and Transportation). Development of the WAP documentation must be done with full cognizance of the potential impacts on these system elements. However, coverage of transportation and storage requirements within the WAP documentation is not planned at this time.

It is noted that development of the waste acceptance documentation and activities must, of necessity, proceed in parallel with other design and development activities in both repository and waste producer projects. Indeed, some waste form testing (e.g., radionuclide release testing) is likely to continue well beyond development of the WAS's and submittal of license applications as part of the performance confirmation program required by 10 CFR 60. Thus, the various pieces of documentation must be produced on "best available" rather than "final" information and periodic updating of all documentation developed may be required. Thus it is considered essential that the basis and rationale for each requirement and specification be provided as part of the document developed, and that "preliminary information" and "reservations" be carefully identified in the documentation.

Waste form testing programs will be developed by the waste producer to assure compliance with the repository specifications. Additionally, the repository will develop a test program to support the repository site Licensing requirements. Therefore, it may be desirable to coordinate these tests and the WAP is not intended to limit flexibility in this area in any way.

Because of the tie-in with repository licensing, it is apparent that involvement of the NRC in the Waste Acceptance Process is needed. NRC consultation will be solicited at appropriate points in the process prior to licensing, such as prior to issuing the preliminary GS-SWF-WAS. More definitive plans for NRC involvement will be developed in the near future.

#### Implementation of the WAP

The Materials Steering Committee (MSC) will be responsible for implementation and coordination of the Waste Acceptance Process. A Waste Acceptance Committee (WAC), composed of a chairman from RW and contractor personnel directly involved in waste acceptance, will be charged with responsibility for detailed definition of the WAP and preparation of certain WAP documentation. The WAC will report to a MSC Executive Committee, composed of three members, one each from RW, DP, and NE, and receive guidance from them (see WAC Charter).

A WAC chairman will be selected by the RW member of the MSC Executive Committee, with NE and DP member concurrence. Contractor personnel will be drawn from the OCRWM Technical Support Contractor, (who will serve as Executive Secretary) the MCC, and contractors from each of the repository projects (BWIP, NNWSI, SRP, and CRP) and each waste producing project (DWPF, WVDP, HWVP, INEL, and CWTP). The NRC will not be directly involved nor participate in the activities of the WAC. However, the MSC Executive Committee, with the support of the WAC as necessary, may authorize discussions with the NRC on WAP documents. The executive committee will work through the RW Engineering and Licensing Division to arrange meetings with the NRC. Further, the RW member of the executive committee will chair any such meetings. The meetings will be coordinated with the repositories and appropriate waste producer projects.

The WAC is to be responsible for the initial preparation of the various site-specific, product-specific, and generic documents identified in the WAP. The schedule and sequence for preparation of documents will be determined by the MSC Executive Committee. The lifetime of the WAC beyond the initial preparation of WAP documents will be at the discretion of the MSC.

The pre-existing DWPF/Repositories Intersite Coordination Group will continue to function, if deemed necessary by the WAC, as a subgroup of the WAC, receiving direction from the MSC Executive Committee through the WAC chairman. Other similar subgroups may be formed for specific purposes at the discretion of the WAC chairman with the concurrence of the MSC Executive Committee. However, the participation of individual contractor members in the activities of the WAC or its subgroups will only be with the approval of the contractor's operations office.

Products of the WAC and its subgroups will be submitted as "Draft for Review" to involved project offices and the MSC Executive Committee. Operations offices can provide their comments directly to their WAC representative, or alternatively, to a member of the MSC Executive Committee. The WAC will be responsible for resolution of comments as directed by the MSC Executive Committee.

Documents with comments resolved will be returned as "Draft for Concurrence" to the MSC Executive Committee, which will then solicit concurrence from appropriate operations office and Headquarters personnel. Following concurrence, OCRWM will issue approved documents for use by repository projects and waste producers. The MSC Executive Committee is responsible for establishing the frequency of review and update of WAP documents based on evaluations within individual projects.

The WAC Charter contains details of the WAC organization, scope, purpose, responsibilities, and planned mode of operation.



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 WASHINGTON, D. C. 20555

DEC 16 1985

Mr. Ralph Stein  
 Director  
 Engineering and Licensing Division  
 Office of Geologic Repositories  
 Office of Civilian Radioactive  
 Waste Management  
 U. S. Department of Energy  
 Washington, DC 20585

Dear Mr. Stein:

This is in reply to your letter of August 19, 1985 in which you summarized the Waste Acceptance Process (WAP). You stated that the purpose of the WAP is to formalize the activities within the Office of Civilian Radioactive Waste Management to ensure that waste forms will be acceptable at any potential repository. The WAP provides excellent opportunity for coordination between projects, headquarters and the producers.

As you point out in your letter, waste form production from the Defense Waste Processing Facility (DWPF) and the West Valley Demonstration Project (WVDP) will occur prior to selection of the first repository site and submission of the license application to the U. S. Nuclear Regulatory Commission (NRC). This is a fundamental concern for NRC because all of the WVDP High Level Waste and a significant fraction of the Defense High Level Waste at the Savannah River Plant will be committed to waste forms before the first repository is licensed. We note that the enclosure, "Description of the Waste Acceptance Process", acknowledges that "for the DWPF and WVDP, start-up prior to repository licensing involves a degree of risk that the waste will indeed be [un]acceptable for disposal" (page 6, third paragraph, third sentence).

We understand from your letter that it is U. S. Department of Energy's (DOE) intent to design the WVDP and DWPF waste forms to perform satisfactorily at any of the sites under consideration for the first repository. We believe, however, that a number of activities should be completed before the design the of waste form is finalized. Some examples of these are:

1. Establish a Quality Assurance Program.
2. Allocate performance, i.e., specify the design objectives of the waste package and its component parts. The design objectives should include the environmental conditions that the waste package will experience and the design degradation rates of the individual components.

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3. Select a design reliability target for the waste package and its component parts. This should be supported by an analysis of the consequences of excessive rates of degradation from some fraction of the waste packages.
4. Specify a method for assessing the performance of the waste package and its component parts.
5. Identify the data base required to support the performance assessment and the data base that exists.
6. Identify a plan and a schedule for acquiring additional data that may be needed. This plan should clearly identify which DOE organization is responsible for the acquisition of the data.

The NRC cannot make a final determination on the extent to which the performance objectives specified in 10CFR60.113 are met until all the waste package data and site-specific environmental data are submitted in the license application. We realize that completion of the above activities before finalizing design of DWPF and WVDP waste forms is probably not consistent with current production schedules.

In addition, stronger involvement of the NRC early in the prelicensing period may serve to further minimize the risk of DWPF and WVDP waste forms failing to be acceptable at a repository. In the past [letter from John Martin (NRC) to Mr. Thomas Hindman, Jr. (DOE), dated November 4, 1982, Enclosure 1] we raised two areas of concern related to tests supporting glass as a waste form and glass as part of the engineered barrier system from NRC. We need to know the waste form properties, even if no credit is taken for it, so it can be substantiated that the waste form will not degrade the waste package. What tests have been performed on the borosilicate glass and what are the results of those tests on waste form properties? Also we have stated the need to review preliminary waste package performance assessments, the specifications for the solidified product, and sampling procedures including a quality control plan for production and sampling [letter from T. Clark (NRC) to Dr. W. H. Hannum (DOE), dated February 5, 1985, Enclosure 2].

We believe that completion of the above activities (items 1-6) and early interaction with NRC will reduce significantly the risk that the proposed waste forms will be found unacceptable. We have some concerns that the level of interaction between NRC and DOE currently envisioned may not be timely. We would like to meet with you to discuss in more detail the Waste Acceptance Process and the mechanism for further NRC interaction early in the process. Please contact Mr. William Lilley ((301) 427-4798) to arrange a suitable time and agenda.

We appreciate you informing us about the WAP. We look forward to meeting with you within the near future to settle more specifically where in the process, and in what way, NRC will become involved.

Sincerely,



Hubert J. Miller, Chief  
Repository Projects Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

Enclosures:

1. Letter from John Martin, NRC to  
Mr. Thomas Hindman, Jr., DOE  
November 2, 1982
2. Letter from T. Clark, NRC to  
Dr. W. H. Hannum, DOE  
February 5, 1985

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Mr. Thomas B. Hindman, Jr.  
Acting Director  
DWPF Project Office  
Savannah River Operations Office  
U.S. Department of Energy  
P.O. Box A  
Aiken, South Carolina 29801

Dear Mr. Hindman:

This letter and the attached comments respond to the Federal Register notice, "Proposed Finding of No Significant Impact -- Selection of Borosilicate Glass as the Defense Waste Processing Facility Waste Form for High-Level Radioactive Wastes - Savannah River Plant, Aiken, South Carolina," dated July 29, 1982. The Federal Register notice requested comments on the Department of Energy's (DOE) Environmental Assessment (EA) for "Waste Form Selection for SRP High-Level Waste" (DOE/EA-0179), July, 1982 and the proposed finding of no significant impact.

The EA is the second NEPA document which the DOE has prepared for its Defense Waste Processing Facility (DWPF) at the Savannah River Plant (SRP). The first was a draft Environmental Impact Statement (EIS) (DOE/EIS-00280) which presented and evaluated three alternatives for immobilizing the liquid high-level waste (HLW) stored at the SRP. The NRC submitted formal comments on the draft EIS on December 3, 1981.

The purpose of the EA was to assess the potential environmental consequences of the proposed action to select borosilicate glass as the waste form for the DWPF and to evaluate the potential environmental impacts of selecting an alternative waste form. Our review has centered on the proposed action being taken at SRP only. DOE should not necessarily view the NRC comments or positions taken on the SRP DWPF project as being applicable to other defense or commercial high-level wastes or the liquid wastes at West Valley.

The EA and the Federal Register Notice state that the proposed SRP borosilicate glass waste form is capable of meeting draft and proposed EPA and NRC repository performance specifications, either as a waste form or as a part of the repository waste form package. The EA also states

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that the proposed form is compatible with a full range of repository geologies. However, the EA addresses the other components of the engineered system only in a general way and specifically addresses only two of the geologic media (salt and granite) being considered by the NWTS Program.

The EA also notes that the waste forms produced in the DWPF will be the innermost of the waste package components to be emplaced in a geologic repository and thus the DWPF Program must and will be coordinated with the National Waste Terminal Storage (NWTS) Program which has the responsibility for developing the technology and the repositories for disposal of high-level waste.

As you are aware, I have expressed concern to both you and Dr. Coffman over the need to coordinate the waste form work with the overall repository system development. Based on discussions between our staffs, I understand that steps are underway to improve this area and that as soon as the interface arrangements can be fully implemented, NRC will be invited to participate in interface meetings and discussions, as appropriate. Since the NRC has licensing authority over facilities used for the permanent disposal of high-level waste, such participation at an early date would reduce the possibility of the NRC not licensing a disposal facility because of an unacceptable waste form.

The staff found two principal areas of concern in evaluating the EA with regard to performance of borosilicate glass after disposal in a repository. These same two areas of concern were also emphasized in my letter to Dr. Coffman dated June 9, 1982 (copy attached).

- (1) The vast majority of the tests supporting glass as a waste form have not been conducted using the water, temperature and radiation environment likely to be encountered in a repository which would include both SRP and commercial waste. This results in uncertainty regarding long term performance in a real repository.
- (2) The glass will form only part of the engineered barrier system in the repository. However, the EA does not discuss the engineered system or a reference system (e.g., container, packing materials, backfill, etc.). This results in uncertainty regarding how the glass will interact with the other repository components. It should be noted that drafts of the NRC regulation concerning the technical criteria for geologic disposal dating back to 1979 have emphasized the performance of the engineered barrier system. The regulation

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allows flexibility in how the waste form is combined with other components result in acceptable overall system performance.

Recognizing the above concerns, based on our review of the EA and on our reviews over the past few years of the published literature and test data, the NRC staff judges that the proposed SRP borosilicate glass waste form could be an acceptable waste form in a suitably engineered barrier system. However, to confirm with reasonable assurance the performance predictions contained in the EA, we recommend that the two concerns identified above be pursued.

The NRC staff is ready and willing to participate in a consultative role in addressing the above items.

Sincerely,

Original Signed by

John B. Martin

John B. Martin, Director  
Division of Waste Management

Enclosure:  
As stated

cc: F. E. Coffman

Dr. W. N. Mannum, Director  
 West Valley Project Office  
 Department of Energy-Idaho Operations Office  
 P. O. Box 191  
 West Valley, WY 14171

Dear Dr. Mannum:

This letter responds to your request, dated December 21, 1984, on the subject of canister selection. From the standpoint of process safety the use of an alternative process canister to the Savannah River design is of little consequence. Several important safety considerations arise, however, related to waste package performance in a geological repository. It is in this light that the following comments should be addressed. We look forward to further discussions on this topic.

It should be noted that the NRC has not taken a position on the acceptability of the stainless steel canister used in the SRP verification process for use in the repository. Our previous comments have applied only to acceptability of the nonsilicate glass waste form. The fact that a process canister different from that to be used at SRP may be used by WVP is not of concern by itself because we have taken no position on waste canisters to be used at SRP. We are concerned about the effect any canister used will have on performance of the waste package at the repository. The proposed concept of a process canister should be considered by the waste package designer in the context of the overall repository waste package design and the repository environment that the waste package must withstand.

The following comments highlight the need for addressing the question of what kind of degradation modes might be introduced or enhanced in a waste package based on the proposed alternative if it were to be used in a repository.

- To ensure that the interface with the repository is adequate, designers should consider possible impacts on the thermal behavior of the waste package in the repository. If an overpack were to be used to meet repository requirements, the diametral clearance between the process canister and the overpack can influence the temperature of the emplaced waste form. The diametral clearance, in turn, will be determined by the roundness and straightness tolerances between canister and overpack. Any increase in waste form temperature during the thermal period is a result of using a process canister and an overpack (rather than a single canister) should be considered. For example, if the thermal conductivity of the material between the containers is such that the waste form will reach a higher temperature, the rate of degradation of the waste form after breach of containment and inner container thermal expansion should be taken into consideration.

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2. The process canister material should be compatible in service with that of the overpack so that the overpack is not degraded during service by reaction with the process canister, e.g., enhance degradation of the overpack after breach of containment due to galvanic corrosion.
3. Designers should also assure that sufficient materials margin exists in a 1/4 inch thick carbon steel canister to withstand the interim storage environment for a conservative period of time (perhaps 30 years). There will be some internal corrosion of the process canister by the glass during the pouring and cooling cycle. The canister will be stressed as a result of shrinking more than the glass during the cooling cycle. Finally, some external corrosion is likely to occur from storage in humid air while the waste form is at elevated temperatures.
4. Designers should also assure that mechanical interactions between the process canister and the outer liner do not have an adverse impact on the outer liner during shipment.

The following comment relates to the impacts of sampling the waste form. The paragraph following the bullet on page 5 of your letter states that "The WVDP does not plan to sample any of its waste glass, but some repositories may require it periodically." The paragraph goes on to say that, "if samples are required from places other than near the top surface, they may be removed from anywhere in the process canister by drilling through it." Representative sampling would be important for the future qualification of the WVDP product for use in a repository. The NPC would need to review preliminary waste package performance assessments, the specifications for the solidified product, and sampling procedures (including a quality control plan for production and sampling) before commenting specifically on sampling. The range of physical and chemical properties incurred in the glass monolith should be demonstrated. Similarly, corrosion/leach test data should show that glass within the demonstrated range of physical and chemical properties will have acceptable degradation rates under repository conditions. The NPC will provide comments on the waste composition test matrix before WVDP begins confirmatory tests.

The last paragraph of the second bullet on page 4 of your letter suggests that QA/QC will be considered later. Notwithstanding the fact that DOE appears to be considering taking no credit for the process canister in providing

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containment at the repository, there will be need for some QA and QC on the canister. ~~is~~ is needed as the canister may have some interactive effects on overpacks. An appropriate level of graded QA consistent with importance of such interactive effects on waste package performance will be needed from the outset. We would be pleased to consult with you on this matter.

Sincerely,

...  
...  
A. Thomas Clark, Jr.  
MRC West Valley Project Manager  
Advanced Fuel and Spent Fuel  
Licensing Branch  
Division of Fuel Cycle and --  
Material Safety