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(Return to WM, 623-SS)

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, is 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 DOE-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

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,

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, NNWSI 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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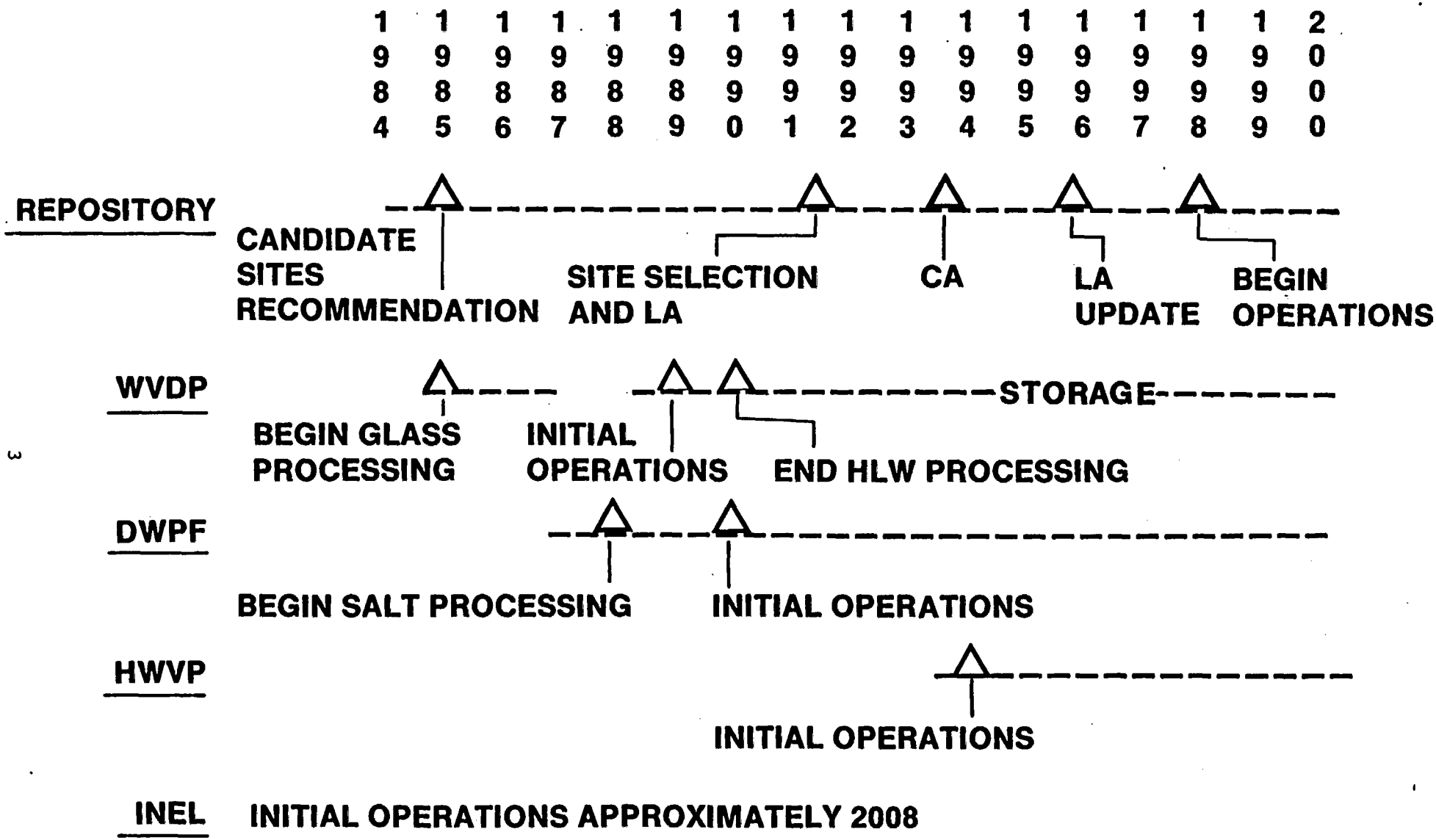
* Waste Acceptance Requirements - A compilation of generally applicable criteria which specify the minimum conditions for acceptability of a waste form at one (specific-site) or all (generic-site) repository sites. The requirements will include identification of repository environmental conditions, constraints 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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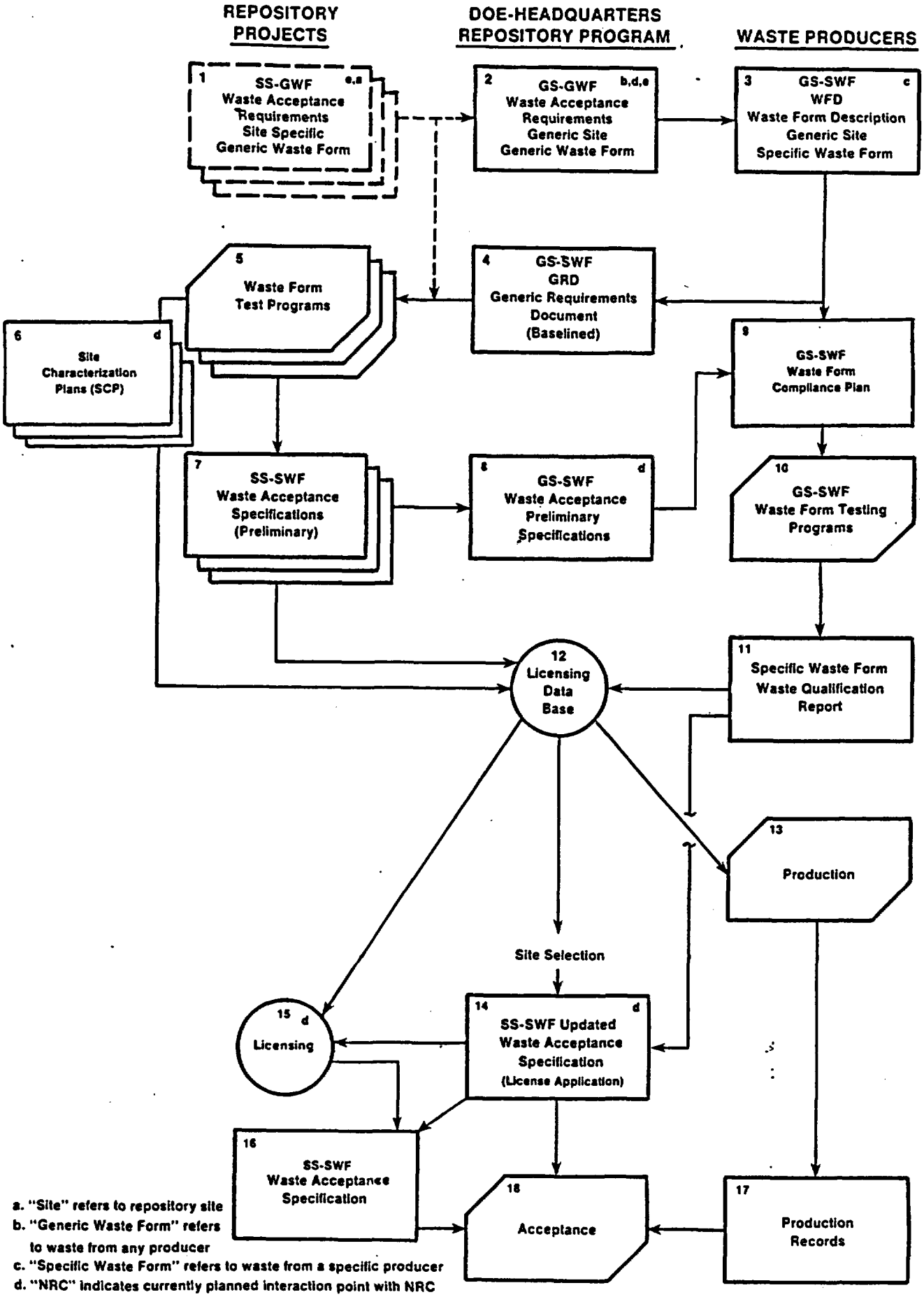
WASTE ACCEPTANCE PROCESS



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.

FROM	DATE OF DOCUMENT	DATE RECEIVED	NO
DOE	8/19/85	8/29/85	WM-85770

LTR	MEMO	REPORT	OTHER
XX			

TO	ORIG.	CC	OTHER
REBrowning		XX	

ACTION NECESSARY	☒	CONCURRENCE	☐	DATE ANSWERED
NO ACTION NECESSARY	☐	COMMENT	☐	BY 9/10

CLASSIF	POST OFFICE	FILE CODE:
	REG. NO.	109. /

DESCRIPTION (Must Be Unclassified)
Waste Acceptance Process (WAP)

REFERRED TO	DATE	RECEIVED BY	DATE
JGreeves	8/29		10/15
TCJohnson			10/31
EAWick			

ENCLOSURES
A memo (Browning to Stein, DOE) was drafted by WMEG and sent to XP for concurrence. That action closes out this ticket.

REMARKS
XP should initiate a new ticket for completion and dispatch of the NRC/DWM reply to Steins 8/19/85 letter - EAWick 10/31/85

U. S. NUCLEAR REGULATORY COMMISSION

MAIL CONTROL FORM

FORM NRC 326 (1-75)

FROM	DATE OF DOCUMENT	DATE RECEIVED	NO
RSTEIN	08 19 85	08 23 85	WM-85756

LTR	MEMO	REPORT	OTHER
X			

TO	ORIG.	CC	OTHER
REBrowning	X	WMKP LLE	9/4/85

ACTION NECESSARY	XX	CONCURRENCE	☐	DATE ANSWERED
NO ACTION NECESSARY	☐	COMMENT	☐	BY 9/6

CLASSIF | POST OFFICE | REG. NO.

FILE CODE: 109.1

DESCRIPTION (Must Be Unclassified)

WASTE ACCEPTENCE PROCESS ACTIVITIES

REFERRED TO	DATE	RECEIVED BY	DATE
H. Miller	8/23		
S. M. Coyle			

ENCLOSURES

Comment 9/5/85 Hardstone EG

REMARKS

EG has lead on preparing response. RP will coordinate & [illegible]

U. S. NUCLEAR REGULATORY COMMISSION

MAIL CONTROL FORM

FORM NRC 326 (1-75)