WBS: 1.2.1.5
SCPB: 8.3.5.2
QA: L

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Civilian Radioactive Waste Management System
Management & Operating Contractor

Technical Document Preparation Plan for the
Retrievability Strategy Report

Revision 00

B000000000-01717-5705-00056 Revision 00

8. PDG 2/6/97

January 24, 1997

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Prepared for :

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Prepared by:

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1/24/97
Date

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1/24/97
Date

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1/27/97
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1/28/97
Date

1. OBJECTIVE

The objective of this systems study is to produce a waste retrievability strategy document that contains sufficient details, recommended design alternatives, and the technical rationale (a) to support Licensing in the development of the *License Application Plan*, and (b) to provide input in the form of design requirements, for the FY 97 *Retrieval Design & Operation* activity in support of viability assessment. The intent of this systems study is to support a decision on how to proceed with design with respect to retrievability, regarding the extent to which the repository/waste package designs should accommodate the retrieval option.

2. SCOPE

The activities to be conducted in support of the retrievability strategy report include the following:

- Evaluate prior work on retrievability and determine a resolution or disposition.
- Perform a regulatory/licensing assessment to determine information needs and level of detail necessary for compliance with NRC requirements.
- Determine level of detail required in the license application on the issue of retrievability.
- Identify potential retrieval environment.
- Determine to what extent the Mined Geologic Disposal System (MGDS) design should accommodate the retrievability requirement now, as opposed to delaying the implementation of designs to accommodate retrieval until the time of retrieval, if required.
- Develop retrieval scenarios that include alternate storage and associated times required for retrieval.

Affected Organizations

The M&O organizations affected by this study are as follows: Field Test Management, MGDS Development, Performance Assessment, Licensing, and Systems Engineering.

3. BACKGROUND

The basis for maintaining the waste retrievability option is stated in the *Nuclear Waste Policy Act (NWPA), As Amended*, and the Code of Federal Regulations Title 10, Part 60, *Disposal of High-Level Radioactive Wastes in Geologic Repositories*. From these documents, the Nuclear Regulatory Commission (NRC) has created supporting documents to provide guidance and constraints in addressing the subject of retrievability. The NRC staff provided 10 CFR Part 60 rationale on "Retrievability" in Section 9 of NUREG-0804, *Staff Analysis of Public Comments on Proposed*

Rule 10 CFR Part 60, "Disposal of High Level- Radioactive Wastes in Geologic Repositories". The rationale contained in this NUREG is as follows:

The NRC staff therefore considers that the option to retrieve the wastes must be preserved long enough to complete a program of monitoring and verification of repository performance. The design must also ensure that the option is preserved long enough to permit a decision to permanently close the repository or take any corrective actions shown to be necessary by verification and monitoring program...

For the licensing procedures to be workable, the staff considers that the option to retrieve should be preserved for the time necessary to emplace all of the wastes, complete a performance confirmation program, arrive at a decision as to whether retrieval must be undertaken, and execute retrieval, if found to be necessary. The design for retrievability should encompass all of these considerations.

The following guidance is provided in NUREG 1318, *Technical Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to Quality Assurance*, Section 4.2(d):

In the event that retrieval is necessary, DOE should, at that time, analyze the proposed retrieval process to identify additional items that are important to safety. These additional items should also be covered under the Subpart G QA Program.

In accordance with 10 CFR Part 60, "retrieval" means " the act of intentionally removing radioactive waste from the underground location at which the waste had been previously emplaced for disposal."

"Retrievability" is defined in the document, *DOE Position on Retrievability and Retrieval for a Geologic Repository* Retrievability, dated 1985, as follows:

"Retrievability" means the capability that is provided by the repository system by means of design approaches, construction methods, and operational procedures--to allow retrieval to be performed.

4. TECHNICAL APPROACH

The technical approach used in the development of this report is described in the following subsections. The study team consists of personnel from Field Test Management, MGDS Development, Performance Assessment, Licensing, and Systems Engineering.

4.1 IDENTIFY APPLICABLE REQUIREMENTS AND CONSTRAINTS

The Nuclear Waste Policy Act, As Amended, 10 CFR 60, 10CFR 960, the *Repository Design Requirement Document*, the *Engineered Barrier Design Requirements Document*, and the *Controlled Design Assumptions Document* will serve as a basis for this study.

4.2 IDENTIFY ASSUMPTIONS

Applicable current assumptions on the subject are contained in the *Controlled Design Assumption (CDA) Document*. Additional key assumptions may be identified as part of the study development process.

For retrieval scenario development, the study team will assume the following:

- Waste stream information is identified in the *CRWMS Requirements Document (CRD)*. However, for contingency planning, a scenario may address greater waste quantities.
- At a minimum, full or partial retrieval scenarios will be developed that will evaluate reasonable worst case expected facility deterioration for both surface and subsurface structures.

4.3 CONDUCT LITERATURE SEARCH AND DISPOSITION OF PAST WORK

Applicable documents on retrieval or retrievability will be identified through the use of the Technical Information Center or Yucca Mountain Project department libraries. Documents that are still considered valid by either the DOE or the NRC will be identified. In addition, the current validity of the approach used in the *Site Characterization Plan (SCP)*, or in other documents, will be determined and explanations provided. The study team will review past work, determine what portions of published documents on the subject are still relevant based on the current MGDS concept, and document this disposition.

4.4 DETERMINE THE LEVEL OF DETAIL REQUIRED TO SUPPORT THE LICENSE APPLICATION PLAN

This task requires development of a list of questions that need to be addressed by the study, that will serve as guidance for the study team, and help determine the required level of detail necessary for developing the *Licensing Application (LA) Plan*. The NRC Draft Regulatory Guide DG-3003, *Format and Content for the License Application for the High-Level Waste Repository*, will be used as the basis for this task.

4.5 IDENTIFY RETRIEVAL ENVIRONMENT

Predicted retrieval conditions, which include emplacement drift temperature, radiation levels, ground support integrity, and excavation stability, will be identified and documented prior to developing retrieval scenarios. This information will require an evaluation of the current MGDS concept, evaluating current values, and recalculating values if required.

4.6 DEVELOP RETRIEVAL SCENARIOS AND ALTERNATIVES

A reference case retrieval scenario will be developed that identifies the step-by-step process used to retrieve waste. Retrieval scenarios will be developed that include normal conditions, abnormal conditions, full retrieval, partial retrieval, retrieval for public health and safety reasons, and retrieval of natural resources. Abnormal conditions will be evaluated, given the operating parameters of the repository identified in Section 4.5. This task requires evaluation of the latest design concept in each system, subsystem, and component that must function in the retrieval operation, as well as identification of feasible design alternatives and evaluation of the alternatives at a conceptual level of detail. Alternatives should reflect the widest possible range of distinctly different solutions for system optimization.

4.7 RETRIEVAL RECOMMENDATIONS AND REQUIREMENTS

Based on the retrieval scenarios developed and the design alternatives identified throughout the retrieval process that represent potential design solutions, an evaluation will be made for each alternative identified with the appropriate technical rationale. Based on the technical rationale, a recommended alternative will be chosen. These recommended alternatives and identified retrieval requirements will be subjected to a review using QAP-3-5, *Development of Technical Documents* procedure. The requirements will be placed into the appropriate document such as the *Controlled Design Assumptions Document (CDA)*, *Systems Description Document (SDD)*, or the *Mined Geologic Disposal System Requirements Document (MGDS-RD)*.

5. DESCRIPTION OF THE TECHNICAL DOCUMENT

The general outline for the *Retrievability Strategy Report* is described below:

Cover Pages

These pages contain the complete title, document identifier, WBS number, SCPB identification number, QA designator, and the signatures and dates for the individuals who prepare, approve and concur with the approval of the document.

Executive Summary

This section provides a top level description of the study objective, findings, and recommendations.

Table of Contents

List of Tables

List of Figures

Section 1 - Introduction

This section provides the objectives, scope, background, study approach, and the organization of the report.

Section 2 - Inputs, Requirements, and Assumptions

This section will list all inputs to the systems study including the *Controlled Design Assumptions Document (CDA)*; 10 CFR 60, *The Nuclear Waste Policy Act, As Amended*; *Repository Design Requirements Document (RDRD)*; and the *Engineered Barrier Design Requirements Document (EBDRD)*.

Section 3 - Assessment and Disposition of Past Retrieval Positions

This section provides assessments of the 1985 DOE/NRC discussions on the generic position paper prepared by DOE on retrievability and retrieval, as well as other Project-related documents. It also includes an evaluation of written comments from the NRC for applicability to the current MGDS concept.

Section 4 - Compliance and Licensing Assessment

This section provides an assessment and evaluation of regulatory and legal requirements, as well as clarification to the applicable regulations and laws. The section also includes an assessment for determining the level of detail required for retrievability in the *LA Plan*.

Section 5 - Retrieval Environment

This section provides an assessment of the subsurface conditions potentially present at the time of retrieval. The evaluation addresses areas such as ground conditions, emplacement drift temperatures, radiation levels, and waste package conditions.

Section 6 - Retrieval Scenarios

This section provides identification and descriptions of retrieval scenarios, including alternatives. It also supplies an explanation of how the MGDS will accommodate each retrieval concept, including a retrieval schedule and alternative storage.

Section 7 - Results, Conclusions, and Recommendations

This section provides a discussion of the findings of the study, identifies the recommended alternatives, and recommended design requirements for retrieval and retrievability.

Section 8 - References

This section provides the list of cited documents, standards and regulations, and data sources used in the study.

Appendices

The appendices will include acronyms, abbreviations, and glossary.

The report style will follow guidance provided in the *Management & Operating (M&O) Contractor Publishing Style Guide*, Revision 3, although minor deviations will be acceptable when deemed necessary.

The acceptability of the report will be based on the criteria defined in the *Participant Planning Sheets*. Following is a reprint of these acceptance criteria:

This report should contain a technical rationale for a decision regarding the design approach to be used for complying with the 10 CFR 60 requirements to retrievability. The report should also contain recommendations regarding the extent to which the repository/waste package designs should accommodate the retrieval option, develop requirements associated with the time for retrieval, and identify the potential conditions requiring retrieval. This study will also develop and evaluate potential scenarios concerning the final disposition of the retrieved waste. A QAP-3-5 and an M&O management review of the report must be completed prior to the delivery of the report to the DOE.

The submittal date of the *Retrievability Strategy Report* to the DOE is April 30, 1997.

6. RESPONSIBILITY

Phil Gehner of the Civilian Radioactive Waste Management System (CRWMS) Management and Operating (M&O) Contractor, Systems Analysis and Modeling Department, is responsible for managing the study, developing the technical document that reports findings, and coordinating changes with the reviewers of the report. The responsibility for tasks assigned to task team leaders is defined in Section 9.

The qualifications of all individuals involved in the preparation of the study report include the following: They have earned a four-year degree from an accredited institution and have a minimum of three years of experience in the field of expertise relevant to this study. In addition, they have received training on an OCRWM-approved QA program as well as on procedure QAP-3-5, *Development of Technical Documents*, and have read this *Technical Document Preparation Plan*.

7. REVIEW AND APPROVAL

The review of the report will be conducted in accordance with M&O QAP-3-5, Sections 5.3.2 through 5.3.7. The approval of the document is the responsibility of Richard Memory, Systems Analysis and Modeling Manager, with concurrence by Richard Wagner, MGDS Systems Engineering Manager. Approval will be obtained in accordance with M&O procedure QAP-3-5, Section 5.4.

8. QUALITY ASSURANCE

An evaluation, conducted in accordance with QAP-2-0, *Control of Activities*, has provided the determination that the work performed for this report is subject to the *Quality Assurance Requirements and Description* (QARD, DOE/RW-0333P) because the report will provide design requirements for inclusion into the appropriate design requirements document. A classification analysis has been performed per QAP-2-3, *Classification of Permanent Items*, and as such, the study has been classified as a "Q" document. Implementing Line Procedure, NLP-2-0, *Determination of Importance Evaluations*, is not required for this activity. Also QAP-SI-0, *Computer Software Qualification*, will not be required. The following M&O QA procedures will be followed in the preparation, revision, and control of the study.

- QAP-1-0, *M&O Organization*
- QAP-2-0, *Control of Activities*
- QAP-2-1, *Indoctrination and Training*
- QAP-2-2, *Verification of Personnel Qualifications*
- QAP-3-5, *Development of Technical Documents*
- QAP-6-1, *Document Control*
- AP-17-1Q, *Record Source Responsibilities for Inclusionary Records*.

9. SCHEDULES

M01 Conduct Research/Develop *Technical Document Preparation Plan (TDPP)* (10/01/96 to 01/17/97)

This task consists of identifying customers and customer needs, conducting a conceptual assessment of previous work on the subject, identifying study participants, and developing a TDPP with a task schedule.

Task Team Leader - Phil Gehner, Systems Engineering

M02 Perform Regulatory/Licensing Assessment (10/21/96 to 12/20/96)

This task consists of determining applicable regulations, position papers, and documents for the required research. The task also includes identifying items for evaluation and making dispositions of those items. An ongoing task includes determining the level of detail, regarding retrievability, required for the LA Plan. The Draft Regulatory Guide, DG-3003, from the NRC is a source document for this assessment.

Task Team Leader - Jeff Weaver, Compliance & Interactions

M03 Identify Predicted Retrieval Environment (12/16/96 to 02/14/97)

This task consists of determining conditions such as radiation levels, emplacement drift temperatures, and ground conditions that will be present at various times during the potential retrieval period.

Task Team Leader - Ned Elkins, Field Test Management

M04 Develop Retrieval Scenarios with Alternatives

(12/09/96 to 02/21/97)

This task consists of identifying retrieval scenarios that includes the evaluation of the longest retrieval and repository closure time period. At a minimum, the scenarios will consider site characterization, performance confirmation, and safety. The Design Basis Events (DBE) analysis, as well as ongoing design work, will be utilized for this task.

Task Team Leader - Dan McKenzie, MGDS Development

M05 Formulate Recommendations and Requirements

(02/07/97 to 03/03/97)

This task consists of formulating recommendations from scenario development and past items dispositioned from key documents. This task does not include QAP-3-9 analysis to support each recommendation.

Task Team Leader - Phil Gehner, Systems Engineering

M06 Develop Document

(12/20/96 to 03/14/97)

This task consists of documenting and evaluating the findings in addition to developing the report, which includes recommendations.

Task Team Leader - Phil Gehner, Systems Engineering

M07 Perform a M&O Internal Document Review and Comment Resolution

(03/17/97 to 03/31/97)

This task consists of conducting an internal document review and resolving comments in accordance with QAP-3-5.

Task Team Leader - Phil Gehner, Systems Engineering

M08 Revise Document

(03/21/97 to 04/11/97)

This task consists of revising the document in response to reviewer comments.

Task Team Leader - Phil Gehner, Systems Engineering

M09 Edit Document

(04/14/97 to 04/28/97)

This task consists of performing a technical edit of the revised document for internal management review.

Task Team Leader - Bonna Savarise, Technical Writing

M10 Submit Document to DOE

(04/30/97)

This task consists of submitting the document to DOE for approval.

Task Team Leader - Phil Gehner, Systems Engineering