STANDARD REVIEW PLAN FOR DRAFT ENVIRONMENTAL ASSESSMENT DEVELOPED BY THE U. S. DEPARTMENT OF ENERGY PURSUANT TO SECTION 112(b) OF THE NUCLEAR WASTE POLICY ACT

DIVISION OF WASTE MANAGEMENT
U. S. NUCLEAR REGULATORY COMMISSION

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ENVIRONMENTAL ASSESSMENT REVIEW PLAN

1.0 INTRODUCTION

This Standard Review Plan for Draft Environmental Assessments (EA's) describes the objectives, rationale, and scope of NRC's review of the draft EA's being prepared by DOE. General guidance is also given for the activities and products needed to prepare for the draft EA review along with information concerning the review team organization and responsibilities, schedules, and internal QA/QC procedures.

This review plan is developed for use by the NRC staff and NRC contractors and consultants who will be involved in the draft EA review. The plan should be applied for each of the nine sites presently being considered by DOE for nomination.

This guidance is intended to promote consistency among the three NRC projects (BWIP, NNWSI, and SRP (Salt)) in the preparation, scope and approach used in reviewing and preparing comments on each of the draft EA's received from DOE. This plan is not intended to be a rigid set of procedures, but rather a guide, flexible enough to satisfy unique project-specific conditions or time and resource limitations.

2.0 BACKGROUND

Under the Nuclear Waste Policy Act (NWPA), DOE must prepare an Environmental Assessment (EA) for each site that is nominated for consideration as a candidate for a repository. The EA's are the principal documents supporting site screening (nomination) decisions. The information and technical evaluation will also be the basis for site recommendation. The content of the EA's are specified generally in NWPA and more specifically in the May 14, 1984 siting guidelines.* The EA's will contain both geotechnical information related to repository performance and environmental information related to environmental impacts of both site characterization activities and the repository itself. Appendix A identifies the content of the EA's as described in the NWPA as well as DOE's reordering of these considerations as defined in the May 14, 1984 siting guidelines. Appendix A also includes Appendix III and IV of the May 14, 1984 siting guidelines which gives the list of system and technical guidelines, the types of findings that will be made in the EA's

*DOE revisions to the Siting Guidelines of November 18, 1983 in Response to the Preliminary Decision on Concurrence by the NRC in March 14, 1984; May 14, 1984.

for each guideline, and the types of information for the nomination of sites as suitable for characterization.

Prior to releasing final EA's, the DOE will provide up to nine draft EA's simultaneously for public comment. This will give NRC and other interested parties an opportunity to formally document their comments regarding the content of the draft EA's.

3.0 OBJECTIVES AND RATIONALE

The information presented and referenced by the EA's will contain data, interpretations and assessments available to date on each of the potential repository sites being considered by DOE for nomination. This information is important to NRC reviews for prelicensing (Site Characterization Plans (SCP's)), licensing (License Application for construction authorization (LA)), and adopting to the extent practicable the Environmental Impact Statement (EIS) prepared by DOE.

The NWPA does not require NRC review and comment on EA's or to otherwise participate in the nomination process beyond the Commission concurring on the siting guidelines. It is nevertheless the intention of the NRC to review and comment on the EA's (similar to other pertinent technical documents) in order to assess the information available to date. Because the statute omits any reference to NRC in connection with the EA's or the nomination process, the NRC staff will not comment on the methodology used by DOE to compare or select sites, the relative merits of one site against another, or environmental effects of site characterization activities. This decision is also consistent with the Commission policy under the recently amended final rule, Licensing and Regulatory Policy and Procedures for Environmental Protection 10 CFR Part 51 (49 FR 9352, March 12, 1984). The statement of considerations in this final rule states "As an independent regulatory agency, the NRC does not select sites or designs or participate with the applicant in selecting proposed sites or designs."

It is appropriate, however, and fully consistent with the objectives of the NWPA for the NRC staff to provide to DOE current expressions of its views on the data, interpretations, and assessments supporting DOE findings and comparisons as well as any potential licensing or EIS issues that DOE should consider in its nomination decisions. Furthermore, in accordance with the

NRC/DOE Procedural Agreement,* comments on the EA's are a useful mechanism for the NRC staff to identify potential licensing and EIS issues that may be anticipated and that may need to be addressed in DOE's activities during site characterization.

More specifically, NRC's review of the draft EA's has two general objectives which relate to NRC's responsibilities in prelicensing/licensing (i.e., safety evaluations) and adopting the EIS, namely:

(1) Prelicensing/licensing: The NRC staff will identify and review potential licensing issues and associated data, interpretations and performance assessments which may be important during site characterization, that might result in licensing problems and which should be addressed by DOE in the EA's.

(2) Adopting the EIS: The NRC staff will identify and review potential EIS issues and associated data interpretations and assessments that might result in the NRC's being unable to adopt DOE's EIS and which should be addressed by DOE in the EA's.

DOE's selection of an alternative site should satisfy the "rule of reason" demanded by the National Environmental Policy Act (NEPA). For this, DOE's selection must be based on a "preliminary determination" that the alternate sites are "suitable for development as repositories consistent with the guidelines" (Section 114(f) of the Waste Policy Act). Accordingly, the NRC staff will identify and review issues and associated uncertainties in data, interpretations and assessments which may render a site clearly not "suitable for development as a repository" (i.e., findings for qualifying and disqualifying conditions). Clearly, for any site exhibiting such characteristics the NRC might be unable to adopt an EIS which would present such a site as an alternative to the proposed action.

The EA's, which follow the siting guidelines and NWPA requirements, will be somewhat complex in their structure; however, NRC's review responsibility and approach is simple. That is, for each draft EA submitted by DOE, NRC will

*Procedural Agreement Between the U. S. Nuclear Regulatory Commission and the U. S. Department of Energy, Identifying Guiding Principles for Interface During Site Investigation and Site Characterization, Federal Register, vol. 48, No. 166, August 25, 1983.

review the findings and conclusions presented - to the extent they bear upon the forging responsibilities - and independently determine if they are substantiated (see Table 1). NRC will use this evaluation as a basis for identifying potential licensing issues for timely staff resolution.

In considering whether matters should be addressed in the EA's, NRC will recognize the distinctions - as to content and purpose - between EA's and subsequent Site Characterization Plans (SCP's). The reviews of the EA's serves the limited function of identifying potential licensing issues and will not otherwise include guidance to DOE on site characterization activities.

4.0 SCOPE

4.1 Material for Reviews

The general scope of NRC's review is discussed above in section 3.0, Objectives and Rationale and shown on Table 1. Table 2 lists the specific items identified in the siting guidelines which are expected to appear in the EA's and describes what NRC will review with respect to each of these items.

Each of the technical review groups referred to in Table 8 will review those sections of the EA's and references in their respective technical area.

4.2 Review Criteria

The following criteria define how the data, interpretations, and assessments that DOE used in applying the siting guidelines to the EA items in Table 1 will be reviewed by NRC.

(1) Adequate substantiation of assessments, interpretations, conclusions and findings.

  (a) Adequate consideration of available data.

  (b) Adequate consideration of alternative interpretations, assumptions, or performance assessments.

  (c) Adequate consideration of uncertainties resulting from all sources including data collection, analyses, interpretations, and performance assessments.

(d) Internal consistency of information including data, interpretations, assumptions, and methods of analysis and evaluation.

(e) Adequate documentation in EA or references to support interpretations, assumptions, conclusions.

(2) Potential licensing and EIS issues identified and adequately considered.

4.3 Level of Detail of Review

Each EA will be generally reviewed with respect to the previously stated objectives, scope, and criteria. More intensive effort will be put into selected detailed reviews of those technical areas judged by the NRC to be of high importance to licensing (i.e., safety evaluations) or adopting the EIS. These reviews will be conducted to the extent allowed by available time and resources.

5.0 PREPARATION FOR DRAFT EA REVIEW

Because of the limited time to review simultaneously as many as nine draft EA's it is essential that the staff be well prepared for the draft EA reviews before their receipt. There will be no time for questions or data review requests of DOE after the draft EA's are received and the NRC review begins. The NRC staff preparations will generally include:

(1) Understanding siting guidelines

(2) Obtaining familiarity with available documents and data

(3) Developing key scenarios and conceptual models (on a selective basis)

(4) Conducting sensitivity analyses (on a selective basis)

(5) Developing preliminary issues

(6) Reviewing key documents

(7) Reviewing data (on-site data reviews on a selective basis)

(8) Conducting scoping review of preliminary EA drafts provided by DOE

The preparations with the highest priority are those under numbers 1, 2, 5, 6 and 7. The other preparations are of lower priority and may be considered optional in some cases depending on available time and resources.

The specific work involved with each of the above items is described in Section 6.0 Work Required and Products. This preparation work will result in a broad familiarization of the overall existing data/information base. Items (1) through (5) will also be the basis for selecting specific technical areas for detailed reviews in item (6). After a reasonable understanding of the data and information available for each site and its surrounding region is achieved, item (8) will be completed to develop initial views on the major concerns and issues related to each preliminary EA draft. These areas of concern would then become the primary focus in the actual draft EA reviews.

The approach described above for selecting technical areas for detailed review will focus the NRC staff resources so that the most effective and efficient review can be conducted of the large amounts of data and information in the draft EA's and their references.

The above preparation work in items (1) to (6) are intended to be done in an overlapping and iterative fashion with early products improved as new information is obtained and reviewed. These early products should be identified as "working papers" so the limited resources available can be placed on initial thinking and not formal product production.

The preparations for the draft EA reviews are really the first phase of preparing for the reviews of the SCP's. Therefore, the "working papers" developed during the draft EA review preparations will be refined and developed in more detail and formality by the NRC staff during the preparation for SCP review for those sites chosen for site characterization.

6.0 WORK REQUIRED AND PRODUCTS

The work that will be done for each technical area in preparing for and completing the draft EA reviews have been divided into the seven tasks listed in Table 3 and described below.

Tasks 1-5 are currently ongoing and will continue to be the focus of the staff's efforts prior to the release of the draft EA's. The tasks outlined in Table 3 are intended to provide only a framework within which project specific work can be developed. Project managers (PM) and review group leaders in the various technical areas will develop the next level of detailed guidance consistent with their needs. This approach is necessary because the exact nature of the preparation work needed and the work previously completed will

vary from one project or technical area to another. Central points for each task are included below.

6.1 Task 1 Familiarity with Documents and Data

1.1 Relevant documents to each project and technical area will be searched for and obtained so that a complete collection can be developed for the WM Document Control Center and a separate working collection can be developed for each review group.

1.2 Pertinent documents will be generally reviewed for content. Key documents should be identified, circulated to appropriate staff for familiarization and listed for future reference.

Key documents are those which are relevant to a site and which:

- o contain results of data collection, analysis, and performance assessments
- o document major program decisions
- o summarize/synthesize information
- o identify and discuss technical issues
- o identify plans for future data collection, analyses, and performance assessments

1.3 A site-related data inventory will be developed at the discretion of each PM. This should be a listing in summary form of the type and amount of data/information relevant to each site from all sources (e.g., DOE, Federal agencies, State agencies, industry, and universities). This should not be a listing of parameter values or results, but rather a summary of:

(1) Type of data

(2) General amount

(3) General areal and subsurface location (as appropriate)

(4) Method of collection/analysis

(5) Reference documenting the data

(6) Storage location if not published

(7) General statement about uncertainties

6.2 Task 2 Develop Key Scenarios and Conceptual Models

Key performance scenarios, or sequences of events/processes important to performance, should be developed following the logic structure defined in Appendix C of the BWIP SCA which breaks down the overall system performance into the 10 CFR Part 60 performance objectives, followed by eleven performance issues, and their existing and anticipated conditions and processes (related to natural, human-induced or repository-induced changes) significant to each performance issue. These key scenarios will show the hierarchy of conceptual models which could be developed and how they relate to performance.

A conceptual model is defined for this purpose as a pictorial and/or narrative description of a repository system or subsystem which represents all relevant components and structures contained within the system or subsystem, the interactions between the components and structures, and any internal or external process which affects the overall performance of the system or subsystem. Conceptual models are both site and study specific.

The Performance Assessment review group will develop "strawman" scenarios, guidance on preparing conceptual models, and examples of conceptual models. The technical review groups will review and modify the key performance scenarios. On the basis of these key performance scenarios, the conceptual models to be developed and documented as working papers by each technical review group during the EA preparations will be identified jointly by each technical review group and the PM.

The technical review groups will develop conceptual models which represent a range of existing and anticipated conditions and processes at the appropriate scale important to performance of a repository in each technical area. The range of conceptual models should be developed from evaluations of published conceptual models as well as others developed based on the review of existing published data in Task 1. Ranges of conceptual models should be based on the range of existing and anticipated conditions and processes making up key performance scenarios.

6.3 Task 3 Conduct Sensitivity Analyses

Analyses should be performed on specific areas of interest using the simplest credible analysis tools, mainly closed form (algebraic) models.

The objective is to gain an initial perspective on which processes and parameters are most sensitive and therefore critical to repository performance. This work also will give the NRC staff some quantitative feel for the data and potential key issues central to both the draft EA's and license reviews.

It will also prepare the staff for reviewing preliminary DOE performance assessment modeling either presented or referenced in the draft EA's.

The technical areas needing sensitivity analysis as well as the type and extent of analysis needed will be determined, jointly by each technical team and the PM.

6.4 Task 4 Develop Preliminary Issues

A list of preliminary issues will be developed for each site in each technical area following the process described and illustrated in Appendix C of the BWIP SCA and using the results of scenario and conceptual model development and sensitivity analyses. Documents which identify issues will also be considered.

An issue is defined in the regulatory sense as follows. "A site issue... is a question about a specific site that must be answered or resolved to complete licensing assessments of the site and design suitability in terms of 10CFR60." (NUREG-0960, Volume 1, Appendix C, page C-1). The preliminary list of issues should be documented in an umbrella site technical position (USTP) following the guidance given in the Detailed Guidance on Umbrella Site Technical Positions.

Issues should be ranked by their importance to performance based on expert judgment and the results of conceptual modeling or any preliminary sensitivity analysis that has been done.

Issue lists for each technical area will be integrated to produce a coordinated set of issues for the total project. Each review group will review all of the issues, provide comment and resolve areas of overlapping issues, missing issues, and incorrect issues. The matrix of site issues and performance issues shown in Table C-3 of Appendix C of the BWIP SCA will be completed to assure completeness of integration. Completeness will also be checked by constructing a matrix of site issues and specific elements of 10 CFR Part 60.

This work will be documented in an issue integration document containing a revised list of issues and the matrices of issues.

6.5 Task 5 Conduct Data and Document Reviews

The key documents identified in Task 1 will be reviewed using the waste management document review form shown on Table 4. The siting guidelines also will be reviewed but not documented.

Under the framework of the DOE/NRC Procedural Agreement, on-site data orientations/reviews will be planned and conducted with DOE/DOE contractors and other organizations as appropriate. These on-site data reviews will give the NRC staff and its contractors the opportunity to examine data and related information (e.g., collection and analysis methods, conditions, and QA/QC procedures) where release has not occurred because of form, recency of collection, or data reports in the process of being written. Data reviews will be in selected areas to further evaluate those issues considered most important to repository performance (identified in Task 4). NRC/DOE will establish what information will be examined in advance of the actual review. The results of data orientations/reviews should be documented following the format used for all DOE/NRC meeting minutes.

Follow-up data reviews or consultation on data or issues might also be planned as time and resources permit.

6.6 Task 6 Scoping Review of Preliminary EA Drafts

DOE is planning to release preliminary drafts of the EA's. A scoping review will be performed as time and resources permit using the most complete, preliminary draft EA's. The objective of this scoping review is to improve the efficiency and effectiveness of the review of the draft EA's. The scoping review will include identifying preliminary major comments and issues, developing an annotated outline of the major comments, refining the plans for the actual review process and identifying lead review responsibilities for EA sections. Comments on these preliminary drafts will not be given to DOE.

Early scoping reviews will also be used to give an indication of the type of performance assessments and how they will be used in making findings on the guidelines in the EA's. This information is critical for preparing to review various performance assessments and findings based on them.

6.7 Task 7 Review Draft EA

The objective and scope of reviewing the draft EA's are defined in Sections 3.0 and 4.0. The product description, review period, and review process and procedures will be described in this section.

6.7.1 Review Period

DOE will issue each draft EA for review and public comment for 60 calendar days. This period may be extended by DOE in response to requests by host states that require additional time to review the contents of the draft EA's. The NRC will complete its review and comment within the 60 day comment period. However, any significant support information which is not provided in the EA, its references, or otherwise made available to the staff before the EA's are released will be identified as a deficiency.

6.7.2 Review Process

The activities and responsibilities for developing and reviewing the comment letter to DOE are outlined in Figure 1.

The process begins with a one week, rapid, scoping review intended to familiarize the project review team with the actual contents of the draft EA and to revise the results of any earlier scoping reviews. Each technical review group is responsible for a scoping review of the entire EA to identify those portions of the EA which need to be reviewed in detail. Lead review responsibilities for EA sections will be revised as needed and agreed upon. A verbal report should be given to the appropriate PM and should describe the general substance of the draft EA, the presence of material that could adversely impact the review process, changes to the annotated outline of comments developed in Task 6, and changes to the review schedule. The scoping review is followed by a three and one-half week period for a detailed review of the EA, preparation of draft 1 of the selected, detailed comments and the major comments, a staff review of the draft 1 comments, and a briefing for the WM Division Director. This is followed by a one and one-half week period for preparing draft 2 of the comments, transmittal letters, a single commission paper; conducting a WM division review which would also include the office of Research (RES) and the Office of Executive Legal Director (ELD); and briefing the NMSS Office Director. This is followed by one week for preparing a final draft for the NMSS Director to review. Lastly, the final comment packages are completed, copied and issued. At this

time the Commission paper with each comment package attached will be sent to the Commission for their information.

6.7.3 Product Description

The final product of the review of each draft EA is a comment package to DOE including NRC's detailed and major comments. The comment package consists of four parts shown in Tables 5 and 6 and described below.

(1) "Transmittal Letter" to DOE consisting of a 2-3 page summary describing NRC's overall reaction and principal concerns with respect to the draft EA's. The BWIP SCA transmittal letter illustrates the appropriate format.

(2) "Introduction" which describes the objectives, scope, and rationale of NRC's review. The introduction will be common to all EA's and prepared in advance of the staff review.

(3) "Major Comments" describing issues critical to licensing or adopting an EIS and which are critical to the EA findings and conclusions. The specific format will be developed during the scoping review of the preliminary draft EA described in Task 6 but will contain a general section and a section for each technical review area.

(4) "Selected Detailed Comments" identifying specific DOE statements which do not meet the review criteria and which would directly affect EA findings and conclusions. NRC will 1) paraphase problematic statements, 2) note the basis for the problem, 3) state the importance to EA findings and conclusions, and 4) suggest resolutions to the problem. An example comment is shown on Table 7. Comments will be presented in this form and organized by EA chapter. The key word categorization of concerns will be developed and provided before the review.

7.0 REVIEW TEAM ORGANIZATION AND RESPONSIBILITY

In order to prepare for and conduct the EA reviews, the project review teams should be established along the lines of the WM organizational structure. In this way, RP will be responsible for overall project management, while GT and EG maintain responsibility for the technical reviews.

Table 8 shows the organizational structure and identifies the staff members for each technical area for each project. The general responsibilities for each element of the project team are described below.

Project Management (Repository Projects Branch)

Project Management is responsible for managing both the EA preparation tasks and the review of the draft EA conducted by each NRC project team. This includes guidance for product preparation, coordination, information transfer and technical integration. Communications and coordinating interactions with DOE and other organizations regarding information transfer, data reviews, and consultations are also the responsibility of Project Management.

During the review of the draft EA's, Project Management will coordinate the production of the major and detailed comments developed by the project team following procedures described in Section 6.7.3. Project Management will also prepare the general, major comments, transmittal letter, and commission paper.

Performance Assessment (Repository Projects Branch)

Performance Assessment is responsible for technical integration of EA preparation work and review of draft EA's, including coordinating: 1) scenario and conceptual model development, 2) preliminary sensitivity analyses, 3) performance assessment methodology development, and 4) reviews of preliminary DOE performance assessments. This work may include developing initial products to assist in the integration of the many technical aspects of performance assessment.

Other Technical Review Areas (Geotechnical and Engineering Branches)

Each technical review group on Table 8 is responsible for: 1) the technical quality of the work in their respective technical areas (i.e., implementing internal QA/QC Procedures in Section 9.0) 2) assuring, along with Project Management and other technical review groups, that the interface requirements among technical areas are scoped and met; and 3) producing the products necessary for preparing for and reviewing the draft EA's as described in Section 6.0.

8.0 SCHEDULES

DOE's current EA schedules are as follows.

- Release up to nine draft EA's — August 1984

- o Draft EA Review Period — 60 days
- o Release up to nine final EA's — December 1984

Based on these dates, NRC's preparation for reviewing the EA's must be complete by August 1. Specific schedule dates for task products are identified in the Detailed Operating Plan.

9.0 INTERNAL QA/QC PROCEDURES

This section describes the required technical and project management reviews (concurrence) of the products produced under this EA Review Plan as well as the required documentation and recordkeeping supporting technical work.

The products identified in the Detailed Operating Plan should be technically reviewed for quality and approved by the respective technical section leader following the established Waste Management policy on approvals of technical work (Waste Management Policy 13, no. 5). Other products should be considered as "working papers" and do not require the above technical review and approval.

In addition to technical reviews performed by the responsible technical section, the Repository Projects Branch will also review products for 1) appropriate format and tone, 2) completeness, 3) technical consistency, 4) appropriate integration, and 5) compatibility with NRC high-level waste management policy.

The technical work supporting the products developed under this plan but not documented in the product itself should be recorded, kept in work files established and controlled by each technical section. These work files would include items such as calculations, detailed evaluations, citations of references used, and documentation of technical reviews and approvals.

REVIEW ACTIVITY AND NUMBER (Responsible branch)

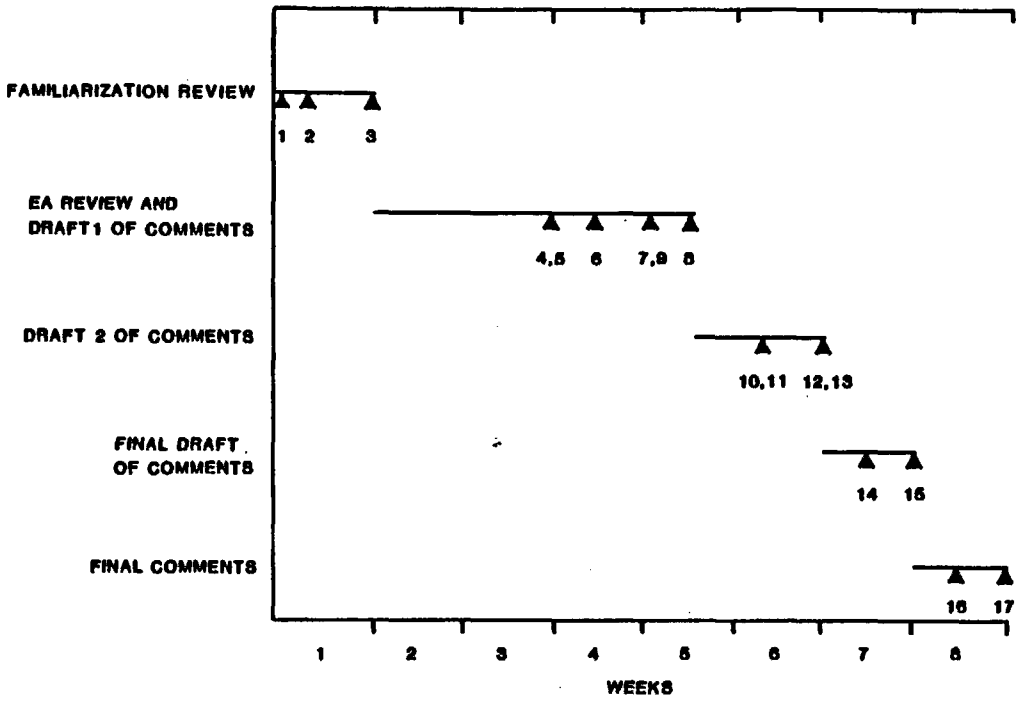
Familiarization Review
1. Receive draft EA's (RP)
2. Distribute draft EA's (RP)
3. Conduct rapid familiarization review (GT, EG, RP, FC)

EA Review and draft 1 of comments
4. Review EA and prepare draft 1 of detailed comments (GT, EG, RP, FC)
5. Identify list of major comments (GT, EG, RP, FC)
6. Review list of major comments (GT, EG, RP, FC)
7. Complete draft 1 of major comments (GT, EG, RP, FC)
8. Staff review of draft 1 of detailed major comments (GT, EG, RP, FC, PC)
9. WM Division Director briefing (GT, EG, RP, PC, FC)

Draft 2 of comments
10. Complete draft 2 of detailed and major comments (GT, EG, RP, FC)
11. Complete draft 1 of transmittal letter and Commission paper (RP)
12. WM Division review of draft 2 of comments, transmittal letter and Commission paper (WM, GT, EG, RP, FC, ELD, PC, RES)
13. NMSS Office Director briefing (GT, EG, RP, PC, FC)

Final draft of comments
14. Complete final draft of comments, transmittal letter and Commission paper (GT, EG, RP, FC)
15. NMSS Office review of final draft (NMSS)

Final comments
16. Complete final comment package (GT, EG, RP, FC)
17. Issue final comment package (RP, WM, NMSS)



Legend

▲ - Time which review activity number is completed
GT - Geotechnical Branch
EG - Engineering Branch
RP - Repository Projects Branch
PC - Policy & Program Control Branch
WM - Division of Waste Management
FC - Division of Fuel Cycle and Material Safety--Transportation
NMSS - Office of Nuclear Material Safety and Safeguards
RES - Office of Nuclear Regulatory Research

FIGURE 1 DRAFT EA REVIEW PROCESS AND SCHEDULE

TABLE 1 GENERAL REVIEW REQUIRED FOR EACH EA/SITE

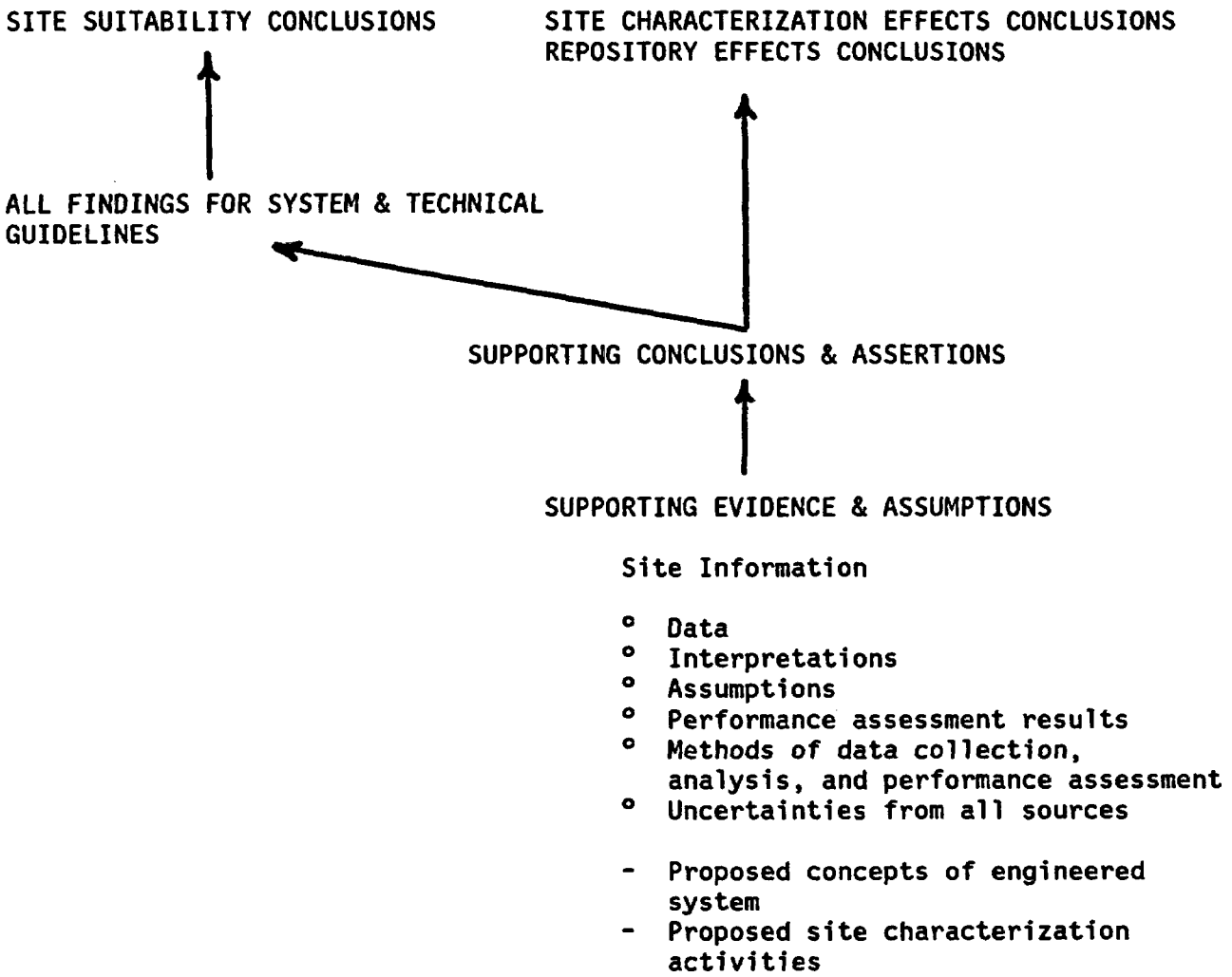


TABLE 2

SCOPE OF NRC'S EA REVIEW

EA ITEMS IDENTIFIED IN SITING GUIDELINES	NRC REVIEW
1. Decision Process for Nomination	° None (addressed by Commission concurrence on siting guidelines)
2. Site Qualification/Disqualification	° DOE findings with respect to the guidelines ° Technical evaluation used to support findings ° Data, interpretations, performance assessments supporting technical evaluations
3. Geohydrologic Setting Determination	° Technical evaluations used to determine the geohydrologic settings ° Data, interpretations, performance assessments supporting technical evaluations
4. Comparative Evaluation of Sites Within Geohydrologic Setting	° None regarding conclusions or methodology ° Substantiation of conclusions
5. Suitability for Development of Repository	° Suitability conclusion ° DOE findings with respect to the appropriate guidelines ° Technical evaluations used to support findings

TABLE 2 (Cont'd)

SCOPE OF NRC'S EA REVIEW

EA ITEMS IDENTIFIED IN SITING GUIDELINES	NRC REVIEW
	° Data, interpretations, performance assessments supporting technical evaluations
6. Suitability for Characterization	° Suitability conclusion
	° DOE findings with respect to the appropriate guidelines
	° Technical evaluations used to support findings
	° Data, interpretations, performance assessments supporting technical evaluations
7. Comparative Evaluation of Site Against All Other Sites	° None regarding conclusions or methodology
	° Substantiation of conclusions
8. Effects of Site Characterization	
° Public Health and Safety (Radiological)	° Proposed site characterization activities
	° Potential effects on repository performance
	° Data, interpretations supporting above
° Public Health and Safety (Non-Radiological)	° None
° Environment	° None

TABLE 2 (Cont'd)

SCOPE OF NRC'S EA REVIEW

EA ITEMS IDENTIFIED IN SITING GUIDELINES	NRC REVIEW
9. Alternative Activities for Site Characterization to Avoid Effects in No. 8 above	° Alternative plans for site characterization activities
10. Regional and Local Impacts of Repository	° Proposed repository facilities and operations
	° Effects on repository performance, environment, transportation and socioeconomics
	° Data, interpretations supporting above
OTHER EA ITEMS	
11. Descriptions of the Site and Region	° Data, interpretations, performance assessments
12. Descriptions of the Repository Design	° Preliminary designs
	° Data, interpretations, performance assessments supporting preliminary designs

TABLE 3

SUMMARY OF WORK REQUIRED, PRODUCTS, AND SCHEDULES

Work Required		Product(s)	Responsibility*
Task 1	Inventory of Documents and Data		
1.1 1.2 1.3	Search/obtain documents Review and identify key documents Develop inventory of existing data	° Document collection, key document list, data inventory	TB(L), RPB(I,R)
Task 2	Develop Key Scenarios and Conceptual Models	° Strawman of key performance scenarios, and conceptual models	RPB(L), TB(I)
		° Develop selected conceptual models	TB(L) RP(R)
Task 3	Conduct Sensitivity Modeling	° Sensitivity analysis needs	TB(L), RPB(I,R)
		° Sensitivity analysis results	TB(L), RPB(R,I)
Task 4	Develop Preliminary Issues		
4.1	Identify, prioritize and integrate	° Draft umbrella STP's	TB(L), RPB(R)
		° Integration of issues	RPB(L), TB(I,R)
Task 5	Conduct Data and Document Reviews		
5.1	Conduct Data and Document Reviews	° Document reviews ° Data Review meeting summary	TB(L), RPB(I,R)
Task 6	Scoping Review of Preliminary EA draft	° Annotated outline for major comments	RPB(L), TB(I,R)
Task 7	Review Draft EA		
7.1	Review and Comment	° Separate sets of detailed comments	TB(L), RPB(I,R)
		° Drafts and final transmittal letter, major comments, commission paper	RPB(L), TB(I,R)

*

L - Lead
I - Input
R - Review
RPB - Repository Projects Branch
TB - Technical Branches
PPCB - Policy and Program Control Branch

TABLE 4

HIGH-LEVEL PROGRAM DOCUMENT REVIEW SHEET

FILE NUMBER:

DOCUMENT:

REVIEWER: DATE REVIEW COMPLETED

BRIEF SUMMARY OF DOCUMENTS DATE APPROVED:

SIGNIFICANCE TO NRC WASTE MANAGEMENT PROGRAM:

PROBLEMS, DEFICIENCIES OR LIMITATIONS OF REPORT:
(Should these limitations be brought to DOE's attention? If so, cover under "action taken"/follow-up activity" below.)

ACTION TAKEN:

FOLLOW-UP ACTIVITY:

TABLE 5

COMPONENTS OF NRC'S STAFF COMMENTS AND TRANSMITTAL LETTER TO DOE

Element	Description/Function	Length(pages)	Example Format
Transmittal letter	Overall conclusions and principal concerns	2-3	BWIP SCA transmittal letter
Major comments and Issues	Conclusions and principal concerns	5-10	General and by discipline Standard format to be developed in Task 6 Scoping Review
Selected detailed Comments	Selected detailed comments for each chapter	20-50	Chapter, page, paragraph and problem, basis, effect on EA decisions, and resolution. See Table 7 for example of standard format

TABLE 6

PRELIMINARY OUTLINE FOR NRC's STAFF COMMENTS AND TRANSMITTAL LETTER TO DOE

Transmittal Letter
Attached Comments

1.0 Introduction

1.1 Purpose and Objectives of NRC Review
1.2 Scope of NRC Review
1.3 Content of draft EA review

2.0 Major Comments and Issues

2.0 General (broad comments on EA conclusions and findings)
2.1 Hydrology
2.2 Geology and Geophysics
2.3 Geochemistry
2.4 Rock Mechanics
2.5 Facility Design
2.6 Waste Package
2.7 Environment, Socioeconomics and Transportation

3.0 Selected Detailed Comments for EA Chapters

3.1 General
3.2 Chapter 1
3.3 Chapter 2
3.4 Chapter 3
3.5 Chapter 4
3.6 Chapter 5
3.7 Chapter 6
3.8 Chapter 7

TABLE 7 FORMAT FOR SELECTED DETAILED COMMENTS AND EXAMPLE

Format	
Comment Number	**Comment Heading**
° EA chapter number - sequential number by chapter	° EA section number and heading ° Page number, paragraph number ° Concern category
	Comment
	° Problem and basis ° Importance to EA findings/conclusions ° Suggested resolution
Example 6-1	
	Section 6.3.2 Geohydrology Favorable Condition Page 6.1-23, paragraph 2, Inadequate consideration of available data
(problem & basis)	In this section the range of hydraulic conductivity values chosen for calculating groundwater travel times is x to x, which results in a travel time of y years. Table z in Waterman, 1984, lists numerous hydraulic conductivity values outside of the chosen range which would result in travel times of y years, which are at least two orders of magnitude faster than those calculated and given in this section. No explanation is given for excluding some of the data in Waterman, 1984.
(importance to EA findings)	Since the faster travel time is less than 10,000 years, the finding that a favorable condition exists does not appear to be supported by the available data.
(suggested resolution)	An explanation is needed for how the range of hydraulic conductivity values was chosen. Included should be the justification for excluding any values from the range.

TABLE 8

NRC/WM HLW REPOSITORY PROJECTS
LEAD AND (BACKUP) WM STAFF

	BWIP	NNWSI	SALT
PROJECT MANAGEMENT	Wright	Coplan	Johnson (Grace)
ON-SITE REPRESENTATIVE	Cook	Presholt	Verma
PERFORMANCE ASSESSMENT	Logsdon (Dunkelman)	Logsdon (Elzeftawy)	Logsdon (Brooks) (Peeters)
HYDROLOGY	Gordon (Coleman)	Pohle Ornstein	Ross (Cooke) (Goode) (Ford)
GEOLOGY-GEOPHYSICS	Westbrook (Rehfeldt)	Rice (Blackford) (Cutter)	Trapp (Lee)
GEOCHEMISTRY	Brooks (Starmer) (Bradburg)	Starmer (Kovach)	Kelly (Dam)
FACILITY DESIGN-ROCK MECHANICS	Nataraja (Buckley)	Dutta (Tanious) (Tiktinsky)	Pearring (Peshell) (Smykowski)
MATERIALS ENGINEERING	Chang (Wick)	Jungling	Tokar (Peterson)
ENVIRONMENT-SOCIOECONOMIC	Pflum (Boyle)	Lilley	Regnier

TABLE 8(Cont'd)

NRC/WM HLW REPOSITORY PROJECTS
LEAD AND (BACKUP) WM STAFF

	BWIP	NNWSI	SALT
TRANSPORTATION	Cook	Cook	Cook
QUALITY ASSURANCE (EXTERNAL)	Kennedy	Kennedy	Kennedy
STATE INTERACTION	Russell	Russell	Mattson
INFORMATION MANAGEMENT	Still (Mattson)	Still (Mattson)	Still (Mattson)
PROGRAM PLANNING-INTEGRATION	Altomare	Altomare	Altomare
EA PRODUCTION MANAGER	Tana	Tana	Tana

APPENDIX A CONTENT OF THE ENVIRONMENTAL ASSESSMENT

EA Content Specified by NWPA

The NWPA specifies the content of the EA's. Section 112(b)(1)(E) of NWPA states that each EA shall include the following:

(1) an evaluation by the Secretary as to whether such site is suitable for site characterization under the siting guidelines established under subsection (a);

(2) an evaluation by the Secretary as to whether such site is suitable for development as a repository under each such guideline that does not require site characterization as a prerequisite for application of such guideline;

(3) an evaluation by the Secretary of the effects of the site characterization activities at such site on the public health and safety and the environment;

(4) a reasonable comparative evaluation by the Secretary of such site with other sites and locations that have been considered;

(5) a description of the decision process by which such site was recommended; and

(6) an assessment of the regional and local impacts of locating the proposed repository at such site.

Furthermore, Section 112(b)(1)(E) of NWPA states that the EA's shall include:

(7) a detailed statement of the basis for recommending that a particular site be nominated;

(8) a detailed statement of the probable impacts of the site characterization activities planned for the site;

(9) a discussion of alternative activities relating to site characterization that may be undertaken to avoid the impacts identified in Item (8) above.

EA Content Specified in the May 14, 1984 Siting Guidelines

The Siting Guidelines rearrange and subdivide the items specified by NWPA into the ten items listed below which will be evaluated and documented in the EA's.

(1) The decision process by which such site was proposed for nomination;

(2) The evaluations that led to the identification of the site as potentially acceptable and to the determination that such site and other such sites were not disqualified;

(3) The basis and process for determining the geohydrologic setting in which the site is located;

(4) The comparative evaluation of such site against other sites in the geohydrologic setting, including the decision process based on that evaluation which resulted in the selection of a preferred site or preferred sites in that setting;

(5) The evaluation of the suitability of such site for development of a repository under the qualifying condition of each guideline specified in Subparts C and D that does not require site characterization as a prerequisite for application of such guideline;

(6) The evaluation of the suitability of such site for characterization under the qualifying condition of the guidelines specified in Subparts C and D that require characterization;

(7) The comparative evaluation of each site with all other sites proposed for nomination;

(8) An evaluation of the effects of the site characterization activities at the site on public health and safety and the environment;

(9) A discussion of alternative activities relating to site characterization that may be taken to avoid such impacts; and,

(10) An assessment of the regional and local impacts of locating a repository at the site.

APPENDIX III.*

APPLICATION OF THE SYSTEM AND TECHNICAL GUIDELINES DURING THE SITING PROCESS.

This appendix presents a table that specifies how the guidelines of Subparts C and D are to be applied at the principal decision points of the siting process. The decision points, as referenced in the table, are defined as follows:

"Potentially acceptable" means the decision point at which a site is identified as potentially acceptable.

"Nomination and recommendation" means the decision point at which a site is nominated as suitable for characterization or recommended as a candidate site for characterization.

"Repository site selection" means the decision point at which a site is recommended for the development of a repository.

The findings resulting from the application of a disqualifying condition for any particular guideline at a given decision point are denoted in the table by the numeral 1 or 2. The numerals 1 and 2 signify the types of findings that are required and are defined as follows:

"1" means either of the following:

(a) The available evidence does not support a finding that the site is disqualified.

or

(b) The available evidence supports a finding that the site is disqualified.

"2" means either of the following:

(a) The available evidence supports a finding that the site is not disqualified on the basis of that evidence and is not likely to be disqualified.

or

(b) The available evidence supports a finding that the site is disqualified or is likely to be disqualified.

The findings resulting from the application of a qualifying condition for any particular guideline at a given decision point are denoted in the table by the numeral 3 or 4. The numerals 3 and 4 signify the types of findings that are required and are defined as follows:

"3" means either of the following:

(a) The available evidence does not support a finding that the site is not likely to meet the qualifying condition.

*DOE Revisions to the Siting Guidelines of November 18, 1983 in response to the Preliminary Decision on Concurrence by the NRC on March 14, 1984, May 14, 1984.

or

(b) The available evidence supports a finding that the site is not likely to meet the qualifying condition, and therefore the site is disqualified.

"4" means either of the following:

(a) The available evidence supports a finding that the site meets the qualifying condition and is likely to continue to meet the qualifying condition.

or

(b) The available evidence supports a finding that the site cannot meet the qualifying condition or is unlikely to be able to meet the qualifying condition, and therefore the site is disqualified.

If performance assessments are used to substantiate any of the above findings, those assessments shall include estimates of the effects of uncertainties in data and modeling.

For both the disqualifying and qualifying conditions of any guideline, a higher finding (e.g., a "2" finding rather than "1") shall be made if there is sufficient evidence to support such a finding.

FINDINGS RESULTING FROM THE APPLICATION OF
THE QUALIFYING AND DISQUALIFYING CONDITIONS OF THE
TECHNICAL GUIDELINES AT MAJOR SITING DECISIONS

Section 960	Guideline	Condition	Siting Decision: Potentially Acceptable	Siting Decision: Nomination and Recommendation	Siting Decision: Repository Site Selection
4-1(a)	System	Qualifying	-	3	4
4-2-1(a)	Geohydrology	Qualifying	-	3	4
4-2-1(d)	Geohydrology	Disqualifying	-	1	2
4-2-2(a)	Geochemistry	Qualifying	-	3	4
4-2-3(a)	Rock Characteristics	Qualifying	-	3	4
4-2-4(a)	Climatic Changes	Qualifying	-	3	4
4-2-5(a)	Erosion	Qualifying	-	3	4
4-2-5(d)	Erosion	Disqualifying	1	1	2
4-2-6(a)	Dissolution	Qualifying	-	3	4
4-2-6(d)	Dissolution	Disqualifying	1	1	2
4-2-7(a)	Tectonics	Qualifying	-	3	4
4-2-7(d)	Tectonics	Disqualifying	1	1	2
4-2-8-1(a)	Natural Resources	Qualifying	-	3	4
4-2-8-1(d)(1)	Natural Resources	Disqualifying	1	1	2
4-2-8-1(d)(2)	Natural Resources	Disqualifying	-	1	2
4-2-8-2(a)	Site Ownership and Control	Qualifying	-	3	4
5-1(a)(1)	System	Qualifying	-	3	4
5-1(a)(2)	System	Qualifying	-	3	4
5-1(a)(3)	System	Qualifying	-	3	4
5-2-1(a)	Population Density and Distribution	Qualifying	-	3	4
5-2-1(d)(1)	Population Density and Distribution	Disqualifying	1	1	2
5-2-1(d)(2)	Population Density and Distribution	Disqualifying	1	1	2
5-2-1(d)(3)	Population Density and Distribution	Disqualifying	-	1	2
5-2-2(a)	Site Ownership and Control	Qualifying	-	3	4
5-2-3(a)	Meteorology	Qualifying	-	3	4
5-2-4(a)	Offsite Installations and Operations	Qualifying	-	3	4
5-2-4(d)	Offsite Installations and Operations	Disqualifying	1	1	2
5-2-5(a)	Environmental Quality	Qualifying	-	3	4
5-2-5(d)(1)	Environmental Quality	Disqualifying	-	1	2
5-2-5(d)(2)	Environmental Quality	Disqualifying	1	1	2
5-2-5(d)(3)	Environmental Quality	Disqualifying	1	1	2
5-2-6(a)	Socioeconomic Impacts	Qualifying	-	3	4
5-2-6(d)	Socioeconomic Impacts	Disqualifying	-	1	2
5-2-7(a)	Transportation	Qualifying	-	3	4
5-2-8(a)	Surface Characteristics	Qualifying	-	3	4
5-2-9(a)	Rock Characteristics	Qualifying	-	3	4
5-2-9(d)	Rock Characteristics	Disqualifying	-	1	2
5-2-10(a)	Hydrology	Qualifying	-	3	4
5-2-10(d)	Hydrology	Disqualifying	-	1	2
5-2-11(a)	Tectonics	Qualifying	-	3	4
5-2-11(d)	Tectonics	Disqualifying	1	1	2

APPENDIX IV*

TYPES OF INFORMATION FOR THE NOMINATION OF SITES AS SUITABLE FOR CHARACTERIZATION.

The types of information specified below are those that the DOE expects will be included in the evidence used for evaluations and applications of the guidelines of Subparts C and D at the time of nomination of a site as suitable for characterization. The types of information listed under each guideline are considered to be the most significant for the evaluation of that guideline. However, the types of information listed under any particular guideline will be used, as necessary, for the evaluation of any other guideline. As stated in Section 960.3-1-4-2, the DOE will use technically conservative assumptions or extrapolations of regional data, where necessary, to supplement this information. The information specified below will be supplemented with conceptual models, as appropriate, and analyses of uncertainties in the data.

Before site-characterization studies and related nongeologic data gathering activities, the available evidence is not expected to provide precise information, but, rather, to provide a reasonable basis for assessing the merits or shortcomings of the site against the guidelines of Subparts C and D. Consequently, the types of information described below should be interpreted so as to accommodate differences among sites and differences in the information available before detailed studies.

The specific information required for the guideline applications set forth in Appendix III of this Part is expected to differ from site to site because of site-specific factors, both with regard to favorable and potentially adverse conditions and with regard to the sources and reliability of the information. The types of information specified in this appendix will be used except where the findings set forth in Appendix III of this Part can be arrived at by reasonable alternative means or the information is not required for the particular site.

960.4-2-1 Geohydrology.

Description of the geohydrologic setting of the site, in context with its geologic setting, in order to estimate the pre-waste-emplacement ground-water flow conditions. The types of information to support this description should include--

- Location and estimated hydraulic properties of aquifers, confining units, and aquitards.
- Potential areas and modes of recharge and discharge for aquifers.
- Regional potentiometric surfaces of aquifers.
- Likely flow paths from the repository to locations in the expected accessible environment, as based on regional data.

*DOE Revisions to the Siting Guidelines of November 18, 1983 in response to the Preliminary Decision on Concurrence by the NRC on March 14, 1984, May 14, 1984.

- Preliminary estimates of ground-water travel times along the likely flow paths from the repository to locations in the expected accessible environment.

- Current use of principal aquifers and State or local management plans for such use.

960.4-2-2 Geochemistry.

Description of the geochemical and hydrochemical conditions of the host rock, of the surrounding geohydrologic units, and along likely ground-water paths to locations in the expected accessible environment, in order to estimate the potential for the migration of radionuclides. The types of information to support this description should include--

- Petrology of the rocks.

- Mineralogy of the rocks and general characteristics of fracture fillings.

- Geochemical and mechanical stability of the minerals under expected repository conditions.

- General characteristics of the ground-water chemistry (e.g., reducing/oxidizing conditions and the principal ions that may affect the waste package or radionuclide behavior).

- Geochemical properties of minerals as related to radionuclide transport.

960.4-2-3 Rock Characteristics.

Description of the geologic and geomechanical characteristics of the site, in context with the geologic setting, in order to estimate the capability of the host rock and surrounding rock units to accommodate the thermal, mechanical, chemical, and radiation stresses expected to be induced by repository construction, operation, and closure and by expected interactions among the waste, host rock, ground water, and engineered components of the repository system. The types of information to support this description should include--

- Approximate geology and stratigraphy of the site, including the depth, thickness, and lateral extent of the host rock and surrounding rock units.

- Approximate structural framework of the rock units and any major discontinuities identified from core samples.

- Approximate thermal, mechanical, and thermomechanical properties of the rocks, with consideration of the effects of time, stress, temperature, dimensional scale, and any major identified structural discontinuities.

- Estimates of the magnitude and direction of in situ stress and of temperature in the host rock and surrounding rock units.

960.4-2-4 Climatic Changes.

Description of the climatic conditions of the site region, in context with global and regional patterns of climatic changes during the Quaternary Period, in order to project likely future changes in climate such that potential impacts on the repository can be estimated. The types of information to support this description should include--

- Expected climatic conditions and cycles, based on extrapolation of climates during the Quaternary Period.

- Geomorphology of the site region and evidence of changes due to climatic changes.

- Estimated effects of expected climatic cycles on the surface-water and the ground-water systems.

960.4-2-5 Erosion.

Description of the structure, stratigraphy, and geomorphology of the site, in context with the geologic setting, in order to estimate the depth of waste emplacement and the likelihood for erosional processes to uncover the waste in less than one million years. The types of information to support this description should include--

- Depth, thickness, and lateral extent of the host rock and the overlying rock units.

- Lithology of the stratigraphic units above the host rock.

- Nature and rates of geomorphic processes during the Quaternary Period.

960.4-2-6 Dissolution.

Description of the stratigraphy, structure, hydrology, and geochemistry of the site, in context with the geologic setting, to delineate the approximate limits of subsurface rock dissolution, if any. This description should include such information as the following:

- The stratigraphy of the site, including rock units largely comprised of water-soluble minerals.

- The approximate extent and configuration of features indicative of dissolution within the geologic setting.

960.4-2-7 Tectonics.

Description of the tectonic setting of the site, in context with its geologic setting, in order to project the tectonic stability of the site over the next 10,000 years and to identify tectonic features and processes that

could be reasonably expected to have a potentially adverse effect on the performance of the repository. The types of information to support this description should include--

- The tectonic history and framework of the geologic setting and the site.
- Quaternary faults in the geologic setting, including their length, displacement, and any information regarding the age of latest movement.
- Active tectonic processes, such as uplift, diapirism, tilting, subsidence, faulting, and volcanism.
- Estimate of the geothermal gradient.
- Estimate of the regional in situ stress field.
- The historical seismicity of the geologic setting.

960.4-2-8 Human Interference.

960.4-2-8-1 Natural Resources.

Description of the mineral and energy resources of the site, in order to project whether past or future exploration and recovery could have a potentially adverse effect on the performance of the repository. The types of information to support this description should include--

- Known occurrences of energy and mineral resources, including ground water.
- Estimates of the present and projected value of these resources compared with resources contained in other areas of similar size in the geologic setting.
- Past and present drilling and mining operations in the vicinity of the site.

960.4-2-8-2 Site Ownership and Control.

Description of the ownership of land for the geologic-repository operations area and the controlled area, in order to evaluate whether the DOE can obtain ownership of, and control access to, the site. The types of information to support this description should include--

- Present land ownership.

960.5-2-1 Population Density and Distribution.

Description of the population density and distribution of the site region, in order to identify highly populated areas and the nearest 1 mile by

1 mile area having a population greater than 1,000 persons. The types of information to support this description should include--

- The most-recent U.S. census, including population composition, distribution, and density.

960.5-2-2 Site Ownership and Control.

Description of current ownership of land, including surface and subsurface mineral and water rights,in order to evaluate whether the DOE can obtain control of land within the projected restricted area. The types of information to support this description should include--

- Present land ownership.

960.5-2-3 Meteorology.

The meteorological setting, as determined from the closest recording station, in order to project meteorological conditions during repository operation and closure and their potential effects on the transport of airborne emissions. The types of information to support this description should include--

- Wind and atmospheric-dispersion characteristics.
- Precipitation characteristics.
- Extreme weather phenomena.

960.5-2-4 Offsite Installations and Operations.

Description of offsite installations and operations in the vicinity of the site in order to estimate their projected effects on repository construction, operation, or closure. The types of information to support this description should include--

- Location and nature of nearby industrial, transportation, and military installations and operations, including atomic energy defense activities.

960.5-2-5 Environmental Quality.

Description of environmental conditions in order to estimate potential impacts on public health and welfare and on environmental quality. The types of information to support this description should include--

- Applicable Federal, State, and local procedural and substantive environmental requirements.
- Existing air quality and trends.
- Existing surface-water and ground-water quality and quantity.

- Existing land resources and uses.
- Existing terrestrial and aquatic vegetation and wildlife.
- Location of any identified critical habitats for threatened or endangered species.
- Existing aesthetic characteristics.
- Location of components of the National Park System, the National Wildlife Refuge System, the National Wild and Scenic Rivers System, the National Wilderness Preservation System, or National Forest Land.
- Location of significant State or regional protected resource areas, such as State parks, wildlife areas, or historical areas.
- Location of significant Native American resources such as major Indian religious sites, or other sites of unique cultural interest.

960.5-2-6 Socioeconomic Impacts.

Description of the socioeconomic conditions of the site, including population density and distribution, economics, community services and facilities, social conditions, and fiscal and government structure, in order to estimate the impacts that might result from site characterization and from the development of a repository at that site. The types of information to support this description should include--

- Population composition, density, and distribution.
- Economic base and economic activity, including major sectors of local economy.
- Employment distribution and trends by economic sector.
- Resource usage.
- Community services and infrastructure, including trends in use and current capacity utilization.
- Housing supply and demand.
- Life style and indicators of the quality of life.
- Existing social problems.
- Sources of, and trends in, local government expenditures and revenues.

960.5-2-7 Transportation.

Description of the transportation facilities in the vicinity of the site in order to evaluate existing or required access routes or improvements. The types of information to support this description should include--

- Estimates of the overall cost and risk of transporting waste to the site.

- Description of the road and rail network between the site and the nearest Interstate highways and major rail lines; also, description of the waterway system, if any.

- Analyses of the adequacy of the existing regional transportation network to handle waste shipments; the movement of supplies for repository construction, operation, and closure; removal of nonradioactive waste from the site; and the transportation of the labor force.

- Improvements anticipated to be required in the transportation network and their feasibility, cost, and environmental impacts.

- Compatibility of the required transportation network improvements with the local and regional transportation and land-use plans.

- Analysis of weather impacts on transportation.

- Analysis of emergency response requirements and capabilities related to transportation.

960.5-2-8 Surface Characteristics.

Description of the surface characteristics of the site, in order to evaluate whether repository construction, operation, and closure are feasible on the basis of site characteristics that influence those activities. The types of information to support this description should include--

- Topography of the site.

- Existing and planned surface bodies of water.

- Definition of areas of landslides and other potentially unstable slopes, poorly drained material, or materials of low bearing strength or of high liquefaction potential.

960.5-2-9 Rock Characteristics.

Description of the geologic and geomechanical characteristics of the site, in context with the geologic setting, in order to project the capability of the host rock and the surrounding rock units to provide the space required for the underground facility and safe underground openings during repository construction, operation, and closure. The types of information to support this description should include--

- Depth, thickness, and lateral extent of the host rock.

- Stratigraphic and structural features within the host rock and adjacent rock units.

- Thermal, mechanical, and thermomechanical properties and constructibility characteristics of the rocks, with consideration of the effects of time, stress, temperature, dimensional scale, and any major identified structural discontinuities.

- Fluid inclusions and gas content in the host rock.

- Estimates of the magnitude and direction of in situ stress and of temperature in the host rock.

960.5-2-10 Hydrology.

Description of the hydrology of the site, in context with its geologic setting, in order to project compatibility with repository construction, operation, and closure. The types of information to support this description should include--

- Surface-water systems, including recharge and runoff characteristics, and potential for flooding of the repository.

- Nature and location of aquifers, confining units, and aquitards.

- Potentiometric surfaces of aquifers.

- Hydraulic properties of geohydrologic units.

960.5-2-11 Tectonics.

Description of the tectonic setting of the site, in context with the regional setting, in order to estimate any expected effects of tectonic activity on repository construction, operation, or closure. The types of information to support this description should include--

- Quaternary faults.

- Active tectonic processes.

- Preliminary estimates of expected ground motion caused by the maximum potential earthquake within the geologic setting.