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Office of Civilian Radioactive Waste Management

Office of Geologic Respositories

Issues Hierarchy For A Mined Geologic Disposal System

(OGR/B-10)

August 1987

U.S. Department of Energy
Office of Civilian Radioactive Waste Management

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Washington, D.C. 20585

FOREWORD

The Nuclear Waste Policy Act of 1982 (NWPA) charges the Department of Energy (DOE) with responsibility for siting, constructing, operating, and permanently closing a mined geologic disposal system (MGDS) for high-level waste and spent nuclear fuel. The Nuclear Regulatory Commission (NRC) is charged with responsibility for promulgating the regulatory requirements and criteria (10 CFR Part 60) that will govern authorization for the construction, licensing, and approval for permanent closure of the MGDS. In the DOE's Office of Civilian Radioactive Waste Management (OCRWM), the Office of Geologic Repositories (OGR) has primary responsibility for the MGDS program.

The NWPA also requires that the DOE prepare, and the NRC adopt to the extent practicable, an environmental impact statement (EIS) to satisfy the requirements of the National Environmental Policy Act (NEPA) and the implementing regulations of 40 CFR Part 1500 et seq. These implementing regulations require that the DOE undertake a scoping process to identify the significant issues to be addressed in the EIS.

In 10 CFR Part 60 and in guidance (Revision 1 to Regulatory Guide 4.17) to the DOE for the preparation of site characterization plans (SCPs) for geologic repositories, the NRC has indicated that the identification of the issues that must be resolved to complete licensing assessments of site and design suitability is an important step in the licensing process.

As required by the NWPA, the DOE prepared the Mission Plan for the Civilian Radioactive Waste Management Program (DOE/RW-0005, June 1985) to provide an informational basis sufficient to permit informed decisions to be made in carrying out the program for the development of the MGDS. To address the NWPA requirement that the information needed to support the siting and construction of repositories be identified, the Mission Plan included a hierarchy of generic issues derived from the applicable Federal regulations that define the requirements for the MGDS and that must be resolved to demonstrate that these requirements have been satisfied.

The issues hierarchy developed by the OGR for the MGDS and presented in this document is based on the issues-hierarchy concept presented in the Mission Plan. The OGR issues hierarchy presents the issues that the DOE will use to guide the development of SCPs and the conduct of site-characterization activities. These issues must be resolved to demonstrate compliance with applicable Federal regulations and to support site selection and licensing for an MGDS. Specific questions that may be identified during the licensing process and in the development of an EIS are encompassed by the general issue statements in the OGR issues hierarchy. The OGR issues hierarchy is limited to the issues related to the siting and licensing requirements of applicable Federal regulations and does not address the requirements of other regulations, functional or operating requirements for the MGDS, or requirements for the integration and the design/operational efficiency of the MGDS. Although the DOE believes that this document contains a comprehensive set of siting and licensing issues, this document will be revised as necessary during site characterization to encompass any additional issues that may arise.

The OGR issues hierarchy is a formal programmatic change-controlled document and is effective immediately. Its implementation will follow all standard procedures prescribed by the program's baseline procedure (see OGR/B-1). Any changes to this document must be made formally through the change-control procedure. It is to be implemented by the Project Offices in their preparation of SCPs and should specifically be incorporated into SCP Sections 8.1, 8.2, and 8.3.

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1. INTRODUCTION

The Office of Geologic Repositories (OGR) has adopted an issues hierarchy for use by all Project Offices. The issues hierarchy provides a framework for representing issues related to regulatory requirements for siting and licensing a mined geologic disposal system (MGDS) and for describing the work that needs to be completed during site characterization to resolve those issues. The issues in the issues hierarchy are defined as the questions relating to the performance of the MGDS that must be resolved to demonstrate compliance with the applicable Federal regulations (including 10 CFR Part 60, 10 CFR Part 960, 40 CFR Part 191, and 10 CFR Part 20).

The issues hierarchy is structured around four broad areas related to the requirements for siting and licensing an MGDS (postclosure performance; preclosure radiological safety; environment, socioeconomics, and transportation; and the feasibility and cost of MGDS development) and provides the framework for defining the information needed to satisfy the applicable regulatory requirements in each of these areas. As such, the issues hierarchy does not specify the requirements that the MGDS must satisfy but rather defines issues related to requirements for siting and licensing. The Generic Requirements for a Mined Geologic Disposal System (the GR, OGR/B-2) and the associated requirements documents prepared by the Projects specify the requirements that must be satisfied by the MGDS. The GR, in combination with the Project-level requirements documents, addresses all aspects of the MGDS, including siting and licensing. The issues hierarchy and the GR are linked by an issue-resolution strategy and a performance-allocation process (see Section 6) that leads to the identification of the system elements that will be relied on to resolve the issue by meeting the related regulatory performance objectives and design criteria.

The OGR issues hierarchy was developed to provide a common basis for all Project Offices to plan site-characterization activities. It will be used in preparing the SCP for each site to be characterized and in reporting the status of site-characterization activities in the semiannual progress reports. The specific use of this hierarchy for other purposes has not yet been defined by OGR.

The purpose of this document is to present the issues hierarchy, describe the rationale used to develop the hierarchy, and describe how the issues hierarchy is used in program planning. Section 2 presents the overall rationale for the issues hierarchy and explains the structure and the organization of the hierarchy. Section 3 presents the issues hierarchy itself, and Section 4 describes the basis for the development of individual issues. Section 5 provides a correlation between the issues and the applicable Federal regulations. Section 6 describes how the issues drive the development of plans in support of siting and licensing requirements through the use of an issue-resolution strategy that includes performance allocation.

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2. RATIONALE FOR THE DEVELOPMENT AND STRUCTURE OF THE ISSUES HIERARCHY

The issues hierarchy consists of three levels of detail: key issues, issues, and information needs. This structure provides a convenient means for distinguishing broad questions of overall suitability (key issues) from (1) more-specific questions (issues) about the characteristics of the site, the features of the design, and the performance of the system and (2) requirements for the basic information (information needs) used to answer the specific questions. The portion of the issues hierarchy presented in Section 3 of this document and intended for use by all Project Offices includes the key issues and the issues but does not include information needs. The information needs required to resolve each issue will be developed on a site-specific basis and will be fully presented in the individual SCPs and other program documents.

Key issues relate to broad-level technical or institutional requirements grouped into four topical areas relating to the overall performance of the mined geologic disposal system, as identified by the DOE siting guidelines, 10 CFR Part 960.

Issues are subordinate to key issues. Collectively, the group of issues under a key issue indicate what questions must be answered to satisfy the key issue. Taken together, the issues provide a conceptual outline to structure the resolution strategies for each key issue. The issues are derived, in part, from the technical guidelines of 10 CFR Part 960, from the performance objectives and design criteria of 10 CFR Part 60, and from the requirements of 40 CFR Part 191.

Information needs represent information required to resolve issues and form the third level of the hierarchy. Although generally similar for all sites, site-specific information needs will be developed for each candidate site. Additional levels may be used, as appropriate, to identify the lowest level of detail required.

The issues hierarchy presented in Section 3 is based on the issues-hierarchy concept presented in the Mission Plan (DOE/RW-0005, June 1985, Volume 1, Part II, Chapter 1). The key issues in the hierarchy have been adopted nearly verbatim from the key issues in the Mission Plan, and thus they are derived directly from the system guidelines in 10 CFR Part 960. The issues defined for each key issue in the hierarchy, taken together, are identical in overall scope with the issues in the Mission Plan, but the structure and specific wording of the issues are different. The issues under each key issue are grouped into performance issues and design issues.

Performance issues generally address questions regarding compliance with regulatory requirements that are related to the performance of the mined geologic disposal system. They generally relate directly to the highest level of regulatory requirements to be satisfied or findings that must be made. For example, there are performance issues that correspond to each of the post-closure performance objectives set forth in 10 CFR 60.112. Performance issues identify the information related to design, site characteristics, and performance assessments needed to address the regulatory requirements. Information about performance assessments is addressed directly by the performance issues;

information about design and site characteristics is addressed by the design issues and the characterization program, respectively.

Design issues address questions regarding compliance with regulatory requirements related to the design of the repository, the seals, and the waste package. Design issues may address the design criteria specified in 10 CFR 60.130 through 60.134, the requirements of the preclosure system and technical guidelines in 10 CFR 960.5-1 and 960.5-2, or the information required to support the resolution of the performance issues. Design issues identify the information about site characteristics that is needed for design purposes.

The characterization program will be developed to evaluate the site characteristics, processes, and events that may affect waste-package and repository design and performance. The program will address the detailed information on site characteristics that will be used to develop site descriptions and support the resolution of related design and performance issues, including the information needed to demonstrate compliance with 10 CFR Part 960 in support of site selection.

Thus, the performance and the design issues provide requirements (priorities) for the characterization program. The characterization program results in data for the analyses needed to address design and performance issues. A characterization activity will take place only if that activity is necessary to provide data for resolving an identified design or performance issue.

The wording of each issue in the hierarchy was chosen to reflect the identified interrelationships among the issues and the characterization program and, where practical, to explicitly tie the issue to the associated regulatory requirement(s) by citing the applicable regulation(s). Although the key issues and issues are intended to convey precisely the same meaning as the regulations, in some cases the terms used in an issue are not the same as the terms used by the regulations. These differences reflect differences between the definitions of terms used in various regulations and the definitions that the DOE has chosen to adopt in the Generic Requirements for a Mined Geologic Disposal System. The issues hierarchy in Section 3 uses terms from this baselined DOE document.

3. ISSUES HIERARCHY

KEY ISSUE 1: Will the mined geologic disposal system at [site name] isolate the radioactive waste from the accessible environment after closure in accordance with the requirements set forth in 40 CFR Part 191, 10 CFR Part 60, and 10 CFR Part 960?

PERFORMANCE ISSUES

ISSUE 1.1: Will the mined geologic disposal system meet the system performance objective for limiting radionuclide releases to the accessible environment as required by 10 CFR 60.112 and 40 CFR 191.13?

ISSUE 1.2: Will the mined geologic disposal system meet the requirements for limiting individual doses in the accessible environment as required by 40 CFR 191.15?

ISSUE 1.3: Will the mined geologic disposal system meet the requirements for the protection of special sources of ground water as required by 40 CFR 191.16?

ISSUE 1.4: Will the waste package meet the performance objective for containment as required by 10 CFR 60.113?

ISSUE 1.5: Will the waste package and the repository engineered barriers meet the performance objective for limiting radionuclide release rates as required by 10 CFR 60.113?

ISSUE 1.6: Will the site meet the performance objective for pre-waste-emplacement ground-water travel time as required by 10 CFR 60.113?

ISSUE 1.7: Will the performance-confirmation program meet the requirements of 10 CFR 60.137?

ISSUE 1.8: Can the demonstrations for favorable and potentially adverse conditions be made as required by 10 CFR 60.122?

ISSUE 1.9: (a) Can the higher-level findings required by 10 CFR Part 960 be made for the qualifying condition of the postclosure system guideline and the disqualifying and qualifying conditions of the technical guidelines for geohydrology, geochemistry, rock characteristics, climate changes, erosion, dissolution, tectonics, and human interference; and (b) can the comparative evaluations required by 10 CFR 960.3-1-5 be made?

DESIGN ISSUES

ISSUE 1.10: Have the characteristics and configurations of the waste packages been adequately established to (a) show compliance with the postclosure design criteria of 10 CFR 60.135 and (b) provide information for the resolution of the performance issues?

ISSUE 1.11: Have the characteristics and configurations of the repository and the repository engineered barriers been adequately established to (a) show compliance with the postclosure design criteria of 10 CFR 60.133 and (b) provide information for the resolution of the performance issues?

ISSUE 1.12: Have the characteristics and configurations of the shaft and borehole seals been adequately established to (a) show compliance with the postclosure design criteria of 10 CFR 60.134 and (b) provide information for the resolution of the performance issues?

KEY ISSUE 2: Will the projected releases of radioactive materials to restricted and unrestricted areas and the resulting radiation exposures of the general public and workers during repository operation, closure, and decommissioning at [site name] meet applicable safety requirements set forth in 10 CFR Part 20, 10 CFR Part 60, 10 CFR Part 960, and 40 CFR Part 191?

PERFORMANCE ISSUES

ISSUE 2.1: During repository operation, closure, and decommissioning (a) will the expected average radiation dose received by members of the public within any highly populated area be less than a small fraction of the allowable limits and (b) will the expected radiation dose received by any member of the public in an unrestricted area be less than the allowable limits as required by 10 CFR 60.111; 40 CFR Part 191, Subpart A; and 10 CFR Part 20?

ISSUE 2.2: Can the repository be designed, constructed, operated, closed, and decommissioned in a manner that ensures the radiological safety of workers under normal operations as required by 10 CFR 60.111 and 10 CFR Part 20?

ISSUE 2.3: Can the repository be designed, constructed, operated, closed, and decommissioned in such a way that credible accidents do not result in projected radiological exposures of the general public at the nearest boundary of the unrestricted area, or workers in the restricted area, in excess of applicable limiting values?

ISSUE 2.4: Can the repository be designed, constructed, operated, closed, and decommissioned so that the option of waste retrieval will be preserved as required by 10 CFR 60.111?

ISSUE 2.5: Can the higher-level findings required by 10 CFR Part 960 be made for the qualifying condition of the preclosure system guideline and the disqualifying and qualifying conditions of the technical guidelines for population density and distribution, site ownership and control, meteorology, and offsite installations and operations?

DESIGN ISSUES

ISSUE 2.6: Have the characteristics and configurations of the waste packages been adequately established to (a) show compliance with the preclosure design criteria of 10 CFR 60.135 and (b) provide information for the resolution of the performance issues?

ISSUE 2.7: Have the characteristics and configurations of the repository been adequately established to (a) show compliance with the preclosure design criteria of 10 CFR 60.130 through 60.133 and (b) provide information for the resolution of the performance issues?

KEY ISSUE 3: Can the mined geologic disposal system at [site name] be sited, constructed, operated, closed, and decommissioned and can the associated transportation system be sited, constructed, and operated so that the quality of the environment will be protected and waste-transportation operations can be conducted without causing unacceptable risks to public health or safety?

Note: The issues under key issue 3 will be identified after the EIS scoping hearings. The issues hierarchy will be amended at that time.

KEY ISSUE 4: Will the construction, operation (including retrieval), closure, and decommissioning of the mined geologic disposal system be feasible at [site name] on the basis of reasonably available technology and will the associated costs be reasonable in accordance with the requirements set forth in 10 CFR Part 960?

PERFORMANCE ISSUES

ISSUE 4.1: Can the higher-level findings required by 10 CFR Part 960 be made for the qualifying condition of the preclosure system guideline and the disqualifying and qualifying conditions of the technical guidelines for surface characteristics, rock characteristics, hydrology, and tectonics?

DESIGN ISSUES

ISSUE 4.2: Are the repository design and operating procedures developed to ensure the nonradiological health and safety of workers adequately established for the resolution of the performance issues?

ISSUE 4.3: Are the waste-package production technologies adequately established for the resolution of the performance issues?

ISSUE 4.4: Are the technologies of repository construction, operation, closure, and decommissioning adequately established for the resolution of the performance issues?

ISSUE 4.5: Are the costs of the waste packages and the repository adequately established for the resolution of the performance issues?

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4. BASIS FOR THE WORDING OF ISSUES

Regardless of the regulatory source of the issue, the wording of the issues presented in Section 3 was chosen to make the terminology consistent with that used in the GR to describe the components of the preclosure and the postclosure mined geologic disposal system (MGDS). Additional clarification regarding the rationale for the wording of specific issues is presented in this section on a case-by-case basis. Citations of applicable regulations are abbreviated as follows:

Regulation	Abbreviation
10 CFR Part 60	Part 60
Sections of Part 60	60.x
10 CFR Part 960	Part 960
Sections of Part 960	960.x
40 CFR Part 191	Part 191
Sections of Part 191	191.x

KEY ISSUE 1

Key issue 1 of the Mission Plan (DOE/RW-0005), revised to identify the site and include a citation to the postclosure requirements of Part 960; key issue 1 of the Mission Plan is derived directly from postclosure system guideline 960.4-1, which defines the general long-term performance requirements for the MGDS; the requirements of 960.4-1 are based on the technical criteria of Part 60, Subpart E, and the environmental standards of Part 191, Subpart B.

PERFORMANCE ISSUES

ISSUE 1.1

Overall system performance objective of 60.112 requiring conformance with applicable EPA standards for radionuclide releases to the accessible environment after permanent closure; the requirements of Part 191, Subpart B, of the final EPA standard are incorporated by inference; the containment requirements of 191.13 were the only applicable EPA standard for postclosure releases at the time 60.112 was written; future NRC rulemaking will conform Part 60 to specifically include the requirements of 191.13.

ISSUE 1.2

Individual protection requirements of 191.15; as presently written, the overall system performance objective of 60.112 requires conformance with the applicable EPA standards for postclosure releases to the accessible environment and therefore incorporates the requirements of Part 191, Subpart B, of the EPA standard by inference; future NRC rulemaking will conform Part 60 to specifically include the requirements of 191.15.

ISSUE 1.3

Ground-water protection requirements of 191.16; as presently written, the overall system performance objective of 60.112 requires conformance with the applicable EPA standards for postclosure releases to the accessible environment and therefore incorporates the requirements of Part 191, Subpart B, of the EPA standard by inference; future NRC rulemaking will conform Part 60 to specifically include the requirements of 191.16.

ISSUE 1.4

Performance objective for waste-package containment from 60.113.

ISSUE 1.5

Performance objective for the engineered-barrier system (NRC terminology) from 60.113, with the terminology revised to be consistent with the GR and indicate that the postclosure barriers of the MGDS being considered are the waste package and the repository engineered barriers.

ISSUE 1.6

Performance objective for the geologic setting (NRC terminology), with respect to the pre-waste-emplacement ground-water travel time, from 60.113.

ISSUE 1.7

Technical criteria from 60.137, linking design to the implementation of the performance-confirmation program required by Part 60, Subpart F; although the performance-confirmation program is conducted during the preclosure period, this issue is included under key issue 1 because it is required to provide assurance regarding postclosure performance.

ISSUE 1.8

Identifies need to address the siting criteria of 60.122.

ISSUE 1.9

Higher-level findings, as required by Part 960, Appendix III, with respect to the postclosure guidelines of Part 960 Subpart C; and comparative evaluations of alternative sites against these postclosure guidelines, as required by 960.3-2-4 according to the basis for such evaluations as specified in 960.3-1-5.

DESIGN ISSUES

ISSUE 1.10

Identifies need to address the postclosure design criteria of 60.135 for the waste package and provide information to support the resolution of related performance issues.

ISSUE 1.11

Identifies need to address the postclosure design criteria of 60.133 for the underground facility (NRC terminology), now identified as the repository and repository engineered barriers to be consistent with the GR, and provide information to support the resolution of related performance issues.

ISSUE 1.12

Identifies need to address the postclosure design criteria of 60.134 for shaft and borehole seals and provide information to support the resolution of related performance issues.

KEY ISSUE 2

Key issue 2 of the Mission Plan (DOE/RW-0005), revised to identify the site and include a citation to the preclosure requirements of Part 960; key issue 2 of the Mission Plan is derived from preclosure system guideline 960.5-1(a)(1), which requires compliance with the applicable radiological safety requirements of Part 20; Part 60, Subpart E; and the environmental standards of Part 191, Subpart A.

PERFORMANCE ISSUES

ISSUE 2.1

Issue 2.1 of the Mission Plan, which is derived from preclosure technical guideline 960.5-2-1, with citations of the applicable preclosure radiological safety requirements for members of the public in unrestricted areas from 60.111, Part 20, and Part 191, Subpart A.

ISSUE 2.2

Preclosure radiological safety requirements for workers, with citations of the applicable regulatory requirements of 60.111 and Part 20.

ISSUE 2.3

Identifies need to address preclosure accident releases; no regulatory citation is given, as the NRC has not undertaken a rulemaking to define the allowable accident releases during the preclosure period.

ISSUE 2.4

Identifies need to ensure retrievability as required by 10 CFR 60.111.

ISSUE 2.5

Higher-level findings, as required by Part 960, Appendix III, with respect to the preclosure guidelines of Part 960, Subpart D, for preclosure radiological safety; and comparative evaluations of alternative sites against these preclosure guidelines, as required by 960.3-2-4, according to the basis for such evaluations as specified in 960.3-1-5.

DESIGN ISSUES

ISSUE 2.6

Identifies need to address the preclosure design criteria of 60.135 for the waste package and provide information to support the resolution of related performance issues.

ISSUE 2.7

Identifies need to address the preclosure design criteria of 60.131 through 60.133 for the preclosure repository system and operations and to provide information to support the resolution of related performance issues.

KEY ISSUE 3

Key issue 3 of the Mission Plan (DOE/RW-0005), revised to identify the site and incorporate the term "mined geologic disposal system" as used in the GR; the waste-transportation system is identified separately from the MGDS. Key issue 3 is derived from preclosure system guideline 960.5-1(a)(2) for the environment, socioeconomics, and transportation.

KEY ISSUE 4

Key issue 4 of the Mission Plan (DOE/RW-0005), revised to identify the site and include a citation of the preclosure requirements of Part 960 and to include specific mention of retrievability, closure, and decommissioning with respect to feasibility and cost; key issue 4 of the Mission Plan is derived directly from preclosure system guideline 960.5-1(a)(3).

PERFORMANCE ISSUES

ISSUE 4.1

Higher-level findings, required by Part 960, Appendix III, with respect to the preclosure guidelines of Part 960, Subpart D, for the ease and cost of siting, construction, operation, and closure and comparative evaluations of alternative sites against these preclosure guidelines, as required by 960.3-2-4, according to the basis for such evaluations as specified in 960.3-1-5.

DESIGN ISSUES

ISSUE 4.2

Identifies the need to adequately characterize the nature and feasibility of the repository design and associated operating procedures needed to ensure the nonradiological health and safety of the workers in order to support the resolution of the related performance issue.

ISSUE 4.3

Identifies the need to adequately characterize the nature and availability of the technology to be used for waste-package fabrication in order to support the resolution of the related performance issue.

ISSUE 4.4

Identifies the need to adequately characterize the nature and feasibility of the technology to be used during repository construction, operation, closure, and decommissioning in order to support resolution of the related performance issue.

ISSUE 4.5

Identifies the need to adequately characterize the costs associated with waste package fabrication and repository construction, operation, closure, and decommissioning in order to support the resolution of the related performance issue.

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5. CORRELATION OF ISSUES WITH REGULATORY REQUIREMENTS

This issues hierarchy provides a unified, comprehensive framework for representing the regulatory requirements that must be satisfied to site and license a mined geologic disposal system. The connection between the issues and the regulatory requirements was described in general terms in the rationale for the wording of individual issues, as presented in Section 4. Figures 1, 2, and 3 provide a graphical correlation between each of the issues and specific regulatory requirements from 10 CFR Part 960, 10 CFR Part 60, 40 CFR Part 191, and 10 CFR Part 20.

The matrices indicate (with a solid circle), for each specific regulatory requirement, the performance or design issue(s) that, when resolved, will satisfy that regulatory requirement. Although there are numerous secondary interrelationships and support requirements among the issues that are not indicated on the matrices, these interrelationships will be identified and accounted for in the approach to issue resolution and performance allocation described in Section 6.

KEY ISSUE 1

Postclosure performance.

	REGULATIONS \ ISSUES	PERFORMANCE									DESIGN		
		1.1 RELEASES TO ACCESSIBLE ENVIRONMENT	1.2 INDIVIDUAL PROTECTION	1.3 GROUND-WATER PROTECTION	1.4 WASTE PACKAGE CONTAINMENT	1.5 RELEASE RATE	1.6 GROUND-WATER TRAVEL TIME	1.7 PERFORMANCE CONFIRMATION	1.8 NRC SITING CRITERIA	1.9 DOE GUIDELINE FINDINGS	1.10 WASTE PACKAGE	1.11 REPOSITORY	1.12 SEALS
10 CFR 960	960.3-1-6 SITE EVALUATIONS									●			
	960.4-1 POSTCLOSURE SYSTEM									●			
	960.4-2-1 GEOHYDROLOGY									●			
	960.4-2-2 GEOCHEMISTRY									●			
	960.4-2-3 ROCK CHARACTERISTICS									●			
	960.4-2-4 CLIMATIC CHANGES									●			
	960.4-2-5 EROSION									●			
	960.4-2-6 DISSOLUTION									●			
	960.4-2-7 TECTONICS									●			
	960.4-2-8 HUMAN INTERFERENCE									●			
10 CFR 60	60.112 SYSTEM PERFORMANCE OBJECTIVE	●											
	60.113 SUBSYSTEM PERFORMANCE OBJECTIVES				●	●	●						
	60.122 SITING CRITERIA								●				
	60.133 UNDERGROUND FACILITY DESIGN CRITERIA											●	
	60.134 SEAL DESIGN CRITERIA												●
	60.135 WASTE PACKAGE DESIGN CRITERIA										●		
	60.137 PERFORMANCE CONFIRMATION REQUIREMENTS							●					
40 CFR 191	191.13 CONTAINMENT REQUIREMENTS	●											
	191.15 INDIVIDUAL PROTECTION REQUIREMENTS		●										
	191.16 GROUND-WATER PROTECTION REQUIREMENTS			●									

NOTE:

THE SYMBOL ● MEANS THAT RESOLUTION OF THE INDICATED ISSUE(S) WILL SATISFY THE INDICATED REGULATORY REQUIREMENT

Figure 1. Correlation of issues to regulations for key issue 1

KEY ISSUE 2

Preclosure radiological safety.

	REGULATIONS \ ISSUES	PERFORMANCE					DESIGN	
		2.1 PUBLIC SAFETY DURING NORMAL OPERATION	2.2 WORKER SAFETY	2.3 PUBLIC SAFETY DURING ACCIDENTS	2.4 RETRIEVABILITY	2.5 DOE GUIDELINE FINDINGS	2.6 WASTE PACKAGE DESIGN	2.7 REPOSITORY DESIGN
10 CFR 960	960.5-1 PRECLOSURE SYSTEM — RADIOLOGICAL SAFETY					●		
10 CFR 960	960.5-2-1 POPULATION					●		
10 CFR 960	960.5-2-2 SITE OWNERSHIP					●		
10 CFR 960	960.5-2-3 METEOROLOGY					●		
10 CFR 960	960.5-2-4 OFFSITE INSTALLATIONS					●		
10 CFR 60	60.111 RADIOLOGICAL PROTECTION AND RETRIEVABILITY	●	●		●			
10 CFR 60	60.131 GENERAL DESIGN CRITERIA							●
10 CFR 60	60.132 SURFACE FACILITY DESIGN CRITERIA							●
10 CFR 60	60.133 UNDERGROUND FACILITY DESIGN CRITERIA							●
	60.135 WASTE PACKAGE DESIGN CRITERIA						●	
	40 CFR 191, Subpart A STANDARDS FOR MANAGEMENT	●						
	10 CFR 20 RADIATION PROTECTION STANDARDS	●	●					

NOTE:
THE SYMBOL ● MEANS THAT RESOLUTION OF THE INDICATED ISSUE(S) WILL SATISFY THE INDICATED REGULATORY REQUIREMENT

Figure 2. Correlation of issues to regulations for key issue 2.

KEY ISSUE 4

Ease and cost of development.

REGULATIONS \ ISSUE	PERFORMANCE: 4.1 GUIDELINE FINDINGS	PERFORMANCE: 4.2 NON-RADIOLOGICAL WORKER SAFETY	PERFORMANCE: 4.3 WASTE PACKAGE PRODUCTION	DESIGN: 4.4 ADEQUACY OF TECHNOLOGY	DESIGN: 4.5 COSTS
10 CFR 960: 960.5-1 PRECLOSURE SYSTEM — EASE AND COST	●	●	●	●	●
960.5-2-8 SURFACE CHARACTERISTICS	●			●	●
960.5-2-9 ROCK CHARACTERISTICS	●			●	●
960.5-2-10 HYDROLOGY	●			●	●
960.5-2-11 TECTONICS	●			●	●

NOTE:

THE SYMBOL ● MEANS THAT RESOLUTION OF THE INDICATED ISSUE(S) WILL SATISFY THE INDICATED REGULATORY REQUIREMEI

Figure 3. Correlation of issues to regulations for key issue 4.

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6. ISSUE-RESOLUTION STRATEGY AND THE PERFORMANCE-ALLOCATION PROCESS

The OGR issues hierarchy provides a common framework to be used by all DOE Project Offices in planning and conducting site characterization activities supporting site selection and licensing. The rationale for systematic resolution of the issues in this hierarchy is presented in a generic "issue-resolution strategy" developed and agreed to by Headquarters and the Project Offices. Since the issues are derived from the applicable regulations, identification of the information needed to resolve these issues facilitates identification and planning of the work that needs to be done to demonstrate compliance with the regulatory requirements. The issue-resolution strategy provides a step-wise procedure for identifying and planning the work needed to support resolution of the issues.

General Application

As shown in Figure 4, the issue-resolution strategy includes up to 12 separate steps, depending on the type of issue, and includes the concept of performance allocation. The overall strategy is based on the identification of regulatory requirements (step 1) and the preparation of a formal description of a proposed mined geologic disposal system (step 1a). This information is used to define the issues in the issues hierarchy (step 2). Next, a "licensing strategy" (step 3) is developed for each individual issue; it determines how the components of the MGDS will be relied on during licensing to demonstrate compliance with the regulatory requirements. Using the information available at the time the strategy is being developed (or revised), a statement identifying the site features, engineered features, conceptual models, and analyses that are expected to be relied on in resolving the issue is developed for planning purposes. This statement, relating to the strategy for the resolution of a single issue, is called a "licensing strategy," because, when combined with the strategies developed for all other issues, it establishes the basis for the plans to be followed in demonstrating compliance with regulatory requirements, eventually supporting the DOE's selection of a site for the development of a repository and the NRC's requirements for approving construction, operation, closure, and license termination for a repository. In the initial stages of site characterization, this plan will necessarily be based on a preliminary definition of licensing strategies. These strategies will guide the development of the programs for testing and analysis, however, and will help to make clear what tests and analyses are necessary to support the resolution of the issues. As the characterization of candidate sites proceeds and better information becomes available, the licensing strategies will be refined, as needed, to better support the site-selection and licensing requirements.

The licensing-strategy step and the next three steps define the performance-allocation process. Performance allocation entails deciding which system elements will be relied on in resolving an issue, identifying the functions that the elements will be expected to perform, and the processes that will affect the performance of each element, identifying and assigning specific quantitative goals to measures and parameters that represent the expected performance, and developing a testing program to obtain the information relevant to the identified parameters. The development of a licensing strategy (step 3 of Figure 4) is the first step in the performance-allocation process

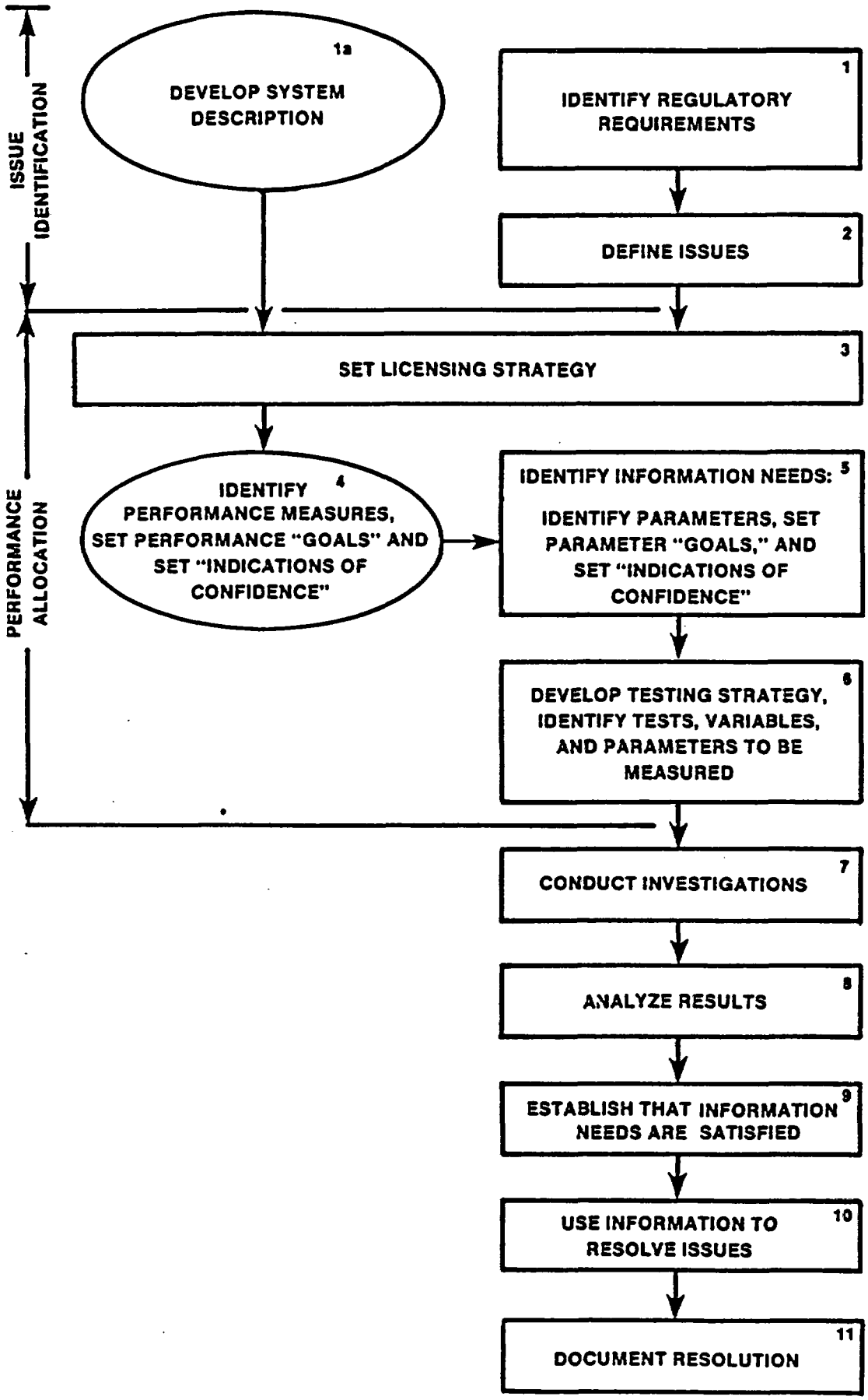

Figure 4. Issue-resolution strategy.

Steps 4 through 6 can be described as expressing the licensing strategy in certain specifically defined terms and using those expressions to continue the development of information needs for each issue in the hierarchy and to derive an explicit, detailed statement of the strategy and objectives of the test program needed to support the resolution of the issue. The tests themselves are defined in step 6 once the information and parameter needs have been identified for all issues and consolidated into nonredundant lists of the requirements for each area of testing or analysis. Steps 4 through 6 may be iterative in that the identification of the requirements for one step may reveal a need for changes in a preceding step or even in the licensing strategy.

After the performance-allocation process has been completed, the remaining steps include the conduct of the investigations (step 7) and performance of the analyses and evaluations needed to support issue resolution (step 8). In step 9 the results of the investigations and analyses are used to establish whether the information needs have been satisfied. Once this determination has been made, the information is employed to demonstrate issue resolution (step 10), and the resolution process is documented (step 11).

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