
Nuclear Waste Policy Act
(Section 113)



Site Characterization Plan

***Yucca Mountain Site, Nevada Research
and Development Area, Nevada***

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Chapter 8, Section 8.1, Rationale

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8.1 RATIONALE FOR THE SITE CHARACTERIZATION PROGRAM

The site characterization program and Chapter 8 follow two organizing principles. The first is the issues hierarchy, which states the questions the DOE feels must be resolved about the performance of the mined geologic disposal system (i.e., the waste package, the engineered repository, and the natural system at the site) to demonstrate compliance with the applicable Federal regulations. The second principle is a general procedure, or "strategy," for determining how those issues are to be resolved. This general strategy can be used to develop a specific strategy for the resolution of each issue. One step in the application of the specific strategies results in the identification of the site information needed to support the resolution of the issues. An understanding of these principles is helpful in following the discussions in the rest of this document; this section therefore discusses them briefly.

8.1.1 THE ISSUES-BASED APPROACH TO PLANNING SITE CHARACTERIZATION

The issues hierarchy states questions about the performance of the disposal system and identifies the information that must be known before a site can be selected and licensed. It is based on the issues-hierarchy concept presented in the Mission Plan (DOE, 1985b). The discussion that follows explains the derivation, structure, scope, and objectives of the issues hierarchy. More information can be found in the Issues Hierarchy for a Mined Geologic Disposal System (DOE, 1986d).

8.1.1.1 Derivation, structure, and scope

The issues hierarchy is a three-tiered framework consisting of key issues, issues, and information needs. On the first, or highest, tier there are four key issues, which embody the principal requirements established by the regulations governing geologic disposal. Each of the key issues is followed, in the second tier, by a group of several issues that expand on the requirements stated in the key issue they represent. The third tier consists of still more detailed sets of information called the "information needs"--one set for each issue. This framework provides a convenient means for distinguishing broad questions of overall performance and suitability (key issues) from more specific questions about the characteristics of the site, the design of the repository and the waste package, and the performance of the total geologic disposal system. It also distinguishes the key issues and issues from requirements for the basic information needed to resolve the issues.

The issues hierarchy, then, defines issues that must be resolved to demonstrate compliance with key regulatory requirements. Other, detailed requirements that the disposal system must satisfy, such as functional requirements, are included in the specifications given in the Generic Requirements for a Mined Geologic Disposal System (DOE, 1986c), the Waste Management System Requirements and Descriptions (DOE, 1986f), and in the requirements document that will be issued for a repository at the Yucca

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Mountain site. As the definition of requirements progresses, the requirements and the issues hierarchy will be compared and correlated to ensure consistency and completeness in each. The role of the system requirements and descriptions in the issue resolution strategy is described in Section 8.1.2.

The information needs supporting the key issues and issues have been developed. The entire issues hierarchy for the Yucca Mountain site is presented in Section 8.2.1.1. Although care has been taken to ensure that this issues hierarchy contains a comprehensive list of siting and licensing issues, it will be revised as necessary during site characterization to encompass any additional issues that may arise.

Key issues

The key issues embody the principal requirements established by the regulations governing repositories and have been adopted nearly verbatim from the key issues in the Mission Plan. They are stated as questions that must be answered affirmatively if a site is to be selected for development, licensing. The key issues are derived from the four system guidelines of the DOE siting guidelines promulgated in 10 CFR Part 960 and are, therefore, concerned with (1) the performance of the repository system after closure; (2) radiological safety before closure; (3) the environmental, socioeconomic, and transportation impacts of the repository; and (4) the ease and cost of repository siting, construction, operation, and closure.

Key Issue 1 (postclosure performance) is derived directly from the post-closure system guideline (10 CFR 960.4-1), which defines the general long-term performance requirements for the disposal system as a whole. These performance requirements reflect the general objectives of protecting the health and safety of the public and the quality of the environment; they are based specifically on the standards promulgated by the Environmental Protection Agency (EPA) in Subpart B of 40 CFR Part 191, and adopted by the Nuclear Regulatory Commission (NRC) of 10 CFR Part 60.

Key Issue 2 (preclosure radiological safety) is derived from the preclosure system guideline (10 CFR 960.5-1(a)(1)). It requires compliance with the applicable requirements of the EPA standards in Subpart A of 40 CFR Part 191, and the NRC criteria in 10 CFR Part 60 and 10 CFR Part 20. Because compliance with these regulatory requirements depends mainly on the design and operating procedures of the repository rather than on the geologic characteristics of the site, not all aspects of Key Issue 2 are directly addressed in the site characterization plan (SCP). Little information from the site characterization program is required for the resolution of Key Issue 2. Instead most of the information needed to resolve this issue will be obtained from design studies for the repository and the waste package and from studies conducted concurrently with site characterization. (Plans for such studies will be presented in an environmental program plan and a repository design plan for the Yucca Mountain site.)

Key Issue 3, which is concerned with the environmental, socioeconomic, and transportation impacts associated with a repository, is derived from the preclosure system guideline (10 CFR 960.5-1(a)(2)). The resolution of this issue does not directly depend on information from site characterization

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activities and, therefore, this key issue is not addressed in the SCP. The information needed to resolve this issue will be collected during the environmental and socioeconomic investigations performed concurrently with site characterization. Plans for these studies will be presented in environmental and socioeconomic program plans, prepared concurrently with the SCP.

Key Issue 4 (the ease and cost of repository siting, construction, operation, and closure) is derived from the preclosure system guideline (10 CFR 960.5-1(a)(3)). The requirements of this issue are derived from those of the referenced preclosure system guideline, which requires that the technical feasibility and cost of repository siting, construction, operation, and closure be evaluated in light of the site characteristics and related design requirements. The resolution of this issue depends in part on site conditions and in part on information that can be developed independently of the description of site conditions. Plans to acquire this independent information will be presented in a repository-design plan; these plans are not presented in this SCP, because the activities they describe do not fall within the definition of site characterization in the Nuclear Waste Policy Act (NWPA, 1983).

Matrices that correlate each issue with specific regulatory requirements are presented in Section 8.2.1.2, which also discusses the relationship of the issues hierarchy to other sets of issues--for example, those proposed by the NRC in the draft issue-oriented site technical positions.

Issues

The issues defined for each key issue are also stated as questions (Section 8.2.1.1). When each group of issues was constructed, an effort was made to include in the group all the questions that must be answered to resolve the key issue. Taken together, the issues, therefore, provide a conceptual strategy for resolving each key issue. The issues defined for each key issue are identical in overall scope to the issues in the Mission Plan, but the structure and the wording are different. The issues are derived, in part, from the DOE siting guidelines of 10 CFR Part 960, from the NRC performance objectives and design criteria of 10 CFR Part 60, and from the EPA requirements of 40 CFR Part 191.

To accommodate the structure and the intent of the regulations in 10 CFR Part 60 and 10 CFR Part 960, the issues are divided into performance issues and design issues. The NRC criteria in 10 CFR Part 60 clearly make a distinction between performance objectives and design criteria; though obviously related, performance objectives and design criteria have different purposes and must be addressed from different perspectives.

The performance issues generally address questions about compliance with regulatory requirements for the performance of the disposal system. They are generally related directly to the highest level of regulatory requirements to be satisfied. For example, there are performance issues that correspond to each of the postclosure performance objectives stated in 10 CFR 60.113. There are also performance issues that correspond to the requirement to make higher-level findings for the postclosure guidelines and for each set of preclosure guidelines in 10 CFR Part 960.

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The design issues address questions about the design of the repository, the shaft and borehole seals, and the waste package. They address the design criteria specified in 10 CFR 60.130 through 60.135, the design-related considerations of preclosure guideline 10 CFR 960.5-1(a)(3), and information required to support the resolution of performance issues.

The resolution of both the performance and the design issues requires information about the site, and to provide this information the site program described in Section 8.3.1 has been developed. This program will evaluate the site characteristics, processes, and events that may affect the design and the performance of the waste package and the repository; the results will provide the detailed site information that will be used to develop site descriptions and to support the resolution of design and performance issues, including the demonstration of compliance with the siting guidelines. The site program is organized by technical discipline (e.g., geohydrology, geochemistry, and rock characteristics), and it provides a means of controlling and integrating the investigations in each technical discipline.

The relationship among the two categories of issues and the site program can be summarized as follows: the performance and the design issues establish requirements and priorities for the site program, while the site program produces data for the analyses needed to address design and performance issues. An investigation or other type of activity in the site program will take place only if it is necessary to provide information needed to resolve a design or a performance issue.

Information needs

On the third tier of the issues hierarchy is a set of statements called "information needs." Unlike the key issues and issues, the information needs are stated as requirements for technical information rather than as questions. In developing the information needs, an attempt was made to list the categories of information needed for resolving the issues. In principle, then, acquiring all the information called for at the third tier of the hierarchy will allow all the issues to be resolved through analyses and evaluations that use the information. If the issues are resolved affirmatively, the key issues will also have been resolved.

Site-specific information needs for the Yucca Mountain site have been identified and are listed in Section 8.2.1.1.

8.1.1.2 Application in the site characterization plan

The issues hierarchy, which is presented in Section 8.2.1.1, is useful in the SCP because it is a framework for developing the site characterization program described in Section 8.3 and for explaining why the proposed program is adequate and necessary. In simple terms, the site characterization program will be adequate if it addresses all the information needs in the third tier of the issues hierarchy. And the necessity for any particular planned study can be established by determining its role in supplying an information need. For these reasons, the issues hierarchy in Section 8.2.1.1 is used as

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an organizing principle for many parts of the SCP. In particular, Section 8.3, which describes the characterization program, is organized around the investigations and studies that are required to satisfy the information needs in the issues hierarchy. The defining of these issues was itself a part of the issues-based approach to site characterization described in this section and the issue resolution strategy described in the next section.

8.1.2 ISSUE RESOLUTION STRATEGY

To resolve the issues in the issues hierarchy, the DOE has adopted a general "issue resolution strategy" that guides the development of specific plans for resolving each issue. This general strategy is a procedure consisting of four distinct processes: issue identification, performance allocation, data collection and analysis, and issue resolution documentation. The steps in these processes are outlined in Figure 8.1-1. The first two processes, applied separately to each issue, lead to the identification of the information necessary to resolve the issue and the development of plans for acquiring that information. The reasoning used in carrying out those two processes is, then, the basis for the rationale for the particular site characterization activities that are intended to resolve the issue. The rationale and the plans for these activities are described in Sections 8.2 and 8.3. An understanding of the general issue resolution strategy is important for understanding these four steps and the site characterization program presented in Section 8.3.

8.1.2.1 Issue identification

The first process in the issue resolution strategy, labeled "issue identification" in Figure 8.1-1, consists of three steps. Two of these steps (1 and 2) are the development of the issues hierarchy itself. Step 1 identifies the regulatory requirements; from them the issues are derived (step 2), as explained in Section 8.1.1. The plans for resolution of each issue will be affected by the current understanding of the site. Therefore, a step (step 1a) is needed to describe to the extent to which it is known. In this step conceptual models and working hypotheses for the site are identified and preliminary designs for these concepts are specified. This description for a repository system at the Yucca Mountain site will be presented in site-specific requirements and system-description documents.

8.1.2.2 Performance allocation

The second process in the strategy, called "performance allocation," consists of the steps that provide the rationale for the establishment of particular site characterization activities. In the issue resolution strategy the term "performance allocation" refers only to the four steps, steps 3 through 6, shown in Figure 8.1-1. Applied separately to each issue in the hierarchy, this process produces the principal guidance for planning the activities needed to resolve the issue. The performance-allocation concept

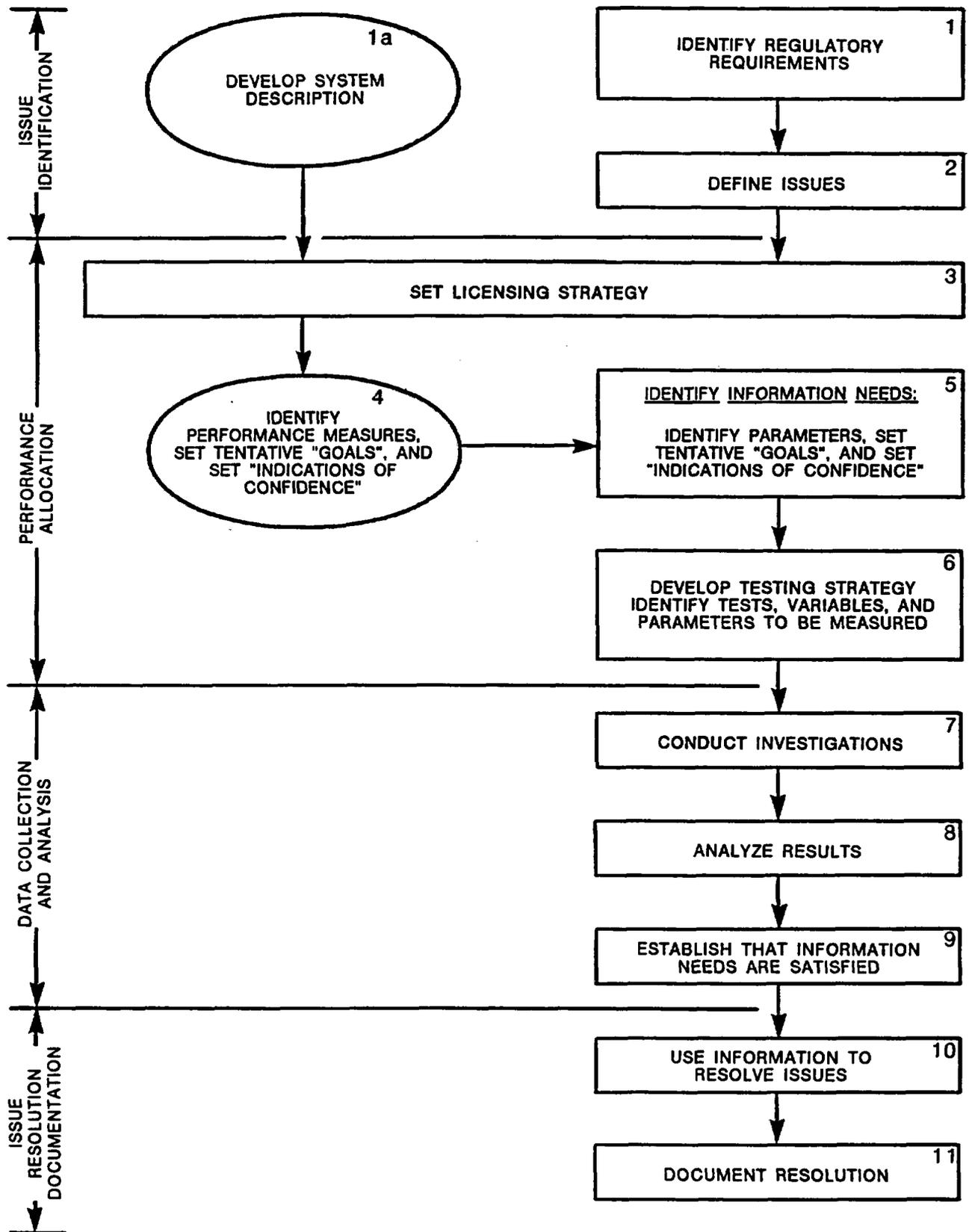


Figure 8.1-1. Issue resolution strategy.

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was developed in open meetings between the DOE and the NRC and documented in the minutes of those meetings.

Licensing strategy

For each issue, the first step in performance allocation (step 3 in Figure 8.1-1) is the adoption of a "licensing strategy." This step uses available information to develop, for planning purposes, a statement of the site features, engineered features, conceptual models, and analyses that the DOE expects to be important in resolving the issue. The statement is called a licensing strategy because the combined statements developed in step 3 for all the issues are the basis for the current DOE plans to show compliance with regulatory requirements. Eventually, information developed from the current plans is intended to support the recommendation of a site for development and the demonstration of compliance with NRC requirements for the construction, operation, closure, and decommissioning of a repository.

In this document, the licensing strategy is necessarily preliminary because site characterization is only beginning. But the strategy is developed well enough to guide the preparation of the plans for tests and analyses and to make clear what activities are considered to be necessary and whether they will be sufficient to resolve the issue. As site characterization proceeds and additional information becomes available, the licensing strategy may be revised. In fact, the licensing strategies described in this document are likely to change before the submission of the license application to the NRC; for the purposes of this SCP, they are simply the basis for initial planning.

For guiding the development of the SCP, the principal product of step 3 is a statement of the disposal-system components on which the DOE currently intends to rely in resolving the issue; if these components perform as the licensing strategy indicates they are expected to perform, the issue is likely to be resolved. The statement may also identify, for each of the components, specific features or characteristics that the DOE expects will contribute to the performance of the component and, hence, to the resolution of the issue. The performance and design issues provide the statement of disposal-system components for use in later steps as a basis for deciding what specific information is needed for resolving the issue.

Performance measures and tentative goals

Step 4 carries the strategy further by establishing "performance measures" for each of the components identified in step 3. A performance measure is a physical quantity that describes the performance of the component. The measure may be a directly measurable quantity, or it may be a quantity derived from other, more directly measurable quantities.

For each performance measure, step 4 establishes a tentative "goal." The word "goal" is enclosed within quotation marks in Figure 8.1-1 to show that it has a special meaning in performance allocation. The tentative goal is not a target that the performance measure must attain if the repository is to perform properly, and therefore it does not have to be met. Instead, it is simply a guide for the development of a testing program--a guide that states the licensing strategy quantitatively and can be changed or discarded

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once the testing program has been established. In assigning goals to the performance measures, the DOE will specify values that are consistent with the licensing strategy for the issue. If the tests and analyses can demonstrate that a goal is attained, the licensing strategy for the issue will be satisfied, and the issue will likely be resolved. The goals are, therefore, guides for deciding, in the later steps of performance allocation, what information must be provided by the testing program. Whenever a goal is identified, the reasoning that led to its selection is also presented.

As a further guide for testing, step 4 accompanies each tentative goal with an "indication of confidence," a statement that further clarifies the role of the component in the licensing strategy. The indication of confidence expresses, as quantitatively as possible, the confidence with which the licensing strategy desires the testing program to show that the goal has been attained.

For some goals, it is possible to use statistically rigorous numerical values as indications of confidence; for most of them, however, only a qualitative expression is now possible. When qualitative indicators are assigned, they are accompanied by further explanation of their intended meaning.

Because they depend on a licensing strategy that is preliminary, the goals and indications of confidence are also preliminary. As site characterization progresses and more information is acquired, these goals and indicators will probably be changed to guide continued testing toward the collection of the needed information.

Information needs

The performance allocation process now proceeds to develop specific requirements for future work. Step 5 identifies "information needs," which state, for each issue, the categories or types of information needed to resolve the issue. The information needs identified for the Yucca Mountain site are listed in Section 8.2. Section 8.3 explains how these information needs were derived from the licensing strategy developed earlier in the performance allocation process.

Part of the development of an information need is the identification of the "parameters" needed to evaluate the performance measures. As already mentioned, many performance measures (e.g., the time of ground-water travel through a particular geohydrologic unit) are not directly measurable quantities. Often, however, they can be expressed by an equation in which quantities that can be measured more directly appear as parameters (e.g., hydraulic conductivity). Step 5 furthers the development of plans for testing by listing these parameters. Sometimes the performance measures cannot be expressed simply as an equation containing associated parameters; then in step 5, by an extension of the notion of mathematical parameters, lists are made of whatever quantities must be measured to demonstrate that the goal associated with the performance measure has been met. The performance allocations reported in later sections of this chapter call these quantities, as well as the quantities derived from rigorous equations, "parameters." Parameters derived for the resolution of design issues are usually called "design parameters"; those for performance issues are "performance parameters."

In step 5 a tentative goal is assigned to each parameter. Like the goals for performance measures, these goals are not values that must be achieved by the disposal system. They are simply quantitative statements about the values that the licensing strategy expects to use for the parameters in showing that the issue has been resolved. Frequently, the goals are expressed as inequalities because the licensing strategy may require only that the value of a parameter be shown to lie within a stated range or to be greater or smaller than some stated value.

If the results of site characterization can successfully demonstrate that the tentative goal has been met, the DOE plans for getting a license will be fulfilled as far as that parameter's contribution to the associated performance measure is concerned. The demonstration will not, of course, guarantee a successful license application because many other parameters will enter the calculations in support of the license. Moreover, failure to meet the goal would not be reason to suspect that the license application will be unsuccessful because the goals are not values that, by themselves, are essential to the performance of a disposal system. The reason for setting the goals is simply to guide the specification of tests in the characterization program--to tell quantitatively what information will lead to the resolution of the performance and the design issues.

As a further guide to the detailed specification of tests, step 5 also specifies two indications of confidence for the goal assigned to each parameter. Like the indicators for goals for performance measures, these indicators are not numerically rigorous but are expressed in qualitative terms: high, medium, and low.

The first of these two indications, called "needed confidence" in the performance allocation tables in this chapter of the SCP, answers the following question: When the DOE presents its license application, how confident must it be that the goal has been met? In other words, what confidence does the licensing strategy require for the demonstration that the goal has been met? In assigning the indicators of needed confidence, the DOE is guided primarily by two considerations:

1. Importance. How important to the licensing strategy is the associated goal? Usually the goal is so important that a value of "high" is assigned to the needed confidence. When the goal is a request for information that is not crucial to the license application, an assignment of low or medium confidence is usually appropriate.
2. Sensitivity of the parameter associated with the goal. In addition to considering the importance of a goal, the DOE may examine the sensitivity with which the associated parameter contributes to performance measures and other parameters. If a performance measure or another parameter is highly sensitive to the likely or expected variations in the parameter for which a goal is assigned, the needed confidence may be higher than it would be for a parameter whose variations make little difference.

The second indication of confidence, called "current confidence" in the performance allocation tables, answers the following question: If the DOE were

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to present its license application today and could use only currently available data in the presentation, how confident would it feel that the associated goal has been met? In assigning the indicators of current confidence, the DOE is guided by considering the amount and the quality of the available data and the uncertainties in any models used to interpret those data.

Testing strategy

Step 6 in Figure 8.1-1 uses the information needs, expressed in the terms adopted during step 5, to define the work that will produce the needed information. The parameters derived in step 5 are usually not directly measurable quantities, but must be derived from other quantities that can be measured through testing. For example, hydraulic conductivity, mentioned previously as a possible parameter for calculations of ground-water travel time, is not directly measurable in a field test. Step 6, then, identifies additional, more directly measurable, quantities that can contribute to determining values for the performance and design parameters derived in step 5. These additional quantities are generally called "characterization parameters." Some of the SCP sections describing the site program also use other kinds of parameters, called by different names, in explaining how characterization parameters are being developed.

Step 6 also defines a "testing basis," whose purpose is to give further information about the way in which the characterization parameters need to be measured. Some of the testing bases appearing in the later sections of this chapter describe the accuracy with which the associated characterization parameters need to be measured; some describe the confidence that the measurements should produce for licensing. As the later sections explain, the particular descriptions of a testing basis are tailored to the parameters they explain and to the development status of those parameters.

The parameters, confidences, and testing bases are the foundation for the strategy detailed in Section 8.3 in the descriptions of the planned site characterization work. That section describes the planned tests; it identifies the experimental variables and the parameters (from steps 5 and 6) that the tests will measure. It also describes plans for developing the needed analytical models and design information.

Conceptual model uncertainties

The performance allocation approach relies heavily on the current conceptual models of the site to set the licensing strategies, to identify performance measures, to set tentative performance goals and indications of confidence, and to identify information needs. Therefore, it is also important that the site characterization program address the uncertainties in these conceptual models. The investigations to test the conceptual models that have significant uncertainties are described in the characterization programs in Section 8.3. Detailed tables are presented in the discussion of these programs that identify the conceptual models of concern, the uncertainties in these conceptual models, the significance of these uncertainties relative to the resolution of the performance and design issues, alternative hypotheses consistent with existing data, and the planned activities to address the uncertainties.

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8.1.2.3 Data collection and analysis

The data collection and analysis process of the issue resolution strategy will continue after issuance of the SCP. The steps in this process are to conduct the investigations dictated by the testing strategies in the SCP, to analyze the results of these investigations, and to check that the information obtained satisfies the information needs in these strategies. These are steps 7, 8, and 9 of the issue resolution strategy of Figure 8.1-1.

The review establishing whether the information needs are satisfied (step 9) involves a comparison of the data with the goals established in the testing strategy and an evaluation of the usefulness of additional testing. Therefore, this review provides the technical information for the decision to continue or terminate testing.

The process associated with the determination if the data are sufficient is suggested in the logic diagram shown in Figure 8.1-2. The three steps of this process (steps 7, 8, and 9) are also noted in this diagram.

Two fundamental premises should be mentioned before the steps in the process are discussed. First, a full performance assessment cannot be conducted after each study to determine if the information obtained is sufficient to resolve issues. The site characterization program is extremely complex and comprehensive. While many of the critical elements needed for the full performance assessments will be completed early, others that will be needed will not be completed until much later, and some not until the end of site characterization. To wait until the complete set of information is available to evaluate the testing is not prudent. Therefore, elements of this program will be evaluated individually with respect to adequacy of the information obtained without resorting to full performance assessments. Part of this evaluation will involve some analysis. The extent of such analysis is discussed below.

The second premise behind the data collection process is that the investigations specified in the SCP define all the testing needed to confirm the conceptual models and hypotheses serving as the basis for the current licensing strategies. That is, if all of these models and hypotheses are indeed confirmed, the testing dictated in the testing strategies should be sufficient to resolve all the performance and design issues. However, it is not likely that all of these hypotheses, most of which are based on preliminary information, will be confirmed. Therefore, it is expected that some of the conceptual models for the site will be modified as a result of the site characterization, and that the strategies may need to change. Accordingly, analysis of the results of the testing will be conducted as the testing proceeds to determine if the investigations set forth in the SCP need to be completed or if the testing strategies need to be modified.

Therefore, the first steps in the process are to initiate the studies under the various investigations (step 7) and to conduct analyses as the data become available (steps 8a and 8b). For the purpose of deciding if the data are sufficient, the principal result of these analyses is an estimate of the confidence that the particular parameter goals specified for the study are met. This estimate will depend not only upon the uncertainties in those parameters, but also the uncertainties in the models and hypotheses upon which

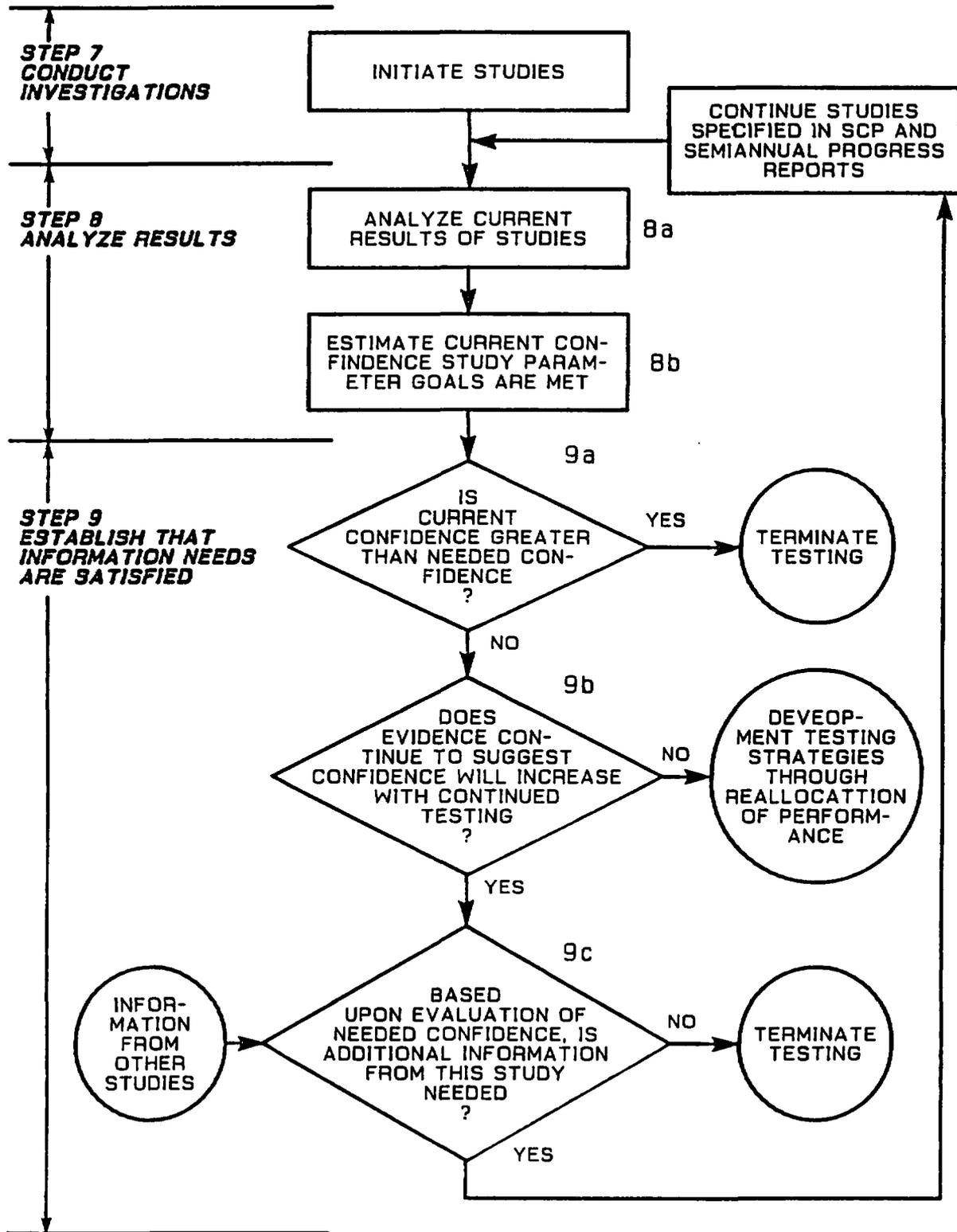


Figure 8.1-2. Data collection and analysis process.

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the parameters are based, and these uncertainties must be taken into account in making the estimates. In some cases, the estimates may be quantitative; but in many cases judgment, supported with appropriate documentation, will be the principal basis for the estimates. All reviews and documentation will be performed in accordance with established quality assurance procedures as described in Section 8.6.

The current confidence in the parameter goals will be compared with the needed confidences expressed in the SCP and the semiannual progress reports (step 9a). Because the needed confidences are qualitative and subjective in many cases, this comparison will also require judgment and technical review. If it is concluded that the needed confidences are exceeded, the testing can be terminated.

It may not be possible to conclude that the needed confidences have been achieved, and in most cases, the testing would then continue until the next review or even until the full set of tests specified in the SCP has been completed. However, there are conditions under which such testing may be terminated without increasing the confidence that the parameter goals are met. One such condition is indicated in step 9b; in this case, information from the testing program may suggest that additional testing will not increase the confidence. For example, it may be discovered that site characteristics are actually much different than originally thought and that there is now a high confidence that the original goals will not be met. In this case, the testing associated with this strategy would be terminated and new strategies could be developed, consistent with the new information. Any new strategies would be reported in the semiannual progress reports.

Another condition, illustrated in step 9c of the logic diagram, is the case in which information from other studies may suggest that the information from the testing being evaluated is less important than originally thought; that is, the needed confidence is less than originally proposed. In this case, the testing may also be terminated. Because such a decision will usually involve judgment, the basis for such a decision will also be technically reviewed. This review will be conducted both at the technical level and at the management level of DOE and its contractors. The final review and acceptance of the need for continuing testing will be reviewed and approved by DOE program management.

The review of the data collection and analysis process will involve judgments at three levels of detail: the study level, the investigation level, and the issue level. The judgments at the study level involve the technical evaluations of the current confidence that the parameter goals are met (step 9a of the logic diagram) and the evaluation of whether the current confidence can be increased by additional testing (step 9b). On the basis of these technical evaluations, recommendations are made to continue the testing program or to terminate some of the testing.

There is a level of both technical and management judgment at the investigation level to ensure that the objectives of the investigations are met and that the information needs are being satisfied. For example, recommendations to terminate testing because of the technical considerations at the study level will be reviewed from both a technical and management perspective to ensure that the investigation objectives are not jeopardized by such an

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action. In addition, the information from all of the studies is reviewed at the investigation level to determine if information from particular studies is no longer needed and whether those studies should be terminated as a result (step 9c of the logic diagram).

Finally, there is a level of management judgment at the issue level to ensure that proper steps are being taken for issue resolution. The recommendations made at the study level, which are considered to be consistent with the objectives of the investigations, and the recommendations made at the investigation level to extend or curtail any of the testing originally planned will be reviewed at the issue level by DOE technical management for this purpose. This review will address the adequacy of the information obtained in the site characterization program with regard to issue resolution and will consider the concerns of outside organizations, such as the NRC, in this regard.

8.1.2.4 Issue resolution documentation

The purpose of the issue resolution documentation process of the issue resolution strategy is to use the information obtained from site characterization to determine if there is sufficient data to support successful license application. This will be accomplished by evaluating the available information, developing positions on each of the issues and technical concerns for the site, providing for independent review of these positions as appropriate, and by documenting the reviewed positions to finalize them. This section discusses the approach that the DOE intends to use to carry out these activities.

The approach that is described here recognizes the fact that some uncertainties are likely to remain even after site characterization. These residual uncertainties do not necessarily preclude the reasonable assurance that is the objective of the site characterization program; indeed, the NRC itself recognized in its statements of considerations in support of the regulation (NUREG-0804) that such uncertainties would be expected to remain. Nevertheless, these uncertainties must be addressed in the issue closure process.

The discussion below describes the approach to addressing these uncertainties through the development of positions that are based upon the design, testing, and analysis planned for the site characterization program. The DOE recognizes that its judgments in developing these positions will be carefully scrutinized and questioned. The DOE expects to interact with independent reviewers, including the NRC, regarding some of these questioned items before formal licensing activities. The role of such review and interactions in the issue closure process is described below.

The steps of this process are shown in Figure 8.1-3. These are steps 10 and 11 of the issue resolution strategy of Figure 8.1-1. The first of these steps (step 10) is to use the information collected during site characterization to resolve the issue. This process begins by assembling the available data (step 10a). Although in many cases, this assembly could occur after all testing and design associated with a given issue are completed, it may be

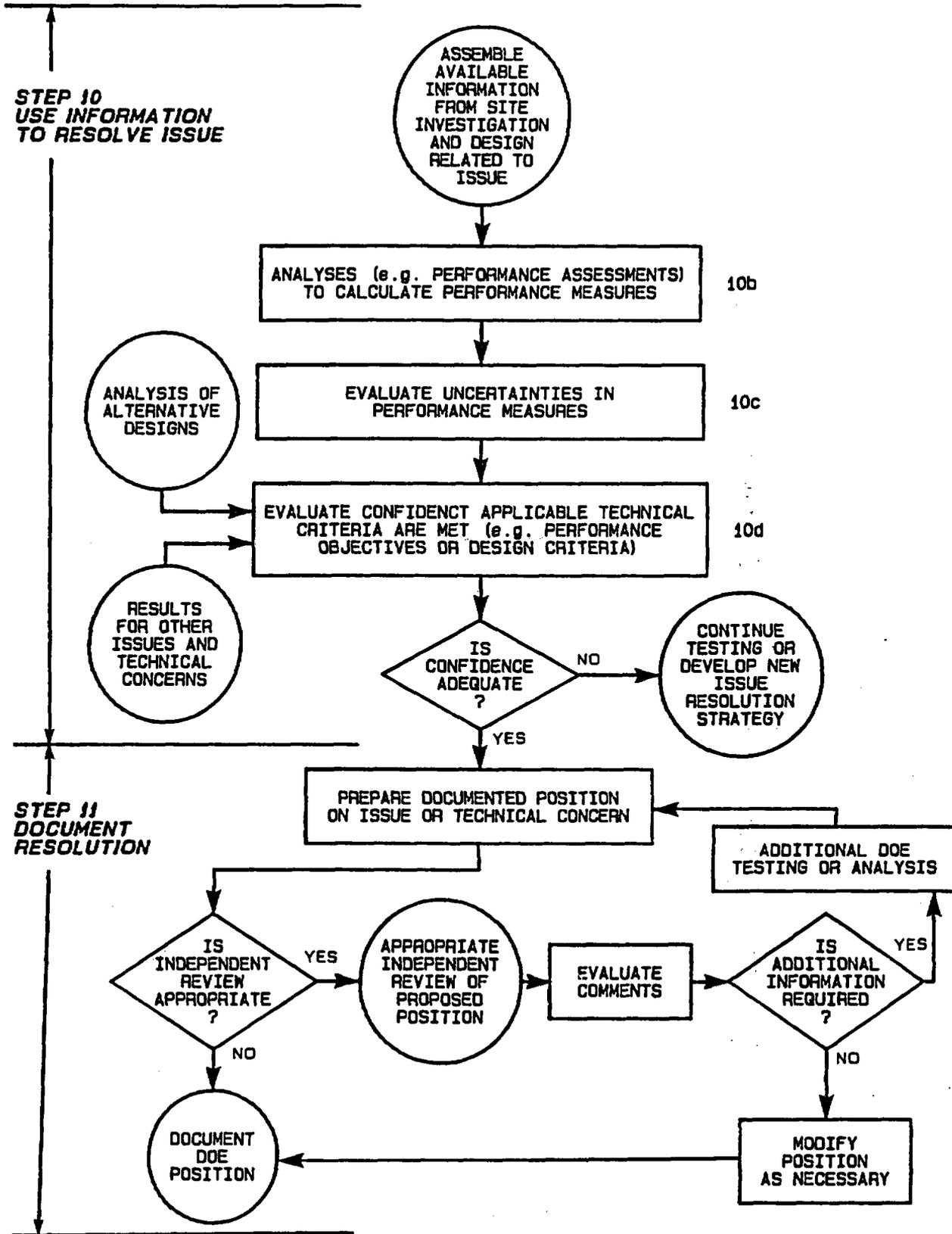


Figure 8.1-3. Issue resolution documentation.

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appropriate to begin to develop a position on an issue as the information is obtained. It may, for example, be found that a position can be taken even before all the information originally envisioned to be necessary is acquired. This would be the case if it were found that one barrier were to perform so well that less information about another barrier would be necessary.

Periodic performance assessments will be conducted to evaluate the performance measures for the issue on the basis of the available information (step 10b). The full range of uncertainties in these performance measures will be evaluated (step 10c). This evaluation will involve sensitivity and uncertainty analysis of the parameters of the models and analysis of the validity of the models. Alternative conceptual models will also be evaluated. In addition, information that is not yet available will be taken into account in assessing these uncertainties. Then, using the analyses of performance measures, the confidence that the applicable technical criteria are met will be evaluated (step 10d). This confidence will depend upon the range of uncertainties that still exists.

The remaining uncertainties will be addressed in several ways. First, analyses of alternative designs will be conducted. From such analyses, it may be learned that one design is superior to others for the resolution of the issue or that issue resolution is not sensitive to the design options being considered. In addition, the impacts of the resolution of other issues will be taken into account; that is, the results of the analyses for all issues will be used in evaluating the level of confidence that the technical criteria are met.

The next step (10e) is to decide if the current level of confidence that the technical criteria are met is adequate or not. This determination will be a judgment based upon the information available and not upon pre-set criteria; however, the performance goals and needed confidences in those goals for the performance measures will provide useful guides for the kinds of judgments that will be made.

The information from these analyses is then used to develop a documented position on the issue or technical concern in a position paper. The position papers would then be available for independent review as appropriate. For those instances where independent reviews have been sought, the DOE will review the comments resulting from these independent reviews and interact with the reviewers to account for differences (step 10g). From this evaluation, the DOE will determine what actions should be taken. For example, the DOE may be able to resolve significant differences and determine that it is appropriate to move forward with the position. On the other hand, the DOE may decide that the current level of uncertainty is too large and develop plans to acquire additional information to reduce this uncertainty. Alternatively, the DOE may decide to modify the position as a result of the comments.

The next step of the issue resolution strategy (step 11) is to formally document the issue resolution to support licensing. The resolution of the issues would be documented in Issue Resolution Reports (IRRs). The positions on the technical criteria of Subpart E of 10 CFR Part 60 will be documented as a part of the safety analysis report (SAR) that will be a part of DOE's license application. Throughout the issue resolution process, the DOE will be soliciting the views of and interacting with outside organizations, such as

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the NRC, on selected key topics. As already mentioned, the current versions of the strategies are preliminary and intended simply as a basis for initial planning.

8.1.2.5 Application of the issue resolution strategy

The entire issue resolution strategy is intended to be iterative. Section 8.3 reports the current DOE issue resolution strategies. As explained previously, the licensing strategy, as well as the tentative goals and the indications of confidence for the performance measures and related parameters, may be changed to reflect new information or in response to comments about plans or test results. If they are changed, the steps that follow in the issue resolution strategy will also be reexamined and their products revised. The analyses of the results of the investigations (step 8) may produce new understandings that require the rethinking of earlier steps. Any of the steps may, in fact, lead to revisions of the issue resolution strategy.

The rationale for future changes to the issue resolution strategies (e.g., revised licensing strategies and performance allocations) will be documented in the site characterization progress reports, which will also report the results of site characterization studies. The reviews, interactions, and reports will continue until the license application is submitted to the NRC.