THE SITING GUIDELINES AND THEIR ROLE IN REPOSITORY SITE SELECTION

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ABSTRACT

The first requirement of the Nuclear Waste Policy Act was for the Secretary of Energy to issue general guidelines for siting repositories. The guidelines were to specify detailed geologic considerations that would be the primary criteria for the selection of sites in various host rocks as well as factors that would qualify or disqualify any site from development as a repository. These guidelines were clearly intended to provide not only the framework for the siting program but also the stimulus for establishing effective communication and consultation among the parties involved in the program. The Act further required that the guidelines be a factor in the development of all future decision documents of the Office of Civilian Radioactive Waste Management, including the environmental assessments that would accompany the nomination of sites for characterization, the site-characterization plans that are to be prepared before the sinking of exploratory shafts at any candidate site, and the environmental impact statement that is to support the recommendation of a site for development as a repository. More than two years after its passage, the intention of the Act for the guidelines has been realized. Concurred in by the Nuclear Regulatory Commission on June 22, 1984, and issued by the Department in November 1984, the guidelines include postclosure technical guidelines that apply to conditions governing the long-term performance of the repository system; preclosure technical guidelines that apply to conditions governing the siting, construction, operation, and closure of the repository; and system guidelines whose objective is to ensure that the regulatory requirements of the Environmental Protection Agency and the Nuclear Regulatory Commission are met.

Developed through a comprehensive program of public comment and consultation with the States, the guidelines established a standard for communication. Comments received during the comment and consultation process resulted in changes not only to the guidelines but to the program itself. The process followed for the guidelines has provided a model for consultation on the Department's Mission Plan and draft environmental assessments and will provide a model to be followed for consultation on the site-characterization plans and the environmental impact statement.

INTRODUCTION

The Nuclear Waste Policy Act of 1982 (the Act) was landmark legislation aimed at resolving a problem of national importance and concern--the disposal of spent nuclear fuel and high-level radioactive waste. The Act established a schedule for the siting, construction, and operation of the geologic repositories that are to be used for the disposal of these wastes; established Federal responsibility and policy for such disposal; and defined the relationship between Federal and State governments with respect to such disposal. In its introductory statement of findings, the Act emphasized the point that while the responsibility for providing geologic repositories for this waste belonged to the Federal Government, State and public participation in their planning and development was essential to promote public confidence in the safety of such repositories. The Federal agency assigned responsibility for geologic disposal is the U.S. Department of Energy.

As its first requirement, the Act required the Department to issue general guidelines for the recommendation of sites for repositories. The Act clearly intended these guidelines to provide the basic foundation for the Department's siting program and to be a factor in the development of future major decision documents. The Act specifically required that the guidelines be incorporated or referenced in the Mission Plan, in the environmental assessments that were to accompany the nomination of sites as suitable for site characterization, the site-characterization plans to be prepared for each of the candidate sites recommended for site characterization, and, finally, in the environmental impact statement to be prepared for any site recommended for development as a repository.

In addition, the Act clearly intended that the process of developing the guidelines serve as the first instance of promoting improved interaction between interested States, the public, and the Department and increasing State and public involvement in planning stages. The Act required that in developing the guidelines the Department consult with the Council on Environmental Quality, the Environmental Protection Agency, the U.S. Geological Survey, and interested Governors--and obtain the concurrence of the Nuclear Regulatory Commission. Finally, the Act required the guidelines to specify detailed geologic considerations that would be the primary criteria for the selection of sites in various geologic media; specify factors that would qualify and disqualify sites; specify population factors that would disqualify sites; specify considerations of

the cost and impacts of waste transportation; and specify the consideration and recommendation to the extent practicable of sites in different geologic media.

Development of the Guidelines

After the passage of the Act, in a process by now widely documented and discussed, the Department began the preparation of the siting guidelines. A proposed set of technical, system, and program guidelines was developed and published for public comment in the Federal Register of February 6, 1983. In order to comply with the Act's consultation requirements as well as to afford the fullest opportunity for public participation and input, the Department then decided to develop the guidelines according to a formal rulemaking process as specified by the Administrative Procedures Act. This process included providing opportunity for public comment; conducting a series of nationwide public hearings; holding individual and group meetings with States, affected Indian tribes, and Federal agencies; evaluating over 3000 individual comments; preparing a formal comment-response document; and preparing several revised iterations of the guidelines before the submittal of final guidelines to the Commission for its concurrence. The Department afforded two full opportunities for review and comment by the States, affected Indian tribes, the public, and Federal agencies. Moreover, additional opportunities for State review and comment were provided before the submittal of the guidelines to the Commission in November 1983. In addition, although its concurrence proceeding was not a rulemaking, the NRC decided to accept written comments and to conduct a public meeting on the guidelines.

In the course of conducting this extensive interaction with the public and the States, the Department received a large number of comments that resulted in specific changes to the guidelines. Among them were requests that the guidelines be more specific and quantitative; that the various guidelines be ranked by order of application and priority; that additional disqualifying conditions be developed; that the method of applying the guidelines throughout the entire siting process be clearly indicated; that transportation be given greater emphasis; and that State-designated resources be extended protection equivalent to the protection afforded to national resources under the environmental quality guideline. Many comments requested that additional opportunity be afforded for state and public participation--and the Department accommodated those requests by greatly expanding opportunities for comment and input from the States and the public.

In response to the comments, the technical guidelines were reorganized into postclosure and preclosure guidelines, and levels of relative importance were assigned to the two groups. Implementation guidelines were added to explain how the technical guidelines would be applied throughout the siting process, and a separate appendix (Appendix III) was developed to explain the required levels of findings to be made at each stage of their application. Wherever possible, the guidelines were revised to be more precise and specific. Another appendix (Appendix IV) was added to give examples of the types of information that would be needed for site nomination. New disqualifying conditions were added to six guidelines. A specific guideline for transportation was developed. Consideration was extended to State-protected resources under the environmental quality guideline.

The end result of this process of public, State, and agency interaction was the development of guidelines that are both responsive to the greatest extent possible to the issues raised during the interaction and responsible for setting the technical framework for a siting program that will result in the identification of suitable sites. An important result was the development of a healthy new working relationship with the States and with other Federal agencies. The culmination of this process was the issuance of the Department's final siting guidelines, 10 CFR Part 960, which were signed by the Secretary of Energy on November 30, 1984, and became effective 30 days later on January 7, 1985.

Structure of the Guidelines

The final guidelines contain three major categories--implementation guidelines, postclosure guidelines, and preclosure guidelines. The implementation guidelines replace the program guidelines contained in the proposed guidelines. They were developed in response to numerous comments requesting clarification of the process for applying the guidelines throughout siting. They govern the application of all other guidelines in the evaluation of sites, and they establish general rules to be followed during site screening, nomination, recommendation for characterization, and recommendation for repository development.

The postclosure guidelines address the site characteristics that are important for the long-term behavior of a repository after waste has been emplaced and the repository has been closed. These are the considerations that are most important for ensuring the long-term protection of the health and safety of the public.

The preclosure guidelines address the siting considerations important to the operation of the repository before it is closed--while the repository is being constructed and waste is being received and emplaced. These are the considerations that are important in protecting the public from exposure to radiation during repository operations, protecting the quality of the environment, and mitigating the socioeconomic effects that may be associated with repository development.

Both the postclosure guidelines and the preclosure guidelines are divided into system guidelines and technical guidelines. The system guidelines state board requirements that provide

for the protection of public health and safety and the quality of the environment through meeting applicable regulatory standards. The corresponding technical guidelines establish the conditions that must be evaluated in determining whether the system guidelines are met.

The postclosure guidelines contain a single system guidelines establishing waste containment and isolation requirements based on NRC and EPA regulations and eight technical guidelines. These technical guidelines are considered to be of equivalent importance and are not listed in relative order. The preclosure guidelines contain three system guidelines with corresponding sets of technical guidelines. These three system guidelines cover, first, preclosure radiological safety; second, environment, socioeconomics, and transportation; and third, ease and cost of siting, construction, operation, and closure. These three system guidelines with their corresponding groups of technical guidelines are listed in the relative order of importance. However, within each specific group of preclosure guidelines, the technical guidelines are of equal importance.

Each technical guideline contains a qualifying condition and sets of favorable and potentially adverse conditions. Twelve of the guidelines also contain disqualifying conditions. The qualifying conditions specify the minimum requirements that a site must meet in order to be considered to qualify for site selection. Any given site must meet all qualifying conditions in order to continue to be considered. Failure to meet any single qualifying condition will permanently disqualify a site. Qualifying conditions are usually stated in terms of their impact on the performance of the repository system. In most cases this requires an anlysis of system performance. Complete data for such analyses will be available only after site characterization and investigation; consequently, a final determination of whether a site is qualified usually cannot be made until after the completion of these activities.

Disqualifying conditions describe conditions that are considered to be so adverse as to disqualify a site without further consideration if determined to be present. In many cases it is possible to establish that a disqualifying condition does exist at a particular site. However, in some cases the final determination will require an analysis of data gathered during site characterization.

In addition, favorable and potentially adverse conditions based on the NRC's 10 CFR 60 are included for each technical guideline. These are conditions that can be used early in the siting process to predict the suitability of a site before detailed site studies have been conducted. They provide preliminary indications of expected site performance and are intended for use primarily during site screening, nomination, and recommendation.

Application of the Guidelines

Because of the importance of the qualifying and disqualifying conditions, the Department developed a specific process for "applying" the guidelines. This process provided for increasing levels of confidence in making required findings on site qualification and disqualification as information is obtained for the site under consideration. The findings required for the various phases of the siting process are specified and defined in Appendix III of the siting guidelines.

At the time of nomination and recommendation for characterization, the Department must determine that the evidence does not indicate that the site is disqualified and that the site is likely to meet the qualifying condition. At the time of selection for repository development, the Department must make and support with confidence the higher level finding that the site has no disqualifying conditions and meets all qualifying conditions.

No findings are specified or required for the favorable and potentially adverse conditions, since they are intended, by their presence or absence, primarily to provide preliminary indications of site performance. As site characterization and investigation activities proceed and site-specific information is acquired and analyzed, it will be possible to accurately evaluate the ability of a site to meet the qualifying conditions and ascertain whether disqualifying conditions exist. Thus the emphasis will shift toward making findings relative to the qualifying and disqualifying conditions, rather than the favorable and potentially adverse conditions.

Finally, the guidelines contain Appendix IV, which specifies the types of information that is to be included in the evidence used at the time of nomination for site characterization. The listed information is to be supplemented as necessary with conservative assumptions, extrapolations from regional data, the use of conceptual models, and analyses of data uncertainties.

Since their development, the guidelines have, as required by the Act, formed the basis for other programmatic activities and the development of various program documents. They were directly addressed in Volume II of the Mission Plan, where Chapter 1 presented four key issues based on the four system guidelines and various issues based on the qualifying conditions of the technical guidelines. These issues and the associated information needs are used as the basis for explaining repository siting and development activities.

The guidelines were used in the draft environmental assessments (EAs) prepared to accompany the nomination of sites considered suitable for characterization. The implementation guidelines required that the potentially acceptable sites under consideration

be grouped by geohydrologic basin and that the preferred site in each geohydrologic basin be selected. For the sites in basalt and tuff (the Hanford site in Washington and the Yucca Mountain site in Nevada), this had already been accomplished during screening. However, for the seven salt sites, located in three geohydrologic basins, preferred sites had not yet been selected. The EAs for the basalt and the tuff sites discussed the process by which preferred sites had previously been selected. For the salt sites, Chapter 2 presented the basis for identifying preferred sites within each basin. After this identification, the preferred site within each basin was nominated as suitable for characterization in accordance with the procedure specified in the implementation guidelines.

In Chapter 6 of each EA, each guideline was evaluated on a site-specific basis. A rigorous format was developed for this evaluation. First the qualifying condition was presented and the objective of the guideline was discussed. The data relevant to the evaluation were then presented and any data uncertainties or assumptions used in analysis were discussed. Next each favorable condition, potentially adverse, and disqualifying condition was presented and evaluated, and a conclusion stated as to whether the condition was present. Finally, a conclusion was stated on the ability of the site to meet the qualifying condition. For qualifying and disqualifying conditions, the conclusion was stated in terms of the findings required by Appendix III. Wherever possible, the higher level finding was made.

The guidelines were used in Chapter 7, which presented a comparative evaluation of each of the five sites proposed for nomination against each siting guideline. That comparative evaluation provided the basis for ranking the five nominated sites and proposing three preferred sites for recommendation for characterization.

The next use of the siting guidelines will occur during site characterization and the concurrent site investigations. The Act and therefore the siting guidelines define site characterization as those activities undertaken to establish geologic and subsurface conditions at a candidate site. The Act further differentiates between two distinct sets of siting guidelines--those that require site characterization and those that do not. As required by the Act, the program for conducting site-characterization activities will be presented in a site characterization plan (SCP) to be developed for each candidate site. As part of the program for site characterization, the SCPs will present plans for resolving issues related to site characterization and for substantiating the higher level findings required for the qualifying and disqualifying conditions of the guidelines that require site characterization.

In parallel with site characterization, the Department will conduct site investigations to collect information about demographic, environmental, and socioeconomic conditions. These activities will be carried out in order to support the preparation of an environmental impact statement later in the process and to establish compliance with the guidelines that do not require characterization. Plans for conducting these site investigations and collecting data will be presented in environmental and socioeconomic planning documents. These documents will contain plans for resolving issues not related to site characterization and for substantiating the higher level findings required for the guidelines that do not require characterization.

When the environmental impact statement is prepared to support the selection of a repository site, the guidelines will be used as the basis for a comparative evaluation of the sites. At that time it will be necessary to demonstrate that the candidate sites considered as alternative repository locations had been determined to be suitable in accordance with the guidelines.

Summary

In the formal issuance of the final siting guidelines, the Department has made a major step toward achieving the objectives of the Nuclear Waste Policy Act. These guidelines provide a basic foundation for the siting program and have been substantively incorporated into subsequent major steps of the siting process. Consultation and interaction with the States, affected Indian tribes, the public, and other Federal agencies was an important part of this process. This interaction resulted in modifications to the guidelines and consequently to the Department's siting program. It also contributed to establishing improved avenues of communication and in significantly increasing participation in the planning and development stages of the siting program.