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OFFICE OF NUCLEAR REGULATORY RESEARCH

DRAFT REGULATORY GUIDE AND VALUE/IMPACT STATEMENT

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Division 4  
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STANDARD FORMAT AND CONTENT OF  
ENVIRONMENTAL REPORTS FOR NEAR-SURFACE  
DISPOSAL OF RADIOACTIVE WASTE

This regulatory guide and the associated value/impact statement are being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. They have not received complete staff review and do not represent an official NRC staff position.

Public comments are being solicited on both drafts, the guide (including any implementation schedule) and the value/impact statement. Comments on the value/impact statement should be accompanied by supporting data. Comments on both drafts should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch, by **JUN 21 1982**

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## INTRODUCTION

### 1. National Environmental Goals

Prior to the issuance of a license authorizing disposal of low-level radioactive waste, the Nuclear Regulatory Commission (NRC) is required to assess the potential environmental effects of the proposed activities to ensure that issuance of the license will be consistent with the national environmental goals. In order to obtain information essential for this assessment, the NRC requires that each applicant for a license for land disposal of radioactive wastes submit a report on the potential environmental impact of the proposed project in accordance with § 61.10 of 10 CFR Part 61.

The national environmental goals are expressed by the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190, 83 Stat. 852), as follows:

"...it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may--

"(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

"(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

"(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

"(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

"(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

"(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

In addition to NEPA, the Atomic Energy Act of 1954, and the Energy Reorganization Act of 1974, numerous other pieces of legislation and implementing regulations, both Federal and State, may affect the siting and operation of land disposal facilities. Some of these such as the Endangered Species Act of 1973 require that the NRC make primary determination of acceptability, while compliance with others such as the Federal Water Pollution Control Act must be reported to the NRC.

No attempt will be made in this guide to discuss any of these in detail. The applicant should make an independent determination of those statutes and regulations that may affect the proposed project. Early consultation with the NRC staff is encouraged to determine relevancy in specific instances.

## 2. Applicant's Environmental Report

Section 51.40, "Environmental Reports," of 10 CFR Part 51, "Licensing and Regulatory Policy and Procedures for Environmental Protection," requires that each applicant for a license authorizing receipt and disposal of radioactive waste submit 15 copies of a separate document entitled "The Applicant's Environmental Report" with the license application. The applicant must retain an additional 85 copies of the environmental report for distribution to Federal, State, and local officials in accordance with written instructions issued by the NRC's Director of the Office of Nuclear Material Safety and Safeguards. The applicant's environmental reports are important documents of public record. Therefore, the applicant is urged to give full attention to their completeness.

The environmental report must discuss the following environmental considerations:

- a. The environmental impact of the proposed action,
- b. Any adverse environmental effects that cannot be avoided if the proposal were implemented,
- c. Alternatives to the proposed action,
- d. The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- e. Any irreversible and irretrievable commitments of resources that would be involved in the proposed action if it were implemented.

The discussion of alternatives to the proposed action in the environmental report must be sufficiently complete to aid the Commission in developing and exploring, in accordance with Section 102(2)(E) of NEPA, "...appropriate alternatives...in any proposal which involves unresolved conflicts concerning alternative uses of available resources."

The environmental report must include a benefit-cost analysis that considers and balances the environmental effects of the facility and the alternatives available for reducing or avoiding adverse environmental effects, as well as the environmental, economic, technical, and other benefits of the facility. The benefit-cost analysis must, to the fullest extent practicable, quantify the various factors considered. To the extent that such factors cannot be quantified, they must be discussed in qualitative terms. The environmental report should contain sufficient data to aid the Commission in its development of an independent benefit-cost analysis covering the factors specified.

The environmental report must also include a discussion of the status of compliance of the facility with applicable environmental quality standards and requirements that have been imposed by Federal, State, and regional agencies having responsibility for environmental protection. In addition, the environmental impact of the facility should be fully discussed with respect to matters covered by such standards and requirements irrespective of whether a certification from the appropriate authority has been obtained. While compliance with NRC

standards and criteria pertaining to radiological effects will be necessary to meet the licensing requirements of the Atomic Energy Act, the benefit-cost analysis for the purposes of NEPA must consider the radiological effects together with a broad range of other environmental effects of the facility.

### 3. Preparation of Environmental Reports

#### a. Purpose of This Guide

The Commission's regulations set forth in 10 CFR Part 51 provide only general information concerning the content of an applicant's environmental report. This guide has been prepared to provide specific and detailed guidance for the preparation of environmental reports for land disposal facilities.

This guide identifies the information needed by the NRC staff in its assessment of the potential environmental effects of the proposed land disposal facility and establishes a format acceptable to the staff for its presentation. However, conformance with this Standard Format is not required. Use of the format of this guide will help ensure the completeness of the information provided, will assist the NRC staff and others in locating the information, and will aid in shortening the time needed for the review process.

#### b. Scope of This Guide

In order to cover a wide variety of anticipated situations, the scope of this guide is comprehensive. In its development the NRC staff has tried to anticipate the information needs corresponding to a wide range of siting, design, and operational characteristics affecting the potential significant environmental impacts of a land disposal facility. In some instances, requests for specific information may not be applicable to a particular project. If any topics are not relevant to the particular project or change under consideration, the applicant should identify them. If any topics in this guide relate to information not available at the time the report is prepared, the applicant should indicate when the information will be available.



c. Presentation of Information

The applicant should strive for clear, concise presentation of the information provided in the environmental report. Each subject should be treated in sufficient depth and with sufficient documentation\* to permit the Commission to independently evaluate the extent of the environmental impact. Tables, line drawings, and photographs should be used wherever they contribute to the clarity and brevity of the report. The number of significant figures stated in numerical data should reflect the accuracy of the data. Descriptive and narrative passages should be brief and concise. In cases where test results are needed to support conclusions, test data, procedures, techniques, and equipment used to perform the tests should be included, if necessary, or referenced.

Pertinent published information relating to the site, the facility, and its surroundings should be referenced. Where published information or assumptions are essential to evaluate specific environmental effects of the proposed activities, they should be included in summary or verbatim form in the environmental report or as an appendix to the report.

Some of the information to be included in the environmental report may have already been prepared by the applicant during preparation of the license application for the proposed project. In such cases, this information (whether in the form of text, tables, or figures) may be incorporated in the environmental report by reference.

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\* "Documentation" as used in this guide means presentation of information, supporting data, and statements and includes (1) references to published information, (2) citations from the applicant's experience, and (3) reference to unpublished information developed by the applicant or the applicant's consultants. Statements not supported by documentation are acceptable provided the applicant identifies them either as information for which documentation is not available or as expressions of belief or judgment.

## Chapter 1. PURPOSE AND NEED FOR PROPOSED PROJECT

In this chapter, the applicant should briefly discuss the proposed project and the activities as a result of the project. For example, such matters as the purpose, need for and benefits of the project, plans for waste disposal and management, the types of waste to be disposed of, the sources of radioactive waste, the quantity of radioactive waste to be disposed of, the radioisotopic content of the waste, the waste form, the waste package(s), planned land use of the project areas, closure and site decommissioning plan, postclosure care, and plans for long-term institutional care of the site should be discussed.

With regard to the need for the proposed facility, a discussion should be provided concerning the disposition of the waste if this proposed facility is not licensed. Include in this discussion such matters as the length of time the present capacity will be adequate, the cost of temporary storage, the cost of transportation to a new facility versus old facilities, and restrictions on the use of existing facilities. In discussing need, the most important factor is the relationship of the site to the Low-Level Radioactive Waste Policy Act activities for the region or State.

The Low-Level Radioactive Waste Policy Act (Public Law 96-573), enacted in December 1980, establishes a Federal policy that each State is responsible for providing for low-level waste (LLW) disposal capacity for radioactive waste generated within its borders with the exception of Federal waste from defense or research and development activities. The Act also:

- Permits States to enter into compacts for establishment of regional disposal sites.
- Provides that the compacts must be ratified by Congress.
- After January 1, 1986, permits the use of such a site to be restricted to the disposal of LLW generated within the compact region.

## Chapter 2. SITE CHARACTERISTICS

In this chapter, briefly describe the location of the facility and the geographical, demographical, ecological, meteorological, hydrological, geological, seismological, and socioeconomic characteristics of the site and surrounding vicinity. The objectives are to describe the environmental baseline characteristics of the proposed site in order to determine the environmental impacts of facility design, operation, and closure. Where applicable, clearly reference the data provided in the license application in order to avoid unnecessary duplication of information.

### 2.1 Geography and Demography

Information concerning the site such as geography, population, and land use should be provided in support of the environmental assessment.

#### 2.1.1 Site Location

The site location should be described by specifying the latitude and longitude to the nearest second and the Universal Transverse Mercator coordinates\* to the nearest 100 meters. The State and county in which the site is located should be identified along with nearby towns and cities. The location of the site relative to prominent geographical and cultural features such as rivers and lakes should also be indicated. To facilitate presentation of this information, maps and aerial photographs should be provided. The general location map should encompass at least a 16-km (10-mi) radius. Additional maps should be provided to present detail near the site to show features such as buildings, excavation sites, roads, railroads, streams, or ponds. The scale of each map should permit the measurement of distances with reasonable accuracy. Detailed information in this section may be referenced in subsequent chapters to minimize repetition.

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As found on U.S. Geological Survey topographical maps.

### 2.1.2 Site Description\*

A map or maps of the site and surrounding region should be included in the environmental report and should be of suitable scale to clearly define the boundary and buffer zone(s) of the site. Distances from significant surface and subsurface features to the site boundary and to the edge of buffer zone(s) should be shown. The areas to be considered as the exclusion area and buffer zone should be clearly delineated if they are not the same as the boundaries of the site.

The environmental report should include a description of surface and mineral rights with respect to the properties described, e.g., ownership, lease, easements.

The topography of the site and vicinity should be described, including suitable contour maps that indicate the character of surface drainage patterns and potential impact of surface winds. Topographic map(s) that show the locations of principal facility installations should also be provided.

Vegetative cover and surface soil characteristics should be described sufficiently to indicate potential erosion and fire hazards.

Traffic and transportation routes should be identified.

### 2.1.3 Population Distribution

Population data presented should be based on the most recent U.S. census data and State and local population projections. On a map of suitable scale that identifies places of significant population grouping such as cities and towns within a 16-km (10-mi) radius, the residential population density should be provided. A table appropriately keyed to the map should provide the current residential population density for the expected first year of facility operation and census years through the anticipated operational life of the facility.

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\*Regulatory guides on site selection and on site suitability and characterization are under development and, when issued, should provide additional guidance in this area.

The distance to the nearest residence should be noted. The basis for population projections should be described.

#### 2.1.4 Uses of Adjacent Lands and Waters

Identify the location, nature, and amounts of present and projected surface and ground-water use (e.g., water supplies, irrigation, reservoirs, recreation, transportation) within 8 km (5 mi) of the site and the present and projected population associated with each use point, where appropriate.

Data on both present and projected future water use should be summarized and tabulated; users should be located on maps of legible scale. Tabulations should include:

1. Location: Include symbols shown on maps identifying the location of water users. Provide map coordinates if appropriate.
2. Distance from disposal facility.
3. Withdrawal Rate: Provide present and projected withdrawal rate (in liters per second or cubic meters per second) for each water use.
4. Return Rates: Provide present and projected irrigation return rates (in liters per second or cubic meters per second) if appropriate.
5. Type of Water Use: Provide type of water use for each location, e.g., municipal, industrial, irrigation, stock/game watering.
6. In addition, for ground-water use, indicate depth of wells, ground-water elevation, and drawdown, and characterize the use by aquifer.
7. Source and Projection of Water-Use Estimates: Where use rates are anticipated to change over the life of the project and beyond, indicate projections and the source of the projection information. Sources for such projections may be available from users or planning agencies at different levels of government.

For items 3 and 4 above, indicate monthly values if seasonal use varies significantly.

Provide data on the annual recreational and commercial fish catch from waters within an 8-km (5-mi) radius of the site. Report the catch by principal species, location, and amount used for human consumption (amounts consumed locally should be specifically noted).

## 2.2 Ecology

In this section, discuss the flora and fauna within 8 km (5 mi) of the site. This initial inventory will reveal certain organisms that, because of their importance to the community, should be given specific attention. A species is "important" (for the purposes of this guide) if a specific causal link can be identified between the facility and the species and if one or more of the following criteria applies: (1) the species is commercially or recreationally valuable, (2) the species is threatened or endangered,\* (3) the species affects the well-being of some important species within criteria (1) or (2), or (4) the species is critical to the structure and function of the ecological system or is a biological indicator of radionuclides or chemical pollutants in the environment.

The information should be presented in two separate subsections: "Terrestrial Ecology" and "Aquatic Ecology." The sources of information should be identified, and contacts with regional, State, and local officials should be identified and documented. As part of this identification, present a list of pertinent published material dealing with the ecology of the region. Locate and describe any ecological or biological studies of the site or its environs currently in progress.

\*

In writing and reviewing environmental reports, specific consideration should be given to possible impact on any species (or its habitat) that has been determined to be endangered or threatened with endangerment by the Secretary of the Interior and the Secretary of Commerce. New terminology defining "endangered or threatened with endangerment" has been set forth in Public Law 93-205, 87 Stat. 884. However, State laws and regulations and unregulated rare species and ecologically important habitat areas should also be considered.

### 2.2.1 Description

Describe the flora and fauna in the vicinity of the site, their habitats, and their distribution. Identify any species considered important (as defined in Section 2.2).

### 2.2.2 Important Species

Discuss in detail the quantitative abundances of the important species. The discussion should include species that migrate through the area or use it for breeding grounds. Special attention should be given to the relative importance of the site area to the total regional area of the living resources (potential or exploited).

### 2.2.3 Domestic Flora and Fauna

The applicant should provide data on the count and distribution of important domestic fauna, in particular, cattle, sheep, and other meat animals that may be involved in the exposure of man to radionuclides. Important game, dairy, recreational, and work animals should receive similar treatment. A map that shows the distribution of the principal plant communities should be provided.

### 2.2.4 Species-Environment Relationships

The discussion of species-environment relationships should include descriptions of area usage (e.g., habitat, breeding) for important species; life histories of important regional animals and aquatic organisms, their normal seasonal population fluctuations, and their habitat requirements; and identification of food chains and other interspecies relationships, particularly when these are contributory to predictions or evaluations of the impact of the facility on the regional biota.

## 2.3 Meteorology\*

This section should provide a description of the meteorology of the site and the surrounding area. Meteorological conditions that influence the design and operation of the facility should be identified. Sufficient information should be included to permit an independent evaluation by the NRC staff of atmospheric dispersion characteristics of the local area. State the sources of information and data supplied, and include data collected from the onsite meteorological measurement program. The basis for all meteorological parameters used as a design basis for any facility structure should be described. Where applicable, reference the data provided in the license application in order to avoid unnecessary duplication.

## 2.4 Hydrology\*

Sufficient information should be provided to allow an independent review of all hydrologically related design bases, performance requirements, and operating procedures important to safe and environmentally sound operation. Identify the sources of the hydrologic information, the types of data collected, and the methods and frequency of collection. The surface and subsurface geohydrology and time-history characteristics of the site should be described in detail. Lithographic and geologic maps extending radially 8 km (5 mi) from the site boundary should be provided to show hydrologic, geologic, and stratigraphic characteristics of the site. Where applicable, reference the data provided in the license application in order to avoid unnecessary duplication.

### 2.4.1 Ground Water

Describe the hydrology of the region that affects the local ground-water aquifers, formations, sources, and sinks. Describe the recharge potential of the immediate facility area. Sufficient site-specific data should be provided for the evaluation of the effects of construction and operation of the facility on established ground-water tables and usage.

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\*A regulatory guide on site suitability and characterization is under development and, when issued, should provide additional guidance in this area.



Descriptions of the major aquifers in the area should include piezometric contour maps, hydraulic gradients, horizontal and vertical permeabilities for representative geologic features, total and effective porosities, bulk densities estimates, storage coefficients, dispersion and distribution (sorption) coefficients, descriptions of pertinent geologic formations and soil types, including formation depth throughout the site and to the nearest downgradient well or water body, chemical and radiological properties (as required by EPA Water Quality Standards or by any existing State regulation), and time histories of ground-water fluctuations. In addition, the baseline water quality of bodies of water adjacent to the site should be provided.

Provide data concerning any drawdown of ground water that may be caused by withdrawals from neighboring major industrial, agricultural, or municipal wells.

#### 2.4.2 Surface Water

Describe the location, size, shape, and other hydrologic characteristics of water bodies in the environs of the site. Include a description of upstream and downstream river control structures, and provide a topographic map showing the major hydrologic features.

### 2.5 Geology and Seismology\*

The lithologic, stratigraphic, geomorphic, structural geologic, physiographic, and seismic characteristics of the region and site, the nature of investigations performed, results of investigations, conclusions, and identification of information sources should be provided. The written description should be supplemented by appendices, tables, maps, photographs, and graphics. The discussion should note the stratigraphy, structure, and tectonic history. Provide

\*A regulatory guide on site suitability and characterization is under development and, when issued, should provide additional guidance in this area.

comments on the regional continuity, faulting, dip, and strikes of the water-bearing formations that will be affected. An inventory of economically important minerals and energy-related deposits, including any unique mineralogical or paleontological deposits of particular scientific interest, should be included.

Describe those geological and soil studies designed to determine the environmental impact of the construction or operation of the disposal facility. The description should include identification of the sampling pattern and the justification for its selection, the sampling method, holding periods, preanalysis treatment, and analytical techniques. Other geological and soil studies (e.g., those conducted in support of the license application) should be briefly summarized and reference made to the relevant reports for a more detailed presentation.

The historic seismicity of the region should also be discussed. Where possible, associate seismic events with tectonic features. Reference the data provided in the license application in order to avoid unnecessary duplication.

## 2.6 Regional Historic, Archeological, Architectural, Scenic, Cultural, and Natural Landmarks

Areas valued for their historic, archeological, architectural, scenic, cultural, or natural significance may be affected. The environmental report should include a brief discussion of the historic, archeological, architectural, scenic, cultural, and natural significance, if any, of the disposal site and nearby areas with specific attention to the sites and areas listed in the National Registry of Natural Landmarks, properties included in or eligible for inclusion in the National Register of Historic Places, and areas listed in any existing State or local register.

The environmental report should identify those properties included in or eligible for inclusion in the National Register of Historic Places or any State or local register located within the area of the project's potential environmental impact. Also discuss the consultation with the appropriate State Historic Preservation Officer and State Archeologist concerning the identification of properties included in or eligible for inclusion in the National Register or any existing State or local register.

## 2.7 Background Radiological and Chemical Characteristics

### 2.7.1 Radiological Characteristics

Describe the natural background radiation levels in the immediate vicinity of the site. The discussion should include the concentrations of radioactive materials found in important biota, soil, geological formations, regional surface water, and local ground water as established by the preoperational radiological monitoring program.

### 2.7.2 Chemical Characteristics

Describe the chemical properties of the site and its immediate vicinity. The discussion should include the chemical properties of surface water, air, and ground water and its ability to form precipitates with radionuclides. Factors such as specific conductivity, pH, concentration of chloride, total dissolved solids, and dissolved organic compounds should be addressed in the discussion.

## 2.8 Other Environmental Features

For certain sites, some relevant information on the facility may not clearly fall within the scope of the preceding topics. Additional information may be required with respect to some environmental features in order to reflect the value of the site and site environs to important segments of the population. Such information should be included in this section.

## Chapter 3. DISPOSAL FACILITY

This chapter should provide a brief discussion of the principal features of the disposal facility. It should briefly provide information in sufficient detail on facility equipment and systems that interact with the environment to permit an independent evaluation by the NRC staff of the environmental effects of the proposed project. Where applicable, the license application should be referenced in order to avoid unnecessary repetition of data.

### 3.1 Description of Wastes To Be Accepted

Briefly describe the sources and maximum anticipated monthly volumes of fuel-cycle and non-fuel-cycle radioactive wastes to be accepted at the disposal facility. Provide information on properties of the wastes such as (1) form and mechanical stability, (2) packaging, (3) chemical composition, and (4) radiological characteristics. Data provided in Chapter 1, "Purpose and Need for Proposed Project," may be referenced as necessary.

### 3.2 Facility Description

#### 3.2.1 Description of Facility

Provide an overview showing the land, buildings, and equipment to be used for the disposal of radioactive wastes into the subsurface of the land.

#### 3.2.2 Principal Features

On an appropriately scaled map or drawing, locate the buildings and other installed surface features, as well as subsurface features. Also show roadways, parking areas, and utility and water service locations. Diagrams used in Chapter 2, "Site Characteristics," may be referenced. Descriptions requested subsequently may be supplemented by references to the license application.

3.2.2.1 Restricted Area. Show the restricted area as defined in paragraph 20.3(a)(14) of 10 CFR Part 20, "Standards for Protection Against Radiation."

3.2.2.2 Site Boundary and Buffer Zones. Show the boundary that encompasses the area owned and controlled by the applicant. All activities in this area should be under the direct control of the applicant. Indicate existing and proposed fenced areas.

3.2.2.3 Exclusion Areas. Show any areas in which public activities will be controlled but in which some restricted activities will be allowed.

3.2.2.4 Site Utility Supplies and Systems. Identify and describe the utility supplies and systems as well as the source(s) of water. Include the location and purpose of all wells and utility lines (if appropriate).

3.2.2.5 Storage Facilities. Show the location of excavation spoils and other storage of materials and equipment.

### 3.2.3 Site Utilization Plan

Identify and discuss general plans for the future use of the facility. Discuss the order in which trenches will be developed. On an appropriately scaled map or drawing, show the location and layout of future installations.

### 3.2.4 Construction Plans

3.2.4.1 Excavation and Engineering Modifications. Briefly discuss the design bases and construction plans required to enhance and improve the ability of the natural characteristics of the site to confine the waste after disposal. Using drawings as necessary, show the layout of the functional features of the burial facilities.

3.2.4.2 Waste Placement. Briefly describe the features of the burial facility that ensure placement of wastes with ease of operation, maximum utilization of space, and minimum deformation of waste packages and minimum potential subsidence of the disposal units.

3.2.4.3 Backfilling and Compaction. Briefly describe criteria, procedures, and methods that will be used to backfill and compact the fill and cover materials

during the operational phase. Include consideration of composition and specification of backfill, reconsolidation procedures, precautions to prevent water intrusion, thermal and radiological effects, waste or waste container interactions, and materials (e.g., clay) added to mitigate waste migration.

3.2.4.4 Trench Sealing and Use of Engineered Structures. Briefly describe measures to direct surface water away from disposal areas. Discuss any engineered methods or structures to be used to keep the possibility of infiltration of rain and surface water to a minimum. Describe water-proofing techniques to be used, including a discussion of the chemical and physical properties of materials selected. Include consideration of the thickness and types of cover to be used and the stabilization techniques to be used on the cover surface.

3.2.4.5 Site Drainage and Erosion (Operational and Postclosure). Briefly describe the drainage system and show how it will ensure efficient and rapid removal of precipitation waters and prevent flooding and erosion. Discuss surface treatment to be used to resist erosion and to prevent particulate releases via wind erosion.

### 3.3 Support Facilities

#### 3.3.1 Types of Structures

3.3.1.1 Administration Buildings. Briefly describe the functional features of these facilities, including laboratories, records and equipment storage areas, dining area, shower, decontamination rooms, and change rooms.

3.3.1.2 Storage and Waste Handling Area. Briefly describe, using drawings as necessary, the layout of the functional features of this area, including capabilities for (1) waste reception, offloading, storage, and handling; (2) repackaging damaged containers; (3) decontaminating transport equipment; and (4) short-term storage.

3.3.1.3 Decontamination Area for Equipment. Briefly describe, using drawings as necessary, facilities for decontamination of transport, handling, and other equipment.

### 3.3.2 Excavated Materials Area

Describe facilities for surface storage and protection of excavated materials. Indicate approximate spoil pile elevations. Discuss potential for and mitigating measures related to wind erosion and water runoff. Discuss potential for siltation to nearby water bodies. Describe the use of this material for backfill and planned disposition of any excess material.

## Chapter 4. ENVIRONMENTAL EFFECTS

The construction of a disposal facility may have short-term and long-term effects on the environments; some of the effects will be adverse and some may be beneficial. Effects are considered adverse if environmental change or stress causes a valuable or otherwise important biotic population or natural resource to be less safe, less healthy, less abundant, less productive, less esthetically or culturally pleasing; if the change or stress reduces the diversity and variety of individual choice, the standard of living, or the extent of sharing of life's amenities; or if the change or stress tends to lower the quality of renewable resources or to impair the recycling of depletable resources.

In the discussion of adverse environmental effects, it should be made clear which of these are considered unavoidable and subject to later amelioration and which are regarded as unavoidable and irreversible. Those effects that represent an irretrievable commitment of resources should receive detailed consideration. (In the context of this discussion, "irretrievable commitment of resources" alludes to natural resources and means a permanent impairment of these, e.g., loss of wildlife habitat; destruction of nesting, breeding, or nursing areas; interference with migratory routes; loss of valuable or esthetically treasured natural areas; expenditure of directly utilized resources.) Sufficient data should be provided to allow an independent analysis of the effects of a disposal facility on the environment.

Also discuss the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. As used in this guide, "short term" refers to the operating life of the proposed facility, and "long term" refers to time periods extending beyond this life. Assess the action for cumulative and projected long-term effects from the point of view that each generation is trustee of the environment for each succeeding generation.

### 4.1 Long-Term Environmental Effects

In this section, discuss the long-term effects of the facility on the environment. Effects are considered long term if environmental change occurs after site closure, e.g., the effects of long-term land commitment or possible radionuclide migration from the facility.



With regard to the long-term effect of radionuclide migration on the safety of the populace, it should be noted that § 61.41 of 10 CFR Part 61 requires that concentrations of radioactive material released to the general environment be specifically limited. In the license application, the applicant is requested to demonstrate that the requirements of § 61.41 have been met. A duplication of this analysis is not necessary in the environmental report, but a summary of the results should be provided for completeness.

#### 4.1.1 Environmental Effects of Long-Term Containment

Describe the environmental effects of long-term containment of the waste in the disposal facility. Consider the effects of items such as land commitment, institutional safeguards, monitoring, maintaining access, and site maintenance. Discuss any measures designed to mitigate or reverse undesirable effects, any effects of long-term containment the consequences of which may be beneficial to the region, and any irreversible and irretrievable commitments of resources.

#### 4.1.2 Environmental Effects of Potential Radionuclide Releases

Describe the environmental effects of radionuclide and hazardous chemical migration from the disposal facility. Radionuclide migration pathways should be analyzed in order to demonstrate that the general population is protected from releases of radionuclides, including air, soil, ground water, surface water, plant uptake, and exhumation by burrowing animals. The environmental effects described should include both radiological and nonradiological effects. Where applicable, reference the data provided in the license application in order to avoid unnecessary duplication.

4.1.2.1 Radiological Health Impacts. Describe radiological impacts of waste migration from the disposal facility. Determine the internal dose received from ingestion or inhalation from the various pathways that may be assumed to exist at the site. Make separate estimates for total doses received assuming the use of mitigating measures and for total doses received without the use of mitigating measures.

4.1.2.2 Nonradiological Health Impacts. Describe the health impacts of chemically hazardous waste migration from the disposal facility. Determine to the extent practicable the concentrations of hazardous chemicals in the ground water at the site boundary. Also describe the potential effects of hazardous substances from other pathways. Make separate estimates for potential health effects assuming the use of mitigating measures and for health effects without the use of mitigating measures.

4.1.2.3 Other Impacts. Describe all impacts due to waste migration that are nonradiological. This should include items such as cost of interdictive measures, cost of drilling new wells, cost of water treatment, and, if justified, cost of replacing farmland or moving existing industries. Nonradiological impacts should also include ecological and other environmental impacts associated with the use of mitigating measures such as impacts associated with construction.

## 4.2 Short-Term Environmental Effects

In this section, discuss the short-term effects of the facility on the environment. Effects are considered short term if related to construction, operation, and closure of the disposal facility.

### 4.2.1 Site Preparation and Construction

4.2.1.1 Land Use and Terrestrial Impacts. Describe how construction activities may disturb the existing terrain and wildlife habitats. Consider the effects of such activities as creating building material supply areas; building temporary or permanent roads, bridges, or service lines; disposing of trash; excavating; and land filling. Provide information bearing on such questions as how much land will be torn up and for how long; will there be dust or smoke problems; and what explosives will be used, where, and how often. Indicate the proximity of human populations, and identify undesirable impacts on their environment arising from noise, disruption of stock grazing patterns, and inconvenience due to the movement of men, material, and machines. Include those activities associated with any provision of housing, transportation, and educational facilities for workers and their families. Describe any expected changes in accessibility of historical and archeological sites in the region. Discuss

measures designed to mitigate or reverse undesirable effects, such as erosion control, dust stabilization, landscape restoration, control of truck traffic, and restoration of affected habitats.

The discussion should also include any effects of site preparation and construction activities the consequences of which may be beneficial to the region.

4.2.1.2 Water Use and Aquatic Impacts. The discussion of water use should describe the impact of site preparation and construction activities on area water sources. Activities that may affect surface water include surface excavation, stream diversion, clearing, and grubbing and related activities. Describe the effects of these activities on fish and wildlife resources, water quality, water supply, esthetics, and recreation, as applicable. Describe measures to mitigate undesirable effects such as pollution control and other procedures for habitat improvement.

4.2.1.3 Resources Committed. Discuss any irreversible and irretrievable commitments of resources (e.g., loss of land for competing uses, destruction of wildlife habitat, destruction of natural resources) that are expected if site preparation and facility construction proceed. Such losses should be evaluated in terms of their relative and long-term net impacts, as well as their absolute impacts.

#### 4.2.2 Facility Operation

This section should describe the interaction of the operating waste disposal facility and the environment. Measures planned to reduce any undesirable effects of the total project should be described in detail.

In the discussion of environmental effects, those that are considered unavoidable but either inherently temporary or subject to later amelioration should be clearly distinguished from those regarded as unavoidable and irreversible. Those effects that represent an irretrievable commitment of resources should receive detailed consideration.

The impacts of operation of the proposed facility should be, to the fullest extent practicable, quantified and systematically presented. In the discussion of each impact, make clear whether the supporting evidence is based on theoretical, laboratory, onsite, or field studies undertaken for the planned project or for other endeavors. The source of each impact and the population or resource affected should be made clear in each case. The impacts should be distinguished in terms of their effects on surface-water bodies, ground water, air, land, land use, ecological systems, and important plants and animals.

4.2.2.1 Radiological Impact on Biota Other Than Man. In this section, consider the impact on biota other than man attributable to the release of radioactive materials from the facility. The biota to be considered are those species of local flora and local and migratory fauna defined as "important" in Section 2.2. Since the region may contain many important species, concentrate efforts on those important species whose terrestrial and aquatic habitats provide the highest potential for radiation exposure.

4.2.2.2 Radiological Impact on Man. In this section, consider the radiological effects on man of operations and transportation of radioactive materials. Estimates of the radiological impact on man via various exposure pathways should be provided. The various possible pathways for radiation exposure of man should be identified and described in textual and flow-chart format. Discuss any exposure pathways, if they exist, involving radionuclide accumulation in specific components of the environment.

4.2.2.3 Effects of Chemical Discharges. Operation of the disposal facility may involve chemical discharges. In this section, the specific concentrations of nonradioactive wastes in effluents at the points of discharge should be compared with natural ambient concentrations without the discharge and also compared with applicable standards. The projected effects of the effluents for both acute and chronic exposure of the biota (including any long-term buildup in soils and sediments and in the biota) should be identified and discussed. Dilution and mixing of discharges into the receiving environs should be discussed in detail, and estimates of concentrations at various distances from the point of discharge should be provided. The effects on terrestrial and aquatic environments from chemical wastes that contaminate ground water should be included.

4.2.2.4 Effects of Sanitary and Other Waste Discharges. Describe and discuss the environmental impact associated with sanitary and other facility waste systems discussed in the preceding section.

4.2.2.5 Other Effects. Discuss any effects of operation that do not clearly fall under any single topic of paragraphs 4.2.2.1 through 4.2.2.4. These may include changes in land and water use at the project site; interaction of the facility with other existing or projected neighboring facilities; effects of construction and operation of roads, transmission corridors, railroads, etc.; and disposal of solid and liquid wastes other than those already discussed.

#### 4.2.3 Facility Closure Activities

This section should describe the interaction of the closure activities and the environment. Such activities are expected to include dismantling, decontamination, filling, grading, revegetation, marking, and capping. A statement should be made that includes a listing and description of the various activities that will be considered part of closure at the facility. Because of the short duration of the activities, the information requirements of this section, as described below, are similar to those of Section 4.2.1, which also deals with activities of short duration.

4.2.3.1 Land Use and Terrestrial Impacts. Describe how closure activities may disturb the existing terrain and wildlife habitats. Identify any impacts that will result from or be enhanced by closure activities. Of the impacts identified, indicate whether these will be temporary and end with facility closure or whether they will continue after the facility has been closed. Discuss measures designed to mitigate or reverse undesirable effects such as erosion control, dust stabilization, landscape restoration, control of truck traffic, and restoration of affected habitats.

The discussion should also include any effects of site closure activities the consequences of which may be beneficial to the region.

4.2.3.2 Water Use and Aquatic Impacts. The discussion of water use should describe the impact of facility closure activities on area water sources. Such

activities may include use of water for decontamination and reseedling and discharge of associated effluents and sediment. Describe the effects of these activities on fish and wildlife resources, water quality, water supply, esthetics, and recreation, as applicable. Describe measures to mitigate undesirable effects.

The discussion should also include any effects of site closure that may be beneficial to the region.

## Chapter 5. ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

The purpose of this chapter is to describe in detail the means by which the baseline data presented in other chapters were collected and to describe the plans and programs for monitoring the impacts of the proposed activities on the environment.\*

Section 5.1 addresses the measurement of preexisting characteristics of the site and the surrounding region. This program will establish a reference framework for assessing subsequent environmental effects attributable to the proposed activity and for use as baseline reference data at the time of site closure.

Attention should be directed to two considerations pertinent to Section 5.1. First, the term "preexisting" refers to the characteristics of the site prior to any waste-disposal-related activities. A given characteristic or parameter may or may not require assessment prior to site disturbance because of facility construction, depending on whether that particular characteristic may be altered at these stages. Second, in most instances this guide indicates the specific environmental effects to be evaluated; consequently, the parameters to be measured will be apparent. In some cases, it may be necessary to establish a monitoring program based on the applicant's own identification of potential or possible effects and to provide the underlying rationale for such a program. Accordingly, the plans for measurement of preexisting conditions should be carefully reviewed to ensure that these plans include all factors that must be subsequently monitored as discussed in Section 5.2.

Sampling design, frequency, methodology (including calibration and checks with standards), and instrumentation for both collection and analysis should be discussed as applicable.

In all cases, estimate the statistical validity of any proposed sampling program. Information should be provided on instrument accuracy, sensitivity,

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\*A regulatory guide on site suitability and characterization is under development and, when issued, should provide additional guidance in this area.

and (especially for highly automated systems) reliability. Where standard analytical or sampling techniques can be identified, they need only be so identified and referenced.

For quantitative descriptions of samples collected within each area of interest and each time of interest, descriptive statistics should include, unless justifiably omitted, the mean, standard deviation, standard error, and a confidence interval for the mean. In each case, the sample size should be clearly indicated. If diversity indices are used to describe a collection of organisms, the specific diversity indices used should be stated.

### 5.1 Preoperational Environmental Programs

The program for collection of initial or baseline environmental data prior to submittal of the environmental report should be described in sufficient detail to make it clear that the applicant has established a thorough and comprehensive approach to environmental assessment. The description of these programs should be confined principally to technical descriptions of instrumentation, scheduling, technique, and procedures.

Where information from the literature has been used, it should be concisely summarized and documented by reference to original data sources. Where the availability of original sources that support important conclusions is limited, provide either extensive quotations or references to accessible secondary sources.\* In all cases, clearly distinguish information derived from published results from information derived from the field measurements.

#### 5.1.1 Meteorological Baselines

Describe the program for obtaining information on local air quality and local and regional meteorology.

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Any reports of work (e.g., ecological surveys) supported by the applicant that are of significant value in assessing the environmental impact of the facility should be included as appendices or supplements to the environmental report unless these reports are otherwise generally available.



Identify sources of meteorological data used to determine the atmospheric dispersion characteristics reported in Section 2.3. Specify locations and elevations of observation stations, instrumentation, and frequency and duration of measurements for the applicant's measuring activities and for activities of governmental agencies or other organizations on whose information the applicant intends to rely. The description should show the basis for predicting such effects as the dispersion of airborne effluents and should present the methodology for gathering baseline data.

Describe in detail any models used either to derive estimates of basic meteorological information or to estimate the effects of effluents, and discuss their validity and accuracy.

#### 5.1.2 Hydrology and Water Quality

Describe the source of baseline ground-water data presented in Section 2.4.1. Provide a map of the site area showing the location of test holes, wells, springs, ditches, and drains used for the collection of baseline data. The location of lysimeters and tensionmeters in the unsaturated zone should also be shown on the map. Provide a summary table for the sampling locations shown on the map with the following information:

1. Ground elevation, drilled depth, intake depths, and elevations for wells;
2. Frequency and period of sampling; and
3. Water quality and hydrologic parameters measured.

Explain the rationale for the number and location of sampling points. Statistical analyses of data should be used to show that the baseline water quality parameter has been accurately characterized. Possible correlations of the water quality parameters with soil moisture and water table elevation should also be investigated. Measurements of water table and soil moisture should be sufficient to estimate the expected variations in these parameters throughout the life of the facility.

Also discuss precautions taken to avoid contamination of aquifers when installing monitoring wells or test holes in two aquifer systems.

If a body of surface water may be affected by the proposed activities, describe the programs by which the background condition of the water and the related ecology were determined. If a natural water body has already been subjected to environmental stress from pollutant sources, evaluate the nature of this stress and its consequences. Estimate the potential quality of the affected water body.

### 5.1.3 Terrestrial Environment

In this section, discuss the program used to assess the ecological characteristics of the site with primary reference to important species identified in Section 2.2. Those portions of the program concerned with determining the presence and abundance of important amphibious species should be detailed in terms of frequency, pattern, and duration of observation. Describe how taxonomic determinations were made and validated. In this connection, discuss the reference collection of voucher specimens or other means whereby consistent identification will be ensured.

Provide a description of the methods used, or to be used, for observing natural variations of ecological parameters. If these methods involve indicator organisms, the criteria for their selection should be presented. The discussion of methods should include estimates of standard error in making reported determinations.

Discuss the basis for predictions of any nonlethal physiological and behavioral responses of important species that may be caused by construction or operation of the facility. This discussion should be appropriately correlated with the description of the monitoring program, including estimates of the standard error for each correlation.

#### 5.1.4 Radiological Baselines

In this section, describe in detail the methods used to determine the pre-operational radiation levels at the site and concentrations of radionuclides in important local and regional biota, soil, sediment, vegetation, air, and surface and ground waters. Specific information should be provided on (1) the types of samples collected; (2) sampling locations clearly shown on a map keyed to a table listing sampling locations as a function of direction and distance from the proposed site; (3) analyses to be performed on each sample; (4) general types of sample collection equipment; (5) sample collection and analyses frequency; (6) lower limit of detection for each analysis; and (7) the approximate starting date and duration of the program. The discussion should include the justification for the choice of sampling sites, analyses, and sampling frequencies. Reference may be made to Sections 5.1.2 and 5.1.3 regarding meteorological and hydrological baseline studies.

Summarize any information available from the literature regarding background radiological characteristics of the site that were considered in designing the program.

### 5.2 Operational Monitoring

Describe the proposed operational monitoring program for planned operations. Review of this description will be facilitated if maps of proposed observation sites and tabular presentations of summary descriptors of such factors as sample collection and analysis frequency, type of sampling, method of collection, analytic method, preanalysis treatment, instrumentation, and minimum sensitivities are included. The discussion should include the justification for the choice of sampling sites, analyses, and sampling frequencies. The program description should be explicit with respect to the parameter limits that are not to be exceeded under normal operating conditions and with respect to the actions planned in the event the limits are exceeded.

#### 5.2.1 Meteorological Monitoring System

Describe the proposed operational meteorological monitoring system. In addition to the physical description, discuss how the data collected during

the preoperational monitoring were used to design the operational monitoring system.

Also discuss details of proposed maintenance and inspection of the monitoring system.

#### 5.2.2 Hydrological Monitoring System

Describe the proposed operational hydrologic monitoring system. In addition, discuss how the baseline hydrologic data were considered in the design of the operational monitoring system. Particular detail should be provided in the discussion for the piezometric surface and its expected variations, soil moisture variations, and the location of hydrostratigraphic units. Also discuss how any routine liquid effluent releases (e.g., water that collects in operational trenches from precipitation) will be monitored. Details of proposed inspection and maintenance of the monitoring system should also be discussed.

#### 5.2.3 Ecological Monitoring System

Describe the proposed operational ecological monitoring system. In addition, discuss how the baseline ecological data collected during the preoperational monitoring were used to design the system. Reference may be made to Section 5.1.3 regarding the selection of indicator organisms and statistical methods of analyses.

#### 5.2.4 Radiological Monitoring System

Describe the proposed operational radiological monitoring system. In addition, discuss how the baseline radiological data collected during preoperational monitoring were used to design the system. As with the preoperational monitoring program, specific information should be provided on (1) the types of samples collected; (2) sampling locations clearly shown on a map keyed to a table listing sampling locations as a function of direction and distance from the proposed site; (3) analyses to be performed on each sample; (4) general types of sample

collection equipment; (5) sample collection and analyses frequency; and (6) lower limit of detection for each analysis. The discussion should include the action levels for radionuclide concentrations in air and water samples and the actions to be associated with these levels. Reference may be made to Sections 5.2.1 and 5.2.2 regarding meteorological and hydrologic operational monitoring.

### 5.3 Postoperational Monitoring

Describe the postoperational monitoring system (meteorological, hydrological, and ecological) as conceptually planned using available data. Also describe how data collected from the operational monitoring program and from the facility's inspection and maintenance program will be considered in the final design of the postoperational monitoring system. This postoperational monitoring system should be designed to be a continuation of all preceding monitoring systems.

## Chapter 6. ENVIRONMENTAL EFFECTS OF ACCIDENTS

Discuss the environmental and health effects of possible accidents that may occur at the facility during operation. Accidents due to human error should be addressed. The period of site life during which the accident and consequences may occur should also be considered.

Provide accident analyses for the type of accidents listed below. Discuss the likely severity of the accident and its potential effect on the environment. A probability analysis based on existing data from operating sites and other studies may be used to assess the likelihood of such accidents occurring. Precautionary or mitigating measures to be followed to lower the probability of occurrence of these accidents should be described. This discussion is intended to provide a qualitative review and not a formal quantitative risk assessment.

Types of accidents to be addressed include:

1. Waste spillage,
2. Equipment failure or site worker error,
3. Fire and chemical reactions,
4. Mishaps involving transport vehicles, and
5. Nearby offsite accidents.

## Chapter 7. ECONOMIC AND SOCIAL EFFECTS OF PROPOSED PROJECT

In this chapter, describe the economic and social effects of the proposed project. There are, of course, limitations on the extent to which all the social and economic benefits and costs of a radioactive waste land disposal facility can be evaluated. The wide variety of benefits and costs are not only difficult to assess, but many are not amenable to quantification or even to estimation in commensurable units. Quantify primary benefits and costs such as the quantity of radioactive waste for disposal and the capital costs and operating and maintenance costs of the proposed facility. Other primary benefits and costs not amenable to quantification may be addressed qualitatively, using preestablished criteria recognized in the particular discipline.

Second- and higher-order costs or benefits (i.e., impacts flowing from first-order social and economic impacts) need to be discussed only where they would significantly modify the aggregate of costs or benefits, thus affecting the overall cost-benefit balance.

The primary benefits of a proposed project are those derived from the activities that generate the wastes and the value to these activities and necessity of the land disposal of radioactive wastes for these activities.

Examples of economic costs directly associated with a disposal facility include:

1. Cost of siting,
2. Cost of land,
3. Cost of preparing all licensing submittals,
4. License fees,
5. Preoperational costs,
6. Costs during facility operation,
7. Revenues during facility operation, including escrow funds,
8. Site stabilization costs, and
9. Cost of maintaining the site for as long as is necessary.

Examples of economic costs indirectly associated with a disposal facility include:

1. Cost of preparing the wastes for shipping,
2. Transportation cost,
3. Disposal fees,
4. Impact of costs on utility, medical, and other industries, and
5. Impact of costs on the public.

Other potential social and economic effects may include:

1. Tax revenues to be received by local and State governments,
2. Temporary and permanent new jobs created and payroll,
3. Incremental increase in regional product (value-added concept),
4. Creation and improvement of local roads or other transportation facilities,
5. Shortages of housing, including inflationary rentals or prices,
6. Congestion of local streets and highways,
7. Noise and esthetic disturbances,
8. Overloading of water supply and sewerage treatment facilities,
9. Crowding of local schools, hospitals, and other public facilities,
10. Overtaxing of community services,
11. Disruptions of local community caused by using the land,
12. Impairment of recreational values,
13. Deterioration of esthetic or scenic values,
14. Restrictions on access to areas of scenic, historic, or cultural interest,
15. Degradation of areas having historic, cultural, natural, or archeological value,
16. Removal of land from present or contemplated alternative uses,
17. Lost income from alternative land uses,
18. Decrease in real estate values in areas affected by the disposal operation,
19. Increased costs to local governments for the services required by the workers,
20. Esthetic effects of effluents,



21. Effects of ground-water alteration on local water supplies, and
22. Public attitude and public confidence.

Discuss significant costs and benefits that may be realized from the proposed project. Where the costs and benefits can be expressed in monetary terms, they should be presented in constant base dollars. In each instance where a particular cost or benefit is discussed, indicate, to the extent practical, who is likely to be affected and for how long. In the case of esthetic impacts that are difficult to quantify, provide, where applicable, pictorial drawings of structures or ground surface modifications visible to the public.

Any special measures to be taken to alleviate certain impacts should be described. This description should include a discussion of how the financial sureties presented in the license application will eliminate the potential economic burden on the locality.

## Chapter 8. ALTERNATIVES TO PROPOSED PROJECT

In this chapter, present a discussion of alternatives sufficiently complete to aid the Commission in developing and exploring all reasonable alternatives to the proposed project. The environmental impacts of the proposal and the alternatives should be presented in comparative form.

Discuss the range of practicable alternatives to general facility design features and the comparative analyses that led to the general design proposal and the selected site.

Present the site selection process as the consequence of an analysis of alternatives in which environmental and economic costs and benefits were evaluated and compared to identify several suitable candidate sites that were then subjected to a uniform comparison to make the final selection. Presentation of the process in clear, logical sequence is crucial. The comparison of alternatives should stop at the level where there is no difference between the alternatives in terms of environmental impact.

The applicant may wish to use the following definitions in discussing the site selection process:

- Region of Interest is the geographic area initially considered in the site selection process. This area may be the State, a group of contiguous States, a geographic region, or, in some cases, the entire land area of the United States.
- Candidate Areas are reasonable homogeneous areas within the region of interest investigated for potential sites. Candidate areas may be made up of a single large area or several unconnected ones. The criteria governing homogeneity include natural resources, geography, and population on which the potential project would have an impact.
- Potential Sites are those sites within the candidate areas that have been identified for preliminary assessment in establishing candidate sites.

- Candidate Sites are those sites that the applicant considers potentially licensable, capable of being developed, and otherwise appropriate for evaluation during the process of selecting a proposed site. It should be demonstrated that the candidate sites are among the best that could reasonably be found.
- Proposed Site is the site for which an applicant seeks a license to dispose of low-level radioactive waste. It should be possible to demonstrate that there is no alternative site that is obviously superior to the proposed site.

### 8.1 Selection of Candidate Areas\*

The first step will typically consist of defining the region of interest such as the geographic boundaries of an individual State or regional compact. Present an initial survey of site availability using methodology that provides a survey of the entire region available to the applicant. After identifying areas containing possible sites, discuss the process by which sites with less desirable characteristics were eliminated without extensive analysis.

The purpose of the site selection process is to identify a reasonable number of realistic siting options.

In assessing potential candidate areas, the applicant may place primary reliance on reconnaissance-level information. Reconnaissance-level information refers to information or analyses that can be retrieved or generated without the performance of additional site-specific investigations. It includes relevant scientific literature, reports of government or private research agencies, consultation with experts, and analyses performed using such information. It may also include short-term limited field investigations, particularly for selection of the proposed site from the candidate sites. The amount of reconnaissance-level information and the extent of analyses included should depend on (1) the importance and magnitude of the potential impact on the evaluation and (2) whether

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\* As used in this chapter, the term "area" is defined as several square miles (large enough to contain several sites).

the decision to be made from it is one of identifying a region of interest, identifying candidate sites, or selecting a proposed site.

It is expected that each candidate area considered will be small enough for any site developed within it to have essentially similar environmental relationships (e.g., proximity to the same urban area). The areas considered should not be restricted to those containing land actually owned by the applicant, a State, or the Federal Government.

If a State, region, locality, or tribe within the region of interest has a law specifically affecting radioactive waste disposal siting, the law should be cited and any applicable constraints described.

Display the areas being appraised by means of maps and charts portraying the distribution of the sources of waste for near-surface disposal,\* environmental and other features, and other relevant information. (A consistent identification system should be established and retained on all graphic and verbal materials in this section.) The maps should display pertinent information such as the following:

1. Areas considered by the applicant;
2. Population distribution;
3. Surface- and ground-water resources;
4. Railroads, highways, and waterways (existing and planned) suitable for waste transportation;
5. Important topographic features (e.g., mountains, marshes, fault lines);
6. Dedicated land-use areas (e.g., parks, historical sites, wilderness areas, testing grounds, airports);
7. Valuable agricultural, residential, recreational, or other areas that may be impacted; and
8. Significant sources of waste for near-surface disposal (if they are within the candidate area).

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\*To avoid repetition, the applicant should refer, as appropriate, to material presented in Chapter 1, "Purpose and Need for Proposed Project."

The U.S. Geological Survey's 7.5-minute or 15-minute quadrangles may be appropriate base maps for displaying candidate areas. Separate maps depicting various features of the candidate areas should have the same scale for ease of reference.

Consider factors such as the following in screening candidate areas:

1. The primary criterion should be the acceptability of the area for long-term waste isolation, i.e., the proposed site suitability requirements of § 61.50 of 10 CFR Part 61.
2. Geographic screening may be based on significant waste sources and transportation routes.
3. Only the determining characteristics of the identified areas need be discussed. Specific tracts need not be identified at this stage unless already owned by the applicant, a State, or the Federal Government.
4. The compatibility with any existing land-use planning programs for the development of each candidate area should be indicated, and the views of local planning groups and interested citizens concerning use of the candidate area should be summarized.
5. Current use of the land should be documented and the potential for preempting other highly valued uses of land such as agriculture, recreation, residences, or industry should be noted.
6. The availability of a labor pool for facility operation within commuting distance should be estimated.

## 8.2 Selection of Candidate Site Alternatives

At this point, the number of suitable areas will have been reduced, making possible the investigation of a limited number of alternative sites. These alternative sites and their corresponding general facility design features should be briefly described. The description should include site plans indicating locations considered for the near-surface disposal of particular types of radioactive

waste and any transportation considerations that significantly affect site desirability.

The criteria to be used in selecting the candidate site alternatives are similar to the criteria used in selecting candidate areas, as described in Section 8.1. Application of these criteria in greater depth will be required, however, since the relative merits of the various sites may be less obvious than those of the aggregate areas in which they are located.

The applicant should conduct preliminary reconnaissance-type environmental investigations at alternative sites. Detailed engineering design studies are not necessary for all alternative sites. However, conceptual designs and transportation route studies are appropriate.

Provide a discussion of whether the alternatives will comply with applicable Federal, State, and local environmental quality standards and requirements.

### 8.3 Analysis of Candidate Site Alternatives

An analysis of realistic alternatives in terms of both economic and environmental costs should be made to show why the proposed site is preferred over all other candidate site alternatives. In presenting the analysis, insofar as possible, a tabular format showing side-by-side comparison of alternatives with respect to selection criteria should be used.

Quantification may not be possible for all factors because of the lack of adequate data or lack of a generally accepted standard. Under such circumstances, qualitative and general comparative statements supported by documentation may be used. Where possible, experience derived from the operation of facilities at the same or at an environmentally similar site may be helpful in appraising the nature of expected environmental impacts.

Various criteria have been suggested in this guide for use in comparing the alternative sites and the proposed site. The criteria selected should reflect benefits and costs that were evaluated in selecting the candidate site. The following factors may be helpful as a checklist:

- Engineering and Environmental Factors
  - Meteorology
  - Geology
  - Climatology
  - Seismology
  - Soils
  - Ground- and surface-water hydrology
  - Population distribution
  - Sensitivity of aquatic and terrestrial habitats affected
  - Commitment of resources
  - Dedicated areas
  - Projected recreational usage
  - Scenic values
  - Archeological, historic, and unique cultural resources
  - Mineral resources
- Land-Use Factors (including compatibility with zoning or use changes)
  - Zoning
  - Local land-use plans
  - Suitability of land for competing uses
- Institutional Factors (e.g., State or regional site certification)
  - Local laws and environmental standards
  - Political subdivisions
- Cost Factors
  - Capital costs
  - Operating and maintenance costs (annual)
  - Closure and decommissioning costs
  - Licensing costs
  - Engineering costs
- Public Concerns

#### 8.4 Alternative Site Designs

Discuss the design of the proposed project and alternative designs available by means of a comparative assessment. The design requirements proposed in § 61.51 of 10 CFR Part 61 should form the primary basis for evaluating site designs.

Discussion of alternative site designs should consider the following, as appropriate:

- Receiving, classifying, and processing waste
- Planned location and configuration of waste disposal units on the site
- Construction of disposal units
- Onsite transport of waste and placement in disposal units
- Monitoring during and following operation of site

Environmental effects of alternative designs should be documented and supported by available information. To the extent practicable, the magnitude of each effect should be quantified. Where quantification is not possible, qualitative evaluations should be used.

In some specific cases, accurate estimation of an effect that is believed to be very small may require a data collection effort that would not be commensurate with the value of the information to be obtained. Such circumstances should be considered in the presentation.



## Chapter 9. SUMMARY BENEFIT-COST BALANCE

In this chapter, the benefit-cost statement should be presented. The presentation should be made in the form of a narrative with accompanying tables and charts. It should make clear what the applicant considers to be the important benefits and costs of the proposed facility and why, in the judgment of the applicant, the benefits outweigh the costs.

Develop criteria for assessing and comparing benefits and costs where these are expressed in nonmonetary or qualitative terms. The rationales for the selection among land disposal alternatives, as well as among design alternatives, should be presented. In any case, carefully describe any aggregation of effects, and discuss the tradeoffs that were made in order to justify the proposed operation. If any of the benefits or costs are deleted from the analysis, the rationale for doing so should be explained. Key all the terms used in the benefit-cost analysis to the relevant sections of the environmental report.

## Chapter 10. STATUS OF COMPLIANCE

In this chapter, list all Federal permits, licenses, approvals, and other entitlements required by Federal, State, local, and regional authorities that must be obtained for protection of the environment, and discuss the status of compliance with these requirements. The discussion of alternatives in the report should include a discussion of whether the alternatives will comply with such applicable environmental quality standards and requirements.

## Chapter 11. REFERENCES

Provide a bibliography of all sources used in preparation of the environmental report. References cited should be keyed to the specific sections and page numbers to which they apply.

## DRAFT VALUE/IMPACT STATEMENT

### 1. PROPOSED ACTION

#### 1.1 Description

The proposed action is to issue for comment a regulatory guide that would provide specific guidance on preparation of environmental reports submitted to NRC in support of an application for a license to receive, possess, and dispose of radioactive waste at near-surface disposal sites. This regulatory guide is supported by existing NRC regulations and reflects experience gained in the past from actual licensing cases, as well as NRC staff judgment in areas where there is no direct experience.

#### 1.2 Need

The Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended, provide the NRC with licensing and related regulatory authority concerning the disposal of radioactive waste.

10 CFR Part 51 provides general guidance to the format and content of environmental reports submitted in support of licenses to receive, possess, and dispose of radioactive waste at near-surface disposal sites. However, detailed guidance is essential to applicants for the efficient preparation of environmental reports for waste disposal facility licenses and their review by the NRC staff. Such guidance is not presently delineated in NRC regulations or regulatory guides. Based on experience gained in the review and issuance of licenses, the NRC staff has identified information that should be contained in environmental reports to reflect present needs and practices. This guidance will be helpful to both applicants and NRC staff in reducing the costs and time involved in preparing environmental reports.

### 1.3 Value/Impact

#### 1.3.1 NRC

Issuance of guidance would result in a significant reduction in the number of questions and requests for clarification that would otherwise be submitted by the NRC staff to applicants, would improve the consistency in application reviews as a result of more uniform application submittals, would reduce the amount of staff review effort in license processing, and would expedite licensing actions.

#### 1.3.2 Other Government or State Agencies

With respect to Agreement States to which license applications are submitted, the value/impact of issuance of the guidance will be the same as indicated above. For the NRC, issuance of the guidance will likely result in the submittal of environmental reports that are more understandable to other Federal and State agencies reviewing them.

#### 1.3.3 Industry

The applicant will likely save funds because of expediting licensing actions and reducing the staff review effort.

#### 1.3.4 Public

Since there is no reduction or relaxation of any environmental requirements, no impact on the public is anticipated other than an improved public understanding of the information considered by NRC in the licensing process.

### 1.4 Decision

Specific guidance on preparation of environmental reports in support of licenses to authorize receipt, possession, and disposal of radioactive waste in near-surface disposal facilities should be clearly delineated. Guidance should therefore be issued.

## 2. TECHNICAL APPROACH

### 2.1 Technical Alternatives

None available.

## 2.2 Discussion and Comparison of Technical Alternatives

Not applicable.

## 2.3 Decision on Technical Approach

Not applicable.

## 3. PROCEDURAL APPROACH

### 3.1 Procedural Alternatives

Potential RES procedures that may be used to issue the guidance include the following:

- Regulation
- Regulatory guide
- ANSI standard, endorsed by a regulatory guide
- NUREG report
- Branch position

### 3.2 Value/Impact of Procedural Alternatives

A regulation on Licensing and Regulatory Policy and Procedures for Environmental Protection, 10 CFR Part 51, has been prepared by the NRC staff, which provides only general guidance rather than specific regulatory requirements. Regulatory guides are issued to describe and make available to the public methods acceptable to the NRC staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in specific evaluations, or to provide guidance to the applicant. No ANSI standard has been developed. A NUREG does not appear appropriate, since a NUREG usually contains only results of specific studies and/or basic research findings. A specific branch position has not been prepared, nor is one anticipated. Preparation of a regulatory guide appears to be the best viable course of action because of the extent of

detail to be contained in the guidance and the need to provide for flexibility in adapting the guidance to individual cases.

### 3.3 Decision on Procedural Approach

A regulatory guide should be issued for comment.

## 4. STATUTORY CONSIDERATIONS

### 4.1 NRC Authority

The Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended, provide the NRC with licensing and related regulatory authority concerning the disposal of radioactive waste.

### 4.2 Need for NEPA Assessment

The proposed action is not a major action, as defined in 10 CFR Part 51, and therefore the staff does not have to prepare an environmental impact statement.

## 5. RELATIONSHIP TO OTHER EXISTING OR PROPOSED REGULATIONS OR POLICIES

The guide is intended to provide instructive guidance on the format and content of environmental reports submitted to the NRC in support of a license to receive, possess, and dispose of radioactive waste in near-surface disposal facilities. This action is supported by the regulation on Licensing and Regulation Policy and Procedures for Environmental Protection (10 CFR Part 51).

## 6. SUMMARY AND CONCLUSIONS

A regulatory guide should be issued for comment in order to provide detailed guidance to applicants in preparing environmental reports, to improve the NRC staff consistency in reviewing applications as a result of uniform applications, to reduce the amount of staff time expended in licensing, and to provide guidance to the Agreement States in reviewing environmental reports.

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