NUREG-1300

Environmental Standard Review Plan

for the review of a license application for a Low-Level Radioactive Waste Disposal Facility

Environmental Report

U.S. Nuclear Regulatory Commission

Office of Nuclear Material Safety and Safeguards

April 1987

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NUREG-1300

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CONTENTS AND STATUS SHEET

PREFACE

This document, "Environmental Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility," was prepared by the staff of the U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Material Safety and Safeguards, Division of Waste Management. The individual environmental standard review plans (ESRPs) that make up this document constitute a series of instructions for the staff to utilize in the conduct of environmental reviews of applications for new low-level radioactive waste disposal facilities (LLRWDFs). The composite ESRP is intended to serve three purposes:

(1) to provide guidance to the NRC staff

(2) to ensure that licensing decisions made by NRC conform to the National Environmental Policy Act of 1969 (NEPA)

(3) to meet NRC's responsibilities under Section 9 of the Low Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPAA)

The preparation of this document is especially timely. Because of the passage of the LLRWPAA and its predecessor, the Low Level Radioactive Waste Policy Act of 1980, the States and regional compacts formed by the States have undertaken considerable activity aimed at the development and eventual operation of new low-level radioactive waste disposal facilities. An applicant for a license is required by Part 51 of Title 10 of the Code of Federal Regulations (10 CFR 51) to submit an environmental report (ER). This ER will serve as the basis for an environmental statement to be prepared by NRC as part of the licensing process.

Use of the ESRPs in this document by the NRC staff will ensure the following:

(1) Data essential to a specific environmental review and subsequent decision-making process will be supplied and reviewed.

(2) Appropriate consideration, including coordination and consultation, will be given to other Federal and State requirements applicable to a particular environmental review.

(3) The analysis and evaluation procedures for review of a given area are standardized, thus achieving uniformity of approach.

(4) Each impact assessment will concentrate on the review of those potential environmental impacts of significance, and analysis of irrelevant data or of insignificant impacts will be minimized.

(5) The analysis methods to be used and staff judgments are objective and based on sound analytical procedures. The ESRPs have been prepared for an environmental statement that will embrace the range of environmental factors and conditions expected for the majority of LLRWDF applications.

It is recognized that conditions will occur from time to time that will not fall within the ESRPs that are included in this document. The plans have been prepared to permit the inclusion of such conditions in the environmental review.

This document has been prepared with due regard for the NRC's obligations under NEPA and any applicable interpretations of that Act, including the Commission's Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions under 10 CFR 51. These regulations were revised in 1984 to reflect the Commission's adoption of the Council on Environmental Quality's (CEQ's) 1978 regulations implementing NEPA. The CEQ regulations and NRC's conforming 10 CFR 51 reflect a significant departure from past agency practice in the content and preparation of environmental statements. The organization of this document closely follows the format for an environmental statement (shown at the end of this preface) included in the revised 10 CFR 51.

Each ESRP includes applicable references to related Federal agency regulations, guidelines, or acts that will affect the staff's environmental review. Provisions have been made for periodic revisions of these plans to respond to future regulations, guidelines, or acts affecting NRC's environmental review procedures. Comments and suggestions for improving this document, as well as notices of errors or omissions, should be sent to George C. Pangburn, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

Each ESRP includes a section describing the data or information required to complete the environmental review specified by that plan. The contents of Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste," were considered in the preparation of each ESRP, but were not a constraint in developing the data or information requirements. Thus, the overall data and information requirements of these ESRPs are not necessarily consistent with the guidance provided in Regulatory Guide 4.18.

The NRC staff anticipates the preparation of a revised version of Regulatory Guide 4.18 that will accurately reflect the ESRP requirements for data and information to be supplied in an applicant's ER. During the period before the preparation of this revision, the review procedures outlined in each ESRP will be followed. Some latitude in the form of data and information requirements will be allowed, reflecting NRC's understanding of the need for a transition period.

The following instructions, applicable to most of the ESRPs, are provided here to avoid repetition in each plan:

(1) As an initial step in each environmental review, the reviewer is expected to develop an understanding of the entire project as proposed by the applicant. The purpose of this instruction is to ensure that reviewers place their individual reviews in perspective in relation to the overall project and concentrate their efforts on issues of substance. This general project review is to be conducted as the first step of the overall environmental review process and is to be completed before requests for additional information are developed.

(2) With very few exceptions, the reviews of a given ER are conducted in parallel, and, therefore, the completed results of reviews performed under related plans may not be available to a reviewer before that reviewer initiates the individual environmental review.

(3) Although each ESRP represents a discrete segment of the NRC's overall environmental review, no review can be completed without some interrelation with related reviews as well as with the entire project. All reviewers are instructed to maintain close communication with other reviewers throughout the review procedure. The NRC Environmental Project Manager, who is the central point of contact for all reviewers, will usually initiate contacts with outside groups and must be informed of all such contacts.

(4) Each reviewer is expected to seek out and be aware of any related technical analyses and assessments in areas of concurrent jurisdiction, such as air and water quality and aquatic impacts. Particular attention should be given to those analyses and assessments prepared under provisions of memoranda of understanding between the NRC and other Federal or State agencies. When so directed by such memoranda, the reviewer will participate with Federal and State officials in the development of the impact assessments under the relevant ESRPs. Working through the Environmental Project Manager, the reviewer will be responsible for resolving any differences between staff analyses and analyses of other agencies. When such resolution is not possible, the reviewer will ensure that all viewpoints are addressed in the environmental statement or that the specific provisions of the relevant memoranda of understanding have been followed.

(5) Where an analysis procedure, as outlined in an ESRP, has been conducted by an applicant and reported in the applicant's ER, the reviewer need not repeat the analysis. However, the applicant's work should be evaluated in sufficient depth to permit verification of the analysis and its results.

(6) Each reviewer will maintain complete documentation of contacts with outside agencies, organizations, and individuals.

(7) The analysis procedure for many of the ESRPs directs the reviewer to consult with the applicant or request additional information in certain specified circumstances. All consultation or requests will be made through the NRC Environmental Project Manager, using appropriate NRC management procedures.

(8) Those sections of the environmental statement that contain recommendations to the NRC decisionmaker shall reflect the results of a consensus among the reviewers, and the Environmental Project Manager shall have the authority to resolve disagreements between reviewers so as to arrive at a recommendation. Development of recommendations will involve input from reviewers, the Environmental Project Manager, and those other reviewers that would be affected by the recommendation.

The environmental statement (ES) should contain the following elements:

ACKNOWLEDGMENTS

This Environmental Standard Review Plan (NUREG-1300) for the review of license applications for low-level radioactive waste disposal facilities was prepared by the staff of the Division of Waste Management, Office of Nuclear Material Safety and Safeguards, under the direction of George Pangburn. The following members of the staff and management were contributors to the document:

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ABSTRACT

The Environmental Standard Review Plan (ESRP) (NUREG-1300) provides guidance to staff reviewers in the Office of Nuclear Material Safety and Safeguards who perform environmental reviews of environmental reports prepared by applicants in support of license applications to construct and operate new low-level radioactive waste disposal facilities. The individual ESRPs that constitute this document identify the information considered necessary to conduct the review, the purpose and scope of the review, the analysis procedure and evaluation, the formal input to the environmental statement, and the references considered appropriate for each review. The ESRP is intended to ensure quality and uniformity of approach in individual reviews as well as compliance with the National Environmental Policy Act of 1969. In addition, the ESRP will make information about the environmental component of the licensing process more readily available and thereby will serve to improve the understanding of this process among the public, States and regional compacts, and the regulated community.

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 1.1
PURPOSE AND NEED

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 1.0, "Purpose of and Need for Proposed Project"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with regional compacts and State agencies
- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant regarding the proposed action, its purpose, and the need that led the applicant to apply for a license to dispose of low-level radioactive waste. The staff will review the information on the types, sources, and quantities of radioactive waste to be disposed of; current waste disposal methods; continued availability of current waste disposal methods; and any other information deemed important.

3. ANALYSIS PROCEDURE

The staff will (1) verify that the information adequately describes the purpose of and need for the proposed action; (2) confirm the applicant's data on projected sources, volumes, and types of waste; and (3) verify any additional information that supports the case for the proposed action.

4. EVALUATION

On the basis of the analysis of the information, the staff will be able to independently confirm the purpose of and need for the proposed near-surface disposal facility. This evaluation will be critical to the staff assessment of alternatives to be provided in Section 2 of the ES.

5. INPUT TO THE ES

The staff will prepare Section 1.1, "Purpose and Need," of the ES. In addition, the staff will provide pertinent information to the staff reviewers responsible for the following ES sections:

- 2.2.1, "Alternative of No Action"
- 2.3, "Staff Assessment of Alternatives and Recommendations"
- 4.13, "Relationships Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity"

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 1.2
SCOPING PROCESS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- None

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Staff summary of determinations and conclusions of the scoping process

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the scoping process in accordance with 10 CFR 51.28 and 51.29. In this section of the ES, the staff will set forth the scope of the ES, the significant issues to be analyzed in depth in the ES, and other information that will bound the Commission's environmental review of the proposed action.

3. ANALYSIS PROCEDURE

The material to be reviewed is informational in nature, and a detailed technical analysis is not required. The staff will use the information in the staff summary of determinations and conclusions of the scoping process to provide a focus for the ES.

4. EVALUATION

This section is largely descriptive in nature, and, therefore, it is the staff's responsibility to ensure that the results of the scoping process as identified in the aforementioned staff summary are accurately reflected in the ES.

5. INPUT TO THE ES

The staff will prepare Section 1.2, "Scoping Process," of the ES. This section will describe the depth of analysis and degree of emphasis for various subject areas and will directly affect the contents and structure of the remainder of the ES.

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 1.3
STATUS OF REQUIRED PERMITS AND APPROVALS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 9.0, "Status of Compliance"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Control of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's identification and assessment of environmentally related authorizations required by local, regional, State, and Federal agencies as a prerequisite to licensing or granting of a permit for a near-surface disposal facility. The scope of the review will consist of the identification of those agencies and authorizations that deal with environmental issues. This will include (1) determination of status, (2) identification of environmental concerns, and (3) potential administrative problems that could delay or prevent agency authorization. The results of this environmental review will be used by the staff reviewers responsible for the remainder of the ES to help identify areas of environmental concern and determine applicant compliance with existing standards and regulations.

Information needed for the staff's review will usually include the following:

(1) name of each related authorization, including the responsible agency and the applicable law, ordinance, or regulation (from the ER)

(2) principal environmental factors to be covered by the authorization (from the ER)

(3) date of application/initiation and scheduled date of issuance of each authorization (from the ER and consultation with local, State, and Federal agencies)

(4) current status of each authorization (from consultation with local, State, and Federal agencies)

3. ANALYSIS PROCEDURE

The basic listing and status of authorizations can be obtained from the applicant's ER. The staff reviewers responsible for other sections of the ES will be consulted to determine if there are other authorizations not listed in the applicant's ER that should be added to this list. As part of this consultation, the staff will determine which authorizations pertain to environmental concerns. For each environmentally related authorization, the staff will establish the following:

(1) current status of each authorization

(2) environmental concerns of the authorizing agency that are to be addressed by the staff reviewers responsible for the relevant ES sections

(3) potential problems that may affect granting of the authorization

(4) administrative requirements of the authorizing agencies

4. EVALUATION

The staff will evaluate the list of authorizations to ensure that (1) it is correct, (2) the environmental concerns of the authorizing agency have been identified, (3) the potential problems that may affect granting of the authorization have been identified, and (4) these concerns and potential problems are being considered by the staff reviewers responsible for the relevant ES sections. The staff will ensure that the status of each environmentally related authorization is current, and will contact the responsible agency for this information when it has not been determined by other staff reviewers.

5. INPUT TO THE ES

The staff will prepare Section 1.3, "Status of Required Permits and Approvals," of the ES. In addition, the staff will provide descriptions of those authorizations that pertain to environmental issues to the staff reviewers responsible for other ES sections and will identify any potential problems that should be considered by those staff reviewers.

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.1
DESCRIPTION OF THE PROPOSED ACTION

This ESRP consists of the following:

ESRP 2.1.1 Location
ESRP 2.1.2 Description of Disposal Facilities, Disposal Units, and Design Features
ESRP 2.1.3 Waste Disposal Operations
ESRP 2.1.4 Environmental Monitoring and Surveillance
ESRP 2.1.5 Site Closure and Stabilization
ESRP 2.1.6 Institutional Controls
ESRP 2.1.7 Financial Assurances

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.1.1
LOCATION

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1, "Geography and Demography"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to request for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's description of the geographical location of the applicant's preferred site. The scope of the review will consist of a description of the geography in sufficient detail in order to orient the reader and to establish a geographical point of reference for other descriptive material (e.g., land and water use and ecology).

Information needed for the staff's review will usually include the following:

(1) site location: State, county, latitude and longitude, and universal transverse Mercator coordinates (from the ER)

(2) area of the site (from the ER)

(3) distance and direction from the nearest major city, nearby towns and readily recognized landmarks, and nearby major highways, rivers, and other bodies of water (from the ER and site visit)

(4) for geographical orientation, simplified maps centered on the site: one general map with a radius of approximately 50 kilometers and a second map with a radius of approximately 10 kilometers (from the ER)

(5) a topographic map of the site and environs (from the ER)

3. ANALYSIS PROCEDURE

Because this section will be used primarily for orientation purposes, the necessary information usually can be obtained from the applicant's ER. The staff will visit the site to verify that important features have been noted.

4. EVALUATION

The staff will establish whether the descriptive information clearly and concisely orients the reader with regard to the location of the preferred site. The staff will verify both by site visit and by independent review of geographical information that the descriptive information is correct and complete.

5. INPUT TO THE ES

The staff will prepare Section 2.1.1, "Location," of the ES. This section will briefly and clearly orient the reader with regard to the site location and will be a source of background information for the staff reviewers responsible for Section 3 of the ES.

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.1.2
DESCRIPTION OF DISPOSAL FACILITIES, DISPOSAL UNITS, AND DESIGN FEATURES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 4.2, "Facility Description"
- 4.3, "Support Facilities"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's concise description of disposal facilities, disposal units, and design features at the applicant's preferred site. The scope of the review will consist of (1) the general layout of the applicant's preferred site; (2) the type, number, and location of disposal units; (3) the design features that are designed to provide long-term isolation of disposed waste; (4) improvement of the site's natural characteristics for achieving the goal of protecting public health and safety; and (5) utility systems, access roads, railroads, and auxiliary buildings. The staff may reference applicable sections of the staff's safety evaluation report (SER), which will provide more detail.

Information needed for the staff's review will usually include the following and should be accompanied by an appropriate scaled map or drawings and submitted with other references:

(1) description of site boundary, buffer zones, disposal units, location of buildings, surface features, and restricted area

(1) description and location of site boundary, buffer zones, disposal units, buildings, surface features, and restricted area

(2) description of site utility supplies and systems

(3) description of equipment to be used for construction and for the placement of waste into the disposal units

(4) description of the design features that are required to ensure the long-term performance objective

3. ANALYSIS PROCEDURE

The staff will verify that the information is sufficient to support the assessment in the EIS. The detailed analysis and evaluation of the design and construction of the proposed low-level radioactive waste disposal facility and the capability of the facility to meet the performance objectives of Subpart C to 10 CFR 61 will be presented in the staff's SER.

The staff will ensure that the applicant's description of facilities, buildings, and equipment to be used for construction and for the placement of waste into the disposal units is adequate. The site boundary, buffer zones, disposal units, buildings, surface features, restricted area, and site utility supplies and systems as well as roadways and parking area should be shown on an appropriate scaled map or drawings.

The staff will ensure that the applicant's descriptions of the design features of the land disposal facility and disposal units related to the following functions are sufficient for the purposes of the ES:

(1) minimize infiltration of water into disposal units
(2) ensure the integrity of disposal unit covers
(3) ensure the structural stability of backfill wastes and covers
(4) minimize contact of waste with standing water
(5) provide adequate site drainage during operations and after closure
(6) facilitate site closure and stabilization
(7) minimize the need for long-term maintenance
(8) provide a barrier against inadvertent intrusion
(9) maintain occupational exposures as low as is reasonably achievable
(10) provide adequate monitoring of the disposal site
(11) provide an adequate buffer zone for monitoring and carrying out potential mitigative actions, in accordance with 10 CFR 61.12(c).

The staff will ensure that the applicant's construction plans, including excavation, backfilling, and compaction methods and procedures, measures for directing water away from the disposal areas and waterproof techniques required to enhance and improve the ability of the natural site characteristics to confine the waste after disposal, are complete.

Finally, the staff will review and evaluate the applicant's description of auxiliary buildings and facilities, such as the administration building,

storage and waste handling building, decontamination area for equipment, and surface storage and protection of excavated materials.

4. EVALUATION

The staff will verify that sufficient information pertaining to disposal facilities, disposal units, and design features has been provided in the ER to satisfy the requirements and guidance of Regulatory Guide 4.18. The information should be adequate so that it can serve as the basis for assessing and determining potential visual and esthetic effects on the surrounding environment. The staff then will determine the extent to which esthetics were considered in integrating the proposed disposal facility with the surrounding environment.

5. INPUT TO THE ES

The staff will prepare Section 2.1.2, "Description of Disposal Facilities, Disposal Units, and Design Features," of the ES. In addition, the staff will provide pertinent information to the staff reviewers responsible for the following ES sections:

- 2.2.3, "Alternative Disposal Facilities, Disposal Units, and Design Features"
- 2.2.5, "Summary Alternatives for Detailed Consideration"
- 2.3, "Staff Assessment of Alternatives and Recommendations"

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.1.3
WASTE DISPOSAL OPERATIONS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 4.2, "Facility Description"
- 4.3, "Support Facilities"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's concise description of the waste disposal operations to be carried out at the applicant's preferred site. The scope of the review will consist of (1) the receipt, handling, inspection, and emplacement of the low-level waste into the disposal unit excavation; (2) the operations to minimize the development of void spaces between waste containers; (3) the procedures for filling the void spaces between placed waste packages; (4) the procedures for placing and compacting fill cover and engineering materials over the waste during the operational phase; (5) the procedures for locating and marking disposal unit boundaries; and (6) the provision of a buffer zone around the disposal facility to reserve an area if it should be necessary to take mitigative measures.

Information needed for the staff's review will include the following:

(1) description of measures for examining, surveying, and inspecting arriving waste shipments for compliance with applicable regulations on transportation and proper labeling and classification of waste contents

(2) description of procedures for handling, segregating, and temporarily storing the waste

(3) description of waste emplacement equipment and operations that allow waste package integrity to be maintained and worker exposure to be minimized

(4) description of operations to minimize and of materials to backfill void spaces between waste containers (e.g., stacking arrangement for containers; engineering properties of backfill material such as quality, durability, gradation, placement moisture, density, permeability, compressibility, and thermal, chemical, and radiological effects on backfill materials resulting from environmental conditions existing in disposal unit)

(5) description of materials to be placed as shielding over the emplaced waste up to the top of the individual disposal unit excavations (type(s) of materials, quality, durability, thickness(es), strength, placement moisture and compaction density requirements, permeability, compressibility, erosion resistance, and radiation attenuation properties, and thermal, chemical, and radiological effects on proposed materials)

(6) description of the procedures for locating, marking, surveying, and accurately recording the locations and boundaries of backfilled disposal units

(7) description of the plans for reserving a sufficiently sized buffer zone within the facility areal boundary that would permit mitigative measures (e.g., elimination or control of contaminated leachate) to be taken, if required

The applicant should provide the above information in Section 2.0 of the ER; however, Section 4.0 of the applicant's safety analysis report (SAR) would provide similar information in greater detail, which the staff may refer to in its environmental review when assessing the completeness and acceptability of this information. NUREG-1200 provides guidance on the information to be provided in the SAR on waste disposal operations.

3. ANALYSIS PROCEDURE

The staff will verify that the information adequately describes the waste disposal operations for the proposed low-level waste disposal facility. This information will be used by the staff in its assessment of the environmental effects of the proposed disposal facility described in Section 5.0 of the ER.

The staff's analysis of the information on waste disposal operations will be closely coordinated with that of the information provided by the applicant in Sections 2.1 and 3.0 of the ER. The purpose of this coordination is to verify that the applicant's descriptions of the waste disposal operations reviewed under this ESRP are consistent with the information provided in the following ER sections: (1) Section 2.1.2 with respect to the layout and design features of the disposal units; (2) Section 2.1.4 with respect to the instrumentation

and procedures to be used in surveillance and monitoring for surface water infiltration, groundwater movement, and settlement of the disposal units that would reflect the performance of the cover materials placed over the waste; (3) Section 2.1.5 with respect to the cover materials placed over the waste containers and the satisfactory performance of these materials in relation to the long-term stability aspects of the site closure plan; and (4) Sections 3.4 and 3.5 with regard to the information on site characteristics and the description of disposal unit excavations, backfill materials, and groundwater conditions.

On the basis of its review of the information in the ER and SAR, the staff may request that the applicant supply additional information if the information provided by the applicant is not adequate.

4. EVALUATION

The staff will verify and ensure that sufficient descriptive information on the waste disposal operations has been provided to permit an assessment of the environmental effects of the proposed disposal facility (Section 5.0 of the ER).

5. INPUT TO THE ES

The staff will prepare Section 2.1.3, "Waste Disposal Operations," of the ES. In addition, the staff will verify the completeness and accuracy of the information provided to the staff reviewers responsible for ES Sections 2.1.4, 2.1.5, and 3 as it pertains to proposed waste disposal operations and their effect on design features, environmental monitoring and surveillance requirements, site closure and stabilization plans, and hydrologic and geologic considerations of the disposal unit excavations.

6. REFERENCES

U.S. Nuclear Regulatory Commission, NUREG-1200, "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility," January 1987.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.1.4
ENVIRONMENTAL MONITORING AND SURVEILLANCE

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 8.1, "Preoperational Environmental Programs"
- 8.2, "Operational Monitoring"
- 8.3, "Postoperational Monitoring"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.2, "Description of Disposal Facilities, Disposal Units, and Design Features"

Standard(s) and/or Guide(s)

- NUREG-1200, "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility," Sections 4.1 and 4.2 of Standard Review Plan 2.9

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultations with State (or regional) compacts and State agencies

- "Draft Technical Position Paper - Environmental Monitoring of Low-Level Waste Disposal Facilities," Division of Waste Management, to be published

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the design of the applicant's environmental monitoring and surveillance program. The scope of the review will consist of the instrumentation, schedules, techniques, and procedures for environmental monitoring and surveillance of the preferred site and its environs. Special care must be taken to critically examine potential exposure pathways on the basis of the baseline data (ecological, meteorological, climatic, hydrological, geological, geochemical, and seismic) obtained from the applicant's field measurements during the preoperational phase.

Information needed for the staff's review will usually include the following:

(1) kinds of samples collected, frequency of collection, and locations of each sample (a map that identifies each location as a function of direction, elevation, and distance from the proposed site is required)

(2) description of the types of equipment used for sample collection, the methods used for calibration, and the frequency of calibration

(3) kinds of analyses to be performed on each sample, the lower limit of detection for each type of analysis, the frequency of analysis for each sample, and the quality assurance program for the assay program

(4) statistical basis to be used for comparing the baseline measurements with the corresponding measurements during the operational, closure, and postclosure observation periods of the site

(5) summary of information regarding background radiological and nonradiological characteristics of the site considered in the design of the monitoring program in a format acceptable to the NRC staff

(6) descriptive program of the proposed surveillance of the disposal site

3. ANALYSIS PROCEDURE

The staff will determine if the statistical techniques proposed by the applicant are sufficiently sensitive so that significant differences can be detected between values monitored during the preoperational phase and their corresponding values measured during the operational and postoperational phases.

To ensure that significant environmental effects can readily be detected, the design of the applicant's proposed environmental monitoring program will be reviewed against the design criteria given in "Draft Technical Position Paper - Environmental Monitoring of Low-Level Waste Disposal Facilities" prepared by the Division of Waste Management. The staff will coordinate this review with that of the staff reviewer responsible for assessing the plan in the SER.

The staff will ensure that the program will include both radiological and nonradiological constituents to ensure that the proposed project is in compliance with existing local, State, and Federal standards.

4. EVALUATION

The staff will evaluate the proposed environmental monitoring and surveillance program to ensure that the applicant has provided sufficient data for the evaluation of significant future environmental effects resulting from the shallow-land burial of waste at the proposed site. The staff will also compare the program with the guidance contained in "Draft Technical Position Paper - Environmental Monitoring of Low-Level Waste Disposal Facilities."

5. INPUT TO THE ES

The staff will prepare Section 2.1.4, "Environmental Monitoring and Surveillance," of the ES. This section will contain a concise description of the environmental monitoring and surveillance program proposed by the applicant for the site construction, operational, and postoperational periods.

6. REFERENCES

U.S. Nuclear Regulatory Commission, NUREG-1200, "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility," January 1987.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.1.5
SITE CLOSURE AND STABILIZATION

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1.2, "Site Description"
- 4.2.1, "Principal Features"
- 4.2.2, "Site Utilization Plan"
- 4.3.2, "Excavated Materials Area"
- 5.1.3, "Facility Closure Activities Effects"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.4, "Environmental Monitoring and Surveillance"

Standard(s) and/or Guide(s)

- 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and description of the site closure and stabilization aspects of the low-level waste disposal facility proposed by the applicant. The scope of this review will consist of a determination that the information provided is sufficiently detailed to enable an evaluation of the environmental consequences resulting from the proposed action.

Information needed for the staff's review will usually include the following:

(1) details on decommissioning, decontamination, and dismantling proposed as part of site closure

(2) details on the site stabilization aspects of site closure such as trench caps, overall site cover and its grading, stability of all natural and engineered slopes of dikes and ditches at the site, surface drainage, and erosion protection features

(3) details on proposals for postclosure environmental monitoring and surveillance program

The applicant should provide the above information in Section 2.0 of the ER. However, Section 5.0 of the safety analysis report (SAR) will contain the site closure and stabilization information for the proposed facility. The staff may refer to this information, although it may be more detailed than is necessary for the environmental review.

3. ANALYSIS PROCEDURE

The staff will verify that the information adequately describes the site closure and stabilization aspects of the proposed facility. This information will be used to perform the environmental consequences analyses addressed in ESRP 4. The information needed to describe the site closure and stabilization aspects of a facility consists of (1) a description of the decommissioning, decontamination, and dismantling operations associated with site closure, (2) a description of the engineering details of site closure and stabilization, and (3) a description of the environmental monitoring and surveillance associated with site closure.

The description of the decommissioning, decontamination, and dismantling aspects of site closure should include information on how the applicant intends to decommission the facility - moth balling, inplace entombment, removal and disposal off site, or a combination of these. Although the decommissioning plan is a dynamic document that is likely to be revised on the basis of operational experience, the plan presented with the ER should provide information on the final method of decontaminating and decommissioning the disposal facility and disposal site, the decontamination survey of the facility and site, estimates of the decontamination waste and plans for final disposal of decontamination waste, soil contamination survey at the site, estimate of radiation exposure during the decommissioning phase, and other detailed information needed for the environmental consequences analyses.

The description of the engineering details of the site closure and stabilization plan should provide the following information: (1) details of cap or cover for individual disposal excavation units; (2) overall cover on all disposal excavations at the site; (3) engineering details of overall site grading and vegetative or rubble cover; (4) engineering details of ditches, drains, embankments, engineered or natural slopes, and slope protection features (riprap or revetment, etc.) that are permanent features of the site; and (5) fence and other intruder barrier features that have been proposed as permanent features of site closure and site stabilization. The level of detail should be adequate so that the staff can perform an environmental consequences analysis.

The procedure to verify the adequacy of the description of the environmental monitoring and surveillance program features of the site closure operations is given in ESRP 2.1.4.

If the information on the above items in the ER and the SAR is not adequate, the staff will request that the applicant provide appropriate additional information.

4. EVALUATION

On the basis of the analysis of the information conducted under this ESRP, the staff should be able to independently confirm that the description in the ER of the site closure and stabilization plan proposed for the facility is adequate to enable an analysis of the environmental consequences of the proposed action.

5. INPUT TO THE ES

The staff will prepare Section 2.1.5, "Site Closure and Stabilization," of the ES. The information in this section will be used to assess the environmental consequences of the proposed action.

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL REVIEW PLAN 2.1.6
INSTITUTIONAL CONTROLS

1. REVIEW INPUT

The staff will use the following to perform its review under this SRP:

Environmental Report Section(s)

- 5.2, "Long-Term Environmental Effects"
- 7.3, "Relationship Between Short-Term Uses and Long-Term Productivity of Man's Environment"
- 8.3, "Postoperational Monitoring"
- 9.0, "Status of Compliance"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.5, "Site Closure and Stabilization"
- 2.1.7, "Financial Assurances"
- 2.2.4, "Alternative Plans for Site Closure and Stabilization"

Standard(s) and/or Guide(s)

- Branch Technical Position, "Funding Assurances for Closure, Post-Closure and Long-Term Care"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, or Federal agencies controlling land ownership
- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and description of current plans for the eventual institutional control of the disposal site. Institutional control of a "closed" disposal site is required for up to 100 years following license transfer (10 CFR 61.7(b)(4)). It is necessary, therefore, that the licensee's closure arrangements provide assurance that

agreements are in place between the licensee and the government landowner who will ensure long-term custodial care of the low-level waste disposal site.

The applicant will submit certification that the proposed facility is on land owned by the Federal or State Government and that said entity is prepared to provide custodial care when the license is transferred. Additionally, the applicant will describe its responsibilities to authorities other than the primary custodial agency (i.e., NRC, Federal, State, or local authorities).

It is anticipated that much of the information relevant to an evaluation of institutional control arrangements will already have been provided by the applicant in the safety analysis report. If such is the case, the information may be incorporated by reference in the ES.

3. ANALYSIS PROCEDURE

The material to be reviewed is primarily informational in nature, and a detailed technical analysis is not required. The applicant, however, should provide a concise and complete documentable summary of institutional control arrangements for the postclosure period. The applicant should clearly acknowledge its responsibilities under the various codes, statutes, and regulations of both State and Federal authorities. Certification of such responsibilities should be verifiable and legally binding.

The staff will review material of a legal nature for completeness and then forward it to the Office of General Counsel for detailed legal interpretation. Authorities referenced in the ER will be contacted and asked to verify information pertinent to their legal control of the applicant.

4. EVALUATION

The staff will verify all information pertaining to institutional control of the disposal site. The information must be sufficient to allow the staff to prepare an adequate description of institutional controls and time frames for inclusion in the ES.

5. INPUT TO THE ES

The staff will prepare Section 2.1.6, "Institutional Controls," of the ES. In addition, the staff will provide pertinent information to the staff reviewer responsible for the following ES section:

- 2.1.7, "Financial Assurances"

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, Branch Technical Position, "Funding Assurances for Closure, Post-Closure and Long-Term Care," December 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.1.7
FINANCIAL ASSURANCES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 1.0, "Purpose of and Need for Proposed Project"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and concise description of the financial assurance mechanism proposed by the applicant for disposal site closure, stabilization, and institutional care. The scope of this review will be limited to a description of the mechanism as reviewed by the staff for the safety evaluation report (SER).

Information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the anticipated magnitude of the potential impact. The following information will usually be needed:

(1) description of the mechanism proposed by the applicant as financial assurance (i.e., surety bonds, cash deposits, certificates of deposit, deposits of government securities, escrow accounts, irrevocable letters or lines of credit, trust funds, or other combinations of the above or such other types of arrangements as may be approved by the Commission)

(2) description of the basis for the amounts in the proposed financial assurance mechanism

(3) identification of the term of the surety mechanism and provisions for review and increase by the applicant to reflect inflation, changes in site engineering plans, etc.

3. ANALYSIS PROCEDURE

The staff will consult with the Project Manager responsible for the SER review to determine if the staff found that the financial assurance mechanism is adequate, and if not, what modifications have been discussed or proposed by the staff. The staff will not conduct a separate analysis or finding, but will ensure that the financial assurance discussion in the ES agrees with the review findings of the SER.

4. EVALUATION

This section is largely descriptive in nature, and, therefore, it is the staff's responsibility to ensure that the description of the financial assurance mechanism as reviewed by the staff during the SER review process is accurate.

5. INPUT TO THE ES

The staff will prepare Section 2.1.7, "Financial Assurances," of the ES. This section will describe the financial assurance mechanism proposed by the applicant for site closure, stabilization, and institutional care.

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.2
ALTERNATIVES TO THE PROPOSED ACTION

This ESRP consists of the following:

ESRP 2.2.1 Alternative of No Action
ESRP 2.2.2 Alternative Sites
ESRP 2.2.3 Alternative Disposal Facilities, Disposal Units, and Design Features
ESRP 2.2.4 Alternative Plans for Site Closure and Stabilization
ESRP 2.2.5 Summary Alternatives for Detailed Consideration

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.2.1
ALTERNATIVE OF NO ACTION

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 1.0, "Purpose of and Need for Proposed Project"

Environmental Review(s) Performed Under the Following ESRP(s)

- 1.1, "Purpose and Need"
- 1.2, "Scoping Process"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Staff summary of determinations and conclusions of the scoping process

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the alternative of no action. The scope of this review will consist of the identification of the no action alternative and the consequences of that alternative. In addition to the information generated in Section 1.1, "Purpose and Need," and Section 1.2, "Scoping Process," of the ES, the staff will consider the following types and kinds of information:

(1) legal and/or other constraints on the continued use of existing disposal facilities

(2) volume reduction or waste-minimization techniques that might eliminate the need for a new low-level waste disposal facility

(3) options for low-level waste disposal absent the availability of new disposal capacity including the impacts associated with such options

3. ANALYSIS PROCEDURE

In addition to the analyses documented in Sections 1.1 and 1.2 of the ES, the staff will independently verify the information provided by the applicant relevant to this alternative. Additionally, the staff will explore the consequences of no action in sufficient depth to ensure that the requirements of 10 CFR 51 and the National Environmental Policy Act (NEPA) are met. The analysis will be more informational than technical in nature and should assist in bounding the no action alternative for consideration by the decisionmaker.

4. EVALUATION

On the basis of the analysis of the information conducted under this ESRP, the staff should be able to demonstrate that the requirements of 10 CFR 51 and NEPA with respect to the no action alternative are met. This evaluation will be critical to the assessments in Sections 2.2.5 and 2.3 as well as subsequent sections of the ES.

5. INPUT TO THE ES

The staff will prepare Section 2.2.1, "Alternative of No Action," of the ES. In addition, the staff will provide pertinent information to the staff reviewers responsible for the following ES sections:

- 2.2.5, "Summary Alternatives for Detailed Consideration"
- 2.3, "Staff Assessment of Alternatives and Recommendations"

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.2.2
ALTERNATIVE SITES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.1, "Siting Alternatives"

Environmental Review(s) Performed Under the Following ESRP(s)

- 1.1, "Purpose and Need"
- 2.1.1, "Location"
- 2.2.1, "Alternative of No Action"

Standard(s) and/or Guide(s)

- Draft Regulatory Guide, "Guidance for Selecting Sites for Near-Surface Disposal of Low-Level Radioactive Waste"

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and assessment of the applicant's evaluation of alternative sites in selecting a proposed site for near-surface disposal of radioactive waste. The scope of the review will consist of the following considerations:

(1) whether the region of interest was of sufficient size to allow an evaluation of a reasonable number of candidate areas with the potential for different environmental impacts

(2) whether the candidate areas selected in the region of interest reflect a sufficiently broad range of environmental characteristics to ensure that sites identified from within the candidate areas provide an acceptable range of potential environmental impacts

(3) whether the candidate sites are among the best that could reasonably be found and whether they meet the site suitability requirements of 10 CFR 61

By taking into account the considerations noted above, the staff will be able to ensure that the alternative sites that will be given detailed consideration in the ES (including the applicant's preferred site) are environmentally acceptable and potentially licenseable.

The information needed for the staff's review will be affected by case-specific factors, and the degree of detail may be modified according to the results of the scoping process and the anticipated magnitude of the potential impacts. Information needed for the staff's review will usually include the following:

(1) basis for the selection of the region of interest

(2) description and maps of the region of interest

(3) description of the methodology for selecting candidate areas within the region of interest as well as identification of the areas themselves

(4) description of the methodology for selecting candidate sites from the candidate areas as well as identification of the candidate sites themselves

(5) basis for the applicant's selection of a preferred site from among the candidate sites

3. ANALYSIS PROCEDURE

The objective of the analysis procedure is to ensure that the candidate sites (from which the applicant has selected a preferred site) are among the best that could reasonably be found. The staff will examine the process, the factors, and the criteria that the applicant used to select the candidate sites and will use the following general procedure:

(1) Identify the region of interest, within which the site selection process was conducted.

(2) Within the region of interest, identify major diverse environmental qualities that would lead to consideration of sites with differing environmental impacts. Such qualities would include

(a) major physiographic units
(b) hydrologic regime
(c) climatic regime
(d) general land cover or ecosystem

(3) Identify any constraints on the applicant's siting options with respect to the region of interest (i.e., regional compact agreements; host-State designation; and other legal, political, institutional, or economic constraints).

(4) Review the candidate areas identified by the applicant within the region of interest to ensure that they reflect a sufficiently broad range of environmental characteristics and that there are no fatal flaws associated with them.

(5) Review the applicant's process for identifying, within the candidate areas, candidate sites that are potentially licenseable, capable of being developed, and otherwise appropriate for evaluation by the staff. The staff will ensure that the applicant has considered the site suitability criteria of 10 CFR 61.50 as well as environmental factors such as compliance with existing standards, land use, critical habitats, cultural resources, and socioeconomics.

4. EVALUATION

The staff will make the following findings based on the procedure identified above:

(1) The region of interest selected by the applicant is of sufficent size and environmental diversity so that candidate areas selected from within it will reflect a thorough consideration of alternatives.

(2) The candidate areas selected reflect the diversity of the region of interest (i.e., act as a representative cross-section of environmental characteristics) and have no fatal flaws associated with them.

(3) The candidate sites selected from the candidate areas are potentially licenseable, capable of being developed, and otherwise appropriate for evaluation by the staff.

On the basis of the above findings, the staff will be able to determine whether the candidate sites are among the best that could reasonably be found. If the staff is able to make this determination, it will use these candidate sites in the process described in ESRP 2.2.5, "Summary Alternatives for Detailed Consideration."

5. INPUT TO THE ES

The staff will prepare Section 2.2.2, "Alternative Sites," of the ES. This section will contain an analysis of the process used by the applicant in selecting candidate or alternative sites (including the applicant's preferred site) to ensure that the alternative sites, which the staff will assess, are among the best that could be found. The staff will prepare a summary documenting the analysis, supported by maps and tables as appropriate.

In addition, the staff will provide the following information or ensure that it has been provided to the staff reviewer responsible for the following ES section:

- 2.2.5, "Summary Alternatives for Detailed Consideration" - the alternative sites that will be used in constructing the summary alternatives or cases for analysis in the ES

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, Draft Regulatory Guide, "Guidance for Selecting Sites for Near-Surface Disposal of Radioactive Waste," March 1987.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.2.3
ALTERNATIVE DISPOSAL FACILITIES, DISPOSAL UNITS, AND DESIGN FEATURES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1.1, "Site Location"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- None

Other

- None

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's evaluation of alternatives to the proposed design. The scope of the review will consist of the identification of possible alternative designs considered by the applicant and an evaluation of the suitability of these designs for the proposed site. The staff will screen alternative disposal facility designs, alternative disposal unit designs, and alternative design features to eliminate designs or design features that would result in adverse environmental effects and therefore are obviously unsuitable for the proposed site. Alternatives that pass this level of review will be used for the evaluation under ESRP 2.2.5.

Information needed for the staff's review will usually include the following:

(1) identification of alternative disposal facility designs, alternative disposal unit designs, and/or alternative design features considered by the applicant

(2) conceptual descriptions of each alternative

(3) reasons why the alternative designs considered by the applicant were found to be unsuitable or descriptions of the alternative to the level of detail required for the evaluation under ESRP 2.2.5

3. ANALYSIS PROCEDURE

The staff will evaluate the alternative designs proposed by the applicant to ensure that each alternative design contains the essential design features as stated in ESRP 2.1.2. The staff will also ensure that the applicant has considered the following guidelines in its discussion of alternative designs:

(1) Information pertaining to the proposed alternative designs should be obtained by means of a formal study that considers all relevant factors and provides the rationale and documentation for supporting the complex alternative designs.

(2) Realistic alternative designs should be analyzed in terms of economic, environmental, and public health and safety factors to show why the proposed alternative designs are compatible with the proposed designs at the applicant's preferred site.

(3) The applicant's assessment of proposed alternative designs should be based on the summary of benefits and costs of each alternative pertaining to disposal facility design, disposal unit design, facility construction, and waste disposal operation.

(4) If the applicant determines that the proposed alternative designs are inferior to the proposed design, the applicant should discuss the reasons why the considered alternative designs are not suitable.

4. EVALUATION

The staff will ensure that each alternative design considered has been described in sufficient detail to enable the staff to make an effective assessment and comparison of environmental effects. For those alternative designs eliminated from consideration, the staff will ensure that the justification for this decision has been adequately documented. Alternative designs determined to be environmentally preferable or equivalent to the proposed action will be considered in Section 2.2.5 of the ES. This evaluation will be integrated with the review under ESRPs 2.1.2 and 2.2.5.

5. INPUT TO THE ES

The staff will prepare Section 2.2.3, "Alternative Disposal Facilities, Disposal Units, and Design Features," of the ES. In addition, the staff will provide pertinent information to the staff reviewers responsible for the following ES sections:

- 2.2.5, "Summary Alternatives for Detailed Consideration"
- 2.3, "Staff Assessment of Alternatives and Recommendations"

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.2.4
ALTERNATIVE PLANS FOR SITE CLOSURE AND STABILIZATION

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1.2, "Site Description"
- 4.2.1, "Principal Features"
- 4.2.2, "Site Utilization Plan"
- 4.3.2, "Excavated Materials Area"
- 5.1.3, "Facility Closure Activities Effects"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.5, "Site Closure and Stablization"

Standard(s) and/or Guide(s)

- 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste"

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of alternative site closure and stabilization plans considered by the applicant in deciding on the proposed action for the low-level waste disposal facility. The scope of the review will consist of a determination that the information provided is adequately detailed so that the staff can perform a comparative evaluation of the environmental consequences resulting from the proposed action. Information needed for the staff's evaluation of the alternative plans for site closure and stabilization of the facility is similar to that in ESRP 2.1.5. However, the level of detail should be sufficient so that the staff can judge the relative merits of the environmental consequences of the alternative plans for site closure and stabilization of the facility.

3. ANALYSIS PROCEDURE

The staff will verify that the information adequately describes the alternative plans for site closure and stabilization that were considered and evaluated by the applicant for the proposed facility. The information needed to describe these alternative plans includes (1) a description of alternative proposals for the decontamination and decommissioning operations associated with site closure, (2) a description of the engineering details of the alternative concepts for site closure and stabilization, and (3) a description of the environmental monitoring and surveillance program for the alternative site closure plans.

The information needed to describe the site closure and stabilization activity for the preferred alternative is given in ESRP 2.1.5. The information on the alternative plans for site closure and stabilization is similar to that in ESRP 2.1.5, but the level of detail may be appropriately simplified so that the staff can perform a comparative evaluation of the environmental consequences of the proposed action.

If the information on the alternative plans is not adequate to enable a comparative evaluation, the staff will request that the applicant provide appropriate additional information.

4. EVALUATION

On the basis of the analysis of the information conducted under this ESRP, the staff should be able to independently confirm that the description of the alternative site closure and stabilization plans considered by the applicant is adequate to enable the staff to perform a comparative analysis of the environmental consequences of these alternative plans.

5. INPUT TO THE ES

The staff will prepare Section 2.2.4, "Alternative Plans for Site Closure and Stabilization," of the ES. The information in this section will be used to assess the environmental consequences of site closure and stabilization for these alternative plans.

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.2.5
SUMMARY ALTERNATIVES FOR DETAILED CONSIDERATION

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"

Environmental Review(s) Performed Under the Following ESRP(s)

- 1.2, "Scoping Process"
- 2.1.1, "Location"
- 2.1.2, "Description of Disposal Facilities, Disposal Units, and Design Features"
- 2.1.3, "Waste Disposal Operations"
- 2.1.5, "Site Closure and Stabilization"
- 2.2.1, "Alternative of No Action"
- 2.2.2, "Alternative Sites"
- 2.2.3, "Alternative Disposal Facilities, Disposal Units, and Design Features"
- 2.2.4, "Alternative Plans for Site Closure and Stabilization"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Responses to requests for additional information
- Staff summary of determinations and conclusions of the scoping process

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and selection of alternatives to be given detailed consideration in the ES. The scope of this

review will consist of the alternatives proposed by the applicant, alternatives identified in the scoping process, and any additional alternatives considered necessary or appropriate by the staff to meet the Commission's obligations under the National Environmental Policy Act and 10 CFR 51.

The information needed for the staff's review will be affected by case-specific factors, and the degree of detail may be modified according to the results of the scoping process and the anticipated magnitude of the potential impacts. Information needed for the review will usually include the following:

(1) identification and description of the alternative sites (including the applicant's preferred site) considered by the applicant (from ES Section 2.2.2)

(2) identification and description of alternative disposal facilities, disposal units, and design features (from ES Section 2.2.3)

(3) identification and description of alternative plans for site closure and stabilization (from ES Section 2.2.4)

(4) identification and description of additional alternatives developed as a result of the scoping process or the staff's initial review of the applicant's proposal.

3. ANALYSIS PROCEDURE

The staff will evaluate the information identified above and, on the basis of that information, will develop the alternatives to be given detailed consideration in the ES. At a minimum, the staff, in the ES, will consider the comparative environmental impacts of the alternative of no action, the applicant's preferred alternative, and at least two other site/design alternatives to ensure that a sufficiently broad range of environmental impacts has been evaluated. The staff will use the following general procedure in conducting this review:

(1) Alternatives eliminated from detailed consideration in previous ES sections will be described in summary form, and the reasons for their elimination will be stated.

(2) The staff will construct alternative cases or scenarios based on those reasonable alternatives remaining, and those cases will form the basis for environmental descriptions and impact analysis in the ES.

(3) Reasonable alternatives will not be excluded from consideration solely because they are not within NRC's jurisdiction.

4. EVALUATION

The staff will ensure that the alternatives to be given detailed consideration are (1) are technically feasible, (2) are reasonably available, and (3) reflect potentially different environmental impacts. The staff will also ensure that no alternative that meets these criteria is excluded from consideration.

5. INPUT TO THE ES

The staff will prepare Section 2.2.5, "Summary Alternatives for Detailed Consideration," of the ES. This section will set forth the alternative cases or scenarios to be considered in Sections 3 and 4 of the ES and ultimately evaluated in Section 2.3.

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 2.3
STAFF ASSESSMENT OF ALTERNATIVES AND RECOMMENDATIONS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"
- 5.0, "Environmental Effects of Proposed Facility"
- 6.0, "Environmental Effects of Accidents"
- 7.0, "Summary Evaluation of Proposed Project"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1, "Description of the Proposed Action"
- 2.2, "Alternatives to the Proposed Action"
- 4, "Environmental Consequences and Mitigating Actions"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- None

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's summary assessment of the environmental consequences of alternatives and the development of a preliminary recommendation on the action to be taken. The scope of the review will consist of both qualitative and quantitative impact measures as well as staff recommendations for environmental license conditions.

The information needed for the staff's review will be affected by case-specific factors, and the degree of detail may be modified according to the results of the scoping process and the anticipated magnitude of the potential impacts. Information needed for the review will usually include the following for each alternative case:

(1) summary description of direct and indirect unavoidable adverse impacts, quantified wherever possible (from ES Section 4.11)

(2) summary description of direct and indirect, irreversible and irretrievable commitments of resources, quantified wherever possible (from ES Section 4.12)

(3) description of mitigating measures deemed necessary by the staff

(4) summary costs associated with the alternatives

3. ANALYSIS PROCEDURE

The staff will assemble and evaluate the measures of impact associated with the alternatives subjected to detailed consideration in making a recommendation for licensing action. The staff will focus the analysis on those areas determined to be of major concern in performing the overall impact analysis. Minor issues accordingly will be given minor consideration. To the extent possible, the staff should attempt to summarize the potential impacts and benefits of the alternatives in tabular form so that they can be compared easily. In developing the rationale for a licensing recommendation, the staff will follow the general philosophy stated in the supplementary information for NRC's Revised 10 CFR 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions and Related Conforming Amendments," published in the Federal Register on March 12, 1984 at pp 9352-56. This philosophy, although directed primarily at the environmental review of nuclear power plants, also applies to the environmental review of near-surface radioactive waste disposal facilities. The staff should try to identify first those alternatives that are environmentally inferior to the applicant's preferred alternative. Those alternatives may be dismissed with only sufficient narrative to justify why they were found to be inferior to the preferred alternative. Should the remaining alternatives be found to be environmentally equivalent to the preferred alternative, the staff should recommend the latter with such conditions as it finds necessary.

However, if one or more alternatives are determined to be environmentally preferable to the preferred alternative, the staff will have to make a detailed and reasoned comparative evaluation of impacts to arrive at a licensing recommendation.

The determination of environmentally inferior, equivalent, or preferable is highly case specific. However, the following types of adverse impacts can be used as examples that could result in a particular alternative being found environmentally inferior to another:

(1) elimination of critical habitat for one or more endangered species
(2) loss of extensive archaeological resources
(3) significantly higher dose levels to the nearest resident
(4) permanent removal from productivity of prime or unique farmlands
(5) unmitigated project-generated demands on local infrastructure components

These examples are illustrative only and represent extreme impacts in several environmental categories. The staff may also find that the cumulative effect of several individually less severe impacts could result in a finding of environmental inferiority relative to the applicant's preferred alternative.

4. EVALUATION

The staff will consider the individual and cumulative impacts of the alternatives relative to the preferred alternative and will make a finding on the environmental acceptability of each. In each case the applicant's proposal with such mitigative measures as are deemed necessary will serve as the basis for comparison. Alternatives will be classified as either (1) environmentally inferior, (2) environmentally equivalent, or (3) environmentally preferable to the applicant's proposal.

5. INPUT TO THE ES

The staff will prepare Section 2.3, "Staff Assessment of Alternatives and Recommendations," of the ES. This section will be the focus of the information and analyses presented in Sections 2, 3, and 4 of the ES and will result in a licensing recommendation by the staff.

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions and Related Conforming Admendments," Federal Register, Vol. 49, No. 49, pp. 9352-56, May 12, 1984.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.1
LAND

This ESRP consists of the following:

ESRP 3.1.1 Population Distribution and Characteristics
ESRP 3.1.2 Current and Projected Land Use

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.1.1
POPULATION DISTRIBUTION AND CHARACTERISTICS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1.3, "Population Distribution"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's analysis of population distribution within a 10-kilometer radius of the applicant's preferred site and the alternatives selected for detailed consideration. This review should be in sufficiently detailed to provide input to pathway analyses and accident analyses and to provide support for socioeconomic analysis. The scope of the review will consist of verification of population distribution and characteristics for each alternative at the time the application was submitted and projections to date of initial operations and by decennial census over the facility's estimated operational lifetime.

The information needed for the staff's review will be affected by site-specific considerations at each alternative, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential impacts. Population data should be based on the current decennial census data and, where available, more recent census data and projections. Information needed for the review for each alternative will usually include the following:

(1) On a map of suitable scale that identifies places of significant population grouping, such as cities and towns within a 10-kilometer radius,

concentric circles should be drawn (with the site at the center point) at distances of 2, 4, 6, 8, and 10 kilometers. The circles should be divided into 22½° sectors with each sector centered on 1 of the 16 compass points (with reference to true north, e.g., north-northeast and northeast). A table appropriately keyed to the map should provide the current residential and transient populations within each area for (a) the expected first year of facility operation and (b) for decennial census years through the operational lifetime of the facility. The tables should provide population totals for each sector and annular ring and a total for the 0- to 10-kilometer enclosed population. The basis for population projections should be described (from the ER).

(2) Distance and direction to nearest residence (from the ER).

(3) Location and size of towns with populations greater than 10,000 within a 50-kilometer radius (from the ER).

3. ANALYSIS PROCEDURE

The staff will prepare population distribution charts for each alternative that provide population data for both permanent and transient populations as they exist currently, at the time of facility startup, and for census years during the operational life of the facility. The staff's analysis of the data will consist of the following:

(1) a review of all data used to update the basic decennial census data

(2) a review of the methods used to establish population data within a 10-kilometer radius of each alternative

(3) a review of the applicant's methods/sources for population projections

4. EVALUATION

The staff will establish that the population distribution data are adequate to assess the comparative radiological impacts of alternatives and to support the assessment of socioeconomic factors and impacts of these alternatives.

5. INPUT TO THE ES

The staff will prepare Section 3.1.1, "Population Distribution and Characteristics," of the ES. This section will summarize the staff's review of the demographic characteristics of the alternatives and will provide a brief narrative description of such characteristics including any unique population factors such as high transient population (daily or seasonal) or new communities.

In addition, the staff will provide the following pertinent information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 3.7.2, "Infrastructure Characteristics" - population forecast data
- 4.6., "Socioeconomics" - community distribution and population forecast data
- 4.8.1, "Pathways Analysis" - population forecast data
- 4.9, "Impacts of Accidents" - population forecast data

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.1.2
CURRENT AND PROJECTED LAND USE

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1.1, "Site Location"
- 3.1.2, "Site Description"
- 3.1.4, "Uses of Adjacent Lands and Waters"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 2.2.2, "Alternative Sites"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's concise description of current and future land-use conditions for each alternative identified in Section 2.2.5 of the ES. The scope of the review will consist of the establishment of current land uses at the alternative sites and in their vicinity and projected future land uses that might be affected or modified as a result of the construction, operation, and closure of a low-level radioactive waste disposal facility.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential impacts. Information needed for the review will usually include the following:

(1) Maps showing land use for the various alternatives and within a 10-kilometer radius of each alternative. (These maps should be of the same scale as maps included in Section 2 for the sake of consistency.) Land-use categories should be consistent with those defined by Anderson et al. (1976) and should show both general categories of use, patterns of ownership, and special-use areas such as national parks, military reservations, Indian reservations, or wilderness areas (from the ER).

(2) Land areas devoted to major uses within the confines of the alternatives as well as within a 10-kilometer radius of each (from the ER).

(3) Highway and utility rights of way at each alternative and in its vicinity (from the ER).

(4) Other-than-major land uses (e.g., recreation) for each alternative that could be significantly affected by the proposed action (from the ER, the site visit, and consultation with resource agencies).

(5) Land-use plans that include the alternative sites within their scope (from consultation with resource agencies).

3. ANALYSIS PROCEDURE

The staff's analysis of land-use characteristics will be closely coordinated with the impact assessment review described in the ESRPs under ESRP 4 (specifically ESRP 4.1) to establish the land-use characteristics of the alternatives under consideration. The staff will identify the present land use at each alternative (including the 10-kilometer radius) according to the categories defined by Anderson et al. (1976). The level of detail in selecting land-use categories should be based on the potential for impacts and the staff's conclusions and determinations from the scoping process. The staff will also identify total area by land-use category.

Among the characteristics to be considered in the review will be the following:

(1) waterways, highways, roads, and railroads at each alternative, especially those that would be closed to public use

(2) natural gas and electrical transmission and other utility lines

(3) recreational areas located at each alternative or in its vicinity

(4) visually sensitive areas or view sheds that could be affected by construction or operation of the proposed facility

(5) residential areas, airports, and industrial or commercial facilities in the vicinity of each alternative

(6) agricultural and forested areas on or in the vicinity of each alternative

(7) land-use plans that include each alternative within their scope

4. EVALUATION

The staff will ensure that the information is adequate so that it can serve as a basis for the assessment of the environmental impacts of the alternative sites identified in Section 2.2.5 of the ES. The staff will verify the accuracy of the land-use information by visiting the site and by consulting with appropriate local, State, and Federal agencies.

5. INPUT TO THE ES

The staff will prepare Section 3.1.2, "Current and Projected Land Use," of the ES. The depth and extent of the input to the ES will be governed by the land-use characteristics of the alternatives and the potential land-use impacts of construction, operations, closure, and long-term care of the proposed facility. The information should be presented in a concise form, and maps and tables should be used wherever possible.

Section 3.1.2 of the ES should include

(1) a brief description of the land-use characteristics of the alternatives

(2) a tabulation of areas dedicated to each land-use category in the site and vicinity (the tabulations may be supplemented by land-use maps as necessary for clarity)

The staff will also provide the following pertinent information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 3.6.1, "Terrestrial Ecology" - land-use data as needed to describe terrestrial ecology
- 3.7.2, "Infrastructure Characteristics" - land-use data as needed to describe infrastructure characteristics
- 3.7.4, "Sociocultural Characteristics" - land-use data as needed to describe sociocultural characteristics
- 4.1, "Land" - land-use descriptions to support the assessment of impacts on land use
- 4.6, "Socioeconomics" - land-use descriptions to support the assessment of socioeconomic impacts

6. REFERENCES

Anderson, J. R., E. E. Hardy, J. T. Roach, and R. E. Witmer, "A Land-Use and Land-Cover Classification System for Use With Remote Sensor Data," U.S. Geological Survey Professional Paper 964, Washington, DC, 1976.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.2
METEOROLOGY AND AIR QUALITY

This ESRP consists of the following:

ESRP 3.2.1 Meteorology
ESRP 3.2.2 Ambient Air Quality

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.2.1
METEOROLOGY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"
- 3.3.1, " Meteorology"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Draft Regulatory Guide Task ES 401-4, "Onsite Meteorological Measurement Program for Uranium Recovery Facilities - Data Acquisition and Reporting"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultations with National Oceanic and Atmospheric Administration on site-specific meteorological data and with other local, State, and Federal agencies
- NUREG-0902, "Site Suitability, Selection and Characterization"
- Randerson, D., "Atmospheric Science and Power Production"

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and description of the meteorological conditions for each of the alternatives identified in Section 2.2.5 of the ES. This will permit the characterization of atmospheric transport and diffusion processes for the alternative sites and an independent evaluation of atmospheric diffusion characteristics that may be expected to prevail during the construction, operational, and postoperational phases of the site's lifetime.

The scope of the review will consist of verification of the adequacy of the site-specific and regional meteorological information provided by the applicant in Section 3.3 of the ER. These data may be used by the staff, and

should be used by the applicant, as input to atmospheric transport and diffusion models for the calculation of long-term, time-averaged relative atmospheric (χ/Q) and ground deposition (D/Q) concentrations for the alternative sites. Site-specific measured values are the preferred form of the data; however, reconnaissance-level values are acceptable if the applicant can show that they are representative of the alternative sites.

The kinds of data and the types of information needed for the staff's review are given in Regulatory Guide 4.18 and Draft Regulatory Guide Task ES 401-4 (as they relate to a low-level radioactive waste disposal site). The following categories of site-specific meteorological information (averaged for a collection period of not less than 1 year) are necessary to perform the staff's review:

(1) Meteorological parameters (such as joint-frequency distributions of wind speed/direction) as necessary to characterize the alternative sites.

(2) The locations of the meteorological instruments and the rationale for their selection. These locations should be identified on a map that shows detailed topographic features and a plot of maximum elevation versus distance from the disposal site in each of the sixteen 22½° sectors radiating from the site.

(3) If measured data are submitted by the applicant, they should reflect inspection frequencies (and schedules for calibration and maintenance for the monitoring stations) that are sufficient to ensure an annual data recovery of at least 90 percent for each individual parameter measured.

3. ANALYSIS PROCEDURE

For routine conditions (such as a steady low-level release of gaseous effluent), the staff will compare the meteorological information submitted by the applicant with the meteorological criteria in Draft Regulatory Guide Task ES 401-4 and in NUREG-0902. The data should be reported in a format that is compatible with computer codes to be used by the NRC staff for the calculation of atmospheric transport and dispersion. The staff will assess the climatic description of regional and local meteorological conditions for completeness and accuracy against standard references (e.g., "Climatic Atlas of the United States" and "Local Climatological Data - Annual Summary With Comparative Data," both published by the U.S. Department of Commerce).

4. EVALUATION

The staff will verify that the meteorological information submitted by the applicant is complete and sufficiently accurate so that the staff can reasonably estimate the atmospheric transport, dispersion, and ground deposition of contaminants resulting from routine and nonroutine atmospheric releases from the alternative sites.

5. INPUT TO THE ES

The staff will prepare Section 3.2.1, "Meteorology," of the ES. The meteorological information will also be used as part of the determination of the water budget at a disposal site. The information may also be used by the staff for the calculations of the individual and population doses from airborne radiological and nonradiological contaminants called for in ESRP 4.8.

6. REFERENCES

Randerson, D., ed., "Atmospheric Science and Power Production," DOE/TIC-27601 (DE84005177), Weather Service Nuclear Support Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, for the U.S. Department of Energy, Office of Health and Environmental Research, Office of Energy Research, Washington, DC, 1984.

U.S. Department of Commerce, "Climatic Atlas of the United States," National Climatic Data Center, National Oceanic and Atmospheric Administration, Asheville, NC, June 1968.

---, "Local Climatological Data - Annual Summary With Comparative Data," National Climatic Data Center, National Oceanic and Atmospheric Administration, Asheville, NC, published annually.

U.S. Nuclear Regulatory Commission, Draft Regulatory Guide Task ES 401-4, "Onsite Meteorological Measurement Program for Uranium Recovery Facilities - Data Acquisition and Reporting," September 1985.

---, NUREG-0902, "Site Suitability, Selection and Characterization," April 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.2.2
AMBIENT AIR QUALITY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"
- 3.3.1, "Meteorology"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.2, "Alternatives to the Proposed Action"

Standard(s) and/or Guide(s)

- 40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards"
- 40 CFR 52, "Protection of the Environment"
- 40 CFR 58, "Ambient Air Quality Surveillance"
- *Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"*

Other

- Consultation with local, State, and Federal agencies
- National Council on Radiation Protection and Measurements, NCRP Report 45, "Natural Background Radiation in the United States"

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and description of the air quality conditions that exist at each of the alternatives identified in Section 2.2.5 of the ES before construction and operation. The scope of the review will consist of the identification of site-specific radiological and nonradiological baseline concentrations at receptor locations during the site characterization (preoperational) phase.

Information needed for the staff's review will usually including the following:

(1) Identification of radiological airborne contaminants contributed by atmospheric fallout and those released from the soil as a consequence of natural ecological processes.

(2) Identification of nonradiological airborne pollutants generated by processes such as onsite evaporation or incineration processes, contaminants dispersed to the disposal site as a result of nearby industrial and/or manufacturing processes, and those resulting from agricultural applications (such as spray application of fertilizers or pesticides).

(3) Annual average concentration values for naturally occurring nonradiological pollutants that the applicant expects may be associated with the proposed action. These nonradiological pollutants should be identified in Section 2.0 of the ER.

(4) Identification of the air quality control region, the air quality classification for the region, ambient air concentrations in the region, and air quality ceilings for regulated pollutants in the region. Any deviations of the site characteristics from those of the region should be documented.

These data will serve as the baseline concentrations for comparison with the air quality during subsequent phases of the lifetime of the disposal site.

3. ANALYSIS PROCEDURE

The staff will determine if the applicant's data are adequate by carefully reviewing the sources of this information (reconnaissance-level and/or measured data may be reported by the applicant). Typical atmospheric concentrations of natural radionuclides are given in Chapter 6, "Inhaled Radioactivity," in NCRP Report 45. The concentrations reported for the radiological contaminants should be annual average concentrations obtained from isotopic analysis by gamma spectroscopy and by gross alpha and gross beta analyses. The staff will compare the reported nonradiological concentrations with the corresponding National Primary and Secondary Ambient Air Quality Standards listed in 40 CFR 50.

If air quality data are missing or reported without an uncertainty limit (a value that includes the percent uncertainty from the mean at the 95 percent confidence level and that includes both systematic and random errors is preferred), the staff will request that the applicant provide them. If any reported values are grossly different from those values given in the references above, the staff will confirm the air quality concentrations with the appropriate State or Federal agency.

4. EVALUATION

The staff will verify that the information submitted by the applicant is complete and sufficiently accurate so that it can reasonably estimate the ambient air quality resulting from a release of radiological and nonradiological contaminants from the alternatives.

5. INPUT TO THE ES

The staff will prepare Section 3.2.2, "Ambient Air Quality," of the ES. The concentration values reported in this section will be compared with the corresponding values reported in Section 4.2 of the ES in order to estimate the environmental impacts of airborne pollutants.

6. REFERENCES

Code of Federal Regulations, Title 40, "Protection of Environment," U.S. Government Printing Office, Washington, DC, revised annually.

National Council on Radiation Protection and Measurements, NCRP Report 45, "Natural Background Radiation in the United States," Washington, DC, November 1975.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.3
AMBIENT RADIATION LEVELS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.2, "Alternatives to the Proposed Action"

Standard(s) and/or Guide(s)

- 10 CFR 61.41, "Protection of the General Population From Releases of Radioactivity"
- "Draft Technical Position Paper - Environmental Monitoring of Low-Level Waste Disposal Facilities," Division of Waste Management, to be published
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- National Council on Radiation Protection and Measurements, NCRP Report 45, "Natural Background Radiation in the United States"

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the baseline concentrations of radionuclides and levels of radiation in the biosphere in the vicinity of the alternatives discussed in Section 2.0 of the ER. These values, in conjunction with appropriate statistical methods, will provide standards of comparison to assess the significance of exposures of members of the general population and biota to various man-made sources of ionizing radiation.

The scope of the review will consist of an evaluation of the concentrations of radionuclides in the vicinity of the site for the following media: air, surface water, groundwater, soil, vegetation, sediments, and possible sources

of human food found in the immediate area of the disposal site. Radiation fields produced by natural sources will also be evaluated.

The baseline data required from the applicant are long-term annual time-averaged values. Concentrations should be reported using units given in NCRP Report 45 for each medium sampled, and radiation field values should be reported in microrem/hour (based on measurement of the photon, beta, and electron components of the radiation fields). Concentration values reported should be those obtained from isotopic analysis of the samples using gamma spectroscopy. Water samples and potential food sources should also be analyzed for gross alpha and gross beta activity.

Reconnaissance-level or measured data submitted for the staff's review should include the following kinds of information (the applicant should present the rationale for the selections):

(1) the media sampled; the frequency of sample collection; a listing of the exact location of each sample as a function of elevation, direction, and distance from the alternative site (identified on a map and/or aerial photograph); and each medium sampled at that location

(2) a description of the type of equipment used for sample collection

(3) the kinds of analyses performed on each sample, the lower limit of detection for each type of analysis, and the frequency of analysis for each sample

(4) the statistical basis to be used for comparison of the baseline measurements with the corresponding measurements during the construction, operational, closure, and postclosure observation periods of the site

If the data necessary for the analysis are missing or reported without an uncertainty limit (the percent deviation from the mean at the 95 percent confidence level is the preferred value), the staff should request this information from the applicant.

3. ANALYSIS PROCEDURE

The staff will determine if baseline levels have been reported for all important pathways (determined by the anticipated types and quantities of radionuclides to be released from the site). Typical levels for the radiation fields and concentrations to be expected in the media sampled are given in NCRP Report 45. If any reported values are grossly different from values given in the reference above, the staff should confirm the data with the appropriate State or Federal agency.

Reconnaissance-level data are acceptable if the applicant can show that they are representative of the conditions prevailing at the alternative site and are sufficient for the evaluation of the baseline ambient radiation levels. Measured data should follow the criteria listed in "Draft Technical Position Paper - Environmental Monitoring of Low-Level Waste Facilities" prepared by the Division of Waste Management.

EVALUATION

The staff will verify that the baseline data reported for each medium in each significant pathway are (1) complete; that is, all the information in Items (1) through (4) of Section 2 of this ESRP including data that were missing or reported without an uncertainty limit has been submitted; (2) given in the form of long-term annual average values; and (3) reported in appropriate units as given in NCRP Report 45. The staff may need to coordinate its observations with those of other members of the review team in the Division of Waste Management in order to ensure that the baseline data reported are sufficient.

5. INPUT TO THE ES

The staff will prepare Section 3.3, "Ambient Radiation Levels," of the ES. The staff will provide the reported baseline concentrations and values for the radiation fields to the staff reviewers responsible for the following ES sections so that the environmental impacts of the alternative sites can be assessed:

- 4.8.2, "Dose to Man"
- 4.8.3, "Dose to Biota Other Than Man"

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

National Council on Radiation Protection and Measurements, NCRP Report 45, "Natural Background Radiation in the United States," Washington, DC, November 1975.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.4
HYDROLOGY

This ESRP consists of the following:

ESRP 3.4.1 Surface Water
ESRP 3.4.2 Groundwater

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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.4.1
SURFACE WATER

This ESRP consists of the following:

ESRP 3.4.1.1 Surface Water Regime
ESRP 3.4.1.2 Surface Water Quality
ESRP 3.4.1.3 Surface Water Use

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U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.4.1.1
SURFACE WATER REGIME

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.1.2.2, "Candidate Area Selection"
- 2.1.2.3, "Candidate Site Selection"
- 3.1.1, "Site Location"
- 3.1.2, "Site Description"
- 3.4, "Hydrology"
- 3.4.2, "Surface Water"
- 3.5, "Geology and Seismology"
- 8.1.2, "Hydrology and Water Quality"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.2.5, "Summary Alternatives for Detailed Consideration"

Standard(s) and/or Guide(s)

- Executive Order No. 11988, "Floodplain Management," 1977
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit
- State water resource data (U.S. Geological Survey, annual reports)

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's concise description of the surface water bodies that could affect or be affected by the alternatives identified under ESRP 2.2.5. The scope of the review will consist of an evaluation of regional and site-specific data on the physical and hydrological characteristics of the water bodies in sufficient detail to provide basic data to the staff reviewers responsible for the evaluation of impacts on surface water regime, quality, and use.

The information needed for the staff's review will be affected by regional and site-specific factors and by the anticipated magnitude of potential hydrological impacts. For the evaluation of alternatives other than the applicant's preferred site, reconnaissance-level data should be sufficient. The information needed for the review will usually include the following:

(1) maps sufficiently detailed so that they show the major surface water systems that could be affected by the alternatives being considered (from the ER and the general literature)

(2) lists identifying the affected water bodies, their sizes and drainage areas, and their stream gradients or water surface elevations (from the ER and the general literature)

(3) maximum, average-maximum, average, average-minimum, and minimum monthly temperatures of affected water bodies (from the ER and the general literature)

(4) maximum, average-maximum, average, average-minimum, and minimum monthly flows of affected streams, and variations in water surface elevations of other affected water bodies (from the ER and the general literature)

(5) flood-frequency distributions and floodplain descriptions (following Executive Order No. 11988) for affected streams, including their relationships to the sites (from the ER and the general literature)

(6) historical drought stages or water surface elevations for affected water bodies, and 7-day, 10-year low flows for affected streams (from the ER and the general literature)

(7) description of hydrographic modifications (e.g., diversion dams and channelization) or flood-control measures (e.g., reservoirs and levees) located on affected water bodies, including known future projects (from the ER, the site visit, consultation with appropriate agencies, and the general literature)

(8) estimated erosion (e.g., wave and channel) and sedimentation characteristics, including rate, bed and suspended load fractions, and total sediment yield, of affected water bodies; also, the estimated sheet, rill, and gully erosion characteristics of sites under consideration (from the ER and the general literature)

(9) quantitative and qualitative descriptions of groundwater-surface water interactions (e.g., groundwater (baseflow) contributions to streamflow) (from the ER and the general literature)

3. ANALYSIS PROCEDURE

The staff's analysis of surface water hydrology will be closely coordinated with the environmental reviews of surface water quality and use and the environmental reviews of groundwater regime, quality, and use in order to establish the hydrological characteristics that are most likely to be affected

by the alternatives being considered. The depth of analysis will be related to the level of consideration being given each alternative.

The staff will identify the monthly and annual ranges, averages, and historical extremes of the physical and hydrological characteristics of potentially affected surface water bodies. Historical data should be adjusted to present or known future conditions. If observations are incomplete or unavailable, the staff will request that the applicant make additional measurements or develop additional data using accepted hydrological techniques such as those identified by Chow (1964), Linsley et al. (1975), Riggs (1985), Soil Conservation Service (1972), U.S. Army Corps of Engineers (1959, May 1973, and 1973), U.S. Geological Survey (1977), and U.S. Water Resources Council (1978) (see Section 6 of this ESRP).

The staff will determine if the sites under consideration or any site-related structures or alterations of the natural topography are located on the 100-year floodplain (as defined in Executive Order No. 11988) and, if so, the extent of floodplain alteration.

The staff will use such sources of information as necessary to obtain sufficient data for the required level of review. The following sources of regional and site-specific information are recommended:

(1) river basin commissions, regional interagency committees, and regional power administrations (e.g., Tennessee Valley Authority)

(2) State agencies, including those dealing with ecology, conservation, public health, fish and game, forestry, agriculture, and water resources; State engineer; State highway departments; and special natural resource commissions (names and functions vary from State to State)

(3) Federal agencies, including the U.S. Army Corps of Engineers, Geological Survey, Bureau of Reclamation, Soil Conservation Service, Forest Service, Weather Service, Coast and Geodetic Survey, National Oceanographic and Atmospheric Administration, Coast Guard, Fish and Wildlife Service, and Federal Highway Administration

4. EVALUATION

The staff will ensure that the data are sufficient to provide quantitative information on the regime of surface water bodies that may be affected by the alternatives being considered. The staff will ensure that this quantitative information is sufficient for use in other reviews dealing with the evaluation of impacts on surface water regime, quality, and use. If necessary, the staff will recommend that the applicant collect additional hydrologic data.

The staff will evaluate the hydrological descriptions and data to ascertain if they are relevant, complete, reliable, and accurate. The staff will verify that accepted hydrological practices were used in the measurements and data development programs. If necessary, the staff will request that the applicant substantiate the methodologies used in the collection or generation of data.

5. INPUT TO THE ES

The staff will prepare Section 3.4.1.1, "Surface Water Regime," of the ES. This section should contain a concise description of the regime of surface water bodies that could be affected by the alternatives under consideration. The depth and extent of the descriptions will be governed by the level of consideration being given each alternative and by the anticipated magnitude of hydrological impacts. The following information will usually be included in ES Section 3.4.1.1:

(1) Physical descriptions of affected surface water bodies and floodplains. These descriptions should include maps and lists or tables that identify the water bodies, floodplains, and hydrographic modifications; show their relationships to the sites under consideration; and define their physical characteristics.

(2) Descriptions of the hydrological characteristics of the affected water bodies. These descriptions should include tables of hydrological data (e.g., historical monthly disharges) and figures of historical or seasonal trends (e.g., flood-frequency curves, baseflow recession curves) so that the information will be presented in as concise a form as possible.

(3) Quantitative and qualitative descriptions of any other hydrological conditions that may be affected, such as groundwater-surface water interactions.

The staff will ensure that ES Section 3.4.1.1 contains information in sufficient detail to support the descriptions and assessments in the following ES sections:

- 3.4.1.2, "Surface Water Quality"
- 3.4.1.3, "Surface Water Use"
- 4.3.1, "Surface Water Hydrology"
- 4.3.2, "Groundwater Hydrology"

6. REFERENCES

Chow, V., ed., Handbook of Hydrology, McGraw-Hill Book Company, New York, 1964.

Linsley, R. K., M. A. Kohler, and J. L. H. Paulus, Hydrology for Engineers, McGraw-Hill Book Company, New York, 1975.

Riggs, H. C., Developments in Water Science, Vol. 22, Streamflow Characteristics, Elsevier, New York, 1985.

U.S. Army Corps of Engineers, Engineering Manual EM 1110-2-1405, "Flood Hydrograph Analysis and Computations," August 31, 1959.

---, Shore Protection Manual, Corps of Engineers Coastal Engineering Research Center, 1973.

---, "Water Surface Profiles, HEC 2," Corps of Engineers Hydrologic Engineering Center, Davis, CA, May 1973.

U.S. Department of Agriculture, Soil Conservation Service, SCS National Engineering Handbook, Section 4, Hydrology, U.S. Government Printing Office, Washington, DC, 1972.

U.S. Geological Survey, National Handbook of Recommended Methods for Water-Data Acquisition, U.S. Department of the Interior, Reston, VA, 1977.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

U.S. Water Resources Council, "Floodplain Management Guidelines for Implementing Executive Order 11988," Federal Register, Vol. 43, p. 6030, February 10, 1978.

NUREG-1300
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.4.1.2
SURFACE WATER QUALITY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.1.2.2, "Candidate Area Selection"
- 3.1.1, "Site Location"
- 3.1.2, "Site Description"
- 3.1.4, "Uses of Adjacent Lands and Waters"
- 3.2, "Ecology"
- 3.4.2, "Surface Water"
- 3.5, "Geology and Seismology"
- 8.1.2, "Hydrology and Water Quality"
- 8.1.3, "Terrestrial Environment"
- 8.1.4, "Radiological Baselines"

Environmental Review(s) Performed Under the Following ESRP(s)

- 3.4.1.1, "Surface Water Regime"

Standard(s) and/or Guide(s)

- NUREG-0902, "Site Suitability, Selection and Characterization"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- State and Federal water quality standards

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- State and Federal water resource data

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's analysis and evaluation of the applicant's characterization of regional and site-specific surface water quality conditions and the staff's preparation of Section 3.4.1.2 of the ES. The scope of the review will consist of a thorough evaluation of the applicant's characterization of existing and potential surface water quality

conditions that may affect or be affected by the construction and waste disposal operations of the alternatives.

Information needed for the staff's review will usually include the following:

(1) A complete set of site-specific surface water chemistry data. Data should assess seasonal variations and should include the mean, range, and temporal and spatial variations in water quality parameters such as

(a) concentrations of major inorganic constituents (including important trace elements), dissolved gases, and radioactive elements

(b) concentrations of major organic constituents, dissolved organic carbon, total organic carbon, total organic halogens, and water quality indicator organisms (e.g., fecal coliforms and fecal streptococci)

(c) pH, oxidation/reduction conditions, total dissolved solids, specific conductance, alkalinity, ionic strength, and density

(d) turbidity, and the nature of colloidal-sized materials

(e) temperature

Spatial and temporal variations in surface water quality conditions and the potential for these variations to affect characterization and modeling of the site should be identified. Reconnaissance-level data may be used for alternatives other than the applicant's preferred site. (From the ER; the general literature; and consultation with local, State, and Federal agencies)

(2) Regional surface water quality data, whether acquired through a literature search conducted by the applicant or, if necessary, collected by the applicant, to be used to describe the surface water quality characteristics of the region and vicinity. This information will also help identify spatial variations in surface water quality conditions. (From the ER; consultation with local, State, and Federal agencies; and the general literature)

(3) Descriptions of preexisting chemically stressed (i.e., contaminated) surface water environments, and sources of contamination to any water body that may affect local water quality or site construction, operations, or monitoring programs.

3. ANALYSIS PROCEDURE

The staff's analysis of the physical, chemical, and biological surface water quality properties in ES Section 3.4.1.2 will be closely coordinated with the environmental reviews of surface water regime and surface water use to establish the long- and short-term surface water effects of the alternatives being considered. The analysis will also be used as a basis for the assessment of the effects of the alternatives in ES Sections 4.3.1, 4.3.2, 4.5.1, 4.5.2, 4.9, 4.11, and 4.13.

The staff will identify the spatial and temporal variations in the physical, chemical, and biological water quality parameters and, if available, the historical extremes of these parameters. If historical data are not included in the ER, the staff will obtain the data, if available, through consultation with the applicant or the appropriate agency. This information will be used to define the baseline physical, chemical, and (where appropriate) biological surface water quality conditions that may be affected by site construction and operations.

The staff will identify (1) those parameters or conditions that may enhance the migration of contaminants from the disposal site and (2) the potential of the water bodies in question to disperse and dilute contaminants.

The staff will identify existing chemically stressed (i.e., contaminated) surface water environments on the basis of water quality criteria for the approved water-use classification of the water body in question. Historical literature addressing water quality issues for the water body in question should be consulted in identifying these stresses. The staff will identify those stresses that may affect water use and site monitoring programs or enhance the migration of contaminants from the disposal site.

The staff will obtain the information from the applicant's ER, from the applicant's responses to staff questions, and from consultation with local, State, and Federal agencies. Sources of data such as State agencies and Federal agencies such as the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and the U.S. Geological Survey will be used as available and as necessary when the staff has determined that additional information is needed.

If site-specific data are needed, the following sources are suggested:

(1) comprehensive framework studies of water and related lands by river basin commissions and regional interagency commissions

(2) STORET water quality data, U.S. Environmental Protection Agency

(3) WATSTORE Water Quality File, U.S. Geological Survey National Water Data Storage and Retrieval System

(4) reports and data from State agencies, including those dealing with ecology, conservation, public health, fish and game, forestry, agriculture, water resources, and State lands; State engineer; State highway departments; and special natural resources commissions (names and functions vary from State to State)

4. EVALUATION

The staff will ensure that the data are sufficient to enable a complete, quantitative description of the physical, chemical, and (as appropriate) biological water quality characteristics that may affect or be affected by the construction and waste disposal operations of the alternatives. The description of water quality should be relevant, accurate, complete, and reliable so that it can be used for impact assessments in other sections of the ES. The staff

also will ascertain if the appropriate local, State, and Federal agencies have been consulted. In evaluating the information, the staff should consult applicable standards and guides and may wish to consult additional references such as the documents by the American Public Health Association (1985), Hem (1985), U.S. Environmental Protection Agency (1983 and 1986), and U.S. Geological Survey (1977) (see Section 6 of this ESRP). If deemed necessary, the staff will recommend that the applicant collect additional data, verify existing data, and substantiate the methodology used to determine surface water quality conditions.

5. INPUT TO THE ES

The staff will prepare Section 3.4.1.2, "Surface Water Quality," of the ES. The depth and extent of the description will be governed by the water quality characteristics that could affect or be affected by site construction and waste disposal operations and the nature and magnitude of the expected impacts. The following information will be included in ES Section 3.4.1.2:

(1) Complete description of surface water quality parameters for the site and vicinity. This description should include those parameters that could be affected by site construction and waste disposal operations or cause enhanced migration of contaminants from the disposal site. Seasonal variations in surface water quality should also be described. The description may contain statistical summaries of the water quality characteristics, including mean, mean low, mean high, and historical high and low values (as available) for the site and vicinity.

(2) Descriptions of preexisting chemically stressed (i.e., contaminated) surface water environments at the site and in the vicinity, and local sources of contamination that may affect site construction, operations, or monitoring programs.

(3) Any other significant or unusual surface water quality characteristics that could affect or be affected by the proposed and alternative construction and waste disposal operations.

(4) The potential for the water body in question to dilute and disperse contaminants.

The staff will also provide pertinent information and ensure that ES Section 3.4.1.2 contains information in sufficient detail to support assessments of the impacts in the following ES sections:

- 4.3.1, "Surface Water Hydrology"
- 4.3.2, "Groundwater Hydrology"
- 4.5.1, "Terrestrial Ecosystem"
- 4.5.2, "Aquatic Ecosystem"
- 4.9, "Impacts of Accidents"
- 4.11, "Unavoidable Adverse Environmental Impacts"
- 4.13, "Relationships Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity"

6. REFERENCES

American Public Health Association, "Standard Methods for the Examination of Water and Waste Water," 16th ed., Washington, DC, 1985.

Hem, J. D., "Study and Interpretation of the Chemical Characteristics of Natural Water," U.S. Geological Survey Water-Supply Paper 2254, U.S. Government Printing Office, Washington, DC, 1985.

U.S. Environmental Protection Agency, "Methods for Chemical Analysis of Water and Wastes," Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1983.

---, "Guidelines Establishing Test Procedures for the Analysis of Pollutants," Title 40, Code of Federal Regulations, Part 136, U.S. Government Printing Office, Washington, DC, 1986.

U.S. Geological Survey, Office of Water Data Coordination, National Handbook of Recommended Methods for Water-Data Acquisition, U.S. Department of the Interior, Reston, VA, 1977.

U.S. Nuclear Regulatory Commission, NUREG-0902, "Site Suitability, Selection and Characterization," April 1982.

---, Regulatory Guide, 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.4.1.3
SURFACE WATER USE

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1, "Geography and Demography"
- 3.1.3, "Population Distribution"
- 3.1.4, "Uses of Adjacent Lands and Waters"
- 3.4, "Hydrology"
- 3.4.2, "Surface Water"

Environmental Review(s) Performed Under the Following ESRP(s)

- 3.1.1, "Population Distribution and Characteristics"
- 3.1.2, "Current and Projected Land Use"
- 3.4.1.1, "Surface Water Regime"
- 3.4.1.2, "Surface Water Quality"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's description of surface water uses that could be affected by the alternatives identified under ESRP 2.2.5. The scope of the review will consist of (1) an evaluation of such water uses as domestic, municipal, agricultural, industrial, mining, recreational, and navigational and hydroelectric power generation; (2) identification of the water use locations; and (3) quantification of water diversions, consumption, and returns. The review will encompass past, present, and known future water uses.

The information needed for the staff's review will be affected by regional and site-specific factors and by the anticipated magnitude of potential

impacts on present and future water uses. To evaluate alternatives other than the applicant's preferred site, reconnaissance-level data should be sufficient. Information needed for the review will usually include the following:

(1) maps sufficiently detailed so that they show the surface water systems that could be affected by the alternatives being considered (from the ER, appropriate environmental reviews, and the general literature)

(2) lists identifying the affected water bodies and the water uses associated with them (from the ER, appropriate environmental reviews, and the general literature)

(3) for off-channel uses, average monthly withdrawal, consumption, and return rates for each diversion by use category; also, maps showing the locations of diversions and returns on the affected water bodies with respect to the sites under consideration (from the ER, consultation with appropriate agencies, and the general literature)

(4) for on-channel uses, quantitative and qualitative descriptions of the kind, location, use rate, and time variation of such uses; also, maps showing the kinds and locations of the activities on affected water bodies with respect to the sites under consideration (from the ER, consultation with appropriate agencies, and the general literature)

(5) summary of statutory and other legal restrictions relating to water use or specific water-body restrictions on water use imposed by Federal or State regulations (from the ER and consultation with appropriate agencies and their regulations)

(6) quantitative and qualitative descriptions of future water use based on past and present use, demographic trends, and potential for the development of new water uses (from the ER, appropriate environmental review and the general literature)

3. ANALYSIS PROCEDURE

The staff will evaluate those aspects of water use related to consumptive use, nonconsumptive use, and effluent pathways. The depth of analysis will be related to the importance of the water use and the proximity of the use to the sites under consideration.

The staff will identify consumptive water uses that may be affected by the alternatives being considered. Important characteristics to be identified include (1) type of use (e.g., municipal, industrial, and agricultural), (2) number of users, (3) water source, (4) locations of diversions and returns, (4) rate and time variation of use, and (5) water rights.

The staff will identify recreational, navigational, and other nonconsumptive water uses that may be affected by the alternatives being considered. Important characteristics to be identified include (1) activity, (2) location, (3) number of users, and (4) rate and time variation of use.

The staff will identify those water uses that provide potential pathways for both radiological and nonradiological effluents. Important characteristics to be identified include (1) type of use, (2) number of users, (3) water sources, (4) location of diversions for consumptive uses, (5) location of receptors for nonconsumptive uses, and (4) rate and time variation of use for each.

The staff will contact sources of information as necessary in order to obtain sufficient data for the required level of review. These may include local water-supply companies or agencies, river basin commissions, State agencies (e.g., those concerned with water resources, fish and wildlife, and parks), and various Federal agencies such as the U.S. Army Corps of Engineers, Geological Survey, Forest Service, Fish and Wildlife Service, and Department of Agriculture. In addition, local water users may be questioned during the site visit.

Because of the geographic and hydrologic diversity of potential low-level waste disposal sites, only the following reference document is suggested for the staff's use in its review: U.S. Geological Survey, National Handbook of Recommended Methods for Water Data Acquisition. Generally, regional and site-specific information on water use can be obtained from Federal, State, and local agencies such as those in the preceding paragraph. Additional information may also be obtained from the private sector (e.g., water-supply companies) and from local colleges and universities.

4. EVALUATION

The staff will ensure that data are sufficient to provide quantitative information on surface water uses that may be affected by the alternatives being considered. The staff will ensure that this information is sufficient for use in other reviews dealing with the evaluation of impacts on consumptive and nonconsumptive surface water use. If necessary, the staff will recommend that the applicant collect additional surface water use data.

The staff will evaluate the surface water use data and information to ensure that they are relevant, complete, reliable, and accurate. The staff may consult with appropriate Federal, State, and local agencies, as well as water users, in making this evaluation.

5. INPUT TO THE ES

The staff will prepare Section 3.4.1.3, "Surface Water Use," of the ES. This section will contain a concise description of surface water uses that may be affected by the alternatives being considered. The depth and extent of the description will be governed by the level of consideration being given each alternative and by the nature and anticipated magnitude of impacts on surface water use. The following information will usually be included in ES Section 3.4.1.3:

(1) A summary of past, present, and future consumptive and nonconsumptive surface water uses within the hydrological system that may be affected by the alternatives under consideration. The summary should include maps, lists, tables, and figures that describe the types of use,

number of users, water sources, locations of diversions and returns or activities, consumption or use rates, long-term or seasonal trends and variations, and water rights. Appropriate maps, tables, or descriptions from ES Sections 3.4.1.1 and 3.4.1.2 should be referenced to avoid duplication.

(2) A summary of water uses that provide potential surface water pathways for both radiological and nonradiological effluents from the sites under consideration. The summary should include a description of the types of use, number of users, water sources, location of diversions for consumptive uses, location of receptors for nonconsumptive uses, and rate and time variation of use for each. Appropriate maps, tables, or descriptions from ES Sections 3.4.1.1 and 3.4.1.2 or other portions of Section 3.4.1.3 should be referenced.

(3) A summary of statutory and other legal restrictions relating to water use or specific water-body restrictions on water use imposed by Federal, State, or local regulations.

The staff will ensure that ES Section 3.4.1.3 is sufficiently detailed to support the assessments in the following ES section:

- 4.3.1, "Surface Water Hydrology"

6. REFERENCES

U.S. Geological Survey, Office of Water Data Coordination, National Handbook of Recommended Methods for Water Data Acquisition, U.S. Department of the Interior, Reston, VA, 1977.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.4.2
GROUNDWATER

This ESRP consists of the following:

ESRP 3.4.2.1 Groundwater Regime
ESRP 3.4.2.2 Groundwater Quality
ESRP 3.4.2.3 Groundwater Use

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.4.2.1
GROUNDWATER REGIME

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1, "Geography and Demography"
- 3.4.1, "Ground Water"
- 3.4.2, "Surface Water"
- 3.5, "Geology and Seismology"
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"
- 7.1, "Unavoidable Adverse Environmental Impacts"
- 8.1.2, "Hydrology and Water Quality"
- 8.2.2, "Hydrological Monitoring System"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 3.1.1, "Population Distribution and Characteristics"
- 3.1.2, "Current and Projected Land Use"
- 3.4.1.1, "Surface Water Regime"
- 3.4.1.2, "Surface Water Quality"
- 3.4.1.3, "Surface Water Use"
- 3.4.2.3, "Groundwater Use"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's description of the groundwater regime that could affect or be affected by the alternatives identified in Section 2.2.5 of the ES. The scope of the review will consist of an evaluation of site-specific and regional data on the groundwater regime in sufficient

detail to provide the basic data to the staff reviewers responsible for the evaluation of the impacts on existing aquifers at the site and vicinity.

The information needed for the staff's review will be affected by site-specific factors and the anticipated magnitude of the impacts on the groundwater regime. For sites other than the preferred site, reconnaissance-level data may suffice. Information needed for the review will usually include the following:

(1) areal extent of major hydrogeologic units, recharge and discharge areas, elevation and depth of major hydrogeologic units, and stratigraphic relationships (from the ER and the general literature)

(2) piezometric contour maps and cross-sections showing temporal and areal distribution of head levels for each principal hydrogeologic unit (from the ER and the general literature)

(3) groundwater velocities and hydraulic gradients (from the ER and the general literature)

(4) principal saturated flow paths and associated groundwater fluxes and travel times (from the ER and the general literature)

(5) data and methods used for determining principal hydraulic characteristics for each major unit, such as permeability, hydraulic conductivity or transmissivity, specific storage or specific yield, total and effective porosity, bulk density, and aquifer compressibility (from the ER and the general literature)

(6) data and methods used for determining radionuclide transport characteristics of each major hydrogeologic unit, including soil and rock mineralogy, clay content and cation exchange capacity, distribution coefficients (retardation), and coefficients of dispersion (hydrodynamic dispersion) (from the ER and the general literature)

(7) groundwater-surface water interactions (from the ER and the general literature)

(8) historical and seasonal trends in water table elevation or potentiometric levels, water table fluctuation zones, and communications between different aquifers (from the ER and the general literature)

3. ANALYSIS PROCEDURE

The analysis of groundwater hydrology will be closely coordinated with the environmental reviews of groundwater quality and use and the environmental reviews of surface water regime, quality, and use in order to establish the hydrological characteristics that are most likely to be affected by the alternatives being considered.

The staff will identify the seasonal trends and historical extremes in water table elevation or potentiometric levels, communications between aquifers,

surface water-groundwater interactions, and recharge and discharge relationships of potentially affected groundwater systems. Historical data should be adjusted to present or known future conditions (e.g., pumping schemes). If observations are incomplete or unavailable, the staff will request that the applicant make or develop measurements using acceptable hydrological techniques such as those identified by Chow (1964), Stallman (1971), and Walton (1970) (see Section 6 of this ESRP).

The staff will use sources of information such as

(1) State agencies, including those dealing with ecology, conservation, public health, fish and game, agriculture, and water resources; State engineer; State highway department; and special natural resource commissions (names and functions vary from State to State)

(2) Federal agencies, including the Geological Survey, Bureau of Reclamation, Soil Conservation Service, Forest Service, Agricultural Resource Service, Weather Service, Coast and Geodetic Survey, National Oceanic and Atmospheric Survey, Fish and Wildlife Service, and Federal Highway Administration

(3) river basin commissions and regional interagency committees

4. EVALUATION

The staff will ensure that the data are sufficient to provide quantitative information on the groundwater regimes that may be affected by the alternatives being considered. The staff will ensure that this quantitative information is sufficient for use in other reviews under ESRP 4.3.2 dealing with the evaluation of impacts on groundwater regime, quality, and use.

The staff will evaluate the hydrological descriptions and data to ensure that they are relevant, complete, reliable, and accurate so that they can be used for the impact evaluations under ESRP 4.3.2. The staff will verify that accepted hydrological practices such as those identified by Chow (1964), Stallman (1971), and Walton (1970) were used in the measurements and data development programs. If necessary, the staff will request that the applicant substantiate the methods used in the collection or generation of data.

5. INPUT TO THE ES

The staff will prepare Section 3.4.2.1, "Groundwater Regime," of the ES. This section should contain a concise description of the groundwater regimes that could be affected by the alternatives under consideration. The depth and extent of the descriptions will be governed by the level of consideration being given each alternative and by the anticipated magnitude of the hydrologic impacts. The following information will usually be included in ES Section 3.4.2.1:

(1) Descriptions of the physical characteristics of the groundwater regimes potentially affected by the alternatives. These descriptions should include maps that identify the groundwater systems and their relationships

to the alternatives. More detailed information is required for groundwater systems at or near the site than for groundwater systems at a greater distance.

(2) Descriptions of the hydrological characteristics of the groundwater regime potentially affected by the alternatives. These descriptions should include tables and/or figures of hydrological data (e.g., seasonal fluctuations in water levels, recharge and discharge relationships, communications between aquifers, and groundwater/surface water interactions).

(3) Water table or piezometric contour maps.

(4) Other hydrological data, such as annual historical groundwater discharges, historical extremes of flow, and aquifer properties (tables of these may be useful).

The staff will ensure that ES Section 3.4.2.1 contains information in sufficient detail to support the descriptions and assessments in the following ES sections:

- 4.3.1, "Surface Water Hydrology".
- 4.3.2, "Groundwater Hydrology"
- 4.8.1, "Pathways Analysis"
- 4.9.1, "Waste Spillage"
- 4.11, "Unavoidable Adverse Environmental Impacts"

6. REFERENCES

Chow, V., ed., Handbook of Hydrology, McGraw-Hill Book Company, New York, 1964.

Stallman, R. W., Technical Water Resource Investigations, Book 3, Aquifer-Test Design Observation and Data Analysis, Chapter B1, U.S. Geological Survey, 1971.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

Walton, W. C., Groundwater Resource Evaluation, McGraw-Hill Book Company, New York, 1970.

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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.4.2.2
GROUNDWATER QUALITY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.1.2.2, "Candidate Area Selection"
- 3.1.4, "Uses of Adjacent Lands and Waters"
- 3.2, "Ecology"
- 3.4.1, "Ground Water"
- 3.5, "Geology and Seismology"
- 8.1.2, "Hydrology and Water Quality"
- 8.1.3, "Terrestrial Environment"
- 8.1.4, "Radiological Baselines"

Environmental Review(s) Performed Under the Following ESRP(s)

- 3.4.2.1, "Groundwater Regime"

Standard(s) and/or Guide(s)

- NUREG-0902, "Site Suitability, Selection and Characterization"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- State and Federal water quality standards

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- State and Federal water resource data

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's analysis and evaluation of the applicant's characterization of regional and site-specific groundwater quality conditions and the staff's preparation of Section 3.4.2.2 of the ES. The scope of the review will consist of a thorough evaluation of the applicant's characterization of existing and potential groundwater quality conditions that may affect or be affected by the construction and waste disposal operations of the alternatives.

Information needed for the staff's review will usually include the following:

(1) A complete set of site-specific groundwater chemistry data. Data should assess seasonal variations and should include the mean, range, and temporal and spatial variations in water quality parameters such as

(a) concentrations of major inorganic constituents (including important trace elements), dissolved gases, and radioactive elements

(b) concentrations of major organic constituents, dissolved organic carbon, total organic carbon, total organic halogens, and water quality indicator organisms (e.g., fecal coliforms and fecal streptococci)

(c) pH, oxidation/reduction conditions, total dissolved solids, specific conductance, alkalinity, ionic strength, and density

(d) turbidity, and the nature of colloidal-sized materials

(e) temperature

Spatial and temporal variations in groundwater quality conditions and the potential for these variations to affect characterization and modeling of the site should be identified. Reconnaissance-level data may be used for alternatives other than the applicant's preferred site. (From the ER; the general literature; and consultation with local, State, and Federal agencies)

(2) Regional groundwater quality data, whether acquired through a literature search conducted by the applicant or, if necessary, collected by the applicant, to be used to describe the groundwater quality characteristics of the region and vicinity. This information will also help identify spatial variations in groundwater quality conditions. (From the ER; the general literature; and consultation with local, State, and Federal agencies)

(3) Descriptions of preexisting chemically stressed (i.e., contaminated) groundwater environments and sources of contamination to any water body that may affect local water quality or site construction, operations, or monitoring programs.

3. ANALYSIS PROCEDURE

The staff's analysis of the physical, chemical, and biological groundwater quality properties in ES Section 3.4.2.2 will be closely coordinated with the environmental reviews of groundwater regime and groundwater use to establish the long- and short-term groundwater effects of the alternatives being considered. The analysis will also be used as a basis for the assessment of the effects of the alternatives in ES Sections 4.3.1, 4.3.2, 4.5.1, 4.5.2, 4.9, 4.11, and 4.13.

The staff will identify the spatial and temporal variations in the physical, chemical, and biological water quality parameters and, if available,

historical extremes of these parameters. If historical data are not included in the ER, the staff will obtain the data, if available, through consultation with the applicant or the appropriate agency. This information will be used to define the baseline physical, chemical, and (where appropriate) biological groundwater quality conditions that may be affected by site construction and operations.

The staff will identify those parameters or conditions that may enhance the migration of contaminants from the disposal site.

The staff will identify preexisting chemically stressed (i.e., contaminated) groundwater environments on the basis of water quality criteria for the approved water-use classification of the water source in question. Historical literature addressing water quality issues for the water source in question should be consulted in identifying these stresses. The staff will identify those stresses that may affect water use and site monitoring programs or enhance the migration of contaminants from the disposal site.

The staff will obtain the information from the applicant's ER, from the applicant's responses to staff questions, and from consultation with local, State, and Federal agencies. Sources of data such as State agencies and Federal agencies, such as the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and the U.S. Geological Survey, will be used as available and as necessary when the staff has determined that additional information is needed.

If site-specific data are needed, the following sources are suggested:

(1) STORET water quality data, U.S. Environmental Protection Agency

(2) WATSTORE Water Quality File, U.S. Geological Survey National Water Data Storage and Retrieval System

(3) reports and data from State agencies, including those dealing with ecology, conservation, public health, fish and game, forestry, agriculture, water resources, and State lands; State engineer; State highway departments; and special natural resources commissions (names and functions vary from State to State)

4. EVALUATION

The staff will ensure that data are sufficient to enable a complete, quantitative description of the physical, chemical, and (as appropriate) biological water quality characteristics that may affect or be affected by construction and waste disposal operations of the alternatives. The description of water quality should be relevant, accurate, complete, and reliable so that it can be used for impact assessments in other sections of the ES. The staff also will ascertain if the appropriate local, State, and Federal agencies have been consulted. In evaluating the information, the staff should consult applicable standards and guides and may wish to consult additional references such as the documents by American Public Health Association (1985), Britton and Gerba (1984), Hem (1985), U.S. Environmental Protection Agency (1983 and

1986), and U.S. Geological Survey (1977) (see Section 6 of this ESRP). If deemed necessary, the staff will recommend that the applicant collect additional data, verify existing data, and substantiate the methodology used to determine groundwater quality conditions.

5. INPUT TO THE ES

The staff will prepare Section 3.4.2.2, "Groundwater Quality," of the ES. The depth and extent of the description will be governed by the water quality characteristics that could affect or be affected by construction and waste disposal operations and the nature and magnitude of the expected impacts. The following information will be included in ES Section 3.4.2.2:

(1) Complete description of groundwater quality parameters for the site and vicinity. This description should include those parameters that could be affected by site construction and waste disposal operations or cause enhanced migration of contaminants from the disposal site. Seasonal variations in groundwater quality should also be described. The description may contain statistical summaries of the water quality characteristics, including mean, mean low, mean high, and historical high and low values (as available) for the site and vicinity.

(2) Descriptions of preexisting chemically stressed (i.e, contaminated) groundwater environments at the site and in the vicinity of the site, and local sources of contamination that may affect site construction, operations, or monitoring programs.

(3) Any other significant or unusual groundwater quality characteristics that could affect or be affected by the proposed and alternative construction and waste disposal operations.

The staff will also provide pertinent information and ensure that ES Section 3.4.2.2 contains information in sufficient detail to support the assessments of impacts in the following ES sections:

- 4.3.1, "Surface Water Hydrology"
- 4.3.2, "Groundwater Hydrology"
- 4.5.1, "Terrestrial Ecosystem"
- 4.5.2, "Aquatic Ecosystem"
- 4.9, "Impacts of Accidents"
- 4.11, "Unavoidable Adverse Environmental Impacts"
- 4.13, "Relationships Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity"

6. REFERENCES

American Public Health Association, "Standard Methods for the Examination of Water and Waste Water," 16th ed., Washington, DC, 1985.

Britton, G., and C. P. Gerba (eds.), Groundwater Pollution Microbiology, Wiley Interscience, John Wiley and Sons, New York, 1984.

Hem, J. D., "Study and Interpretation of the Chemical Characteristics of Natural Water," U.S. Geological Survey Water-Supply Paper 2254, U.S. Government Printing Office, Washington, DC, 1985.

U.S. Environmental Protection Agency, "Methods for Chemical Analysis of Water and Wastes," Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1983.

---, "Guidelines Establishing Test Procedures for the Analysis of Pollutants," Title 40, Code of Federal Regulations, Part 136, U.S. Government Printing Office, Washington, DC, 1986.

U.S. Geological Survey, Office of Water Data Coordination, National Handbook of Recommended Methods for Water-Data Acquisition, U.S. Department of the Interior, Reston, VA, 1977.

U.S. Nuclear Regulatory Commission, NUREG-0902, "Site Suitability, Selection and Characterization," April 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.4.2.3
GROUNDWATER USE

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1, "Geography and Demography"
- 3.1.1, "Site Location"
- 3.1.2, "Site Description"
- 3.1.3, "Population Distribution"
- 3.1.4, "Uses of Adjacent Lands and Waters"
- 3.4.1, "Ground Water"
- 3.4.2, "Surface Water"
- 3.5, "Geology and Seismology"
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"
- 7.1, "Unavoidable Adverse Environmental Impacts"
- 8.1.2, "Hydrology and Water Quality"
- 8.2.2, "Hydrological Monitoring System"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 3.1.1, "Population Distribution and Characteristics"
- 3.1.2, "Current and Projected Land Use"
- 3.4.1.2, "Surface Water Quality"
- 3.4.1.3, "Surface Water Use"
- 3.4.2.1, "Groundwater Regime"
- 3.4.2.2, "Groundwater Quality"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's description of groundwater uses that could affect or be affected by the alternatives identified in Section 2.2.5 of the ES. The scope of the review will consist of (1) an evaluation of such water uses as industrial, municipal, domestic, agricultural, and energy-resource development well uses; (2) identification of the locations of water use; and (3) quantification of groundwater exploitation and recharge. The review will cover past, present, and future (both known and potential) water uses.

The information needed for the staff's review will be affected by site-specific factors and the anticipated magnitude of the potential impacts on groundwater use. For sites other than the preferred site, reconnaissance-level data may suffice. Information needed for the review will usually include the following:

(1) maps showing the relationship of the site to the major hydrogeologic systems (from the ER and the general literature)

(2) identification of locations and rates of groundwater recharge and groundwater discharge at the site and vicinity (from the ER and the general literature)

(3) inventory of existing groundwater users within the site and vicinity including location, type, amounts, and rates of use, hydrogeologic unit used, and typical well construction details; identification of the nearest downgradient groundwater users and nearest supply well relying on groundwater (from the ER and the general literature)

(4) data on drawdown (or mounding) caused by withdrawals (or injections) of groundwater from neighboring major industrial, agricultural, and municipal wells, including extent of depression (or impression) cones (from the ER, regional groundwater management agencies, and the general literature)

(5) description of future groundwater withdrawals based on past and present withdrawals and the potential for development of new groundwater withdrawals in the foreseeable future; description of groundwater uses and changes through time in potentiometric levels (from the ER, regional groundwater management agencies, and the general literature)

3. ANALYSIS PROCEDURE

The staff will identify groundwater uses that could affect or be affected by the site and groundwater uses that provide potential pathways for radiological and nonradiological contaminants. For groundwater uses that could affect or be affected by the site, the important characteristics to be identified include groundwater source, locations of groundwater use and discharge, amount and time variation of use, and water rights. The staff

will consult with the staff reviewers responsible for ES Sections 4.3.1, "Surface Water Hydrology," and 4.3.2, "Groundwater Hydrology," to establish the degree of detail needed for this review.

For those groundwater uses that provide pathways for contaminants, the important characteristics to be identified include groundwater sources, locations of groundwater use and discharge, and amount and time variation of use. The staff will consult with the staff reviewers responsible for ES Sections 4.8, "Radiological Impacts and Dose Assessment," and 4.11, "Unavoidable Adverse Environmental Impacts," to establish the degree of detail needed for this review.

In addition to information obtained from the applicant's ER and from the applicant's responses to subsequent staff questions, the staff is expected to use additional sources of data such as local water-supply companies or agencies, river basin commissions, State agencies (e.g., those dealing with water resources and fish and wildlife), and various Federal agencies (e.g., the U.S. Army Corps of Engineers and the U.S. Geological Survey) when necessary to complete the analysis. Local water users may be questioned during the site visit.

Because of the geographic and hydrologic diversity of potential site locations and the large number of published sources of information on water use, no specific listing of reference documents that may be used by the staff in its review is provided. Generally, maps and charts by the U.S. Geological Survey, National Oceanic and Atmospheric Administration, Army Map Service, and Federal Aviation Administration; water supply papers of the U.S. Geological Survey; river basin reports of the U.S. Army Corps of Engineers; and relevant publications of Federal, State, and regional agencies and local colleges and universities that describe water use in the site vicinity and region may be used. If the preliminary safety analysis report for the proposed site is available, it may be consulted as needed.

Using the above information, the staff will compile and tabulate water uses by the categories and characteristics described in this section. In its analysis, the staff will include past, present, and future (both known and potential) water uses.

4. EVALUATION

The staff will ensure that data and information on water use are adequate to serve as a basis for assessing the impacts of the proposed site on groundwater use. In evaluating this material, the staff will ensure that the data are sufficient to provide quantitative information on groundwater uses to be affected by the site. The staff may wish to consult with appropriate Federal, State, and local agencies in making this evaluation.

5. INPUT TO THE ES

The staff will prepare Section 3.4.2.3, "Groundwater Use," of the ES. This section should contain a concise description of the groundwater uses that could be affected by the alternatives identified in Section 2.2.5 of the ES. The depth and extent of the description will be governed by the groundwater uses that could be affected by each alternative and by the nature and magnitude of the expected impacts on groundwater use.

This section will usually include a summary of present and known future groundwater withdrawals on the site and for distances great enough to cover potentially affected groundwater systems. Appropriate maps or descriptions from ER Section 3.4.2.3 will be referenced to depict the groundwater hydrology. References to applicable State laws on water use should be included.

The staff will provide pertinent information or ensure that it has been provided to the staff reviewers responsible for the following ES sections and will ensure that ES Section 3.4.2.3 contains information in sufficient detail to support the descriptions and assessments in the following ES sections:

- 4.1, "Land"
- 4.3.1, "Surface Water Hydrology"
- 4.3.2, "Groundwater Hydrology"
- 4.8.1, "Pathways Analysis"
- 4.9.1, "Waste Spillage"
- 4.11, "Unavoidable Adverse Environmental Impacts"

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.5
GEOLOGY

This ESRP consists of the following:

ESRP 3.5.1 Geology
ESRP 3.5.2 Soils
ESRP 3.5.3 Seismic Characteristics
ESRP 3.5.4 Mineral Resources

NUREG-1300
U.S. Nuclear Regulatory Commission
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.5.1
GEOLOGY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.1.2.2, "Candidate Area Selection"
- 2.1.2.3, "Candidate Site Selection"
- 3.1.1, "Site Location"
- 3.1.2, "Site Description"
- 3.1.4, "Uses of Adjacent Lands and Waters"
- 3.4, "Hydrology"
- 3.5, "Geology and Seismology"
- 5.2.2, "Environmental Effects of Potential Radionuclide Releases"

Environmental Review(s) Performed Under the Following ESRP(s)

- 3.1.2, "Current and Projected Land Use"
- 3.4, "Hydrology"
- 3.5.2, "Soils"
- 3.5.3, "Seismic Characteristics"
- 3.5.4, "Mineral Resources"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and evaluation of the geologic conditions presented in the applicant's ER and the staff's preparation of Section 3.5.1 in the ES. This ESRP also provides a framework for other staff reviews of environmental studies in hydrology and geochemistry.

The scope of the review will consist of a description and discussion of the regional and site geology in sufficient detail so that the effect of the

construction, operation, and closure of the facility on the geology of the site can be determined. The detail required is a function of the complexity of the geology of the site, but information needed for the staff's review will usually include the following:

(1) description of the tectonic province and regional geologic features

(2) geologic maps sufficiently detailed so that they show the major geologic units and structural features that could affect or be affected by the disposal site (from the ER and the general literature)

(3) tables identifying the mineralogy, petrology, grain size, and hydrologic characteristics of major stratigraphic units (from the ER and the general literature)

(4) description of major structural features including faults and folds (from the ER and the general literature)

(5) description of small-scale structural features including joints, bedding surfaces, and metamorphic fabrics (from the ER and the general literature)

(6) description of topographic features indicative of faulting and/or mass wasting including fault scarps, karst topography, and landslide scars

(7) description of paleontologic resources that could be affected by the disposal site (from the ER and the general literature)

3. ANALYSIS PROCEDURE

The staff's analysis of geology will provide a framework for environmental reviews of the groundwater regime, geochemistry, mineral resources, and seismic characteristics.

The staff will analyze specific geologic factors that could affect or be affected by the disposal site. The analysis will typically include the following:

(1) an analysis of the tectonic province and regional geologic features of the site that will be based on a review of appropriate regional tectonic and geologic maps and reports

(2) an analysis of major structural features (e.g., folds and faults) that could affect or be affected by the disposal site that will be based on a review of logs defining surface and subsurface features and a review of areal structural, geologic, and lithologic maps and reports

(3) an analysis of small-scale structural features (e.g., joints and bedding surfaces) that will based on a review of detailed structural maps

(4) an analysis of stratigraphic units (including hydrologic characteristics) that could affect or be affected by the disposal site that will be based

on a review of detailed geologic maps accompanied by detailed lithologic descriptions

(5) an analysis of topographic features of faulting and/or mass wasting that will be based on a review of surficial geologic maps and slope maps

(6) an analysis of the potential for affecting important index or guide fossil-bearing strata that will be based on a review of detailed regional lithologic and paleontological descriptions

The staff will use sources of information as necessary to obtain sufficient data for the required level of review. The following sources of regional and site-specific information are recommended:

(1) State agencies, including those dealing with State geological surveys, and university geology departments

(2) Federal agencies, including the U.S. Geological Survey, Bureau of Mines, and U.S. Army Corps of Engineers

4. EVALUATION

The staff will ensure that the data are sufficient so that quantitative information can be obtained on the geology that may be affected by the alternatives being considered. The staff will ensure that this quantitative information is sufficient for use in other evaluations of groundwater, surface water, and mineral resources in ES Sections 3.4, 3.5.4, 4.3, and 4.4.2. If necessary, the staff will recommend that the applicant collect additional geologic data.

The staff will review the geologic interpretations, descriptions, and data to ensure that they are relevant, complete, and accurate. The review will typically include the following:

(1) An evaluation of the geologic maps provided to determine geologic hazards. The evaluation should be based on a comparison with previously published or open-file maps from Federal and State agencies.

(2) An evaluation of the description of major stratigraphic units, boreholes, and previously established, formally defined units. Emphasis should be placed on major hydrologic units, fossil- and mineral-bearing strata, and major facies changes.

(3) An evaluation of the major and small-scale structural features to determine faults or other structural features that may provide pathways for waste, present engineering hazards, and otherwise compromise the proposed site or alternatives. The evaluation should be based on a comparison with previously published or open-file maps or structural descriptions.

(4) An evaluation of topographic or mass wasting features identified to determine unstable areas that may present engineering hazards or

otherwise compromise the proposed or alternative sites. The evaluation should be based on a comparison with previously published reports.

(5) An evaluation of the importance of fossil-bearing strata present for index and guide fossils in order to enhance the understanding of stratigraphic relationships.

5. INPUT TO THE ES

The staff will prepare Section 3.5.1, "Geology," of the ES. This section will contain a concise description of the stratigraphy and structure that could be affected by the alternatives under consideration. The depth and extent of the descriptions will be governed by the level of consideration being given each alternative and by the anticipated magnitude of geologic impacts. The following information will usually be included in ES Section 3.5.1:

(1) descriptions of geologic units, including maps and tables that identify the distribution and physical character of rock units and show their relationship to the sites under consideration

(2) descriptions of major structural and topographic features, including maps and tables that define the distribution and physical character of major features and show their relationship to the sites under consideration

(3) quantitative and qualitative descriptions of any other geologic conditions that may be affected

The staff will ensure that ES Section 3.5.1 contains information in sufficient detail to support the descriptions and assessments in the following ES sections:

- 3.4.2, "Groundwater"
- 3.5.3, "Seismic Characteristics"
- 3.5.4, "Mineral Resources"

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.5.2
SOILS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1, "Geography and Demography"
- 3.2, "Ecology"
- 3.3, "Meteorology and Air Quality"
- 3.4.1, "Ground Water"
- 3.4.2, "Surface Water"
- 3.5, "Geology and Seismology"
- 4.2, "Facility Description"
- 4.3, "Support Facilities"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1, "Description of the Proposed Action"
- 2.1.1, "Location"
- 2.2, "Alternatives to the Proposed Action"
- 3.1.2, "Current and Projected Land Use"
- 3.2, "Meteorology and Air Quality"
- 3.4.1.1, "Surface Water Regime"
- 3.4.2.1, "Groundwater Regime"
- 3.5.1, "Geology"
- 3.5.3, "Seismic Characteristics"
- 3.5.4, "Mineral Resources"
- 3.6, "Ecology"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Literature review
- Responses to requests for additional information
- Site visits

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of information provided by the applicant and the staff's description of soil conditions that could be affected by the alternatives identified in Section 2.2.5 of the ES. The scope of this review will consist of (1) the identification of natural soils (e.g., see Hunt, 1972) including weathered bedrock; deposits transported by fluvial, colluvial, eolian, marine, lacustrine, or glacial processes; sedentary deposits formed in swamps, bogs, or evaporite basins; and the profiles formed by weathering and organic activity near a soil unit's upper boundary; and (2) an assessment of pedologic and geomorphic processes resulting in soil accumulation or erosion.

This ESRP also provides a framework for other staff reviews, particularly environmental studies of geochemistry, hydrology, and ecology. The kinds of data and information needed for the review will vary depending on regional and site-specific factors and the anticipated magnitude of the proposed actions. Information needed for the staff's review will usually include the following:

(1) Identification of soil series or broader class, as specifically as possible (from the ER and U.S. Department of Agriculture (USDA) literature).

(2) Description of physiographic setting, such as hillslopes, alluvial terrace, or floodplain (from the ER, site visits, topographic maps, and general literature).

(3) Nature of bedrock and other underlying materials in the area. Some of the information may be referenced in Section 3.5 of the ER and included in Section 3.5 of the ES (from the ER, U.S. Geological Survey (USGS) maps and literature, and general literature).

(4) Slopes; descriptions of approximate gradient or range of gradients (from the ER and USGS maps).

(5) Description of plant cover and vegetation at the site, such as pine forest, corn, and pasture (from the ER, USDA literature, and general literature).

(6) Description of climate; annual and monthly precipitation and temperature data, including mean annual temperature, mean annual precipitation, and annual extremes (from the ER and the National Oceanographic and Atmospheric Administration).

(7) Description of soil materials and horizons and whether they are products of weathered bedrock or surficial deposits. For the horizon descriptions, USDA nomenclature should be used (see USDA, 1975). Soil profile descriptions for each soil unit would be expected to include horizon designation, depth, thickness, boundary, color, texture, structure, consistence, roots, pores, and reaction. Additional features in the description might include iron or carbonate concretions, effervescence with dilute hydrochloric acid, and cementation (from the ER and USDA literature).

(8) Maps and cross-sections of soil and bedrock distribution, showing differing soil types, if present. Diagrams should include the general soils of the region and specific soils of the site (from the ER and USDA literature).

(9) Relationships between soils and surficial geologic processes, including erosion by wind or running water (from the ER and general literature).

(10) Susceptibility of soils to mass wasting through slow displacements, such as creep and solifluction, and fast movements, such as debris slides and flows and earthflow (from the ER and general literature).

(11) Rates and recurrences of processes in Items (9) and (10) above (from the ER and general literature).

(12) Geochemical interactions between soil materials and percolating and interstitial waters in the vadose zone, and groundwater in the saturated zone. Some of this information will be found in Section 3.4 of the ER and included in Section 3.4 of the ES (from the ER and general literature).

3. ANALYSIS PROCEDURE

The staff will verify that sufficient information is presented in the ER to characterize soils at a proposed low-level waste disposal facility. The staff's analysis will be closely coordinated with the reviews of ER Sections 3.1, "Geography and Demography," 3.2, "Ecology," 3.3, "Meteorology and Air Quality," 3.4, "Hydrology," and 3.5, "Geology and Seismology."

The ER should contain information and data, listed in Section 2 of this ESRP, that identify all soil conditions relevant to low-level radioactive waste disposal. Data on soils must be complete so that potential impacts on soils resulting from waste disposal can be characterized (see ESRP 4.4.1). The staff's analysis of soil conditions should consider the following:

(1) completeness and accuracy of soil descriptions and classification at and near alternative disposal sites and borrow areas

(2) complete identification of relationships between soil materials and biologic, meteorologic, hydrologic, and surface and subsurface geologic processes

(3) complete identification of current uses of soil and land resources

If observations or data are incomplete or unavailable, the staff will request that the applicant develop data using the standard methods and terminology such as those identified by Hunt (1972) and the USDA (1975). The staff will use the information in the ER in concert with regional and site-specific reference materials from the following sources to ensure the accuracy and completeness of soil descriptions:

(1) Federal agencies, especially Soil Conservation Service; also Forest Service Bureau of Land Management, Geological Survey, and U.S. Army Corps of Engineers

(2) State agencies, especially agricultural or farm bureaus; also geologic surveys, natural resources divisions, and the State engineer and highway administration departments

(3) other sources such as university reports and dissertations and environmental and conservation organizations

4. EVALUATION

The staff will evaluate the information provided by the applicant to ensure that (1) soil studies have included all alternative sites; (2) all soil units have been considered; (3) all locations of proposed operations, such as site buildings, disposal areas, buffer zones, and borrow areas, have been included; and (4) other aspects of the sites (geography, ecology, meteorology, hydrology, and geology) have been described in sufficient detail so that their interactions with soils can be determined. The staff will ensure that this information is included in the appropriate section of the ES.

The staff will verify that observations and data provide quantitative information derived through a review of relevant literature and through accepted field and laboratory methods.

5. INPUT TO THE ES

The staff will prepare Section 3.5.2, "Soils," of the ES. This section will contain a concise description, derived from the ER and this review, of soil characteristics that could be affected by the alternatives under consideration. Depth of the report will be governed by the level of consideration being given to a particular alternative and the soil's susceptibility to adverse impacts. The following information will usually be included in ES Section 3.5.2.:

(1) physical description of affected soil units, which will include maps, of cross-sections, and lists describing areal and volumetric predictions effects on soil units

(2) descriptions of features related to soils that may also experience indirect effects of impacts on soils, such as future land use (especially agriculture), terrestrial ecology, natural resources, groundwater, and surface water

6. REFERENCES

Hunt, C. B., Geology of Soils, Their Evolution, Classification, and Uses, W. H. Freeman and Company, San Francisco, 1972.

U.S. Department of Agriculture, Soil Conservation Service, Soil Survey Staff, Agricultural Handbook No. 436, "Soil Taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys," U.S. Government Printing Office, Washington, DC, 1975.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.5.3
SEISMIC CHARACTERISTICS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.5, "Geology and Seismology"

Environmental Review(s) Performed Under the Following ESRP(s)

- None

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- None

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's description of the seismic conditions that could be affected by the alternatives identified in Section 2.2.5 of the ES. The scope of the review will consist of the analysis of the effects of construction and operation of the proposed low-level waste disposal facility on the seismic activities at the site. This ESRP also provides a framework for other staff reviews of environmental studies related to the engineering aspects of the site.

The information needed for the staff's review will include a description of the regional and local seismicity in relation to the alternatives.

3. ANALYSIS PROCEDURE

The potential for seismic impact is negligible, and the staff's experience has been that such an impact is not likely. Therefore, an environmental review of seismicity normally is not required. If the potential for seismic impact should exist, the potential impact will be analyzed and evaluated on a case-by-case basis.

4. EVALUATION

None required unless the potential for a seismic impact exists.

5. INPUT TO THE ES

On the basis of the information provided, the staff will prepare Section 3.5.3, "Seismic Characteristics," of the ES. This section will contain, if necessary, an analysis and evaluation of the seismic data for the alternatives identified in Section 2.2.5 of the ES.

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.5.4
MINERAL RESOURCES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1.2, "Site Description"
- 3.1.4, "Uses of Adjacent Lands and Waters"
- 3.5, "Geology and Seismology"
- 3.6, "Regional Historic, Archeological, Architectural, Scenic, Cultural, and Natural Landmarks"
- 7.1, "Unavoidable Adverse Environmental Impacts"
- 7.2, "Irreversible and Irretrievable Commitments of Resources"

Environmental Review(s) Performed Under the Following ESRP(s)

- 3.1.2, "Current and Projected Land Use"
- 3.5.1, "Geology"
- 3.5.2, "Soils"
- 3.8, "Cultural Resources"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- U.S. Geological Survey Circular 831, "Principles of a Resource/Reserve Classification for Minerals"

Other

- Consultation with local, State, and Federal agencies
- Local courthouse records
- Responses to requests for additional information
- Site visit
- U.S. Bureau of Mines, U.S. Geological Survey, and State geologic survey reports and data

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's description of known or identified mineral resources, as defined in U.S. Geological Survey Circular 831, that could be affected by the proposed action. The scope of the review will consist of the identification and evaluation of site-specific and regional reconnaissance-level data on mineral resources including (1) economic, marginally economic, and subeconomic identified resources at the site; (2) the uses and net worth of such mineral resources; and (3) the locations of active or abandoned mines, prospects, quarries, borrow pits, wells, and excavations.

The information needed for the staff's review of the primary site will usually include the following site-specific and regional information relevant to mineral resources. Only reconnaissance-level data and information will usually be needed for the review of alternative sites.

(1) maps that are sufficiently detailed so that they show all active and abandoned mines, prospects, borings, wells, borrow pits, quarries, and excavations and identify those that are currently active

(2) lists, coded to maps in Item (1), of commodity types at each mine, prospect, boring, well, borrow pit, quarry, and excavation

(3) detailed maps that show all workings such as shafts, pits, trenches, adits, stopes, and drifts at the proposed site

(4) maps with descriptions of geologic units that host all mines, prospects, quarries, borrow pits, and excavations

(5) all available logs from wells and borings at the site

(6) a listing of all completion practices on wells and drilled holes within the affected area

(7) quantitative information (if available) such as assays, tonnages, ore grades, and production amounts of active or previously active mines, wells, borrow pits, and quarries

(8) summary of ownership of mineral rights and leases held for exploratory rights

3. ANALYSIS PROCEDURE

The staff's review of known mineral resources will be closely coordinated with the environmental reviews of current and projected land use, geology, and soils in order to establish potentially exploitable mineral resources that may be affected by the alternatives being considered.

The staff will identify current and historical mining and exploration activity and known exploitable resources for the affected site and surrounding area. Historical resource data should be projected to current prices and demand. If

data are incomplete, additional sources of information should be consulted. If data are unavailable, some assessment should be made using regional and site-specific geological data and regional mineral resource data from references and information sources.

The staff's analysis of specific mineral resource data and information will usually include the following:

(1) an analysis of affected known mineral resources that is based on a review of maps and lists provided and other appropriate literature

(2) an analysis of regional geologic units known to host mineral deposits that is based on a review of regional geologic and mineral resource maps and reports and other information provided

(3) an analysis of well logs or data that is based on a review of logs and log reports

(4) an analysis of quantitative information on assays, tonnages, and production amounts that is based on a review of published and unpublished reports, State mineral files, and other information provided

(5) an analysis of ownership of mineral rights and property leases that is based on a review of local courthouse records and information provided

The staff will use sources of information as necessary to obtain sufficient data for the required level of review. Recommended sources for regional and site-specific information are the following:

(1) State geologic surveys, mining associations, offices of industry and trade, and planning commissions

(2) local and regional planning commissions and courthouse records

(3) Federal agencies including the Bureau of Mines, Geological Survey, Bureau of Land Management, Forest Service, and Environmental Protection Agency

4. EVALUATION

The staff will ensure that the data are sufficient to provide quantitative and qualitative information on the known mineral resources that may be affected by the alternatives being considered. If necessary, the staff will recommend that the applicant collect additional relevant mineral resource data.

The staff will evaluate the mineral resource information and descriptions to ensure that they are thorough, relevant, reliable, applicable, and accurate. The staff will also verify the information sources and references. The review will usually include the following:

(1) evaluation of maps and lists provided of mines, prospects, wells, borings, borrow pits, and quarries to determine known mineral resources that could be affected by the proposed action

(2) evaluation of geologic maps and descriptions to determine host lithologies for mineral resources

(3) evaluation of well logs to determine zones of economic, marginally economic, or subeconomic known or identified mineral resources

(4) evaluation of quantitative assay, tonnage, and production data to determine economic, marginally economic, or subeconomic known or identified mineral resources

(5) evaluation of ownership of mineral or exploratory rights for the alternatives being considered

5. INPUT TO THE ES

The staff will prepare Section 3.5.4, "Mineral Resources," of the ES. This section will contain a concise description of known mineral resources and recovery operations. The depth and extent of the descriptions will be governed by the level of consideration being given each alternative and by the anticipated affect on the resource of each alternative if potentially exploitable mineral resources are present. The following information will be included in ES Section 3.5.4:

(1) Descriptions of any geologic formations at the site that are host for or are likely to host mineral resources. These descriptions should include maps that identify the geologic units.

(2) Annotated maps showing active and abandoned mines, prospects, quarries, borrow pits, wells; and borings.

(3) Detailed maps, for the primary site, of the workings and excavations at each mine, prospect, quarry, or borrow pit.

(4) If available, descriptions of significant mineral resources in wells and borings.

(5) A listing of wells and borings at the site that, because of completion practices, could provide significant pathways for waste.

(6) Quantitative data and/or qualitative assessment of known mineral resources that would be affected by the proposed action. Present and projected demand for known resources should be described to the degree possible.

The staff will ensure that ES Section 3.5.4 contains descriptive information in sufficient detail to support the descriptions and assessments in the following ES sections:

- 3.1.2, "Current and Projected Land Use"
- 3.5.1, "Geology"
- 3.5.2, "Soils"

6. REFERENCES

U.S. Bureau of Mines and U.S. Geological Survey, U.S. Geological Survey Circular 831, "Principles of a Resource/Reserve Classification for Minerals," Washington, DC, 1980.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.6
ECOLOGY

This ESRP consists of the following:

ESRP 3.6.1 Terrestrial Ecology
ESRP 3.6.2 Aquatic Ecology

NUREG-1300
U.S. Nuclear Regulatory Commission
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.6.1
TERRESTRIAL ECOLOGY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.2.1, "Terrestrial Ecology"
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"
- 8.1.3, "Terrestrial Environment"
- 8.2.3, "Ecological Monitoring System"
- 8.3, "Postoperational Monitoring"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.4, "Environmental Monitoring and Surveillance"
- 2.2.5, "Summary Alternatives for Detailed Consideration"

Standard(s) and/or Guide(s)

- Endangered Species Act of 1973
- Fish and Wildlife Coordination Act of 1958
- NUREG-0902, "Site Suitability, Selection and Characterization"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's concise description of the terrestrial environment and biota of the alternatives identified in Section 2.2.5 of the ES. The staff will provide pertinent information to the staff reviewers responsible for other evaluations of the effects of construction, operations, and closure on the terrestrial ecosystem under ESRP 4.5.1.

The scope of the review will consist of the following:

(1) Review of the applicant's identification and description of terrestrial species (both wild and domestic), including the composition, spatial distribution, abundance, and other attributes of biotic assemblages that could be affected by the planned action for both the proposed and alternative sites.

(2) Review of the applicant's identification of any important* species, irreplaceable terrestrial natural resources, and the location of wildlife sanctuaries and natural areas that might be affected by the proposed action.

(3) Review of the applicant's compliance with applicable Federal, State, and local ecological quality standards and regulations regarding, for example, endangered species, unique wildlife habitats, national parklands, and critical wildlife breeding areas.

(4) Review of the applicant's program that was used to collect initial baseline ecological data. Sampling design, frequency, methodology, and instrumentation for both collection and analysis will be evaluated as applicable. If the terrestrial environment has already been subject to environmental stress from pollutant sources, the applicant should provide information on the nature of this stress and its consequences.

(5) Review of the applicant's sources of information, including published reports and contacts with regional, State, and local officials.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential impact. Information needed for the review will usually include the following:

(1) Maps of the alternatives and vicinity (5-kilometer radius) showing the boundaries of major plant communities, the location of minor communities, special habitats (e.g., springs, seeps, bogs, sink holes, cliff faces, and rare or unique habitats) and any habitats used by "important" species (U.S. Geological survey topographic maps of 7-1/2-minute scale can serve as base maps when available). The site boundary, the construction zone, and other areas to be cleared should be shown on these maps. When available, the maps described above should be supplemented with recent aerial photographs of comparable scale.

*A species is "important" if a specific causal link can be identified between the proposed project and the species and if one or more of the following criteria apply: (1) the species is commercially or recreationally valuable, (2) the species is threatened or endangered (Pub. Law 93-205, 87 Stat. 884), (3) the species affects the well-being of some important species specified 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 in the environment.

(2) Data for the alternatives that will include the composition and abundance of floral species. Such information will be important for the reviews under ESRPs 4.8.1, "Pathway Analysis," and 4.8.3, "Dose to Biota Other Than Man," because plant species can control radionuclide uptake from the soil. The identification of significant faunal exposure pathways will also be important in determining the sampling frequency of environmental monitoring programs (ESRP 2.1.4, "Environmental Monitoring and Surveillance"). In addition, a map that shows the distribution of principal farm crops in the area (10-kilometer radius) should be provided.

(3) Discussion of natural and man-induced effects resulting from activities such as farming, logging, grazing, and burning. The successional stages (i.e., weed, brush, pole, and mature stages) of each endeavor should be addressed.

(4) A map of each alternative and vicinity showing the locations of National, State, local, and private wildlife refuges or other land areas dedicated to the preservation, management, or study of wildlife and wildlife habitats.

(5) List of important terrestrial vertebrate species known to occupy the site and vicinity (5-kilometer radius). The quantitative abundance of each important species should be estimated; determinations should include migratory species and species that only use the area for temporary breeding purposes. Information on the variety and abundance of species will be important for the review under ESRPs 4.8.1 and 4.8.3; faunal (both wild and domestic) foraging habits, diet, and metabolism can influence radionuclide concentrations and affect the human food chain. The identification of significant faunal exposure pathways will also be important in determining the sampling or measurement frequencies of environmental monitoring programs (ESRP 2.1.4).

(6) Lists of threatened or endangered species that are known to occur, and for any such species, their site-specific habitat. The relationships between threatened or endangered species and the environment should be discussed. This discussion should include a description of the use of the area important species (i.e., nursery and breeding), their normal seasonal population fluctuations, and their habitat requirements. In addition, information on food chain and interspecies relationships should be provided.

(7) Data on the number and distribution of important domestic fauna, particularly cattle and sheep and other meat animals, that may contribute to the exposure of humans to radionuclides. Important game, dairy, recreational, and work animals should receive similar treatment. A map that shows the distribution of the above-mentioned faunal types in the area of each alternative (5-kilometer radius) should be provided.

(8) Discussion of the results of any ecological or biological studies previously completed or currently in progress. If such studies are not available, a detailed discussion of the applicant's minimal 1-year ecological survey (quarterly sampling) is required. Such a study will be

evaluated for its use of established scientific methods for surveying, data retrieval, and data reduction.

3. ANALYSIS PROCEDURE

The staff will (1) describe terrestrial communities (both floral and faunal) and their interactions with their environment, (2) describe existing habitats, and (3) identify important species. The review under this ESRP will be closely coordinated with the review under ESRP 4.5.1 so that the environmental consequences of the alternatives can be evaluated.

The staff's description of the important terrestrial communities and habitat types will be supplemented by a review of pertinent literature, information acquired during the site visit(s), and consultation with appropriate local, State, and Federal agencies, including the U.S. Fish and Wildlife Service and the appropriate State fish and wildlife agency.

4. EVALUATION

In evaluating the applicant's description of terrestrial resources of the alternatives the staff will consult the appropriate standards and guides given in Section 1 of this ESRP. Within these guides, the staff will find a framework for the description of terrestrial resources for the environmental impact assessment of low-level waste disposal facilities. The staff will also become familiar with the provisions of any Federal statutes germane to the evaluation under this ESRP such as the Fish and Wildlife Coordination Act of 1958, and the Endangered Species Act of 1973.

The staff will ensure that (1) the information on important terrestrial resources is sufficient to provide quantitative data on the value (economic, environmental and social), distribution, and abundance of biota expected to be affected by construction, operation, and closure; (2) if biological-indicator species are involved, criteria as to their selection have been verified; and (3) local, State, and Federal fish, game, and conservation departments and other appropriate resource agencies and institutions have been consulted.

5. INPUT TO THE ES

The staff will prepare Section 3.6.1, "Terrestrial Ecology," of the ES. This section will contain descriptions of the terrestrial resources of the alternatives including offsite areas that could be affected by the disposal project. The descriptions should be brief and should include the following:

(1) The principal terrestrial ecological features of the alternatives. Emphasis should be placed on communities that likely will be affected by construction, operation, and closure activities. The extent of discussion should be adequate to support the impact assessments in ES Sections 2.3, 4.5.1, 4.11, and 4.12.

(2) Wildlife sanctuaries and natural areas that could be affected by the proposed project. Special attention will be given to describing important species. Estimates of their abundance will be provided where

appropriate. Special habitat needs such as cover, forage, and protection from prey species will be emphasized if the proposed project would potentially disrupt these needs.

The staff will provide terrestrial ecology data to the staff reviewers responsible for the following ES sections:

- 2.1.4, "Environmental Monitoring and Surveillance"
- 2.3, "Staff Assessment of Alternatives and Recommendations"
- 4.5.1, "Terrestrial Ecosystem"
- 4.8.1, "Pathways Analysis"
- 4.8.3, "Dose to Biota Other Than Man"
- 4.11, "Unavoidable Adverse Environmental Impacts"
- 4.12, "Irreversible and Irretrievable Commitments of Resources"

6. REFERENCES

U.S. Nuclear Regulatory Commission, NUREG-0902, "Site Suitability, Selection, and Characterization," April 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.6.2
AQUATIC ECOLOGY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.2.2, "Aquatic Ecology"
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"
- 8.2.3, "Ecological Monitoring System"
- 8.3, "Postoperational Monitoring"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.4, "Environmental Monitoring and Surveillance"
- 2.2.5, "Summary Alternatives for Detailed Consideration"

Standard(s) and/or Guide(s)

- Coastal Zone Management Act of 1972
- Endangered Species Act of 1973
- Federal Water Pollution Control Act of 1948
- Federal Water Pollution Control Act Amendments of 1972
- Fish and Wildlife Coordination Act of 1958
- Marine Sanctuaries Act of 1972
- NUREG-0902, "Site Suitability, Selection and Characterization"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- Rivers and Harbors Act of 1899
- State and local laws affecting water quality

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's concise description of the aquatic environment and biota of the alternatives identified in Section 2.2.5 of the ES. The staff will provide pertinent information to the staff reviewers responsible for other evaluations of the effects of construction, operations, and closure on the aquatic ecosystem.

The scope of the review will consist of the following:

(1) Review of the applicant's identification and description of aquatic species including the composition, spatial distribution, abundance, and other attributes of biotic assemblages that could be affected by the alternatives under consideration.

(2) Review of the applicant's identification of any important* species, irreplaceable aquatic natural resources, and the location of aquatic sanctuaries and natural areas that might be affected by the proposed action.

(3) Review of the applicant's compliance with applicable Federal, State, and local ecological quality standards and regulations regarding, for example, endangered species, unique aquatic habitats, and critical aquatic species breeding areas.

(4) Review of the applicant's program that was used to collect initial baseline ecological data. Sampling design, frequency, methodology, and instrumentation for both collection and analysis will be evaluated as applicable. If a natural water body has already been subject to environmental stress from pollutant sources, the applicant should provide information on the nature of this stress and its consequences.

(5) Review of the applicant's sources of information, including published reports and contacts with regional, State, and local officials.

*A species is "important" if a specific causal link can be identified between the proposed project and the species and if one or more of the following criteria apply: (1) the species is commercially or recreationally valuable, (2) the species is threatened or endangered (Pub. Law 93-205, 87 Stat. 884), (3) the species affects the well-being of some important species specified 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 in the environment.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential impact.

The staff will describe the important aquatic communities and important aquatic habitat types on the basis of the following information provided by the applicant:

(1) Maps of the alternatives and vicinity (5-kilometer radius) showing the locations of major aquatic communities and important aquatic habitats (U.S. Geological Survey maps of 7-1/2-minute scale can serve as base maps when available). The site boundary, the construction zone, and other areas to be cleared should be shown on these maps so the staff can evaluate, spatially, the potential effects of construction activities on identified habitats as well as ascertain the proximity of significant migration pathways to the designated disposal site property. When available, the maps described above should be supplemented with recent aerial photographs of comparable scale.

(2) Data for the alternatives that will include the composition, abundance, and seasonal variability of aquatic species. Such information will be important for the review under ESRPs 4.8.1 and 4.8.3. The identification of significant exposure pathways will also be important in determining the sampling frequency of environmental monitoring programs. In addition, a map that shows the location of any harvested aquatic species used either for stock or human consumption within a 10-kilometer radius of the site should be provided.

(3) Description of the relative significance of the various identified aquatic habitats in a regional context. Maps delineating the location of important or irreplaceable aquatic resources such as wetlands, sanctuaries, or preserves should be furnished.

(4) Description of the temporal and spatial distribution of important finfish, shellfish, and other invertebrates, including benthos, and their quantitative abundance, where appropriate. Critical species habitats such as spawning areas, nursing grounds, food habitats, feeding areas, and wintering areas should be identified.

(5) Discussion of the composition and distribution of any plankton communities. Emphasis should be placed on the eggs and larvae of important fin and shellfish species. Information on physical, chemical, and biological factors, including nutrient concentrations, known to influence species diet, distribution, and abundance should be provided.

(6) Identification of endangered or threatened aquatic species that are known to be present in the region and delineation of their specific habitat requirements.

(7) Discussion of the results of any ecological or biological studies previously completed or currently in progress. If such studies are not

available, a detailed description of the applicant's 1-year environmental survey is required. Such a study will be evaluated for its use of established scientific methods for surveying, data retrieval, and data reduction.

3. ANALYSIS PROCEDURE

The staff will (1) describe the aquatic communities and their interactions with the environment, (2) describe existing aquatic habitats, and (3) identify important species. The review under this ESRP will be closely coordinated with the review under ESRP 4.5.2 so that the environmental consequences of the proposed action can be evaluated. In evaluating the applicant's information, the staff should consult applicable standards and guides and may wish to consult additional references such as the documents by Edmondson and Winberg (1971), Ricker (1971), Russel-Hunter (1975), and Vollandwider (1971) (see Section 6 of the ESRP).

The staff description of important aquatic communities and habitat types based on information provided by the applicant will be supplemented by a review of pertinent literature, information acquired during the site visit(s), and consultation with the U.S. Fish and Wildlife Service and the appropriate State fish and wildlife agency.

4. EVALUATION

The staff will ensure that the regional and site-specific aquatic ecological information is adequate to serve as a basis for the assessment of the effects of facility construction, operation, and closure on the aquatic ecosystem. The staff will consult the appropriate standards and guides as noted in this ESRP to assist in the evaluation. The staff will also become familiar with the provisions of Federal statutes germane to the evaluation under this ESRP.

The staff will ensure that (1) information on important aquatic resources of the alternatives is sufficiently detailed and accurate so that adequate quantitative data can be obtained on the value, distribution, and abundance of vulnerable biota (vulnerable to site construction, operation, and closure activities); (2) if indicator species are involved, criteria as to their selection have been verified; (3) if diversity indices or other statistics are used, each index chosen for analysis is appropriate; (4) descriptions will include existing environmental and man-induced stresses on aquatic biota; and (5) local, State, and Federal conservation departments, as well as other appropriate Federal agencies or their publications, have been consulted to verify information needed for the staff's analysis.

5. INPUT TO THE ES

The staff will prepare Section 3.6.2, "Aquatic Ecology," of the ES. This section will contain descriptions of aquatic resources, stressing those features that could be affected by the proposed project. The descriptions should be brief and should include the following:

(1) The principal aquatic ecological features of the alternatives. Emphasis should be placed on communities that likely will be affected by construction, operation, and closure activities. The extent of discussion should be adequate to support the impact assessments in ES Sections 2.3, 4.5.2, 4.11, and 4.1.2.

(2) Important species and aquatic food webs leading to humans. Estimates of species abundance and habitat needs should be emphasized.

The staff will provide aquatic ecology data to the staff reviewers responsible for the following ES sections:

- 2.1.4, "Environmental Monitoring and Surveillance"
- 2.3, "Staff Assessment of Alternatives and Recommendations"
- 4.5.2, "Aquatic Ecosystem"
- 4.8.1, "Pathways Analysis"
- 4.8.3, "Dose to Biota Other Than Man"
- 4.11, "Unavoidable Adverse Environmental Impacts"
- 4.12, "Irreversible and Irretrievable Commitments of Resources"

6. REFERENCES

Edmondson, W. T., and G. G. Winberg, IBP Handbook No. 17, A Manual on Methods for Measuring Secondary Productivity in Fresh Waters, International Biological Programme, Blackwell Scientific Publications, Oxford and Edinburgh, 1971.

Ricker, W. E., IBP Handbook No. 3, Methods for Assessment of Fish Production in Fresh Waters, International Biological Programme, Blackwell Scientific Publications, Oxford and Edinburgh, 1971.

Russel-Hunter, W. D., Aquatic Productivity, The MacMillan Company, New York, 1975.

U.S. Nuclear Regulatory Commission, NUREG-0902, "Site Suitability, Selection, and Characterization," April 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

Vollandwider, R. A., IBP Handbook No. 12, A Manual on Methods for Measuring Primary Production in Aquatic Environments, International Biological Programme, Blackwell Scientific Publications, Oxford and Edinburgh, 1971.

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.7
SOCIOECONOMICS

This ESRP consists of the following:

ESRP 3.7.1 Labor Force and Employment
ESRP 3.7.2 Infrastructure Characteristics
ESRP 3.7.3 Tax Base and Revenues
ESRP 3.7.4 Sociocultural Characteristics

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.7.1
LABOR FORCE AND EMPLOYMENT

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.7, "Socioeconomics"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 2.2.2, "Alternative Sites"
- 2.2.5, "Summary Alternatives for Detailed Consideration"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's concise description of the labor force and employment characteristics of the alternatives identified in Section 2.2.5 of the ES. The staff will provide pertinent information to the staff reviewers responsible for the identification and assessment of the effects of construction, operation, closure, and long-term care of the proposed low-level waste disposal facility.

The scope of the review will be based on the magnitude and nature of the expected effects of the proposed facility as identified in the scoping process. At a minimum, the staff's review of the labor force and employment characteristics will be described in sufficient detail to permit a subsequent staff assessment and calculation of specific impacts.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential

impact. The information needed for the review will usually include the following:

(1) identification of major industries in the region,* by category, including employment (from the ER and consultation with local and State agencies)

(2) size and nature of the construction industry and construction labor force within the region (from the ER and consultation with local and State agencies)

(3) size and nature of the total regional labor force (from the ER and consultation with local and State agencies)

(4) regional unemployment levels and economic projection (from the ER and consultation with local and State agencies)

(5) identification and location of major competitors for the labor force, i.e., large-scale, multiyear construction projects (from consultation with local and State agencies)

3. ANALYSIS PROCEDURE

The staff's analysis of the labor force and employment in the region surrounding each alternative will be closely coordinated with the impact assessment review under ESRPs 4.1 and 4.6 to establish the parameters that will affect socioeconomic impacts. The staff will analyze the labor force and employment characteristics of each region in order to obtain adequate information on the availability of skilled and unskilled labor to meet the needs of the project.

4. EVALUATION

The staff will ensure that the information on labor force and employment is adequate so that it can be used as a basis for the assessment of impacts on the local communities resulting from the construction, operation, closure, and long-term care of the proposed facility.

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*The region, as used in this ESRP, is limited to the area that includes the following for which social and economic base data must be provided:

(1) the counties in which the alternative sites would be located
(2) those specific portions of surrounding counties and urbanized areas (generally up to 40 kilometers from each alternative site) from which the construction work force would be principally drawn, or whose community services would be affected because construction workers changed residence.

Other social and economic impacts can generally be presumed to affect the same area covered by this definition of the region.

5. INPUT TO THE ES

The factors identified above will govern the depth and extent of the input to the ES. The staff will prepare Section 3.7.1, "Labor Force and Employment," of the ES. This section will summarize the staff's review of the labor force and employment characteristics for the region surrounding each alternative site.

The staff also will provide the following information or ensure that it has been provided to the staff reviewer responsible for the following ES section:

- 4.6, "Socioeconomics" - estimates of the adequacy of the labor force size, composition, and availability to meet the labor force needs of the project.

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.7.2
INFRASTRUCTURE CHARACTERISTICS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.7, "Socioeconomics"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 2.2.2, "Alternative Sites"
- 2.2.5, "Summary Alternatives for Detailed Consideration"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's concise description of the infrastructure characteristics for the alternatives identified in Section 2.2.5 of the ES. The staff will provide pertinent information to the staff reviewers responsible for the identification and assessment of the socioeconomic impacts of the construction, operation, closure, and long-term care of the proposed low-level waste disposal facility.

The scope of the review will be based on the magnitude and nature of the expected impacts of the proposed facility as identified in the scoping process. At a minimum, the staff's review of the infrastructure characteristics will be described in sufficient detail to permit a subsequent staff assessment and evaluation of specific impacts.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential

impacts. The information needed for the review will usually include the following:

Housing

(1) location and amount of existing and projected housing
(2) characteristics of existing housing: types, age, size, and condition
(3) trends in size of housing stock
(4) turnover and vacancy rates
(5) constraints on development of new housing (if any)

Health and Public Safety

(1) present and projected water and sewer/sewage disposal facilities, including present capacity and projected percentage of use

(2) present and projected police and fire capabilities

(3) location of hospitals and number of physicians and specialized health facilities, including present and projected capacity

Education

(1) regional private and secondary schools, including pupil-teacher ratios, capacity, and present percentage of use

(2) regional junior colleges, technical schools, and higher institutions, including capacity and present percentage of use

Highways and Transportation

(1) regional and local highway systems, including carrying capacity and condition of roads and highways

(2) availability and type of public transportation

(3) modifications that might affect traffic flow to and from the alternatives

3. ANALYSIS PROCEDURE

The staff's analysis of the infrastructure characteristics in the region surrounding each alternative will be closely coordinated with the impact assessment review under ESRPs 4.1 and 4.6 in order to establish the parameters that will affect socioeconomic impacts. The staff will analyze the infrastructure characteristics of each region in order to provide sufficient information on the availability of an adequate infrastructure to meet the needs of the project.

4. EVALUATION

The staff will ensure that the information on the infrastructure characteristics is adequate to serve as a basis for the assessment of impacts on the

local communities resulting from the construction, operation, closure, and long-term care of the proposed facility.

5. INPUT TO THE ES

The factors identified above will govern the depth and extent of the input to the ES. The staff will prepare Section 3.7.2, "Infrastructure Characteristics," of the ES. This section will summarize the staff's review of the infrastructure characteristics for the region surrounding each alternative site.

The staff also will provide the following information or ensure that it has been provided to the staff reviewer responsible for the following ES section:

- 4.6, "Socioeconomics" - estimates of the adequacy of existing housing, health and public safety facilities and capabilities, educational institutions, and transportation facilities to meet the needs of the incoming labor force associated with the project

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

ENVIRONMENTAL STANDARD REVIEW PLAN 3.7.3
TAX BASE AND REVENUES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.7, "Socioeconomics"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 2.2.2, "Alternative Sites"
- 2.2.5, "Summary Alternatives for Detailed Consideration"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's concise description of the regional tax base and revenues of the alternatives identified in Section 2.2.5 of the ES. The staff will provide pertinent information to the staff reviewers responsible for the identification and assessment of the socioeconomic impacts of the construction, operation, closure, and long-term care of the proposed low-level waste disposal facility.

The scope of the review will be based on the magnitude and nature of the expected impacts of the proposed facility as identified in the scoping process. At a minimum, the staff's review of tax base and revenues will be described in sufficient detail to permit a subsequent staff assessment and evaluation of specific impacts.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the

results of the scoping process and the anticipated magnitude of the potential impact. Information needed for the review will usually include the following:

(1) regional political jurisdictions and tax districts, including the tax districts that will be directly affected by the construction, operation, closure, and long-term care of the proposed facility

(2) regional tax structure and the distribution of present revenues to each jurisdiction and district

3. ANALYSIS PROCEDURE

The staff's analysis of the tax base and resources in the region surrounding each alternative will be closely coordinated with the impact assessment review under ESRPs 4.1 and 4.6 in order to establish the parameters that will affect socioeconomic impacts. The staff will analyze the tax base and revenue data of each region in order to provide adequate information on the economic impacts of the proposed facility.

4. EVALUATION

The staff will ensure that the information on the regional tax base and revenues is adequate to serve as a basis for the assessment of impacts on the local communities resulting from the construction, operation, closure, and long-term care of the proposed facility.

5. INPUT TO THE ES

The factors identified above will govern the depth and extent of the input to the ES. The staff will prepare Section 3.7.3, "Tax Base and Revenues," of the ES. This section will summarize the staff's review of the tax base and revenue data for the region surrounding each alternative site.

The staff also will provide the following information or ensure that it has been provided to the staff reviewer responsible for the following ES section:

- 4.6, "Socioeconomics," - quantitative and qualitative data on the regional tax base and revenues relative to each alternative site

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.7.4
SOCIOCULTURAL CHARACTERISTICS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.7, "Socioeconomics"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 2.2.2, "Alternative Sites"
- 2.2.5, "Summary Alternatives for Detailed Consideration"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's concise description of the sociocultural characteristics of the alternatives identified in Section 2.2.5 of the ES. The potential for sociocultural impacts is highly site specific. For this reason, the staff will review this area with the applicant early during the preparation of the ER to establish the necessity of considering sociocultural characteristics. The staff will provide pertinent information to the staff reviewers responsible for the identification and assessment of the effects of the construction, operation, closure, and long-term care of the proposed low-level waste disposal facility.

The scope of the review will be based on the magnitude and nature of the expected impacts of the proposed facility as identified in the scoping process. At a minimum, the staff's review of sociocultural factors will be described in sufficient detail to permit a subsequent staff assessment and calculation of specific impacts.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential impact. Information needed for the review will usually include the following:

(1) social structure and significant institutions of major communities within the region surrounding each alternative site

(2) identification and evaluation of significant community problems (i.e., crime, family stability, substance abuse, etc.)

(3) results of attitudinal surveys, if conducted, of local attitudes, life-style indicators, cultural values, community cohesion, etc.

3. ANALYSIS PROCEDURE

The staff's analysis of the sociocultural characteristics of the region surrounding each alternative will be closely coordinated with the impact assessment review under ESRP 4.6 in order to establish the parameters that will affect socioeconomic impacts. The staff will analyze the sociocultural characteristics of each region in order to provide adequate information on the sociocultural factors that are likely to affect or be affected by the needs of the project and result in potential adverse impacts.

4. EVALUATION

The staff will ensure that the information on the sociocultural characteristics is adequate to serve as a basis for the assessment of impacts on the local communities resulting from the construction, operation, closure, and long-term care of the proposed facility.

5. INPUT TO THE ES

The factors identified above will govern the depth and extent of the input to the ES. The staff will prepare Section 3.7.4, "Sociocultural Characteristics," of the ES. This section will summarize the staff's review of the sociocultural characteristics for the region surrounding each alternative.

The staff also will provide the following information or ensure that it has been provided to the staff reviewer responsible for the following ES section:

- 4.6, "Socioeconomics" - data on the sociocultural factors likely to affect or be affected by the project

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 3.8
CULTURAL RESOURCES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.6, "Regional Historic, Archaeological, Architectural, Scenic, Cultural and Natural Landmarks"
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.2.5, "Summary Alternatives for Detailed Consideration"

Standard(s) and/or Guide(s)

- 36 CFR 800, "Protection of Historic and Cultural Properties"
- Executive Order 11593, "Protection and Enhancement of the Cultural Environment," 1971
- Historical and Archaeological Preservation Act of 1974
- National Historic Preservation Act of 1966
- NUREG-0902, "Site Suitability, Selection and Characterization"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- U.S. Department of the Interior, The National Register of Historic Places

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's concise description of those

historic, archaeological, and cultural resources* that could be affected by disposal facility construction and operation. The results of this review will be used for other reviews of the effects of construction and operation on these resources.

The scope of the review will consist of the following:

(1) evaluation of the methods used to identify and locate cultural, historic, and archaeological resources

(2) evaluation of the results of the surveys conducted

(3) confirmation of the location and significance of any properties that are listed or are eligible for inclusion in The National Register of Historic Places

(4) review of any additional information pertaining to the identification and description of cultural or historic resources that could be affected by the construction or operation of the proposed project

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential impact. Information needed for the review will usually include the following:

(1) The applicant's detailed description of any archaeological or historical surveys (planned or ongoing) of the proposed and alternative sites and vicinity. The description should include a map outlining the physical extent of the survey and a brief discussion of survey techniques and the qualifications of the surveying party. If a "new" survey is planned, both historic and archaeological resources should be considered.

    For site evaluations (especially the alternative sites), the applicant should rely heavily on reconnaissance-level information that can be retrieved or generated without performing additional specific investigations. This includes relevant scientific government or private agency reports and consultations with experts.

(2) The applicant's identification (on a map) and discussion of "important"** sites. The applicant's determinations should be supported by (a) the State historic preservation officer (SHPO), (b) an extensive literature review, (c) field reconnaissance work, and (d) limited surface testing, if necessary.

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*Historic and cultural resources include districts, sites, buildings, structures or objects of historical, archaeological, architectural, or cultural significance.

**"Important" implies locations valued for their historic, archaeological, architectural, scenic, cultural, or landmark significance.

(3) The results of the staff's consultation with the SHPO and the State archaeologist and/or State historian, if they exist, to determine if there are any additional comments or information concerning the proposed action. An additional source of information in the area of historic and cultural preservation is the Office of Archaeology and Historic Preservation of the National Park Service, U.S. Department of the Interior. The staff may also choose to consult this entity to substantiate the applicant's results.

(4) The results of the staff's consultation with the SHPO in applying The National Register criteria to any important historical, archaeological, or cultural locations identified in the applicant's survey(s). If the staff determines that a particular location appears to meet the criteria, it should request, in writing, an opinion from the U.S. Department of the Interior. The request for determination of eligibility should be sent directly to the Director of the Historic Preservation Council, U.S. Department of the Interior.

(5) The results of the staff's search of The National Register of Historic Places to verify the applicant's list of properties included therein. It should be noted that a disposal site can have a visual or audible effect on cultural and historic resources that are located some distance from the proposed site. Therefore, all properties listed in The National Register that are within 10 kilometers of the potential disposal site should be identified. In addition to the above, the staff should consider compliance with appropriate State and/or local historic preservation laws.

3. ANALYSIS PROCEDURE

In evaluating the cultural resources of the alternatives identified in Section 2.2.5 of the ES, the staff will review the following information provided by the applicant: (1) the description of any archaeological or historical surveys; (2) the discussion of relevant comments by any organization contacted by the applicant for the purpose of locating and assessing archaeological and historic resources; and (3) the description of all properties within or adjacent to (within a 10 kilometer radius) the sites that are listed or are eligible for inclusion in The National Register of Historic Places or are included in State or local registers. The review under this ESRP will be coordinated with the review under ESRP 4.7 in order to carefully evaluate the environmental consequences of the proposed action.

4. EVALUATION

The staff will ensure that the historic, archaeological, and cultural resources that could be affected by the construction, operation, and closure of the proposed project have been identified, located, and described in sufficient detail to enable an analysis and assessment of these impacts.

5. INPUT TO THE ES

The staff will prepare Section 3.8, "Cultural Resources," of the ES. The depth and scope of input to the ES will be dictated by the extent and significance of the identified historic, archaeological, and cultural resources and by the nature and magnitude of the expected impacts of construction, operation, and closure. The following information usually will be included in ES Section 3.8:

(1) A description of historic, archaeological, and cultural resources that are listed in or are eligible for inclusion in The National Register of Historic Places. Any resource, with the potential for inclusion, should have SHPO concurrence. A description of resources included in State and/or local registers should also be provided.

(2) A list and summary of conversations with members of organizations or individuals contacted by the applicant or NRC staff who provided necessary information concerning the location and significance of important resources.

(3) A brief description of the overall results and adequacy of any surveys (field or archival) that were conducted by the applicant or others.

The staff will provide historic, archaeological, and cultural resource information to the staff reviewer responsible for the following ES section:

- 4.7, "Cultural Resources"

6. REFERENCES

Code of Federal Regulations, Title 36, "Parks, Forests and Public Property," U.S. Government Printing Office, Washington, D.C., revised annually.

U.S. Department of the Interior, National Park Service, The National Register of Historic Places, U.S. Government Printing Office, Washington, D.C., revised periodically.

U.S. Nuclear Regulatory Commission, NUREG-0902, "Site Suitability Selection and Characterization," April 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.1
LAND

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1.1, "Site Location"
- 3.1.2, "Site Description"
- 3.1.4, "Uses of Adjacent Lands and Waters"
- 5.1.1.1, "Land-Use Effects"
- 5.1.2.5, "Other Effects"
- 5.1.3.1, "Land Use and Terrestrial Impacts"
- 5.2.1, "Environmental Effects of Long-Term Containment"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 2.2.2, "Alternative Sites"
- 2.2.3, "Alternative Disposal Facilities, Disposal Units, and Design Features"
- 2.2.5, "Summary Alternatives for Detailed Consideration"
- 3.1.2, "Current and Projected Land Use"
- 3.6.1, "Terrestrial Ecology"
- 3.7.2, "Infrastructure Characteristics"
- 3.8, "Cultural Resources"

Standard(s) and/or Guide(s)

- Federal Land Policy and Management Act of 1976
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- U.S. Department of Agriculture, "Prime and Unique Farmlands," Final Rule, 43 FR 4030, January 31, 1978
- Wilderness Act of 1976

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's assessment of the direct and indirect impacts of construction, operation, closure, and long-term care on land use associated with the alternatives identified in Section 2.2.5 of the ES. The scope of the review will consist of the analysis and evaluation of the alternatives in sufficient detail in order to determine the significance of potential land-use impacts and to recommend how these impacts should be treated in the licensing process (e.g., recommendations that would mitigate adverse environmental impacts). The impact analysis should consider the potential changes in land use for each alternative as a result of construction, operation, closure, and long-term care.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the anticipated magnitude of the potential impact. Information needed for the review will usually include the following:

(1) maps showing land-use categories according to the categories defined by Anderson et al. (1976) for the various alternatives and within a 10-kilometer radius of each alternative (from ES Section 3.1.2)

(2) land areas devoted to major uses within the confines of the alternatives as well as within a 10-kilometer radius of each alternative (from ES Section 3.1.2)

(3) highways and utilities at each alternative and in its vicinity (from ES Section 3.1.2)

(4) special land uses, such as recreation, for each alternative and its vicinity (from ES Section 3.1.2)

(5) local and regional land-use plans that include the alternatives within their scope (from ES Section 3.1.2)

(6) for each alternative, the area and location of land that will be disturbed by construction on either a long- or short-term basis (from ES Section 3.1.2)

(7) proposed land restoration and management actions such as recontouring or grading, permanent landscaping, revegetation of disturbed areas, restoration of stream flows, and establishment of recreational areas (from the ER and on request from the applicant)

3. ANALYSIS PROCEDURE

The staff will consider land-use impacts of the various alternatives in terms of (1) long-term restrictions on land use and long-term physical changes in land use and (2) short-term physical changes in land use. Long-term restrictions and/or changes in land use will be considered in terms of the amount and quality of land affected after proposed measures, if any, have been implemented. Restrictions on the use of farmland, industrial areas, recreational areas, residential areas, and other areas will be reviewed. In specific cases, the degree of change or impact can sometimes be analyzed by comparison to existing standards, guides, or local use plans and zoning ordinances. The staff should consult these documents and ensure that the evaluations of impacts at the alternatives are consistent. In most cases, however, no standards or guides exist, and the staff will have to evaluate the severity of the impact without these aids.

Restrictions on the use of land such as farmland or forest can be analyzed in the context of the amount and quality of the land to be affected by each alternative. The U.S. Department of Agriculture has developed two indices of land quality that may be used for guidance:

(1) Land Capability Classification: This classification places land in one of eight categories as defined in each State's "Conservation Needs Inventory" document. Land in capability Classes I and II is usually the most productive and, therefore, subject to the most detailed analysis when it is to be committed. Land in Classes III through VIII is less important and, therefore, its commitment is not as thoroughly analyzed.

(2) "Prime" or "Unique" Classification: "Prime" land, as defined in the U.S. Department of Agriculture Final Rule (Federal Register, January 31, 1978), is generally also in Class I or II and is the most productive. The criteria for committing prime land have not been established. If the staff determines that prime land is to be committed, it must assess productivity and provide the results of that assessment to the staff reviewer responsible for ES Section 4.11, "Unavoidable Adverse Environmental Impacts."

"Unique" land, because of an unusual convergence of soil and climate, is suited to the production of a special crop that is not widely grown elsewhere. The criteria for the commitment of unique land have not been established. If the staff finds that unique land is to be committed, it must assess productivity and provide the results of that assessment to the staff reviewer responsible for ES Section 4.11.

To assess productivity, the staff will use a State's annually published document on agricultural statistics, which contains crop and animal production statistics and land areas by county. The staff will also consult with local and State agricultural and soil conservation agencies as necessary to complete this assessment.

4. EVALUATION

For each alternative the staff generally will consider the following to assess the severity of impacts on land use:

(1) physical amount or extent of land affected
(2) quality/use category of affected area
(3) duration of impacts: short-term or long-term
(4) other quantitative or qualitative measures

Evaluation of each identified impact will result in one of the following determinations:

(1) The impact is minor and mitigation is not required.

(2) The impact is adverse, but it can be mitigated by specific practicable design or procedural modifications.

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided.

If the staff cannot identify any mitigative or avoidance practices, it will provide a detailed summary of the land-use changes and their impacts to the staff reviewer responsible for ES Section 4.11.

5. INPUT TO THE ES

The staff will prepare Section 4.1, "Land," of the ES, which should contain the following: (1) a brief description and quantification of the land-use changes with regard to the alternatives, thus ensuring disclosure to the public of major direct and indirect land-use consequences of the proposed action, (2) the basis of the staff's analysis of the project, and (3) the staff's conclusions, recommendations, and conditions regarding land use.

This section should be clear to a nontechnical reader. Extensive descriptive material may be incorporated by reference and need not be duplicated in the statement.

The staff's analysis may be presented in a narrative summary, and important aspects of the impacts resulting from potential land-use changes should be highlighted. The discussion should identify important impacts and mitigating actions. Minor issues should receive minor treatment. Important or disputed issues should be discussed in detail.

The staff will provide the following information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 4.5, "Ecology" - a list of land-use impacts that should be considered for potential ecological impacts

- 4.6, "Socioeconomics" - a list of land-use impacts that should be considered for potential socioeconomic impacts

- 4.7, "Cultural Resources" - a list of impacts that could affect historic/archeological sites

- 4.11, "Unavoidable Adverse Environmental Impacts" - a summary of the unavoidable impacts that are predicted to occur as a result of changes in land use

- 4.12, "Irreversible and Irretrievable Commitments of Resources" - a summary of irreversible and irretrievable commitments of land-use resources

6. REFERENCES

Anderson, J. R., E. E. Hardy, J. T. Roach, and R. E. Wirmer, "A Land-Use and Land-Cover Classification System for Use With Remote Sensor Data," U.S. Geological Survey Professional Paper 964, Washington, DC, 1976.

U.S. Department of Agriculture, "Prime and Unique Farmlands," Final Rule, Federal Register, Vol. 43, p. 4030, January 31, 1978.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
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Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.2
METEOROLOGY AND AIR QUALITY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.2, "Alternatives to the Proposed Action"
- 3.1.1, "Population Distribution and Characteristics"
- 3.1.2, "Current and Projected Land Use"
- 3.2.1, "Meteorology"
- 3.2.2, "Ambient Air Quality"

Standard(s) and/or Guide(s)

- 10 CFR 20.106, "Radioactivity in Effluents to Unrestricted Areas"
- 40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards"
- 40 CFR 52, "Protection of the Environment"
- 40 CFR 58, "Ambient Air Quality Surveillance"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultations with local, State, and Federal agencies
- NUREG-0902, "Site Suitability, Selection and Characterization"

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and independent assessment of the environmental impacts resulting from the releases of radiological and nonradiological pollutants to the atmosphere during the construction, operational, closure, and postoperational phases of the alternatives under consideration. For those pollutants identified by the applicant, the scope of the review will consist of an evaluation of their impacts on the environment at receptor locations for postulated releases during each of the above phases.

Information needed for the staff's review will usually include the following:

(1) The expected ground-level concentrations of radiological and nonradiological pollutants at the facility boundary and receptor locations during each phase of the life cycle of the waste disposal site. The potential radiological airborne pollutants resulting from releases from waste buried at the disposal site should be identified and their estimated ground-level airborne concentrations should be listed. The nonradiological pollutants generated during the construction, operational, and closure periods from fugitive dusts and the combustion of fossil fuels will include sulfur dioxide, suspended particulate matter, carbon monoxide, ozone, hydrocarbons, nitrogen dioxide, and lead.

(2) Documentation of the methods used to identify each concentration (such as reconnaissance-level information, instrumental measurements, or calculations from a conceptual model).

(3) Evidence of compliance with relevant local, State, and Federal ambient air quality standards.

3. ANALYSIS PROCEDURE

For the preferred site and for each alternative site:

(1) The staff will compare the radiological and nonradiological concentrations reported by the applicant with the baseline concentrations reported in ES Section 3.2.2 (using appropriate statistical techniques) in order to identify significant differences between the baseline and impact concentrations. It may be necessary for the staff to use conceptual/computer models to verify the ambient air concentrations reported by the applicant.

(2) The staff will determine if the projected ground-level concentration of any radiological or non-radiological pollutant significantly exceeds (a) its corresponding baseline concentration as reported in ES Section 3.2.2 or (b) any national primary and secondary ambient air quality standards listed in 40 CFR 50. If any significant differences are found, the staff should contact the applicant for further clarification of the parameters used in the calculation and, if necessary, should perform an independent evaluation of the concentrations in question.

4. EVALUATION

The staff will independently confirm the applicant's projected ground-level concentrations for radiological and nonradiological contaminants. After having done this, the staff will evaluate the significance of any increases above background levels either by comparing them with ambient air quality standards for the location under consideration or by including them in the pathways analysis to determine the consequent dose to humans or other biota. If values exceeding established standards are projected, the staff will notify the project manager to ensure that the necessary coordination with local, State, and Federal agencies takes place.

5. INPUT TO THE ES

The staff will prepare Section 4.2, "Meteorology and Air Quality," of the ES. The information in this section will be used in Section 4.8, "Radiological Impacts and Dose Assessment," of the ES to determine compliance of the proposed or alternative sites with 10 CFR 61.41.

6. REFERENCES

Code of Federal Regulations, Title 10, "Energy," and Title 40, "Protection of Environment," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Nuclear Regulatory Commission, NUREG-0902, "Site Suitability, Selection and Characterization," April 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.3
HYDROLOGY

This ESRP consists of the following:

ESRP 4.3.1 Surface Water Hydrology
ESRP 4.3.2 Groundwater Hydrology

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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.3.1
SURFACE WATER HYDROLOGY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.1, "Siting Alternatives"
- 2.2, "Alternative Facility Designs"
- 4.2.3.4, "Disposal Unit Covers and Use of Engineered Structures"
- 4.2.3.5, "Site Drainage and Erosion (Operational and Postclosure)"
- 4.3.2, "Excavated Materials Area"
- 5.1, "Short-Term Evnironmental Effects"
- 5.1.1, "Site Preparation and Construction Effects"
- 5.1.2, "Facility Operation Effects"
- 5.1.3, "Facility Closure Activities Effects"
- 5.2, "Long-Term Environmental Effects"
- 5.2.1, "Environmental Effects of Long-Term Containment"
- 5.2.2, "Environmental Effects of Potential Radionuclide Releases"
- 7.1, "Unavoidable Adverse Environmental Impacts"
- 7.2, "Irreversible and Irretrievable Commitments of Resources"
- 7.3, "Relationship Between Short-Term Uses and Long-Term Productivity of Man's Environment"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.2, "Description of Disposal Facilities, Disposal Units, and Design Features"
- 2.1.5, "Site Closure and Stabilization"
- 2.2.2, "Alternative Sites"
- 2.2.3, "Alternative Disposal Facilities, Disposal Units, and Design Features
- 2.2.4, "Alternative Plans for Site Closure and Stabilization"
- 3.4.1.1, "Surface Water Regime"
- 3.4.1.2, "Surface Water Quality"
- 3.4.1.3, "Surface Water Use"

- 3.4.2.1, "Groundwater Regime"
- 3.4.2.2, "Groundwater Quality"
- 3.4.2.3, "Groundwater Use"
- 3.5.1, "Geology"
- 3.5.2, "Soils"

Standard(s) and/or Guide(s)

- Executive Order No. 11988, "Floodplain Management," 1977
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's identification, assessment, and description of the impacts of the alternatives selected for detailed consideration on surface water bodies that will affect or will be affected by the alternatives. The scope of the review will include an analysis of the effects of the alternatives, including site preparation, construction, operation, and closure, on the regime, quality, and use of surface water bodies. The review will also encompass an evaluation of features designed to minimize the impacts on surface water and an evaluation of compliance with local, State, and Federal regulations governing surface water regime, quality, and use.

The information needed for the staff's review will be affected by regional and site-specific factors. Information needed for the review will usually include the following for each of the alternatives:

(1) Data on surface water regime, quality, and use (from the ER and appropriate environmental reviews).

(2) Maps and lists identifying surface water bodies whose regime, quality, or use would be affected by the alternatives (from the ER and appropriate environmental reviews).

(3) Maps and lists identifying surface water users that would be affected by changes in surface water regime or quality caused by the alternatives (from the ER and appropriate environmental reviews).

(4) Quantitative and qualitative descriptions of the impacts of site preparation, construction, operation, and closure on the regime, quality, and use of surface water. Specific data required for each ER section related to this review are described in Regulatory Guide 4.18 (from the ER and appropriate environmental reviews).

(5) Quantitative and qualitative descriptions of natural or man-made features designed to minimize surface water impacts (from the ER, site visit, appropriate environmental reviews, and the general literature).

(6) Description and analysis of surface water pathways to demonstrate that potential radiological and nonradiological effluent concentrations will be within acceptable limits (from the ER and appropriate environmental reviews).

(7) Quantitative and qualitative descriptions of the impacts on groundwater-surface water interactions (from the ER and appropriate environmental reviews).

(8) Local, State, and Federal regulations applicable to surface water regime, quality, and use (from the ER, appropriate environmental reviews, and consultation with appropriate agencies and their regulations).

3. ANALYSIS PROCEDURE

The staff's analysis of impacts on surface water will be closely coordinated with the environmental reviews performed under the ESRPs listed in Section 1 of this ESRP. The analysis procedure will be divided into three parts in order to assess the impacts on surface water (1) regime, (2) quality, and (3) use that may result from the alternatives being considered. The depth of analysis will be governed by the level of consideration being given each alternative. Descriptions of the types of analyses to be conducted can be found in references such as the documents by Becker and Mills (1972), Curran and Associates (1976), Darnell et al. (1976), U.S. Environmental Protection Agency (1973a, 1973b, and 1976), and U.S. Water Resources Council (1978) (see Section 6 of this ESRP).

Surface Water Regime

The staff will determine if any of the activities associated with the alternatives being considered, including site preparation, construction, operation, and closure, will have an impact on surface water regime. If so, the staff will quantify, as much as possible, the magnitude of the anticipated impacts. Analyses of the following will usually be conducted:

(1) effects of increased or decreased runoff, which may result from changes in vegetation or topography during site preparation and construction or emplacement of runoff-enhancing (infiltration-retarding) covers during operation and closure, on the flow regime (water surface elevation) and erosion potential of affected surface water bodies

(2) effects of increased or decreased groundwater recharge, resulting from increased or decreased runoff, on the low-flow (water surface elevation) characteristics of affected surface water bodies

(3) effects of construction on, or other alteration of, the 100-year floodplain (as defined in Executive Order No. 11988) on flood flows and water surface profiles of affected surface water bodies

(4) effects of proposed channelized drainage and surface water diversions on flood flows and erosion potentials of affected surface water bodies

(5) effects of increased sediment load, which may result from the exposure of unconsolidated materials to erosion during site preparation, construction, and operation, on the sedimentation rates and erosion potentials of affected surface water bodies

(6) the legal ramifications of anticipated changes in surface water regime with respect to Federal, State, and local regulations

The staff's analysis of impacts on surface water regime will be conducted from the additional perspective of providing pertinent information to the staff reviewers responsible for the analysis of impacts on surface water quality and use.

Surface Water Quality

The staff will determine if any of the activities associated with the alternatives being considered, including site preparation, construction, operation, and closure, will have an impact on surface water quality. If so, the staff will quantify, as much as possible, the magnitude of the anticipated impacts. Anticipated impacts on surface water regime should be taken into consideration during the analysis. Analyses of the following will usually be conducted:

(1) effects of operational, postoperational, or accidental releases of radioactive effluents on established radiological baselines for the affected water bodies

(2) effects of constructional, operational, postoperational, or accidental releases of nonradiological chemical effluents (organic and inorganic) on established water quality baselines for the affected water bodies

(3) effects of changes in physical (e.g., turbidity) or biological (e.g., water quality indicator organisms) surface water characteristics on the established water quality baselines for the affected surface water bodies

(4) the legal ramifications of anticipated changes in surface water quality with respect to Federal, State, and local regulations

The staff's analysis of impacts on surface water quality will be conducted from the additional perspective of providing pertinent information to the staff reviewers responsible for the analysis of impacts on surface water use.

Surface Water Use

The staff will determine if any of the activities associated with the alternatives being considered, including site preparation, construction, operation, and closure, will have an impact on surface water use. If so, the staff will quantify, as much as possible, the magnitude of the anticipated impacts. Anticipated impacts on surface water regime and quality should be taken into consideration during the analysis. Analyses of the following will usually be conducted:

(1) effects of decreased flow volumes (water surface elevations) during periods of low flow on consumptive and nonconsumptive water uses (e.g., industrial and domestic use, waste assimilation, irrigation, navigation, and hydroelectric power generation) involving the affected surface water bodies

(2) effects of increased sediment load and sedimentation on water uses such as navigation and reservoir storage capacity on the affected surface water bodies

(3) effects of changes in nonradiological water quality (i.e., total dissolved solids, total organic carbon, turbidity, heavy metals, water quality indicator organisms, and major organic and inorganic constituents) on consumptive and nonconsumptive water uses (e.g., industrial and domestic use, fish and wildlife habitat, and recreation) involving the affected surface water bodies

(4) effects of changes in radiological water quality on consumptive and nonconsumptive water uses involving the affected surface water bodies

(5) the legal ramifications of anticipated changes in surface water use with respect to Federal, State, and local regulations

The staff will use sources of information as necessary to conduct the surface water impacts analyses at the required level of review. These sources should include consultation with all applicable Federal, State, and local agencies, as well as with the applicant and local water users.

4. EVALUATION

The staff will ensure that the surface water impacts analyses are relevant, complete, reliable, accurate, and conservative, according to the level of consideration being given each alternative. If necessary, the staff will request that the applicant provide additional analyses or substantiate the methodologies that were used. If anticipated impacts and the level of consideration warrant, the staff will conduct independent analyses to further evaluate surface water impacts.

Evaluation of each identified impact will result in one of the following determinations:

(1) The impact is minor and mitigation is not required. When all impacts are of this nature, the staff will accept the alternative(s) as proposed.

(2) The impact is adverse, but it can be mitigated by specific design or procedural modifications. In this case, the staff will consult with the staff reviewer responsible for ES Section 2.2, "Alternatives to the Proposed Action," to determine if the recommended modifications are practicable. The staff will provide information on the verified modifications and recommendations to the staff reviewer responsible for ES Section 2.3, "Staff Assessment of Alternatives and Recommendations."

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided. When impacts of this nature are identified, the staff will inform the staff reviewers responsible for ES Sections 2.2 and 2.3 that an analysis of alternative designs or procedures is required. The staff will participate in any analysis or evaluation of alternatives that would result in avoidance of the impact and that could be considered practicable. If no such alternatives can be identified, the staff will provide this information to the staff reviewers responsible for ES Sections 4.11, "Unavoidable Adverse Environmental Impacts," and 4.12, "Irreversible and Irretrievable Commitments of Resources."

5. INPUT TO THE ES

The staff will prepare Section 4.3.1, "Surface Water Hydrology," of the ES. This section will contain concise descriptions of the anticipated impacts on surface water regime, quality, and use that were identified in the impacts analyses. The depth and extent of these descriptions will be governed by the level of consideration being given each alternative and the anticipated magnitude of the impacts. The following information will usually be included in ES Section 4.3.1:

(1) Quantitative and qualitative descriptions of identified impacts on the regime, quality, and use of affected surface water bodies. These descriptions should include maps, lists, tables, and figures as necessary to present the analysis results as concisely as possible.

(2) A summary of the evaluation findings, including recommended modification and adverse impacts.

(3) A summary of the legal ramifications of the identified impacts with respect to applicable Federal, State, and local regulations.

The staff will also provide pertinent information on the identified surface water impacts to the staff reviewers responsible for the following ES sections:

- 2.3, "Staff Assessment of Alternatives and Recommendations"
- 4.5.2, "Aquatic Ecosystem"
- 4.7, "Cultural Resources"
- 4.8, "Radiological Impacts and Dose Assessment"

- 4.10, "Relationships to Land-Use Plans, Policies, and Controls"
- 4.11, "Unavoidable Adverse Environmental Impacts"
- 4.12, "Irreversible and Irretrievable Commitments of Resources"
- 4.13, "Relationships Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity"

6. REFERENCES

Becker, B. C., and T. R. Mills, "Guidelines for Erosion and Sediment Control Planning and Implementation," U.S. Environmental Protection Agency, EPA-R2-72-015, August 1972.

Curran and Associates, Inc., Guidelines for Review of Environmental Impact Statements, Vol. IV, Channelization Projects, prepared for U.S. Environmental Protection Agency, Office of Federal Activities, Washington, DC, July 1976.

Darnell, R. M., W. E. Pequegnet, B. M. James, F. J. Benson, and R. A. Defenbaugh, "Impacts of Construction Activities in Wetlands of the United States," EPA-600/3-76-045, NTIS PB 256 674/3WP, Tereco Corp., College Station, TX, April 1976.

U.S. Environmental Protection Agency, "Processes, Procedures, and Methods To Control Pollution Resulting From All Construction Activity," EPA-430/9-73-007, Office of Air and Water Programs, Washington, DC, October 1973a.

---, "Methods For Identifying and Evaluating the Nature and Extent of Non-Point Sources of Pollutants," EPA-430/9-73-014, Washington, DC, October 1973b.

---, Guidelines for Review of Environmental Impact Statements, Vol. III, Impoundment Projects, Office of Federal Activities, Washington, DC, 1976.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

U.S. Water Resources Council, "Floodplain Management Guidelines for Implementing Executive Order 11988," Federal Register, Vol. 43, p. 6030, February 10, 1978.

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.3.2
GROUNDWATER HYDROLOGY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.1, "Siting Alternatives"
- 2.2, "Alternative Facility Designs"
- 3.4.1, "Ground Water"
- 3.4.2, "Surface Water"
- 3.5, "Geology and Seismology"
- 4.1, "Description of Wastes To Be Accepted"
- 4.2, "Facility Description"
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"
- 7.1, "Unavoidable Adverse Environmental Impacts"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1, "Description of the Proposed Action"
- 2.2, "Alternatives to the Proposed Action"
- 3.1, "Land"
- 3.4.1.1, "Surface Water Regime"
- 3.4.1.2, "Surface Water Quality"
- 3.4.1.3, "Surface Water Use"
- 3.4.2.1, "Groundwater Regime"
- 3.4.2.2, "Groundwater Quality"
- 3.4.2.3, "Groundwater Use"
- 3.5.1, "Geology"
- 3.5.2, "Soils"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's assessment and description of the potential impacts of the alternatives selected for detailed consideration on the groundwater regime, quality, and use. The scope of the review will consist of (1) analysis of predicted impacts on local and regional groundwater regimes; (2) analysis and evaluation of proposed features designed to minimize contaminant migration and subsequent adverse impacts on groundwater quality and use; and (3) evaluation of compliance with local, State, and Federal regulations applicable to water use and water quality.

The information needed for the staff's review will be affected by site-specific factors and the anticipated magnitude of the impacts on groundwater regime and use. Information needed for the review will usually include the following:

(1) Descriptions of the hydrogeologic units and general stratigraphic units at the site and vicinity (from the ER and the general literature).

(2) Descriptions of the hydrologic properties and radionuclide transport characteristics of major hydrogeologic units at the site and vicinity, needed for groundwater pathways analysis (from the ER and the general literature).

(3) Principal saturated flowpaths at the site and vicinity and associated groundwater fluxes and travel times (from the ER and general literature).

(4) Locations of groundwater users and natural groundwater discharge points located downgradient from the site where contaminants could become accessible to the public (from the ER and the site visit).

(5) Aquifer recharge areas located downgradient from the site that could become contaminated by either surface or subsurface releases from the disposal site (from the ER and the site visit).

(6) Identification of potential alterations in locations and rates of groundwater recharge or discharge resulting from site activities (from the ER and the general literature).

(7) Description and analysis of groundwater migration pathways to demonstrate that potential radionuclide concentrations will be within acceptable limits. The analysis should include transient flow simulations resulting from known or potential future groundwater withdrawals (from the ER and the general literature).

(8) Natural and engineered features designed to impede waste/water contact and contaminant migration from the proposed facility (from the ER, the general literature, and the site visit).

(9) State and Federal regulations applicable to water quality and water use (from consultation with State and Federal agencies).

3. ANALYSIS PROCEDURE

The staff's analysis of impacts on groundwater will be coordinated with the environmental reviews performed under the ESRPs listed in Section 1 of this ESRP to ensure that sufficient data have been provided to support the identification and description of potential impacts on groundwater regime, quality, and use that may result from the alternatives being considered. The depth of analysis will be governed by the level of consideration being given each alternative.

Information obtained during the site visit will be used for the analysis. During the site visit, the staff will observe the topography of the site, special geologic features controlling runoff and infiltration, and the general pattern of groundwater use at the site and vicinity and will identify those water users and water-use areas that should be analyzed. The staff will consult with appropriate nearby local, State, and Federal organizations and agencies for further identification of water users, water uses, or water quality considerations that should be analyzed.

Groundwater Regime

The staff will determine if any of the activities associated with the alternatives being considered (site preparation, construction, operation, and closure) will alter the groundwater regime. The staff will identify the alterations of the groundwater regime by correlating these activities with changes in groundwater quantity and availability and changes in groundwater flow. The staff will then determine the likely physical effects on groundwater quality and groundwater use, using techniques such as those cited in the documents by Darnell et al. (1976) and the U.S. Environmental Protection Agency (1973a and 1973b) (see Section 6 of this ESRP). Examples of analyses to be conducted include the following:

(1) Identification of the site activities that could alter the locations and rates of groundwater recharge and discharge and determination of the subsequent physical effects on the groundwater flow regime (e.g., changes in water table elevation, rate, and/or direction of flow).

(2) Identification of the site activities that could alter groundwater quantities resulting in decreased water availability. Water used during site preparation and construction, water diversions, and points of discharge will be considered.

(3) Evaluation of the legal ramifications of the potential alterations of the groundwater regime with respect to Federal, State, and local regulations.

The staff's analysis of alterations of the groundwater regime will be used to determine the impacts on groundwater quality and groundwater use.

Groundwater Quality

The staff will determine if any of the activities associated with the alternatives being considered (site preparation, construction, operation, and closure) will affect groundwater quality. The staff will then determine those water users or water-use areas that could be affected by the alterations in water quality. The staff will consult with the staff reviewer responsible for ES Section 3.4.2.2 to determine the baseline water quality of the affected groundwater systems, and with the staff reviewer responsible for ES Section 3.4.2.3 to identify potentially affected water users. Examples of analyses to be conducted include the following:

(1) analysis of the effects of operational, postoperational, or accidental releases of radioactive effluents on established groundwater quality baselines for the potentially affected groundwater systems

(2) analysis of the effects of constructional, operational, postoperational, or accidental releases of nonradiological chemical effluents (organic and inorganic) on established groundwater quality baselines for the potentially affected groundwater systems

(3) evaluation of the legal ramifications of the potential impacts on groundwater quality with respect to Federal, State, and local regulations

The staff's analysis of impacts on groundwater quality will be used to determine the impacts on groundwater use.

Groundwater Use

The staff will determine if any of the activities associated with the alternatives being considered (site preparation, construction, operation, and closure) will affect groundwater use. If so, the staff will quantify to the extent possible the magnitude of the anticipated impacts. Anticipated alterations of groundwater regime and groundwater quality should be considered during the analysis of impacts on groundwater use. Examples of analysis to be conducted include the following:

(1) If the staff has determined that site activities will result in decreased groundwater availability, identification of the locations of the water users likely to be affected. The staff will consider the effects of decreased groundwater availability (e.g., lowered groundwater level and reduced well yields) and determine their effect on individual water users and water-use areas. Seasonal requirements for water and temporal variations in water availability will be considered.

(2) Analysis of the potential impacts of groundwater quality (radiological and nonradiological) on groundwater use. Present and potential future uses that could be affected will be considered.

(3) Evaluation of the legal ramifications of potential impacts on groundwater use with respect to Federal, State, and local regulations.

4. EVALUATION

Evaluation of each identified impact will result in one of the following determinations:

(1) The impact is minor, and mitigation is not required. When all impacts are of this nature, the staff will accept the alternative(s) as proposed.

(2) The impact is adverse, but it can be mitigated by specific design or procedural modifications that the staff has identified. For these cases, the staff will consult with the staff reviewer responsible for ES Section 2.2, "Alternatives to the Proposed Action," to determine if the recommended modifications are practicable. The staff will provide a list of verified modifications and recommendations to the staff reviewer responsible for ES Section 2.3, "Staff Assessment of Alternatives and Recommendations."

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided. When impacts of this nature are identified, the staff will inform the staff reviewers responsible for ES Sections 2.2 and 2.3 that an analysis of alternative designs or procedures is required. The staff will participate in any analysis or evaluation of alternatives that would result in the avoidance of the impact and that could be considered practicable. If no such alternatives can be identified, the staff will provide this information to the staff reviewers responsible for ES Sections 4.11, "Unavoidable Adverse Environmental Impacts," and 4.12, "Irreversible and Irretrievable Commitments of Resources."

The staff will ensure that the site activities associated with the alternatives being considered that will result in alterations in the groundwater regime have been identified and will confirm that the alterations affecting groundwater quantity and use have been described in sufficient detail to allow for the subsequent analysis and assessment of these impacts. Specifically, the staff will ensure the following:

(1) The physical changes caused by identified alterations in groundwater regime have been described in sufficient detail to permit an assessment of the environmental impacts. The staff will determine the extent and magnitude of the resulting impacts and recommend means to mitigate or avoid them.

(2) The identified alterations in groundwater regime have been analyzed with respect to their potential impacts on water users or water-use areas. Impacts will be evaluated for individual water users and for water-use areas. When necessary, the staff will consult with local, State, and Federal agencies. When adverse impacts have been identified, the staff will seek means to mitigate or avoid them.

(3) Alterations in groundwater regime that affect water quality have been identified and the impacts on water users or water-use areas have been described. The staff will consult with the staff reviewers responsible

for ES Sections 3.4.2.2 and 3.4.2.3 to ensure that potentially affected water users have been identified and that baseline water quality data for the affected groundwater systems are available. When adverse impacts have been identified, the staff will identify means to mitigate or avoid them.

(4) The identified alterations in groundwater regime are compatible with existing and known future water rights and allocations.

5. INPUT TO THE ES

The staff will prepare Section 4.3.2, "Groundwater Hydrology," of the ES. This section will contain concise descriptions of the anticipated impacts on groundwater regime, quality, and use that were identified in the impacts analyses. The depth and extent of these descriptions will be governed by the level of consideration being given each alternative and the anticipated magnitude of the impacts. The following information will usually be included in ES Section 4.3.2:

(1) Quantitative and qualitative descriptions of the identified impacts on the regime, quality, and use of affected groundwater systems. These descriptions should include maps, lists, tables, and figures as necessary to present the analysis results as concisely as possible.

(2) A summary of the evaluation findings, including recommended modifications and adverse impacts.

(3) A summary of the legal ramifications of the identified alterations and impacts with respect to applicable Federal, State, and local regulations.

The staff will provide pertinent information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 4.1, "Land"
- 4.6, "Socioeconomics"
- 4.8, "Radiological Impacts and Dose Assessment"
- 4.10, "Relationships to Land-Use Plans, Policies, and Controls"
- 4.11, "Unavoidable Adverse Environmental Impacts"
- 4.12, "Irreversible and Irretrievable Commitments of Resources"
- 4.13, "Relationships Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity"

6. REFERENCES

Darnell, R. M., W. E. Pequegnet, B. M. James, F. J. Benson, and R. A. Defenbaugh, "Impacts of Construction Activities in Wetlands of the United States," EPA-600/3-76-045, NTIS PB 256 674/3WP, Tereco Corp., College Station, TX, April 1976.

U.S. Environmental Protection Agency, "Processes, Procedures, and Methods To Control Pollution Resulting From All Construction Activity," EPA-430/9-73-007, Office of Air and Water Programs, Washington, DC, October 1973a.

---, "Methods for Identifying and Evaluating the Nature and Extent of Non-Point Sources of Pollutants," EPA-430/9-73-014, Washington, DC, October 1973b.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.4
GEOLOGY

This ESRP consists of the following:

ESRP 4.4.1 Soils
ESRP 4.4.2 Mineral Resources

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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.4.1
SOILS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1, "Geography and Demography"
- 3.2, "Ecology"
- 3.3, "Meteorology and Air Quality"
- 3.4, "Hydrology"
- 3.5, "Geology and Seismology"
- 4.2, "Facility Description"
- 4.3, "Support Facilities"
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"
- 7.1, "Unavoidable Adverse Environmental Effects"
- 7.2, "Irreversible and Irretrievable Commitments of Resources"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1, "Description of the Proposed Action"
- 2.2, "Alternatives to the Proposed Action"
- 3.1.2, "Current and Projected Land Use"
- 3.2.1, "Meteorology"
- 3.4.1, "Surface Water"
- 3.4.2, "Groundwater"
- 3.5, "Geology"
- 3.6, "Ecology"
- 4.1, "Land"
- 4.3, "Hydrology"
- 4.5, "Ecology"
- 4.8, "Radiological Impacts and Dose Assessment"
- 4.10, "Relationships to Land-Use Plans, Policies, and Controls"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Literature review

- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of information provided by the applicant and the staff's identification, assessment, and description of predicted impacts on soil units resulting from alternatives selected for detailed consideration. The scope of the review will consist of an analysis of the effects on soil units of construction and excavation, radiological impacts of waste emplacement and burial, and effects of post-closure institutional controls on short- and long-term land use. The staff's review of impacts on soil will be completed in concert with reviews of geologic, geochemical, hydrologic, ecologic, and land-use issues.

Information needed for the staff's review will be affected by regional and site-specific factors regarding soil materials and proposed site operations. Information needed for the review will usually include the following:

(1) Calculation of volumes of soil materials isolated from future use at a proposed site and all borrow areas by excavation for backfill, trench caps, or removal from the site (from the ER and staff calculations).

(2) Calculated predictions of volumes of soil material lost through erosion caused by land-use changes (procedures such as construction and excavation) based on the Uniform Soil Loss equation (from the ER and verification by staff calculations).

(3) Changes in susceptibility of soils to erosion and mass wasting during and after site construction caused by recontouring of the land, changes in surface drainage patterns, oversteepening of slopes, removal of stabilizing vegetation, and overburdening of top slopes by waste packages or facility buildings (from the ER and staff calculations).

(4) Changes in rates and recurrence intervals of erosion and mass wasting events caused by proposed actions identified in Item (3) above (from the ER and staff calculations).

(5) Changes in soil-unit properties related to surface water and groundwater, and floral and faunal ecology, caused by soil disruption, compaction, erosion, or mass wasting (from the ER and staff calculations).

(6) Changes in susceptibility of soil units to structural failure, collapse, or liquefaction caused by disruption at the site. These processes would be expected to result from alterations of soil cohesion and pore-water pressures caused by compaction or excavation (from the ER and staff calculations).

(7) Calculation of acreage of arable soils or foundation soils isolated from future use at the proposed site and all borrow areas as a result of anticipated radiological impacts and long-term institutional controls (from the ER and staff calculations).

(8) Assessment of radiological pathways through contaminated soils to aquatic and terrestrial environments and humans.

3. ANALYSIS PROCEDURE

The staff's analysis of impacts on soils at a proposed low-level waste disposal facility will be closely coordinated with the environmental reviews of impacts on ecology, surface water, groundwater, and future land use. Impacts on any of these environmental components are likely to involve direct or indirect impacts on the others.

The staff will identify the potential impacts on soils resulting from the various alternatives proposed for the disposal of low-level radioactive waste. In its evaluation of impacts, the staff will consider the following:

(1) present and future land use

(2) present and future use of soil materials

(3) changes in soil properties and surficial geologic processes caused by waste disposal and site management

(4) changes in the environment of wildlife ecology

The staff's analysis will consider the impacts on soils resulting from

(1) institutional management of proposed site areas and buffer zones

(2) offsite sources of borrow material

(3) radionuclide migration due to the nature of the site's soils, climate, ecology, surface water, groundwater, and geology

4. EVALUATION

The staff will evaluate the itemization of impacts to ensure that (1) all soil units have been considered; (2) all locations of proposed operations, including site buildings, disposal areas, buffer zones, and borrow areas, have been included; and (3) indirect impacts on soils, such as impacts on vegetation or surface water runoff, have been identified and that these other impacts are being considered in the appropriate section of the ES.

The staff will evaluate the list of impacts on soils to ensure that it is complete and accurate according to the level of consideration being given each alternative.

Evaluation of each identified impact will result in one of the following determinations:

(1) The impact is minor, and mitigation is not required. When all impacts are of this nature, the staff will accept the alternative(s) as proposed.

(2) The impact is adverse, but it can be mitigated by specific design or procedural modifications that have been icentified by the staff. For these cases, the staff will consult with the staff reviewer responsible for ES Section 2.2, "Alternatives to the Proposed Action," to determine if the recommended modifications are practicable. The staff will provide a list of verified modifications and recommendations in ES Section 2.3, "Staff Assessment of Alternatives and Recommendations."

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided. When impacts of this nature are identified, the staff will prepare an analysis of alternative designs or procedures to be included in Sections 2.2 and 2.3 of the ES. The staff will participate in any analysis or evaluation of alternatives that would result in avoidance of the impact and that could be considered practicable. If no such alternatives can be identified, the staff will provide this information in Section 4.11, "Unavoidable Adverse Environmental Impacts," and Section 4.12, "Irreversible and Irretrievable Commitments of Resources," in the ES.

5. INPUT TO THE ES

The staff will prepare Section 4.4.1, "Soils," of the ES. This section will contain concise descriptions of the anticipated impacts on soils that were identified in the impacts analyses. The depth and extent of these descriptions will be governed by the level of consideration being given each alternative and the anticipated magnitude of the impacts. The following information will usually be included in ES Section 4.4.1:

(1) Descriptions of soils in the site area and region systems. These should be included by reference in ES Section 3.5.1.

(2) Quantitative and qualitative descriptions of identified impacts on the soils. These descriptions should include maps, lists, tables, and figures as necessary to present the analysis results as concisely as possible.

(3) A summary of evaluation findings, including adverse impacts and recommended modifications to the proposed action.

(4) A summary of the legal ramifications of identified alterations and impacts with respect to applicable Federal, State, and local regulations.

The staff will provide pertinent information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 4.1, "Land"
- 4.3, "Hydrology"
- 4.5, "Ecology"
- 4.8, "Radiological Impacts and Dose Assessment"
- 4.10, "Relationships to Land-Use Plans, Policies, and Controls"
- 4.11, "Unavoidable Adverse Environmental Impacts"

- 4.12, "Irreversible and Irretrievable Commitments of Resources"
- 4.13, "Relationships Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity"

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.4.2
MINERAL RESOURCES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.1.4, "Uses of Adjacent Lands and Waters"
- 3.4.2, "Surface Water"
- 3.5, "Geology and Seismology"
- 3.6, "Regional Historic, Archeological, Architectural, Scenic, Cultural, and Natural Landmarks"
- 7.1, "Unavoidable Adverse Environmental Impacts"
- 7.2, "Irreversible and Irretrievable Commitments of Resources"
- 7.3, "Relationship Between Short-Term Uses and Long-Term Productivity of Man's Environment"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.2, "Description of Disposal Facilities, Disposal Units, and Design Features"
- 3.1.2, "Current and Projected Land Use"
- 3.4.1.1, "Surface Water Regime"
- 3.4.2.1, "Groundwater Regime"
- 3.5.1, "Geology"
- 3.5.2, "Soils"
- 3.5.4, "Mineral Resources"
- 4.3, "Hydrology"
- 4.4.1, "Soils"
- 4.12, "Irreversible and Irretrievable Commitments of Resources"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- U.S. Geological Survey Circular 831, "Principles of a Resource/Reserve Classification for Minerals"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the information provided by the applicant and the staff's identification, assessment, and description of the effects of the construction, operation, and closure of the alternatives on mineral resources. The scope of the review will consist of an analysis of the effects of site preparation, construction, operation, and closure on the quantity, production, and availability of mineral resources in the area under consideration.

The information needed for the staff's review will be affected by regional and site-specific factors and will usually include the following:

(1) maps sufficiently detailed so that they show the locations and types of mineral resources that could be affected by the preparation, construction, and operation of the disposal site or alternatives

(2) lists identifying the availability and amounts of mineral resources that could be affected by the preparation, construction, and operation of the proposed disposal site

3. ANALYSIS PROCEDURE

The staff's analysis of the impacts on mineral resources will be closely related to the environmental reviews of geology, hydrology, and the commitments of resources in order to establish the effects of the alternatives being considered. The depth of analysis will be governed by the level of consideration being given each alternative. The staff will perform the following analyses in order to determine specific impacts on mineral resources:

(1) An analysis of mineral resources that could be affected by the preparation, construction, operation, and closure of the alternatives by review and comparison of maps delineating the locations and types of mineral resources.

(2) An analysis to determine if the alternatives under consideration will affect or alter the availability and quantity of mineral resources. To

perform the analysis, the staff will consider the resource needs and current demands at the disposal site.

The staff will use the following recommended sources of regional and site-specific information, if necessary, to obtain sufficient data for the required level of review:

(1) State offices of industry and trade, mining associations, and geological surveys

(2) local planning commissions

(3) Federal agencies, including the U.S. Bureau of Mines, Geological Survey, and Bureau of Reclamation

4. EVALUATION

The staff will ensure that the data are sufficient to provide quantitative information on the quantity, production, and availability of mineral resources that may be affected by the alternatives being considered. The staff will ensure that this quantitative information is sufficient to permit an evaluation of the impacts on mineral resource users and supplies. If necessary, the staff will recommend that the applicant collect additional information and data.

The staff will evaluate the descriptions and data to ensure that they are relevant, complete, reliable, and accurate and will verify the data, information, and references. The review will usually include the following:

(1) an evaluation to establish if maps provided are complete and sufficiently detailed so that they show the types and locations of mineral resources that could be affected by the preparation, construction, operation, and closure of the alternatives being considered

(2) an evaluation of quantitative mineral resource data to determine possible impacts on amounts and availability of mineral resources

5. INPUT TO THE ES

The staff will prepare Section 4.4.2, "Mineral Resources," of the ES. This section will contain a clear, concise description of the mineral resources and their availability that could be affected by the alternatives under consideration. The depth and extent of the descriptions will be governed by the level of consideration being given each alternative and by the degree of impact on mineral resources. The following information will usually be included in ES Section 4.4.2:

(1) identification of types and locations of mineral resources that could be affected by the preparation, construction, operation, and closure of the alternatives being considered

(2) discussion of the effects of site preparation, construction, and operation on the availability and production of mineral resources

The staff will ensure that ES Section 4.4.2 contains descriptive information in sufficient detail to support the descriptions and assessments in the following ES sections:

- 3.1.2, "Current and Projected Land Use"
- 3.5.1, "Geology"
- 3.5.4, "Mineral Resources"
- 4.12, "Irreversible and Irretrievable Commitments of Resources"

6. REFERENCES

U.S. Bureau of Mines and U.S. Geological Survey, "Principles of a Resource/Reserve Classification for Minerals," U.S. Geological Survey Circular 831, 1980.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.5
ECOLOGY

This ESRP consists of the following:

ESRP 4.5.1 Terrestrial Ecosystem
Appendix A - Construction Activities of Recognized Good Practice

ESRP 4.5.2 Aquatic Ecosystem

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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.5.1
TERRESTRIAL ECOSYSTEM

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.2.1, "Terrestrial Ecology"
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"
- 8.1.3, "Terrestrial Environment"
- 8.2.3, "Ecological Monitoring System"
- 8.3, "Postoperational Monitoring"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.4, "Environmental Monitoring and Surveillance"
- 2.2.5, "Summary Alternatives for Detailed Consideration"
- 2.3, "Staff Assessment of Alternatives and Recommendations"
- 3.6.1, "Terrestrial Ecology"

Standard(s) and/or Guide(s)

- Endangered Species Act of 1973
- Fish and Wildlife Coordination Act of 1958
- NUREG-0902, "Site Suitability, Selection and Characterization"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's description, quantification, and assessment of the impacts on the terrestrial ecosystem of the construction, operational, and closure activities associated with the alternatives identified in Section 2.2.5 of the ES. The scope of the review will consist of an evaluation of the construction, operational, and closure activities in sufficient detail to allow the staff to (1) estimate the significance of potential impacts on the species, populations, communities, and habitats of

the biota and (2) recommend how those impacts should be treated in the licensing decision. If necessary, the staff will recommend the mitigation of the projected environmental impacts.

Both onsite and offsite construction activities will be considered. To assess the impacts the staff will evaluate the following:

(1) the proposed schedule of construction activities

(2) construction activities of "recognized good practice" (see Appendix A to this ESRP)

(3) proposed site plans, including lands to be cleared, buildings, disposal areas, and the construction zone

(4) proposed clearing methods, erosion runoff and siltation control methods, and dust suppression methods

(5) plans for the restoration of land areas used for the short term during construction

(6) any proposed construction activities that may threaten rare, unique, or endangered species

(7) the tolerances of and/or susceptibilities of "important"* biota to physical and chemical pollutants resulting from construction activities

(8) the survey of major plant communities and critical species and habitats that are expected to be affected by construction activities

(9) evaluation of important preexisting environmental stress factors

The staff will evaluate the applicant's discussion of the adverse terrestrial environmental impacts associated with facility closure and decommissioning in a way similar to that identified above for construction-phase impacts. In addition, the commitment of irreversible and irretrievable floral and faunal resources resulting from restricted access and closure practices will be evaluated.

*A species is "important" if a specific causal link can be identified between the proposed project and the species and if one or more of the following criteria apply: (1) the species is commercially or recreationally valuable, (2) the species is threatened or endangered (Pub. Law 93-205, 87 Stat. 884), (3) the species affects the well-being of some important species specified 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 in the environment.

3. ANALYSIS PROCEDURE

The staff will identify the construction, operational, and closure activities that will affect important flora and fauna of the alternatives identified in Section 2.2.5 of the ES. All species, communities, and habitats identified in ESRP 3.6.1 will be evaluated to determine potential impact. The areal extent of such impacts should be graphically provided by the applicant. This entails the preparation of site and vicinity maps on which impact areas have been superimposed over resource areas. Other information, in addition to that identified in ESRP 3.6.1, which should be furnished by the applicant and which will facilitate the staff's thorough evaluation of terrestrial impacts, includes the following:

(1) site and vicinity maps showing proposed facility structures, waste disposal areas, land to be cleared, construction zone, site boundary, and total area of land to be disturbed

(2) identification of the land area to be used only on a short-term basis during construction and a discussion of plans for restoration of this land

(3) discussion and special consideration of any construction, operational, or closure activities expected to affect threatened or endangered species

When necessary, the staff will supplement the above data and information through consultations with local, State, and Federal agencies and through site visits and inspections.

For important species having commercial or recreational value, the staff will estimate the magnitude of the impact, which may be expressed in terms of dollars, lost opportunity for recreational pursuits, percent reduction in harvest, percent loss of habitat, or other appropriate quantifiers.

If threatened or endangered species are known to be present in the project area, and the proposed project is predicted to endanger them further, the staff will consult with the U.S. Department of the Interior.

In addition, the staff will assess the following:

(1) the acreage of plant community types preempted and the acreage modified by construction activities

(2) the adequacy of proposed plans for preventing soil erosion runoff into surface water and for revegetating disturbed soil

(3) the impact of habitat modification (e.g., tree removal) on attendant animal populations

(4) construction, operational, or closure activities that will alter surface drainage patterns supporting terrestrial biota

(5) disposal of construction or nonradioactive operational or closure wastes that will require landfill or special disposal

(6) construction, operational, or closure activities that will create obstacles to the movements of vertebrate species or result in increased dispersal of invertebrate species

(7) the impact on biota of any preexisting environmental stress factors (e.g., water pollution and air pollution)

(8) the effects of noise on important terrestrial biota

The staff must become familiar with the provisions of statutes, standards, and guides pertinent to the construction, operation, and closure of low-level waste disposal facilities. Those applicable to this environmental review are listed under "Standard(s) and/or Guide(s)" in Section 1 of this ESRP. Finally, the staff will analyze construction activities in light of recognized good practice, that is, construction activities that tend to mitigate adverse environmental impacts. Appendix A to this ESRP lists good-practice construction activities. Additional guidance in this regard may be found in the documents by Beasley (1972), U.S. Army Corps of Engineers (1971), U.S. Department of Agriculture (1970), U.S. Department of the Interior (1974), and U.S. Environmental Protection Agency (1973) (see Section 6 of this ESRP).

4. EVALUATION

Evaluation of each identified impact will result in one of the following determinations:

(1) The impact is minor, and mitigation is not required.

(2) The impact is adverse, but it can be mitigated by specific design or procedural modifications that the staff has identified and determined to be practicable.

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided. When impacts of this nature are identified, the staff (a) will inform the staff reviewer responsible for ES Section 2.2 that analysis and evaluation of alternative designs or procedures are required and (b) will participate in any such analysis and evaluation of alternatives that would result in avoidance of the impact and that could be considered practicable.

The staff will assess each predicted impact using criteria appropriate for the affected segment of the ecosystem. For example, loss of more than a few percent of the habitat available in the region for an important species could require consideration of mitigative action. If mitigation is required, the staff will recommend appropriate measures (e.g., alternative placement of structures, alternative schedules, or alternative construction practices).

To assess the impacts, the staff will perform the following:

(1) The staff will evaluate loss of habitat for endangered or threatened species in accordance with the provisions of the Endangered Species Act of 1973. Where loss of habitat for commercially or recreationally important species occurs, the staff will consider the effects on the harvestable crop. Generally, loss of up to 5 percent of such a habitat in the site vicinity will have a negligible effect on the crop and require no further analysis. If losses should exceed 5 percent, the staff will consider the loss in relation to the regional abundance of these species.

(2) The staff will evaluate practices during construction to minimize soil erosion and the number of acres disturbed.

(3) The staff will evaluate (a) the intrusion on or destruction of terrestrial plant and animal communities that are regarded as representative of natural, undisturbed, or remnant communities or that show unusual ecological or geographical distributions and (b) the loss of fragile or sensitive habitats.

(4) The staff will assess the applicant's commitment to the use of recognized good construction practices (see Appendix A to this ESRP).

(5) In addition to direct impacts on animals such as loss of habitat, the staff will consider secondary impacts such as altered behavior resulting from construction noise.

5. INPUT TO THE ES

The staff will prepare Section 4.5.1, "Terrestrial Ecosystem," of the ES. This section will contain (1) a description of the intended construction, operational, and closure activities and a discussion of the timing of such efforts thus ensuring public disclosure of major, direct ecological consequences of the proposed project; (2) the basis of the staff's analysis of the project; and (3) the staff's conclusions, recommendations, and conditions regarding the impacts of the construction, operational, and closure activities on the terrestrial ecosystem.

This section should include a map showing disposal site boundaries and the estimated extent of the impact. The staff will discuss (1) the relationship between important biota (as described in ESRP 3.6.1) and areas of intended site activities and (2) the biota's susceptibility to the proposed actions. The staff will provide a summary of impacts for each of the activities as described in Sections 3 and 4 of this ESRP. For all the activities, the commitment of terrestrial resources should be indicated. The staff will discuss compliance with the guidelines and regulations of other agencies and will document consultations with such agencies in this regard.

Any construction, operational, or closure activity that requires mitigative action will be described along with the staff's recommendations on mitigation.

The staff will recommend the consideration of alternatives for any proposed activity that is predicted to result in an adverse impact that cannot be mitigated. Practices proposed by the applicant for the protection of the environment will be described if the staff determines that they are necessary.

The staff will make the following recommendation or provide the following information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 2.2, "Alternatives to the Proposed Action" - the recommendation that alternative locations and facility or component designs be considered if, in the staff's judgment, a proposed activity will result in an adverse environmental impact that carnot be mitigated by alternative practices and procedures

- 4.11, "Unadvoidable Adverse Environmental Impacts" - a brief summary of the unavoidable impacts that are likely to occur during construction, which will usually be limited to the more significant impacts as, for example, modification of habitat for important species

- 4.12, "Irreversible and Irretrievable Comments of Resources" - a brief summary of irreversible and irretrievable commitments of terrestrial resources that are likely to occur during facility construction, operation, and closure

6. REFERENCES

Beasley, R. P., Erosion and Sediment Pollution Control, The Iowa State University Press, Ames, IA, 1972.

U.S. Army Corps of Engineers, "Environmental Protection Measures for Construction Practices," Corps of Engineers, Seattle District, Seattle, WA, 1971.

U.S. Department of Agriculture, "Controlling Erosion on Construction Sites," Agriculture Information Bulletin 347, Washington, DC, December 1970.

U.S. Department of the Interior, "Environmental Guidebook for Construction," U.S. Government Printing Office, Washington, DC, 1974.

U.S. Environmental Protection Agency, "Processes, Procedures, and Methods To Control Pollution Resulting From All Construction Activity," EPA-430/9-73-007, Office of Air and Water Programs, Washington, DC, October 1973.

U.S. Nuclear Regulatory Commission, NUREG-0902, "Site Suitability, Selection and Characterization," April 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

ENVIRONMENTAL STANDARD REVIEW PLAN 4.5.1 - APPENDIX A CONSTRUCTION ACTIVITIES OF RECOGNIZED GOOD PRACTICE

The following examples of construction activities are recognized as "good practice" and were derived from a review of NRC environmental statements. The good practices chosen are site specific and dependent on the potential adverse impact on terrestrial and aquatic ecosystems.

(1) Tree and Brush Clearing

Tree and brush clearing should be confined to minimum-sized areas. Construction areas should be judiciously located so as to avoid excessively steep slopes. Buffer zones of trees and brush should be left near all surface waterways. This can range from absolute prohibition of cutting and intrusion by work forces and equipment to selective clearing. Figures of anywhere from 15 to 200 meters have been used for the width of this buffer strip. Slash can be chipped and used for mulch. If burning is performed, it should not be done during excessively windy periods or periods of high air pollution conditions (inversions).

(2) Petroleum Products, Salvagable Materials, and Landfill

Petroleum wastes should be collected and saved for possible reuse. Salvagable materials should be collected and stored in designated areas. Landfills for burial of nonradioactive construction wastes should not be located near surface waterways, nor should they be located where groundwater or surface water can become contaminated. Landfill areas should be revegetated with plant species suited to the soil and climatic regime of the region, and the beautification of the region or enhancement of wildlife habitats should be a concern.

(3) Burning and Fire

Burning practices range from "no burning" to "burning all combustible materials." Materials should not be burned near waterways where the residue can wash into the water. In remote, heavily forested areas with potentially high fire hazard, no burning should be permitted and vehicles should be equipped with devices to reduce the chances of inadvertent fire damage. Open burning should be done in accordance with State or local regulations.

(4) Evacuation, Grading, Drainage, Erosion, Sediment Control, and Revegetation

Excavation and earth moving should be balanced so that earth removed from one area is used as fill for another area. Topsoil should be segregated and stored for use in revegetation. Stored topsoil and other excavated materials should be contoured and treated for erosion control. Excess excavated

materials should be spread out in such a manner so that they will not erode into nearby waterways. Drainage, erosion, and sediment control practices are highly variable and extremely site specific. They basically involve keeping land disturbance to a minimum both in area and time; controlling drainage so runoff rates and amounts are controlled; stabilizing land surface with mats, mulches, chemicals, vegetation, etc.; and providing places for suspended materials to settle out of runoff before draining into waterways. Some applicants have drawn up very specific plans that include information on percent slope, size of sediment basins based on expected runoff, percent of basin fill-in allowed, time of exposure of land, dates of seeding, size and number of terraces, particle-size distribution (texture), organic matter content, and plant nutrient status of soil. Long-term revegetation practices are usually tailored to specific soil and site growing conditions, but temporary erosion controls and revegetation practices should also be detailed.

(5) Dust

The most common sources of dust during construction include dirt and gravel-surfaced roads, unpaved parking areas, concrete batch plants, sand blasting, and bare ground. Paving and graveling of roads, spraying with water or calcium chloride, dust-control devices on batch plants, and revegetation of disturbed soils are common practices for minimizing dust. Spraying of bituminous coatings (oiling), asphalt, or water-soluble polymers may have an adverse terrestrial effect when these substances contaminate runoff and should be avoided or the materials should be applied with care.

(6) Roads and Parking, Laydown, Assembly, and Staging Areas

Access roads should be kept to a minimum. Slopes, drainage structures, pavement types, revegetation of embankments, etc., should be detailed. Roads, parking areas, laydown and assembly areas, etc., should be located away from waterways and on level terrain, if possible. Temporary areas should be graded and revegetated. Rutted and compacted soil should be loosened and seeded.

(7) Pesticides and Herbicides

As a general rule, application of chemical herbicides and pesticides should be avoided during construction phases of the project. Alternatives to the use of these chemicals, or measures that will serve to avoid the necessity to use these chemicals, should be considered.

(8) Sanitary Wastes

Portable chemical toilets can be used during the early stages of construction. Wastes are usually collected by a licensed contractor. A temporary package sewage treatment plant can be used on site.

(9) Concrete

Waste water and runoff from aggregate washing, cement truck washings, and the disposal facility area will have a high lime content and should be routed to settling ponds and treated before they are released. Discharge from these

ponds should be monitored. Cement spoil should be dumped in designated areas and allowed to harden and used as fill whenever possible. All concrete operations should be conducted away from waterways where contamination from airborne cement dust or from runoff is possible.

(10) Stream Crossings and Riparian Area Habitats

Special consideration should be given to construction activities that involve stream crossings or riparian areas. A vegetative buffer strip should be maintained at all waterways and riparian areas (conditions can range from no clearing to selective clearing). Stream crossings should be avoided but, if necessary, they can either be simple fords with rocks if the crossing is to be used only occasionally or culverts and a bridge (but this usually entails damage to stream banks and riparian areas and may cause impounding of the water). Banks are sometimes riprapped, or other special erosion control measures are taken. Sometimes activities near streams and riparian areas should cease during flood season, spawning periods, etc.

(11) Special Considerations

Sometimes consideration should be given to the use of special equipment in unusual environments or unique situations that change with time. It must be kept in mind that the following practices are highly site specific.

Consideration should be given to the use of special equipment, such as oversized tires on vehicles that cross sensitive habitats. Also, construction activities should occasionally be prohibited during certain seasons. Occasionally, special efforts should be made to improve habitats or to replace habitats committed to facilities or other purposes.

(12) Control

Administrative control procedures should be established and shall provide the framework for the onsite quality assurance program. It should be the responsibility of the facility operator to select personnel with demonstrated ability and experience in assessing the relative importance of activities being performed to mitigate terrestrial impacts. A full-time coordinator should be assigned to the control and quality assurance program through the peak construction years of the project. The function of this individual would include review of the construction activities to see that they conform to the conditions of the construction permit, and analysis of monitoring feedback to ensure a minimal impact of construction activities on the terrestrial and aquatic environment. The coordinator would also be responsible for briefing construction personnel on the prevailing environmental policy and would provide supervision in sensitive ecological areas.

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.5.2
AQUATIC ECOSYSTEM

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.2.2, "Aquatic Ecology "
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"
- 8.2.3, "Ecological Monitoring System"
- 8.3, "Postoperational Monitoring"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.4, "Environmental Monitoring and Surveillance"
- 2.2.5, "Summary Alternatives for Detailed Consideration"
- 2.3, "Staff Assessment of Alternatives and Recommendations
- 3.6.2, "Aquatic Ecology"

Standard(s) and/or Guide(s)

- Coastal Zone Management Act of 1972
- Endangered Species Act of 1973
- Federal Water Pollution Control Act of 1948
- Federal Water Pollution Control Act Amendments of 1972
- Fish and Wildlife Coordination Act of 1958
- Marine Sanctuaries Act of 1972
- NUREG-0902, "Site Suitability, Selection and Characterization"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- Rivers and Harbors Act of 1899
- State and local laws affecting water quality

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's description, quantification, and assessment of the impacts on the aquatic ecosystem of the construction, operational, and closure activities associated with the alternatives identified in Section 2.2.5 of the ES. The scope of the review will consist of an evaluation of the construction, operational, and closure activities in sufficient detail to allow the staff to (1) estimate the significance of potential impacts on the species, populations, communities, and habitats of the biota and (2) recommend how those impacts should be treated in the licensing decision. If necessary, the staff will recommend the mitigation of the projected environmental impacts.

Both onsite and offsite construction activities will be considered. To assess the impacts, the staff will evaluate the following:

(1) the proposed schedule of construction activities

(2) construction activities of "recognized good practice" (see Appendix A to ESRP 4.5.1)

(3) proposed site plans, including lands to be cleared, buildings, disposal areas, and the construction zone

(4) proposed clearing methods, erosion runoff and siltation control methods, and dust suppression methods

(5) any proposed construction activities that may threaten rare, unique, or endangered aquatic species

(6) the tolerances of and/or susceptibilities of "important"* biota to physical and chemical pollutants resulting from construction activities

(7) the survey of major aquatic species and critical aquatic habitats (i.e., spawning, nursery, feeding, wintering, or migration areas) that are expected to be affected by construction activities

*A species is "important" if a specific causal link can be identified between the proposed project and the species and if one or more of the following criteria apply: (1) the species is commercially or recreationally valuable, (2) the species is threatened or endangered (Pub. Law 93-205, 87 Stat. 884), (3) the species affects the well-being of some important species specified 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 in the environment.

(8) water bodies receiving construction effluents and the average and maximum flow rates, composition, and physical characteristics of those effluents

(9) potential changes to surface water and groundwater quality resulting from construction activities

(10) important preexisting environmental stress factors

Aquatic species identified must be evaluated for their radiological impact potential during operation and closure and after closure of the facility. The staff will evaluate the applicant's discussion of the adverse aquatic environmental impacts associated with facility closure in a way similar to that identified above for construction-phase impacts. In addition, the commitment of irreversible and irretrievable aquatic resources resulting from restricted access and closure practices will be evaluated.

Finally, the staff will evaluate the adequacy and accuracy of data collection and analytical methods used in aquatic monitoring. The staff will determine if the applicant's identification of important aquatic species and habitats is sufficient to establish a baseline for assessing the subsequent impacts of site construction, operation, and closure. The results of the review will be used to support the findings of the review under ESRP 2.1.4, "Environmental Monitoring and Surveillance."

3. ANALYSIS PROCEDURE

The staff's analysis of the effects of construction, operation, and closure on the aquatic ecosystems will be coordinated with the environmental review under ESRP 3.6.2, "Aquatic Ecology." This will ensure that the environmental factors most likely to be affected by the proposed facility are described in sufficient detail to permit an assessment of the predicted impacts.

The staff must become familiar with the provisions of standards, guides, and agreements pertinent to the construction of low-level waste disposal facilities. A listing of those believed most pertinent to this environmental review is contained under "Standard(s) and/or Guide(s)" in Section 1 of this ESRP. The staff will determine the applicant's compliance with applicable regulations and guides and, when necessary, consult with appropriate local, State, and Federal agencies. The staff also must become familiar with general references on construction practices and impacts. A few of those practices are discussed in Appendix A to ESRP 4.5.1.

Using the environmental descriptions prepared for ES Section 3.6.2, the staff will identify construction, operational, and closure activities that could affect important aquatic flora and fauna of the site and offsite areas. The staff also will determine the areal extent of the potential impact. This entails the review of site and vicinity maps on which impact areas have been superimposed over resource areas. Such maps should delineate facility structures, waste disposal areas, land to be cleared, construction zone, site boundary, and the total area of land to be disturbed.

For affected species having commercial or recreational value, the staff will estimate the magnitude of the impact, which may be expressed in terms of dollars, lost opportunity for recreational pursuits, percent reduction in harvest, percent loss of habitat, or other appropriate quantifiers.

If threatened or endangered species are known to be present in the project area, and the proposed project is predicted to endanger them further, the staff will consult with the U.S. Department of the Interior.

In addition, the staff will assess the following:

(1) The critical life history needs of important fish and shellfish in off-site water courses (i.e., seasonal requirements, migration routes, spawning areas, nursery grounds, and feeding and wintering areas). The staff will relate these needs to the disposal facility construction schedule and determine if impacts are likely to be of short duration or otherwise reversible. The staff will assess potential changes to water quality. Where habitats of endangered or threatened aquatic species (flora and fauna) are to be disturbed by facility activities, guidelines promulgated under the Endangered Species Act of 1973 should be followed.

(2) The types of sediments, petroleum products, pesticides, fertilizers, heavy metals, and other potential pollutants that may enter adjacent water bodies. The staff will determine both the points of entry of site drainage into surface bodies and the areal extent of impact by suspended materials and siltation. The staff will determine if construction impacts can be reversed following completion of construction activities. The staff also will assess plans for the maintenance of siltation ponds or catchment basins.

(3) Clearing activities along reaches of streams and other surface water sources adjacent to the site. The staff will identify water bodies where such activities will occur and will indicate the extent of the changes resulting from the activities. These should be compared with the extent of the remaining similar habitats in the region.

(4) The impact on aquatic species of any preexisting environmental stress factors (e.g., poor water quality and natural siltation). Information to help make this determination will be developed by the reviews conducted under ESRPs 2.1.4, "Environmental Monitoring and Surveillance," and 3.4.1.2, "Surface Water Quality."

In addition to the above analyses, the staff will evaluate any other site-specific impacts of construction, operation, or closure on aquatic ecosystems that can be predicted on the basis of proposed facility activities and the local aquatic ecosystem. The staff will consult with the staff reviewers responsible for ES Sections 2.1.4, 2.1.5, 2.2.4, 3.4.1, and 4.3.1. Additional guidance may be found in the documents by Beasley (1972), National Academy of Sciences (1972), Sherk and Cronin (1970), U.S. Army Corps of Engineers (1971), U.S. Department of Agriculture (1970), U.S. Department of the Interior (1974), and U.S. Environmental Protection Agency (1973) (see Section 6 of this ESRP).

4. EVALUATION

Evaluation of each identified impact will result in one of the following determinations:

(1) The impact is minor, and mitigation is not required. When impacts are of this nature, the staff will accept project construction as proposed.

(2) The impact is adverse, but it can be mitigated by specific design or procedural modifications that the staff has identified and determined are practicable.

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided. When impacts of this nature are identified, the staff (a) will inform the staff reviewer responsible for ES Section 2.2 that analysis and evaluation of alternative designs or procedures are required and (b) will participate in any such analysis and evaluation of alternatives that would result in avoidance of the impact and that could be considered practicable.

In making the following evaluations of specific impacts identified in Section 3 of this ESRP, the staff will consider the extent in time of the identified impacts. For many facility activities, especially construction activities, the associated impacts on aquatic resources can be short term and potentially reversible. The staff will evaluate the proposed construction, operational, and closure activities and any associated monitoring programs to ensure that the applicant is planning to use generally acceptable practices that should result in minimizing adverse impacts (see Appendix A to ESRP 4.5.1). Important considerations will include the following:

(1) Disturbance of benthic areas. The staff will evaluate the loss of habitat for endangered or threatened species by following the guidelines of the Endangered Species Act of 1973. Where loss of important areas or habitats for commercial or sport species occurs, the staff will consider the effects on the harvestable crop.

(2) Surface runoff. Good construction practices will generally control surface runoff. Where drainage courses represent an especially important resource, attention should be given to measures for their protection during construction. The staff will determine if (a) facility activities affecting water quality (e.g., runoff and turbidity) will comply with State, regional, and Federal water quality standards and (b) the controls proposed by the applicant will ensure satisfactory protection of surface waters.

(3) Clearing stream banks. Clearing of vegetation from stream banks should be limited to that required for construction activities and the placement of structures.

5. INPUT TO THE ES

The staff will prepare Section 4.5.2, "Aquatic Ecosystem" of the ES. This section will contain (1) a description of the intended construction, operational, and closure activities and a discussion of the timing of such efforts thus ensuring public disclosure of the major direct ecological consequences of the proposed project; (2) the basis of the staff's analysis of the project; and (3) the staff's conclusions, recommendations, and conditions regarding the effects of construction, operation, and closure on the aquatic ecosystem.

This section should include a map showing disposal site boundaries and the estimated extent of the impact. The staff will discuss (1) the relationship between important aquatic biota (as described in ESRP 3.6.2) and areas of intended site activities and (2) the biota's susceptibility to the proposed actions. The staff will provide a summary of impacts for each of the activities as described in Sections 3 and 4 of this ESRP. For all the activities, the commitment of aquatic resources should be indicated. The staff will discuss compliance with the guidelines and regulations of other agencies and will document consultations with such agencies in this regard made in response to these guidelines.

Any construction, operational, or closure activity that requires mitigative action will be described along with the staff's recommendations on mitigation. The staff will recommend the consideration of alternatives for any proposed activity that is predicted to result in an adverse impact that cannot be mitigated. Practices proposed by the applicant for the protection of the environment will be described if the staff determines that they are necessary.

The staff will make the following recommendation or provide the following information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 2.1.4, "Environmental Monitoring and Surveillance" - discussion of any deficiencies in the site preparation and preoperational monitoring program that should be corrected by additional monitoring provisions

- 2.2, "Alternatives to the Proposed Action" - the recommendation that alternative locations and facility or component designs be considered if, in the staff's judgment, a proposed activity results in an adverse environmental impact that cannot be mitigated by alternative practices and procedures

- 3.6.2, "Aquatic Ecology" - descriptive material on the aquatic ecology of the site and vicinity needed to support the analyses in Section 3.6.2

- 4.11, "Unavoidable Adverse Environmental Impacts" - a brief summary of the unavoidable impacts that are likely to occur during construction, which will usually be limited to the more significant impacts as, for example, modification of aquatic habitat for important species

- 4.12, "Irreversible and Irretrievable Commitments of Resources" - a brief summary of irreversible and irretrievable commitments of aquatic

resources that are likely to occur during facility construction, operation, and closure

6. REFERENCES

Beasley, R. P., Erosion and Sediment Pollution Control, The Iowa State University Press, Ames, IA, 1972.

National Academy of Sciences and National Academy of Engineering, Committee on Water Quality Criteria, "Water Quality Criteria," Ecological Research Series, Washington, DC, 1972.

Sherk, J. A., Jr., and L. E. Cronin, "The Effects of Suspended and Deposited Sediments on Estuarine Organisms: An Annotated Bibliography of Selected References," U.S. Army Corps of Engineers, Washington, DC, 1970.

U.S. Army Corps of Engineers, "Environmental Protection Measures for Construction Practices," Corps of Engineers, Seattle District, Seattle, WA, 1971.

U.S. Department of Agriculture, "Controlling Erosion on Construction Sites," Agriculture Information Bulletin 347, Washington, DC, December 1970.

U.S. Department of the Interior, "Environmental Guidebook for Construction," U.S. Government Printing Office, Washington, DC, 1974.

U.S. Environmental Protection Agency, "Processes, Procedures and Methods To Control Pollution Resulting From All Construction Activity," EPA-430/9-73-007, Office of Air and Water Programs, Washington, DC, 1973.

U.S. Nuclear Regulatory Commission, NUREG-0902, "Site Suitability, Selection and Characterization," April 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.6
SOCIOECONOMICS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.7, "Socioeconomics"

Environmental Review(s) Performed Under the Following ESRP(s)

- 3.7.1, "Labor Force and Employment"
- 3.7.2, "Infrastructure Characteristics"
- 3.7.3, "Tax Base and Revenues"
- 3.7.4, "Sociocultural Characteristics"

Standard(s) and/or Guide(s)

- 29 CFR 1910, "Occupational and Health Standards"
- 29 CFR 1926, "Safety and Health Regulations for Construction"
- 40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's analysis and evaluation of the social and economic impacts of construction, operation, closure, and long-term care of the alternatives on the surrounding region and individual communities that could be affected by the proposed action.

The scope of the review will consist of the evaluation of the social, economic, and physical impacts resulting from the construction of the low-level waste disposal facility and from the activities and demands of the construction and operational labor force. Categories of impacts flowing directly from construction are (1) private-sector regional materials, products, and services; (2) regional labor; (3) tax revenues to local jurisdictions; (4) public facilities and services; (5) social or economic significance of ecological and

land-use impacts, including human displacement; and (6) local planning-political decisionmaking processes. Categories of impacts flowing from the activities and demands of the construction and operational labor force are (1) population-settlement pattern, (2) housing, (3) land use, (4) education, (5) other public facilities and service, (6) transportation, (7) private-sector goods and services, (8) employment and regional income, (9) tax revenues to local jurisdictions, (10) local planning-political decisionmaking processes, and (11) social structure and community cohesion. Categories of direct physical impacts resulting from construction will include disturbances caused by noise, odors, vehicular exhaust, dust, and vibration. The staff will identify specific impacts and where they will occur and will predict their relative magnitude. When necessary, the staff will recommend the consideration of alternative practices or procedures that would mitigate the predicted adverse impacts.

The information needed for the staff's review will be affected by site- and station-specific factors, and the degree of detail will be modified according to the anticipated magnitude of the potential impact. In addition to the information specified in ESRPs 3.1.1, 3.7.1, 3.7.2, 3.7.3, and 3.7.4, the following information will usually be needed for the review:

(1) distribution of people, buildings, roads, and recreational facilities that will be affected by construction-related activities (from the ER)

(2) applicable standards for levels of noise, dust, and gaseous pollutants (from consultation with Federal, State, and local agencies)

(3) predicted noise levels at sensitive areas identified in Item (1) (from the ER)

(4) predicted air pollutant levels at sensitive areas identified in Item (1) (from the ER)

(5) annual expenditures within the region for materials and services during construction (from the ER)

(6) plans to supplement public facilities and services to support construction and the agencies responsible for facility expansion (from the ER and consultation with State and local agencies)

(7) taxes by type and jurisdiction to be paid during construction and operation (from the ER)

(8) annual construction labor force requirements over the construction period; where necessary, labor force requirements for the major construction crafts (from the ER)

3. ANALYSIS PROCEDURE

The staff's analysis of the social and economic impacts of the alternatives will be coordinated with the environmental evaluations in ES Section 3.7, "Socioeconomics." The staff will ensure that the environmental factors most

likely to be affected by construction are described in sufficient detail to permit an assessment of the predicted impacts. On the basis of these descriptions, the staff will identify and analyze components of the regional and community social, political, and economic systems that might be affected.

The staff will determine, from the full scope of potential impacts, those impacts that are minor and those that are likely to be adverse and thus will require detailed analysis. When practicable, quantitative measures of adverse impacts will be developed. All impacts identified during the analysis will be considered, to the extent possible, in terms of location, duration, and magnitude. The staff should be aware that the duration of some impacts may be altered because of the completion of construction and dispersal of the construction labor force. The staff will also confer with the staff reviewers responsible for ES Sections 4.1, "Land," 4.5, "Ecology," and 4.7, "Cultural Resources" to determine if any of the impacts identified in these sections are of sufficient social or economic importance to warrant further evaluation under this ESRP.

For analytical purposes it is effective to categorize impacts into those directly resulting from construction and those resulting from the activities and demands of the construction and operational labor force. The staff will use the following steps for the analysis of social and economic impacts directly associated with the construction of the facility:

(1) Estimate the annual value of the major categories of materials and services to be purchased within the region and compare that value with the estimated value of the materials and services that would have been produced had there been no construction and operation of the facility.

(2) Estimate the annual construction labor force requirements over the construction period and compare them with the number of workers available from within the region. If necessary, the staff may determine these requirements for the major construction crafts, using standard craft categories. In addition, estimate the annual operational labor force requirements over the facility life time and compare them with the number of workers available from within the region.

(3) Identify those jurisdictions receiving significant tax revenues derived from construction, purchased services and materials, and the operational labor force.

(4) Estimate the physical demands placed by construction and operation on local public facilities and services (e.g., fire, police, sewage, and water) and compare these demands with existing facilities and services.

(5) In consultation with appropriate staff members, determine if any impacts identified under land use, water use, ecology, and cultural resources require further analysis regarding social and economic consequences.

(6) Determine the families or households to be displaced because of plant construction.

The staff will use the following steps for the analysis of physical impacts directly associated with the construction of the facility:

(1) Review the distribution of residents and transients who could be affected, including those in sensitive-use areas (e.g., hospitals, residences, and recreational areas) and the allowable limits of impacts.

(2) Identify predicted noise levels and pollutant concentrations particularly in regard to sensitive-use areas and existing standards.

(3) Identify potential impacts on the community and predict their magnitude.

The staff will use the following steps for the analysis of socioeconomic impacts associated with the construction and operational labor force:

(1) From the previous estimates of labor force requirements and the number of workers available within the region, predict the number of workers originating from within the region and the number of workers who will be relocating.

(2) Estimate the number of consturction and operations workers who will be relocating, and predict their temporal and geographic distribution.

(3) Estimate the number of indirect or induced workers who will have to relocate, and predict their temporal and geographic distribution.

(4) Estimate the overall impact of workers who will be relocating on regional income, employment, and population. Identify critical services and goods for the affected region.

(5) Predict potential changes in regional housing patterns (e.g., introduction of mobile homes).

(6) Estimate the additional level of public facilities and services that will have to support workers who will be relocating as a function of their probable location. Types of facilities and services that should be considered include those pertaining to education, water and sewage, safety, health, welfare, transportation, and recreation.

(7) Identify potential adverse traffic conditions caused by transportation of workers and materials to and from the site.

(8) Identify those jurisdictions expected to receive significant tax revenues generated by the facility payroll and induced economic activity.

(9) Compare the total flow of tax revenues from the various sources associated with facility construction and operation with the expenditures required to meet the additional demand for public facilities and services.

Additional guidance on the analysis of socioeconomic impacts may be found in Fitzsimmons et al. (1975) (see Section 6 of this ESRP).

4. EVALUATION

Evaluation of each identified impact will result in one of the following determinations:

(1) The impact is minor, and mitigation is not required.

(2) The impact is adverse, but it can be mitigated by design changes or procedural modifications that the staff has identified and determined are practicable.

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided.

The staff will categorize impacts as those over which the applicant has some control and those over which the applicant has little or no control. Those impacts over which the applicant has little or no control are indirect results of construction and are usually associated with the influx of the construction labor force.

For those impacts over which the applicant has control, the criteria outlined above will apply.

For those impacts over which the applicant has little or no control and which in the staff's judgment are adverse, the staff will (1) prepare a description of these impacts for inclusion in the ES, (2) where appropriate, identify potential solutions to the problem that are beyond the jurisdiction of the NRC, and (3) ensure that these impacts will be considered in the staff's final evaluation of the proposed action.

5. INPUT TO THE ES

The staff will prepare Section 4.6, "Socioeconomics," of the ES. This section will (1) contain a description of the social and economic impacts resulting from the proposed action; (2) present the basis for the staff's analysis; and (3) present the staff's conclusions, recommendations, and conditions regarding the impacts of the reviewed construction activity on the region's social, political, and economic structure. The following information will usually be included in ES Section 4.6:

(1) a statement of the scope of coverage and the objectives of the analysis

(2) a summary of the steps taken in the analysis and the methodologies used

(3) a summary of the findings of the analysis for each impact category, with the level of detail determined by the severity of the anticipated impact

(4) identification and assessment of potential mitigative measures

The staff will provide the following information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 4.11, "Unavoidable Adverse Environmental Impacts" - a list of unavoidable adverse social and economic impacts predicted to occur as a result of the proposed action

- 4.12, "Irreversible and Irretrievable Commitments of Resources" - a brief summary of the irreversible and irretrievable commitments of social and economic resources predicted to occur as a result of the proposed action

6. REFERENCES

Code of Federal Regulations, Title 29, "Labor," and Title 40, "Protection of Environment," U.S. Government Printing Office, Washington, DC, revised annually.

Fitzsimmons, S. J., L. E. Stuart, and P. C. Wolff, "Social Assessment Manual: A Guide to the Preparation of the Social Well-Being Account," Abt Associates, Inc., for the Bureau of Reclamation, U.S. Department of the Interior, Contract No. 14-06-D7342(5), July 1975.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.7
CULTURAL RESOURCES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 3.6, "Regional Historic, Archaeological, Architectural, Scenic, Cultural, and Natural Landmarks"
- 5.1, "Short-Term Environmental Effects"
- 5.2, "Long-Term Environmental Effects"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.2.5, "Summary Alternatives for Detailed Consideration"
- 3.8, "Cultural Resources"

Standard(s) and/or Guide(s)

- 36 CFR 800, "Protection of Historic and Cultural Properties"
- Executive Order 11593, "Protection and Enhancement of the Cultural Environment," 1971
- Historical and Archaeological Preservation Act of 1974
- National Historic Preservation Act of 1966
- NUREG-0902, "Site Suitability, Selection and Characterization"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- U.S. Department of the Interior, The National Register of Historic Places

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's assessment of the potential impacts of the proposed construction, operational, and closure activities on the historic, archaeological, and cultural resources* associated with the alternatives being considered. The review will be sufficiently detailed to enable the staff to predict and assess potential impacts and to recommend that alternative locations, designs, practices, or procedures that would mitigate predicted adverse impacts be considered.

The scope of the review will consist of the following:

(1) evaluation of the applicant's description of the historic, archaeological, and cultural resources within the site boundary and adjacent offsite areas (both the proposed and alternative sites)

(2) evaluation of the applicant's description of the historic, archaeological, and cultural resources that are within 10 kilometers of the site and adjacent offsite areas (both the proposed and alternative sites)

(3) evaluation of the State historic preservation officer's (SHPO's) comments on the proposed facility concerning important historic, archaeological, and cultural resources (both the proposed and alternative sites)

(4) evaluation of the compatibility of the proposed project with State laws and plans for historic preservation

(5) evaluation of the applicant's impact assessment of cultural resources and any mitigative measures proposed to minimize adverse impacts

3. ANALYSIS PROCEDURE

The staff's analysis of the effects of the construction, operational, and closure activities of the facility on historic and cultural resources will be coordinated with the environmental review under ESRP 3.8 to ensure that those environmental factors most likely to be affected by the facility are described in that section.

The staff will consult with the Interagency Archaeological Service Division (IASD) of the Office of Archaeology and Historic Preservation of the National Archaeological Service, U.S. Department of the Interior.

The staff, with the assistance of the IASD and in consultation with the SHPO, will consider those cultural and historic resources that are listed or are eligible for inclusion in The National Register of Historic Places and that

*Historic, archaeological, and cultural resources include districts, sites, buildings, structures, or objects of historical, archaeological, architectural, or cultural significance.

may be affected by the proposed project. The staff will use the information derived from the appropriate environmental reviews describing the proposed construction, operational, and closure activities to identify those actions that could result in potential impacts. The staff's assessment of the potential impacts on these resources will be guided by 36 CFR 800, which describes in detail how to assess the effect of a proposed action on properties that are listed or are eligible for inclusion in The National Register. It should be recognized that there are generally two types of impacts on a resource: direct impacts (e.g., destruction during excavation) and indirect impacts (e.g., visual impact and denial of access). Both types of impact will be considered in this analysis.

Cultural and historic resources that are neither listed nor eligible for inclusion in The National Register are not protected by the provisions of the National Historic Preservation Act, Executive Order 11593, or 36 CFR 800. Nevertheless, potential impacts on these resources and measures and controls to avoid adverse impacts must be considered, even though these resources are not eligible for inclusion in The National Register.

4. EVALUATION

Evaluation of each identified impact will result in one of the following determinations:

(1) The impact is minor, and mitigation is not required. When all impacts are of this nature, the staff will accept the design and construction as proposed.

(2) The impact is adverse, but it can be mitigated by specific design or procedural modifications that the staff has identified and determined to be practicable. For these cases, the staff will consult with the project manager and the staff reviewer responsible for ES Section 2.2.5 to verify that the staff's recommendations are practicable and will lead to an improvement.

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided. When impacts of this nature are identified, the staff will inform the staff reviewer responsible for ES Section 2.2.3 that analysis and evaluation of alternative designs or procedures are required. The staff will participate in any such analysis and evaluation of alternatives that would result in avoidance of the impact and that could be considered practicable. If no such alternatives can be identified, the staff will be responsible for providing this information to the staff reviewers responsible for ES Sections 4.11 and 4.12.

The staff will evaluate proposed construction activities to ensure that the applicant has committed to use currently acceptable practices to minimize impacts. The staff will, in consultation with the SHPO, use 36 CFR 800 to evaluate the potential impacts on properties listed or eligible for inclusion in The National Register.

In the case of properties not eligible for inclusion in The National Register, assistance from the SHPO, the Office of Archaeology and Historic Preservation, or other qualified individuals may be needed. The staff will consider alternatives to reduce the impact on the cultural and historic resources and determine the cost for each alternative versus the benefit derived. The cost of the recovery required by the Historical and Archaeological Preservation Act of 1974 should be included in the consideration of alternatives. When the evaluation does not justify preservation of the resource, the applicant will be asked to recover archaeological, historic, architectural, and cultural data on the resource. This recovery may include recording by photographs and measured drawings, archaeological excavations to uncover data and material, removal of structures or salvage of architectural features, and other steps that will ensure full knowledge of the lost resource. Salvaged artifacts and materials should be deposited where they will be of public and educational benefit.

5. INPUT TO THE ES

The staff will prepare Section 4.7, "Cultural Resources," of the ES. This section will contain (1) a description of the impacts; (2) the basis for the staff's analysis; and (3) the staff's conclusions, recommendations, and conditions regarding the impacts of the proposed project activities on the historic, archaeological, and cultural resources. The following information will usually be included in ES Section 4.7:

(1) a positive statement of no effect for properties listed or eligible for inclusion in The National Register that will not be affected

(2) description of significant impacts on those properties that are listed or eligible for inclusion in The National Register and a discussion of the steps that led to a determination of whether or not any effects are adverse

(3) description of any adverse impacts on the cultural and historic resources not eligible for inclusion in The National Register

(4) description of any measures and controls that are available to limit adverse impacts

The staff will make the following recommendation or provide the following information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 2.2.3, "Alternative Disposal Facilities, Disposal Units, and Design Features" - the recommendation that alternative plant designs, locations, or construction activities that would result in avoidance of the impacts be considered when the staff concludes that proposed construction, operational, and closure activities will result in adverse impacts on historic and cultural resources that should be avoided

2.2.5, "Summary Alternatives for Detailed Consideration" - the recommendation that alternative plant designs, locations, or construction activities that would result in avoidance of the impacts be considered when the staff concludes that proposed construction, operational, and closure activities will result in adverse impacts on historic and cultural resources that should be avoided

- 4.11, "Unavoidable Adverse Environmental Impacts" - a list of the unavoidable impacts that are predicted to occur as a result of the proposed construction activity

- 4.12, "Irreversible and Irretrievable Commitments of Resources" - a brief summary of the irreversible and irretrievable commitments of historic and cultural resources resulting from the proposed construction activity

6. REFERENCES

Code of Federal Regulations, Title 36, "Parks, Forests, and Public Property," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Department of the Interior, National Park Service, The National Register of Historic Places, U.S. Government Printing Office, Washington, DC, revised periodically.

U.S. Nuclear Regulatory Commission, NUREG-0902, "Site Suitability, Selection and Characterization," April 1982.

---, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.8
RADIOLOGICAL IMPACTS AND DOSE ASSESSMENT

This ESRP consists of the following:

ESRP 4.8.1 Pathways Analysis
Appendix A - Generic Release and Transport Scenarios

ESRP 4.8.2 Dose to Man
ESRP 4.8.3 Dose to Biota Other Than Man

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.8.1
PATHWAYS ANALYSIS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"
- 3.0, "Characteristics of Proposed Site"
- 4.0, "Design of Proposed Facility"
- 5.0, "Environmental Effects of Proposed Facility"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2, "Alternatives Including the Proposed Action"
- 3, "Affected Environment"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with regional compacts and State agencies
- Responses to requests for additional information
- Staff summary of determinations and conclusions of the scoping process

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's identification and assessment of the release and transport of radionuclides from each of the alternatives selected for consideration in ES Section 2.2.5. Three basic time periods are to be considered for each alternative: operations, closure, and long term, where "long term" encompasses the postclosure observation period, the active institutional control period, and beyond. The scope of the review is to identify and quantify, as needed, the most significant mechanisms by which radionuclides (or radiation) may be released from waste and transported through the environment to a biota access location. A biota access location is simply a location whereby humans (or other biota) may receive an exposure to ionizing radiation. Examples of biota access locations include a well positioned in groundwater in the downstream gradient from the disposal facility, and the downwind boundary of the disposal facility.

This section of the ES is used to provide a source term for the determination of radiation dose rates, which generally will be provided in Section 4.8.2, "Dose to Man," of the ES. The staff also will coordinate its review under this ESRP with the reviews under ESRPs 4.2, "Meteorology and Air Quality," and 4.3, "Hydrology," under which the nonradiological impacts from the disposal facility are being assessed to ensure that assumptions on possible release and transport mechanisms are not inconsistent.

3. ANALYSIS PROCEDURE

The basic list of alternatives to be considered will be obtained from the applicant's ER and Section 2 of the ES. Information on environmental attributes that will influence the potential release and transport of radionuclides will be obtained generally from the applicant's ER and Section 3 of the ES. For each alternative for which radionuclide release and transport is to be considered, the staff will perform the following actions:

(1) Establish a list of possible radionuclide release/transport combinations (scenarios). That is, determine the different scenarios that could result in radionuclides being released and transported to a biota access location. The specific list of scenarios will vary depending on the particular disposal alternative being considered. However, a generic list of scenarios is included as Appendix A to this ESRP.

(2) Determine the scenarios that warrant more detailed consideration, so that a concise list of scenarios that are important in terms of decisionmaking can be compiled. Considerations that would influence this determination include (a) the comparative significance of a specific scenario in terms of potential impacts during a particular period of concern, (b) the degree of public or regulatory concern regarding a specific scenario as determined through the scoping process, and (c) the representativeness of the scenario.

(3) Compare the lists against information provided by the applicant. Request additional information from the applicant as needed.

(4) Assess the applicant's procedures and assumptions for each scenario. Request additional information from the applicant as needed. Formulate NRC staff models and assumptions as needed.

In Step (2), it should be noted that the assessment of the comparative significance of potential impacts from specific scenarios should be based on similar periods of concern. For example, impacts from the various possible operational scenarios would be compared against one another to determine those scenarios that are most significant for the decisionmaking process during the operational period. At this time one would not be comparing operational impacts against closure impacts. It is also not necessary to determine long lists of scenarios that involve only minor modifications to the basic assumptions. Rather, one is looking for a concise list of representative, or bounding, scenarios. Finally, the scoping process for determining those scenarios that are to be considered in detail should be documented. Where appropriate, generic studies and analyses may be referenced to eliminate those scenarios having minimal comparative impacts.

4. EVALUATION

The staff will evaluate the release/transport scenarios proposed by the applicant and determine their adequacy so that a decision regarding the licensing of a new disposal facility can be made. Information gaps should be identified, and additional information should be obtained from the applicant as needed.

The staff also will determine the need for independent confirmatory analyses by the NRC staff, particularly for those scenarios deemed to be most critical for licensing a disposal facility. NRC staff models would be formulated as needed.

5. INPUT TO THE ES

The staff will prepare Section 4.8.1, "Pathways Analysis," of the ES.

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.8.1 - APPENDIX A
GENERIC RELEASE AND TRANSPORT SCENARIOS

The purpose of this appendix is to provide a list of generic scenarios for release and transport of radionuclides from a disposal facility (see Table A.1). Three periods are concerned: operations, closure, and long term. Some scenarios may begin in one period and continue during the following periods. For example, the groundwater migration scenario begins during site operations but continues during closure and over the long term.

Note that there is a certain interdependence among release/transport scenarios. For example, the activities of burrowing animals and plant roots may not only disperse waste through air and water pathways, but may also increase percolation of water into disposal units, and thus increase releases through groundwater pathways. Human intrusion events could similarly increase releases through groundwater pathways. Also note that releases resulting from direct human intrusion into disposed waste, or impacts due to use of the site surface, would not occur until the end of the institutional control period.

Table A.1 Generic release and transport scenarios

Scenario	Radiation*	Release/transport pathways
Operations		
Doses to general population along waste transport route	g	None
Doses to individuals near disposal site from parked trucks	g	None
Doses to individuals near disposal site from site operations (e.g., hoisting liners with cranes)	g	None
Releases from contaminated surfaces such as buildings and grounds	a, b, g	Air, surface water
Releases from decomposing waste (e.g., methane gas)	b	Air
Uptake and dispersion by plants and animals	a, b, g	Air, surface water
Radionuclide leaching and migration	a, b, g	Groundwater
Closure		
Releases from demolition activities	a, b, g	Air, surface water
Releases from residual site contamination	a, b, g	Air, surface water
Releases from decomposing waste (e.g., methane gas)	b	Air
Uptake and dispersion by plants and animals	a, b, g	Air, surface water
Radionuclide leaching and migration	a, b, g	Groundwater
Long term		
Releases from residual site contamination	a, b, g	Air, surface water
Releases from decomposing waste (e.g., methane gas)	b	Air

*g = gamma; a = alpha; b = beta.

Table A.1 (Continued)

Scenario	Radiation*	Release/transport pathways
Long term (continued)		
Uptake and dispersion by plants and animals	a, b, g	Air, surface water
Radionuclide leaching and migration	a, b, g	Groundwater
Releases due to erosion and other surface processes	a, b, g	Air, surface water
Releases due to seismic activity	a, b, g	Air, surface water, groundwater
Dispersion due to human contact with waste	a, b, g	Air, surface water
Doses from human use of site surfaces	g	None

*g = gamma; a = alpha; b = beta.

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.8.2
DOSE TO MAN

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"
- 3.0, "Characteristics of Proposed Site"
- 4.0, "Design of Proposed Facility"
- 5.0, "Environmental Effects of Proposed Facility"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2, "Alternatives Including the Proposed Action"
- 3, "Affected Environment"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- ES Section 4.8.1, "Pathways Analysis"

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's identification and assessment of radiological impacts based on the presence of radioactivity at a "biota access location." A biota access location is simply a location whereby humans may receive an exposure to ionizing radiation. Examples of biota access locations include a well positioned in groundwater in the downstream gradient from the disposal facility, and the downwind boundary of the disposal facility. Release and transport of radionuclides from radioactive wastes are considered in ESRP 4.8.1, "Pathways Analysis."

The scope of this review will consist of possible radionuclide movement through various pathways following the occurrence of contaminated material at a biota access location. For example, assuming that a water well forms a biota access location, then possible pathways for human exposure include direct consumption of the water, consumption of plants irrigated with the contaminated water, and consumption of livestock fed contaminated water. For each of these pathways, the staff must make a number of assumptions on consumption rates and transfer between different components of the pathways

(e.g., transfer between contaminated soil and plants via root uptake). Finally, radiation doses resulting from either direct exposure, ingestion, or inhalation need to be considered.

3. ANALYSIS PROCEDURE

For each alternative and scenario, the staff will examine the dose assessment and pathway transfer models and assumptions presented by the applicant and determine their adequacy. Information gaps should be identified, and additional information should be obtained from the applicant as needed.

The staff also will determine if the assumptions and models presented by the applicant should be adopted for the ES, or if independent confirmatory analysis is needed. If the latter, the staff will perform the calculations.

4. EVALUATION

The staff will determine the reasonableness of the pathways presented and confirm the use of up-to-date radionuclide transfer coefficients and health physics methodologies (e.g., dose conversion factors in Publication 30 of the International Commission on Radiological Protection). The staff will perform independent calculations as needed.

5. INPUT TO THE ES

The staff will prepare Section 4.8.2, "Dose to Man," of the ES.

6. REFERENCES

International Commission on Radiological Protection, Limits for Intakes of Radionuclides by Workers, Part 1, Publication 30, Pergamon Press, Oxford, England, July 1978.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

ENVIRONMENTAL STANDARD REVIEW PLAN 4.8.3
DOSE TO BIOTA OTHER THAN MAN

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"
- 3.0, "Characteristics of Proposed Site"
- 4.0, "Design of Proposed Facility"
- 5.0, "Environmental Effects of Proposed Facility"

Environmental Review(s) Performed Under the Folowing ESRP(s)

- 2, "Alternatives Including the Proposed Action"
- 3, "Affected Environment"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- ES Section 4.8.1, "Pathways Analysis"

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's identification and assessment of radiological impacts to biota other than humans based on the presence of radioactivity at a "biota access location." A biota access location is simply a location whereby biota may receive an exposure to ionizing radiation. Examples of biota access locations include a well positioned in groundwater in the downstream gradient from the disposal facility, and the downwind boundary of the disposal facility. Release and transport of radionuclides from radioactive wastes are considered in ESRP 4.8.1, "Pathways Analysis."

The scope of this review will consist of possible radionuclide movement through various pathways following the occurrence of contaminated material at a biota access location. For example, assuming that a water well forms a biota access location, then possible pathways for exposure include direct consumption of the water, consumption of plants irrigated with the contaminated water, and consumption of livestock fed contaminated water. For each of these pathways, the staff must make a number of assumptions on consumption rates and transfer between different components of the pathways (e.g., transfer between

contaminated soil and plants via root uptake). Finally, radiation doses resulting from either direct exposure, ingestion, or inhalation need to be considered.

Because of the wide variety of biota other than humans, the review will be limited to a few representative species, in particular endangered species.

3. ANALYSIS PROCEDURE

For each alternative and scenario, the staff will examine the dose assessment and pathway transfer models and assumptions presented by the applicant and determine their adequacy. Information gaps should be identified, and additional information should be obtained from the applicant as needed.

4. EVALUATION

The staff will determine the reasonableness of the applicant's assessment of doses to biota other than man.

5. INPUT TO THE ES

The staff will prepare Section 4.8.3, "Dose to Biota Other Than Man," of the ES.

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.9
IMPACTS OF ACCIDENTS

This ESRP consists of the following:

ESRP 4.9.1 Waste Spillage
ESRP 4.9.2 Fire and/or Chemical Reactions
ESRP 4.9.3 Transportation Accidents
ESRP 4.9.4 Nuclear Criticality
ESRP 4.9.5 Onsite Effects of Offsite Accidents

NUREG-1300
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LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.9.1
WASTE SPILLAGE

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 6.0, "Environmental Effects of Accidents"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.2, "Description of Disposal Facilities, Disposal Units, and Design Features"
- 2.1.3, "Waste Disposal Operations"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Waste-manifest information developed during operational history of container-drop incidents at present operating sites

2. PURPOSE AND SCOPE

The purpose of this ESRP is to provide the staff's methodology for assessing the adequacy of the applicant's projection of the radionuclide and chemical source term for the release of material resulting from waste-spillage accidents.

3. ANALYSIS PROCEDURE

The staff will verify that the information provided by the applicant is sufficient to allow an independent calculation of the radiological and chemical release of material from dropped disposal containers. This will require that the staff examine the validity of the applicant's methodology and assumptions regarding the following:

(1) The number and kinds of waste streams that the applicant anticipates will be received at the disposal facility. These waste streams will be site specific and will depend on the types of generators (e.g., hospitals, universities, or nuclear power plants) producing waste that will be

shipped within and to the region where the waste disposal facility will be located.

(2) The applicant's assumptions and procedures for determining the frequency (and corresponding probability) that waste from a certain stream would be involved in a container-drop accident.

(3) The applicant's assumptions concerning container size and fractional release based on waste form and container conditions.

(4) The calculated quantities of chemicals and radionuclides released to the site environs.

4. EVALUATION

The staff will evaluate the accuracy of the applicant's waste stream data (which should be updated periodically on the basis of site-specific disposal history) and accident frequency and container waste form packaging assumptions to determine if the release scenarios and calculated chemical and radiological release quantities are reasonable. In addition, following its review of the applicant's data, the staff will determine if additional information is needed and ask the applicant to respond as necessary.

5. INPUT TO THE ES

The staff will prepare Section 4.9.1, "Waste Spillage," of the ES. This section will contain a concise description of the environmental effects of waste spillage for the alternatives identified in ES Section 2.2.5, "Summary Alternatives for Detailed Consideration." When possible, the staff will quantify any postulated effects and, to the extent that such effects would result in a credible dose to the offsite environment, the staff will coordinate this review with that of, and provide pertinent information to, the staff reviewers responsible for the following:

- ES Section 4.8.1, "Pathways Analysis"
- ES Section 4.8.2, "Dose to Man
- ES Section 4.8.3, "Dose to Biota Other Than Man"
- SER Section 6.1.4, "Radionuclide Release - Accidents or Unusual Operational Conditions"

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.9.2
FIRE AND/OR CHEMICAL REACTIONS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 2.0, "Alternatives to Proposed Project"
- 3.1, "Geography and Demography"
- 3.3, "Meteorology and Air Quality"
- 4.1, "Description of Wastes To Be Accepted"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.4, "Environmental Monitoring and Surveillance"
- 2.2.5, "Summary Alternatives for Detailed Consideration"
- 3.2, "Meteorology and Air Quality"
- 3.3, "Ambient Radiation Levels"
- 4.8.1, "Pathways Analysis"

Standard(s) and/or Guide(s)

- National Fire Protection Association, NFPA 30-1984, "Flammable and Combustible Liquids Code"
- NUREG-1200, "Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility," Standard Review Plan 3.4.3, "Fire Protection System"
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"
- U.S. Environmental Protection Agency, EPA-520/1-75-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," draft revision

Other

- Consultation with State (or regional) compacts and State agencies
- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review of the applicant's assessment of the effects of fires and/or chemical reactions for the alternatives identified in Section 2.2.5 of the ES. The scope of this review will consist of an evaluation of conceivable accident scenarios proposed by the applicant for fires and explosions that could be induced by incompatible chemicals, by biological exothermic reactions (e.g., spontaneous combustion), or by normal site operations (e.g., dropping a waste container in the presence of an ignition source such as a spark). The discussion by the applicant should provide a qualitative review, not a formal quantitative risk assessment.

The information needed for the staff's review will usually include the following:

(1) A qualitative estimate of the probability of fires and explosions (and the severity of accidents) based on existing data from operating sites and on the physical and chemical properties of the types of waste characteristically generated in the compact region where the waste disposal facility will be located. These probabilities should be reported for the construction, operational, and postoperational phases. The applicant should describe the effects of fires and/or explosions postulated for the waste-receipt area, the waste-storage area, as well as the waste-disposal area. The applicant should have given special emphasis to the operational phase because the consequences of fire and/or explosion are likely to be more severe during this phase.

(2) A description of the secondary combustion products produced by chemical reactions during fires (smoldering or rapid) and an evaluation of their toxicity and hazards relative to the original source. The applicant should also identify those radionuclides that may be expected to be released from the site in the event of rupture, erosion, or diffusion.

(3) Precautionary measures to be followed by the applicant to lower the probability of occurrence of these accidents. This will include a listing of the instruments to be used in onsite surveys for combustible vapors and gases and the quality control, quality assurance, and training programs for the staff who will use them.

(4) Meteorological, demographic, and land-use data in an acceptable format for use as input into mathematical or computer models for predicting the offsite consequences of the release.

3. ANALYSIS PROCEDURE

(1) The staff will consider the expected environmental effects in relation to the protective action guides developed by the U.S. Environmental Protection Agency for radiological contaminants and the relevant codes developed by the National Fire Protection Association. The staff will find valuable information in the following publications when performing an evaluation of the chemical reactions that could possibly result in fire and/or an explosion:

(a) Bretherick, L., Handbook of Reactive Chemical Hazards

(b) Hatayama, H. K., et al., "A Method for Determining Hazardous Wastes Compatibility"

(c) National Fire Protection Association, Manual of Hazardous Chemical Reactions

(2) The staff will determine how protective measures (e.g., sheltering, evacuation, and decontamination) selected by the disposal-site operator will reduce the effects of an accident both on site and off site..

(3) The staff will determine if the applicant has addressed (at a minimum) the following accident scenarios:

(a) Fire in an open disposal trench with the subsequent continued and/or explosive release of pollutant over a larger area than during normal operations (because the heated air is more buoyant and vertical dispersion of the plume is greater than under normal operational conditions). This evaluation should consider both particulate and gaseous releases for the operational, closure, and postclosure observation periods.

(b) A potential explosion resulting from overpressurization of a waste container.

(c) An explosion hazard resulting from the buildup of hydrogen and methane gas produced by radiolysis or by bacterial action on the waste.

4. EVALUATION

The staff will determine if the ER contains sufficient information to enable it to make an independent estimate of the environmental effects of accidents resulting from fire and explosion. The staff will determine if the applicant has described an acceptable survey program for the detection of potential fire and explosion hazards and has considered the offsite effects of such accidents in the unlikely event they were to occur.

5. INPUT TO THE ES

The staff will prepare Section 4.9.2, "Fire and/or Chemical Reactions" of the ES. This section will include a concise description of the environmental effects of a postulated accident related to a fire or a chemical reaction. When possible, the staff will qualify any effects to the extent that such effects would result in a credible dose to the environment. The staff will provide pertinent information to the staff reviewers responsible for the following ES sections, as necessary:

- 4.8.1, "Pathways Analysis"
- 4.8.2, "Dose to Man"
- 4.8.3, "Dose to Biota Other Than Man"

6. REFERENCES

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NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.9.3
TRANSPORTATION ACCIDENTS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 6.0, "Environmental Effects of Accidents"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 2.1.3, "Waste Disposal Operations"
- 2.2.2, "Alternative Sites"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for New-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies
- Responses to requests for additional information
- Site visit

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and assessment of potential impacts resulting from accidents associated with the transportation of radioactive waste. The scope of this review will consist of an evaluation of transportation accident risks in relation to the alternatives being considered, the potential severity of accidents, and the environmental impacts of such accidents.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential impact. The information needed for the review will usually include the following:

(1) identification of credible transportation accident scenarios and their probability (from the ER)

(2) severity of the accident and potential environmental impacts, including any quantitative estimates of injuries and/or deaths (from the ER)

(3) evaluation of the alternatives with respect to comparative environmental impacts (from the ER)

3. ANALYSIS PROCEDURE

The staff will review and assess the transportation accident scenarios identified by the applicant for each alternative being considered to verify that they are reasonable and that the probability of occurrence has been considered. In addition, the staff will independently assess the severity of the accident and the effects of that accident on the environment. The analysis is expected to be primarily a qualitative one, although quantitative data may be included.

4. EVALUATION

The impacts of postulated transportation accidents are not considered to be major inputs to the evaluation of alternatives by the staff. However, the staff will assess the impacts on the basis of probability and estimated severity and categorize them as follows:

(1) The impact is minor, and mitigation is not required.

(2) The impact is adverse, but it can be successfully mitigated by specific design or procedural modifications that the staff has identified and determined to be practicable.

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided.

When no mitigation or avoidance practices can be identified, the staff will provide a summary of the adverse impacts of transportation accidents to the staff reviewer responsible for ES Section 4.11, "Unavoidable Adverse Environmental Impacts."

5. INPUT TO THE ES

The staff will prepare Section 4.9.3, "Transportation Accidents," of the ES. This section will contain (1) a description of the potential impacts of transportation accidents associated with the alternatives being considered, (2) the basis of the staff's analysis of the alternatives, and (3) the staff's conclusions, recommendations, and conditions regarding transportation accidents.

The staff's analysis may be presented in a narrative summary that highlights the impacts resulting from potential transportation accidents. The staff's discussion should identify important impacts and mitigative actions.

The staff will provide the following information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 4.11, "Unavoidable Adverse Environmental Impacts" - a summary of the unavoidable impacts that may occur as a result of postulated accidents

- 4.12, "Irreversible and Irretrievable Commitments of Resources" - a summary of irreversible and irretrievable commitments of resources

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.9.4
NUCLEAR CRITICALITY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 6.0, "Environmental Effects of Accidents"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.2, "Description of Disposal Facilities, Disposal Units, and Design Features"
- 2.1.3, "Waste Disposal Operations"

Standard(s) and Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and assessment of potential impacts resulting from a postulated nuclear criticality event. The scope of this review will consist of an assessment of the potential severity of such an event as well as the environmental impacts resulting from it.

The information needed for the staff's review may be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential impact. The information needed for the review will usually include the following:

(1) identification of the types and concentrations of special nuclear material (SNM) (if any) to be received as waste (from the ER)

(2) procedures for the receipt, handling, and disposal of SNM waste (from the ER)

(3) the applicant's estimates and calculation of the probability, severity, and potential environmental impacts of a nuclear criticality event (from the ER)

3. ANALYSIS PROCEDURE

The staff will review and assess the applicant's procedures and analyses related to criticality to verify that they are reasonable and that the probability of occurrence has been considered. In addition, the staff will independently assess the severity of the accident and the potential impacts on the environment.

4. EVALUATION

The likelihood of a nuclear criticality accident is considered to be extremely small given the low concentrations of SNM in most shipments of low-level waste, and, therefore, the results of this accident analysis are not considered to be major inputs to the evaluation of the alternatives being considered. However, the staff will assess the impacts of the accident and categorize them as follows:

(1) The impact is minor, and mitigation is not required.

(2) The impact is adverse, but it can be successfully mitigated by specific waste form, design, or procedural modifications that the staff has identified and determined to be practicable.

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided.

When no mitigation or avoidance practices can be identified, the staff will provide a summary of the adverse impacts of a criticality accident to the staff reviewer responsible for ES Section 4.11, "Unavoidable Adverse Environmental Impacts."

5. INPUT TO THE ES

The staff will prepare Section 4.9.4, "Nuclear Criticality," of the ES. This section will contain (1) a description of the potential impacts, (2) the basis of the staff's analysis of the impacts, and (3) the staff's conclusions and recommendations.

The staff's analysis may be presented in a narrative summary that highlights the impacts resulting from a postulated criticality accident. This discussion should identify important impacts and mitigative actions.

The staff will provide the following information or ensure that it has been provided to the staff reviewer responsible for the following ES section:

- 4.11, "Unavoidable Adverse Environmental Impacts" - a summary of the unavoidable impacts that may occur as a result of a criticality accident

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.9.5
ONSITE EFFECTS OF OFFSITE ACCIDENTS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 6.0, "Environmental Effects of Accidents"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2.1.1, "Location"
- 3.1.1, "Population Distribution and Characteristics"
- 3.1.2, "Current and Projected Land Use"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Responses to requests for additional information

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and assessment of potential impacts resulting from offsite accidents. The scope of this review will consist of an evaluation of the relative risks from offsite accidents for the alternatives being considered, the potential severity of accidents, and the environmental impacts of such accidents.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the results of the scoping process and the anticipated magnitude of the potential impact. The information needed for the review will usually include the following:

(1) identification of credible offsite accident scenarios and their probability (from the ER)

(2) severity of the accident and potential impacts on the environment, including any quantitative estimates of injuries and/or deaths (from the ER)

(3) evaluation of the alternatives with respect to the potential environmental effects of offsite accidents (from the ER)

3. ANALYSIS PROCEDURE

The staff will review and assess the offsite accident scenarios identified by the applicant for each alternative being considered to verify that they are reasonable and comprehensive and that the probability of occurrence has been considered. In addition, the staff will independently assess the severity of the accident and its potential environmental impacts. The analysis is expected to be primarily a qualitative one, although quantitative data may be included.

4. EVALUATION

The impacts of postulated offsite accidents are not considered to be major inputs to the staff's evaluation of the alternatives being considered. However, the staff will assess the impacts on the basis of probability and estimated severity and categorize them as follows:

(1) The impact is minor, and mitigation is not required.

(2) The impact is adverse, but it can be successfully mitigated by specific design or procedural modifications that the staff has identified and determined to be practicable.

(3) The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided.

When no mitigation or avoidance practices can be identified, the staff will provide a summary of the adverse impacts of transportation accidents to the staff reviewer responsible for ES Section 4.11, "Unavoidable Adverse Environmental Impacts."

5. INPUT TO THE ES

The staff will prepare Section 4.9.5, "Onsite Effects of Offsite Accidents," of the ES. This section will contain (1) a description of the potential impacts from offsite accidents, (2) the basis of the staff's analysis of the alternatives being considered, and (3) the staff's conclusions, recommendations, and conditions regarding offsite accidents.

The staff's analysis may be presented in a narrative summary that highlights the impacts resulting from potential offsite accidents. The discussion will identify the important impacts and mitigative actions.

The staff will provide the following information or ensure that it has been provided to the staff reviewers responsible for following ES sections:

- 4.11, "Unavoidable Adverse Environmental Impacts" - a summary of the unavoidable impacts that may occur as a result of postulated offsite accidents

- 4.12, "Irreversible and Irretrievable Commitments of Resources" - a summary of the irreversible and irretrievable commitments of resources

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.10
RELATIONSHIPS TO LAND-USE PLANS, POLICIES, AND CONTROLS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 5.0, "Environmental Effects of Proposed Facility"
- 6.0, "Environmental Effects of Accidents"
- 7.0, "Summary Evaluation of Proposed Project"

Environmental Review(s) Performed Under the Following ESRP(s)

- 1.2, "Scoping Process"
- 1.3, "Status of Required Permits and Approvals"
- 3.1.2, "Current and Projected Land Use"
- 4.1, "Land"

Standard(s) and/or Guide(s)

- Local land-use plans, policies, and controls
- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- Consultation with local, State, and Federal agencies

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and assessment of potential conflicts between the alternatives being considered and existing local, State, regional, and/or Federal land-use plans, policies, and controls for the areas under consideration. The scope of this review will consist of both the direct and indirect (induced) conflicts resulting from the alternatives and the concomitant planning efforts.

The information needed for the staff's review will be affected by site-specific factors, and the degree of detail will be modified according to the anticipated magnitude of the potential impact. The information needed for the review will usually include the folowing:

(1) land-use plans, policies or controls for the areas under consideration (from the staff reviewers responsible for ES Sections 1.3 and 3.1.2)

(2) impacts on land-use plans, policies, or controls, both short term and long term (from the staff reviewer responsible for ES Section 4.1)

3. ANALYSIS PROCEDURE

The staff will consult with the staff reviewers responsible for ES Sections 1.3 and 3.1.2 to identify the primary land management and/or land planning agencies that have jurisdiction over the areas under consideration for the alternatives being considered, as well as the nature of existing land-use plans, policies, and controls. The staff also will consult with the staff reviewer responsible for ES Section 4.1 to confirm any conflicts with such plans identified in the course of that review. The staff will verify that the relationships of the alternatives to existing land-use plans, policies, and controls have been adequately considered and will prepare a summary description of the nature of those relationships.

4. EVALUATION

This section is a summary description and requires no technical evaluation or findings. The information in this section will be included in ES Section 2.3, which will contain the summary staff assessment of alternatives and recommendations.

5. INPUT TO THE ES

The staff will prepare Section 4.10, "Relationships to Land-Use Plans, Policies, and Controls," of the ES. The staff's summary description of the nature of these relationships will constitute the narrative of this section. The staff will also provide pertinent information or ensure that it has been provided to the staff reviewer responsible for the following ES section:

- 2.3, "Staff Assessment of Alternatives and Recommendations"

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.11
UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 7.1, "Unavoidable Adverse Environmental Impacts"

Environmental Review(s) Performed Under the Following ESRP(s)

- 2, "Alternatives Including the Proposed Action"
- 4.1, "Land"
- 4.2, "Meteorology and Air Quality"
- 4.3, "Hydrology"
- 4.4, "Geology"
- 4.5, "Ecology"
- 4.6, "Socioeconomics"
- 4.7, "Cultural Resources"
- 4.8, "Radiological Impacts and Dose Assessment"
- 4.9, "Impacts of Accidents"

Standard(s) and/or Guides

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- None

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's summary identification and description of the predicted adverse environmental impacts of construction, operation, closure, and long-term care that cannot be avoided and for which no practicable means of mitigation are available. The scope of the review will consist of (1) a tabulation of impacts identified by the staff as being adverse, (2) organization of these impacts by environmental categories, and (3) preparation of a summary describing the nature and magnitude of each impact category.

The results of this review will be used (1) to provide a summary of those unavoidable adverse environmental impacts that will remain after all practicable

mitigative measures have been taken and (2) as input to the staff's assessment of the alternatives and recommendations in ES Section 2.3.

The information needed for the staff's review will be limited to descriptions of those predicted adverse impacts identified by the staff reviewers responsible for ES Sections 4.1 through 4.9.

3. ANALYSIS PROCEDURE

The staff's analysis and summary of adverse environmental impacts of construction and operation will be based on project design, construction, operation, closure, and long-term care of the alternatives proposed by the applicant. The analysis will also incorporate those measures and controls identified and recommended by the staff to limit adverse impacts. The staff will identify these impacts, organize them by environmental categories, and summarize each category for inclusion in the ES. The following analysis procedure will be used:

(1) The staff will consult with the staff reviewers responsible for ES Sections 4.1 through 4.9 and will obtain from them a listing of adverse environmental impacts. The staff will organize these impacts as follows:

   (a) staff-identified adverse impacts based on the alternatives proposed by the applicant

   (b) staff-recommended design modifications or modified procedures and practices to mitigate or avoid these impacts

   (c) the unavoidable adverse impacts that will remain after all practicable means to avoid or mitigate the impacts have been taken

(2) The staff will categorize the identified impacts as follows:

   (a) land-use impacts
   (b) meteorological and air quality impacts
   (c) hydrological impacts
   (d) geological impacts
   (e) ecological impacts
   (f) socioeconomic impacts
   (g) cultural resources impacts
   (h) radiological impacts
   (i) impacts of accidents

(3) The staff will ensure that the time scale for each impact is identified (e.g., 4-6 months during construction, throughout the facility's lifetime, indefinitely), will identify (for the staff reviewer responsible for ES Section 4.12) any impacts that result in irreversible and irretrievable commitment of resources, and will include (for the staff reviewer responsible for ES Section 4.13) those impacts that are to be considered short term or long term.

4. EVALUATION

The staff will consult with the staff reviewers responsible for ES Sections 4.1 through 4.9 to ensure that adequate documentation, including the applicant's commitments to avoid adverse impacts, is available to support the staff's conclusions on adverse impacts.

The staff will ensure that each identified impact has been appropriately categorized. When a particular action or operation results in multiple impacts (e.g., access-road construction and use may have impacts affecting land use, terrestrial ecology, and socioeconomics), the staff will ensure that the impacts are addressed in each appropriate category.

5. INPUT TO THE ES

The staff will prepare Section 4.11, "Unavoidable Adverse Environmental Impacts," of the ES. The staff's summary of adverse impacts for the alternatives being considered will constitute the narrative for this section. The staff also will provide the following information or ensure that it has been provided to the staff reviewers responsible for the following ES sections:

- 2.3, "Staff Assessment of Alternatives and Recommendations" - a summary description of direct and indirect unavoidable adverse environmental impacts
- 4.12, "Irreversible and Irretrievable Commitments of Resources" - a list of the unavoidable adverse impacts that will result in irreversible and irretrievable commitments of resources
- 4.13, "Relationships Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity" - a list categorizing the unavoidable adverse impacts of the alternatives as short term or long term

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

NUREG-1300
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.12
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 7.2, "Irreversible and Irretrievable Commitments of Resources"

Environmental Review(s) Performed Under the Following ESRP(s)

- 4.1, "Land"
- 4.2, "Meteorology and Air Quality"
- 4.3, "Hydrology"
- 4.4, "Geology"
- 4.5, "Ecology"
- 4.6, "Socioeconomics"
- 4.7, "Cultural Resources"
- 4.8, "Radiological Impacts and Dose Assessment"
- 4.9, "Impacts of Accidents"
- 4.11, "Unavoidable Adverse Environmental Impacts"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- None

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's summary identification and description of the predicted irreversible and irretrievable commitments of resources involved in the construction and operation of the proposed low-level waste disposal facility that cannot be avoided by practicable means. The scope of the review will consist of (1) a tabulation of all environmental resource commitments identified by the staff as being irreversible, (2) a tabulation of all materials used in construction and operation that are irretrievably committed, (3) organization of these commitments by category, and (4) the preparation of a summary describing the nature and magnitude of each commitment category.

The results of this review will be used to provide a summary of the irreversible and irretrievable commitments of resources that will be used as input to the staff's assessment in ES Section 2.3 of alternatives and recommendations.

The information needed for the staff's review will include descriptions of the irreversible commitments of environmental resources identified by the staff reviewers responsible for ES Sections 4.1 through 4.9 and the irretrievable commitments of material sources identified by the applicant. Information needed for the review will usually include the following:

(1) Environmental Commitments

- unavoidable adverse environmental impacts (from the staff reviewer responsible for ES Section 4.11)

(2) Resource Commitments

- commitments of materials used during construction, operation, closure, and long-term care (from the ER)

"Irreversible commitment" applies to environmental resources and the commitment of the environment that cannot be altered at some later time to restore the order of environmental resources that is current at the time of the commitment. "Irretrievable commitment" applies to material resources and the commitment of materials that, when used, cannot by practicable means be recycled or restored for other use.

3. ANALYSIS PROCEDURE

The staff's analysis and summary of irreversible and irretrievable commitments of resources will consist of two sections dealing with the following: (1) irreversible environmental commitments (e.g., land-use productivity) predicted by the staff reviewers responsible for ES Sections 4.1 through 4.9 and (2) irretrievable material resources (e.g., steel) proposed by the applicant for use in project construction and operation. The staff will identify and summarize these commitments for inclusion in the ES. The following analysis procedure will be used:

(1) The staff will consult with the staff reviewers responsible for ES Sections 4.1 through 4.9 and will obtain from them a listing of irreversible commitments of environmental resources based on (a) the applicant's proposed project and (b) the project with staff-recommended modifications. The staff will organize these commitments as follows:

    (a) staff-identified commitments based on the project as proposed by the applicant

    (b) staff-recommended design modifications or modified procedures and practices to minimize or avoid these commitments

    (c) the unavoidable commitments that will remain after all practicable means to avoid or minimize them have been taken

(2) The staff will identify those materials that will be irretrievably committed as a result of the proposed action.

4. EVALUATION

The staff will consult with the staff reviewers responsible for ES Sections 4.1 through 4.9 and 4.11 to ensure that the staff's conclusions on the irreversibility of environmental commitments are appropriate and can be supported. The staff will consider irreversible commitments as they may apply to the categories identified in ESRP 4.11.

The staff will ensure that the irretrievable commitments of material resources identified by the applicant are reasonable and that any other material resources identified by the staff reviewers responsible for ES Sections 4.1 through 4.9 have been included.

5. INPUT TO THE ES

The staff will prepare Section 4.12, "Irreversible and Irretrievable Commitments of Resources," of the ES. The section will usually consist of a brief paragraph and a table describing the resource commitments in quantitative and/or qualitative terms. In addition, the staff will provide pertinent information or ensure that it has been provided to the staff reviewer responsible for the following ES section:

- 2.3, "Staff Assessment of Alternatives and Recommendations"

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

ENVIRONMENTAL STANDARD REVIEW PLAN 4.13
RELATIONSHIPS BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

1. REVIEW INPUT

The staff will use the following to perform its review under this ESRP:

Environmental Report Section(s)

- 7.3, "Relationships Between Short-Term Uses and Long-Term Productivity of Man's Environment"

Environmental Review(s) Performed Under the Following ESRP(s)

- 4.11, "Unavoidable Adverse Environmental Impacts"
- 4.12, "Irreversible and Irretrievable Commitments of Resources"

Standard(s) and/or Guide(s)

- Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste"

Other

- None

2. PURPOSE AND SCOPE

The purpose of this ESRP is to direct the staff's review and assessment of the local short-term uses of the environment stemming from the alternatives being considered and the effects of these uses on long-term environmental productivity. The scope of the review will include an analysis of the predicted short-term unavoidable adverse environmental impacts (or environmental benefits) of each alternative as well as the predicted long-term environmental impacts (or benefits). For the purposes of this ESRP, "short-term" represents the period from the start of construction to the completion of site closure, and "long-term" represents the period extending beyond the completion of site closure. The review also will include an evaluation of the extent to which the proposed project's use of the environment will foreclose any options for other future use of the environment.

Information on the unavoidable adverse environmental impacts and the irreversible and irretrievable commitments of resources that represent short-term and long-term use of the environment needed for the staff's review will be obtained from the staff reviewers responsible for ES Sections 4.11 and 4.12, respectively.

3. ANALYSIS PROCEDURE

The staff's analysis of the relationship between short-term uses and long-term productivity will be based on the tabulation of unavoidable adverse environmental impacts and irreversible and irretrievable commitments of resources prepared by the staff reviewers responsible for ES Sections 4.11 and 4.12. The staff will identify through consultation with the appropriate staff reviewers those other uses of the environment that will be foreclosed by the proposed action (e.g., loss of productive farmland) and will classify these as either short-term or long-term preemptions. As necessary, the staff will consult with appropriate local, State, and Federal agencies to make these determinations.

4. EVALUATION

The staff will evaluate the project's effect on short-term use and the long-term productivity capabilities of the environment and will determine if the information provided by the reviews is complete, accurate, and applicable.

5. INPUT TO THE ES

The staff will prepare Section 4.13, "Relationships Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity," of the ES. The section will contain a summary and analysis of the predicted short-term unavoidable adverse impacts (or environmental benefits) of the alternatives and the predicted long-term adverse environmental impacts (or benefits) resulting from the alternatives.

In addition, the staff will provide pertinent information or ensure that it has been provided to the staff reviewer responsible for the following ES section:

- 2.3, "Staff Assessment of Alternatives and Recommendations"

6. REFERENCE

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.18, "Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste."

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BIBLIOGRAPHIC DATA SHEET

SEE INSTRUCTIONS ON THE REVERSE

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11a TYPE OF REPORT

b PERIOD COVERED (Inclusive dates)

12 SUPPLEMENTARY NOTES

13 ABSTRACT (200 words or less)

The Environmental Standard Review Plan (ESRP) (NUREG-1300) provides guidance to staff reviewers in the Office of Nuclear Material Safety and Safeguards who perform environmental reviews of Applicant's environmental reports prepared in support of license applications to construct and operate new low-level radioactive waste disposal facilities. The individual ESRP's which make up this document identify the information considered necessary to conduct the review, the purpose and scope of the review, the analysis procedure and evaluation, the formal inputs made to the Environmental Statement and the references considered appropriate for each review. By providing this information to the staff, the ESRP is intended to assure quality and uniformity of approach in individual reviews as well as compliance with the National Environmental Policy Act of 1969. In addition, the ESRP will make information about the environmental component of the licensing process more readily available and thereby improve the understanding of this process among the public, States and Regional Compacts and the regulated community.

14 DOCUMENT ANALYSIS - a KEYWORDS/DESCRIPTORS

Environmental Standard Review Plan (ESRP)
Environmental Statement
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National Environmental Policy Act

b IDENTIFIERS/OPEN ENDED TERMS

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