NUREG-1555, Supplement 1
Revision 2

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Standard Review Plans for Environmental Reviews for Nuclear Power Plants

Supplement 1: Operating License Renewal

Draft Report for Comment

Office of Nuclear Material Safety and Safeguards

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Standard Review Plans for Environmental Reviews for Nuclear Power Plants

Supplement 1: Operating License Renewal

Draft Report for Comment

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Office of Nuclear Material Safety and Safeguards

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Mail comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Rulemakings and Adjudications Staff.

For any questions about the material in this report, please contact: Jennifer Davis, Senior Environmental Project Manager, or Kevin Folk, Senior Environmental Project Manager, at 1-800-368-5642, extension 3835 or 6944 (respectively), or by e-mail at Jennifer.Davis@nrc.gov or Kevin.Folk@nrc.gov.

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ABSTRACT

This document provides guidance to U.S. Nuclear Regulatory Commission staff in implementing the provisions in Title 10 of the *Code of Federal Regulations* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," when conducting environmental reviews of applications for the initial and subsequent renewal of a nuclear power plant operating license(s). This standard review plan guides the staff in preparing a nuclear power plant-specific supplemental environmental impact statement to NUREG-1437, Revision 2, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. This document supplements NUREG-1555, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants*, which provides guidance for the environmental reviews of construction permits, initial operating licenses, early site permits, and combined licenses for new nuclear power plants.

PAPERWORK REDUCTION ACT STATEMENT

This NUREG provides voluntary guidance for implementing the mandatory information collections in 10 CFR Part 51 that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget (OMB) under control number 3150-0021. Send comments regarding these information collections to the FOIA, Library, and Information Collections Branch (T6-A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by email to Infocollects.Resource@nrc.gov, and to the OMB reviewer at: OMB Office of Information and Regulatory Affairs (3150-0021). Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503; email: oira_submission@omb.eop.gov.

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EXECUTIVE SUMMARY

This environmental standard review plan (ESRP) provides guidance for U.S. Nuclear Regulatory Commission (NRC) staff use in conducting environmental reviews of applications for the initial license renewal (LR) or subsequent license renewal (SLR) of a nuclear power plant operating license(s) and preparing a nuclear power plant-specific (hereafter called plant-specific) supplemental environmental impact statements (SEISs) to NUREG-1437, Revision 2, the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (LR GEIS; NRC 2023a). This ESRP amends NUREG-1555, Supplement 1, Revision 1, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants; Supplement 1: Operating License Renewal*, (NRC 2013) issued June 2013. Use of this ESRP helps ensure the completeness and consistency of the environmental review and analyses conducted by the NRC staff.

Questions regarding the content of any plan in this document may be directed to the NRC at the following address:

Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Additional copies of these plans may be obtained as indicated on the inside front cover of this document.

NRC's Implementation of the National Environmental Policy Act

This ESRP demonstrates how the NRC staff meets the provisions in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," to conduct environmental reviews for the renewal of operating licenses and prepare plant-specific SEISs to the LR GEIS. The NRC regulations at 10 CFR Part 51 implement Section 102(2) of the National Environmental Policy Act of 1969 (NEPA). The NRC published the license renewal provisions of 10 CFR Part 51 in the *Federal Register* on December 18, 1996 (61 FR 66537), which became effective on January 17, 1997. The NRC's intention in developing the rule was to improve the efficiency of the environmental review process for the renewal of nuclear power plant operating licenses. These provisions also support the analyses conducted for and reported in the LR GEIS.

Environmental Review Process

After receiving the applicant's environmental report (ER) for initial LR or SLR, the NRC staff performs an acceptance review to determine whether the ER contains sufficient information for the staff to undertake the environmental/NEPA review. After accepting the ER, the NRC staff begins to conduct its environmental review and prepare the plant-specific SEIS. The ESRP guides the NRC staff's environmental review and preparation of the SEIS. In each SEIS, the staff analyzes the nuclear plant site-specific environmental impacts of renewing the nuclear power plant operating license (the proposed action) and reasonable alternatives to renewing the license. The SEIS presents the staff's recommendation regarding the environmental acceptability of the license renewal action. The NRC's record of decision considers this recommendation, along with the findings from the safety review (10 CFR Part 54).

The NRC's environmental (NEPA) review process consists of the following actions required by 10 CFR Part 51:

- Publish a notice of intent to conduct an initial LR or SLR environmental review and to prepare a plant-specific SEIS to the LR GEIS in the *Federal Register* (see 10 CFR 51.27, "Notice of Intent"; 10 CFR 51.95(c), "Post Construction Environmental Impact Statements: Operating License Renewal Stage"; and 10 CFR 51.116, "Notice of Intent") and send copies of the notice to appropriate Federal, State, and local agencies and Indian Tribes;[1] public interest groups; and any other persons (e.g., representatives of environmental justice communities[2]) that have expressed interest in the initial LR or SLR environmental review (see 10 CFR 51.116, "Notice of Intent"). The notice describes the proposed action, explains the NRC scoping process, provides information about public meeting locations and where copies of the ER are available for public examination, and invites members of the public to participate in the scoping process.

- Conduct scoping (see 10 CFR 51.28, "Scoping—Participants," 10 CFR 51.29, "Scoping—Environmental Impact Statement and Supplement to Environmental Impact Statement"; 10 CFR 51.71, "Draft Environmental Impact Statement—Contents"; 10 CFR 51.95(c)(1); and 40 CFR 1506.6(b)(3), "Public Involvement"). The scoping process includes identifying environmental issues and inviting State and local agency officials, Indian Tribes, representatives of environmental justice communities, environmental interest groups, and other members of the public to participate in the scoping process. Scoping provides an opportunity for any member of the public to identify environmental issues and concerns they believe are significant that may not have been adequately addressed in the ER. Environmental issues may be introduced in oral statements made at the scoping meeting or in written comments sent directly to the NRC or submitted via https://www.regulations.gov/. During scoping, staff can visit the nuclear power plant and, if requested, meet with officials from local, regional, and State agencies and Indian Tribes and representatives of environmental justice communities and environmental interest groups. Depending on the issues and concerns raised during scoping, the staff may request additional information from the applicant.

- Prepare a plant-specific draft SEIS to the LR GEIS (see 10 CFR 51.70, "Draft Environmental Impact Statement—General"; 10 CFR 51.71, "Draft Environmental Impact Statement—Contents"; and 10 CFR 51.95[c]), "Operating license renewal stage." In developing the draft SEIS, the NRC staff will evaluate (verify and validate) information provided by the applicant and will seek and collect information from independent sources.

- Distribute the draft SEIS for comment (see 10 CFR 51.73, "Request for Comments on Draft Environmental Impact Statement," and 10 CFR 51.74, "Distribution of Draft Environmental Impact Statement and Supplement to Draft Environmental Impact Statement; News Releases"). The U.S. Environmental Protection Agency (EPA) and the NRC will publish separate notices of the availability in the *Federal Register*. Copies of the draft SEIS will be distributed to appropriate Federal, State, and local agencies and Indian Tribes; environmental justice communities; environmental interest groups, organizations, and individuals who expressed interest and participated in the environmental review; and any other individuals who request a copy (see 10 CFR 51.74, "Distribution of Draft

[1] The term "Indian Tribes" refers to Federally recognized Tribes as acknowledged by the Secretary of the Interior pursuant to the Federally Recognized Indian Tribe List Act of 1994 (25 U.S.C. § 479a).

[2] Environmental justice communities can also include State-recognized Tribes, those that self-identify as Indian Tribes, and tribal members. Tribal members can be part of an environmental justice community that has different interests and concerns than a Tribal government.

Environmental Impact Statement and Supplement to Draft Environmental Impact Statement; News Releases"). As described for scoping above, any member of the public may provide comments on the draft SEIS in oral statements made at a public meeting or in written comments sent directly to the NRC or submitted via https://www.regulations.gov/.

- Prepare a final SEIS to the LR GEIS (see 10 CFR 51.90, "Final Environmental Impact Statement— General"; 10 CFR 51.91, "Final Environmental Impact Statement—Contents"; and 10 CFR 51.95[c]), "Operating license renewal stage." In developing the final SEIS, the NRC staff will respond to all comments, prepare responses and revise the SEIS, if necessary. This includes determining whether comments identify new and significant information that was not considered in the LR GEIS. After addressing public comments, the staff will determine whether the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable. The NRC then will submit the final SEIS to EPA, and both agencies will publish notices of availability in the *Federal Register* (see 10 CFR 51.93, "Distribution of Final Environmental Impact Statement and Supplement to Final Environmental Impact Statement; News Releases," and 10 CFR 51.118, "Final Environmental Impact Statement—Notice of Availability"). Copies of the final SEIS will be distributed to Federal, State, and local agencies and Indian Tribes; environmental justice communities; environmental interest groups, organizations, and individuals who expressed interest and participated in the environmental review; and any other organizations or individuals who request a copy.
- The Commission may hold a hearing if it determines that it is in the public interest or if a request for hearing and petition to intervene are granted. In accordance with 10 CFR 2.105(a)(10), "Notice of Proposed Action," the NRC will issue a notice of opportunity for hearing as soon as practicable. Any person whose interest may be affected by the initial LR or SLR action may request a hearing. (See also 10 CFR 51.104, "NRC Proceeding Using Public Hearings; Consideration of Environmental Impact Statement.")
- Prepare a record of decision (see 10 CFR 51.103, "Record of Decision—General"). Among other things, the record of decision will summarize the impacts of initial LR or SLR and the energy replacement alternatives considered in the SEIS, the measures taken to minimize and/or reduce any adverse environmental effects, and any license conditions adopted in connection with mitigation measures. In making a final decision on initial or subsequent license renewal, the NRC will determine whether the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable. The NRC publishes the Commission's final decision on whether to renew the nuclear plant operating license in the *Federal Register*.

The environmental project manager (EPM) is responsible for the NRC's environmental review and the preparation of the plant-specific SEIS for initial LRs or SLRs. The EPM coordinates the work of the technical staff during the ER acceptance review and the SEIS environmental review. As previously noted, the purpose for the acceptance review is to determine whether the applicant's ER contains sufficient information for the staff to undertake the environmental review. If acceptable, the ER is docketed, and the environmental review begins.

The EPM also coordinates the environmental review with the applicant and NRC management. In addition, the EPM coordinates the efforts of technical staff and contractor personnel to develop a SEIS for each nuclear power plant-specific (hereafter called plant-specific) environmental review. With assistance from the technical staff, the EPM prepares the

recommendation for the licensing action to be taken by the Director of NRC's Office of Nuclear Reactor Regulation.

The environmental review is currently conducted by technical staff in the Office of Nuclear Material Safety and Safeguards' Division of Rulemaking, Environmental, and Financial Support, the Office of Nuclear Reactor Regulation's Division of Risk Assessment, and by the EPM. The responsibilities of the EPM and technical staff in carrying out the environmental review, including ER acceptability criteria, are outlined in this ESRP.

During initial LR or SLR environmental reviews, it may be necessary for the NRC staff to request additional information from the applicant. Transmitted by the EPM, these requests may include requests for confirmation of information (i.e., RCIs) or requests for additional information (i.e., RAIs). Requests for confirmation of information and requests for additional information record the staff's information needs to support the environmental reviews.

Standard review plans in this ESRP provide procedures for conducting the environmental review and preparing the plant-specific SEIS. The EPM is responsible for ensuring that the staff's conclusions meet NRC regulatory and policy requirements. It is expected that each SEIS prepared by the NRC staff will:

- stand on its own as an analytical document that fully informs decisionmakers and the public of the environmental effects of the proposed action and those of reasonable alternatives
- emphasize the issues that are significant and reduce emphasis on other issues and background material
- be written in plain language

The SEIS is submitted for review and comment to the NRC division director, the Office of the General Counsel, and branch chiefs. Approval is obtained from the EPM's division director before publication of the SEIS.

***The Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (LR GEIS; NUREG-1437)**

The LR GEIS addresses the environmental impacts of license renewal (initial license renewal [LR] or subsequent license renewal [SLR][3]) by identifying environmental issues common to all nuclear power plants (or a subset of plants) and environmental issues requiring plant-specific analyses. The NRC staff conducts environmental reviews and prepares SEISs to address issues that could not be generically dispositioned in the LR GEIS.

The LR GEIS improves the efficiency of the NRC license renewal environmental review process by (1) providing an evaluation of the types of environmental impacts that may occur by an initial LR of commercial nuclear power plant operating licenses or SLR, (2) identifying and assessing impacts that are expected to be generic (the same or similar) at all nuclear plants (or plants with specified plant or site characteristics), and (3) defining the number and scope of environmental issues that need to be addressed in plant-specific SEISs. The LR GEIS also provides information that aids in the preparation of plant-specific EISs.

[3] The technical bases for the environmental issues and findings in the LR GEIS fully account for the impacts of initial LR and one term of SLR (see Section 1.6 of the LR GEIS).

The NRC committed to review and update the findings in Table B-1, "Summary of Findings on Environmental Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants," located in Appendix B to Subpart A of 10 CFR Part 51. The Commission stated that it intends to review the assessment of impacts in Table B-1 and the LR GEIS and update it on a 10-year cycle, if necessary.

The NRC staff reviewed and evaluated the environmental issues and impact findings in the 2013 LR GEIS to determine if the findings presented in the 2013 LR GEIS support the scope of license renewal, including initial LR and SLR terms and to update or revise those findings as appropriate. The NRC considered changes in applicable laws and regulations, new data in its possession, collective experience, and lessons learned and knowledge gained from conducting environmental reviews for initial LR and SLR since development of the 2013 LR GEIS. In doing so, the NRC considered the need to modify, add, group, subdivide, or delete any of the 78 issues in the 2013 LR GEIS.

The revised LR GEIS (NUREG-1437, Revision 2; NRC 2023a) evaluates 80 environmental issues, 59 of which have been evaluated in the LR GEIS and their impacts determined to be applicable to license renewal for all nuclear power plants or a subset of plants. These issues are Category 1 issues, and do not require additional analysis in a plant-specific environmental review unless new and significant information is found. Of the remaining 21 environmental impact issues, 20 are Category 2 issues that require plant-specific analyses. One issue (Electromagnetic fields (EMFs)) is not categorized because scientific consensus on their effects on human health is lacking, and the NRC staff does not perform a plant-specific analysis of this issue in SEISs. Once a consensus has been reached by appropriate Federal health agencies on the potential health effects, the NRC will revise its guidance and evaluation of this issue.

The NRC's standard of significance for impacts as established in the LR GEIS for license renewal environmental issues considered Council on Environmental Quality (CEQ) terminology including revisions in Part 1501—NEPA and Agency Planning (40 CFR 1501). In considering whether the effects of the proposed action are significant, the NRC analyzes the potentially affected environment and degree of the effects or impacts of the proposed action (license renewal—either initial LR or SLR). The NRC established three levels of significance for potential impacts: SMALL, MODERATE, and LARGE. The definitions of the three significance levels, presented in the footnotes to Table B–1 in Appendix B to Subpart A of 10 CFR Part 51, are as follows:

- SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small.
- MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

In addition to determining the impacts for each environmental issue, a determination was made about whether the analysis in the LR GEIS could be applied to all nuclear power plants (or plants with specified design or site characteristics). Issues were assigned a Category 1 or Category 2 designation as follows:

Category 1 issues are those that meet all the following criteria:

- Environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.
- A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for offsite radiological impacts of spent nuclear fuel and high-level waste disposal and offsite radiological impacts—collective impacts from other than the disposal of spent fuel and high-level waste).
- Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required in future SEISs unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria of Category 1 and, therefore, require additional plant-specific review.

Scope of the Environmental Standard Review Plans

The individual ESRPs in Supplement 1, Revision 2, guide the review of environmental impact issues associated with license renewal. The ESRPs address all of the environmental impact issues discussed in the revised LR GEIS as well as any new environmental impact issues identified through the public scoping process. They also provide the framework for conducting impact analyses and preparing sections for the plant-specific SEIS. A review procedure is provided for each Category 2 issue. The ESRPs also provide for systematic integration of new and significant information on Category 1 issues.

Use of the ESRPs in the environmental review process for license renewal would ensure:

- identification of environmental impact issues, data and other information, and analysis
- consideration of specific environmental issues of concern to Federal, State, regional, and local agencies and Indian Tribes, as appropriate
- standardization of review procedures for the analysis of environmental impact issues
- focused environmental review of potentially significant environmental impacts

Organization of the Environmental Standard Review Plans

The ESRPs are grouped into the following six chapters.

1. Purpose and Need for the Proposed Action
2. Alternatives Including the Proposed Action
3. Affected Environment
4. Environmental Consequences and Mitigating Actions
5. Environmental Impacts of Postulated Accidents
6. Summary and Conclusions

Chapters 1 through 3 are descriptive in nature. They guide the review of the purpose and need for the proposed action, the identification of reasonable alternatives to the proposed action, and the description of the nuclear power plant site and the affected environment. Chapters 4 and 5 address the analysis of environmental impacts. They guide the review of the potential environmental impacts associated with continued plant operations and refurbishment associated with license renewal. Chapter 6 addresses comparison of the proposed action with reasonable alternatives and the summarization of the conclusions regarding the environmental impacts of license renewal. Note: The organization of chapters, supporting appendices, and the order of subject matter areas presented in individual SEISs prepared pursuant to the LR GEIS, NUREG-1437, Revision 2, may differ from the organization of the sections of this ESRP document.

Chapters 4 and 5 identify Category 1 and 2 issues and new and significant information. Review plans serve to guide in the:

- evaluation of the applicant's process for identifying and evaluating new information
- evaluation of information submitted by members of the public during the scoping process, and information identified during the environmental review to determine whether new information is significant
- identification of the information required to complete a plant-specific review of the issue
- preparation of statements for the SEIS that describe the issue and present the conclusion

Content in the chapters of this ESRP document are presented in four sections:

1. **Areas of Review**. Describes the purpose and scope of the environmental review.
2. **Acceptance Criteria**. Provides guidance on determining the acceptability of the environmental impact analysis in the SEIS.
3. **Review Procedures**. Describes the methods the staff uses in conducting the environmental review. The level of detail in the methods of environmental review varies from review plan to review plan.
4. **Evaluation Findings**. Provides guidance on how to summarize the conclusions of the environmental review.

Chapter 7 contains the bibliographic reference information supporting the material cited in all review plans, and Appendices A and B provide supplemental information.

Each ESRP provides a list of data and information needs under section "Areas of Review". The following sources of information should be considered, as applicable:

- applicant's ER
- previous NRC environmental analyses (e.g., final environmental statements, SEISs and other EISs, and environmental assessments)
- applicant's Safety Analysis Report or Updated Final Safety Analysis Reports
- NRC Safety Evaluation Reports
- *Generic Environmental Impact Statement for License Renewal of Nuclear Plants,* NUREG-1437, Revision 2 (NRC 2023a)
- other Federal, State, and local agencies and Indian Tribes

- other publicly available information.

New and Significant Information

The NRC staff is required to address any new and significant information on the environmental impacts of initial LR or SLR involving Category 1 issues in the plant-specific SEIS. For Category 2 issues, the staff must consider any new information with respect to the applicable discussion in the LR GEIS or related Category 1 issues. This section describes the identification of new information, evaluation of the significance of new information, and the treatment of new and significant information. When no new and significant information is found regarding Category 1 issues, a statement should be included in the SEIS that briefly describes the search and evaluation of new information and states that no new information was identified or the new information was determined to be not significant.

The process for identifying new and significant information should consider:

- **The applicant's ER**. Applicants for an initial LR or SLR are required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information regarding the environmental impacts of license renewal of which they are aware. In reviewing the applicant's ER, the NRC staff must consider the applicant's process for discovering and evaluating the significance of any new information. Is the process adequate to ensure a reasonable likelihood that the applicant would be aware of new information, if it existed?
- **Records of public meetings and correspondence related to the application**. Compare information presented by the public with information considered in the LR GEIS. Is the information new in the sense that it postdates the analysis conducted for the LR GEIS?
- **Environmental quality standards and regulations**. Have the applicable environmental quality standards and regulations changed since the analysis conducted for the LR GEIS? If so, do the changes affect the NRC evaluation of applications for license renewal?
- **Technical and scientific literature**. Does recent technical and scientific literature contain information that would alter conclusions in the LR GEIS for Category 1 issues? Does the information indicate that there may be environmental impacts that were not considered in the LR GEIS?

Any new information should be considered in relation to existing Category 1 issues or, in rare circumstances, may reveal the need to consider a new environmental issue. After the impacts have been defined, the significance level of each issue should be determined using the significance level definitions in the LR GEIS. Appropriate mitigation measures should be identified and considered for each issue for which there is an adverse environmental impact. The consideration of mitigation measures should be in proportion to the potential adverse impact.

If the new information provides a seriously different picture of the environmental consequences or the new information shows that an issue previously considered SMALL would have a significance level of MODERATE or LARGE, the reviewer should prepare a plant-specific assessment in the SEIS to the LR GEIS and seek Commission approval to waive the Category 1 finding. If plant-specific information is identified and determined to be relevant to the power plant and is also relevant to other power plants (i.e., generic information), then NRC staff would seek Commission approval to either suspend the application of the rule on a generic basis with respect to the analysis or delay granting the renewal application (and possibly other renewal applications) until the analysis in the LR GEIS is updated and the rule amended. If the

rule is suspended for the analysis, each plant-specific SEIS would reflect the corrected analysis until such time as the rule is amended. The assessment should include a concise description of the new environmental impact information (including source) and how this information applies to the nuclear power plant. The statement also should identify the significance level of the potential adverse impacts and list any mitigation measures that would be considered appropriate. A summary statement and a list of references cited in the impact assessment also should be provided.

Following issuance of the plant-specific final SEIS, and prior to the license renewal action being taken, the staff may need to conduct a similar assessment for Category 1 and Category 2 issues, if it discovers potentially new information.

General Instructions

The following instructions are provided here to avoid repetition in each review plan:

- **Project Overview**. The reviewer is expected to develop an understanding of the proposed action (i.e., the initial LR or SLR). The purpose of this instruction is to ensure that reviewers concentrate their efforts on significant environmental issues and associated impacts. This project overview is to be conducted during the acceptance review and is to be completed before developing potential requests for confirmation of information (i.e., RCIs) or requests for additional information (i.e., RAIs).
- **Internal Review Coordination**. The EPM is the central point of contact for all reviewers. Although each ESRP represents a discrete segment of NRC's environmental review, no review can be completed without coordination with related reviews. For example, the technical analyses presented in Chapters 4 and 5 of the ESRP rely on information from the descriptive chapters (Chapters 1 through 3) for background information. All reviewers are instructed to maintain close communication with other reviewers throughout the review. With few exceptions, the reviews are conducted in parallel; thus, other environmental reviews may not be available to reviewers before their own environmental review is completed.
- **External Review Coordination**. The EPM initiates contact with outside agencies and must be informed of all concurrent or subsequent contacts made by reviewers. Each reviewer is expected to be aware of any related technical analyses and environmental assessments. Particular attention should be given to analyses and environmental assessments prepared under provisions of memoranda of understanding between the NRC and other Federal, State, regional, and local agencies and Indian Tribes. Working through the EPM, the reviewer is responsible for resolving any differences of opinion between analyses conducted by the NRC staff and analyses conducted by other agencies. The reviewer must ensure that all viewpoints are presented or that the specific provisions of the memoranda of understanding are followed.
- **Consultation with Other Agencies**. Environmental reviews may require consultation with other Federal, State, regional, and local agencies and Indian Tribes. Agencies include, but are not limited to, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service concerning federally endangered and threatened species and critical habitats; the National Marine Fisheries Service concerning essential fish habitat; the National Oceanic and Atmospheric Administration's Office of National Marine Sanctuaries concerning national marine sanctuaries; the State Historic Preservation Officer, Tribal Historic Preservation Officer, and Indian Tribes concerning historic and cultural resources listed or eligible for listing on the National Register of Historic Places; the Environmental Protection Agency (or

authorized States or Indian Tribes) responsible for implementation of the Clean Water Act; and State agencies responsible for Coastal Zone Management Act consistency determinations and Clean Air Act State Implementation Plans. The reviewer should initiate these consultations early in the environmental review process and should coordinate these with the EPM.

- **Consultation with the Applicant**. All consultations or discussions with the applicant are made through the EPM.
- **Site Visit**. Most reviewers benefit from an in-person visit to the nuclear plant site. This visit provides the reviewer with firsthand knowledge of the site and the location and position of facilities. It also allows the reviewer an opportunity to study the environment around the nuclear plant site and meet with knowledgeable licensee staff with responsibility for environmental management and compliance at the plant site. The site visit and associated meetings can be supplemented with virtual site tours and meetings.
- **Depth of Review**. The reviewer must conduct an environmental impact analysis in sufficient depth to permit verification and validation of the analysis and conclusions.
- **Data Age**. If data are more than five years old, consider and explain, as appropriate, whether the data, studies, operation experience, etc. are relevant in describing the affected environmental and assessing the impacts of license renewal. For example, show that both the potentially affected resources and the effects of nuclear power plant continued operations and refurbishment on those resources have remained, and can be expected to remain, unchanged or similar over the license renewal term (initial or SLR).
- **Consideration of Mitigation**. Mitigation measures should be considered in proportion to the level of impact when adverse impacts are identified. Statements also should describe the potential effectiveness of mitigation measures.
- **Best Management Practices**. The reviewer must evaluate the applicant's commitments to use practices that minimize, reduce, or avoid adverse impacts. These practices, often referred to as best management practices, are activities that can mitigate potential adverse environmental impacts.
- **Quality Assurance**. Reviewers should identify and evaluate the quality assurance measures taken by the applicant in the collection and analysis of data. Quality assurance measures are also evaluated when computer models have been used to predict environmental impacts.
- **Findings**. Findings should reflect "consensus" agreement among reviewers. This requires input from the reviewer, the EPM, and any other NRC reviewers affected by the findings.
- **Documentation**. Each reviewer should maintain documentation, logs, and other records of communication and consultation with outside agencies and organizations.
- **Definitions**. Use of the following terminology applies only to the environmental review process. Terms such as plant and station, used in a SEIS, continue to reflect the choice of terms used to identify the nuclear plant (e.g., Calvert Cliffs Nuclear Power Plant, Oconee Nuclear Station).
  - station: Consists of all facilities (reactor containment, turbine, and control buildings, intakes, discharges, etc.) located on the nuclear power plant site. Generally, the station includes everything located on the applicant's property that supports the existing reactor(s). In some cases, intake and discharge structures may be located offsite, but are considered part of the station. Transmission lines and their associated facilities are

generally not considered part of the station. Other facilities not associated with the production of electricity (e.g., a visitor center or a fish hatchery), however, are considered part of the station.

- nuclear power plant (plant): The nuclear reactor, reactor power conversion systems, intake and discharge structures, and all other facilities involved with the production of electricity. A plant can be more than one reactor and power conversion system. Transmission lines and other off-station facilities are not part of the plant.
- main plant area: This term is used to describe the area that is occupied by the power block (i.e., nuclear island), including the reactor units, turbine building(s), but also the switchyard(s), and other buildings associated with nuclear power generation such as radioactive waste management and diesel generator buildings.
- unit: One reactor power conversion system. Generally, the term “unit” is used only when the applicant is proposing to relicense more than one unit.
- facility: Any individual identifiable part of the station or plant. Examples: The visitor center is a facility. A substation is a facility. An intake system could be a facility (if discussed separately from the remainder of the plant).
- mitigation: Impact mitigation is the process of modifying an activity to prevent, eliminate, and/or reduce the adverse environmental impact.

ABBREVIATIONS AND ACRONYMS

APE	area of potential effects
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CWA	Clean Water Act
EA	environmental assessment
EFH	essential fish habitat
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
EPM	environmental project manager
ER	environmental report
ESA	Endangered Species Act
ESRP	environmental standard review plan (NUREG-1555)
FWS	U.S. Fish and Wildlife Service
GEIS	*Generic Environmental Impact Statement for License Renewal of Nuclear Power Plant* (NUREG-1437)
GHG	greenhouse gas
HAPC	habitat area of particular concern
ITS	incidental take statement
LR	license renewal
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act of 1969
NESC	National Electrical Safety Code
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMSA	National Marine Sanctuaries Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	*National Register of Historic Places*
ONMS	Office of National Marine Sanctuaries (of the National Oceanic and Atmospheric Administration)

ROW(s)	right(s)-of-way
SAMA	severe accident mitigation alternatives
SAMDA	severe accident mitigation design alternatives
SEIS	supplemental environmental impact statement
SHPO	State Historic Preservation Officer
SLR	subsequent license renewal
SME	subject matter expert
THPO	Tribal Historic Preservation Officer

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Areas of Review

This environmental standard review plan (ESRP) provides guidance for the preparation of the purpose and need for the proposed action. The discussion of purpose and need is found in Section 1.3 of the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (LR GEIS; NUREG-1437, Revision 2; NRC 2023a).

1.2 Acceptance Criteria

The reviewer should ensure that the introduction is consistent with the following regulations:

- Title 10 of the *Code of Federal Regulations* Section 51.70(b) (10 CFR 51.70(b)). "The draft environmental impact statement will be concise, clear, and analytic, and written in plain language with appropriate graphics. The format provided in Section 1(a) of Appendix A of this subpart should be used. The U.S. Nuclear Regulatory Commission (NRC) staff will independently evaluate and be responsible for the reliability of all information used in the draft environmental impact statement."
- 10 CFR 51.95(c), concerning the renewal of an operating license or combined license for a nuclear power plant. Under Parts 52 or 54 of this chapter, the Commission shall prepare an environmental impact statement, which is a supplement to the Commission's NUREG-1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*.
- 10 CFR 51.103(a)(5). In making a final decision on a license renewal action pursuant to Part 54 of this chapter, the Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.
- 10 CFR Part 51, Appendix A to Subpart A of Part 51, concerning format for presentation of material in environmental impact statements
- 10 CFR Part 51, Appendix A(4), concerning purpose of and need for action.

Technical Rationale

Renewal of an operating license by the NRC is just one of the conditions required for continued safe operation of a nuclear power plant. Renewing the operating license would provide the licensee, State regulators, and utility officials with the option of extending plant operations beyond the term of the original license(s) should circumstances warrant it, whereas not renewing the operating license eliminates this option. Therefore, the Commission has defined the purpose and need for license renewal (renewal of an operating license including initial license renewal [LR] or subsequent license renewal [SLR]) in terms of providing the licensee, State regulators, and utility officials with the option of extending the operating period of the nuclear plant. The introduction should present the Commission's stated definition of purpose and need.

1.3 Review Procedures

The material to be prepared is informational in nature; no specific analysis of the data is required.

1.4 Evaluation Findings

The reviewer should prepare one or more introductory paragraphs for the supplemental environmental impact statement (SEIS) and should include the purpose and need for license renewal as it appears in Section 1.3 of the LR GEIS.

> The purpose and need for the proposed action (i.e., initial license renewal or subsequent license renewal) of a commercial nuclear power plant operating license is to provide an option that allows for baseload power generation capability beyond the current nuclear power plant operating license to meet future system generating needs. Such needs may be determined by other energy-planning decisionmakers, such as State, utility, system, and, where authorized, Federal (other than NRC). Unless there are findings in the safety review required by the Atomic Energy Act (42 U.S.C. § 2011 et seq.) or National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. § 4321 et seq.) environmental review that would lead the NRC to reject a license renewal application, the NRC does not have a role in the energy-planning decisions about whether a particular nuclear power plant should continue to operate.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Overview

This environmental standard review plan (ESRP) section provides general guidance for the preparation of the discussion of alternatives and the U.S. Nuclear Regulatory Commission's (NRC) proposed action. The proposed action for license renewal and alternatives to license renewal are described in Chapter 2 of the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (LR GEIS; NUREG-1437, Revision 2; NRC 2023a).

2.1.1 Areas of Review

The purpose of this ESRP is to (1) provide a statement of the proposed action (initial license renewal [LR] or subsequent license renewal [SLR]) for the supplemental environmental impact statement (SEIS), (2) provide background information related to the regulatory basis for license renewal, and (3) provide a brief description of the alternatives.

2.1.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 1.2, the reviewer should ensure that the introduction prepared under this ESRP is consistent with the following regulation:

- Title 10 of the *Code of Federal Regulations* (CFR) Part 51 (10 CFR Part 51), Appendix A(5), concerning alternatives including the proposed action.

Technical Rationale

Renewal of a plant operating license is defined in 10 CFR Part 51 as requiring the preparation of an environmental impact statement (EIS). The introductory paragraphs prepared under this ESRP should clearly define the action and provide the readers of the SEIS with background information related to license renewal. This information is summarized in the LR GEIS.

2.1.3 Review Procedures

The material to be prepared is informational in nature; no specific analysis of the data is required. Much of the required material may be taken directly from the LR GEIS. However, the reviewer should reflect the applicant's schedule for activities in preparation for license renewal, including refurbishment.

2.1.4 Evaluation Findings

The reviewer for this ESRP should prepare several introductory paragraphs for the SEIS. The first paragraph should clearly state the nature of the proposed action (license renewal) and alternatives to license renewal. The remaining paragraphs should describe the regulatory bases for license renewal and alternatives, outline the process of license renewal, and outline the applicant's process.

2.2 General Plant Information

2.2.1 Areas of Review

This ESRP provides guidance for the description of the plant and plant operations during the license renewal term. This section includes a description of the layout and appearance of the nuclear plant facility and existing structures (onsite and offsite). It also includes descriptions of the reactor and electric generating equipment, as well as the plant's cooling system and auxiliary water systems.

The scope includes (1) description of principal structures, site boundaries, exclusion areas, restricted areas, and transportation routes to the site; (2) the type(s) and size(s) of reactors and electrical generating equipment and their major performance parameters; (3) a general description of the cooling system and modes of operation; (4) the intake and discharge locations and structures; (5) the auxiliary system; and (6) performance characteristics for these systems.

Data and Information Needs

The types of data and information needed are specific for the nuclear power plant site and the plant. The following data or information may be needed, as appropriate:

- A map and description of the plant site location including State, local, and Indian Tribe political jurisdictions (e.g., county, town, township, service districts, parish)
- Maps with the following information:
  - the site showing site boundaries and properties; plant exclusion area; site structures and facilities; major land uses (with land use classifications consistent with the U.S. Geological Survey categories given in "USGS NLCD Land Cover Class Legend and Description," update issued in 2019; USGS 2019) and land cover; the construction zone for refurbishment, if any; sites for any other planned buildings, facilities, and structures (both temporary and permanent); areas under lease and public access; and transportation routes entering and adjacent to the site
  - the site vicinity within a 6-mile (10-kilometer) radius of the site showing boundaries of political jurisdictions, place names, topographic and physiographic features, residential areas, airports, industrial and commercial facilities, roads and highways, railroads, Indian reservation and trust lands, and military reservations
  - the region within a 50-mile (80-kilometer) radius of the site showing political jurisdictions, place names, topographic and physiographic features, and transportation networks and facilities.
- Identification and description of known and reasonably foreseeable Federal and non-Federal projects and other actions that may contribute to the cumulative environmental impacts of license renewal and extended plant operation. Identify and map all Federal facilities, including national parks, national forests, national wildlife areas, and military facilities; Indian reservation and trust lands; and State parks, recreational areas, and conservation lands. Include distances, as well as nonattainment and maintenance areas defined under the Clean Air Act (42 U.S.C. § 7401 et seq.), as amended within 50 miles (80 kilometers) of the plant site.

- Number of units and description of each reactor, including type (e.g., boiling water reactor, pressurized water reactor), power conversion system manufacturer, fuel assembly description, and total quantities of uranium
- Summary of engineered safety features of the nuclear power plant
- Historic average irradiation level of spent fuel, in megawatt days per ton
- Rated and design core thermal power, the rated and design gross electrical output, and the rated and design net electrical output in megawatts electric. (The rated power is defined as the power level at which each reactor is operated, and the design power is defined as the highest power level that would be permitted by plant design. The gross electrical output is the power level measured at the output terminals of the generator and expressed in megawatts electric. The net unit electrical output is equal to the gross electrical output minus the nominal service and auxiliary loads.)
- Simplified flow diagram for the reactor-power conversion system
- Description of the plant's heat dissipation system, including the water supply source; intake and discharge locations; intake velocity; flow path of water from the intake point to the discharge point; any installed equipment or mitigation measures that reduce aquatic organism entrainment or impingement; and average temperatures of water at the discharge point. The description should include each operational mode and indicate the periods of time that the system has historically operated in each mode.
- For each operational mode, provide information about the following:
  - quantities of heat generated, dissipated to the atmosphere, and released in liquid discharges
  - water sources and quantities of water withdrawn, consumed, and discharged
  - monthly variation and stratification for the body of water used for cooling intake and discharge
  - any changes to the cooling system in preparation for license renewal or changes made during the current license term.

2.2.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 1.2, the reviewer should ensure that the introductory and descriptive paragraphs prepared under this ESRP are consistent with the following regulations:

- 10 CFR 51.52, concerning criteria related to nuclear power plant-specific (hereafter called plant-specific) analysis of the effects of transportation of fuel and waste to and from the facility. Note: Generic determinations have been made that the impacts in Table S-4 are bounding for fuel with uranium enrichment of up to 5 percent by weight irradiated to 62,000 megawatt days per ton, provided that fuel is shipped more than five years after discharge from the reactor.
- 10 CFR 51.53(c)(2). The report must contain a description of the proposed action, including the applicant's plans to modify the facility or its administrative control procedures as described in accordance with 10 CFR 54.21 of this chapter. This report must describe in detail the affected environment around the plant, the modifications directly affecting the environment or any plant effluents, and any planned refurbishment activities. In addition,

the applicant shall discuss in this report the environmental impacts of alternatives and any other matters discussed in 10 CFR 51.45.

- 10 CFR 51.53(c)(3)(ii)(A-D) describes analyses that must be performed with respect to the environmental impacts of and related interactions with the environment of a plant's cooling water and auxiliary systems and requiring the environmental report (ER) to provide a description of such systems, including their water requirements and intakes and discharges, to support the discussions of the affected environment.

Technical Rationale

The technical rationale for evaluating the applicant's external appearance and setting description is discussed in the following paragraph:

> A description of the overall appearance of the nuclear power plant and its setting is needed to clarify the physical parameters of the current power station and any significant modifications to the facility. The description of the external appearance of the plant and plant layout should be in sufficient detail to form an adequate basis for staff analysis of various land use and socioeconomic impacts of continued plant operations and refurbishment.

The technical rationale for evaluating the description of the applicant's reactor system is discussed in the following paragraph:

> A description of the overall nuclear energy generating system is useful background information for the evaluation of certain environmental impacts resulting from continued plant operations and refurbishment activities. This description should include information about reactor type, number of units, thermal power level, and other factors about the facility.

The technical rationale for evaluating the description of the applicant's cooling systems is discussed in the following paragraph:

> The cooling system has the greatest interface with and potential effect on the environment. This section is descriptive in nature and presents information necessary for the evaluation of environmental impacts associated with cooling system modification related to license renewal and continued plant operations during the license renewal term. The description of the external appearance of the cooling system and its operational modes should be in sufficient detail to form an adequate basis for staff analysis of the environmental impacts of continued plant operations and refurbishment activities during the license renewal term.

2.2.3 Review Procedures

The reviewer should ensure that the description of the layout and appearance of the nuclear plant facility and existing structures (onsite and offsite) provides adequate information for the reviews conducted under the ESRP sections in Chapters 3 and 4. The following review steps are suggested:

1. Review plant and station layout and external appearance data.

2. Determine the relationship of the plant design and layout to the surrounding environment, including any aesthetic features of the site and vicinity.

3. Identify maps and drawings that show relevant features of the plant, the site, and the region. The maps and drawings also should identify significant offsite features, if any, in the vicinity (i.e., Federal facilities, including national parks, forests, wildlife areas, Indian reservation and trust lands).

The material to be prepared on the reactor-power conversion system is informational in nature; no specific analysis of the data is required. Identify the reactor power conversion and engineered safety feature systems and the basic design performance data. As a rule, if the data listed under "Data and Information Needs" above are provided, that objective would be met.

The material to be prepared on the cooling systems is informational in nature. No specific analysis is required, but the use of tables such as Table 2-1 and Table 2-2 in this ESRP may assist data organization. For the general cooling system description, the reviewer should gather the following information largely from design and historical documentation for use in later sections:

- type and configuration
- water source and proximity to facility
- modes of operation and percentage of time, water source and quantities of water withdrawn, consumed, and discharged in each mode
- specific details depending on system type (see Table 2-1 and Table 2-2)
- monthly variation and stratification for the body of water used for cooling intake and discharge
- other major plant systems and flow rates.

Table 2-1 Design Details of Heat-Dissipation-System Components

Component	Design Details
Cooling towers (from the environmental report [ER])	• Type of configuration • Materials of construction • Number and arrangement • Rated heat-dissipation capacity
Cooling lakes and ponds (from the ER)	• Surface area • Volume • Bathymetry
Spray ponds or canals (from the ER)	• Arrangement and configuration of spray modules • Pond or canal geometry • Surface area and water volume
Condenser (from the ER)	• Heat transfer area and materials of construction • Antifouling treatment

Table 2-2 Performance Characteristics of the Heat-Dissipation System

Component	Design Details
Cooling towers (from the ER)	• Input and discharge flow rates and temperatures for monthly average meteorological conditions • Wet-bulb temperature, approach to wet-bulb, and range Performance curves • Air flow • Power consumption noise levels • Drift rate and drop size
Cooling lakes and ponds (from the ER)	• Flow rates (through condenser) • Flow-through times • Flow pattern • Monthly average water temperatures (mean for entire lake or pond, inlet [from condenser], outlet [to condenser]) • Surface elevation (mean, maximum, minimum)
Spray ponds or canals (from the ER)	• Flow rates (through condenser) • Flow-through times • Flow pattern • Monthly average water temperatures (inlet [from condenser], outlet [to condenser]) • Surface elevation (mean, maximum, minimum) • Spray system operating parameters (e.g., power consumption, drop size)
Condenser (from the ER)	• Condenser flow rate • Temperature differential across condenser • Time-of-passage through system (including intake and discharge system passage times)

- For intake systems, include:
  - drawing of the intake structure showing the relationship of the structure to the water surface, bottom geometry, and shoreline
  - location of the intake in relation to the outfall
  - description of the cooling-water pumping facility
  - description of the trash racks, traveling screens, trash baskets, and fish return devices
  - performance characteristics (e.g., flow rates, intake velocities) for the operational modes identified
  - performance characteristics for specific intake related functions, such as de-icing, trash rack clearing, screen washing, trash basket removal, or fish return system operation
  - location and description of components for the addition of chemicals (e.g., corrosion inhibitors, antifouling agents) to the intake system.

- For discharge systems, include:
  - drawings of the outfall structure, showing its location in the receiving water body, relationship to water surface, bottom geometry, and shoreline
  - a description of discharge canal or discharge lines
  - performance characteristics (e.g., discharge flow rates, discharge velocities, discharge temperatures, and temperature differentials) for the operational modes identified
  - descriptions of specific discharge related components (e.g., diffusers, fish barriers).
- For heat-dissipation systems, include:
  - location of heat-dissipation system components relative to other site features
  - design details of heat-dissipation system components affecting system performance
  - heat-dissipation system performance characteristics for the operational modes
  - nuclear power plant site-specific meteorological data
  - nuclear power plant site-specific water supply data.
- For cooling towers, determine the average discharge temperatures for each month of the year using cooling tower performance curves. The average discharge temperature would be calculated by using the average wet-bulb temperature for the month.
- For spray systems, analyze the applicant's estimates of average monthly discharge temperatures. The depth and extent of this analysis should depend on the seriousness of the predicted impacts of the heated effluent on the receiving body of water and the level of confidence in the applicant's model.
- In the cases where auxiliary systems are employed to further cool the blowdown discharged from the main cooling system, determine the final discharge temperature.

2.2.4 Evaluation Findings

The SEIS should include a summary description of the reactor-power conversion and engineered safety feature systems, a flow diagram, and a table of design and performance parameters.

The level of detail of information included in the SEIS should include the following information:

- narrative description of the cooling system and the intake and discharge structures and characteristics
- sketches of intake, discharge, and heat-dissipation components
- description of operational modes and their important characteristics (e.g., frequency and duration, discharge temperature, water consumption, and chemical concentration factor)
- drawings of important subsystems (e.g., perforated-pipe assemblies).

The reviewer should verify that cooling system component descriptions are consistent, accurate, and given in sufficient detail to serve the needs of the reviewers of intake, discharge, and heat-dissipation system impacts.

2.3 Refurbishment Activities

2.3.1 Areas of Review

This ESRP provides guidance for the description of any planned refurbishment activities performed in support of license renewal (initial LR or SLR), exclusive of routine plant operation and maintenance activities. This section includes a description of any major structures and components that would be replaced or modified.

The scope includes (1) identification and description of major structures and components to undergo refurbishment, (2) description of where construction materials would be stored, as well as removal and disposal, and (3) description of related activities that have the potential to affect the surrounding environment either directly or indirectly.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- description of the proposed refurbishment activity, including specific structures and components that would be replaced or modified
- description of the location used for material storage, removal, and disposal
- description of any transportation or delivery activities in support of the refurbishment activity, including the transport and delivery of equipment, structures, and components (e.g., steam generators, vessel heads), as well as any dredging and bridge and road modifications
- list of applicable Federal and State agency permits required for this activity
- description of specific refurbishment-related activities that have the potential to either directly or indirectly affect the environment
- discussion of the schedule for the refurbishment activity, including normal maintenance schedules and refueling outages.

2.3.2 Acceptance Criteria

The reviewer should ensure that the introductory and descriptive paragraphs prepared under this ESRP are consistent with the applicable acceptance criteria specified in Sections 1.2 and 2.2.2.

Technical Rationale

This section is descriptive in nature and presents information necessary for the evaluation of environmental impacts associated with refurbishment. The descriptions should be in sufficient detail to form an adequate basis for staff analysis of environmental impacts of refurbishment activities associated with license renewal.

2.3.3 Review Procedures

The material to be prepared on refurbishment activities is informational; no specific analysis is required. The reviewer should ensure that description of the plant refurbishment activities provides adequate information for the reviews conducted under the ESRPs in Chapters 3 and 4. The following review steps are suggested:

1. Review the discussion of plant refurbishment in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).
2. Obtain a description of the proposed refurbishment activity, including descriptions of the specific structures and components that would be replaced or modified.
3. Obtain descriptions of transport and storage of necessary equipment and materials, including any proposed transportation plans.
4. Obtain the proposed schedule for refurbishment work, including planned changes in staffing, if any.
5. Prepare a section describing the refurbishment activities for the SEIS.

2.3.4 Evaluation Findings

The reviewer of information covered by this ESRP should prepare introductory paragraphs for the SEIS. The paragraph(s) should introduce the nature of the material to be presented.

2.4 Employment

2.4.1 Areas of Review

The ER should include current information on the annual average number of operations workers at the nuclear power plant. The information should include both permanent full-time onsite and refueling outage workers (i.e., the total annual average number of full-time workers including contractors), as well as information on the average duration of refueling and maintenance outages (number of weeks) and their frequency (number of months).

Data and Information Needs

The following data or information may be needed:

- description of the nuclear power plant's current employment, including information on maintenance and refueling outages
- annual average number of workers supporting nuclear power plant operations, maintenance, and refueling outages
- number of workers onsite during refurbishment activities
- any changes in the number of workers onsite during and in support of license renewal.

2.4.2 Acceptance Criteria

The reviewer should ensure that the information considered under this ESRP is consistent with the applicable acceptance criteria specified in Sections 1.2 and 2.2.2.

Technical Rationale

The information is descriptive and is necessary for the evaluation of environmental impacts. Employment information should be of sufficient detail to determine if the impacts of continued reactor operations during the license renewal term and refurbishment at the nuclear power plant are different from the conclusions in the LR GEIS.

2.4.3 Review Procedures

No specific analysis is required. The following review steps are suggested:

1. Review the employment discussion in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).
2. Review the plant employment information in the applicant's ER, including the number of workers needed during maintenance and refueling outages and annual average employment.
3. Evaluate the number of workers required to support any refurbishment activity described in Section 2.3 and determine the residential distribution of the refurbishment workforce.
4. Determine if the applicant plans to change the annual average number of onsite workers during and in support of license renewal and refurbishment activities, if any.

2.4.4 Evaluation of Findings

The depth and extent of the input to the SEIS would depend on nuclear power plant site- and plant-specific factors. The reviewer should verify that the plant employment description is consistent, accurate, and given in sufficient detail to serve the needs of the reviewers for ESRP sections in Chapters 3 and 4.

2.5 Alternatives to the Proposed Action

2.5.1 Areas of Review

This ESRP provides guidance for describing alternatives to the proposed action (initial LR or SLR).

The scope includes (1) a brief description the process used to identify and select reasonable alternatives to the proposed action and (2) brief descriptions of all the alternatives considered for replacing or offsetting the nuclear power plant's existing electrical generating capacity, as well as for reducing or avoiding potential adverse effects, if applicable. It includes descriptions of the reasonable alternatives to the proposed action (license renewal) discussed in the LR GEIS (NRC 2023a) and identification of alternatives eliminated from detailed study.

Data and Information Needs

The reviewer for this ESRP requires the following information:

- the applicant's discussion of reasonable alternatives to the proposed action
- the applicant's discussion of alternatives eliminated from detailed study.

2.5.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Sections 1.2 and 2.2.2, the reviewer should ensure that the paragraphs prepared under this ESRP are consistent with the following regulations:

- 10 CFR 51.45(b)(3), concerning alternatives to the proposed action. The discussion of alternatives shall be sufficiently complete to aid the Commission in developing and exploring, pursuant to Section 102(2)(E) of National Environmental Policy Act of 1969 (NEPA), "appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." To the extent practicable, the environmental impacts of license renewal and the replacement power alternatives should be presented in comparative form.
- 10 CFR 51.53(c)(3)(iii). The report must contain a consideration of alternatives for reducing adverse impacts, as required by Section 51.45(c), for all Category 2 license renewal issues in Appendix B to Subpart A of this part. No such consideration is required for Category 1 issues in Appendix B to Subpart A of this part.
- 10 CFR 51, Appendix A(5), concerning alternatives including the proposed action
- 10 CFR 51.71(d), concerning the draft EIS will include a preliminary analysis that considers and weighs the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse environmental effects
- 10 CFR 51.95(c), concerning renewal of an operating license or combined license for a nuclear power plant. Under Parts 52 or 54 of this chapter, the Commission shall prepare an EIS, which is a supplement to the Commission's NUREG-1437, Revision 2, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants."
- 10 CFR 51.103(a)(2). Identify all alternatives considered by the Commission in reaching the decision, state that these alternatives were included in the range of alternatives discussed in the environmental impact statement and specify the alternative or alternatives which were considered to be environmentally preferable.
- 10 CFR 51, Appendix A(4), "Purpose of and Need for Action." The alternative of no-action will be discussed.
- 10 CFR 51, Appendix A(7), concerning the environmental consequences of alternatives, including the proposed actions and any mitigating actions which may be taken. Alternatives eliminated from detailed study will be identified and a discussion of those alternatives will be confined to a brief statement of the reasons why the alternatives were eliminated. The level of information for each alternative considered in detail will reflect the depth of analysis required for sound decisionmaking.

Technical Rationale

The LR GEIS does not contain any conclusions regarding the environmental impact or acceptability of alternatives to license renewal (initial LR or SLR). Accordingly, the NRC must conduct an analysis of reasonable alternatives to license renewal in plant-specific environmental reviews. A reasonable alternative must be commercially viable on a utility scale and operational prior to the expiration of the reactor's operating license or expected to become commercially viable on a utility scale and operational prior to the expiration of the reactor's operating license.

This discussion should provide the reader with a clear understanding of the alternatives considered and those alternatives considered for detailed analysis.

2.5.3 Review Procedures

Examine the applicant's ER and consider the process used by the applicant to determine a range of reasonable alternatives to the proposed action.

Alternatives considered are (1) the no-action alternative; (2) alternative energy sources for replacing existing nuclear generating capacity using other energy sources (including fossil fuel, new nuclear, and renewable energy); (3) alternative energy sources for offsetting existing nuclear generation capacity using conservation and energy efficiency (demand-side management), delayed retirement, or purchased power; and (4) alternatives for reducing adverse impacts. The reviewer should identify the criteria used in evaluating the reasonableness of the alternatives and explain which alternatives would not be considered for detailed analysis and why. A reasonable alternative must be commercially viable on a utility scale and operational prior to the expiration of the reactor's operating license or expected to become commercially viable on a utility scale and operational prior to the expiration of the reactor's operating license. Analysis of alternative energy sources does not involve the determination of whether any power is needed or should be generated. The decision to generate power and the determination of how much power is needed are at the discretion of State and utility officials.

The reviewer should identify the alternatives that would be carried forward for comparison with renewing the operating license of a nuclear power plant. The reviewer should discuss the extent to which these alternatives have been considered by State authorities (e.g., public service commissions and environmental, natural resource, or energy agencies). To the extent possible, each alternative should be analyzed on a nuclear power plant site- or region- specific basis.

The reviewer should identify and characterize key impact parameters associated with each alternative evaluated in detail based on Chapter 4 of the LR GEIS, the applicant's ER, and the integrated resource plans for the area(s) or region(s) currently or (if different) likely to be served by the plant and should assume the incorporation of appropriate mitigation measures (e.g., emission control technologies and best management practices) for each alternative.

2.5.4 Evaluation Findings

The reviewer of information covered by this ESRP should prepare discussions for the SEIS describing reasonable alternatives to the proposed action in sufficient detail and in similar format to the proposed action to support the environmental analysis and comparison of the effects of these alternatives with the effects of continued plant operations. The information presented in the SEIS would depend on nuclear power plant site- and plant-specific factors.

3.0 AFFECTED ENVIRONMENT

3.1 Overview

This environmental standard review plan (ESRP) provides general guidance for preparing the sections that describe the affected environment of a nuclear power plant site and vicinity based on the reviews conducted under ESRP Sections 3.2 through 3.12. In preparing a supplemental environmental impact statement (SEIS), it is permissible for the descriptions of the affected environment for each resource area to be included in the same SEIS chapter as the evaluation of the potential environmental consequences (impacts) of the proposed action and alternatives to the proposed action (see Chapter 4 of this ESRP).

3.1.1 Areas of Review

This ESRP provides guidance on the review and preparation of technical information used for describing the affected environment at a nuclear power plant in the SEIS.

3.1.2 Acceptance Criteria

The reviewer should ensure introductory paragraphs for the affected environment description prepared under this ESRP are consistent with the following requirements:

- Title 10 of the *Code of Federal Regulations* 51.45(d) (10 CFR 51.45(d)), concerning status of compliance. The environmental report (ER) shall list all Federal permits, licenses, approvals and other entitlements which must be obtained in connection with the proposed action and shall describe the status of compliance with these requirements. The environmental report shall also include a discussion of the status of compliance with applicable environmental quality standards and requirements including, but not limited to, applicable zoning and land use regulations, and thermal and other water pollution limitations or requirements which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection.
- 10 CFR 51.53(c)(2). The report must contain a description of the proposed action, including the applicant's plans to modify the facility or its administrative control procedures as described in accordance with 10 CFR 54.21 of this chapter. This report must describe in detail the affected environment around the plant, the modifications directly affecting the environment or any plant effluents, and any planned refurbishment activities. In addition, the applicant shall discuss in this report the environmental impacts of alternatives and any other matters discussed in 10 CFR 51.45.
- 10 CFR 51.70(b). The draft environmental impact statement (EIS) will be concise, clear, and analytic, and written in plain language with appropriate graphics. The format provided in Section 1(a) of Appendix A of this subpart should be used. The U.S. Nuclear Regulatory Commission (NRC) staff will independently evaluate and be responsible for the reliability of all information used in the draft EIS.
- 10 CFR 51.95(c), concerning renewal of an operating license or combined license for a nuclear power plant. Under Parts 52 or 54 of this chapter, the Commission shall prepare an EIS, which is a supplement to the Commission's NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (LR GEIS; NUREG-1437, Revision 2; NRC 2023a).

- 10 CFR Part 51, Appendix A to Subpart A, paragraph 6, concerning affected environment. The environmental impact statement will succinctly describe the environment to be affected by the proposed action. Data and analyses in the statement will be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced. Effort and attention will be concentrated on important issues; useless bulk will be eliminated.
- 10 CFR Part 51, Appendix B to Subpart A, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," Table B-1, "Summary of Findings on Environmental Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants."
- Additional regulatory positions and specific criteria in support of the regulations identified above are as follows:
  - LIC-203, Revision 4, Procedural Guidance for Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues (NRC 2020c).

Technical Rationale

The review conducted under this ESRP is used to prepare sections describing the affected environment at a nuclear power plant for the SEIS. The information in these sections provides background and baseline information for use in determining the environmental impacts of continued reactor operations and refurbishment activities associated with license renewal (initial license renewal [LR] or subsequent license renewal [SLR]).

3.1.3 Review Procedures

The information is descriptive; no analysis of data is required. The introduction should list the information being presented and describe its relationship to the environmental consequences presented in Chapter 4 of the SEIS. It should indicate that the objective of SEIS Sections 3.2 through 3.12 is to provide a general description of the affected environment as background and/or baseline information. Some detailed descriptions may be needed to support the analyses of environmental impacts in Chapter 4.

It is important to point out sections in this chapter that address environmental issues raised by the public during scoping.

3.1.4 Evaluation Findings

The reviewer should prepare a paragraph(s) introducing the information being presented covered by ESRPs 3.2 through 3.12. The extent of environmental information presented should be commensurate with the potential impacts of continued reactor operations during the license renewal term and refurbishment activities in support of license renewal.

3.2 Land Use and Visual Resources

3.2.1 Areas of Review

This ESRP provides guidance for the land use and visual resource review. The scope should include the land use and visual resources that might be affected by continued reactor operations during the license renewal term and refurbishment activities in support of license renewal (initial LR or SLR).

For nuclear power plants located in a coastal zone or coastal watershed, as defined by each State participating in the National Coastal Zone Management Program, applicants must submit to the affected State certification that the proposed license renewal action is consistent with the State Coastal Zone Management Program. Applicants must receive a determination from the State agency that manages the State Coastal Zone Management Program that the proposed license renewal action would be consistent with the State program. A Federal agency cannot issue a license or permit until the State concurs.

Data and Information Needs

The following data or information may be needed:

- land use data (onsite and offsite) and descriptions from prior environmental review documents, including the applicant's ER and final environmental statements prepared for nuclear power plant construction and operation
- map showing the nuclear power plant location in relationship to State and local political jurisdictions (e.g., county, town, township, service districts, parish)
- map of the site boundaries and properties showing plant exclusion area; site structures and facilities; major land uses and land cover; the areas affected by refurbishment, if any; sites for any planned new buildings, facilities, and structures (both temporary and permanent); areas under lease or with public access; and transportation routes
- map of the area within a 6-mile (10-kilometer) radius showing political jurisdictions, major land uses and land cover, topographic and physiographic features, transportation networks and facilities, place names, and Indian reservation and trust lands
- map of the area within a 50-mile (80-kilometer) radius of the nuclear power plant showing political jurisdictions, place names, topographic and physiographic features, and transportation networks and facilities, all Federal facilities, including national parks, national forests, national wildlife areas, and military facilities; Indian reservation and trust lands; and State parks, recreational areas, and conservation lands
- description of land uses and land cover within in-scope transmission line rights-of-ways (ROWs) and any recent changes to current and planned land use restrictions or covenants on use
- description of the plant's visual setting, including the identities and heights of the tallest structures, lights, and vapor plumes, as well as direction and distances from which these structures, lights, and plumes are visible.

3.2.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 3.1.2, for those nuclear power plants located in a coastal zone, the land use review includes the following requirement:

- 15 CFR Part 930, the regulations governing implementation of the requirement for Federal consistency with approved coastal management programs (as set forth in the Coastal Zone Management Act of 1972).

3.2.3 Review Procedures

The following review steps are suggested:

1. Review the applicant's ER, scoping issues raised concerning land use and visual resource information.
2. Confirm land use, land cover, and visual resource information, including in-scope transmission lines and ROWs potentially affected by continued reactor operations and refurbishment associated with license renewal.
3. Describe place names, topographic and physiographic features, and transportation networks.
4. Identify current local land use, zoning, and development plans – control and land use changes.
5. Identify affected coastal zones or coastal watersheds, as defined by State National Coastal Zone Management Programs.

3.2.4 Evaluation Findings

The reviewer should ensure that the land use and visual resource information provides a sufficient basis for assessing the effects of continued reactor operations and refurbishment activities associated with license renewal.

3.3 Meteorology, Air Quality, and Noise

3.3.1 Areas of Review

This ESRP provides guidance for the review of the meteorology, air quality, and noise environment of the site and surrounding area. This review should provide background information for inclusion in the SEIS and input to reviewers for ESRPs for license renewal (initial LR or SLR) dealing with evaluation of the impacts of continued plant operations during the license renewal term and refurbishment activities in support of license renewal.

The scope includes descriptions of (1) regional climatology, (2) meteorological characteristics of the site and vicinity using data from the onsite meteorological monitoring program, (3) local and regional air quality, and (4) noise generated at, and in the vicinity of, the site.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors; the level of detail should be scaled according to the anticipated magnitude of the potential impacts. The following data or information may be needed, if appropriate:

- climatic descriptions from prior environmental documents, including the EISs prepared at the construction-permit and operating-license stages
- recent climatological data from nearby National Weather Service stations
- extreme weather events, such as floods, hails, thunderstorms, tornadoes, hurricanes, etc., from the National Climatic Data Center Storm Events database, and historical events and damages to the site or nearby areas

- summary of meteorological data from the onsite meteorological program for the most recent 5-year period
- descriptions of meteorological phenomena, if any, associated with the plant's cooling system operation
- description of regional air quality, including the locations of mandatory Federal Class I areas and nonattainment and/or maintenance areas in the region
- map of the region within a 50-mile (80-kilometer) radius of the nonattainment and maintenance areas of the site
- list of onsite emission sources and emission data for all criteria pollutants on an annual basis
- if refurbishment activities are planned, an estimate of additional workers, area of land disturbed for waste storage or laydown areas, vehicle emissions, construction equipment emissions, and fugitive dust emissions
- any current or past noise studies and analyses conducted in the vicinity of the site
- nearby sensitive receptors such as residences, schools, and nursing homes
- list of primary offsite noise generating sources in the vicinity of the site
- list of principal onsite noise-generating sources, with given distances to the nearest site boundary and nearby sensitive receptors.

3.3.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 3.1.2 of this ESRP, the acceptance criteria for the evaluation of site meteorology, air quality, and noise are based on the following requirements:

- 40 CFR Part 50 concerning the National Ambient Air Quality Standards
- 40 CFR Part 51, Subpart W, concerning requirements related to applicable implementation plans
- 40 CFR Part 51, Appendix W, concerning air quality models
- 40 CFR Part 52 concerning Implementation Plans
- 40 CFR Part 81, Subparts C and D, concerning attainment status designations approved by the U.S. Environmental Protection Agency (EPA) and identification of mandatory Class I Federal areas
- 40 CFR Part 93, Subpart B, concerning requirements for determining conformity of Federal actions to State or Federal implementation plans.

Additional regulatory positions and specific criteria in support of the regulations identified above are as follows:

- Regulatory Guide 1.23, Meteorological Monitoring Programs for Nuclear Power Plants (NRC 2007a)
- ESRP 2.7 in NUREG-1555 (NRC 2000) provides guidance on onsite meteorological measurements for use in licensing applications.

3.3.3 Review Procedures

The following review steps are suggested:

1. Review the air quality discussion in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (LR GEIS; NUREG-1437, Revision 2; NRC 2023a) to identify the information considered and the conclusions reached. This step establishes the base for evaluation of information identified by the applicant, the public, and the staff.
2. Obtain descriptions of the site meteorological, climatological, dispersion characteristics, and acoustic (noise) environment.
3. Obtain recent meteorological data for the site and climatological data for the region surrounding the site.
4. Obtain the air-quality attainment status and available air-quality data for the region.
5. Obtain an inventory of onsite air emission sources, air emissions, and noise-generating sources.
6. Determine if license renewal will result in an increase in air emissions (e.g., additional worker vehicle emissions from refurbishment activities).
7. If site is located in a designated attainment area, continue the review at Step 9. If site is located in a designated non-attainment or maintenance area and license renewal will result in an increase in air emissions, proceed to Step 8 for a conformity determination.
8. Determine if air emissions will exceed de minimis threshold levels specified in 40 CFR 93.153(b), commonly referred to as an applicability analysis. If de minimis levels are not exceeded, proceed to Step 9. If de minimis levels are exceeded, a conformity determination must be completed. A conformity determination can be conducted via different methods, including air quality modeling to demonstrate that air emissions will not cause or contribute to a violation of the national ambient air quality standards. Models approved by the EPA for air quality calculations are listed in Appendix W of 40 CFR Part 51.
9. Prepare a section for the SEIS that presents an updated summary of the meteorology, climatology, air quality, and noise environment for the plant site and region. The summary should address normal conditions and historic severe weather. If an applicability analysis or conformity determination was conducted, this should be documented in the SEIS. The section should describe and summarize the meteorological data used in atmospheric model calculations for the conformity determination. The atmospheric models used should be identified in the SEIS, but detailed model descriptions should be avoided.

3.3.4 Evaluation Findings

The reviewer should ensure that the meteorology, air quality, and noise information is adequate as a basis for assessment of the effects of continued plant operations and refurbishment associated with license renewal. The reviewer should consult with appropriate Federal, State, regional, and local agencies and Indian Tribes to assess the accuracy of the meteorology, air quality, and noise information, if necessary.

3.4 Geologic Environment

3.4.1 Areas of Review

This ESRP provides guidance for the review of the geology and soils of the site and surrounding area. This review should provide background information for inclusion in the SEIS and to support the evaluation of the impacts of continued plant operations and refurbishment associated with license renewal (initial LR or SLR).

The scope includes (1) description of geologic setting, (2) overview of seismicity and seismic history, (3) description of onsite soils and their relationship to site geology, and (4) description of soil erosion potential at the site.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed, if appropriate:

- descriptions of the geologic setting at the plant site, including occurring rock types, formation names, and thicknesses
- descriptions of seismic potential at the site and seismic history
- identity of largest known local and historic regional earthquake
- description of safe-shutdown earthquake for the plant
- description of onsite soils (e.g., overburden and unconsolidated material) and their relationship to site geology (whether the material was brought in from offsite or is naturally occurring)
- description of onsite erosion control and run-off best management practices
- description of erosion potential at the site
- identity of any important farmland soils (e.g., prime farmland) on or in the vicinity of the site
- description of any rare or unique geologic resources, including rock, mineral, or energy rights and assets at or adjoining the site, including resource extraction activities (e.g., oil or gas wells, onsite or nearby borrow areas, quarries, or similar resource extraction sites).

3.4.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 3.1.2 also apply for the evaluation of site geology and soils.

3.4.3 Review Procedures

The following review steps are suggested:

1. Review the discussion of potential impacts of continued plant operation and refurbishment activities on geology and soils in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a), to identify the information considered and the conclusions reached. This step establishes the base for evaluation of information identified by the applicant, the public, and the staff.

2. Obtain descriptions of regional and local geology, soils, geologic resources, and seismic setting.

3. Obtain descriptions of the site geology, soils, geologic resources, and seismic setting from prior environmental documents.

4. Obtain descriptions of seismic potential at the site and seismic history, including the largest known local and historic regional earthquake and safe-shutdown earthquake for the plant.

5. Obtain descriptions of any onsite erosion control plans and run-off best management practices.

6. Prepare a section for the SEIS that presents an updated summary of the geology and soils, including significant geologic resources, and seismic setting for the plant site and surrounding region.

3.4.4 Evaluation Findings

The reviewer should ensure that the geology and soils information is adequate as a basis for assessment of the effects of continued plant operations and refurbishment associated with license renewal. The reviewer should consult with appropriate Federal, State, regional, and local agencies, as well as Indian Tribes, to assess the accuracy of the geology and soils information, if necessary.

3.5 Water Resources

3.5.1 Areas of Review

This ESRP provides guidance for the review of water use and quality that could be affected by continued plant operations and refurbishment associated with license renewal (initial LR or SLR).

The scope includes (1) consideration of such water uses as domestic, municipal, agricultural, industrial, mining, recreation, navigation, and hydroelectric power; (2) identification of their locations; (3) quantification of water diversions, consumption, and returns; (4) consideration of site-specific and regional data on the physical, chemical, and biological characteristics of groundwater and surface water for the evaluation of water-quality impacts to water bodies, aquifers, aquatic ecosystems due to water withdrawals and effluent discharges; (5) water use related to continued plant operations and refurbishment associated with license renewal; and (6) preparation of a section describing water use and water quality for the SEIS. The review should be limited to existing and reasonably foreseeable future water uses and trends.

Data and Information Needs

The types of data and information needed would be based on nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- Maps (including digital databases such as a Geographic Information System) showing the relationship of the site to the major hydrologic systems, surface water bodies, floodplains, and groundwater aquifer systems that could be affected by plant water withdrawals and/or discharges.
- Quantitative descriptions of present and known future surface water uses (withdrawals, consumptions, and returns), groundwater withdrawals, and nonconsumptive water uses

(recreational, navigational, instream, etc.) that may be affected by continued plant operations and refurbishment. This should include any bodies of water or aquifers at distances close enough to affect or be adversely affected by plant operations. This should also include a quantitative description of any water uses that provide potential liquid pathways for both radiological and nonradiological effluents. The following should be included:

- locations of diversions and returns concerning the site and the water body
- identification of the water body
- average monthly withdrawal and return rate for each surface water diversion by use category
- locations and depths of wells in relation to the site
- identification of aquifers, including any EPA-designated sole source aquifers
- the average monthly groundwater withdrawal rates by use category
- identification of water bodies and locations within a 6-mile (10-kilometer) radius of the plant site, including any delineated floodplains or zones of inundation for adjoining and onsite surface water features (maps may be useful)
- the type and location of activity on the identified water body (maps may be useful).

- 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
- Water-use (water balance) diagram for the plant showing flow rates to and from the various water systems (e.g., circulating water system, sanitary system, radwaste and chemical waste systems, service water systems), points of consumption, and source and discharge locations.
- For the water-use diagram, the data and narrative description for maximum water consumption, water consumption during periods of minimum water availability, and average operation by month and by plant operating status
- A description of any other station water uses showing flow rates to and from the facility, average water consumption, and maximum water consumption:
  - For surface waters: Water temperature, suspended solids, total dissolved solids, hardness, turbidity, color, odor, pH, conductivity, dissolved oxygen, biological oxygen demand, chemical oxygen demand, phosphorus forms (total and orthophosphate), nitrogen forms (ammonia, nitrate, nitrite, organic), alkalinity, chlorides, sulfate, sodium, potassium, calcium, magnesium, heavy metals (e.g., mercury, lead), phytoplankton (chlorophyll a), and indicator microorganisms (e.g., total coliform, fecal coliforms, dinoflagellates, blue-green algae)
  - For groundwater: The above-surface-water data, minus phytoplankton and with silica, iron, and bicarbonate added.
- Other nuclear power plant site-specific water-quality characteristics
- Descriptions of preexisting aquatic environmental stresses and their effects on surface or groundwater quality for waters that interact with the plant (e.g., water bodies at or near the site that do not meet established water-quality standards). These should include State Clean Water Act (CWA; 33 U.S.C. § 1251 et seq.) Section 303(d) lists of impaired waters which classify the quality of each of the State's water bodies.

- Descriptions of pollutant sources with discharges to water, including National Pollutant Discharge Elimination System (NPDES) permitted discharges and associated monitoring requirements, that may interact with the plant, including locations relative to the site and the affected water bodies, and the magnitude and nature of the pollutant discharges, including spatial and temporal variations.

3.5.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 3.1.2, acceptance criteria for the evaluation of water resources are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(A). If the applicant's plant utilizes cooling towers or cooling ponds and withdraws makeup water from a river, an assessment of the impact of the proposed action on water availability and competing water demands, the flow of the river, and related impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be provided. The applicant shall also provide an assessment of the impacts of the withdrawal of water from the river on alluvial aquifers during low flow.
- 10 CFR 51.53(c)(3)(ii)(C). If the applicant's plant pumps more than 100 gallons (total onsite) of groundwater per minute, an assessment of the impact of the proposed action on groundwater must be provided.
- 10 CFR 51.53(c)(3)(ii)(D). If the applicant's plant utilizes cooling ponds, an assessment of the impact of the proposed action on groundwater quality must be provided.
- 10 CFR 51.53(c)(3)(ii)(P). An applicant shall assess the impact of any documented inadvertent releases of radionuclides into groundwater. The applicant shall include in its assessment a description of any groundwater protection program used for the surveillance of piping and components containing radioactive liquids for which a pathway to groundwater may exist. The assessment must also include a description of any past inadvertent releases and the projected impact to the environment (e.g., aquifers, rivers, lakes, ponds, the ocean) during the license renewal term.
- 33 CFR Part 330, Appendix A, concerning conditions, limitations, and restrictions on construction activities
- 40 CFR Part 121, State Certification of Activities Requiring a Federal License or Permit
- 40 CFR Parts 122–133, Water Programs, concerning NPDES permit conditions for discharges, including storm-water discharges and water quality standards
- 40 CFR Part 147, concerning restrictions on waste disposal options
- 40 CFR Part 149, concerning possible supplemental restrictions on waste disposal and water use in or above a sole source aquifer
- 40 CFR Part 165, concerning the disposal and storage of pesticides and pesticide containers
- 40 CFR Part 403, concerning waste effluents
- 40 CFR Part 423, concerning effluent limitations for the steam electric power generating point source category
- 40 CFR Parts 700–716, concerning practices and procedures for managing toxic chemicals
- Federal, State, regional, local, and Indian Tribe water laws and water rights.

Additional regulatory positions and specific criteria in support of regulations identified above are as follows:

- Compliance with environmental quality standards and requirements of the CWA is not a substitute for and does not negate the requirement for the NRC to weigh the environmental impacts of the proposed action, including any degradation of water quality, and to consider alternatives to the proposed action that are available for reducing the adverse impacts. If an environmental assessment of aquatic impacts is available from the permitting authority, the NRC would consider the assessment in its determination of the magnitude of the environmental impacts in striking an overall cost-benefit balance. When no such assessment of aquatic impacts is available from the permitting authority, the NRC (possibly in conjunction with the permitting authority and other agencies having relevant expertise) should establish its own impact determination.
- Because water quality and water supply are interdependent, changes in water quality must be considered simultaneously with changes in water supply. In *PUD No. 1 of Jefferson County v. Washington Department of Ecology*, 511 U.S. 700 (1994), the United States Supreme Court interpreted the CWA as allowing States to impose conditions on certifications, such as limitations on a given project, insofar as necessary to enforce a designated use contained in the State's water quality standard. The Court held that these limitations do not have to be specifically tied to a discharge requirement.

3.5.3 Review Procedures

The following review steps are suggested:

1. Identify consumptive water uses that could affect the water supply of the plant or that may be adversely affected by the plant, including the following important characteristics:
   - water source
   - locations of diversions and returns
   - amount and time variation of use
   - water rights.
2. Identify recreational, navigational, and other nonconsumptive water uses. The important characteristics to be specified are
   - location
   - activity
   - amount and time variation of use.
3. Identify the water uses that provide potential pathways for both radiological and nonradiological effluents, including the following important characteristics:
   - water sources
   - location of diversions for consumptive uses
   - location of receptors for nonconsumptive uses
   - effluent discharges and pollutant characteristics
   - amount and time variation of each water use and discharge.

4. In addition to information obtained from the applicant's ER and from responses to questions to the applicant, use additional sources of data, such as:
   - local water-supply companies or agencies
   - river basin commissions
   - State agencies (e.g., water resources, fish and wildlife)
   - various agencies, such as the U.S. Army Corps of Engineers and the U.S. Geological Survey and Indian Tribal agencies when needed to complete the analysis. Using the above information, compile and tabulate water uses by the categories and characteristics described in this ESRP section but limit the analysis to consideration of current and reasonably known or foreseeable future water uses.

Ensure that water-use data and information are adequate to serve as a basis for assessing the impacts of continued plant operations and refurbishment associated with license renewal on water use.

- When evaluating the adequacy of this material, the reviewer should ensure that data are sufficient to predict water-use impacts to the plant as well as water-use characteristics to be impacted by refurbishment and operation during the renewal term.
- Consult with appropriate Federal, State, regional, local, and Indian Tribe agencies in making this evaluation.

The reviewer's analysis of water quality should ensure that the physical, chemical, and biological water-quality parameters that could be affected by continued plant operations during the license renewal term and refurbishment in support of license renewal have been described. The reviewer should take the following steps:

1. Identify the location and spatial distribution of the physical, chemical, and biological characteristics, the monthly and annual ranges, and the historical extremes of those water-quality characteristics that could potentially be affected by continued plant operations and refurbishment.
2. Determine the presence of existing water-quality-related environmental stresses. Consult the quality criteria requirements of other water users, as indicated by the approved water-use classification (such as CWA 303[d], lists) or water resource planning documents for the water body in question.
3. When applicable, discuss the water-quality conditions, floodplains and waterway buffer zones, water rights, and agreements as they affect water quality and water supply and resource plans for the site and vicinity with Federal, State, regional, local, and Indian Tribe water resource and pollution control and monitoring agencies.
4. Obtain the information primarily from the applicant's ER, responses to questions to the applicant, and consultation with Federal, State, regional, local, and Indian Tribe agencies. Use sources of data such as river basin planning organizations and State and Federal agencies, such as the EPA, the U.S. Army Corps of Engineers, and the U.S. Geological Survey, if additional information or verification is deemed necessary.
5. Ensure that the
   - data are sufficient to provide quantitative information on the physical, chemical, and biological water-quality characteristics potentially affecting or affected by continued plant operations and refurbishment

- hydrologic and water-quality descriptions are sufficient, concerning relevancy, completeness, reliability, and accuracy for input to the impact assessments of other sections
- Federal, State, regional, local, and Indian Tribe agencies appropriate to the objectives of this review have been consulted.

When evaluating the adequacy of this material,

- consult the applicable standards and guides for this environmental review and use the site visit and/or consultations with permitting agencies to evaluate the completeness of the water-quality descriptions
- evaluate, when necessary, the collection of additional data, the verification of data, and the substantiation of the methodology used to estimate water-quality parameters.

Include the appropriate depth and extent of the input to the SEIS as governed by the hydrologic and water-quality characteristics that could be affected by continued plant operations and refurbishment and by the nature and magnitude of the expected impacts. The following information should be included as input to the SEIS:

- Descriptions of site and vicinity surface-water and groundwater occurrence, flow, and quality that could be affected by continued plant operations and refurbishment. The description may consist of statistical summaries of the relevant characteristics, including mean, mean low and high, and historical low and high values (as available) for the site and vicinity. The data included should be commensurate with the anticipated impacts. Figures may be used to show long-term and seasonal trends.
- A description of the water-quality related environmental stresses in the site and vicinity.

3.5.4 Evaluation Findings

The reviewer should ensure that the water resources information is adequate as a basis for assessment of the effects of continued plant operations and refurbishment associated with license renewal. The depth and extent of the input to the SEIS would be governed by the water-use and quality characteristics of the site and vicinity and the potential water-use and quality impacts of continued plant operations during the license renewal term and refurbishment in support of license renewal. The information should be presented in a concise form.

Data should be given in tables where appropriate. The following information should be considered and included as appropriate:

- a summary of present and reasonably known future surface-water uses and effluent discharges on or from the site and within the hydrological system in which the plant is located and that may be adversely affected by the plant
- a summary of present and reasonably known future groundwater withdrawals and effluent discharges on the site and for distances great enough to cover potentially affected groundwater aquifers
- references to applicable Federal, State, regional, local, and Indian Tribe water use and quality standards.

3.6 Ecological Resources

3.6.1 Areas of Review

This ESRP provides guidance on how the NRC staff should consider the potential effects of continued operation of a nuclear power plant during an initial LR or SLR term on ecological resources. Ecological resources include terrestrial, aquatic, and federally protected resources.

To perform the ecological resource review, the reviewer should (1) identify the characteristics of the ecological environment; (2) identify important ecological attributes and resources; (2) identify the attributes and resources that license renewal could affect; (4) gather surveys, studies, monitoring, and other information on these resources; (5) coordinate with relevant Federal and State agencies and Indian Tribes (e.g., applicable treaty rights) with special expertise or jurisdiction; and (6) prepare SEIS sections describing terrestrial resources, aquatic resources, and federally protected ecological resources.

Data and Information Needs

The ecological resources review may require the following information about the ecological environment. Data and information needed for a given review would be site-specific and would depend on nuclear power plant site-specific and plant-specific factors.

Terrestrial Resources

- Level I, II, and III terrestrial ecoregion
- characteristics of the Level III ecoregion (see Table D.5-1 of the LR GEIS)
- descriptions of terrestrial habitats (e.g., oak-hickory forest, tallgrass prairie, tidal salt marsh, lacustrine wetland) on or near the site
- information on characteristic plant and animal species associated with each habitat type
- copies of terrestrial surveys, studies, and monitoring performed on or near the site (e.g., baseline studies, habitat assessments, native plant surveys, wetland delineations, endangered and threatened species monitoring)
- information on important terrestrial species and habitats (e.g., keystone species, indicator species, representative species, migratory birds, state-listed species, bird rookeries and flyways, important bird areas, known bat hibernacula, locally significant habitats, natural heritage areas, wildlife sanctuaries and preserves, federally or state-managed lands)
- information on non-native, nuisance, and invasive species of local or regional concern
- information concerning the length of in-scope transmission lines; locations where ROWs cross wetlands, riparian areas, or other important or sensitive habitats; and line termination points (e.g., substation or point at which in-scope portion of the lines ends).

Aquatic Resources

- marine ecoregion (for nuclear power plants near oceanic, estuarine, or gulf waters)
- waterbodies affected by nuclear power plant operations
- characteristics of the affected waterbodies

  - descriptions of the aquatic habitats of the waterbodies (e.g., nearshore, benthic, open water, etc.)
  - size, bathymetry, temperature regimes, streamflow and discharge, salinity, tidal flows, typical seasonal fluctuations, sediment types, and general water quality
  - main channel, dams, and any flood controls
  - additional human uses of the waterbody other than for nuclear power plant cooling (e.g., recreational, industrial, etc.)
- relevant watershed(s), including source and receiving waterbodies
- information on characteristic plant and animal species associated with each affected waterbody, especially those species vulnerable to impingement and entrainment
- descriptions of other aquatic habitats or features on the site
- information on fish stocking programs
- copies of aquatic surveys, studies, and monitoring performed on or near the site (e.g., regional fishery studies; endangered and threatened species monitoring; baseline, impingement, entrainment, thermal, and other studies performed in connection with CWA Section 316(a) and (b) requirements)
- information on important aquatic species and habitats (e.g., keystone species, indicator species, representative species, state-listed species, recreational and commercially important fisheries, spawning and rearing areas, waters within Federal or State parks and preserves)
- information on non-native, nuisance, and invasive species of local or regional concern
- information concerning the length of in-scope transmission lines; locations where ROWs cross waterbodies, aquatic features, or other important or sensitive habitats; and line termination points (e.g., substation or point at which in-scope portion of the lines ends).

Federally Protected Ecological Resources

- sufficient information on the proposed action to define the Endangered Species Act (ESA) action area (e.g., all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02)
- information on endangered and threatened species (collectively, “listed species”) and critical habitats protected under the ESA that are potentially present in the action area under both U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) jurisdiction (collectively, “the Services”)
- information on designated essential fish habitat (EFH), including habitats of particular concern, designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) that are present in the area
- information on national marine sanctuaries protected under the National Marine Sanctuaries Act (NMSA) that are present in the area.

Additionally, the following information may be relevant to the ecological resources review:

- the ecological environment prior to nuclear power plant construction and major changes that have happened since (e.g., habitat loss, degradation, or fragmentation; changes in presence or abundances of plant and animal populations; urbanization and development; impoundments and associated pond and reservoir creation; river channelization)
- changes to the ecological environment anticipated during the license renewal term
- relevant regional, State, Federal, and Indian Tribe permits and controls to reduce or mitigate impacts on the ecological environment (e.g., NPDES permit conditions and requirements related to impingement mortality, entrainment, and thermal effluents)
- site or fleet-wide environmental procedures, wildlife management plans, best management practices, and conservation initiatives undertaken or proposed by the applicant
- transmission line ROW maintenance procedures, including physical (e.g., mowing and cutting) and chemical (e.g., herbicides or pesticides) controls and maintenance periodicity
- management of nuisance or invasive species undertaken or proposed by the applicant.

3.6.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 3.1.2, acceptance criteria for the ecological resources review are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(A). If the applicant's plant utilizes cooling towers or cooling ponds and withdraws makeup water from a river, an assessment of the impact of the proposed action on water availability and competing water demands, the flow of the river, and related impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be provided.
- 10 CFR 51.53(c)(3)(ii)(B). If the applicant's plant utilizes once-through cooling or cooling pond water intake and discharge systems, the applicant shall provide a copy of current Clean Water Act 316(b) Best Technology Available determinations and, if applicable, a 316(a) variance in accordance with 40 CFR Part 125 or equivalent State permits and supporting documentation. If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from impingement mortality and entrainment and thermal discharges.
- 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including but not limited to the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.
- 40 CFR Part 122 and 40 CFR Part 125, concerning impingement mortality and entrainment at existing facilities subject to CWA Section 316(b)
- 40 CFR Part 423, concerning thermal effluent discharges subject to CWA Section 316(a)
- 50 CFR Part 402, concerning interagency consultation for federally listed species and critical habitats protected under the ESA
- 50 CFR Part 600, concerning interagency consultation for EFH protected under the MSA.

The following Federal statutes also apply to the ecological resources review:

- Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668–668d) makes it unlawful to take, pursue, molest, or disturb bald and golden eagles, their nests, or their eggs anywhere in the United States. The FWS may issue take permits to individuals, government agencies, or other organizations to authorize limited, non-purposeful disturbance of eagles, in the course of conducting lawful activities such as operating utilities or conducting scientific research.
- Clean Water Act (33 U.S.C. § 1251 et seq.) was enacted to restore and maintain the chemical, physical, and biological integrity of the Nation's water. Section 316(a) of the CWA addresses thermal effects and requires that facilities operate under effluents limitations that assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving body of water. Section 316(b) of the CWA requires that cooling water intake structures of regulated facilities must reflect the best technology available for minimizing impingement mortality and entrainment of aquatic organisms. These sections of the CWA are implemented and enforced through the NPDES program.
- Coastal Zone Management Act of 1972, as amended (16 U.S.C. § 1451 et seq.) addresses the increasing pressures of over-development upon the nation's coastal resources. The Act encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. Section 307(c)(3)(A) of the Act requires that applicants for Federal licenses who conduct activities in a coastal zone provide certification that the proposed activity complies with the enforceable policies of the state's coastal zone program.
- Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.), was enacted to prevent the further decline of endangered and threatened species and to restore those species and their critical habitats. Section 7(a)(2) of the ESA requires Federal agencies to consult with the FWS or NMFS (collectively, "the Services") for Federal actions that may affect listed species or designated critical habitats.
- Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (16 U.S.C. § 1801 et seq.) governs marine fisheries management in U.S. Federal waters. The MSA created eight regional fishery management councils and includes measures to rebuild overfished fisheries, protect EFH, and reduce bycatch. Under Section 305(b) of the MSA, Federal agencies are required to consult with NMFS for any Federal actions that may adversely affect EFH.
- Marine Mammal Protection Act of 1972 (16 U.S.C. § 1361 et seq.) was enacted to protect and manage marine mammals and their products (e.g., the use of hides and meat). The primary authority for implementing the Act belongs to the FWS and NMFS. The FWS manages walruses, polar bears, sea otters, dugongs, marine otters, and the West Indian, Amazonian, and West African manatees. NMFS manages whales, porpoises, seals, and sea lions. The two agencies may issue permits under Section 104 of the Act to persons, including Federal agencies, that authorize the taking or importing of marine mammals.
- Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. § 703 et seq.) is intended to protect birds that have common migration patterns between the United States and Canada, Mexico, Japan, and Russia. The Act stipulates that, except as permitted by regulations, it is unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, or kill any migratory bird.

- National Marine Sanctuaries Act of 1966, as amended (16 U.S.C. § 1431 et seq.) establishes provisions for the designation and protection of marine areas that have special national significance. The NMSA authorizes the Secretary of Commerce to designate national marine sanctuaries and establish the National Marine Sanctuary System. Pursuant to Section 304(d) of the NMSA, Federal agencies must consult with the National Oceanic and Atmospheric Administration's Office of National Marine Sanctuaries when their proposed actions are likely to destroy, cause the loss of, or injure a sanctuary resource.
- Rivers and Harbors Appropriation Act of 1899, Section 10 (33 U.S.C. § 401 et seq.) protects navigable waters in the development of harbors and other construction and excavation. Section 10 of the Act requires entities or persons to obtain a permit from the U.S. Army Corps of Engineers to construct any structure in or over any navigable water of the United States, or to accomplish any other work affecting the course, location, condition, or physical capacity of such waters. Activities requiring Section 10 permits include structures (e.g., piers, wharfs, breakwaters, bulkheads, jetties, weirs, and transmission lines) and work such as dredging or disposal of dredged material, or excavation, filling, or other modifications to the navigable waters of the United States.

The following additional NRC guidance may be relevant to the ecological resources review:

- Regulatory Guide 4.11, Rev. 2, Terrestrial Environmental Studies for Nuclear Power Stations (NRC 2012b) contains technical guidance for designing terrestrial environmental studies and performing analyses for applicants and reactor licensees subject to 10 CFR Part 50, 10 CFR Part 52, and 10 CFR Part 54 who must meet the environmental requirements of 10 CFR Part 51. The guidance addresses designing adequate baseline studies; identifying important species and habitats; and performing terrestrial impact analyses, including the effects of habitat loss, noise, wildlife displacement, bird and bat collisions with plant structures, avian electrocution, cooling tower drift, and hydrological impacts to terrestrial habitats.
- Regulatory Guide 4.24, Rev. 0, Aquatic Environmental Studies for Nuclear Power Stations (NRC 2017a), contains technical guidance for designing aquatic environmental studies and performing analyses for applicants and reactor licensees subject to 10 CFR Part 50, 10 CFR Part 52, and 10 CFR Part 54 who must meet the environmental requirements of 10 CFR Part 51. The guidance addresses designing adequate baseline studies; identifying important species and habitats; and performing terrestrial impact analyses, including the effects of habitat modification, noise and pressure, impingement and entrainment, effluent discharge, cooling tower drift, and transmission line water crossings.

3.6.3 Review Procedures

The reviewer should ensure that the information and data gathered are adequate to serve as a basis for assessing the potential impacts of nuclear power plant license renewal on ecological resources. The following are suggested review steps for preparing input to the SEIS.

Terrestrial Resources

1. Identify the terrestrial ecoregion (Levels I, II, and III) and describe typical characteristics of the Level III ecoregion.
2. Identify and describe the terrestrial habitats on and near the site and within ROWs of in-scope transmission lines. Give special attention to important habitats (e.g., important bird

areas, known bat hibernacula, locally significant habitats, natural heritage areas, wildlife sanctuaries and preserves, federally or state-managed lands, etc.).

3. Describe major changes to the terrestrial environment during or after nuclear power plant construction. These may be related to plant construction or operation or the result of other factors.
4. Note characteristic plant and animal species associated with each habitat type. Give special attention to important species (e.g., keystone species, indicator species, representative species, migratory birds, state-listed species, etc.).
5. Note any non-native, nuisance, and invasive species of local or regional concern, especially those known to be present on the site. Summarize management of such species undertaken at the site, if applicable.
6. Describe terrestrial surveys, studies, and monitoring performed on or near the site, including biological entities or ecological attributes chosen for investigation, methodology, results, and conclusions.
7. Describe any site or fleet-wide environmental procedures, wildlife management plans, best management practices, and conservation initiatives undertaken at the site and relevant to terrestrial resources.
8. Describe relevant regional, state, Federal, and Indian Tribe permits and controls that are in place to reduce or mitigate impacts on the terrestrial environment.
9. Summarize the input of relevant Federal and State agencies with special expertise or jurisdiction over terrestrial resources, as applicable.
10. Summarize the input of affected Indian Tribes, as applicable.

<u>Aquatic Resources</u>

1. Identify the marine ecoregion (if applicable) and describe typical characteristics of that ecoregion (e.g., predominant oceanographic or topographic features, species composition, and dominant biogeographic forcing agents, such as isolation, upwelling, nutrient inputs, freshwater influx, temperature regimes, ice regimes, exposure, sediments, currents, and bathymetric or coastal complexity).
2. Identify the waterbody(ies) affected by nuclear power plant operations, including those within ROWs of in-scope transmission lines, and describe the characteristics of the affected waterbodies, including:
   - the aquatic habitats of the waterbodies;
   - size, bathymetry, temperature regimes, streamflow and discharge, salinity, tidal flows, typical seasonal fluctuations, sediment types, and general water quality;
   - main channel, dams, and any flood controls; and
   - additional human uses of the waterbody other than for nuclear power plant cooling (e.g., recreational, industrial, etc.).
3. Give special attention to important habitats (e.g., spawning and rearing areas, waters within Federal or State parks and preserves, etc.).
4. Identify the relevant watershed(s), including source and receiving waterbodies.

5. Describe major changes to the aquatic environment during or after nuclear power plant construction. These may be related to plant construction or operation or the result of other factors.
6. Describe the trophic structure and identify important trophic links and potential for trophic cascade.
7. Note characteristic plant and animal species associated with each affected waterbody. Give special attention to important species (e.g., keystone species, indicator species, representative species, state-listed species, recreational and commercially important fisheries, marine mammals, etc.) and those species vulnerable to impingement and entrainment.
8. Identify important trophic links.
9. Note any non-native, nuisance, and invasive species of local or regional concern, especially those known to be present on the site. Summarize management of such species undertaken at the site, if applicable.
10. Describe aquatic surveys, studies, and monitoring performed on or near the site, including biological entities or ecological attributes chosen for investigation, methodology, results, and conclusions.
11. Describe any site or fleet-wide environmental procedures, wildlife management plans, best management practices, and conservation initiatives undertaken at the site and relevant to aquatic resources.
12. Describe relevant regional, State, Federal, and Indian Tribe permits and controls that are in place to reduce or mitigate impacts on the aquatic environment.
13. Summarize relevant Federal or State management initiatives, such as fish stocking programs.
14. Summarize the input of Federal and State agencies with special expertise or jurisdiction over aquatic resources, as applicable.
15. Summarize the input of affected Indian Tribes, as applicable.

<u>Federally Protected Ecological Resources</u>

- Federally Listed Species and Critical Habitat
  - Define the ESA action area (see Appendix A.1.3, Review Procedure Step 1).
  - For each federally listed species potentially present in the action area, describe the taxonomy, physical description, distribution and relative abundance, habitat, biology, factors affecting the species, and occurrence of the species within the action area.
  - For each designated critical habitat present in the action area, describe the characteristics of the physical and biological features of the habitat, designation boundaries, and location in relation to the nuclear power plant site and action area. Include maps, when available.
  - Include candidate and proposed species and proposed critical habitats, as appropriate.
  - If Section 7 consultation is anticipated, refer to the ESA regulations at 50 CFR Part 402, "Interagency Cooperation—Endangered Species Act of 1973, as Amended,"; the Services' guidance for conducting Section 7 consultation in *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference*

Activities Under Section 7 of the Endangered Species Act (FWS and NMFS 1998); and Appendix A of this ESRP for additional information that may be required.

- Essential Fish Habitat
  - Define the affected area (see Appendix A.2.3, Review Procedure Step 1).
  - Identify the EFH present in the affected area and the federally managed species and life stages to which the EFH applies.
  - Describe the distribution, habitat preferences, and diet of each federally managed species and life stage.
  - Describe the physical and biological characteristics of the EFH by species and life stage. Give special attention to habitats of particular concern, when applicable.
  - If EFH consultation is anticipated, refer to the EFH regulations at Section 305 at 50 CFR Part 600, "Magnuson–Stevens Act Provisions,"; NMFS's guidance for conducting EFH consultation in Essential Fish Habitat Consultation Guidance (NMFS 2004a) and Preparing Essential Fish Habitat Assessments: A Guide for Federal Action Agencies (NMFS 2004b); and Appendix A of this ESRP for additional information that may be required.
- Sanctuary Resources
  - Define the affected area (see Appendix A.3.3, Review Procedure Step 1).
  - Identify the national marine sanctuary in the affected area and describe the location in relation to the nuclear power plant site. Include maps, when available.
  - Describe the marine resources of the sanctuary, including living and nonliving resources.
  - If NMSA consultation is anticipated, refer to the National Oceanic and Atmospheric Administration (NOAA) Office of National Marine Sanctuaries' (ONMS) guidance for conducting NMSA consultation in *Overview of Conducting Consultation Pursuant to Section 304(d) of the National Marine Sanctuaries Act* (NOAA 2009) and Appendix A of this ESRP for additional information that may be required.

3.6.4 Evaluation Findings

The reviewer should ensure that the ecological information is adequate to serve as a basis for assessing the potential impacts of license renewal and alternatives. The reviewer should consult with relevant Federal and State agencies, as appropriate, to obtain information on ecological resources, especially federally protected ecological resources for which license renewal may necessitate interagency consultation. Coordination with affected Indian Tribes may also be appropriate concerning culturally significant ecological resources. The depth and extent of written input to the SEIS should be governed by the ecological resources present at the site and the potential for license renewal to affect those resources. Data should be presented in tables, maps, or figures, where appropriate.

3.7 Historic and Cultural Resources

3.7.1 Areas of Review

This ESRP provides guidance on how the NRC staff should identify and assess the potential effects of continued operation and refurbishment activities during an initial LR or SLR term on historic and cultural resources and historic properties. Historic and cultural resources include

precontact (i.e., prehistoric) and historic era archaeological sites, districts, buildings, structures, and objects. Historic and cultural resources also include elements of the cultural environment such as landscapes, sacred sites, and other resources that are of religious and cultural importance to Indian Tribes, such as traditional cultural properties important to a living community of people for maintaining its culture.

A historic or a cultural resource is deemed to be historically significant, and thus, a "historic property" within the scope of the National Historic Preservation Act (NHPA) if it has been determined to be eligible for listing or is listed on the National Register of Historic Places (NRHP). The NRHP is maintained by the U.S. National Park Service in accordance with its regulations in 36 CFR Part 60. The NRHP criteria to evaluate the eligibility of a property are set forth in 36 CFR 60.4. Section 106 of the NHPA (NHPA; 54 U.S.C. § 300101 et seq.) requires Federal agencies to take into account the effects of their undertakings (e.g., initial LR or SLR) on historic properties and consult with the appropriate parties as defined in 36 CFR 800.2. For license renewal reviews, the NRC fulfills its Section 106 requirements through the National Environmental Policy Act of 1969 (NEPA) process in accordance with 36 CFR 800.8(c). For NEPA compliance, impacts on cultural resources that are not eligible for or listed in the NRHP would also need to be considered (CEQ and ACHP 2013). Appendix B of this ESRP provides guidance to the NRC staff in conducting NHPA Section 106 consultation.

Data and Information Needs

The type of data and information needed would be affected by nuclear power plant site- and plant-specific factors, the amount of previous survey work conducted in the area of potential effects (APE), and consultation with State Historic Preservation Officer (SHPO)/Tribal Historic Preservation Officer (THPO), Indian Tribes,[1] and other consulting parties. The following data or information should be included in this section:

- Description of the APE. For license renewal (initial LR or SLR), the APE includes lands within the nuclear power plant site boundary and the transmission lines up to the first substation that may be directly (e.g., physically) affected by land-disturbing or other operational activities associated with continued plant operations and maintenance and/or refurbishment activities.
- Cultural background for the APE and surrounding region from the beginning of human settlement to the present.
- Historic use of the land and the activities that have occurred within the APE and the surrounding area documenting past levels of ground disturbance.
- Copy of the site map that identifies the direct and indirect APE (e.g., including scope transmission lines, and in the vicinity).
- All past and current (for license renewal) historic and cultural resource investigations conducted within and surrounding the APE.
- Historic properties within the APE, NRHP eligibility status, and if available, SHPO/THPO, Indian Tribes, and other consulting parties' comments in support of NRC's NHPA Section 106 review.

[1] Per 36 CFR 800.2(c)(2)(ii), the agency official will consult with any Indian Tribe or Native Hawaiian organization that attaches religious and cultural significance to historic properties that may be affected by an undertaking.

- Historic and cultural resources (e.g., sacred sites) within the APE that are not eligible for or listed in the NRHP but should be considered within the context of NEPA.
- Description of the applicant's efforts to engage SHPO/THPO, Indian Tribes, or members of the public to assess historic and cultural resources within the APE.
- Description of any procedures or management plans to protect or minimize impacts to historic and cultural resources (e.g., avoidance and inadvertent discovery procedures) within the APE during the renewal term.

3.7.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 3.1.2, acceptance criteria for the evaluation of historic and cultural resources are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(K). All applicants shall identify any potentially affected historic and cultural resources and historic properties and assess whether future plant operations and any planned refurbishment activities would affect these resources in accordance with Section 106 of the National Historic Preservation Act and in the context of the National Environmental Policy Act.
- 36 CFR Part 800, "Protection of Historic Properties" − The implementing regulations define require Federal agencies to take into account the effects of their undertakings on historic properties included in or eligible for inclusion in the NRHP in consultation with consulting parties as defined under 36 CFR 800.8(c)(1)(i). Under this regulation, the NRC is required to identify and evaluate all historic properties in the APE and take measures to avoid, minimize, or mitigate adverse effects. As indicated in 36 CFR 800.8(c), Section 106 can be integrated with NEPA reviews. The NRC must complete the NHPA Section 106 review process prior to issuance of an initial or subsequent renewed license.
- 36 CFR Part 60, "National Register of Historic Places" – The regulations contain the National Park Service's NRHP—the official list of the Nation's historic places worthy of preservation.
- 36 CFR Part 63, "Determinations of Eligibility for Inclusion in the National Register of Historic Places" – contains guidance for evaluating historic properties and determining whether a property is eligible for listing in the NRHP.

The following Federal statutes also apply to the historic and cultural resources review. A summary of these statutes is provided in Appendix F of the LR GEIS. Note that some statutes listed below apply only to nuclear power plant sites located on public (i.e., Federal) and Tribal lands.

- National Historic Preservation Act of 1966, as amended (54 U.S.C. § 300101 et seq.)
- American Indian Religious Freedom Act (42 U.S.C. § 1996)
- Archeological and Historic Preservation Act of 1974, as amended (54 U.S.C. § 312501 et seq.)
- Archaeological Resources Protection Act of 1979 (16 U.S.C. § 470aa et seq.)
- Native American Graves Protection and Repatriation Act (25 U.S.C. § 3001 et seq.)

Executive Orders

Executive Order 13175, “Consultation and Coordination with Indian Tribal Governments” (65 FR 67249) − This Order seeks “to establish regular and meaningful consultation and collaboration with tribal officials, in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with tribes, and to reduce imposition of unfunded mandates upon Indian tribes.” The NRC voluntarily complies with this Executive Order and has issued a Tribal Policy Statement (82 FR 2402).

NRC Policy and Guidance

NRC Tribal Policy Statement (82 FR 2402) – On January 9, 2017, the NRC published its Tribal Policy Statement of principles to guide the agency's government-to-government interactions with Federally recognized Indian Tribes and Alaska Native Tribes. The agency developed this document in response to direction from the Commission following an increase in the number and complexity of consultations between the NRC and Federally recognized Tribal governments. The policy statement is intended to encourage and facilitate Tribal involvement in activities under NRC jurisdiction. It provides guidance to ensure consistency across the agency in government-to-government relations with federally recognized Tribes. The policy statement also underscores the NRC's commitments to conducting outreach to Tribes, engaging in timely consultation and coordinating with other Federal agencies.

NUREG-2173 (NRC 2018c), Tribal Protocol Manual – This manual is intended to facilitate effective consultations and interactions between the NRC and Indian Tribes concerning activities within the scope of the NRC's jurisdiction.

Staff Guidance for Withholding Sensitive Information About Historic Resources in Accordance with the National Historic Preservation Act (NRC 2011).

3.7.3 Review Procedures

The reviewer should ensure that the information and data gathered are adequate to serve as a basis for assessing the potential impacts of nuclear power plant license renewal on historic and cultural resources and historic properties. The following review steps are suggested when preparing input to the SEIS:

1. Review the historic and cultural resources discussion in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a), to identify the information considered for characterizing the affected environment.
2. Identify and describe the APE (both direct and indirect). Include a site map that delineates the APE (preferably on a U.S. Geological Survey Quadrangle). Provide the legal description of the APE appropriate for the proposed project area. Note that not all areas of the United States. (i.e., the original 13 colonies) use the Public Land Survey System (e.g., township, range, and section information).
3. Review the ER as well as the cultural resource investigations (e.g., archaeological and architectural surveys) cited in the ER for details about historic and cultural resources, NRHP evaluations, and the status of the applicant’s interaction with SHPO and Indian Tribes.
4. Briefly summarize and describe precontact (i.e., prehistoric) and historic land use up to the recent past. The description should focus on providing relevant context for understanding

the types of historic and cultural resources that may be present within the APE and surrounding areas as required for NHPA Section 106 reviews.

5. Identify and describe all past and current historic and cultural resource investigations conducted within the APE and surrounding area.
6. The reviewer should conduct an independent review of SHPO archaeological and architectural databases (i.e., site files) or similar repositories (e.g., Office of State Archaeologist) to verify historic and cultural resources information provided by the applicant in the ER.
7. Consider other sources of information obtained during the NRC site audit, via requests for additional information and requests for confirmatory information, and through the consultation process.
8. Identify and describe historic properties located within the APE along with NRHP eligibility evaluations.
9. Identify and describe historic and cultural resources within the APE that are not eligible for or listed in the NRHP but should be considered within the context of NEPA.
10. Describe and summarize the status of the NRC's NHPA Section 106 consultation with the ACHP, SHPO/THPO, Indian Tribes and interested parties along with and any comments received.
11. Review comments received during the scoping process to identify any issues associated with historic and cultural resources.
12. Review other State regulations protecting historic and cultural resources and burial laws.
13. Refer to staff guidance regarding NHPA Section 106 consultation in Appendix B of this ESRP.

3.7.4 Evaluation Findings

The reviewer should ensure that the historic and cultural resources information is adequate to serve as a basis for assessing the potential impacts of initial LR or SLR and alternatives. The reviewer should consult with SHPO/THPO, Indian Tribes, and interested parties, as appropriate, to obtain information on historic and cultural resources, especially historic properties which would necessitate NHPA Section 106 consultation. The depth and extent of information presented in the SEIS would be governed by the extent and significance of the historic properties present in the APE and the effects of continued plant operations, refurbishment, and decommissioning activities on historic and cultural resources. The reviewer should verify that historic and cultural resources have been identified and described in sufficient detail to provide the basis for subsequent analysis and assessment of these impacts.

3.8 Socioeconomics

3.8.1 Areas of Review

This ESRP guides the review and consideration of socioeconomic factors that could be directly or indirectly affected by changes in nuclear power plant operations. A nuclear power plant and the communities that support it can be described as a dynamic socioeconomic system. The communities provide the people, goods, and services needed to operate the nuclear power plant. Power plant operations, in turn, provide employment and income and pay for goods and services from the communities. The measure of a community's ability to support power plant

operations depends on the ability of the community to respond to changing economic conditions.

The socioeconomic region of influence (ROI) is defined by the counties where nuclear power plant employees and their families reside, spend their income, and use their benefits, thereby affecting economic conditions in the region. Changes in power plant operation affects socioeconomic conditions in the ROI, including employment and income, recreation and tourism, tax revenue, community services and education, population and housing, and transportation.

The scope of the review should include the current socioeconomic factors that might be affected by continued reactor operations and refurbishment associated with license renewal (initial LR or SLR).

Data and Information Needs

The reviewer should consult the LR GEIS (NUREG-1437, Revision 2; NRC 2023a), before undertaking extensive data collection.

The following data or information may be needed:

- most recent average annual total number of permanent plant workers and county of residence, average number of plant outage workers, frequency, and duration (in days or weeks)
- U.S. Bureau of Census information and data related to the ROI (by county) economic base, including:
  - housing: total number of units, number of occupied units, number of vacant units, vacancy rate, and median value
  - demographic information by race and ethnicity and population growth forecasts by county
  - transient (seasonal) population including students attending colleges and universities within 50 miles of the plant
  - civilian labor force by county
  - largest industrial employment by industrial sector category (North American Industry Classification System code)
  - median household income and per capita income
  - percent of families and individuals living below the Census poverty threshold
  - unemployment
- public water supply system information by source (groundwater or surface water, average daily production, system design capacity, and population served)
- information about the local public schools: school district(s), total enrollment
- information on local transportation systems: site access roads, average annual daily traffic volume and road capacity
- Census of Agriculture (U.S. Department of Agriculture) information on migrant farm labor in the ROI (by county), including:

  - number of farms and farm workers working less than 150 days
  - number of farms reporting migrant farm labor
  - number of farms with hired farm labor
- list of major employers in ROI
- annual property tax or payments in lieu of tax (PILOT) information including local tax authorities (e.g., county, municipality, and public school district) and tax assessment information including anticipated or recent changes in State tax laws
- public recreational facilities, including capacity and utilization.

3.8.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 3.1.2 also apply for the review of affected environment socioeconomic characteristics.

3.8.3 Review Procedures

The following review steps are suggested:

1. Review socioeconomics discussions in the LR GEIS.
2. Determine if there is new information that should be evaluated. The following sources of information should be included in the search for new information:
   - any new socioeconomics-related information in the applicant's ER
   - any new socioeconomic information from scoping
3. Compile socioeconomic information on counties within the ROI.
4. Describe the following:
   - power plant employment and expenditures
   - regional economic characteristics
   - demographic characteristics
   - housing and community services
   - tax revenue
   - local transportation
5. Prepare socioeconomic affected environment discussion for the SEIS.

3.8.4 Evaluation Findings

The reviewer should ensure that the socioeconomic information is adequate to serve as a basis for assessing the potential impacts of initial LR or SLR. The amount of socioeconomic information in the SEIS is governed by the potential effects of continued nuclear plant operations and refurbishment during the license renewal term.

3.9 Human Health

3.9.1 Areas of Review

This ESRP provides guidance for the discussion of radiological and nonradiological human health impacts of nuclear power plants. The scope includes preparation of a SEIS section describing the applicant's radioactive waste management program, radiological environmental monitoring program, radioactive effluent release program, occupational radiation exposure, physical hazards, chemical hazards, microbiological hazards, and occupational electric hazards.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- A description of the radioactive liquid, gaseous, and solid waste management and effluent control systems and information on effluents released into the environment and waste stored onsite
- Historical data on occupational doses to plant workers (from NUREG-0713, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities"; NRC 2016)
- Description of the radiological environmental monitoring program and environmental data (from the applicant's annual environmental operating reports)
- Historical maximum doses to a member of the public (from the applicant's annual radioactive effluent release reports)
- Information on the potential changes in radiological impacts from continued plant operations during the renewal term
- Information on the radiological impacts of refurbishment
- Description of the site's industrial safety program to include physical occupational hazards, chemical hazards, occupational microbiological hazards, and occupational electrical hazards (e.g., electromagnetic fields and electric shock)
- Description of the microbiological hazards for members of the public for plants that use a cooling pond, lake, canal, or that discharge into waters of the United States accessible to the public
- Description of the in-scope transmission lines and adherence to National Electrical Safety Code (NESC) standards.

3.9.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 3.1.2, acceptance criteria for the evaluation of human health are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(G). If the applicant's plant uses a cooling pond, lake, canal, or discharges into waters of the United States accessible to the public, an assessment of the impact of the proposed action on public health from thermophilic organisms in the affected water must be provided.

- 10 CFR 51.53(c)(3)(ii)(H). If the applicant's transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the National Electric Safety Code for preventing electric shock from induced currents, an assessment of the impact of the proposed action on the potential shock hazard from the transmission lines must be provided.

3.9.3 Review Procedures

The SEIS section to be prepared on the radiological and nonradiological impacts is informational in nature. No specific analysis is required. The following review steps are suggested:

1. Review the discussion of Human Health in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).
2. Obtain historic information (typically five years of data) on radioactive effluents released from the applicant's plant.
3. Obtain information on expected radioactive releases and exposures from refurbishment activities, if any.
4. Obtain information on projected changes in radioactive releases and exposures from operations during the renewal term, if any.
5. Obtain historical information (typically five years of data) on the radiological environmental monitoring program.
6. Obtain historical information (typically five years of data) on the occupational doses to plant workers.
7. Prepare a section describing the radiological programs and systems for the SEIS. This section should include summary descriptions of the applicant's radioactive effluent monitoring and radiological environmental monitoring programs. It should also include a discussion of doses received by members of the public and plant workers for the most recent calendar year and the trend of such doses for the most recent five years of plant operation. Doses should be compared with relevant regulatory requirements; for example, Appendix I to 10 CFR 50, 10 CFR 20.1201, and 10 CFR 20.1301. For the radiological environmental monitoring program, provide a summary of the results for the most recent calendar year and a trend of the data for the most recent five years of plant operation.
8. Prepare a section describing the chemical hazards. Review applicable plant procedures, plans, and processes designed to prevent and minimize the potential for chemical or hazardous waste release and minimize potential impact on workers, members of the public, and the environment.
9. Prepare a section describing electromagnetic fields including a discussion of the in-scope transmission lines.
10. Prepare a section describing microbiological hazards to workers. Review applicable plant procedures, plans, and processes designed to prevent and minimize the potential for exposure to elevated numbers of microorganisms in unheated and heated water systems onsite.
11. Prepare a section that addresses physical occupational hazards and occupational electric shock hazards.

3.9.4 Evaluation Findings

The reviewer should ensure that the human health information is adequate to serve as a basis for assessing the potential impacts of initial LR or SLR and alternatives. The level of detail of SEIS input would depend on plant- and site-specific factors. The information included in the SEIS should be scaled according to the anticipated magnitudes of the expected impacts. The reviewer should verify that the radiological and nonradiological impact descriptions are consistent, accurate, and given in sufficient detail to serve the needs of the reviewers for ESRPs in other chapters.

3.10 Environmental Justice

3.10.1 Areas of Review

This ESRP provides guidance on describing minority populations, low-income populations, and Indian Tribes that could experience disproportionately high and adverse human health and environmental effects from continued reactor operations and refurbishment activities associated with license renewal (initial LR or SLR).

The descriptions to be provided by this review should be of sufficient detail to permit the assessment and evaluation of human health and environmental effects in ESRP 4.10.

Data and Information Needs

Data and information on minority populations, low-income populations, and Indian Tribes depend on the location of the nuclear power plant. Information can be gleaned from the applicant's ER and from the sources discussed below. The following data or information should be obtained:

- Demographic data are available from online the geographic information systems (GIS) (e.g., EJScreen, an online GIS tool offered by EPA) and U.S. Bureau of the Census data, including Topologically Integrated Geographic Encoding and Referencing geographic system mapping files.[2] In addition, 50-mile (80-kilometer) radius demographic data can be generated using the Circular Area Profiles GIS system from the Missouri Census Data Center, a cooperative program with the Census Bureau's State Data Center Program.[3]
- Comments and concerns expressed by representatives of minority and low-income (environmental justice) communities and Indian Tribes located near the nuclear power plant site (from the ER and comments made during scoping). As part of scoping, it is important to consult with representatives of environmental justice communities and Indian Tribes having specific knowledge about the locations, resource dependencies, customs and practices, and preexisting health and socioeconomic conditions of these populations. This will ensure that environmental justice communities, including transient populations and Indian Tribes are not overlooked and in assessing the potential human health and environmental effects of the proposed action on those populations and communities. Resources devoted to this outreach should be commensurate with the likelihood of human health and environmental effects.

[2] The Topologically Integrated Geographic Encoding and Referencing GIS mapping file system is accessible online at https://www.census.gov/geographies/mapping-files.html.

[3] Missouri Census Data Center, Circular Area Profiles GIS system, is accessible online at https://mcdc.missouri.edu/.

- A description of unique consumption patterns (e.g., subsistence agriculture, hunting, and fishing) and resource dependencies reflecting the traditional or cultural practices of minority populations, low-income populations, and Indian Tribes and existing health conditions.

3.10.2 Acceptance Criteria

In addition to the criteria specified in Section 3.1.2, acceptance criteria for the environmental justice review are based on the following:

- Executive Order 12898 (59 FR 7629) concerning Federal actions to address environmental justice in minority and low-income populations
- "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions," (69 FR 52040) affirms the Commission's commitment to the general goals of Executive Order 12898 and strives to meet those goals as part of the NEPA review for licensing actions.
- 10 CFR 51.53(c)(3)(ii)(N). Applicants shall provide information on the general demographic composition of minority and low-income populations and communities (by race and ethnicity), and Indian Tribes in the vicinity of the nuclear power plant that could be disproportionately affected by license renewal, including continued reactor operations and refurbishment activities.

Additional regulatory positions and specific criteria in support of the regulations identified above are as follows:

- Council on Environmental Quality (CEQ) guidance for addressing environmental justice, Environmental Justice: Guidance under the National Environmental Policy Act, December 10, 1997 (CEQ 1997)
- Federal Interagency Working Group on Environmental Justice and NEPA Committee, Promising Practices for EJ Methodologies in NEPA Reviews, March 2016 (EJ IWG 2016)
- Guidance for specific information requirements for the environmental justice review is contained in Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-203, Revision 4: Procedural Guidance for Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues. LIC-203 (NRC 2020c) is revised periodically. Refer to the latest revision for current guidance.

3.10.3 Review Procedures

The review procedure should be as follows:

1. Identify minority populations, low-income populations, and Indian Tribes within a 50-mile (80-kilometer) radius of the nuclear power plant. For each census block group within this area, minority and low-income populations are identified when (1) the minority or low-income population of an impacted area exceeds 50 percent or (2) the minority or low-income population percentage of the impacted area is meaningfully greater than the minority or low-income population percentage in the general population or other appropriate unit of geographic analysis (e.g., 50-mile radius geographic area or county). All block groups with minority and low-income percentages higher than the percentage for the geographic area and all affected Indian Tribes should be identified on the maps.
2. Identify environmental justice issues and unique characteristics of minority and low-income populations/communities and affected Indian Tribes during scoping.

3. Determine geographic distribution by race, ethnicity, and poverty, as well as delineation of Tribal lands. Identify any unique characteristics of minority and low-income populations and the "special character" of communities and affected Indian Tribes near the nuclear power plant.

   - Minority populations are individual(s) who self-identify as members of the following population groups:
     - Race: (Not Hispanic or Latino)
       a) Black or African American
       b) American Indian or Alaska Native
       c) Asian
       d) Native Hawaiian and Other Pacific Islander
       e) some other race
       f) two or more races
       g) Ethnicity: Hispanic or Latino (of any race)
   - Low-income population is defined as individuals or families living below the poverty level as defined by the U.S. Census Bureau (e.g., the U.S. Census Bureau's Current Population Reports, Series P-60 on Income and Poverty).
   - Sources of information for determining geographic distribution and location of minority populations, low-income populations, and Indian Tribes:
     - Online or other GIS tools (e.g., ArcGIS, EJScreen, or CAPS).

3.10.4 Evaluation Findings

The amount of information in the SEIS is governed by the potential human health and environmental effects on minority populations, low-income populations, or Indian Tribes from continued reactor operations and refurbishment associated with license renewal. The following information should be included in the SEIS:

- A general description of minority populations, low-income populations, and Indian Tribes near the nuclear power plant. This description is to be accompanied by at least two maps that highlight (1) the location of minority populations and Indian Tribes and (2) low-income populations, respectively. These maps should be based on most recent decennial Census supported by American Community Survey data, supplemented by other information, if available.
- A description of affected environmental justice communities and Indian Tribes with unique consumption patterns (e.g., subsistence agriculture, hunting, and fishing) and resource dependencies reflecting the traditional or cultural practices.
- A description of any additional cultural, economic, or human health conditions that could result in disproportionately high and adverse human health and environmental effects (including socioeconomic).

3.11 Waste Management

3.11.1 Areas of Review

This ESRP provides guidance for the preparation of a SEIS section describing the applicant's radioactive and nonradioactive waste management and effluent control systems.

The scope includes describing the existing systems, describing any changes to the systems to be made during the license renewal term (initial LR or SLR) or refurbishment.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors; the level of detail should be scaled according to the anticipated magnitude of the potential impacts. The following data or information may be needed.

Radioactive Waste Systems

- A description of the radioactive liquid and gaseous waste management systems and effluent control systems designed to collect, store, treat, and dispose of all wastes
- Identification of principal release points for radioactive materials to the environment and historical information on composition of discharges
- Identification of any onsite direct radiation sources outside of the plant (e.g., storage of contaminated equipment, low-level radioactive waste storage, or storage of used steam generators)
- Information on the changes in radiological waste impacts from operation that are expected during the renewal term
- Identification of current waste disposal activities including size and location of waste disposal sites (onsite, as applicable, and offsite) as well as the plans for ultimate treatment and/or restoration of retired disposal sites
- A discussion of spent nuclear fuel storage plans for the license renewal term (e.g., ISFSI details, expansion plans)
- A summary of the sources, types, quantities, and composition of all radioactive waste materials (e.g., liquid, solid and gaseous material within the plant) within the plant and expected during the renewal period
- Identification of low-level radioactive waste storage capacity/disposal for the plant over the license renewal term
- Identification of anticipated disposal plans for all wastes (i.e., transfer to an offsite waste disposal facility or a treatment facility or store onsite)
- A description of waste minimization plans or procedures that identifies process changes that can be made to reduce or eliminate waste, including a description of methods to minimize the volume of waste
- Identification of waste management cumulative impacts
- Site-specific effluent monitoring reports for the last five years of plant operation. (Note: annual radioactive effluent release reports are issued by plant licensees and include a summary of radioactive effluent releases from all the facilities on the plant site, including the

waste management and storage facilities. The same reports also provide data on the volume and radioactivity content of solid radioactive waste shipped offsite for processing and disposal. Similarly, the radiological environmental monitoring program conducted by nuclear power plant licensees measures the direct radiation as well as environmental concentrations of all radionuclides originating at the site as well as background radiation).

Nonradioactive Waste Systems

- Description of the nonradioactive waste management systems/effluent treatment systems (i.e., identification of the type of waste generated, regulatory permits, release points, storage, and disposal)
- Identification of source, types, and quantities of nonradioactive liquid and solid waste material within the plant
- Identification of principal release points for nonradioactive materials to the environment and historical information on composition of discharges (i.e., non-radioactive waste management systems effluent release points) and the State/Federal regulations governing them
- Documentation of the permits issued by the agencies responsible for permitting nonradioactive waste systems for atmospheric, liquid, or solid effluents (e.g., NPDES or Resource Conservation and Recovery Act permits)
- Description of a pollution prevention and waste minimization program, if available
- Information on the changes in nonradiological impacts from operation that are expected during the renewal term.

3.11.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 3.1.2, the acceptance criteria for the evaluation of radioactive and nonradioactive waste management are based on the following requirements:

- 10 CFR 50.34a, Design objectives for equipment to control releases of radioactive material in effluents - nuclear power reactors
- 10 CFR 50.36a, Technical specifications on effluents from nuclear power reactors
- 10 CFR Part 20, Standards for Protection Against Radiation
- 10 CFR 50.72, Immediate notification requirements for operating nuclear power reactors
- 10 CFR 50.73, Licensee event report system
- 10 CFR 50.75(g), Reporting and recordkeeping for decommissioning planning
- 10 CFR Part 50, Appendix I, Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion “As Low As Is Reasonably Achievable” for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents
- 10 CFR Part 50, Appendix A; Design Criteria 60, Control of Releases of Radioactive Materials to the Environment
- 10 CFR Part 50, Appendix A; Design Criteria 61, Fuel storage and handling and radioactivity control
- 10 CFR Part 50, Appendix A; Design Criteria 64, Monitoring Radioactivity Releases

- 40 CFR Part 190, Environmental Radiation Protection Standards for Nuclear Power Operations.

Additional regulatory positions and specific criteria in support of the regulations identified above are as follows:

- Regulatory Guide 1.109, Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I (NRC 1977)
- Regulatory Guide 4.1, Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants (NRC 2009b)
- Regulatory Guide 4.2, Preparation of Environmental Reports for Nuclear Power Stations (NRC 2018b)
- Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Program (Normal Operation) - Effluent Streams and the Environment (NRC 2007b)
- Regulatory Guide 1.21, Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants (NRC 2021)
- Regulatory Guide 1.143, Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants (NRC 2001)
- Power reactor licensees are required to keep the public dose from radioactive effluents ALARA. The ALARA criteria is contained in Appendix I of 10 CFR Part 50.
- As further specified in Appendix I to 10 CFR Part 50 concerning their effluent discharges,

  "The licensee shall establish an appropriate surveillance and monitoring program to:

  1. Provide data on quantities of radioactive material released in liquid and gaseous effluents;
  2. Provide data on measurable levels of radiation and radioactive materials in the environment to evaluate the relationship between quantities of radioactive material released in effluents and resultant radiation doses to individuals from principal pathways of exposure; and
  3. Identify changes in the use of unrestricted areas (e.g., for agricultural purposes) to permit modifications in monitoring programs for evaluating doses to individuals from principal pathways of exposure."

3.11.3 Review Procedures

The material to be prepared for the radioactive and nonradioactive waste management and effluent control systems is informational in nature. No specific analysis is required. The following review steps are suggested.

Radioactive Waste Systems

1. Review the discussion of waste management and pollution prevention including the discussions of plant radioactive waste management systems in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).
2. Obtain a description of the radioactive waste management and effluent control systems for the applicant's plant. The description should include identification of release points, a description of all current waste systems including quantities, composition, and frequency of waste generation.
3. Obtain a description of the sources, types, quantities, and composition of all radioactive wastes expected from continued operation.
4. Obtain information on anticipated disposal plans for all wastes.
5. Obtain a description of low-level radioactive waste storage capacity/disposal for the plant over the license renewal term.
6. Obtain information on any planned changes to the radioactive waste management and effluent control systems that would affect releases and exposures from continued plant operations during the license renewal term.
7. Obtain information on planned changes to the radioactive waste management and effluent control systems during refurbishment.
8. Obtain information on pollution prevention and waste minimization measures in place.
9. Obtain information on the spent nuclear fuel storage plans for license renewal term.
10. Obtain site-specific effluent monitoring reports for the last five years of plant operation.
11. Prepare a section describing the radioactive waste management and effluent control systems for the SEIS. This section should include general descriptions of gaseous, liquid, and solid waste processing systems. It should also generally describe the applicant's gaseous and liquid effluent monitoring systems.

Nonradioactive Waste Systems

1. Review the discussion of waste management and pollution prevention including the discussions of plant nonradioactive waste management systems in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).
2. Obtain a description of the nonradioactive wastes and effluent control systems for the applicant's plant.
3. Obtain information on changes to the nonradioactive waste and effluent control systems that could affect releases from continued plant operations during the renewal term.
4. Obtain information on planned changes to the nonradioactive waste and effluent control systems during refurbishment.
5. Obtain a description of the pollution prevention and waste minimization program or policy, if available.
6. Prepare a section describing the nonradioactive waste and effluent control systems for the SEIS.

3.11.4 Evaluation Findings

The depth and extent of the input to the SEIS would depend on plant- and site-specific factors. The level of detail of information included in the SEIS should be scaled according to the anticipated magnitudes of the expected impacts. The reviewer should verify that the radioactive and nonradioactive waste management and effluent control system descriptions are consistent, accurate, and given in sufficient detail to serve the needs of the reviewers for ESRPs in other chapters.

3.12 Greenhouse Gas Emissions and Climate Change

3.12.1 Areas of Review

This ESRP provides guidance for the review of greenhouse gas (GHG) emissions data including preparation of a SEIS section describing the applicant's GHG plant-specific emissions and climate change monitoring, mitigation, or related initiatives. This information supports the evaluation of GHG emission impacts on climate change from continued plant operations and refurbishment associated with license renewal (initial LR or SLR).

In CLI-09-21 (NRC 2009a), the Commission provided direction to the staff on addressing GHG issues in environmental reviews. Accordingly, the scope of this ESRP includes (1) consideration of GHG emissions related to continued plant operations and refurbishment associated with license renewal, (2) observed regional climate change indicators (e.g., precipitation, temperature, storm frequency and severity, sea level rise, floods, and droughts) and projected regional climate changes, and (4) climate change impacts to resource areas affected by license renewal.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site and plant-specific factors. The following data or information may be needed:

- county-level GHG emission sources and associated reported GHG emission data
- a description of nuclear power plant site direct (e.g., stationary combustion sources, refrigeration systems, electrical transmission and distribution systems) and indirect (e.g., worker vehicles, purchased electricity) GHG emission sources from normal nuclear plant operations and quantified annual GHG emissions from these sources
- if refurbishment activities are planned, a description of GHG emitting sources (e.g., motorized equipment, construction vehicles, and worker vehicles) and quantitative GHG emission data for each source
- description of regional observed changes in climate (e.g., ambient temperature, precipitation, sea level rise) from national climate assessment reports (e.g., U.S. Global Change Research Program, Intergovernmental Panel on Climate Change)
- observed changes or trends in climate parameters from onsite monitoring (e.g., warming temperature trend from onsite meteorological station, warming trend in surface water temperatures)
- quantitative descriptions of regional projected climate changes and impacts (climate change impacts should focus on those resource areas that are impacted by license renewal).

3.12.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 3.1.2 of this ESRP, the acceptance criteria for GHG and climate change information are based on the relevant requirements of the following:

- 10 CFR 51.53(c)(3)(ii)(Q). Applicants shall include an assessment of the effects of any observed and projected future changes in climate on environmental resource areas that are affected by license renewal, as well as any mitigation measures implemented at the applicant's plant to address climate change impacts.

Commission Memorandum and Order (NRC 2009a, CLI-09-21, November 3, 2009) providing direction to the NRC staff: "We expect the Staff to include consideration of carbon dioxide and other greenhouse gas emissions in its environmental reviews for major licensing actions under the National Environmental Policy Act. The Staff's analysis for reactor applications should encompass emissions from the uranium fuel cycle as well as from construction and operation of the facility to be licensed. The Staff should ensure that these issues are addressed consistently in agency NEPA evaluations and, as appropriate, update Staff guidance documents to address greenhouse gas emissions."

Additional regulatory positions and specific criteria in support of requirements above are as follows:

- Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act; Final Rule (74 FR 66496) – This rule summarizes the Environmental Protection Agency's (EPA) finding that GHGs in the atmosphere endanger public health and welfare.
- 40 CFR Part 98, "Mandatory Greenhouse Gas Reporting" – Establishes mandatory GHG reporting requirements for certain facilities and contains multiple provisions relevant to the air resources reviewer. 40 CFR 98.6 defines various terms, including an explicit definition of compounds included in the term "greenhouse gas." 40 CFR 98.2 establishes an annual reporting threshold of 25,000 metric tons of carbon dioxide (CO_2) equivalent per year for certain facilities, including stationary fuel combustion units.

3.12.3 Review Procedures

The review procedure should be as follows:

1. Identify and quantify direct and indirect sources of GHG emission sources as a result of normal plant operations and refurbishment activities. Direct GHG emissions include those that are owned or controlled by an organization (e.g., stationary and mobile combustion sources at nuclear power plants, fugitive emissions from refrigeration equipment, and transmission lines). Indirect emissions are those associated with an organization's activities but are emitted from sources owned by other entities (e.g., purchase of electricity, worker vehicle emissions). GHG emissions should be presented in units of carbon dioxide equivalents per year.
2. Identify and describe primary county-level GHG emission sources and associated reported GHG emission data.
3. Quantify GHG emissions from replacement power alternatives.

4. Tabulate and compare GHG emission sources from normal plant operations and refurbishment activities, GHG emissions from replacement power alternatives, and county-level emissions.

5. Discuss regional observed changes in climate and climate change information from national climate assessment reports and available onsite monitoring.

3.12.4 Evaluation Findings

The reviewer should ensure that the GHG emissions and climate change information is adequate as a basis for assessment of the effects of continued plant operations and refurbishment associated with license renewal. Scientific knowledge and Federal policies on climate change are rapidly evolving. The climate change reviewer must be cognizant of relevant laws, requirements, and guidance existing at the time of the review. The reviewer should consult with appropriate Federal, State, regional, and local agencies, as well as Indian Tribes, to assess the accuracy of the GHG emissions and climate change information, if necessary.

4.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATING ACTIONS

4.1 Overview

The following sections address the general procedures for evaluating the environmental consequences of (1) the proposed action, which includes the potential impacts from continued reactor operations and refurbishment activities; (2) the no-action alternative, which represents a decision by the U.S. Nuclear Regulatory Commission (NRC) not to renew the operating license of a nuclear power plant beyond the current operating license term; (3) alternative energy sources for replacing existing nuclear generating capacity using other energy sources (including fossil fuel, new nuclear, and renewable energy), (3) alternative energy sources for offsetting existing nuclear generation capacity using conservation and energy efficiency (demand-side management), delayed retirement, or purchased power, and (4) alternatives for reducing adverse impacts (e.g., revisions to operating procedures or design changes such as a new cooling system).

In preparing a supplemental environmental impact statement (SEIS), it is permissible for the staff's evaluation of the potential environmental consequences (impacts) of the proposed action and alternatives to the proposed action to be integrated with the corresponding descriptions of the affected environment for each affected resource area in the same SEIS chapter (see Chapter 3 of this environmental standard review plan [ESRP]).

4.1.1 Areas of Review

This ESRP introduces the material from the reviews conducted under ESRP Sections 4.2 through 4.14. It includes a description of the environmental issues associated with continued operation during the renewal term (initial license renewal [LR] or subsequent license renewal [SLR]) and any refurbishment discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (LR GEIS; NUREG-1437, Revision 2; NRC 2023a) identifies those issues that the staff has determined to be inapplicable to the applicant's plant because of plant design, and directs readers to SEIS sections that discuss the applicable issues.

4.1.2 Acceptance Criteria

The reviewer should ensure that the introductory paragraphs prepared for the environmental consequences description under this ESRP are consistent with the following regulations:

- Title 10 of the *Code of Federal Regulations* 51.45(c) (10 CFR 51.45(c)), "Analysis." The environmental report (ER) must include an analysis that considers and balances the environmental effects of the proposed action, the environmental impacts of replacement power alternatives, and alternatives available for reducing or avoiding adverse environmental effects.
- 10 CFR 51.53(c)(2). The report must contain a description of the proposed action, including the applicant's plans to modify the facility or its administrative control procedures as described in accordance with 10 CFR 54.21 of this chapter. This report must describe in detail the affected environment around the plant, the modifications directly affecting the environment or any plant effluents, and any planned refurbishment activities. In addition, the applicant shall discuss in this report the environmental impacts of alternatives and any other matters discussed in 10 CFR 51.45.

- 10 CFR 51.70(b). The draft environmental impact statement will be concise, clear, and analytic, and written in plain language with appropriate graphics.…The format provided in Section 1(a) of Appendix A of this subpart should be used. The NRC staff will independently evaluate and be responsible for the reliability of all information used in the draft environmental impact statement.
- 10 CFR 51.71(d), concerning the draft environmental impact statement (EIS) will include a preliminary analysis that considers and weighs the environmental effects of the proposed action; the environmental impacts of alternatives to the proposed action; and alternatives available for reducing or avoiding adverse environmental effects, and compliance with environmental-quality standards and requirements that have been imposed by Federal, State, regional, and local agencies and Indian Tribes. A draft SEIS for license renewal will rely on conclusions as amplified by the supporting information in the LR GEIS for Category 1 issues.
- 10 CFR 51.95(c), concerning renewal of an operating license or combined license for a nuclear power plant. Under Parts 52 or 54 of this chapter, the Commission shall prepare an EIS, which is a supplement to the Commission's NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants."
- 10 CFR Part 51, Appendix A to Subpart A, paragraph 7, concerning the environmental consequences of alternatives, including the proposed actions and any mitigating actions which may be taken. Alternatives eliminated from detailed study will be identified and a discussion of those alternatives will be confined to a brief statement of the reasons why the alternatives were eliminated. The level of information for each alternative considered in detail will reflect the depth of analysis required for sound decisionmaking.
- 10 CFR Part 51, Appendix B to Subpart A, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," Table B-1, "Summary of Findings on Environmental Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants."

Additional regulatory positions and specific criteria in support of the regulations identified above are as follows:

- LIC-203, Revision 4, Procedural Guidance for Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues (NRC 2020c).

Technical Rationale

The review conducted under this ESRP leads to the preparation of SEIS sections that incorporate the conclusions in the LR GEIS related to the environmental impacts of continued plant operations during the license renewal term, any proposed refurbishment, the no-action alternative, and alternatives to replace or offset the generating capacity of the plant or to mitigate potential adverse impacts. The review should also address any new and significant information.

4.1.3 Review Procedures

The material to be prepared is informational in nature; no specific analysis of data is required. Environmental issues associated with continued operations and refurbishment during the renewal term (initial LR or SLR) considered in the LR GEIS that were determined to be Category 1 or uncategorized are listed in Table 4-1.

Table 4-1 Category 1 and Uncategorized Issues (Summary of Findings on Environmental Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants)

Environmental Issue	Category	Impact Finding
Land Use		
Onsite land use	1	SMALL. Changes in onsite land use from continued operations and refurbishment associated with license renewal would be a small fraction of the nuclear power plant site and would involve only land that is controlled by the licensee.
Offsite land use	1	SMALL. Offsite land use would not be affected by continued operations and refurbishment associated with license renewal.
Offsite land use in transmission line right-of-ways (ROWs)[(a)]	1	SMALL. Use of transmission line ROWs from continued operations and refurbishment associated with license renewal would continue with no change in land use restrictions.
Visual Resources		
Aesthetic impacts	1	SMALL. No important changes to the visual appearance of plant structures or transmission lines are expected from continued operations and refurbishment associated with license renewal.
Air Quality		
Air quality impacts	1	SMALL. Air quality impacts from continued operations and refurbishment associated with license renewal are expected to be small at all plants. Emissions from emergency diesel generators and fire pumps and routine operations of boilers used for space heating are minor. Impacts from cooling tower particulate emissions have been small. Emissions resulting from refurbishment activities at locations in or near air quality nonattainment or maintenance areas would be short-lived and would cease after these activities are completed. Operating experience has shown that the scale of refurbishment activities has not resulted in exceedance of the de minimis thresholds for criteria pollutants, and best management practices, including fugitive dust controls and the imposition of permit conditions in State and local air emissions permits, would ensure conformance with applicable State or Tribal implementation plans.
Air quality effects of transmission lines[(a)]	1	SMALL. Production of ozone and oxides of nitrogen from transmission lines is insignificant and does not contribute measurably to ambient levels of these gases.
Noise		
Noise impacts	1	SMALL. Noise levels would remain below regulatory guidelines for offsite receptors during continued operations and refurbishment associated

Environmental Issue	Category	Impact Finding
		with license renewal.
Geologic Environment		
Geology and soils	1	SMALL. The impact of continued operations and refurbishment activities on geology and soils would be small for all nuclear power plants and would not change appreciably during the license renewal term.
Surface Water Resources		
Surface-water use and quality (non-cooling system impacts)	1	SMALL. Impacts are expected to be small if best management practices are employed to control soil erosion and spills. Surface water use associated with continued operations and refurbishment associated with license renewal would not increase significantly or would be reduced if refurbishment occurs during a plant outage.
Altered current patterns at intake and discharge structures	1	SMALL. Altered current patterns would be limited to the area in the vicinity of the intake and discharge structures. These impacts have been small at operating nuclear power plants.
Altered salinity gradients	1	SMALL. Effects on salinity gradients would be limited to the area in the vicinity of the intake and discharge structures. These impacts have been small at operating nuclear power plants.
Altered thermal stratification of lakes	1	SMALL. Effects on thermal stratification would be limited to the area in the vicinity of the intake and discharge structures. These impacts have been small at operating nuclear power plants.
Scouring caused by discharged cooling water	1	SMALL. Scouring effects would be limited to the area in the vicinity of the intake and discharge structures. These impacts have been small at operating nuclear power plants.
Discharge of metals in cooling system effluent	1	SMALL. Discharges of metals have not been found to be a problem at operating nuclear power plants with cooling-tower-based heat dissipation systems and have been satisfactorily mitigated at other plants. Discharges are monitored and controlled as part of the National Pollutant Discharge Elimination System (NPDES) permit process.
Discharge of biocides, sanitary wastes, and minor chemical spills	1	SMALL. The effects of these discharges are regulated by State and Federal environmental agencies. Discharges are monitored and controlled as part of the NPDES permit process. These impacts have been small at operating nuclear power plants.
Surface water use conflicts (plants with once-through cooling systems)	1	SMALL. These conflicts have not been found to be a problem at operating nuclear power plants with once-through heat dissipation systems.
Effects of dredging on surface water quality	1	SMALL. Dredging to remove accumulated sediments in the vicinity of intake and discharge structures and to maintain barge shipping has not been found to be a problem for surface water

Environmental Issue	Category	Impact Finding
		quality. Dredging is performed under permit from the U.S. Army Corps of Engineers, and possibly, from other State or local agencies.
Temperature effects on sediment transport capacity	1	SMALL. These effects have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.
Groundwater Resources		
Groundwater contamination and use (non-cooling system impacts)	1	SMALL. Extensive dewatering is not anticipated from continued operations and refurbishment associated with license renewal. Industrial practices involving the use of solvents, hydrocarbons, heavy metals, or other chemicals, and/or the use of wastewater ponds or lagoons have the potential to contaminate site groundwater, soil, and subsoil. Contamination is subject to State or US. Environmental Protection Agency (EPA) regulated cleanup and monitoring programs. The application of best management practices for handling any materials produced or used during these activities would reduce impacts.
Groundwater use conflicts (plants that withdraw less than 100 gallons per minute [gpm])	1	SMALL. Plants that withdraw less than 100 gpm are not expected to cause any groundwater use conflicts.
Groundwater quality degradation resulting from water withdrawals	1	SMALL. Groundwater withdrawals at operating nuclear power plants would not contribute significantly to groundwater quality degradation.
Terrestrial Resources		
Exposure of terrestrial organisms to radionuclides	1	SMALL. Doses to terrestrial organisms from continued nuclear power plant operation and refurbishment during the license renewal term would be expected to remain well below U.S. Department of Energy exposure guidelines developed to protect these organisms.
Cooling system impacts on terrestrial resources (plants with once-through cooling systems or cooling ponds)	1	SMALL. Continued operation of nuclear power plant cooling systems during license renewal could cause thermal effluent additions to receiving waterbodies, chemical effluent additions to surface water or groundwater, impingement of waterfowl, disturbance of terrestrial plants and wetlands from maintenance dredging, and erosion of shoreline habitat. However, plants where these impacts have occurred successfully mitigated the impact, and it is no longer of concern. These impacts are not expected to be significant issues during the license renewal term.
Cooling tower impacts on terrestrial plants	1	SMALL. Continued operation of nuclear power plant cooling towers could deposit particulates and water droplets or ice on vegetation and lead to structural damage or changes in terrestrial plant communities. However, nuclear power plants where these impacts occurred have successfully mitigated the impact. These

Environmental Issue	Category	Impact Finding
		impacts are not expected to be significant issues during the license renewal term.
Bird collisions with plant structures and transmission lines[a]	1	SMALL. Bird mortalities from collisions with nuclear power plant structures and in-scope transmission lines would be negligible for any species and are unlikely to threaten the stability of local or migratory bird populations or result in noticeable impairment of the function of a species within the ecosystem. These impacts are not expected to be significant issues during the license renewal term.
Transmission line right-of-way (ROW) management impacts on terrestrial resources[a]	1	SMALL. In-scope transmission lines tend to occupy only industrial-use or other developed portions of nuclear power plant sites and, therefore, effects of ROW maintenance on terrestrial plants and animals during the license renewal term would be negligible. Application of best management practices would reduce the potential for impacts.
Electromagnetic field effects on terrestrial plants and animals[a]	1	SMALL. In-scope transmission lines tend to occupy only industrial-use or other developed portions of nuclear power plant sites and, therefore, the effects of electromagnetic fields on terrestrial plants and animals during the license renewal term would be negligible.
Aquatic Resources		
Impingement mortality and entrainment of aquatic organisms (plants with cooling towers)	1	SMALL. No significant impacts on aquatic populations associated with impingement mortality and entrainment at nuclear power plants with cooling towers have been reported, including effects on fish and shellfish from direct mortality, injury, or other sublethal effects. Impacts during the license renewal term would be similar and small. Further, the effects of these cooling water intake systems would be mitigated through adherence to NPDES permit conditions established pursuant to CWA Section 316(b).
Entrainment of phytoplankton and zooplankton	1	SMALL. Entrainment has not resulted in noticeable impacts on phytoplankton or zooplankton populations near operating nuclear power plants. Impacts during the license renewal term would be similar and small. Further, the effects would be mitigated through adherence to NPDES permit conditions established pursuant to CWA Section 316(b).
Effects of thermal effluents on aquatic organisms (plants with cooling towers)	1	SMALL. Acute, sublethal, and community-level effects of thermal effluents have not resulted in noticeable impacts on aquatic communities at nuclear power plants with cooling towers. Impacts during the license renewal term would be similar and small. Further, effects would be mitigated through adherence to state water quality criteria or CWA Section 316(a) variances.

Environmental Issue	Category	Impact Finding
Infrequently reported effects of thermal effluents	1	SMALL. Continued operation of nuclear power plant cooling systems could result in certain infrequently reported thermal impacts, including cold shock, thermal migration barriers, accelerated maturation of aquatic insects, proliferation of aquatic nuisance organisms, depletion of dissolved oxygen, gas supersaturation, eutrophication, and increased susceptibility of exposed fish and shellfish to predation, parasitism, and disease. Most of these effects have not been reported at operating nuclear power plants. Plants that have experienced these impacts successfully mitigated the impact, and it is no longer of concern. Infrequently reported thermal impacts are not expected to be significant issues during the license renewal term.
Effects of nonradiological contaminants on aquatic organisms	1	SMALL. Heavy metal leaching from condenser tubes was an issue at several operating nuclear power plants. These plants successfully mitigated the issue, and it is no longer of concern. Cooling system effluents would be the primary source of nonradiological contaminants during the license renewal term. Implementation of best management practices and adherence to NPDES permit limitations would minimize the effects of these contaminants on the aquatic environment.
Exposure of aquatic organisms to radionuclides	1	SMALL. Doses to aquatic organisms from continued nuclear power plant operation and refurbishment during the license renewal term would be expected to remain well below U.S. Department of Energy exposure guidelines developed to protect these aquatic organisms.
Effects of dredging on aquatic resources	1	SMALL. Dredging at nuclear power plants is expected to occur infrequently, would be of relatively short duration, and would affect relatively small areas. Continued operation of many plants may not require any dredging. Adherence to best management practices and CWA Section 404 permit conditions would mitigate potential impacts at plants where dredging is necessary to maintain function or reliability of cooling systems. Dredging is not expected to be a significant issue during the license renewal term.
Non-cooling system impacts on aquatic resources	1	SMALL. No significant impacts on aquatic resources associated with landscape and grounds maintenance, stormwater management, or ground-disturbing activities at operating nuclear power plants have been reported. Impacts from continued operation and refurbishment during the license renewal term would be similar and small. Application of best management practices and other conservation initiatives would reduce the potential for impacts.

Environmental Issue	Category	Impact Finding
Impacts of transmission line right-of-way (ROW) management on aquatic resources[a]	1	SMALL. In-scope transmission lines tend to occupy only industrial-use or other developed portions of nuclear power plant sites and, therefore, the effects of ROW maintenance on aquatic plants and animals during the license renewal term would be negligible. Application of best management practices would reduce the potential for impacts.
Socioeconomics		
Employment and income, recreation and tourism	1	SMALL. Although most nuclear plants have large numbers of employees with higher than average wages and salaries, employment, income, recreation, and tourism impacts from continued operations and refurbishment associated with license renewal are expected to be small.
Tax revenue	1	SMALL. Nuclear plants provide tax revenue to local jurisdictions in the form of property tax payments, payments in lieu of tax (PILOT), or tax payments on energy production. The amount of tax revenue paid during the license renewal term as a result of continued operations and refurbishment associated with license renewal is not expected to change.
Community services and education	1	SMALL. Changes resulting from continued operations and refurbishment associated with license renewal to local community and educational services would be small. With little or no change in employment at the licensee's plant, value of the power plant, payments on energy production, and PILOT payments expected during the license renewal term, community and educational services would not be affected by continued power plant operations.
Population and housing	1	SMALL. Changes resulting from continued operations and refurbishment associated with license renewal to regional population and housing availability and value would be small. With little or no change in employment at the licensee's plant expected during the license renewal term, population and housing availability and values would not be affected by continued power plant operations.
Transportation	1	SMALL. Changes resulting from continued operations and refurbishment associated with license renewal to traffic volumes would be small.
Human Health		
Radiation exposures to plant workers	1	SMALL. Occupational doses from continued operations and refurbishment associated with license renewal are expected to be within the range of doses experienced during the current license term, and would continue to be well below regulatory limits.
Radiation exposures to the	1	SMALL. Radiation doses to the public from

Environmental Issue	Category	Impact Finding
public		continued operations and refurbishment associated with license renewal are expected to continue at current levels, and would be well below regulatory limits.
Chemical hazards	1	SMALL. Chemical hazards to plant workers resulting from continued operations and refurbishment associated with license renewal are expected to be minimized by the licensee implementing good industrial hygiene practices as required by permits and Federal and State regulations. Chemical releases to the environment and the potential for impacts to the public are expected to be minimized by adherence to discharge limitations of NPDES and other permits.
Microbiological hazards to plant workers	1	SMALL. Occupational health impacts are expected to be controlled by continued application of accepted industrial hygiene practices to minimize worker exposures as required by permits and Federal and State regulations.
Electromagnetic fields (EMFs)[(a)]	N/A	Uncertain impact. Studies of 60-Hz EMFs have not uncovered consistent evidence linking harmful effects with field exposures. EMFs are unlike other agents that have a toxic effect (e.g., toxic chemicals and ionizing radiation) in that dramatic acute effects cannot be forced and longer-term effects, if real, are subtle. Because the state of the science is currently inadequate, no generic conclusion on human health impacts is possible.
Physical occupational hazards	1	SMALL. Occupational safety and health hazards are generic to all types of electrical generating stations, including nuclear power plants, and are of small significance if the workers adhere to safety standards and use protective equipment as required by Federal and State regulations.
Postulated Accidents		
Design-basis accidents	1	SMALL. The NRC staff has concluded that the environmental impacts of design-basis accidents are of small significance for all plants.
Severe accidents[(b)]	1	SMALL. The probability-weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, and societal and economic impacts from severe accidents are small for all plants. Severe accident mitigation alternatives do not warrant further plant-specific analysis because the demonstrated reductions in population dose risk and continued severe accident regulatory improvements substantially reduce the likelihood of finding cost-effective significant plant improvements.
Waste Management		
Low-level waste storage	1	SMALL. The comprehensive regulatory controls

Environmental Issue	Category	Impact Finding
and disposal		that are in place and the low public doses being achieved at reactors ensure that the radiological impacts to the environment would remain small during the license renewal term.
Onsite storage of spent nuclear fuel	1	During the license renewal term, SMALL. The expected increase in the volume of spent fuel from an additional 20 years of operation can be safely accommodated onsite during the license renewal term with small environmental impacts through dry or pool storage at all plants. For the period after the licensed life for reactor operations, the impacts of onsite storage of spent nuclear fuel during the continued storage period are discussed in NUREG–2157 and as stated in § 51.23(b), shall be deemed incorporated into this issue.
Offsite radiological impacts of spent nuclear fuel and high-level waste disposal	1	For the high-level waste and spent-fuel disposal component of the fuel cycle, the EPA established a dose limit of 0.15 mSv (15 millirem) per year for the first 10,000 years and 1.0 mSv (100 millirem) per year between 10,000 years and 1 million years for offsite releases of radionuclides at the proposed repository at Yucca Mountain, Nevada. The Commission concludes that the impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the impacts of spent fuel and high level waste disposal, this issue is considered Category 1.
Mixed-waste storage and disposal	1	SMALL. The comprehensive regulatory controls and the facilities and procedures that are in place ensure proper handling and storage, as well as negligible doses and exposure to toxic materials for the public and the environment at all plants. License renewal would not increase the small, continuing risk to human health and the environment posed by mixed waste at all plants. The radiological and nonradiological environmental impacts of long-term disposal of mixed waste from any individual plant at licensed sites are small.
Nonradioactive waste storage and disposal	1	SMALL. No changes to systems that generate nonradioactive waste are anticipated during the license renewal term. Facilities and procedures are in place to ensure continued proper handling, storage, and disposal, as well as negligible exposure to toxic materials for the public and the environment at all plants.

Environmental Issue	Category	Impact Finding
Greenhouse Gas Emissions and Climate Change		
Greenhouse gas impacts on climate change	1	SMALL. Greenhouse gas impacts on climate change from continued operations and refurbishment associated with license renewal are expected to be small at all plants. Greenhouse gas emissions from routine operations of nuclear power plants are typically very minor, because such plants, by their very nature, do not normally combust fossil fuels to generate electricity. Greenhouse gas emissions from construction vehicles and other motorized equipment for refurbishment activities would be intermittent and temporary, restricted to the refurbishment period. Worker vehicle greenhouse gas emissions for refurbishment would be similar to worker vehicle emissions from normal nuclear power plant operations.
Uranium Fuel Cycle		
Offsite radiological impacts – individual impacts from other than the disposal of spent fuel and high-level waste	1	SMALL. The impacts to the public from radiological exposures have been considered by the Commission in Table S-3 of this part. Based on information in the GEIS, impacts to individuals from radioactive gaseous and liquid releases, including radon-222 and technetium-99, would remain at or below the NRC's regulatory limits.
Offsite radiological impacts – collective impacts from other than the disposal of spent fuel and high-level waste	1	There are no regulatory limits applicable to collective doses to the general public from fuel-cycle facilities. The practice of estimating health effects on the basis of collective doses may not be meaningful. All fuel-cycle facilities are designed and operated to meet the applicable regulatory limits and standards. The Commission concludes that the collective impacts are acceptable. The Commission concludes that the impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the collective impacts of the uranium fuel cycle, this issue is considered Category 1.
Nonradiological impacts of the uranium fuel cycle	1	SMALL. The nonradiological impacts of the uranium fuel cycle resulting from the renewal of an operating license for any plant would be small.
Transportation	1	SMALL. The impacts of transporting materials to and from uranium-fuel-cycle facilities on workers, the public, and the environment are expected to be small.

Environmental Issue	Category	Impact Finding
Termination of Nuclear Power Plant Operations and Decommissioning		
Termination of plant operations and decommissioning	1	SMALL. License renewal is expected to have a negligible effect on the impacts of terminating operations and decommissioning on all resources.

(a) This issue applies only to the in-scope portion of electric power transmission lines, which are defined as transmission lines that connect the nuclear power plant to the substation where electricity is fed into the regional power distribution system and transmission lines that supply power to the nuclear plant from the grid.
(b) Although the NRC does not anticipate any license renewal applications for nuclear power plants for which a previous severe accident mitigation design alternative (SAMDA) or severe accident mitigation alternative (SAMA) analysis has not been performed, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives and would be the functional equivalent of a Category 2 issue requiring site-specific analysis.

Issues and processes common to all nuclear power plants having generic (i.e., the same or similar) environmental impacts are considered Category 1 issues. In the absence of new and significant information, the conclusions in the LR GEIS may be adopted in the SEIS. Category 2 issues are those issues that cannot be generically dispositioned and require a plant-specific analysis to determine the level of impact. These issues are listed in Table 4-2.

Table 4-2 Category 2 Issues (Summary of Findings on Environmental Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants)

Environmental Issue	Category	Impact Finding
Surface Water Resources		
Surface water use conflicts (plants with cooling ponds or cooling towers using makeup water from a river)	2	SMALL or MODERATE. Impacts could be of small or moderate significance, depending on makeup water requirements, water availability, and competing water demands.
Groundwater Resources		
Groundwater use conflicts (plants that withdraw more than 100 gallons per minute [gpm])	2	SMALL, MODERATE, or LARGE. Plants that withdraw more than 100 gpm could cause groundwater use conflicts with nearby groundwater users.
Groundwater use conflicts (plants with closed-cycle cooling systems that withdraw makeup water from a river)	2	SMALL, MODERATE, or LARGE. Water use conflicts could result from water withdrawals from rivers during low-flow conditions, which may affect aquifer recharge. The significance of impacts would depend on makeup water requirements, water availability, and competing water demands.
Groundwater quality degradation (plants with cooling ponds)	2	SMALL or MODERATE. Sites with cooling ponds could degrade groundwater quality. The significance of the impact would depend on site-specific conditions including cooling pond water quality, site hydrogeologic conditions (including the interaction of surface water and groundwater), and the location, depth, and pump rate of water wells.
Radionuclides released to groundwater	2	SMALL or MODERATE. Leaks of radioactive liquids from plant components and pipes have occurred at numerous plants. Groundwater protection programs have been established at all operating nuclear power plants to minimize the potential impact from any inadvertent releases. The magnitude of impacts would depend on site-

Environmental Issue	Category	Impact Finding
		specific characteristics.
Terrestrial Resources		
Non-cooling system impacts on terrestrial resources	2	SMALL, MODERATE, or LARGE. The magnitude of effects of continued nuclear power plant operation and refurbishment, unrelated to operation of the cooling system, would depend on numerous site-specific factors, including ecological setting, planned activities during the license renewal term, and characteristics of the plants and animals present in the area. Application of best management practices and other conservation initiatives would reduce the potential for impacts.
Water use conflicts with terrestrial resources (plants with cooling ponds or cooling towers using makeup water from a river)	2	SMALL or MODERATE. Nuclear power plants could consume water at rates that cause occasional or intermittent water use conflicts with nearby and downstream terrestrial and riparian communities. Such impacts could noticeably affect riparian or wetland species or alter characteristics of the ecological environment during the license renewal term. The one plant where impacts have occurred successfully mitigated the impact. Impacts are expected to be small at most nuclear power plants but could be moderate at some.
Aquatic Resources		
Impingement mortality and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds)	2	SMALL, MODERATE, or LARGE. The impacts of impingement mortality and entrainment would generally be small at nuclear power plants with once-through cooling systems or cooling ponds that have implemented best technology requirements for existing facilities under Clean Water Act Section 316(b). For all other plants, impacts could be small, moderate, or large depending on characteristics of the cooling water intake system, results of impingement and entrainment studies performed at the plant, trends in local fish and shellfish populations, and implementation of mitigation measures.
Effects of thermal effluents on aquatic organisms (plants with once-through cooling systems or cooling ponds)	2	SMALL, MODERATE, or LARGE. Acute, sublethal, and community-level effects of thermal effluents on aquatic organisms would generally be small at nuclear power plants with once-through cooling systems or cooling ponds that adhere to state water quality criteria or that have and maintain a valid CWA Section 316(a) variance. For all other plants, impacts could be small, moderate, or large depending on site-specific factors, including ecological setting of the plant; characteristics of the cooling system and effluent discharges; and characteristics of the fish, shellfish, and other aquatic organisms present in the area.
Water use conflicts with aquatic resources (plants with cooling ponds or cooling towers using	2	SMALL or MODERATE. Nuclear power plants could consume water at rates that cause occasional or intermittent water use conflicts with nearby and downstream aquatic communities.

Environmental Issue	Category	Impact Finding
makeup water from a river)		Such impacts could noticeably affect aquatic plants or animals or alter characteristics of the ecological environment during the license renewal term. The one plant where impacts have occurred successfully mitigated the impact. Impacts are expected to be small at most nuclear power plants but could be moderate at some.
Federally Protected Ecological Resources		
Endangered Species Act: federally listed species and critical habitats under U.S. Fish and Wildlife jurisdiction	2	The potential effects of continued nuclear power plant operation and refurbishment on federally listed species and critical habitats would depend on numerous site-specific factors, including the ecological setting; listed species and critical habitats present in the action area; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and other ground-disturbing activities. Consultation with the U.S. Fish and Wildlife Service under Endangered Species Act Section 7(a)(2) would be required if license renewal may affect listed species or critical habitats under this agency's jurisdiction.
Endangered Species Act: federally listed species and critical habitats under National Marine Fisheries Service jurisdiction	2	The potential effects of continued nuclear power plant operation and refurbishment on federally listed species and critical habitats would depend on numerous site-specific factors, including the ecological setting; listed species and critical habitats present in the action area; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and other ground-disturbing activities. Consultation with the National Marine Fisheries Service under Endangered Species Act Section 7(a)(2) would be required if license renewal may affect listed species or critical habitats under this agency's jurisdiction.
Magnuson-Stevens Act: essential fish habitat	2	The potential effects of continued nuclear power plant operation and refurbishment on essential fish habitat would depend on numerous site-specific factors, including the ecological setting; essential fish habitat present in the area, including habitats of particular concern; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and other activities that may affect aquatic habitats. Consultation with the National Marine Fisheries Service under Magnuson-Stevens Act Section 305(b) would be required if license renewal could result in adverse effects to essential fish habitat.
National Marine Sanctuaries Act: sanctuary resources	2	The potential effects of continued nuclear power plant operation and refurbishment on sanctuary resources would depend on numerous site-specific factors, including the ecological setting; national marine sanctuaries present in the area; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and other activities that may affect aquatic habitats. Consultation with the Office of National Marine Sanctuaries under National Marine Sanctuaries Act Section 304(d)

Environmental Issue	Category	Impact Finding
		would be required if license renewal could destroy, cause the loss of, or injure sanctuary resources.
Historic and Cultural Resources		
Historic and cultural resources[(a)]	2	Impacts from continued operations and refurbishment on historic and cultural resources located onsite and in the transmission line ROW are analyzed on a plant-specific basis. The NRC will perform a National Historic Preservation Act (NHPA) Section 106 review, in accordance with 36 CFR Part 800 which includes consultation with the State and Tribal Historic Preservation Officer, Indian Tribes, and other interested parties.
Human Health		
Microbiological hazards to the public	2	SMALL, MODERATE, or LARGE. These microorganisms are not expected to be a problem at most operating plants except possibly at plants using cooling ponds, lakes, canals, or that discharge to waters of the United States accessible to the public. Impacts would depend on site-specific characteristics.
Electric shock hazards[(a)]	2	SMALL, MODERATE, or LARGE. Electrical shock potential is of small significance for transmission lines that are operated in adherence with the National Electrical Safety Code (NESC). Without a review of conformance with NESC criteria of each nuclear power plant's in-scope transmission lines, it is not possible to determine the significance of the electrical shock potential.
Environmental Justice		
Impacts on minority populations, low-income populations, and Indian tribes	2	Impacts on minority populations, low-income populations, Indian Tribes, and subsistence consumption resulting from continued operations and refurbishment associated with license renewal will be addressed in nuclear plant-specific reviews.
Greenhouse Gas Emissions and Climate Change		
Climate change impacts on environmental resources	2	Climate change can have additive effects on environmental resource conditions that may also be directly impacted by continued operations and refurbishment during the license renewal term. The effects of climate change can vary regionally and climate change information at the regional and local scale is necessary to assess trends and the impacts on the human environment for a specific location. The impacts of climate change on environmental resources during the license renewal term are location-specific and cannot be evaluated generically.
Cumulative Effects		
Cumulative effects	2	Cumulative effects or impacts of continued operations and refurbishment associated with license renewal must be considered on a nuclear plant-specific basis. The effects depend on

Environmental Issue	Category	Impact Finding
		regional resource characteristics, the incremental resource-specific effects of license renewal, and the cumulative significance of other factors affecting the environmental resource.

(a) This issue applies only to the in-scope portion of electric power transmission lines, which are defined as transmission lines that connect the nuclear power plant to the substation where electricity is fed into the regional power distribution system and transmission lines that supply power to the nuclear plant from the grid.

4.1.4 Evaluation Findings

The environmental project manager (EPM) should prepare the introductory paragraphs for the SEIS. The paragraph(s) should introduce the issues to be covered by ESRPs 4.2 through 4.14.

4.2 Land Use and Visual Resources

4.2.1 Areas of Review

This ESRP provides guidance for the review of nuclear power plant-specific (hereafter called plant-specific) land use and aesthetic impacts of continued nuclear plant operations and refurbishment associated with license renewal (initial LR or SLR). Land use and aesthetic impacts are evaluated in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a) for all nuclear power plants.

The scope includes the review of (1) the applicant's ER, (2) land use and aesthetic impacts in the LR GEIS, and (3) any new and significant land use and visual resource information. Following this review, the reviewer then prepares input to the SEIS. Land use and visual resource issues (Category 1), evaluated in the LR GEIS, are listed in Table 4-1.

Data and Information Needs

According to the LR GEIS, land use and visual resources have not been affected by continued nuclear plant operations and refurbishment associated with license renewal. In addition, ongoing activities at the nuclear power plant have not changed appreciably with time, and no change in land use and aesthetic impacts are expected during initial LR and SLR. Based on this, the following data or information may be needed:

- a description of the applicant's process for identifying new and significant land use and visual resource information in the ER
- any new and significant plant-specific land use and aesthetic impact information identified during scoping
- any new and significant plant-specific land use and aesthetic impact information identified during site visit, staff environmental review, and discussions with the applicant.

4.2.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 4.1.2 also apply for the evaluation of land use and aesthetic impacts.

4.2.3 Review Procedures

The following review steps are suggested:

1. The applicant is required by NRC regulation to disclose new and significant land use and visual resource information regarding the environmental impacts of license renewal of which it is aware (see 10 CFR 51.53(c)(3)(iv)). In reviewing the applicant's ER, consider the applicant's process for discovering new land use and visual resource information and evaluating the significance of any new information discovered.
2. Review public scoping meeting transcripts and related correspondence. Compare any new land use and visual resource information with the conclusions in the LR GEIS.
3. Evaluate the significance of any new information for its effect on the land use and aesthetic impact analysis.
4. Prepare SEIS discussion describing the search for new and significant information, summarizing any new information found and the results of the significance evaluation. Incorporate by reference the conclusions from the LR GEIS for the proposed action or modify as necessary to account for any significant new information.

4.2.4 Evaluation Findings

The reviewer should ensure that the analysis provides a sufficient basis for determining land use and aesthetic impacts of continued nuclear plant operations and refurbishment activities associated with license renewal.

4.3 Air Quality and Noise

4.3.1 Areas of Review

This ESRP provides guidance for the review of air quality and noise impacts from continued plant operations during the license renewal term and refurbishment. Air quality and noise impacts are discussed in LR GEIS, NUREG-1437, Revision 2 (NRC 2023a).

The scope includes (1) review of the discussion of air quality and noise impacts in the LR GEIS, (2) review of the applicant's ER, (3) identifying and addressing any new and significant information, and (4) preparing input to the SEIS. Table 4-1 lists the applicable air quality and noise (Category 1) issues considered in the LR GEIS for initial LR or SLR.

Projected air quality impacts from continued operations and refurbishment are a Category 1 issue in the LR GEIS and Table B-1 of Appendix B to Subpart A of Part 51. Air quality effects of transmission lines and noise impacts are also Category 1 issues.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on the air quality impacts identified by the public and other information sources.

4.3.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 4.1.2 of this ESRP also apply for the evaluation of air quality and noise impacts.

4.3.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of air quality and noise impacts in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the basis for evaluating information identified by the applicant, the public, and the staff.
2. Determine if there is new information on these issues that should be evaluated. The following sources of information should be included in the search for new information:
   - The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information regarding the environmental impacts of license renewal of which it is aware. In reviewing the applicant's ER, consider the applicant's process for discovering new information and evaluating the significance of any new information discovered.
   - Records of public scoping meetings and correspondence related to the application. Compare information presented by the public with information considered in the LR GEIS.
3. Evaluate the significance of new information.
4. Prepare a section for the SEIS describing the search for new information, summarizing new information found, presenting results of evaluation of significance, and adopting conclusions from the LR GEIS modified as necessary to account for new and significant information.

4.3.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to the potential air quality impacts, effects of in-scope transmission lines, and noise impacts from continued plant operations and refurbishment. The information that should be included in the SEIS is described in the review procedures.

4.4 Geology and Soils

4.4.1 Areas of Review

This ESRP provides guidance for the review of potential impacts of continued plant operations during the license renewal term and refurbishment associated with geology and soils. Impacts are discussed in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the discussion of geology and soils in the LR GEIS, (2) review of the applicant's ER, (3) identifying and addressing any new and significant information, and (4) preparing input to the SEIS. Table 4-1 lists the applicable geology and soils issue (Category 1) considered in the LR GEIS for initial LR and SLR.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on geology and soils identified by the public and other information sources.

4.4.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 4.1.2 also apply for the evaluation of geology and soil impacts.

4.4.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of geology and soils impacts in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the basis for evaluating information identified by the applicant, the public, and the staff. The following table lists the geology and soils issue addressed in the LR GEIS.

2. Determine if there is new information on these issues that should be evaluated. The following sources of information should be included in the search for new information:
   - The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information regarding the environmental impacts of license renewal of which it is aware. In reviewing the applicant's ER, consider the applicant's process for discovering new information and evaluating the significance of any new information discovered.
   - Records of public scoping meetings and correspondence related to the application. Compare information presented by the public with information considered in the LR GEIS.
3. Evaluate the significance of new information.
4. Prepare a section for the SEIS describing the search for new information, summarizing new information found, presenting results of evaluation of significance, and adopting conclusions from the LR GEIS modified as necessary to account for new and significant information.

4.4.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to the potential geology and soils impacts from continued plant operations during the license renewal term and refurbishment. The information that should be included in the SEIS is described in the review procedures.

4.5 Water Resources

4.5.1 Areas of Review

This ESRP provides guidance for the analysis of surface water and groundwater impacts from continued plant operations during the license renewal term and refurbishment. Surface water and groundwater impacts are discussed in the LR GEIS, NUREG-1437, Revision 2 (NRC 2023a).

The scope includes (1) review the discussion of surface water and groundwater issues in the LR GEIS, (2) review the applicant's ER, (3) identify and address any new and significant information, and (4) prepare input to the SEIS. Table 4-1 lists the applicable Category 1 issues and Table 4-2 lists the applicable Category 2 issues for surface water and groundwater issues identified in the LR GEIS for initial LR and SLR.

4.5.2 Acceptance Criteria (General for Water Resources Issues)

In addition to the applicable acceptance criteria specified in Section 4.1.2, acceptance criteria for the evaluation of surface water and groundwater impacts are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(A). If the applicant's plant utilizes cooling towers or cooling ponds and withdraws makeup water from a river, an assessment of the impact of the proposed action on water availability and competing water demands, the flow of the river, and related impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be provided. The applicant shall also provide an assessment of the impacts of the withdrawal of water from the river on alluvial aquifers during low flow.
- 10 CFR 51.53(c)(3)(ii)(C). If the applicant's plant pumps more than 100 gallons (total onsite) of groundwater per minute, an assessment of the impact of the proposed action on groundwater must be provided.
- 10 CFR 51.53(c)(3)(ii)(D). If the applicant's plant utilizes cooling ponds, an assessment of the impact of the proposed action on groundwater quality must be provided.
- 10 CFR 51.53(c)(3)(ii)(P). An applicant shall assess the impact of any documented inadvertent releases of radionuclides into groundwater. The applicant shall include in its assessment a description of any groundwater protection program used for the surveillance of piping and components containing radioactive liquids for which a pathway to groundwater may exist. The assessment must also include a description of any past inadvertent releases and the projected impact to the environment (e.g., aquifers, rivers, lakes, ponds, the ocean) during the license renewal term.
- 40 CFR Part 6, Appendix A, concerning procedures on floodplain management and wetlands protection
- Federal, State, regional, and local agencies and Indian Tribe water laws and water rights
- 40 CFR Part 121, State Certification of Activities Requiring a Federal License or Permit
- 40 CFR Part 122, concerning the NPDES permit conditions for discharges including stormwater discharges
- 40 CFR Part 124, concerning the NPDES permit process
- 40 CFR Part 125, concerning water-quality standards for the NPDES program

- 40 CFR Part 133, concerning treated effluents
- 40 CFR Part 149, concerning possible supplemental restrictions on waste disposal and water use in or above a sole source aquifer
- 40 CFR Part 165, concerning the disposal and storage of pesticides
- 40 CFR Part 403, concerning pretreatment of waste effluents
- 40 CFR Part 423, concerning effluent limitations for the steam electric power generating point source category.

Additional regulatory positions and specific criteria in support of regulations identified above are as follows (10 CFR 51.71(d)):

> Compliance with environmental quality standards and requirements of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act, is not a substitute for and does not negate the requirement for NRC to weigh the environmental impacts of the proposed action, including any degradation of water quality, and to consider alternatives to the proposed action that are available for reducing the adverse impacts. If an environmental assessment of aquatic impacts is available from the permitting authority, the NRC should consider the assessment in its determination of the magnitude of the environmental impacts in striking an overall benefit-cost balance. When no such assessment of aquatic impacts is available from the permitting authority, the NRC (to the degree possible in conjunction with the permitting authority and other agencies having relevant expertise) should establish its own impact determination.

In *PUD No. 1 of Jefferson County v. Washington Department of Ecology*, 511 U.S. 700 (1994), the United States Supreme Court interpreted the CWA as allowing States to impose conditions on certifications, such as limitations on a given project, insofar as necessary to enforce a designated use contained in the State's water quality standard. The Court held that these limitations do not have to be specifically tied to a discharge requirement.

4.5.3 Review Procedures (General for Water Resources Issues)

1. Review the discussion of surface water and groundwater issues in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the basis for evaluating information identified by the applicant, the public, and the staff.

2. Determine if there is new information on these issues that should be evaluated. The following sources of information should be included in the search for new information:
   - The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information regarding the environmental impacts of license renewal of which it is aware. In reviewing the applicant's ER, consider the applicant's process for discovering new information and evaluating the significance of any new information discovered.
   - Records of public scoping meetings and correspondence related to the application. Compare information presented by the public with information considered in the LR GEIS.
   - Identify relative sources of information used for evaluating impacts, including:

- Studies and monitoring programs: Consider and briefly summarize as appropriate any studies or monitoring programs that provide site-specific data and can assist with understanding the environmental impacts. Include the location, dates, objectives, methods, and results applicable to this license renewal application, and what data or data summaries might be available for NRC review.
- If data are more than five years old, explain why the studies would or would not be relevant for assessing the effects of present and projected future plant operation over the term of license renewal. For example, consider whether both the potentially affected resources and the effect of the plant on them have remained and can be expected to remain unchanged over the term of license renewal.
- Communications with and views of regulatory agencies: Document any communications with regulatory agencies (e.g., EPA or other water quality or water allocation permitting agencies) that are relevant to assessing impact and are not documented elsewhere in the ER. If relevant communications are documented elsewhere, refer the reader to the appropriate sections.
- Other sources: Give in-text citations to sources of data and information used to assess impact and provide a list of references at the end of the chapter.

3. Prepare a section for the SEIS describing the search for new information, summarizing new information found, presenting results of evaluation of significance, and adopting conclusions from the LR GEIS modified as necessary to account for new and significant information.

Additional specific guidance follows for each surface water and groundwater issue identified as plant-specific (Category 2) in the LR GEIS.

4.5.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to the potential surface and groundwater impacts from continued plant operations during the license renewal term and from any refurbishment. The information that should be included in the SEIS is described in the review procedures.

4.5.5 Surface Water Use Conflicts (Plants With Cooling Ponds Or Cooling Towers Using Makeup Water From A River)

4.5.5.1 Areas of Review

This ESRP provides guidance for the review of the potential surface water use conflicts at plants using cooling ponds or cooling towers that withdraw makeup water from a river. Impacts are discussed in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the discussion of surface water use conflicts in the LR GEIS for initial LR and SLR, (2) review of the applicant's ER, (3) identifying and addressing any new and potentially significant information, and (4) preparing input to the SEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on surface water and groundwater use identified by the public and other information sources.

4.5.5.2 Acceptance Criteria

Acceptance criteria for evaluating the use of surface water and groundwater are addressed in ESRP Section 4.5, Water Resources.

4.5.5.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of potential surface water use conflicts with nearby surface water users at plants with cooling ponds or cooling towers using makeup water from a river in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the basis for evaluating information identified by the applicant, the public, and the staff.
2. Summarize average and peak surface water withdrawals and consumptive water use for the current license term and quantify any projected increases during the license renewal term by the nuclear power plant (see ESRP Section 3.5).
3. Briefly describe the hydrologic regime of the affected surface waters, including relevant information on the watershed, drainage basin, subbasin, catchment, etc. and including contributing and any interconnected alluvial aquifers, wetlands, and riparian areas.
4. For the period of record, describe and assess mean annual river flow (discharge), monthly mean flow, 90-percent exceedance flow, high and low-flow extremes, and consider and describe conditions that could lead to extreme low-flow periods.
5. Identify other surface water users relying on the affected surface waters, including downstream municipal, agricultural, or industrial users with which the nuclear power plant may compete, and quantify their average, peak, and seasonal water demands.
6. Use the general review procedures in ESRP Section 4.5, Water Resources, and also consider and review the following:
   - a description of the applicant's process for identifying new and potentially significant information
   - any new information included in the applicant's ER on surface water use conflicts and quality issues known to the applicant and the public
   - any currently employed or proposed practices and measures to control or limit operational water-use impact
   - summary of statutory and other legal restrictions relating to water use or specific water-body restrictions on water use imposed by State or Federal regulations

- Federal, State, regional, local and Indian Tribe standards and regulations applicable to water use including surface water withdrawal registration and reporting and consumptive water use and return flows
- proposed means to ensure operational compliance with water use standards and regulations.

7. Prepare a statement for the SEIS that:
   - analyzes the impacts of continued plant operations and refurbishment
   - describes measures to mitigate adverse impacts
   - provides the significance level of the environmental impacts
   - describes any new information developed or used in the plant-specific assessment.

4.5.5.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to the potential surface water use conflicts from continued plant operations and refurbishment during the license renewal term. The information that should be included in the SEIS is described in the review procedures.

4.5.6 Groundwater Use Conflicts (Plants That Withdraw More Than 100 Gallons Per Minute [gpm])

4.5.6.1 Areas of Review

This ESRP provides guidance for the review of the potential groundwater use conflicts at plants pumping more than 100 gallons per minute for potable and service water and operational dewatering, as well as those using Ranney wells. Impacts are discussed in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the discussion of groundwater use conflicts in the LR GEIS for initial LR and SLR, (2) review of the applicant's ER, (3) identifying and addressing any new and potentially significant information, and (4) preparing input to the SEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on groundwater-use conflicts identified by the public and other information
- sources.

4.5.6.2 Acceptance Criteria

Acceptance criteria for the evaluation of groundwater-use conflicts are addressed in ESRP Section 4.5, Water Resources.

4.5.6.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of the potential for groundwater water use conflicts with nearby groundwater users at plants pumping more than 100 gallons per minute in the LR GEIS. This step establishes the basis for evaluating information identified by the applicant, the public, and the staff.
2. Determine the total seasonal groundwater pumpage needs for the plant. If any season has an average groundwater pumpage of greater than 100 gallons per minute, then continue the analysis at Step 3. Otherwise, prepare a statement for the SEIS that describes the plant's groundwater use and concludes that there are no impacts resulting from groundwater pumpage for potable and service water and operational dewatering.
3. Determine the extent of the influence of the plant's well(s) predicted by either standard analytic approaches or numerical models. Steady-state analytic approaches can be used with the maximum seasonal pumping rates. Numerical models can be used either with the maximum pumping rate to estimate steady-state drawdown or with the average seasonal pumping rates for a transient simulation of the drawdown. Any model results should be validated with any piezometer observations. Possible impacts on predictions from heterogeneous aquifer parameters, particularly stratigraphy, should be considered. If the extent of the cone of depression caused by the plant's well(s) extends beyond the site's boundary, then continue the analysis. This assessment also can include independent review by the NRC staff of modeling analyses or semi-quantitative analyses prepared by the applicant, with adequate supporting documentation.
4. Determine the magnitude of the reduction in yield resulting from the plant's pumpage predicted by numerical procedures. If the drawdown extends beyond the site boundary and into a zone influenced by other wells, then continue the analysis.
5. Use the review procedures in ESRP Section 4.5, Water Resources, and also consider and review the following:
   - descriptions of the site and local groundwater aquifers including geohydrologic characterization data
   - descriptions of the spatial and seasonal changes in water table elevation and pumpage rates for wells both inside and outside the site boundary
   - descriptions of any currently employed or proposed practices and measures to control or limit operational water-use impacts
   - descriptions of Federal, State, regional, and local agencies and Indian Tribe standards and regulations applicable to groundwater use
   - descriptions of proposed means to ensure operational compliance with water use and applicable water quality standards and regulations.
6. Review the applicant's ER, including:
   - applicant's process for identifying new and potentially significant information
   - any new information included in the ER on the groundwater-use and quality issues known to the applicant or the public
   - any currently employed or proposed practices and measures to control or limit operational water-use impact

- summary of statutory and other legal restrictions relating to water use or specific water-body restrictions on water use imposed by State or Federal regulations
- proposed means to ensure operational compliance with water use and water quality standards and regulations.

7. Prepare a statement for the SEIS that:
   - analyzes the impacts of continued plant operations and refurbishment
   - describes measures to mitigate adverse impacts
   - provides the significance level of the environmental impacts
   - describes any new information developed or used in the plant-specific assessment.

4.5.6.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to the potential groundwater-use conflicts from continued plant operations during the license renewal term and refurbishment. The information that should be included in the SEIS is described in the review procedures.

4.5.7 Groundwater Use Conflicts (Plants With Closed-Cycle Cooling Systems That Withdraw Makeup Water From A River)

4.5.7.1 Areas of Review

This ESRP provides guidance for the review of groundwater-use conflicts resulting from surface-water withdrawals from a river during low-flow conditions. Impacts are discussed in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the discussion of groundwater use conflicts in the LR GEIS for initial LR and SLR, (2) review of the applicant's ER, (3) identifying and addressing any new and potentially significant information, and (4) preparing input to the SEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant- specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on groundwater-use conflicts identified by the public and other information sources.

4.5.7.2 Acceptance Criteria

Acceptance criteria for the evaluation of groundwater-use conflicts are addressed in ESRP Section 4.5, Water Resources.

4.5.7.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion in the LR GEIS of potential groundwater use conflicts resulting from surface-water withdrawals during low-flow conditions that may affect alluvial aquifer recharge and groundwater users. This step establishes the basis for evaluating information identified by the applicant, the public, and the staff.
2. Determine whether the river used for makeup water supply is oversubscribed (i.e., the demand for water exceeds water availability) during any season. Water-use permits often include specific restrictions on withdrawals during certain low-flow conditions. If the basin is oversubscribed, continue the analysis. Otherwise, prepare a statement for the SEIS that describes the plant's surface water withdrawals and concludes that no impacts are expected on groundwater users including alluvial aquifers resulting from surface water withdrawals during low-flow conditions.
3. Determine whether the river recharges the aquifer or the aquifer discharges into the river. If the aquifer consistently discharges to the river, then groundwater withdrawals would not be impacted by changes in river flow, whereas the river flows would be impacted by the groundwater withdrawals, although often not significantly. If the aquifer is consistently recharged by the river, then groundwater withdrawals would be impacted by changes in river flow, whereas the river flow would not be significantly impacted by the groundwater withdrawals. Often the direction of water transfer between rivers and their associated aquifers alternates back and forth as one moves downstream. By comparing the piezometer data from the affected aquifer with the river stage height data, the direction of flow can be determined. If the aquifer does not consistently discharge into the river downstream from the makeup water withdrawal location, continue the analysis.
4. Determine the magnitude of the reduction in groundwater yield resulting from the plant's cooling tower makeup water withdrawal. Estimating the magnitude of the reduction of groundwater yield generally requires application of analytic or numerical models. This assessment can also include independent review by the NRC staff of modeling analyses or semi-quantitative analyses prepared by the applicant, with adequate supporting documentation. Only those wells located in areas downstream from the makeup water diversion and completed in an aquifer that includes recharge from the river need be considered. Sensitivity analyses should be included on the parameters governing the exchange of water between the river and the aquifer. Based on the magnitude of the reduction in yield, the impact would be SMALL, MODERATE, or LARGE.
5. Use the review procedures in ESRP Section 4.5, Water Resources, and also consider and review the following:
   - descriptions of the site, the affected river, and the local groundwater aquifers, including geohydrologic characterization data
   - the spatial and seasonal changes in water table elevation, surface withdrawals, groundwater withdrawals, stream stage height for the river, and for the aquifer with hydraulic connection to the river
   - any currently employed or proposed practices and measures to control or limit operational water-use impacts
   - Federal, State, regional, local and Indian Tribe standards and regulations applicable to groundwater and surface-water use

- proposed means to ensure operational compliance with water-use permits, standards, and regulations.

6. Review the applicant's ER, including:
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on the groundwater-use and quality issues known to the applicant or the public
   - any currently employed or proposed practices and measures to control or limit operational water use impact
   - summary of statutory and other legal restrictions relating to water use or specific water-body restrictions on water use imposed by State or Federal regulations
   - proposed means to ensure operational compliance with water use standards and regulations.
7. Prepare a statement for the SEIS that:
   - analyzes the impacts continued plant operations and refurbishment
   - describes measures to mitigate adverse impacts
   - provides the significance level of the environmental impacts
   - describes any new information developed or used in the plant-specific assessment.

4.5.7.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to the potential groundwater-use conflicts from continued plant operations during the during the license renewal term and refurbishment. The information that should be included in the SEIS is described in the review procedures.

4.5.8 Groundwater Quality Degradation (Plants With Cooling Ponds)

4.5.8.1 Areas of Review

This ESRP provides guidance for the review of the potential impact of groundwater quality degradation resulting from closed cycle cooling ponds. Impacts are discussed in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the discussion of groundwater quality degradation in the LR GEIS for initial LR and SLR, (2) review of the applicant's ER, (3) identifying and addressing any new and potentially significant information, and (4) preparing input to the SEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS

- new information on groundwater quality degradation identified by the public and other information sources.

4.5.8.2 Acceptance Criteria

Acceptance criteria for the evaluation of groundwater quality degradation are addressed in ESRP Section 4.5, Water Resources.

4.5.8.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of groundwater quality degradation resulting from closed-cycle cooling-pond sites leaking into the subsurface and aquifers in the LR GEIS. This step establishes the basis for evaluating information identified by the applicant, the public, and the staff.
2. Determine the evolving chemical composition of the cooling pond water. Closed-cycle cooling ponds may have high concentrations of total dissolved solids, heavy metals, and chlorinated organic compounds as a result of evaporation, contact with plant equipment, and water-treatment systems, respectively. These concentrations can evolve over time. The current chemical composition of the cooling water should be described, as well as the estimated chemical composition throughout the renewal term.
3. Review monitoring data on the chemical composition of groundwater in the vadose zone and aquifer that would likely receive water infiltrating from the cooling pond, as well as groundwater unaffected by the cooling pond. If the ambient groundwater quality in the aquifer is better than the estimated quality of the cooling pond water during the license renewal term, then continue with the analysis. Otherwise, prepare a statement for the SEIS that describes the current and projected cooling pond quality and underlying groundwater quality and concludes that no impacts are expected on groundwater quality from continued cooling pond operations, including degradation of groundwater for beneficial uses.
4. Review monitoring data on the infiltration from the cooling ponds to the water table. If the cooling ponds have no liners or the liners are not expected to remain impermeable throughout the license renewal term, then continue with the analysis.
5. Describe the estimated infiltration rate from the ponds throughout the license renewal term. These estimates should be used as the boundary conditions for a groundwater flow and transport model. Vadose zone transport can be neglected if the water infiltrating beneath the cooling pond is assumed to immediately enter the aquifer. If the predicted groundwater plume associated with a conservative nonsorbing tracer is likely to enter the zone of influence of a well, then continue the analysis. This assessment can also include independent review by the NRC staff of modeling analyses or semi-quantitative analyses prepared by the applicant, with adequate supporting documentation.
6. Describe the changes in water quality for each of the impacted supply wells. Both the timing and magnitude of water quality changes should be described. Because this analysis would require the application of groundwater flow and transport simulation models, describe the model calibration activities and any peer-review activities. Compare the predicted changes in groundwater quality to the current or future beneficial uses for the groundwater to assess the magnitude of the impact.
7. Use the review procedures in ESRP Section 4.5, Water Resources, and also consider and review the following:

- cooling pond characteristics (e.g., use of liners, use of impermeable materials, impermeable soils) that would retard/prevent infiltration into local aquifers
- types and concentrations of impurities in the cooling pond water and chemistry of soils along pathways to local aquifers to determine whether cooling pond water can contaminate the groundwater or local surface water
- quality of water of local aquifers that could be affected by infiltration of cooling pond water
- Federal, State, regional, and local agencies and Indian Tribe groundwater quality requirements with emphasis on any changes to these requirements that have occurred during the plant's license term and any anticipated changes to those requirements during the license renewal term
- offsite groundwater users who could be affected by the degradation of aquifers; characterization should include locations and elevations of offsite wells, their pumping rates, and the water needs of groundwater users
- the predicted cumulative effects of using closed-cycle cooling ponds on groundwater quality. This description should include maps of the contamination plume. Information should be provided on groundwater contamination existing at the time of the license renewal application and projected contamination during the license renewal term
- the mitigation measures proposed to prevent or minimize groundwater quality degradation and the estimated impact of implementing these measures. Explain the reasons for not implementing any measures that were considered but rejected.

8. Review the applicant's ER, including:
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on the groundwater quality degradation issues known to the applicant and the public
   - any currently employed or proposed practices and measures to control or limit operational water-use impact
   - summary of statutory and other legal restrictions relating to water quality or specific restrictions on groundwater use and quality imposed by State or Federal regulations
   - proposed means to ensure operational compliance with water use and water quality standards and regulations.
9. Prepare a statement for the SEIS that:
   - analyzes the impacts of continued plant operations and refurbishment
   - describes measures to mitigate adverse impacts
   - provides the significance level of the environmental impacts
   - describes any new information developed or used in the plant-specific assessment.

4.5.8.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to the potential groundwater quality degradation from continued plant operations during the license renewal term and refurbishment. The information that should be included in the SEIS is described in the review procedures.

4.5.9 Radionuclides Released to Groundwater

4.5.9.1 Areas of Review

This ESRP provides guidance for the review of the potential for radionuclides released to groundwater due to inadvertent leaks of radioactive liquids as a result of continued plant operations during the renewal term and refurbishment. Impacts are discussed in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the discussion of radionuclides released to groundwater in the LR GEIS for initial LR or SLR, (2) review of the applicant's ER, (3) identifying and addressing any new and potentially significant information, and (4) preparing input to the SEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on radionuclides released to groundwater identified by the public and other information sources.

4.5.9.2 Acceptance Criteria

Acceptance criteria for the evaluation of radionuclides released to groundwater are addressed in ESRP Section 4.5, Water Resources.

4.5.9.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of the potential for radionuclides released to groundwater in the LR GEIS. This step establishes the basis for evaluating information identified by the applicant, the public, and the staff.
2. Use the review procedures in ESRP Section 4.5, Water Resources, and also consider and review the following: For plants that have groundwater monitoring systems with wells, review and describe:
   - locations of monitoring wells and water supply wells, including construction information such as depth, diameter, screened interval, and construction material
   - depths of wells and groundwater elevations
   - groundwater flow for each aquifer, hydrostratigraphic unit, or other strata (e.g., backfill) potentially impacted by the releases of liquids containing radionuclides beneath the site
   - radionuclide concentrations across the site (e.g., tritium concentrations expressed as picocuries per liter)
   - the plant's groundwater protection program

- for plants that rely on a system other than a groundwater monitoring system composed of wells, describe the program used for preventing, detecting, and responding to inadvertent releases of radioactive materials into the groundwater.

3. Review the applicant's ER, including
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on incidents regarding radionuclides released to groundwater known to the applicant or the public
   - any currently employed or proposed practices and measures to control or limit operational groundwater quality impact (best management practices)
   - summary of statutory and other legal restrictions relating to water quality or specific restrictions on groundwater use and quality imposed by State or Federal regulations
   - proposed means to ensure operational compliance with water use and water quality standards and regulations.
4. Prepare a statement for the SEIS that
   - analyzes the impacts of continued plant operations and refurbishment
   - describes measures to mitigate adverse impacts, if any
   - provides the significance level of the environmental impacts, if any
   - describes any new information developed or used in the plant-specific assessment.

4.5.9.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to the potential impacts of radionuclides released to groundwater from continued plant operations during the license renewal term and refurbishment. The information that should be included in the SEIS is described in the review procedures.

4.6 Ecological Resources

4.6.1 Areas of Review

This ESRP provides guidance on how the NRC staff should consider the potential effects of continued operation of a nuclear power plant during an initial LR or SLR term on ecological resources. Ecological resources include terrestrial, aquatic, and federally protected resources. Impacts are discussed in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope of this review includes (1) review of the LR GEIS's analysis of ecological impacts from license renewal for initial LR or SLR, (2) review of the applicant's ER, (3) review of available studies, data, and other available information related to the issue, (4) identification and disposition of any new and significant information, and (5) preparation of SEIS input. Table 4-1 lists the applicable Category 1 issues and Table 4-2 lists the applicable Category 2 issues for terrestrial and aquatic resource issues identified in the LR GEIS.

Ecological impact assessment for license renewal differs from that for original licensing because license renewal reviews occur after a nuclear power plant has an established history of operation. Whereas ecological impact assessment during initial licensing is predictive or prospective (e.g., it assumes a proposed stressor and proceeds to estimate impacts), the

assessment for license renewal can use a combination of prospective and retrospective approaches. For example, ecological modeling could be used to predict future impacts (in either original licensing or license renewal), while empirical statistical analysis could be used to assess past impacts based on actual observations (in license renewal only). Suter and Barnthouse (1993) discuss the differences between prospective and retrospective assessment and appropriate techniques for their analysis.

Data and Information Needs

The ecological resources review may require the following information on the ecological environment. Data and information needed for a given review would be site-specific and would depend on nuclear power plant site-specific and plant-specific factors.

- the applicant's ER
- the LR GEIS
- copies of ecological surveys and studies performed on or near the site
- copies of regional, state, Federal, and Indian Tribe permits and controls that reduce or mitigate impacts on the ecological environment
- copies of site- or fleet-wide environmental procedures, wildlife management plans, best management practices, and conservation initiatives undertaken or proposed by the applicant
- transmission line ROW maintenance procedures
- information on federally protected ecological resources from the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) (collectively, "the Services") and National Oceanic and Atmospheric Administration (NOAA) databases and State natural heritage sites, including species and habitats protected under the Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (MSA), and National Marine Sanctuaries Act (NMSA)
- new information on ecological resources identified by the public and other information sources.

4.6.2 Acceptance Criteria (General for Ecological Resources Issues)

In addition to the applicable acceptance criteria specified in Section 4.1.2, acceptance criteria for the evaluation of ecological resource impacts are based on the following requirements:

- 40 CFR Part 122 and 40 CFR Part 125, concerning impingement mortality and entrainment at existing facilities subject to Clean Water Act (CWA) Section 316(b)
- 40 CFR Part 423, concerning thermal effluent discharges subject to CWA Section 316(a)
- 50 CFR Part 402, concerning interagency consultation for federally listed species and critical habitats protected under the ESA
- 50 CFR Part 600, concerning interagency consultation for essential fish habitat (EFH) protected under the MSA.

The following Federal statutes also apply to the ecological resources review. See Section 3.6.2 for brief summaries of each statute.

- Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668–668d)

- Clean Water Act (33 U.S.C. § 1251 et seq.)
- Coastal Zone Management Act (16 U.S.C. § 1451 et seq.)
- Endangered Species Act (16 U.S.C. § 1531 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.)
- Marine Mammal Protection Act (16 U.S.C. § 1361 et seq.)
- Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.)
- National Marine Sanctuaries Act (16 U.S.C. § 1431 et seq.)
- Rivers and Harbors Appropriation Act (33 U.S.C. 403 et seq.).

The following additional NRC guidance may be relevant to the ecological resources review. See Section 3.6.2 for brief summaries of each document.

- Regulatory Guide 4.11, Rev. 2, Terrestrial Environmental Studies for Nuclear Power Stations (NRC 2012b)
- Regulatory Guide 4.24, Rev. 0, Aquatic Environmental Studies for Nuclear Power Stations (NRC 2017a).

4.6.3 Review Procedures (General For Ecological Resources Issues)

For all ecological issues, the same basic approach can identify the environmental impacts of license renewal and alternatives. This approach generally follows the EPA's (1998) framework for ecological risk assessment. The analysis should consider how nuclear power plant operation would affect ecosystem structure and function, alter the stability of plant or animal populations, modify the value or availability of ecosystem services, or noticeably affect other attributes of the ecological environment. Ecosystem services refer to a wide range of conditions and processes through which natural ecosystems, and the species that are part of them, help sustain and fulfill human life (Daily et al. 1997).

1. Review the discussion of ecological resource impacts in the LR GEIS. This step establishes the basis for evaluating information identified by the applicant, relevant Federal and State resource agencies, affected Indian Tribes, the public, and the staff. Table 4-1 and Table 4-2 identify the 24 ecological resource issues (15 Category 1 and 9 Category 2) evaluated in the LR GEIS and codified in Table B-1 in Appendix B to Subpart A of 10 CFR Part 51.

2. Review the discussion of license renewal and its impacts on ecological resources provided in the applicant's ER.

3. Identify the relevant sources of information, which may include:

   – Surveys, studies, and monitoring. Summarize any surveys, studies, and monitoring that provide site-specific, local, or regional data on ecological resources and that are relevant to assessing the environmental impacts of license renewal and alternatives. Include the biological entities or ecological attributes chosen for investigation, methodology, results, and conclusions.

   – Communications with and views of relevant regulatory agencies. Document any communications with Federal and State agencies and Indian Tribes with special expertise or jurisdiction (e.g., EPA or other water quality permitting agencies concerning impingement and entrainment and thermal impacts; FWS and NMFS concerning

federally listed species and critical habitats; State natural resource agencies; etc.) that are relevant to assessing impacts and are not documented elsewhere. Include the views of affected Indian Tribes in cases where culturally significant ecological resources may be affected. Discuss major points of view and significant concerns or objections raised by these entities. If relevant communications are documented elsewhere, refer the reader to the appropriate sections. Include other interested stakeholders, as appropriate.

- Other sources. Include in-text citations to other sources of information relied upon and provide full citations in a literature cited section.

4. Identify specific ecological resources and the attributes of those resources potentially at risk. Because ecological systems are complicated, only a subset of resources can be addressed.

   - Identify the potentially affected ecological resources. Describe the potentially affected resources in terms of ecosystem or habitat type (e.g., oak-hickory forest, tallgrass prairie, tidal salt marsh). Give special attention to important habitats (e.g., important bird areas, known bat hibernacula, spawning and rearing areas, locally significant habitats, natural heritage areas, wildlife sanctuaries and preserves, federally or state-managed lands and waters).

   - Describe the potentially affected plants and animals in terms of functional groups (e.g., plants, mammals, reptiles, fish, invertebrates, etc.) or trophic structure (e.g., producers and consumers). For instance, an aquatic system may include plankton, macrophytes, and periphyton (primary producers); zooplankton and benthic macroinvertebrates (primary consumers); and bottom feeding, planktivorous, and piscivorous fish (secondary and tertiary consumers).

   - For federally protected ecological resources, identify and describe the potentially affected federally listed species and designated critical habitats under the ESA. Include candidate and proposed species and proposed critical habitats, if applicable. Identify and describe EFH, including habitats of particular concern (HAPC), by federally managed species and life stage. Identify and describe any national marine sanctuaries and the living and nonliving resources of those sanctuaries.

   - Identify attributes of those resources potentially at risk. Identify the attributes of the resources of concern that are potentially at risk and that are important to protect (EPA 1998). If adverse effects on a species, habitat, or other ecological resource are possible, the resource should be assessed in terms of spatial scale (e.g., local, regional, or national), temporal scale (e.g., the time frame over which stressors or effects will be evaluated), and resource value (e.g., social, economic, or ecological).

   - Evaluate biodiversity, which refers to the variety of life on Earth at all its levels including genes, individuals, species, habitats, and ecosystems. As an important attribute to consider, biodiversity helps maintain the structural diversity and functional integrity of ecosystems and provides a wide pool of biological resources that can respond and adapt to various natural and human-made stressors (CEQ 1993).

5. Explain the relationships between nuclear power plant operation and ecological resource attributes. Relationships can be examined by identifying the pathways through which potential stressors act on the chosen ecological receptors and expressing these as risk hypotheses (see EPA 1998, Section 3.4.1). Risk hypotheses may be very simple, predicting the potential effect of one stressor on one receptor, or extremely complex.

6. Assess and characterize potential impacts. For each potential stressor, multiple ecological receptors may exist, and each receptor may have multiple measurable and susceptible attributes. The effects of nuclear power plant operation on any ecological receptor may be direct or indirect and may vary in spatial or temporal scale. Additionally, the assessment approach may be prospective or retrospective depending on the available data. With such complexity, examining a single line of evidence may not be sufficient to assess a given impact. In such cases, the reviewer should examine several lines of evidence involving several ecological receptors when data allow. If using multiple lines of evidence, explain the qualitative or quantitative method for combining the lines of evidence to arrive at an overall assessment of impact. A typical approach for accomplishing this to consider weight of evidence (e.g., Menzie et al. 1996; EPA 1998).

   If adverse impacts are identified, describe mitigation measures that have been implemented at the nuclear power plant to reduce such impacts and note whether such measures would continue during the license renewal term. Describe any additional mitigation proposed by the applicant or measures that would be required in the future (e.g., conditions anticipated in a future renewed NPDES permit concerning best technology available to minimize impingement mortality and entrainment). Evaluate the expected effects of the mitigation measures. Briefly explain the rationale for not implementing any measures that were considered but rejected.

7. Review in the ER the applicant's process for identifying new and potentially significant information and any new information concerning ecological resource issues.

8. Prepare a statement for the SEIS that:

   - analyzes the impacts of continued plant operations and refurbishment
   - describes measures to mitigate adverse impacts
   - identifies new and significant information, if applicable
   - provides the significance level of the environmental impacts.

4.6.4 Evaluation Findings

The depth and extent of written input to the SEIS should be governed by the number of Category 2 issues applicable to the review and the depth of analysis required to reach a conclusion concerning the potential impacts of license renewal on ecological resources. The information that should be included in the SEIS is described in the review procedures.

4.6.5 Non-Cooling System Impacts on Terrestrial Resources

4.6.5.1 Areas of Review

This ESRP provides guidance for the review of the effects of nuclear power plant operations on terrestrial resources during an initial LR or SLR term that are unrelated to operation of the cooling system. Such activities include landscape and grounds maintenance, stormwater management, elevated noise levels and vibration, and ground-disturbing activities. Section 4.6.1.1.1 of the LR GEIS discusses the impacts of this issue. The scope of this review includes (1) review of the relevant sections of the LR GEIS, (2) review of the applicant's ER, (3) review of available studies, data, and other available information related to the issue, (4) identification and disposition of any new and potentially significant information, and (5) preparation of input for the SEIS.

Data and Information Needs

Section 4.6.1 of this ESRP lists data and information needs for the evaluation of ecological resource impacts.

4.6.5.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.6.2, acceptance criteria for the evaluation of non-cooling system impacts on terrestrial resources are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including but not limited to, the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.

4.6.5.3 Review Procedures

For all ecological resource issues, the same basic approach can identify the environmental impacts of license renewal and alternatives. This approach generally follows the EPA's (1998) framework for ecological risk assessment. Section 4.6.3 of this ESRP contains general review procedures for all ecological resource issues. Follow these procedures along with the following steps unique to the issue of non-cooling system impacts on terrestrial resources.

1. Review the discussion of this issue in the LR GEIS.
2. Review the discussion in the applicant's ER of activities associated with license renewal unrelated to operation of the cooling system that could affect terrestrial resources. Such activities include landscape and grounds maintenance, stormwater management, elevated noise levels and vibration, and ground-disturbing activities. Ground-disturbing activities may be related to refurbishment or other planned activities during the license renewal period that involve demolition or construction.
3. Describe the following, with a focus on the interfaces with the terrestrial environment and how site procedures, permits, and other controls minimize or mitigate impacts on the terrestrial environment.
   - Summarize the applicant's site and landscape maintenance activities. Identify site procedures and permits related to the impacts of these activities on terrestrial resources.
   - Summarize stormwater management on the site, including any stormwater management plans and NPDES permit conditions related to the impacts of stormwater on terrestrial resources.
   - Summarize any elevated noise or vibration levels that would be of particular concern for terrestrial resources, such as those that could disrupt wildlife behavioral patterns or cause animals to avoid certain areas.
   - Describe general operations and maintenance activities during the license renewal period that could affect terrestrial resources such as maintenance or repair of existing buildings, roadways, parking lots, piping, fencing, and security-related structures.

- Describe ground-disturbing activities anticipated during the license renewal period that would disturb terrestrial habitat. Include the amount of land to be disturbed, whether disturbance would be temporary or permanent, the ecological characteristics of the habitat, the species found within the area, and any unique or rare features of the habitat or species found within it. Include terrestrial habitat that would be disturbed by transport or delivery of equipment and supplies as well as laydown or storage of materials, structures, and components. Describe any related road, bridge, rail, or barge slip modifications that would occur that would affect terrestrial habitat.

4. Discuss relevant regional, state, Federal, and Indian Tribe permits and controls not already described that would reduce or mitigate non-cooling system impacts on terrestrial resources.
5. Describe site- or fleet-wide environmental procedures, wildlife management plans, best management practices, and conservation initiatives undertaken or proposed by the applicant that would benefit the terrestrial environment or otherwise mitigate non-cooling system impacts on terrestrial resources.
6. Review the applicant's ER, including
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on ecological impact issues known to the applicant and the public.
7. Prepare a statement for the SEIS related to this issue that
   - analyzes the impacts of continued plant operations and refurbishment
   - describes measures to mitigate adverse impacts
   - provides the significance level of the environmental impacts
   - describes any new information developed or used in the plant-specific assessment.

4.6.5.4 Evaluation Findings

The depth and extent of written SEIS input should be governed by the depth of analysis required to reach a conclusion concerning the impacts of this Category 2 issue on terrestrial resources. The information that should be included in the SEIS is described in the review procedures.

4.6.6 Water Use Conflicts with Terrestrial Resources (Plants With Cooling Ponds Or Cooling Towers Using Makeup Water From A River)

4.6.6.1 Areas of Review

This ESRP provides guidance for the review of water use conflicts that may arise at nuclear power plants with cooling ponds or cooling towers that use makeup water from a river and how those conflicts could affect terrestrial resources during the initial LR or SLR term. Notably, this issue also applies to nuclear power plants with hybrid cooling systems that withdraw makeup water from a river (i.e., once-through cooling systems with helper cooling towers) (e.g., NRC 2020b). Section 4.6.1.1.6 of the LR GEIS discusses the impacts of this issue. The scope of this review includes (1) review of the relevant sections of the LR GEIS, (2) review of the applicant's ER, (3) review of available studies, data, and other available information related to the issue, (4) identification and disposition of any new and potentially significant information, and (5) preparation of SEIS input.

Data and Information Needs

Section 4.6.1 of this ESRP lists data and information needs for the evaluation of ecological resource impacts.

4.6.6.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.6.2, acceptance criteria for the evaluation of water use conflicts with terrestrial resources are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(A). If the applicant's plant utilizes cooling towers or cooling ponds and withdraws makeup water from a river, an assessment of the impact of the proposed action on water availability and competing water demands, the flow of the river, and related impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be provided.

4.6.6.3 Review Procedures

For all ecological resource issues, the same basic approach can identify the environmental impacts of license renewal and alternatives. This approach generally follows the EPA's (1998) framework for ecological risk assessment. Section 4.6.3 of this ESRP contains general review procedures for all ecological resource issues. Follow these procedures along with the following steps unique to the issue of water use conflicts with terrestrial resources.

1. Review the discussion of this issue in the LR GEIS.
2. Review the discussion in the applicant's ER concerning surface water use.
3. Describe the following, with a focus on the interfaces with the terrestrial environment and how site procedures, permits, and other controls minimize or mitigate impacts on the terrestrial environment. Give special attention to riparian, wetland, and marsh habitats that require regular or periodic surface water flow.
   - Summarize the baseline hydrologic regime of the affected surface waters, including seasonal fluctuations in flow and conditions that could lead to extreme periods of low flow.
   - Summarize current and anticipated consumptive water use by the nuclear power plant.
   - Identify other users relying on the affected surface waters, including downstream municipal, agricultural, or industrial users, with which the nuclear power plant may compete.
   - Identify terrestrial habitats and species that would be especially sensitive to reduced water availability (e.g., riparian, wetland, marsh, and other habitats that require saturation or periodic inundation; amphibians, especially early life stages; wildlife that heavily rely on surface waters, such as beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and wading birds; etc.).
   - Discuss regional, state, Federal, and Indian Tribe permits and controls concerning water use and any agreements with water resources control boards.
   - Summarize any other current or proposed practices and measures to control or limit operational water-use impacts.

- Describe past water use conflicts with terrestrial resources, if any, and evaluate whether such conflicts would be likely to arise again during the license renewal term.

4. Review the applicant's ER, including
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on ecological impact issues known to the applicant and the public.
5. Prepare a statement for the SEIS related to this issue that
   - analyzes the impacts of continued plant operations and refurbishment
   - describes measures to mitigate adverse impacts
   - provides the significance level of the environmental impacts
   - describes any new information developed or used in the plant-specific assessment.

4.6.6.4 Evaluation Findings

The depth and extent of written SEIS input should be governed by the depth of analysis required to reach a conclusion concerning the impacts of this Category 2 issue on terrestrial resources. The information that should be included in the SEIS is described in the review procedures.

4.6.7 Impingement Mortality and Entrainment of Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds)

4.6.7.1 Areas of Review

This ESRP provides guidance for the review of the impacts of impingement mortality and entrainment (IM&E) at nuclear power plants with once-through cooling systems or cooling ponds during the license renewal term. Section 4.6.1.2.1 of the LR GEIS discusses the impacts of this issue during initial LR or SLR. The scope of this review includes (1) review of the relevant sections of the LR GEIS, (2) review of the applicant's ER, (3) review of available studies, data, and other available information related to the issue, (4) identification and disposition of any new and potentially significant information, and (5) preparation of SEIS input.

Notably for this issue, Section 316(b) of the CWA addresses the adverse environmental impacts caused by the intake of cooling water from waters of the United States. This section of the CWA grants the EPA the authority to regulate cooling water intake structures to minimize adverse impacts on the aquatic environment. Under the CWA Section 316(b) regulations for existing facilities at 40 CFR 122 and 40 CFR 125, Subpart J, the location, design, construction, and capacity of cooling water intake structures of regulated facilities must reflect the best technology available (BTA) for minimizing IM&E. The EPA, or authorized States and Indian Tribes, are responsible for making BTA determinations. These agencies impose BTA requirements through NPDES permitting programs. When available, the NRC staff relies on the expertise and authority of the NPDES permitting authority with respect to the impacts of IM&E.

Data and Information Needs

Section 4.6.1 of this ESRP lists data and information needs for the evaluation of ecological resource impacts.

4.6.7.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.6.2, acceptance criteria for the evaluation of impingement mortality and entrainment are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(B). If the applicant's plant utilizes once-through cooling or cooling pond water intake and discharge systems, the applicant shall provide a copy of current Clean Water Act (CWA) 316(b) Best Technology Available determinations and, if necessary, a 316(a) variance in accordance with 40 CFR part 125, or equivalent State permits and supporting documentation. If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from impingement mortality and entrainment and thermal discharges.

4.6.7.3 Review Procedures

For all ecological resource issues, the same basic approach can identify the environmental impacts of license renewal and alternatives. This approach generally follows the EPA's (1998) framework for ecological risk assessment. Section 4.6.3 of this ESRP contains general review procedures for all ecological resource issues. Follow these procedures along with the following steps unique to the issue of impingement mortality and entrainment of aquatic organisms.

1. Review the discussion of this issue in the LR GEIS.
2. Review the discussion in the applicant's ER concerning the nuclear power plant's cooling water intake structure design and operation, NPDES permit status, and impingement mortality and entrainment studies and data.
3. Review impingement and entrainment studies conducted at the nuclear power plant and any supporting monitoring and data.
4. Review the nuclear power plant's current NPDES permit and the status of the permitting authority's BTA determinations.
   - If the NPDES permitting authority has made BTA determinations for the nuclear power plant pursuant to CWA Section 316(b) in accordance with the current regulations at 40 CFR Part 122 and 40 CFR Part 125, which were promulgated in 2014 (79 FR 48300), and that plant has implemented any associated requirements or those requirements would be implemented before the license renewal period, then the NRC staff assumes that adverse impacts on the aquatic environment will be minimized (see 10 CFR 51.10(c); 10 CFR 51.53(c)(3)(ii)(B); 10 CFR 51.71(d)). In such cases, the reviewer can conclude that the impacts of either impingement mortality, entrainment, or both would be SMALL over the course of the license renewal term, and no additional analysis is required.
   - If the NPDES permitting authority has not made BTA determinations, the reviewer should analyze the potential impacts of impingement mortality, entrainment, or both using a weight-of-evidence approach. In this approach, the reviewer should consider multiple lines of evidence to assess the presence or absence of ecological impairment (i.e., noticeable or detectable impact) on the aquatic environment. For instance, as its lines of evidence, the staff might consider characteristics of the cooling water intake system design, the results of impingement and entrainment studies performed at the facility, and trends in fish and shellfish population abundance indices. The reviewer should then consider these lines of evidence together to predict the level of impact

(SMALL, MODERATE, or LARGE) that the aquatic environment is likely to experience over the course of the license renewal term.

5. Obtain additional information to assist in evaluating the specific nature of impingement and entrainment effects, as needed, including the following:
   - location of the cooling water intake structure, intake velocities, and withdrawal volumes
   - information on screening device technologies and fish collection and return technologies
   - swimming abilities of local species or their surrogates, including burst, prolonged, or sustained speeds
   - other relevant life history characteristics of local species, such as size and susceptibility to impingement or entrainment at various life stages; population abundances and distributions; special species statuses and designations; and regional management objectives
   - physical or biological factors that might concentrate or attract organisms to the area of the intake.
6. Review the applicant's ER, including
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on ecological impact issues known to the applicant and the public.
7. Prepare a statement for the SEIS related to this issue that
   - summarizes the status of the NPDES permitting authority's CWA Section 316(b) BTA determinations
   - adopts the NPDES permitting authority's conclusions (if the permitting authority has made BTA determinations)
   - analyzes the impacts of continued plant operations and refurbishment (if the permitting authority has not made BTA determinations)
   - describes measures to mitigate adverse impacts
   - provides the significance level of the environmental impacts
   - describes any new information developed or used in the plant-specific assessment.

4.6.7.4 Evaluation Findings

The depth and extent of written SEIS input should be governed by the depth of analysis required to reach a conclusion concerning the impacts of this Category 2 issue on aquatic resources. The information that should be included in the SEIS is described in the review procedures.

4.6.8 Effects of Thermal Effluents on Aquatic Organisms (Plants With Once-Through Cooling Systems Or Cooling Ponds)

4.6.8.1 Areas of Review

This ESRP provides guidance for the review of the impacts of thermal effluents on aquatic organisms at nuclear power plants with once-through cooling systems or cooling ponds during

the license renewal term. Section 4.6.1.2.4 of the LR GEIS discusses the impacts of this issue during initial LR or SLR. The scope of this review includes (1) review of the relevant sections of the LR GEIS, (2) review of the applicant's ER, (3) review of available studies, data, and other available information related to the issue, (4) identification and disposition of any new and potentially significant information, and (5) preparation of SEIS input.

Notably for this issue, Section 316(a) of the CWA addresses the adverse environmental impacts associated with thermal discharges into waters of the United States. Under this section of the act, the EPA, or authorized States and Indian Tribes, establish thermal surface water quality criteria for waters of the United States within their jurisdiction. The EPA, or authorized States and Indian Tribes, also have the authority to impose alternative, less-stringent, facility-specific effluent limits (called "variances") on the thermal component of individual point source discharges. To be eligible, regulated facilities must demonstrate, to the satisfaction of the NPDES permitting authority, that facility-specific effluent limitations will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving body of water. CWA Section 316(a) variances are valid for the term of the NPDES permit (i.e., five years). Facilities must reapply for variances with each NPDES permit renewal application. When available, the NRC staff relies on the expertise and authority of the NPDES permitting authority with respect to thermal impacts on aquatic organisms.

Data and Information Needs

Section 4.6.1 of this ESRP lists data and information needs for the evaluation of ecological resource impacts.

4.6.8.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.6.2, acceptance criteria for the evaluation of thermal effluents on aquatic organisms are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(B). If the applicant's plant utilizes once-through cooling or cooling pond water intake and discharge systems, the applicant shall provide a copy of current Clean Water Act (CWA) 316(b) determinations and, if necessary, a 316(a) variance in accordance with 40 CFR part 125, or equivalent State permits and supporting documentation. If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from impingement mortality and entrainment and thermal discharges.

4.6.8.3 Review Procedures

For all ecological resource issues, the same basic approach can identify the environmental impacts of license renewal and alternatives. This approach generally follows the EPA's (1998) framework for ecological risk assessment. Section 4.6.3 of this ESRP contains general review procedures for all ecological resource issues. Follow these procedures along with the following steps unique to the issue of the effects of thermal effluents on aquatic organisms.

1. Review the discussion of this issue in the LR GEIS.
2. Review the discussion in the applicant's ER concerning the nuclear power plant's cooling water system and effluent discharges, NPDES permit status, and thermal studies and data.

3. Review thermal studies conducted at the nuclear power plant and any supporting monitoring and data.

4. Review the nuclear power plant's current NPDES permit and the status of the permitting authority's CWA Section 316(a) determination.

   - If the NPDES permitting authority has made a determination under CWA Section 316(a) that thermal effluent limits are sufficiently stringent to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving body of water, and the nuclear power plant has implemented any associated requirements, then the NRC staff assumes that adverse impacts on the aquatic environment will be minimized (see 10 CFR 51.10(c); 10 CFR 51.53(c)(3)(ii)(B); and 10 CFR 51.71(d)). In such cases, the reviewer can conclude that thermal impacts on aquatic organisms would be SMALL over the course of the license renewal term, and no additional analysis is required.

   - If the NPDES permitting authority has not granted a CWA Section 316(a) variance, the reviewer should analyze the potential impacts of thermal discharges using a weight-of-evidence approach. In this approach, the reviewer should consider multiple lines of evidence to assess the presence or absence of ecological impairment (i.e., noticeable or detectable impact) on the aquatic environment. For instance, as its lines of evidence, the reviewer might consider characteristics of the cooling water discharge system design, the results of thermal studies performed at the facility, and trends in fish and shellfish population abundance indices. The reviewer should then consider these lines of evidence together to predict the level of impact (SMALL, MODERATE, or LARGE) that the aquatic environment is likely to experience over the course of the license renewal term.

5. Obtain additional information to assist in evaluating the specific nature of thermal stresses, as needed, including the following:

   - thermal plume characteristics, such as areal extent of the plume and thermal contour maps
   - thermal tolerances of local species or their surrogates
   - other relevant life history characteristics of local species, such as seasonal absence or presence; population abundances and distributions; special species statuses and designations; and regional management objectives
   - data on fish kill events related to nuclear power plant operation
   - physical or biological factors that might concentrate or attract organisms to the thermal plume.

6. Review the applicant's ER, including

   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on ecological impact issues known to the applicant and the public

7. Prepare a statement for the SEIS related to this issue that

   - summarizes the status of the NPDES permitting authority's CWA Section 316(a) determination
   - adopts the NPDES permitting authority's conclusions (if the permitting authority has made a CWA Section 316(a) determination)

- analyzes the impacts of continued plant operations and refurbishment (if the permitting authority has not made BTA determinations)
- provides the significance level of the environmental impacts
- describes any new information developed or used in the plant-specific assessment.

4.6.8.4 Evaluation Findings

The depth and extent of written SEIS input should be governed by the depth of analysis required to reach a conclusion concerning the impacts of this Category 2 issue on aquatic resources. The information that should be included in the SEIS is described in the review procedures.

4.6.9 Water Use Conflicts with Aquatic Resources (Plants With Cooling Ponds Or Cooling Towers Using Makeup Water From A River)

4.6.9.1 Areas of Review

This ESRP provides guidance for the review of water use conflicts that may arise at nuclear power plants with cooling ponds or cooling towers that use makeup water from a river and how those conflicts could affect aquatic resources during the initial LR or SLR term. Notably, this issue also applies to nuclear power plants with hybrid cooling systems that withdraw makeup water from a river (i.e., once-through cooling systems with helper cooling towers) (e.g., NRC 2020b). Section 4.6.1.2.10 of the LR GEIS discusses the impacts of this issue. The scope of this review includes (1) review of the relevant sections of the LR GEIS, (2) review of the applicant's ER, (3) review of available studies, data, and other available information related to the issue, (4) identification and disposition of any new and potentially significant information, and (5) preparation of SEIS input.

Data and Information Needs

Section 4.6.1 of this ESRP lists data and information needs for the evaluation of ecological resource impacts.

4.6.9.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.6.2, acceptance criteria for the evaluation of water use conflicts with aquatic organisms are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(A). If the applicant's plant utilizes cooling towers or cooling ponds and withdraws makeup water from a river, an assessment of the impact of the proposed action on water availability and competing water demands, the flow of the river, and related impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be provided.

4.6.9.3 Review Procedures

For all ecological resource issues, the same basic approach can identify the environmental impacts of license renewal and alternatives. This approach generally follows the EPA's (1998) framework for ecological risk assessment. Section 4.6.3 of this ESRP contains general review

procedures for all ecological resource issues. Follow these procedures along with the following steps unique to the issue of water use conflicts with aquatic resources.

1. Review the discussion of this issue in the LR GEIS.
2. Review the discussion in the applicant's ER concerning surface water use.
3. Describe the following, with a focus on the interfaces with the aquatic environment and how site procedures, permits, and other controls minimize or mitigate impacts on the terrestrial environment.
   - Summarize the baseline hydrologic regime of the affected surface waters, including seasonal fluctuations in flow, and conditions that could lead to extreme periods of low flow.
   - Summarize current and anticipated consumptive water use by the nuclear power plant.
   - Identify other users relying on the affected surface waters, including downstream municipal, agricultural, or industrial users, with which the nuclear power plant may compete.
   - Identify aquatic habitats and species that would be especially sensitive to reduced water availability (e.g., nearshore habitat; aquatic plants; early life stages of fish and shellfish; species that rely on specific microhabitats that may not be available under low flow conditions; etc.).
   - Discuss regional, state, Federal, and Indian Tribe permits and controls concerning water use and any agreements with water resources control boards.
   - Summarize any other current or proposed practices and measures to control or limit operational water-use impacts.
   - Describe past water use conflicts with aquatic resources, if any, and evaluate whether such conflicts would be likely to arise again during the license renewal term.
4. Review the applicant's ER, including
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on ecological impact issues known to the applicant and the public
5. Prepare a statement for the SEIS related to this issue that:
   - analyzes the impacts of continued plant operations and refurbishment
   - describes measures to mitigate adverse impacts
   - provides the significance level of the environmental impacts
   - describes any new information developed or used in the plant-specific assessment.

4.6.10 Evaluation Findings

The depth and extent of written SEIS input should be governed by the depth of analysis required to reach a conclusion concerning the impacts of this Category 2 issue on aquatic resources. The information that should be included in the SEIS is described in the review procedures.

4.6.11 Endangered Species Act: Federally Listed Species and Critical Habitats

4.6.11.1 Areas of Review

This ESRP provides guidance for the review of the impacts of nuclear power plant license renewal on federally listed species and critical habitats protected under the ESA. Sections 4.6.1.3.1 and 4.6.1.3.2 of the LR GEIS discuss the impacts of these issues during initial LR or SLR. The scope of this review includes (1) review of the relevant sections of the LR GEIS, (2) review of the applicant's ER, (3) review of available studies, data, and other available information related to the issue, (4) identification and disposition of any new and potentially significant information, (5) consultation with the Services, as appropriate, and (6) preparation of SEIS input.

Congress enacted the ESA in 1973 to protect and recover imperiled species and the ecosystems upon which they depend. The ESA provides a program for the conservation of endangered and threatened plants and animals (collectively, "listed species") and the habitats in which they are found, and it prohibits any person from the take of listed species, as defined in the Act, without a permit. The FWS and NMFS are the lead Federal agencies for implementing the ESA, and these agencies are charged with determining species that warrant listing. The Services divide responsibility for listing and managing species: the FWS is responsible for terrestrial and freshwater species, and NMFS is responsible for marine and anadromous species.

Section 7 of the ESA establishes interagency consultation requirements for actions by Federal agencies. Section 7(a)(1) of the ESA charges Federal agencies to aid in the conservation of listed species. Section 7(a)(2) of the ESA requires that Federal agencies consult with the Services for actions that "may affect" federally listed species and critical habitats and to ensure that their actions do not jeopardize the continued existence of those species or destroy or adversely modify those habitats. Private actions with a Federal nexus, such as construction and operation of facilities that involve Federal licensing or approval, are also subject to consultation. Therefore, the NRC's issuance of initial LR or SLR licenses may trigger consultation requirements. Consultation pursuant to ESA Section 7(a)(2) is commonly referred to as "Section 7 consultation." Appendix A.1 of this ESRP describes the types of Section 7 consultation and provides guidance to the NRC staff in conducting such consultations.

Notably, the LR GEIS discusses federally listed species and critical habitats as two issues: those under FWS jurisdiction and those under NMFS jurisdiction. License renewal may affect listed species and critical habitats under the jurisdiction of one or both Services, and a given review may necessitate separate Section 7 consultations with each Service.

Data and Information Needs

Section 4.6.1 of this ESRP lists data and information needs for the evaluation of ecological resource impacts. Additional data and information needs that may be necessary to meet the statutory and regulatory requirements of the ESA are incorporated into the review procedure below.

4.6.11.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.6.2, acceptance criteria for the evaluation of impacts on federally listed species and critical habitats protected under the ESA are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including but not limited to, the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.

4.6.11.3 Review Procedures

For all ecological resource issues, the same basic approach can identify the environmental impacts of license renewal and alternatives. This approach generally follows the EPA's (1998) framework for ecological risk assessment. Section 4.6.3 of this ESRP contains general review procedures for all ecological resource issues. Follow these procedures along with the following steps unique to the issue of federally listed species and critical habitats.

1. Review the discussion of this issue in the LR GEIS.
2. Review the applicant's ER, including
   - the action area, federally listed species and critical habitats potentially present in the action area, and activities associated with license renewal that could affect these resources
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on ecological impact issues known to the applicant and the public
3. Perform an ESA analysis consistent with the interagency consultation guidance in Appendix A.1 of this ESRP.
4. Initiate and conduct Section 7 consultation with the Services, as appropriate, consistent with the interagency consultation guidance in Appendix A.1 of this ESRP.
5. Prepare a statement for the SEIS related to this issue that
   - documents the ESA analysis or that incorporates by reference a separately prepared biological evaluation or biological assessment, if prepared (see Appendix A.1)
   - reports findings for each federally listed or proposed species and designated or proposed critical habitat in accordance with the terminology used in the ESA and its implementing regulations (see Appendix A.1, Table A-1).

4.6.11.4 Evaluation Findings

The depth and extent of written SEIS input should be governed by the depth of analysis required to reach a conclusion concerning the impacts of this Category 2 issue on federally protected ecological resources. The information that should be included in the SEIS is described in the review procedures.

4.6.12 Magnuson-Stevens Act: Essential Fish Habitat

4.6.12.1 Areas of Review

This ESRP provides guidance for the review of the impacts of nuclear power plant license renewal during initial LR or SLR on EFH protected under the MSA, as amended by the Sustainable Fisheries Act.

Section 4.6.1.3.3 of the LR GEIS discusses the impacts of this issue. The scope of this review includes (1) review of the relevant sections of the LR GEIS, (2) review of the applicant's ER, (3) review of available studies, data, and other available information related to the issue, (4) identification and disposition of any new and potentially significant information, (5) consultation with NMFS, as appropriate, and (6) preparation of SEIS input.

Congress enacted the MSA in 1976 to foster long-term biological and economic sustainability of the Nation's marine fisheries. The MSA is a comprehensive, multi-purposed statute. Its key objectives include preventing overfishing, rebuilding overfished stocks, increasing long-term economic and social benefits, and ensuring a safe and sustainable supply of seafood. NOAA, together with eight regional Fishery Management Councils established under the MSA, implement the provisions of the MSA.

The MSA directs the Fishery Management Councils, in conjunction with NMFS, to designate areas of EFH and to manage marine resources within those areas. EFH is defined as the coastal and marine waters and substrate necessary for fish to spawn, breed, feed, or grow to maturity (50 CFR 600.10). NMFS further defines "waters," "substrate," and "necessary" at 50 CFR 600.10. EFH applies to federally managed finfish and shellfish (herein referred to as "EFH species"). As of 2022, the Councils and NMFS have designated EFH for nearly 1,000 species at multiple life stages.

The Fishery Management Councils also may designate some EFH as a HAPC if that habitat exhibits one or more of the following traits: rare, stressed by development, possessing important ecological functions for EFH species, or especially vulnerable to anthropogenic degradation. HAPC can cover a specific location (e.g., an estuary bank or a single spawning location) or cover habitat type that is found at many locations (e.g., coral, nearshore nursery areas, pupping grounds). HAPC designation does not convey additional restrictions or protections on an area. The designation simply focuses increased scrutiny, study, or mitigation planning compared to surrounding areas because HAPC represent high-priority areas for conservation, management, or research and are necessary for healthy ecosystems and sustainable fisheries. The Fishery Management Councils may, however, restrict the use or possession of fishing gear types within HAPC. The geographic boundaries of HAPC are subject to refinement through amendments, as research better informs management decisions (NOAA 2020).

Section 305(b) of the MSA contains interagency consultation requirements pertaining to Federal agencies and their actions. Under MSA Section 305(b)(2), Federal agencies must consult with NMFS for actions that may adversely affect EFH. Private actions with a Federal nexus, such as construction and operation of facilities that involve Federal licensing or approval, also are subject to consultation. Therefore, the NRC's issuance of initial LR or SLR licenses may trigger consultation requirements. Consultation pursuant to MSA Section 305(b) is commonly referred to as "EFH consultation." Appendix A.2 of this ESRP describes the types of EFH consultation and provides guidance to the NRC staff in conducting such consultations.

Data and Information Needs

Section 4.6.1 of this ESRP lists data and information needs for the evaluation of ecological resource impacts. Additional data and information needs that may be necessary to meet the statutory and regulatory requirements of the MSA are incorporated into the review procedure below.

4.6.12.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.6.2, acceptance criteria for the evaluation of impacts on EFH are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including but not limited to, the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.

4.6.12.3 Review Procedures

For all ecological resource issues, the same basic approach can identify the environmental impacts of license renewal and alternatives. This approach generally follows the EPA's (1998) framework for ecological risk assessment. Section 4.6.3 of the ESRP contains general review procedures for all ecological resource issues. Follow these procedures along with the following steps unique to the issue of EFH.

1. Review the discussion of this issue in the LR GEIS.
2. Review the applicant's ER, including
   - the affected area, EFH and HAPC potentially present in the affected area, and activities associated with license renewal that could affect these habitats
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on ecological impact issues known to the applicant and the public
3. Perform an EFH analysis consistent with the interagency consultation guidance in Appendix A.2 of this ESRP.
4. Initiate and conduct EFH consultation with NMFS, as appropriate, consistent with the interagency consultation guidance in Appendix A.2 of this ESRP.
5. Prepare a statement for the SEIS related to this issue that
   - documents the EFH analysis or that incorporates by reference a separately prepared EFH assessment, if prepared (see Appendix A.2)
   - reports findings for each EFH by federally managed species and life stage in accordance with the terminology used in the EFH and its implementing regulations (see Appendix A.2, Table A-2).

4.6.12.4 Evaluation Findings

The depth and extent of written SEIS input should be governed by the depth of analysis required to reach a conclusion concerning the impacts of this Category 2 issue on federally protected ecological resources. The information that should be included in the SEIS is described in the review procedures.

4.6.13 National Marine Sanctuaries Act: Sanctuary Resources

4.6.13.1 Areas of Review

This ESRP provides guidance for the review of the impacts of nuclear power plant license renewal on sanctuary resources protected under the NMSA. Section 4.6.1.3.4 of the LR GEIS discusses the impacts of this issue during initial LR or SLR. The scope of this review includes (1) review of the relevant sections of the LR GEIS, (2) review of the applicant's ER, (3) review of available studies, data, and other available information related to the issue, (4) identification and disposition of any new and potentially significant information, (5) consultation with NOAA's Office of National Marine Sanctuaries (ONMS), as appropriate, and (6) preparation of SEIS input.

Congress enacted the NMSA in 1972 to protect areas of the marine environment that have special national significance. The NMSA authorizes the Secretary of Commerce to establish the National Marine Sanctuary System and designate sanctuaries within that system. ONMS is charged with comprehensively managing this system, which includes 15 sanctuaries and the Papahānaumokuākea and Rose Atoll marine national monuments, encompassing more than 600,000 square miles of marine and Great Lakes waters from Washington State to the Florida Keys, and from Lake Huron to American Samoa. Within these areas, sanctuary resources include any living or nonliving resource of a national marine sanctuary that contributes to the conservation, recreational, ecological, historical, educational, cultural, archaeological, scientific, or aesthetic value of the sanctuary. As of 2022, four additional sanctuaries are proposed for designation. Maps of designated and proposed sanctuaries are available at https://sanctuaries.noaa.gov/about/maps.html.

In 1992, Congress amended the NMSA to require interagency coordination. Pursuant to Section 304(d) of the NMSA, Federal agencies must consult with ONMS when their proposed actions are likely to destroy, cause the loss of, or injure a sanctuary resource. Private actions with a Federal nexus, such as construction and operation of facilities that involve Federal licensing or approval, are also subject to consultation. Therefore, the NRC's issuance of initial LR or SLR licenses may trigger consultation requirements. Consultation pursuant to NMSA Section 304(d) is commonly referred to as "NMSA consultation." Appendix A.3 of this ESRP describes NMSA consultation and provides guidance to the NRC staff in conducting such consultations.

Data and Information Needs

Section 4.6.1 of this ESRP lists data and information needs for the evaluation of ecological resource impacts. Additional data and information needs that may be necessary to meet the statutory and regulatory requirements of the NMSA are incorporated into the review procedure below.

4.6.13.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.6.2, acceptance criteria for the evaluation of impacts on sanctuary resources protected under the NMSA are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including but not limited to, the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.

4.6.13.3 Review Procedures

For all ecological resource issues, the same basic approach can identify the environmental impacts of license renewal and alternatives. This approach generally follows the EPA's (1998) framework for ecological risk assessment. Section 4.6.3 of this ESRP contains general review procedures for all ecological resource issues. Follow these procedures along with the following steps unique to sanctuary resources.

1. Review the discussion of this issue in the LR GEIS.
2. Review the applicant's ER, including
   - the affected area, national marine sanctuaries and sanctuary resources potentially present in the affected area, and activities associated with license renewal that could affect these habitats
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on ecological impact issues known to the applicant and the public.
3. Perform an NMSA analysis consistent with the interagency consultation guidance in Appendix A.3 of this ESRP.
4. Initiate and conduct NMSA consultation with the ONMS, as appropriate, consistent with the interagency consultation guidance in Appendix A.3 of this ESRP.
5. Prepare a statement for the SEIS related to this issue that
   - documents the EFH analysis or that incorporates by reference a separately prepared EFH assessment, if prepared (see Appendix A.3)
   - reports findings for each EFH by federally managed species and life stage in accordance with the terminology used in the EFH and its implementing regulations (see Appendix A.3, Table A-3).

4.6.13.4 Evaluation Findings

The depth and extent of written SEIS input should be governed by the depth of analysis required to reach a conclusion concerning the impacts of this Category 2 issue on federally protected ecological resources. The information that should be included in the SEIS is described in the review procedures.

4.7 Historic and Cultural Resources

4.7.1 Areas of Review

This ESRP provides guidance for the review of potential impacts of initial LR or SLR on historic and cultural resources and historic properties protected under Section 106 of the National Historic Preservation Act of 1966 (NHPA; 54 U.S.C. § 300101 et seq.). Impacts are discussed in Section 4.7.1 and 4.7.2 of the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of relevant sections of the LR GEIS; (2) review of the applicant's ER; (3) review of available cultural resource investigations and other available information related to the issue; (4) identification and disposition of any new and potentially significant information; (5) consultation with appropriate consulting parties as defined in 36 CFR 800.2, as appropriate; and (6) preparing input to the SEIS. Table 4-2 lists the applicable Category 2 issue for historic and cultural resources.

Section 106 of the NHPA requires Federal agencies to consider the effects of their undertakings (e.g., initial LR or SLR) on historic properties and consult with the appropriate State Historic Preservation Officer/Tribal Historic Preservation Officer (SHPO/THPO), Indian Tribes, and interested parties. The National Environmental Policy Act of 1969 (NEPA) requires Federal agencies to consider the potential effects of their actions on the "affected human environment," which includes "aesthetic, historic, and cultural resources." The issuance of a renewed operating license for a nuclear power plant is an undertaking that could affect historic properties.

In accordance with 36 CFR 800.8(c) "Use of the NEPA process for section 106 purposes," the NRC coordinates its Section 106 responsibilities under the NEPA for license renewal reviews. The NRC may use the NEPA process to comply with Section 106 in lieu of the procedures set forth in Sections 800.3 through 800.6 provided all consulting parties (Advisory Council on Historic Preservation, SHPO, THPO, Indian Tribes, the public, and other interested stakeholders) have been notified in advance and it meets the standards of 36 CFR 800.8(c). The NRC will consult with the appropriate SHPO/THPO for each plant-specific license renewal review. Through early coordination, all issues will be identified.

An assessment of the potential impacts for license renewal differs from that of original licensing because ground-disturbing activities occurred during initial nuclear power plant construction resulting in extensive disturbance of much of the land in and immediately surrounding the power block. Many nuclear power plant facilities were constructed prior to the implementation of NHPA Section 106 regulations located at 36 CFR Part 800; therefore, there were no formal standards for archaeological field investigations or requirements to identify and consult with Indian Tribes. In some cases, archaeological and architectural resource investigations were completed prior to construction, but the methods used then are unlikely to meet the current Secretary of Interior's standards for archaeological and architectural resource investigation. Historic and cultural resource field investigations may be necessary if none were completed previously or may need to be updated to meet current standards.

The area(s) within which historic and cultural resources should be identified is referred to as the area(s) of potential effect (APE[s]), defined at 36 CFR 800.16(d) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of important cultural resources, if any such resources exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR 800.16(d)). For NRC reviews, the license renewal (initial LR or SLR)

APE includes lands within the nuclear power plant site boundary and the transmission lines up to the first substation that may be directly (e.g., physically) affected by land-disturbing or other operational activities associated with continued plant operations and maintenance and/or refurbishment activities. The APE may extend beyond the nuclear plant site when these activities may indirectly (e.g., visual and auditory) affect historic properties. This determination is made irrespective of land ownership or control.

The purpose of the historic and cultural resources assessment is to ensure that such resources that are considered eligible for inclusion in the *National Register of Historic Places* are not adversely affected by initial LR or SLR. If adverse effects cannot be avoided, mitigation must be developed in consultation with the appropriate SHPO/THPO, Indian Tribes, and other interested parties. For historic or cultural resources that do not meet the criteria to be considered a historic property under the NHPA, the NRC will assess whether there are any potential significant impacts on these resource through the NEPA process.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new and significant information identified by the public and other information sources
- a map that identifies the APE and a site disturbance map
- cultural resource investigations (e.g., archaeological or architectural) conducted within the direct and indirect APE and surrounding area
- information related to evaluations for eligibility for the *National Register of Historic Places* (36 CFR Part 60), and associated consultations with the SHPO/THPO, Indian Tribes, and interested parties (e.g., certified local governments, local preservation officials)
- applicant's cultural resource protection procedures or Cultural Resource Management Plans.

4.7.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.1.2, acceptance criteria for the evaluation of historic and cultural resources impacts are based on the relevant requirements of the following:

- 10 CFR 51.53(c)(3)(ii)(K). All applicants shall identify any potentially affected historic and cultural resources and historic properties and assess whether future plant operations and any planned refurbishment activities would affect these resources in accordance with Section 106 of the National Historic Preservation Act and in the context of the National Environmental Policy Act.
- 36 CFR Part 800, "Protection of Historic Properties"
- 36 CFR Part 60, "National Register of Historic Places"
- 36 CFR Part 63, "Determinations of Eligibility for Inclusion in the National Register of Historic Places"

- National Historic Preservation Act of 1966, as amended (54 U.S.C. § 300101 et seq.).

4.7.3 Review Procedures

To analyze the impact of plant operations during the renewal term on historic and cultural resources, review the information collected and discussed in Section 3.7 of the ESRP and complete the following steps:

1. Review the discussion of the impacts of plant operations during the renewal term on historic and cultural resources in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the base for evaluation of information identified by the applicant, the public, and the staff.

2. Analyze the historic and cultural resources and historic properties impacts associated with continued plant operations during the renewal term and refurbishment, as follows:
   - Define the undertaking (i.e., initial LR or SLR).
   - Describe the coordination of the NHPA Section 106 review through NEPA in accordance with 36 CFR 800.8(c).
   - Identify and discuss any activities associated with continued operations, maintenance, and refurbishment that could affect onsite or offsite historic and cultural resources located within the direct and indirect APEs. Such activities include ground-disturbing activities (e.g., land clearing, grading, excavating, road work), increases in traffic, and noise and visual intrusions.
   - Review the site disturbance map (developed by a qualified archaeologist) that indicates areas of heavy disturbance and areas of high potential for undiscovered historic and cultural resources.
   - Identify and assess effects to historic properties found in the direct and indirect APEs that may be affected by the proposed undertaking (i.e., initial LR or SLR). Use the criteria specified in 36 CFR 800.5 to assess adverse effects on historic properties. Provide a basis and documentation for how a conclusion is reached.
   - Identify and assess effects to historic and cultural resources that are not determined to be historic properties but may be considered important in the context of NEPA, as amended (e.g., sacred sites, cemeteries, local gathering areas).
   - Discuss the direct and indirect effects (e.g., ground disturbance, physical, visual, auditory, atmospheric such as fugitive dust, light, and traffic), if any, from the proposed project, and from any associated transmission lines on nearby historic properties or important historic and cultural resources.
   - Review any issues related to historic and cultural resources identified during the public scoping period.
   - Review any correspondence from the SHPO/THPO, Indian Tribes, interested parties, or local preservation officials regarding any cultural resource investigations conducted on the applicant's site.
   - If significant resources are located within the APE, review any procedures or integrated cultural resources management plans instituted by the applicant to protect the historic and cultural resources identified on the site or within the in-scope transmission line ROWs. Also, verify that the applicant has developed these procedures and plans in

consultation with the appropriate SHPO/THPO, local preservation official, or Indian Tribes.

- Through consultation with Indian Tribes, identify any traditional cultural properties.

For impacts on historic properties assessed under Section 106 of the NHPA, the assessment would result in one of three potential determinations (see 36 CFR 800.4 and see Appendix B for further guidance):

- No historic properties present, the undertaking will have no effect to historic properties
- Historic properties present, the undertaking will have no adverse effect upon them
- Historic properties present, the undertaking will have an adverse effect upon one or more historic properties (see 36 CFR 800.5).

For historic or cultural resources that do not meet the criteria to be considered a historic property under the NHPA, the NRC will assess whether there are any potential significant impacts on these resource through the NEPA process.

3. Prepare a statement for the SEIS that

- analyzes the impacts of continued plant operations and refurbishment and summarizes the information that has been reviewed, and the analyses that have been conducted
- describes measures to avoid, minimize, or mitigate adverse impacts
- provides the significance level of the environmental impacts
- discusses any new information developed or used in the plant-specific assessment evaluation findings.

4.7.4 Evaluation Findings

The depth and extent of the information in the assessment would be governed by the extent and significance of the effects of continued operations and refurbishment activities during the renewal term on historic and cultural resources. The reviewer should verify that sufficient information is available to meet the relevant requirements and that the SEIS includes the information described under the review procedures.

4.8 Socioeconomics

4.8.1 Areas of Review

This ESRP provides guidance for the review of plant-specific socioeconomic impacts of continued nuclear plant operations and refurbishment associated with license renewal. Socioeconomic impacts are evaluated in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a) for all nuclear power plants.

The scope includes the review of (1) the applicant's ER, (2) socioeconomic impacts in the LR GEIS during initial LR or SLR, and (3) any new and significant socioeconomic information. Following this review, the reviewer then prepares input to the SEIS. Socioeconomic issues (Category 1), evaluated in the LR GEIS, are listed in Table 4-1.

Data and Information Needs

According to the LR GEIS, continued operations, and refurbishment activities in support of license renewal have had little to no socioeconomic effect on communities near nuclear power plants. Socioeconomic effects of power plant operations have become well established and normal fluctuations in employment, income, and tax revenue have not altered the quality and availability of community services and housing, or increased traffic volumes.

License renewal applicants consistently indicate they have no plans to add operations workers, and increased maintenance and safety inspection activities during the renewal term can be managed using the current workforce. Consequently, people living near nuclear power plants have not experienced any significant socioeconomic impact since construction and the onset of reactor operations. In addition, refurbishment activities, including steam generator and vessel head replacement, have been conducted during regularly scheduled power plant refueling and maintenance outages. Based on this, the following data or information is needed:

- a description of the applicant's process for identifying new and significant socioeconomic information in the ER
- any new and significant plant-specific socioeconomic impact information identified during scoping
- any new and significant plant-specific socioeconomic impact information identified during site visit, staff environmental review, and discussions with applicant.

4.8.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 4.1.2 also apply for the evaluation of the socioeconomic impacts.

4.8.3 Review Procedures

Suggested steps for the socioeconomic review are as follows:

1. The applicant is required by NRC regulation to disclose new and significant socioeconomic information regarding the environmental impacts of license renewal of which it is aware (see 10 CFR 51.53(c)(3)(iv)). In reviewing the applicant's ER, consider the applicant's process for discovering new socioeconomic information and evaluating the significance of any new information discovered.
2. Review public scoping meeting transcripts and related correspondence.
3. Compare any new socioeconomic information with the conclusions in the LR GEIS.
4. Evaluate the significance of any new socioeconomic information for its effect on the socioeconomic impact analysis.
5. Prepare SEIS discussion describing the search for new and significant information, summarizing any new information found and the results of the significance evaluation. Incorporate by reference the conclusions from the LR GEIS for the proposed action or modify as necessary to account for any significant new information.

4.8.4 Evaluation Findings

The reviewer should ensure that the analysis provides a sufficient basis for determining socioeconomic impacts of continued nuclear plant operations and refurbishment activities associated with license renewal.

4.9 Human Health

4.9.1 Areas of Review

This ESRP provides guidance for the analysis and assessment of the human-health impacts from continued plant operations during the license renewal term and refurbishment. Human health impacts are evaluated in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of human health impacts from continued plant operations during the initial LR and SLR term and refurbishment in the LR GEIS, (2) evaluation of new information for significance, and (3) preparation of input to the SEIS. Table 4-1 lists the applicable Category 1 issues and Table 4-2 lists the applicable Category 2 issues for human health identified in the LR GEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on human health impacts identified by the public and other information sources.

4.9.2 Acceptance Criteria

In addition to the applicable acceptance criteria specified in Section 4.1.2, the acceptance criteria for the evaluation of human-health impacts are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(G). If the applicant's plant uses a cooling pond, lake, canal, or discharges into waters of the United States accessible to the public, an assessment of the impact of the proposed action on public health from thermophilic organisms in the affected water must be provided.
- 10 CFR 51.53(c)(3)(ii)(H). If the applicant's transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the National Electric Safety Code for preventing electric shock from induced currents, an assessment of the impact of the proposed action on the potential shock hazard from the transmission lines must be provided.

4.9.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of potential human health impacts from continued plant operations during the operating license renewal term in the LR GEIS. This step establishes the basis

for evaluating any new and significant human health information identified by the applicant, the public, and the staff.

2. Determine whether there is any new human health impact information that should be evaluated. The following sources of information should be included in the search for new information:
   - The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information on the human health impacts of operating license renewal of which it is aware. In reviewing the applicant's ER, consider the applicant's process for discovering new information and evaluating the significance of any new information. Assess whether the process is adequate to ensure a reasonable likelihood that the applicant would be aware of new information.
   - Records of public scoping meetings and correspondence related to the operating license renewal application. Compare the human health information presented by the public with information considered in the LR GEIS. Determine whether the information post-dates the analysis leading to the LR GEIS.
   - Part 20 standards and regulations. Have the applicable standards and regulations changed since the analysis leading to the LR GEIS? If so, determine whether these changes affect the NRC evaluation of applications for license renewal.
3. Evaluate the significance of new human health impact information.
4. Review the applicant's ER, including:
   - the applicant's process for identifying new and potentially significant information
   - any new information included in the ER on human health impact issues known to the applicant and the public
5. Prepare a statement for the SEIS describing the search for new information, summarizing new information found, presenting results of evaluation of significance, and adopting conclusions from the LR GEIS modified as necessary to account for new and significant information.

Additional specific guidance follows for each surface water and groundwater issue identified as plant-specific (Category 2) in the LR GEIS.

4.9.4 Evaluation Findings

The depth and extent of the input to the SEIS would be governed by the extent of the analysis required to reach a conclusion related to the potential human health impacts from continued plant operations and refurbishment. The information that should be included in the SEIS is described in the review procedures.

4.9.5 Microbiological Hazards to the Public

4.9.5.1 Areas of Review

This ESRP provides guidance for the analysis and assessment of the human-health impacts associated with microbiological hazards to the public associated with heated-water discharges from the plant's cooling system during the renewal term. This issue is identified as a Category 2 issue in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) reviewing the impacts to human health from microbiological organism during initial LR or SLR discussion in the LR GEIS, (2) evaluating new information for significance, and (3) preparing input to the SEIS.

Microbiological organisms of concern for public and occupational health, include enteric pathogens (bacteria that typically exist in the intestines of animals and humans (e.g., *Pseudomonas aeruginosa*), thermophilic fungi, bacteria (e.g., *Legionella* spp. and *Vibrio* spp.), free-living amoebae (e.g., *Naegleria fowleri* and *Acanthamoeba* spp.), and organisms that produce toxins that affect human health (e.g., dinoflagellates [*Karenia brevis*] and blue-green algae). Exposure to these microorganisms, or in some cases the endotoxins or exotoxins produced by the organisms, can cause illness or death.

Maximum contaminant levels of various microorganisms, including *Legionella*, in public drinking water systems are regulated by 40 CFR 141.70. However, there are no specific regulations tied to microorganisms that are associated with cooling towers or thermal discharges.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on impacts to human health from thermophilic microorganisms identified by the public and other information sources.

4.9.5.2 Acceptance Criteria

Acceptance criteria for the evaluation of human health impacts from microbiological organisms are addressed in ESRP Section 4.9.2.

4.9.5.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of potential impacts to human health from microbiological organisms associated with continued plant operations during the operating license renewal term in the LR GEIS. This step establishes the basis for evaluating any new and significant information identified by the applicant, the public, and the staff.
2. Review the plant cooling system. If the plant cooling system uses a cooling pond, lake, canal, or discharges to waters of the United States accessible to the public, then continue the analysis at Step 3. Otherwise, prepare a statement for the SEIS that describes the plant cooling system; states that the cooling system discharges to waters not accessible to the public; and concludes that there would not be a detrimental impact from the thermal discharges on the concentration levels of microbiological organisms of concern.
   - A description of the location of the thermal discharges for the plant's cooling system (i.e., a cooling pond, lake, canal, or waters of the United States accessible to the public) and a characterization of the water body receiving discharges from the cooling system (e.g., a large lake or ocean).

- The temperature increase expected for the aquatic environment that is subject to the plant's thermal discharges.
- The results of any analyses that have been made for the presence of microorganisms. Microbiological organisms of concern for public and occupational health, include enteric pathogens (bacteria that typically exist in the intestines of animals and humans (e.g., *Pseudomonas aeruginosa*), thermophilic fungi, bacteria (e.g., *Legionella spp*. and *Vibrio spp*.), free-living amoebae (e.g., *Naegleria fowleri* and *Acanthamoeba spp*.), as well as organisms that produce toxins that affect human health (e.g., dinoflagellates [*Karenia brevis]* and blue-green algae). In addition, analyses for the presence of unusually high concentrations of the normally present *Legionella sp*. (Legionnaires' disease bacteria) and the free-living amoebae of the genera *Naegleria* and *Acanthamoeba* should be cited.
- A list of the outbreaks of waterborne diseases in the United States during the previous 10 years in the vicinity of the plant. This list is published regularly by the Centers for Disease Control and Prevention (CDC 2017).
- An evaluation of available data concerning the occurrence and concentrations of any of the microorganisms listed above in the vicinity of the plant and a determination of whether any of them are present under conditions and in locations that might be harmful to members of the public. If such an evaluation exists, it may be obtained from the applicant or from the State Public Health Department in the State in which the plant is located.

3. Consult with the State Public Health Department and review any records associated with waterborne disease outbreaks in the region. If the State Public Health Department is concerned about such outbreaks or the potential for such outbreaks, then continue the analysis at Step 4. Otherwise, prepare a statement for the SEIS describing the plant cooling system that
   - outlines the process leading to the determination that there have been no or few waterborne disease outbreaks in the region
   - provides a statement from the State Public Health Department indicating their basis for not being concerned about the potential for an impact to the public health from microbiological organisms associated with the cooling system
   - concludes that it appears unlikely that thermal discharges from the plant would increase the number of deleterious thermophilic microorganisms to levels that could cause a public health problem.
4. If the State advises that tests should be conducted for concentration of *Naegleria fowleri* (or other thermophilic microorganisms) in the receiving waters, the licensee should consider performing the tests when the facility has been operating at a power level typical of the level anticipated during the license renewal term for at least a month to ensure a steady state population during the sampling. Samples should be taken at locations of potential public use. An evaluation of the data should be performed, and a determination made of the magnitude of potential impacts of *Naegleria fowleri* (or other thermophilic microorganisms) on public health during the license renewal term. If the potential for an impact is determined, then continue the analysis at Step 5. If the State does not advise that tests be conducted, but they still have a concern related to the presence of deleterious thermophilic microorganisms, then continue the analysis at Step 5 without the testing. Otherwise, prepare a statement for the SEIS that

- describes the results of the tests that were performed
- provides a statement from the State Public Health Department indicating their basis for not being concerned about the potential for an impact to the public health from microbiological organisms associated with the cooling system because of the tests that were performed
- concludes that it appears unlikely that thermal discharges from the plant would increase the number of deleterious thermophilic microorganisms to levels that could cause a public health problem.

5. Request that the applicant consider mitigative measures to minimize the potential impacts if the results of the consultation with the State Public Health Department and/or the review of records associated with waterborne disease outbreaks in the region show any cause for concern regarding public health concerns related to deleterious thermophilic microorganisms. Mitigative measures may include
   - setting up and executing a monitoring program for deleterious thermophilic microorganisms
   - limiting public access to areas affected by the plant's thermal discharges (such as prohibiting public swimming in the mixing zone of the river).
6. Prepare a statement for the SEIS that
   - describes the plant cooling system
   - summarizes the information related to any waterborne disease outbreaks in the region
   - provides a statement from the State Public Health Department indicating any concerns regarding the potential for an impact to the public health from microbiological organisms associated with the cooling system
   - identifies and describes the mitigative measures considered and committed to by the applicant
   - concludes that the impacts of microbiological organisms associated with the cooling system are SMALL, MODERATE, or LARGE within the context of the analysis in the LR GEIS, considering the mitigative measures committed to by the applicant
   - discusses any new information developed or used in the plant-specific assessment.

4.9.5.4 Evaluation Findings

The depth and extent of the input to the SEIS would be governed by the extent of the analysis required to reach a conclusion related to the potential impacts on human health from microbiological organisms associated with the plant's cooling system. The information that should be included in the SEIS is described in the review procedures.

4.9.6 Electric Shock Hazards

4.9.6.1 Areas of Review

This ESRP provides guidance for the review of the electric shock hazards from transmission-line-induced currents. This issue is identified as a Category 2 issue in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the impacts to human health from electric shock from in-scope transmission-line-induced currents during initial LR or SLR in the LR GEIS, (2) evaluation of new information for significance, and (3) preparation of input to the SEIS.

The scope should include determining if transmission lines constructed for the purpose of connecting the plant to the transmission system meet the recommendations of the National Electrical Safety Code (NESC) for preventing electric shock from induced currents. If not, the scope includes assessing the impact of the proposed action on the potential shock hazard from the transmission lines. The scope also includes preparation of input to the SEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on impacts to human health from electric shock from transmission-line-induced currents identified by the public and other information sources.

4.9.6.2 Acceptance Criteria

Acceptance criteria for the evaluation of electric shock from transmission-line-induced currents are addressed in ESRP Section 4.9.2, with the following addition:

- 10 CFR 51.53(c)(3)(ii)(H), concerning assessing impacts of transmission systems not meeting NESC criteria.

Additional regulatory positions and specific criteria in support of the regulation identified above are as follows:

- NESC (IEEE SA 2017) provides guidance concerning electric shock hazards Technical Rationale.

4.9.6.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of the issues associated with electric shock hazards from induced transmission line currents in the LR GEIS.
2. Review the route of the in-scope transmission lines.
3. Review the applicant's analysis demonstrating that the transmission lines continue to meet NESC clearance standards to which they were built. The following data or information may be needed to assess human health impacts from electric shock from transmission-line-induced currents:
   - description of the in-scope transmission lines
   - verification of initial transmission line conformance with NESC criteria (NESC edition to which the lines were built or a later edition)
   - a description of a transmission line management program, if any, including continued compliance with NESC electrical shock provisions

- plans to bring lines into conformance with NESC criteria if not already in compliance. Consider basic electrical design parameters, including transmission design voltage or voltages, line capacity, conductor type and configuration, spacing between phases, minimum conductor clearances to ground, maximum predicted electric field strength(s) at 1 meter above ground, the predicted electric field strength(s) at the edge of the right-of-way in kilovolts per meter, and the design bases for these values (from the ER)
- If NESC clearance standards cannot be demonstrated, a transmission line survey identifying sites or areas that do not meet the standards and that may not meet the standards following anticipated changes in transmission-line operations or changes in land use in the right-of-way.
- If the applicant does not state that in-scope transmission lines meet electrical shock hazard of the NESC code or the applicant's demonstration is not adequate, then continue the review at Step 4. Otherwise, prepare a statement for the SEIS that
    - describes the route of the in-scope transmission lines
    - describes the line (voltage, capacity, conductor configuration, minimum conductor- to-ground clearance, and maximum predicted electrical field strengths 1 meter above ground, etc.)
    - provides the basis for the staff evaluation
    - concludes that the system meets the criteria of the NESC

4. Identify any sites or areas where the transmission lines fail to meet the NESC clearance standards. These areas should be shown on maps, photographs, or drawings to be included in the SEIS.
5. Identify measures that could be taken to meet the standards in the areas where the transmission lines fail to meet the NESC standards. Determine which measures the applicant plans or proposes to undertake, if any, and whether those measures would result in transmission lines meeting the standards.
6. Identify and evaluate mitigation measures for those areas where the transmission lines would not meet NESC standards.
7. Prepare a statement for the SEIS that
    - describes the route of the in-scope transmission lines
    - describes the line (voltage, capacity, conductor configuration, minimum conductor-to-ground clearance, and maximum predicted electrical field strengths 1 meter above ground, etc.) and potential shock hazard from the transmission lines
    - identifies sites or areas where NESC standards would not be met and explains why the standards are not appropriate to the situation or why the applicant would not make modifications to meet standards
    - describes measures to mitigate potential impacts in those areas
    - provides the significance level of the environmental impacts
    - discusses any new information developed or used in the plant-specific assessment.

4.9.6.4 Evaluation Findings

The depth and extent of the input to the SEIS would be governed by the extent of the analysis required to reach a conclusion related to the potential electric shock from transmission-line-induced currents. The information that should be included in the SEIS is described in the review procedures.

4.10 Environmental Justice

Under Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (59 FR 7629), Federal agencies are responsible for identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Although independent agencies, like the NRC, were requested to comply with Executive Order 12898, the NRC Chairman, in a March 1994 letter to the President, committed the NRC to endeavoring to carry out its measures "as part of NRC's efforts to comply with the requirements of NEPA" (NRC 1994).

On December 10, 1997, Council on Environmental Quality (CEQ) issued "Environmental Justice Guidance Under the National Environmental Policy Act." The CEQ developed this guidance to, "further assist Federal agencies with their NEPA procedures." The NRC commented on draft and revised draft versions of this guidance document.

On August 24, 2004, the Commission issued a "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions" (69 FR 52040), which states, "The Commission is committed to the general goals set forth in E.O. 12898, and strives to meet those goals as part of its NEPA review process." The following guidance is consistent with this policy statement.

4.10.1 Areas of Review

This ESRP provides guidance on conducting environmental justice reviews for proposed licensing actions requiring an EIS as part of NRC's compliance with NEPA. This issue is identified as a Category 2 issue in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes the review of (1) the applicant's ER, (2) the LR GEIS, and (3) any new and significant environmental justice information. Following this review, the reviewer then prepares input to the SEIS. The environmental justice issue (Category 2), evaluated in the nuclear plant-specific SEIS is listed in Table 4-2.

Guidance on environmental justice review requirements is found in NRR Office Instruction LIC-203, Revision 4: "Procedural Guidance for Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues" (NRC 2020c).

The scope of the review should include an analysis of the effects from continued nuclear plant operations and refurbishment activities associated with license renewal (initial LR or SLR) on minority populations, low-income populations, and Indian Tribes. The review should be of sufficient detail to permit the determination of whether human health and environmental effects are likely to be disproportionately high and adverse on these populations.

Data and Information Needs

The following data or information may be needed:

- the applicant's ER
- any new and significant plant-specific environmental justice impact information and concerns identified during scoping
- any new and significant plant-specific environmental justice impact information and concerns identified during consultations with representatives of environmental justice communities and Indian Tribes.

4.10.2 Acceptance Criteria

In addition to the criteria specified in Section 4.1.2, acceptance criteria for evaluating environmental justice impacts are based on the following:

- Executive Order 12898 (59 FR 7629), concerning Federal actions to address environmental justice in minority and low-income populations
- "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions," (69 FR 52040) affirms the Commission's commitment to the general goals of Executive Order 12898 and strives to meet those goals as part of its NEPA review for licensing actions.
- 10 CFR 51.53(c)(3)(ii)(N). Applicants shall provide information on the general demographic composition of minority and low-income populations and communities (by race and ethnicity), and Indian Tribes in the vicinity of the nuclear power plant that could be disproportionately affected by license renewal, including continued reactor operations and refurbishment activities.

Additional regulatory positions and specific criteria in support of the regulations identified above are as follows:

- CEQ guidance for addressing environmental justice, Environmental Justice: Guidance under the National Environmental Policy Act, December 10, 1997 (CEQ 1997)
- Federal Interagency Working Group on Environmental Justice and NEPA Committee, Promising Practices for EJ Methodologies in NEPA Reviews, March 2016
- Guidance for specific information requirements for the environmental justice review is in NRR Office Instruction LIC-203, Revision 4, "Procedural Guidance for Categorical Exclusion, Environmental Assessments, and Considering Environmental Issues" (NRC 2020c).

4.10.3 Review Procedures

The review procedure should be as follows:

1. Identify environmental justice issues, concerns, and unique characteristics of minority and low-income populations/communities and Indian Tribes during scoping.
2. Determine whether license renewal would have any human health and environmental effects on minority populations, low-income populations, or Indian Tribes and whether there are other environmental justice concerns. Potential human health and environmental effects are determined through NRC's NEPA review process using LIC-203 (NRC 2020c):

- Impacts that could potentially affect or cause concern to minority populations, low-income populations, and Indian Tribes are evaluated in other environmental resource areas (e.g., air and water quality, socioeconomics, and cultural resources) during the license renewal environmental review. Any potential effects and/or concerns should be summarized in the environmental justice impacts section of the SEIS.
- In considering human health and environmental effects to minority populations, low-income populations, and Indian Tribes, different patterns of consumption of natural resources should also be considered (i.e., differences in rates and/or pattern of fish, vegetable, water, and/or wildlife subsistence consumption reflective of the unique characteristics of these populations and the "special character" of communities located near the nuclear plant) (see Section 4–4 of Executive Order 12898, "Subsistence Consumption of Fish and Wildlife"; 59 FR 7629).
- Consider whether there are any means or pathways for minority populations, low-income populations, or Indian Tribes to be disproportionately affected by license renewal-related activities. Examine the potential impacts to special pathway receptors (e.g., American Indian, Hispanic, and others living a traditional lifestyle pattern of subsistence). For example, special pathway impacts consider levels of contaminants in native vegetation, crops, soils and sediments, surface water, fish, and game animals in the vicinity of nuclear plant sites.
- Sources of information include
    - Radiological Environmental Monitoring Program, annual radiological environmental operating reports
    - State radiological monitoring programs.

3. Determine if human health or environmental effects are disproportionately high and adverse.
    - Consider the following questions:
        - Would the human health or environmental effects be greater for minority populations, low-income populations, or Indian Tribes than the general population?
        - Would any of these effects not be experienced by the general population?
        - Would the human health or environmental effects on minority populations, low-income populations, or Indian Tribes be significant, unacceptable, or above generally accepted norms such as regulatory limits or State and local statutes and ordinances? Should each human health or environmental effect, and where appropriate, the cumulative and multiple effects, be reviewed for significance?
    - To the extent practicable, identify mitigation measures that reflect the needs and preferences of the affected minority population, low-income population, or Indian Tribe and environmental justice communities.

4.10.4 Evaluation Findings

The reviewer should ensure that the analysis provides a sufficient basis for determining environmental justice impacts of continued nuclear plant operations and refurbishment activities associated with license renewal.

4.11 Waste Management

4.11.1 Areas of Review

This ESRP provides guidance for the review of waste management activities at nuclear power plants during the license renewal term and refurbishment. Table 4-1 lists the applicable Category 1 issues for waste management identified in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the discussion of waste management during the initial LR or SLR term in the LR GEIS, (2) identification and evaluation of any new information, and (3) preparation of input to the SEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site and plant- specific factors. The following data or information may be needed:

- a description of the applicant's process for identifying new and potentially significant information
- any new information included in the ER on waste management, pollution prevention and waste minimization at the plant.
- the LR GEIS

4.11.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 4.1.2 also apply for the evaluation of waste management impacts.

4.11.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of waste management during the license renewal term in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the base for evaluation of information identified by the applicant, the public, and the staff.
2. Determine if there is new information on these issues that should be evaluated. The following sources of information should be included in the search for new information:
   - The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information regarding the environmental impacts of license renewal of which it is aware. In reviewing the applicant's ER, consider the applicant's process for discovering new information and evaluating the significance of any new information discovered.
   - Records of public meetings and correspondence related to the application. Compare information presented by the public with information considered in the LR GEIS.

     If the search conducted in this step reveals new information, continue with the analysis. Otherwise, prepare the section for the SEIS describing the search for new information,

stating the conclusion that there is no new information, and adopting the conclusions from the LR GEIS.

3. Evaluate the significance of new information.

4. Prepare a section for the SEIS describing the search for new information, summarizing new information found, presenting results of evaluation of significance, and adopting conclusions from the LR GEIS modified as necessary to account for significant new information.

4.11.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to waste management, pollution prevention, and waste minimization during the license renewal term. The information that should be included in the SEIS is described in the review procedures.

4.12 Greenhouse Gas Emissions and Climate Change

4.12.1 Areas of Review

This ESRP provides guidance for the analysis of greenhouse gas (GHG) emission impacts from continued plant operations during the initial LR or SLR term and refurbishment and associated climate change impacts. The staff should assess both the potential effects of the proposed action (license renewal) on climate change as indicated by GHG emissions, and the effects of climate change on resource areas affected by the proposed action. GHG emissions and climate change impacts are discussed in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the discussion of GHGs and climate change issues in the LR GEIS, (2) review of the applicant's ER, (3) identify and address any new and significant information, and (4) prepare input to the SEIS. Table 4-1 lists the applicable Category 1 issue and Table 4-2 lists the applicable Category 2 issue for GHG emissions and climate change identified in the LR GEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site-and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- new information on GHGs and climate change identified by the public and other information sources.

4.12.2 Acceptance Criteria (General for Greenhouse Gas Emissions and Climate Change Issues)

In addition to the acceptance criteria specified in Section 4.1.2 of this ESRP, the acceptance criteria for evaluation of GHGs and climate change impacts are based on the following requirements:

Commission Memorandum and Order (NRC 2009a, CLI-09-21, November 3, 2009) providing direction to the NRC staff: "We expect the Staff to include consideration of carbon dioxide and other greenhouse gas emissions in its environmental reviews for major licensing actions under the National Environmental Policy Act. The Staff's analysis for reactor applications should encompass emissions from the uranium fuel cycle as well as from construction and operation of the facility to be licensed. The Staff should ensure that these issues are addressed consistently in agency NEPA evaluations and, as appropriate, update Staff guidance documents to address greenhouse gas emissions."

Additional regulatory positions and specific criteria in support of requirements above are as follows:

Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act; Final Rule (74 FR 66496) – This rule summarizes the Environmental Protection Agency's (EPA) finding that GHGs in the atmosphere endanger public health and welfare.

40 CFR Part 98, "Mandatory Greenhouse Gas Reporting" – Establishes mandatory GHG reporting requirements for certain facilities and contains multiple provisions relevant to the air resources reviewer. 40 CFR 98.6 defines various terms, including an explicit definition of compounds included in the term "greenhouse gas." 40 CFR 98.2 establishes an annual reporting threshold of 25,000 metric tons of carbon dioxide (CO_2) equivalent per year for certain facilities, including stationary fuel combustion units.

4.12.3 Review Procedures (General For Greenhouse Gas Emissions And Climate Change Issues)

Suggested steps for the review process are as follows:

1. Review the discussion of GHGs and climate change issues in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the basis for evaluating information identified by the applicant, the public, and the staff. Table 4-1 lists the applicable Category 1 issue and Table 4-2 lists the applicable Category 2 issue for GHG emissions and climate change identified in the LR GEIS.

2. Determine if there is new information on these issues that should be evaluated. The following sources of information should be included in the search for new information:

   - The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information regarding the environmental impacts of license renewal of which it is aware. In reviewing the applicant's ER, consider the applicant's process for discovering new information and evaluating the significance of any new information discovered.
   - Records of public scoping meetings and correspondence related to the application. Compare information presented by the public with information considered in the LR GEIS.

- Identify relevant sources of information used for evaluating impacts, including:
  - Studies and monitoring programs: Briefly summarize any studies or monitoring programs that provide site-specific data and can assist with understanding GHG emission sources and climate change impacts, including trends in key climate change indicators (e.g., precipitation, temperature, storm frequency and severity, sea level rise, floods, and droughts). Include the location, dates, objectives, methods, and results applicable to this license renewal application, and what data or data summaries might be available for NRC review.
  - Communications with and views of relevant regulatory agencies: Document any communications with Federal and State agencies with special expertise (e.g., EPA or State agencies concerning GHG emission regulation and climate change response) that are relevant to assessing impacts and are not documented elsewhere. If relevant communications are documented elsewhere, refer the reader to the appropriate sections. Include other interested stakeholders, as appropriate.
  - Other sources: Give in-text citations to sources of data and information used to assess impact and provide a list of references at the end of the chapter.
- Prepare a statement for the SEIS that
  - describes analysis of continued plant operations and refurbishment
  - describes measures to mitigate adverse impacts, if warranted
  - provides the significance level of the environmental impacts
  - describes new and significant information, if any.

Additional specific guidance follows for the GHG emissions and climate change issue identified as plant-specific (Category 2) in the LR GEIS.

4.12.4 Evaluation Findings

The depth and extent of the input to the SEIS would be determined by the analysis required to reach a conclusion related to the GHG and climate change impacts from continued plant operations and refurbishment during the license renewal term. The information that should be included in the SEIS is described in the review procedures.

4.12.5 Climate Change Impacts on Environmental Resources

4.12.6 Areas of Review

This ESRP provides guidance for the review of climate change impacts on environmental resource areas that are impacted by license renewal and any refurbishment. Impacts are discussed in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the discussion of climate change impacts during initial LR or SLR in the LR GEIS, (2) review of the applicant's ER, (3) identifying and addressing any new and potentially significant information, and (4) preparing input to the SEIS.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site and plant-specific factors. The following data or information may be needed:

- the applicant's ER
- the LR GEIS
- information on climate change impacts identified by the public and other information source
- climate change projections from models, studies, and reports (e.g., U.S. Global Climate Change Research Program).

4.12.7 Acceptance Criteria

In addition to the acceptance criteria specified in Section 4.12.2 of this ESRP, the acceptance criteria for the evaluation of climate change impacts are based on the following requirements:

- 10 CFR 51.53(c)(3)(ii)(Q). Applicants shall include an assessment of the effects of any observed and projected changes in climate on environmental resource areas that are affected by license renewal, as well as any mitigation measures implemented at the applicant's plant to address climate change impacts.

4.12.8 Review Procedures

Suggested steps for the review process are as follows:

- Review the discussion of climate change impacts in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the base for evaluation of information identified by the applicant, the public, and the staff.
- Review regional climate change projections for the 20-year license renewal term from climate change models, studies, and reports (e.g., U.S. Global Climate Change Research Program). The geographic scope considered for climate change projections should not be greater than the U.S. National Climate Assessment regions (Northeast, Southeast, Midwest, etc.), and when available, local scale projections should be considered. Changes in climate parameters should be quantified including changes in, but not limited to, ambient temperature, precipitation, surface water temperature and levels, length of growing season, and flooding, as appropriate.
- Review the applicants ER, including
  - applicant's process for identifying new and potentially significant information
  - any new information included in the ER on climate change, impacts, and issues known to the applicant
  - any currently employed or proposed practices and measure to mitigate climate change impacts.
- Determine environmental resource areas that are incrementally affected by license renewal. The climate change impacts should focus on the environmental resources that could be incrementally affected by license renewal.
- Determine how, and to what extent climatological changes could affect the environmental resource baseline conditions.

- Prepare a statement for the SEIS that
  - Describes and quantifies climate change projections. When discussing changes in climate parameters, identify the future GHG emission projections and scenarios selected.
  - Discusses climate change impacts, including trends, on environmental resource areas that are incrementally affected by license renewal.
  - Describes measures to mitigate adverse impacts.

4.12.9 Evaluation Findings

The depth and extent of the input to the SEIS would be governed by the extent of the analysis required to reach conclusions on potential climate change impacts on environmental resources when added to the impact contribution from continued operations during the license renewal term and refurbishment impacts associated with license renewal. The information that should be included in the SEIS is described in the review procedures.

4.13 Cumulative Effects

4.13.1 Areas Of Review

This ESRP provides guidance for the analysis and assessment of cumulative effects. Issues assessed here were identified as plant-specific (Category 2) in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a), and in Table B-1 of Appendix B, Subpart A to 10 CFR 51.

The scope for each individual section includes (1) review of the cumulative effects issue during initial LR or SLR in the LR GEIS, (2) evaluation of the data and analysis in the applicant's ER, (3) analysis and evaluation of the data, if appropriate, and (4) preparation of input to the SEIS. The Cumulative Impacts issue (Category 2), evaluated in the nuclear plant-specific SEIS is listed in Table 4-2.

4.13.2 Acceptance Criteria

In addition to the acceptance criteria specified in Section 4.12.2, the acceptance criteria for the evaluation of climate change impacts are based on the following requirements:

- Cumulative effects is a Category 2 issue and requires a plant-specific analysis (see 10 CFR 51.53(c)(3)(ii)(O)). CEQ defines cumulative effects in 40 CFR 1508.1(g)(3) as "the effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time." Cumulative effect analyses should consider new and ongoing activities, such as license renewal, that are conducted, regulated, or approved by a Federal agency. The goal of the analysis is to introduce environmental considerations into the planning process as early as needed to improve decisionmaking. Actions to be considered in cumulative impact analyses include activities associated with license renewal (e.g., continued reactor operations and refurbishment), that are conducted, regulated, or approved by a Federal agency.

4.13.3 Review Procedures

Suggested steps for the review process are as follows:

1. Focus on the environmental resources that could be affected by the incremental effects of continued nuclear plant operations and refurbishment. These environmental resource areas include
   - air quality and noise
   - water resources
   - ecological resources
   - historic and cultural resources
   - socioeconomics
   - human health
   - environmental justice
   - waste management
   - global climate change,
2. Establish the following for each resource area:
   - The geographic region of influence that encompasses the areas of potential affect and the distance at which the environmental effects of the proposed action and past, present, and reasonably foreseeable actions may be experienced. Geographic regions of influence vary by affected resource.
   - The timeframe for the cumulate effects analysis incorporates the incremental effects of the proposed action (license renewal) with past, present, and reasonably foreseeable future actions because these combined effects may accumulate or develop over time. Past and present actions include all actions up to and including the date of the license renewal request. The timeframe for the consideration of reasonably foreseeable future actions is the 20-year license renewal (initial LR or SLR) term. Reasonably foreseeable future actions include current and ongoing planned activities, approved and funded for implementation, or generally have a high probability of being implemented.
   - The environmental effects from past and present actions are accounted for in baseline assessments presented in affected environment discussions in Chapter 3 of the ER. Chapter 4 of the ER accounts for the incremental effects or impacts of license renewal.
   - The incremental effects of the proposed action (license renewal) when added to the effects from past, present, and reasonably foreseeable actions, and other actions (including trends such as global climate change) result in the overall cumulative effect. A qualitative cumulative effects analysis is conducted in instances where the incremental effects of the proposed action (license renewal) and past, present, and reasonably foreseeable future actions are uncertain or not well known.
   - For some resource areas (e.g., water and aquatic resources), the incremental contributions of ongoing actions within a region are regulated and monitored through a permitting process (e.g., NPDES) under State or Federal authority. In these cases, it may be assumed that cumulative effects are managed as long as these actions (e.g., facility operations) comply with their respective permits.

- The cumulative effects analysis only considers resources and environmental conditions that could be affected by the proposed license renewal action, including the effects of continued reactor operations during the license renewal term and any refurbishment activities at a nuclear power plant. In order for there to be a cumulative effect, the proposed action (license renewal) must have an incremental new, additive, or increased physical effect or impact on the resource or environmental condition beyond what is already occurring.

4.13.4 Evaluation Findings

The reviewer should ensure that the cumulative effects analysis provides a sufficient basis for determining the impacts from continued nuclear plant operations and refurbishment activities associated with license renewal.

4.14 Impacts Common to All Alternatives

4.14.1 Uranium Fuel Cycle

4.14.1.1 Areas of Review

This ESRP provides guidance for the preparation of introductory paragraphs for the portion of the SEIS that describes environmental impacts of the uranium fuel cycle during the initial LR or SLR term.

The scope includes (1) review of the discussion of the uranium fuel cycle in the LR GEIS, (2) identification and evaluation of new information related to the uranium fuel cycle, (3) preparation of input to the SEIS that presents the analyses related to those Category 1 issues. Table 4-1 lists the applicable Category 1 issues for the uranium fuel cycle identified in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site and plant-specific factors. The following data or information may be needed:

- a description of the applicant's process for identifying new and potentially significant information on environmental issues related to the uranium fuel cycle during the renewal term
- new information on the uranium fuel cycle during the renewal term known to the applicant
- new and potentially significant information on the uranium fuel cycle identified by the public
- a list of environmental issues related to the uranium fuel cycle during the renewal term for which there is significant new information.

4.14.1.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 4.1.2 also apply for the evaluation of the uranium fuel cycle.

4.14.1.3 Review Procedures

Suggested steps for the review process are as follows:

1. Review the discussion of the issue in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the base for evaluation of information identified by the applicant, the public, and the staff. The following table lists the uranium fuel cycle issues that were addressed in the LR GEIS for which generic conclusions were reached.
2. Determine if there is new information on this issue that should be evaluated. The following sources of information should be included in the search for new information:
   - When reviewing the ER, consider the applicant's process for discovering new information and evaluating the significance of any new information discovered.
   - Records of public meetings and correspondence related to the application.
   - Environmental quality standards and regulations.
   - If the search conducted in this step reveals new information, then continue with Step 3.
3. Evaluate the significance of new information.
4. Prepare a section for the SEIS describing the search for new information, summarizing new information found, presenting results of evaluation of significance, and adopting conclusions from the LR GEIS modified as necessary to account for significant new information.

4.14.1.4 Evaluation Findings

The depth and extent of the input to the SEIS would be governed by the extent of the analysis required to reach conclusions on issues related to the uranium fuel cycle during the renewal term. The information that should be included in the SEIS is described in the review procedures.

4.14.2 Replacement Power Alternative Fuel Cycles

4.14.2.1 Areas of Review

This ESRP provides guidance for the review of the environmental impacts of replacement power alternative fuel cycles during the renewal term (initial LR or SLR). This ESRP examines the potential environmental impacts associated with the replacement power alternative fuel cycles. If a renewed license were denied, then the plant generally would be decommissioned earlier than if the license were renewed, and other electric-generating sources would be pursued if power were still needed.

Analysis of replacement power alternative fuel cycles does not involve the determination of whether any power is needed or should be generated. The decision to generate power and the determination of how much power is needed are at the discretion of State and utility officials.

The potential environmental impacts evaluated include land use, ecology, aesthetics, water quality, air quality, waste management, human health, socioeconomics, and historic and cultural resources.

The scope includes (1) review of the discussion of potential impacts of replacement power alternative fuel cycles in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a); (2) identification and evaluation of new information related to potential impacts of replacement power alternative fuel cycles; and (3) preparation of input to the SEIS that presents the analyses related to those Category 1 issues.

Data and Information Needs

The reviewer for this ESRP may obtain the following information from the EPM:

- organizational structure of the SEIS
- list of environmental impacts associated with replacement power alternative fuel cycles that have been determined to be inapplicable to the applicant's plant and the reason for each determination.

4.14.2.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 4.1.2 also apply for the evaluation of the impacts of alternative fuel cycles.

4.14.2.3 Review Procedures

To analyze the environmental impact of replacement power alternative fuel cycles, the reviewer should complete the following steps:

1. Review the discussion of potential environmental impacts of replacement power alternative fuel cycles in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the base for evaluation of information identified by the applicant, the public, and the staff.
2. Obtain information for evaluation. The following sources of information should be included in the search for information:
   - The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information regarding the environmental impacts of license renewal of which it is aware. In reviewing the applicant's ER, consider the applicant's process for discovering new information and evaluating the significance of any new information discovered.
   - Records of public meetings and correspondence related to the application. Compare information presented by the public with information considered in the LR GEIS.
3. Determine, from the scope of environmental impacts of replacement power alternative fuel cycles, those that are minor and those that are likely to be sufficiently important to require detailed analysis.
4. If, based on this analysis, the reviewer determines that there would be more than minor impacts, proceed to Step 4. Otherwise, if the reviewer determines that there would be no environmental impacts or that the impacts would be minor, develop a statement to this effect.
5. Analyze the environmental impacts associated with replacement power alternative fuel cycles, as follows:
   - Identify and calculate the likely environmental impacts of required replacement power alternative fuel cycles including conservation and purchased or imported power, based

on the LR GEIS, the applicant's ER, and the integrated resource plans for the area(s) or region(s) currently or (if different) likely to be served by the nuclear power plant. Assume appropriate mitigation measures (for example emission control technologies and best management practices) for each replacement power alternative.

- Describe the impacts in sufficient detail so that reviewers may compare the adverse and beneficial impacts of the alternatives with those of renewing the operating license. Impact analyses should consider land use, water quality, air quality, ecological resources, human health, social and economic systems, waste management, aesthetics, and cultural resources. The impacts analyses should include direct, indirect, and cumulative impacts. For each alternative, the analysis should identify and, to the extent possible, quantify, unavoidable adverse impacts, irreversible and irretrievable resource commitments, and tradeoffs between short-term use and long-term productivity of the environment. To the extent possible, each alternative should be analyzed on a nuclear power plant site- or region-specific basis. Each impact should be analyzed in proportion to its significance.

Data provided in the applicant's ER are adequate if they describe:

- The degree to which the local environmental resources would be affected by use of replacement power alternatives. These data agree with data obtained from other sources, when available.
- The significance or potential significance of such environmental impacts. SMALL impacts result when no discernible change in environmental resources occurs as a result of using replacement power alternatives. MODERATE impacts result when there is a discernible change. LARGE impacts occur when there is substantial disruption of environmental resources.
- Any mitigative measures for which credit is being taken to reduce environmental concerns.
- Supplemental data obtained from other individuals and organizations may be useful in determining the completeness of the applicant's identification of housing impacts.
- Consider and evaluate potential mitigation measures or alternatives that might reduce or eliminate the adverse impacts or the disproportionate distribution of the impacts in those cases where the impacts are MODERATE or LARGE. These may have been considered in the applicant's ER.
- Based on the results of the assessments listed above, prepare the following for the SEIS:
  - a summary statement (qualitative or quantitative, as appropriate) about the degree to which environmental resources are expected to receive impacts from replacement power alternatives, together with the significance of these impacts
  - a discussion of the reasoning (e.g., based on locations and changes in population, local government revenue base, ecological impacts on other nearby plant sites or transmission corridors) behind the estimated degree of impact
  - a discussion of any mitigative measures for which credit is being taken to reduce environmental concerns.

4.14.2.4 Evaluation Findings

The depth and extent of the information in the SEIS would be governed by the extent and significance of the effects of replacement power alternative fuel cycles. The reviewer should verify that sufficient information is available to meet the relevant requirements.

4.14.3 Termination of Nuclear Plant Operations and Decommissioning

4.14.3.1 Areas of Review

This ESRP provides guidance for the consideration of impacts from the termination of nuclear plant operations and decommissioning and preparation of input to the SEIS.

The scope includes the review of (1) the applicant's ER, (2) termination of nuclear plant operations and decommissioning impacts in the LR GEIS, and (3) any new and potentially significant termination of nuclear plant operations and decommissioning impact information. Following this review, the reviewer then prepares input to the SEIS. The termination of plant operations and decommissioning issue (Category 1) for initial LR or SLR, as evaluated in the LR GEIS (NUREG-1437, Revision 2; NRC 2023a), is listed in Table 4-1.

Data and Information Needs

According to the LR GEIS, the environmental consequences of terminating reactor operations and decommissioning nuclear power plants attributable to the proposed action (license renewal) would be the environmental effects from an additional 20 years of nuclear power plant operations and refurbishment. The impacts from decommissioning a nuclear power plant are evaluated in the *Generic Environmental Impact Statement for Decommissioning of Nuclear Facilities: Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors*, NUREG-0586 (NRC 2002). Based on this, the following data or information may be needed:

- a description of the applicant's process for identifying new and significant information in the ER
- any new and significant plant-specific impact information identified during scoping
- any new and significant plant-specific impact information identified during site visit, staff environmental review, and discussions with applicant.

4.14.3.2 Acceptance Criteria

The applicable acceptance criteria specified in Section 4.1.2 also apply for the evaluation of the impacts of continued nuclear plant operations and refurbishment, associated with license renewal, on the termination of nuclear power plant operations and decommissioning.

4.14.3.3 Review Procedures

The following review steps are suggested:

1. The applicant is required by NRC regulation to disclose new and significant information regarding the environmental impacts of license renewal of which it is aware (see 10 CFR 51.53(c)(3)(iv)). In reviewing the applicant's ER, consider the applicant's process for discovering new information and evaluating the significance of any new information discovered.

2. Review public scoping meeting transcripts and related correspondence. Compare any new information with the conclusions in the LR GEIS.

3. Evaluate the significance of any new information for its effect on the impact analysis.

4. Prepare SEIS discussion describing the search for new and significant information, summarizing any new information found and the results of the significance evaluation. Incorporate by reference the conclusions from the LR GEIS for the proposed action or modify as necessary to account for any significant new information.

4.14.3.4 Evaluation Findings

The reviewer should ensure that the analysis provides a sufficient basis for determining the impacts of continued nuclear plant operations and refurbishment activities, associated with license renewal, on the termination of plant operations and decommissioning.

4.15 References

4.15.1 Areas of Review

This ESRP provides guidance for the consolidated listing of references cited in the main chapters of the SEIS.

4.15.2 Acceptance Criteria

Acceptance criteria for the preparation of the reference list are based on the following requirements (see also Section 4.1.2):

- 10 CFR 51.70(b), concerning preparation of a draft EIS that is concise, clear, analytical, and written in plain language

4.15.3 Review Procedures

The EPM should contact reviewers for ESRP Sections 4.2 through 4.14 and compile a list of references cited in the SEIS sections that the reviewers have prepared. The citations should be checked for completeness and accuracy and prepared for inclusion in the SEIS.

4.15.4 Evaluation Findings

The reviewer of information covered by this ESRP should prepare the SEIS section that lists references cited in the SEIS sections covering environmental impacts. The completed reference list constitutes the findings for this ESRP.

5.0 ENVIRONMENTAL IMPACTS OF POSTULATED ACCIDENTS

5.1 Overview

This environmental standard review plan (ESRP) provides general procedures for evaluating the environmental impacts of postulated plant accidents during the license renewal term (initial license renewal [LR] or subsequent license renewal [SLR]).

5.1.1 Areas of Review

The scope of this plan is the development of paragraphs that introduce the material from the reviews conducted under ESRP Sections 5.2 and 5.3. It includes the description of the environmental issues associated with postulated accidents discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (LR GEIS; NUREG-1437, Revision 2, NRC 2023a) Table 4-1 lists the applicable Category 1 issues for postulated accidents identified in the LR GEIS including design-basis accidents and severe accidents.

5.1.2 Acceptance Criteria (General for Postulated Accidents Issues)

The reviewer should ensure that the introductory paragraphs prepared under this ESRP are consistent with the intent of the following requirements:

- Title 10 of the *Code of Federal Regulations* 51.45(c) (10 CFR 51.45(c)), *Analysis*. "The environmental report must include an analysis that considers and balances the environmental effects of the proposed action, the environmental impacts of replacement power alternatives, and alternatives available for reducing or avoiding adverse environmental effects."
- 10 CFR 51.53(c)(2). "The report must contain a description of the proposed action, including the applicant's plans to modify the facility or its administrative control procedures as described in accordance with 10 CFR 54.21 of this chapter. This report must describe in detail the affected environment around the plant, the modifications directly affecting the environment or any plant effluents, and any planned refurbishment activities. In addition, the applicant shall discuss in this report the environmental impacts of alternatives and any other matters discussed in 10 CFR 51.45."
- 10 CFR 51.70(b). "The draft environmental impact statement will be concise, clear, and analytic, and written in plain language with appropriate graphics. The format provided in Section 1(a) of Appendix A of this subpart should be used. The U.S. Nuclear Regulatory Commission (NRC) staff will independently evaluate and be responsible for the reliability of all information used in the draft environmental impact statement."
- 10 CFR 51.71(d), concerning the draft environmental impact statement will include a preliminary analysis that considers and weighs the environmental effects of the proposed action; the environmental impacts of replacement power alternatives; and alternatives available for reducing or avoiding adverse environmental effects, among other things.
- 10 CFR 51.71(d), concerning compliance with environmental-quality standards and requirements that have been imposed by Federal, State, regional, and local agencies and Indian Tribes

- 10 CFR 51.95(c), concerning renewal of an operating license or combined license for a nuclear power plant. Under Parts 52 or 54 of this chapter, the Commission shall prepare an environmental impact statement, which is a supplement to the Commission's NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants."
- 10 CFR Part 51, Appendix A to Subpart A, paragraph 7, concerning the environmental consequences of alternatives, including the proposed actions and any mitigating actions which may be taken. Alternatives eliminated from detailed study will be identified and a discussion of those alternatives will be confined to a brief statement of the reasons why the alternatives were eliminated. The level of information for each alternative considered in detail will reflect the depth of analysis required for sound decisionmaking.
- 10 CFR Part 51, Appendix B to Subpart A, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," Table B-1, "Summary of Findings on Environmental Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants."

Technical Rationale

The technical rationale for evaluating the applicant's description of the potential environmental impacts of postulated accidents during the renewal term is discussed in the following paragraph:

The NRC staff is required by 10 CFR 51.95(c)(4) to integrate conclusions, as amplified by the supporting information in the LR GEIS, for issues that are designated as Category 1 or resolved Category 2, information developed for those open Category 2 issues applicable to the plant, and any significant new information in an EIS prepared at the license renewal stage. The review conducted under this ESRP leads to preparation of introductory paragraphs that orient the reader concerning the relevance of the material to the overall organization and goals of the SEIS and add clarity to the presentation.

5.1.3 Review Procedures

The material to be prepared is informational in nature, and no specific analysis of data is required.

Generic conclusions relative to impacts were reached in the LR GEIS for those issues that are appropriate for all plants, or for some issues for specific classes of plants. These conclusions were that (1) a single level of significance could be assigned to the impact and (2) plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation. The generic analysis of severe accidents analysis described in the LR GEIS applies to all plants. It concludes that the probability-weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, and societal and economic impacts of severe accidents are of small significance. In the absence of new and significant information, these issues may be addressed in the SEIS without additional plant-specific analysis.

All nuclear power plant licensees have performed analyses of the measures that could mitigate the consequences of severe accidents.

If there is new and significant information related to the environmental impacts associated with postulated accidents identified by the applicant, members of the public, or the staff during the environmental review, the reviewer for this ESRP should prepare a table that directs readers to the SEIS sections dealing with the issues.

5.1.4 Evaluation Findings

The reviewer of information covered by this ESRP should prepare introductory paragraphs for the SEIS. The paragraph(s) should introduce the nature of the material to be presented by the reviewers of information covered by ESRP Sections 5.2 and 5.3. The paragraph(s) should list the types of information to be presented and describe their relationships to information presented earlier and to be presented later in the SEIS.

5.2 Postulated Accidents

5.2.1 Areas of Review

This ESRP provides guidance for the review of environmental impacts of postulated plant accidents during the license renewal term (initial LR or SLR) and preparation of input to the SEIS. These issues are discussed in Section 4.9.1.2 and Appendix E of the LR GEIS (NUREG-1437, Revision 2; NRC 2023a).

The scope includes (1) review of the LR GEIS discussion of postulated accidents, (2) identification and evaluation of new information related to environmental impacts of postulated accidents during the renewal term for significance, and (3) preparation of input to the SEIS that dispositions the Category 1 issue.

Impacts of design-basis and severe accidents during the SLR term are Category 1 issues, as listed in Table 4-1. The probability-weighted consequences of atmospheric releases to groundwater and societal and economic impacts from severe accidents are small for all plants.

If a severe accident mitigation alternatives (SAMA) review or severe accident mitigation design alternatives (SAMDA) review has been conducted, only new and significant information should be evaluated. In the unlikely event that the applicant has not previously conducted a SAMA or SAMDA analysis for the facility, then a full SAMA analysis must be provided. For information on reviewing a new SAMA analysis, please see Revision 1 of this document. The new and significant information specific to the SAMA or SAMDA analysis may be reviewed to the guidance provided in NEI 17-04, Revision 1, “Model SLR New and Significant Assessment Approach for SAMA,” dated August 2019 (NEI 2019).

Data and Information Needs (General for Postulated Accidents)

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors; the level of detail should be scaled according to the anticipated magnitude of the potential impacts. The following data or information may be needed:

- a description of the applicant’s process for identifying new and potentially significant information on environmental issues related to postulated accidents during the license renewal term (initial LR or SLR)
- new information on environmental impacts of postulated plant accidents during the license renewal term (initial LR or SLR) known to the applicant, including applicable and most recent probabilistic risk assessment (PRA) hazard information
- new and potentially significant information on environmental impacts of postulated plant accidents during the license renewal term (initial LR or SLR) identified by the public.

5.2.2 Acceptance Criteria (General for Postulated Accidents)

The applicable acceptance criteria specified in Section 5.1.2 also apply for the evaluation of the impacts of the postulated accidents during the renewal term.

5.2.3 Review Procedures

Evaluate the significance of new information related to the NRC's conclusion in Table 4-1 regarding design-basis accidents.

Evaluate the significance of new information related to the NRC's conclusion in Table 4-1, Severe accidents. That is, the conclusion that "(t)he probability-weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, and societal and economic impacts from severe accidents are small for all plants.

Suggested steps for the review process are as follows:

1. Review the discussion of the issue in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the base for evaluation of information identified by the applicant, the public, and the staff.
2. Determine if there is new information on this issue that should be evaluated. The following sources of information should be included in the search for new information:
   - The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information of environmental impacts of license renewal of which it is aware. In reviewing the applicant's ER, consider the applicant's process for discovering new information related to environmental impacts of postulated accidents and evaluating the significance of any new information discovered.
   - Records of public meetings and correspondence related to the application. Compare information presented by the public with information considered in the LR GEIS.
   - Environmental standards and regulations. Have the applicable environmental quality standards and regulations changed since the analysis leading to the LR GEIS? If so, do the changes affect the NRC evaluation of applications for license renewal?
3. If the search conducted in this step reveals new information, then continue with Step 4. Otherwise, prepare the section for the SEIS describing the search for new information, stating the conclusion that there is none, and adopting conclusions from the LR GEIS.
4. Evaluate the significance of new information.
5. Prepare the section for the SEIS describing the search for new information, summarizing new information found, and presenting results of evaluation of significance.

5.2.4 Evaluation Findings

The depth and extent of the input to the SEIS would be governed by the extent of the analysis required to reach a conclusion related to the environmental impacts of postulated accidents during the license renewal term (initial LR or SLR). The information that should be included in the SEIS is described in the review procedures. In accordance with the Commission's direction in the Staff Requirements Memorandum for SECY-12-0063—Final Rule (NRC 2012a), when reiterating the conclusion of the LR GEIS in the evaluation findings, the following entire phrase

shall be included in the text: "the probability-weighted consequences of severe accidents are SMALL."

5.3 Severe Accident Mitigation Alternatives

5.3.1 Areas of Review

This ESRP provides guidance for the analysis and assessment of SAMAs. Because license SAMAs have been considered at all facilities that the NRC anticipates applying for license renewal in the future, license renewal SAMAs are no longer a Category 2 issue for the operating nuclear power plant fleet, only an evaluation for new and significant information for a previous SAMA or SAMDA is necessary. However, should a facility apply for license renewal that has not previously performed a SAMA analysis, then the staff should look to NUREG-1555, Supplement 1, Revision 1 for guidance on how to review an initial SAMA analysis.

The scope includes an analysis of any new and significant information relating to the applicant's previously performed SAMA or SAMDA analysis and the preparation of an appropriate statement for the SEIS. The previous analysis of SAMAs includes the identification and evaluation of alternatives that reduce the radiological risk from a severe accident by preventing substantial core damage (i.e., preventing a severe accident) or by limiting releases from containment in the event that substantial core damage occurs (i.e., mitigating the impacts of a severe accident). The purpose of the review was to ensure that plant and procedure changes with the potential for improved severe accident safety performance are identified and evaluated.

Data and Information Needs

The type of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information should be reviewed or audited:

- "New" information pertaining to data used in a SAMA analysis that has changed or become available since the time the preceding SAMA analysis was performed.
- "New" information dependent on plant activities or site-specific changes. Examples include
  - identification of a new hazard (e.g., a fault that was not previously analyzed in the seismic analysis)
  - updated plant risk model (e.g., a fire PRA that replaces the Individual Plant Examination of External Events (IPEEE) analysis)
  - impacts of plant changes that are included in the plant risk models that will be reflected in the model results and do not need to be assessed separately.
- Modifications determined to have no risk impact need not be included (e.g., replacement of the condenser vacuum pumps).
- For risk model updates performed to reflect the latest PRA model state of the practice, it is noted that the actual physical plant risk may not have changed, but because the best estimate assessment/understanding of the risk has changed, it is considered to be "new information."
- Consideration of whether potentially cost-beneficial SAMAs identified in U.S. license renewal applications after submittal of the SAMA analysis for the analyzed plant could be new information.

- Applicants for boiling water reactor licenses should assess SAMAs from other boiling water reactor applications; likewise, applicants for pressurized water reactor licenses should assess SAMAs from other pressurized water reactor applications.
- If there is a basis for excluding this body of SAMAs from the pool of "new information" to be evaluated for significance, the rationale should be documented.
- Other data needs include those provided in NEI 17-04, Section 3.1 based on the relevant assessment stage reached (NEI 2019).
- Consistent with guidance in NRC Regulatory Guide 4.2, Supplement 1, Revision 2 (NRC 2023b), the ER should briefly describe the processes that were used for identifying new information and determining its significance. If a determination is made that no new and significant information exists, then the ER should state this determination.
- Alternatively, if a determination is made that one or more "potentially significant" SAMAs are also potentially cost beneficial, then the ER should describe those SAMAs and state that "new and significant" information has been identified. The ER also should indicate whether the "new and significant" SAMAs are aging-related and describe supplementary actions to be taken relative to their discovery, if any.

5.3.2 Acceptance Criteria

Applicable general acceptance criteria are specified in Section 5.1.2. In addition, NEI 17-04 (NEI 2019) provides an approach for assessing the significance of new information of which the applicant for renewal of a nuclear power reactor operating license or extension of a combined license is aware that relates to either (1) the SAMDA analysis or SAMA analysis documented in the NRC's final environmental statement (FES), final SEIS, or environmental assessment (EA) that supported issuance pursuant to 10 CFR Part 50 (or Part 54) of the reactor's initial (or renewed) operating license or (2) the SAMDA analysis documented in the NRC's FES, final SEIS, or EA that supported issuance pursuant to 10 CFR Part 52 of the reactor's combined license and the design certification incorporated therein by reference, if any.

In the event that a SAMA is performed acceptance criteria for the analysis and evaluation of SAMAs are based on the following additional requirements:

- 10 CFR 51.53(c)(3)(ii)(L), "If the staff has not previously considered severe accident mitigation alternatives for the applicant's plant in an environmental impact statement or related supplement or in an environmental assessment, a consideration of alternatives to mitigate severe accidents must be provided."

For the SAMA or SAMDA new and significant evaluation, the following regulatory positions and specific criteria in support of the regulations identified above are as follows:

- NEI 17-04, Revision 1 (NEI 2019), "Model SLR New and Significant Assessment Approach for SAMA," provides information for one acceptable way for the applicant to evaluate new and significant information specific to the SAMA or SAMDA analysis.
- NUREG/BR-0058, Rev. 5, Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission (NRC 2017b) states the policy for the preparation and the contents of regulatory analyses, including estimation of values and impacts for alternatives.
- NUREG-1530 (NRC 2022) provides information on dollars per person- roentgen-equivalent-man conversion factor for offsite damage costs.

- Regulatory Guide 4.2, Supplement 1, Revision 2, Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications (NRC 2023b) provides guidance on preparation of ERs associated with license renewal.
- Regulatory Guides 1.174 (NRC 2018a) and 1.200 (NRC 2020a) provide guidance on general concepts in use and evaluation of probabilistic risk assessments for risk-informed decisions.

In addition to the above, the reviewer should be familiar with Nuclear Energy Institute 05-01, "SAMA Analysis Guidance Document," (NEI 2005) which is the nuclear industry's guidance document describing how to perform the SAMA analysis and describes the information that should be included in the SAMA analysis portion of the ER.

The following acceptance criterion is used in the SAMA or SAMDA new and significant review:

As detailed in NEI 17-04 (NEI 2019), a tiered approach is used that employs a coarse screening process in Stage 1 and progresses to a detailed screening process in Stage 3. Applicants that are able to demonstrate in the Stage 1 screening process that there is no potentially significant new information are not required to perform the Stage 2 or Stage 3 evaluations. New information will be deemed "potentially significant" to the extent it results in the identification in Stage 1 of an unimplemented SAMA that reduces the maximum benefit (MB) by 50 percent or more. The first stage of the model approach uses PRA risk insights and/or risk model quantifications to estimate the percent reduction in MB associated with (1) any unimplemented "Final Plant-Specific SAMAs," and (2) those SAMAs identified as potentially cost beneficial for other industry plants that have been determined to be applicable to but not already implemented at the analyzed plant (referred to herein as "Applicable Industry SAMAs"). In the event that one or more unimplemented Final Plant-Specific SAMAs or Applicable Industry SAMAs are shown in Stage 1 to reduce the MB by 50 percent or more, the applicant must develop an updated averted cost-risk estimate for implementing those SAMAs. Such development is the Stage 2 assessment.

In the event that the results of the Stage 2 assessment support the Stage 1 conclusion that one or more SAMAs reduce the MB by 50 percent or more, those "potentially significant" SAMAs must be further assessed in Stage 3. The Stage 3 assessment consists of performing a cost-benefit analysis for the "potentially significant" SAMAs identified in Stage 2. If any "potentially significant" SAMA is found in Stage 3 to be also potentially cost-beneficial, then the finding indicates the existence of "new and significant'' information. Hence, because "new and significant" information exists, the applicant must supplement the previous SAMA analysis.

Technical Rationale

The technical rationale for evaluating the applicant's SAMAs if new and significant information exists is discussed in the following paragraphs.

If any "potentially significant" SAMA is found in Stage 3 of the NEI 17-04 process to be potentially cost-beneficial, then the finding indicates the existence of "new and significant'' information. Hence, because "new and significant" information exists, the applicant must supplement the previous SAMA analysis.

The SEIS should include an analysis of new and significant information that relates to the previous SAMA or SAMDA. The Stage 3 assessment consists of performing a cost-benefit

analysis for the "potentially significant" SAMAs identified in Stage 2. If any "potentially significant" SAMA is found in Stage 3 to be also potentially cost-beneficial, then the finding indicates the existence of "new and significant'' information. Hence, because "new and significant" information exists, the applicant must supplement the previous SAMA analysis.

A 1989 court decision (Limerick Ecology Action vs. NRC, 869 F.2d 719 [3rd Cir. 1989]) stated that the "Action of NRC in addressing severe accident mitigation design alternatives (SAMDAs) (prior term for SAMAs) through policy statements, not rule making, did not satisfy NEPA, where policy statements did not represent requisite careful consideration of environmental consequences, excluded consideration of design alternatives without making any conclusions about effectiveness of any particular alternative, and issues were not generic in that impact of SAMDAs on environment would differ with a particular plant's design, construction and locations." NRC considers the evaluation of SAMAs in the environmental impact review that is performed as part of every application for a license renewal if SAMAs have not been considered for the plant.

5.3.3 Review Procedures

Evaluate the significance of new information of which the applicant for renewal of a nuclear power reactor operating license or extension of a combined license is aware that relates to either (1) the SAMDA analysis or SAMA analysis documented in the NRC's FES, final SEIS, or EA that supported issuance pursuant to 10 CFR Part 50 (or Part 54) of the reactor's initial (or renewed) operating license or (2) the SAMDA analysis documented in the NRC's FES, final SEIS, or EA that supported issuance pursuant to 10 CFR Part 52 of the reactor's combined license and the design certification incorporated therein by reference, if any.

Suggested steps for the review process are as follows:

1. Review the discussion of the issue in the LR GEIS to identify the information considered and the conclusions reached. This step establishes the base for evaluation of information identified by the applicant, the public, and the NRC staff.
2. Determine if there is new information on this issue that should be evaluated. The following sources of information should be included in the search for new information:
   - The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new and significant information of environmental impacts of license renewal of which it is aware. In reviewing the applicant's ER, consider the applicant's process for discovering new information related to environmental impacts of postulated accidents and evaluating the significance of any new information discovered.
   - Records of public meetings and correspondence related to the application. Compare information presented by the public with information considered in the LR GEIS.
   - Environmental standards and regulations. Have the applicable environmental quality standards and regulations changed since the analysis leading to the LR GEIS? If so, do the changes affect the NRC evaluation of applications for license renewal?
   - If the search conducted in this step reveals new information, then continue with Step 3. Otherwise, prepare the section for SEIS describing the search for new information, stating the conclusion that there is none, and adopting conclusions from the LR GEIS.
3. Evaluate the significance of new information.

4. Prepare the section for the SEIS describing the search for new information, summarizing new information found, and presenting results of evaluation of significance.

5.3.4 Evaluation Findings

The depth and extent of the input to the SEIS would be governed by the review of new and significant information required to reach a conclusion related to the applicant's prior SAMA analysis. The review of new and significant information that should be included in the SEIS is described in the review procedures.

5.4 References

5.4.1 Areas of Review

This ESRP provides guidance for listing references in this chapter of the SEIS.

5.4.2 Acceptance Criteria

Acceptance criteria for the preparation of the reference list are based on the following requirements:

- 10 CFR 51.70(b), concerning preparation of a draft EIS that is concise, clear, analytic, and written in plain language.

5.4.3 Review Procedures

The reviewer should contact reviewers for ESRP Sections 5.1 through 5.3 and compile a list of references cited in the SEIS sections that the reviewers have prepared. The citations should be checked for completeness and accuracy and prepared for inclusion in the SEIS.

5.4.4 Evaluation Findings

The reviewer of information covered by this ESRP should prepare the SEIS section that lists references cited in the SEIS sections covering changes in the environmental impacts of postulated accidents during the license renewal term. The completed reference list constitutes the findings for this ESRP.

6.0 SUMMARY AND CONCLUSIONS

6.1 Areas of Review

This environmental standard review plan (ESRP) provides guidance on preparing these chapters and supporting discussions of the supplemental environmental impact statement (SEIS) that integrates the conclusions for issues designated Category 1 or resolved Category 2 in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (LR GEIS; NUREG-1437, Revision 2; NRC 2023a); information developed for those open Category 2 issues applicable to the plant; and new and significant information. The chapter discussions must conclude whether the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

The scope includes (1) review of the impact analyses prepared for the SEIS, (2) evaluation of the cumulative impacts associated with continued nuclear power plant operations during the license renewal term (initial license renewal [LR] or subsequent license renewal [SLR]) and any refurbishment, (3) review of discussions of the environmental impacts of alternatives, (4) comparison of the environmental impacts of license renewal with the environmental impacts of the alternatives, and (5) preparation of input to the SEIS.

The SEIS input should (1) identify adverse environmental impacts that are unavoidable, (2) identify commitments of resources that are irreversible and irretrievable, and (3) discuss the effects of short-term use on maintenance and long-term productivity of the environment.

Data and Information Needs

The types of data and information needed would be affected by nuclear power plant site- and plant-specific factors. The following data or information may be needed:

- the discussion of environmental impacts of license renewal (initial LR or SLR) in the LR GEIS
- the discussion of plant-specific environmental impacts of license renewal (initial LR or SLR) in the applicant's environmental report
- the summary of environmental impact analyses conducted for the SEIS.

6.2 Acceptance Criteria

Acceptance criteria for the preparation of the summary and conclusions are based on the following requirements:

- Title 10 of the *Code of Federal Regulations* 51.70(b) (10 CFR 51.70(b)), concerning a concise, clear, analytic EIS written in plain language
- 10 CFR 51.71(d), concerning the draft environmental impact statement will include a preliminary analysis that considers and weighs the environmental effects of the proposed action; the environmental impacts of replacement power alternatives; and alternatives available for reducing or avoiding adverse environmental effects, among other things

- 10 CFR 51.71(f), concerning including a preliminary recommendation by the U.S. Nuclear Regulatory Commission (NRC) staff respecting the proposed action reached after considering the environmental effects of the proposed action and reasonable alternatives
- 10 CFR 51.95(c)(4), concerning the NRC staff recommendation regarding the environmental acceptability of the license renewal action that integrates the conclusions, as amplified by the supporting information in the generic EIS, for issues designated Category 1 or resolved Category 2, information developed for those open Category 2 issues applicable to the plant, and any new and significant information. Given this information, the NRC staff, adjudicatory officers, and Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

Technical Rationale

The SEIS must include the NRC staff recommendations regarding the environmental acceptability of the proposed action. In making these recommendations, the NRC staff is required to integrate the conclusions from the LR GEIS, plant-specific impact analyses, and any significant new information. This ESRP summarizes the environmental impacts of the proposed action, comparison of the environmental impacts of the proposed action with the impact of the alternatives, and the staff recommendations.

6.3 Review Procedures

The environmental project manager (EPM) is responsible for the preparation of the SEIS summary and conclusion chapters. The summary and conclusion discussions should be sufficiently complete that a person reading this section would understand:

- the purpose of and need for the proposed action
- the National Environmental Policy Act of 1969 process and NRC's environmental review leading to the preparation of the SEIS
- the environmental impacts of renewing the operating license (initial LR or SLR)
- the environmental impacts of alternatives to renewing the operating license
- staff conclusions and recommendations.

Suggested steps for the preparation of the summary and conclusion chapters of the SEIS are as follows:

1. Prepare introductory paragraphs for the summary and conclusion chapters.
2. Prepare a table that summarizes the findings of the environmental impacts presented in the SEIS. The summary and conclusions table should list of the environmental impacts of license renewal and alternatives to license renewal (including no-action) and state the level of significance of each impact. This table should be organized by area of environmental concern.

   The EPM should also consider the list of unavoidable adverse impacts and the list of irreversible and irretrievable resource commitments, and draw conclusions related to effects of short-term commitments on maintenance and long-term productivity of the environment. The final lists of unavoidable adverse impacts and irreversible and irretrievable resource

commitments and a discussion of the effects of short-term use on maintenance and long-term productivity of the environment should also be included in the SEIS.

3. Prepare input to the SEIS summary and conclusion chapters.

6.4 Evaluation Findings

The EPM prepares the SEIS sections that presents (1) the overall summary of the environmental impacts of license renewal (initial LR or SLR) and alternatives to license renewal (including no-action) and (2) the NRC staff recommendations regarding license renewal. The overall summary should be presented in tabular form. The contents of the table are described in the "Review Procedures" section. The NRC staff recommendation should be stated in terms consistent with the wording of 10 CFR 51.95(c)(4).

7.0 REFERENCES

10 CFR Part 2. *Code of Federal Regulations*, Title 10, *Energy*, Part 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders."

10 CFR Part 20. *Code of Federal Regulations*, Title 10, *Energy*, Part 20, "Standards for Protection Against Radiation."

10 CFR Part 50. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 52. *Code of Federal Regulations*, Title 10, *Energy*, Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

10 CFR Part 54. *Code of Federal Regulations*, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

15 CFR Part 930. *Code of Federal Regulations*, Title 15, *Commerce and Foreign Trade*, Part 930, "Federal Consistency with Approved Coastal Management Programs."

33 CFR Part 330. *Code of Federal Regulations*, Title 33, *Navigation and Navigable Waters*, Part 330, "Nationwide Permit Program."

36 CFR Part 60. *Code of Federal Regulations*, Title 36, *Parks, Forests, and Public Property*, Part 60, “National Register of Historic Places.”

36 CFR Part 63. *Code of Federal Regulations*, Title 36, *Parks, Forests, and Public Property*, Part 63, "Determinations of Eligibility for Inclusion in the National Register of Historic Places."

36 CFR Part 800. *Code of Federal Regulations*, Title 36, *Parks, Forests, and Public Property*, Part 800, "Protection of Historic Properties."

40 CFR Part 6. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 6, "Procedures for Implementing the National Environmental Policy Act and Assessing the Environmental Effects Abroad of EPA Actions."

40 CFR Part 50. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 50, "National Primary and Secondary Ambient Air Quality Standards."

40 CFR Part 51. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans."

40 CFR Part 52. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 52, "Approval and Promulgation of Implementation Plans."

40 CFR Part 81. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 81, "Designation of Areas for Air Quality Planning Purposes."

40 CFR Part 93. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 93, "Determining Conformity of Federal Actions to State or Federal Implementation Plans."

40 CFR Part 98. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 98, "Mandatory Greenhouse Gas Reporting."

40 CFR Part 121. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 121, "State Certification of Activities Requiring a Federal License or Permit."

40 CFR Part 122. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 122, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System."

40 CFR Part 123. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 123, "State Program Requirements."

40 CFR Part 124. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 124, "Procedures for Decisionmaking."

40 CFR Part 125. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 125, "Criteria and Standards for the National Pollutant Discharge Elimination System."

40 CFR Part 127. *Code of Federal Regulation*s, Title 40, *Protection of Environment*, Part 127, "NPDES Electronic Reporting."

40 CFR Part 129. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 129, "Toxic Pollutant Effluent Standards."

40 CFR Part 130. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 130, "Water Quality Planning and Management."

40 CFR Part 131. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 131, "Water Quality Standards."

40 CFR Part 132. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 132, "Water Quality Guidance for the Great Lakes System."

40 CFR Part 133. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 133, "Secondary Treatment Regulation."

40 CFR Part 141. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 141, "National Primary Drinking Water Standards."

40 CFR Part 147. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 147, "State, Tribal, and EPA-Administered Underground Injection Control Programs."

40 CFR Part 149. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 149, "Sole Source Aquifers."

40 CFR Part 165. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 165, "Pesticide Management and Disposal."

40 CFR Part 190. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations."

40 CFR Part 403. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 403, "General Pretreatment Regulations for Existing and New Sources of Pollution."

40 CFR Part 423. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 423, "Steam Electric Power Generating Point Source Category."

40 CFR Part 700. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Subchapter R, *Toxic Substances Control Act*, Part 700, "General."

40 CFR Part 702. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Subchapter R, *Toxic Substances Control Act*, Part 702, "General Practices and Procedures."

40 CFR Part 704. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Subchapter R, *Toxic Substances Control Act*, Part 704, "Reporting and Recordkeeping Requirements."

40 CFR Part 707. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Subchapter R, *Toxic Substances Control Act*, Part 707, "Chemical Imports and Exports."

40 CFR Part 710. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Subchapter R, *Toxic Substances Control Act*, Part 710, "Compilation of the TSCA Chemical Substance Inventory."

40 CFR Part 711. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Subchapter R, *Toxic Substances Control Act*, Part 711, "TSCA Chemical Data Reporting Requirements."

40 CFR Part 712. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Subchapter R, *Toxic Substances Control Act*, Part 712, "Chemical Information Rules."

40 CFR Part 713. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 713, "Reporting Requirements for the TSCA Inventory of Mercury Supply, Use, and Trade."

40 CFR Part 716. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Subchapter R, *Toxic Substances Control Act*, Part 716, "Health and Safety Data Reporting."

40 CFR Part 1501. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 1501, "NEPA and Agency Planning."

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APPENDIX A

INTERAGENCY CONSULTATIONS FOR ECOLOGICAL RESOURCES

The U.S. Nuclear Regulatory Commission (NRC) must consider the effects of its actions on ecological resources protected under several Federal statutes and must consult with the U.S. Fish and Wildlife Service (FWS) or the National Oceanic and Atmospheric Administration (NOAA) prior to acting in cases where an agency action may affect those resources. These statutes include the following:

- the Endangered Species Act of 1973 (ESA, 16 U.S.C. § 1531 et seq.)
- the Magnuson-Stevens Fishery Conservation and Management Act (MSA, 16 U.S.C. § 1801 et seq.), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267)
- the National Marine Sanctuaries Act (NMSA, 16 U.S.C. § 1431 et seq.).

This appendix describes consultation requirements and processes under these statutes.

A.1 Endangered Species Act

A.1.1 Overview of the Act and Consultation Responsibilities

Congress enacted the ESA in 1973 to protect and recover imperiled species and the ecosystems upon which they depend. The ESA provides a program for the conservation of endangered and threatened plants and animals (collectively, "listed species") and the habitats in which they are found, and it prohibits any person from the take of listed species, as defined in the Act, without a permit. The FWS and National Marine Fisheries Service (NMFS) (collectively known as "the Services") are the lead Federal agencies for implementing the ESA and are charged with determining species that warrant listing. The Services divide responsibility for listing and managing species: the FWS is responsible for terrestrial and freshwater species, and NMFS is responsible for marine and anadromous species.

Section 7 of the ESA establishes interagency consultation requirements for actions by Federal agencies. Section 7(a)(1) of the ESA charges Federal agencies to aid in the conservation of listed species. Section 7(a)(2) of the ESA requires that Federal agencies consult with the Services for actions that "may affect" federally listed species and critical habitats and to ensure that their actions do not jeopardize the continued existence of those species or destroy or adversely modify those habitats. Private actions with a Federal nexus, such as construction and operation of facilities that involve Federal licensing or approval, are also subject to consultation. Therefore, the NRC's issuance of initial or subsequent renewed licenses may trigger consultation requirements. Consultation pursuant to ESA Section 7(a)(2) is commonly referred to as "Section 7 consultation."

The Services maintain joint regulations that implement ESA Section 7 at 50 *Code of Federal Regulations* (CFR) Part 402, "Interagency Cooperation—Endangered Species Act of 1973, as Amended." Subpart B prescribes the Section 7 interagency consultation requirements. The NRC also relies upon the Services' detailed procedural guidance for conducting Section 7 consultation in *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act* (FWS and NMFS 1998).

Section 7 consultation may be informal or formal. Generally, the appropriate type of consultation relates to the effect determinations made by the Federal agency, as described below. For proposed species and proposed critical habitats (those species or habitats for which the Services have issued proposed listing or designation rules, but for which final rules have yet to be issued or adopted), the regulations prescribe a process called a conference. Informal consultation, formal consultation, and conference are described below. The Services' regulations also allow for early, special, and emergency consultations. Because instances that would necessitate these types of consultation rarely arise for NRC actions, this guidance does not specifically address early, special, and emergency consultation.

A.1.2 Types of ESA Section 7 Consultation

A.1.2.1 Formal Consultation

Formal Section 7 consultation is appropriate when a Federal agency determines that an action "may affect and is likely to adversely affect" listed species or critical habitats. For any action in which take of listed species or destruction or adverse modification of critical habitat may occur, formal consultation is required.

As the Federal action agency, the NRC is responsible for initiating formal consultation if it is required. The NRC staff must provide the Services with relevant information to support its request for formal consultation, including a biological assessment, if required. The staff must provide the Services with the best scientific and commercial data available, and the Services may request additional information during the consultation process.

Formal consultation takes place over a 135-day timeline (50 CFR 402.14(e). However, consultation may be extended through agreement between the Federal action agency, the Services, and any applicant.

The outcome of formal consultation is the Services' formulation of a biological opinion. A biological opinion evaluates the nature and extent of effects of the action on listed species and critical habitats. It is prepared by the FWS or NMFS and documents the Services' assessment of effects to listed species and critical habitat and whether the Federal action is likely to jeopardize the continued existence of those species or result in destruction or adverse modification of critical habitat. Biological opinions may include an incidental take statement (ITS) consisting of the level of anticipated take, reasonable and prudent measures, and terms and conditions. Any take that is subject to and in compliance with an ITS is not prohibited under the ESA. Biological opinions may also include discretionary conservation recommendations.

For consultations resulting in the Services' issuance of a biological opinion, the NRC requires its licensees to comply with the ITS of the biological opinion by incorporating environmental conditions into the relevant NRC facility license(s). As conditions of NRC-issued licenses, the NRC has a continuing duty to monitor compliance at facilities with valid biological opinions. This role is performed by the NRC's Interagency Consultation Coordinator. The NRC may exclude specific ITS requirements from its license(s) if another Federal agency will require those actions be taken.

A.1.2.2 Informal Consultation

Informal Section 7 consultation is appropriate when a Federal agency determines that an action "may affect but is not likely to adversely affect" listed species or critical habitats. This type of

consultation is a less-structured approach to meeting Section 7 requirements. It includes discussions, correspondence, and meetings between the NRC staff and representatives of the Services. It can also include exploring ways to modify the action to reduce or remove adverse effects and can help the agencies determine the need to engage in formal consultation.

As part of informal consultation, the NRC staff submits ESA effect determination(s) or a biological assessment (if one is required) to the Services, along with supporting information, and requests the Services' concurrence with its determination(s) that the action is not likely to adversely affect listed species or critical habitats. The Services review the supporting information and respond that either (1) the Services concur that the action is not likely to adversely affect listed species or critical habitats, which concludes consultation, or (2) that formal consultation is required.

Informal consultation takes place over a 60-day timeline (50 CFR 402.13(c)(2)). However, consultation may be extended through agreement between the Federal action agency, the Services, and any applicant.

A.1.2.3 Conference

Conference is required for Federal actions that are likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat. A proposed species is a species for which the Services have issued a proposed rule to list as endangered or threatened under the ESA. Proposed critical habitat is habitat for which the Services have issued a proposed rule to designate as critical under the ESA. For actions requiring conference, the Federal agency typically makes ESA effect determinations of "may affect and is likely to adversely affect" for proposed species and "may destroy or adversely modify" for proposed critical habitat. Notably, the threshold for a conference is higher than the threshold for consultation; the regulations only require conference if an action may jeopardize the continued existence of a proposed species.

In practice, conferences are conducted similarly to consultations. The outcome of a conference is either the Services' issuance of a conference opinion or the Services' written documentation of the conclusions reached during the conference, along with any recommendations, in a conference report. The Services' recommendations are discretionary because the NRC is not prohibited from jeopardizing the continued existence of a proposed species or from adversely modifying proposed critical habitat. However, as soon as a listing action is finalized, the prohibition against jeopardy or adverse modification applies regardless of the stage of the action.

A conference does not fulfill a Federal agency's duty to consult under ESA Section 7(a)(2) if the Services subsequently list the proposed species or designate the proposed critical habitat. Upon listing or designation, the Federal agency must initiate consultation with the Services as appropriate and as described previously. However, information developed during the conference can help streamline the subsequent consultation process such that the Federal agency and the Services can focus the consultation on significant new information developed during the listing process and significant changes to the Federal action that would alter the content of the Services' conference opinion or written conclusion. Additionally, the Services may adopt its conference opinion as the biological opinion after the species is listed or critical habitat is designated.

A.1.2.4 No Consultation

Section 7 consultation is not required when the Federal agency determines that an action would have "no effect" on listed or proposed species or on proposed or designated critical habitats. "No effect" determinations are made at the Federal agency's discretion and do not require concurrence from the Services.

A.1.3 ESA Section 7 Consultation Process

This section describes each step in determining whether ESA consultation is necessary and within the consultation process itself. Figure A-1 illustrates the ESA pre-consultation and consultation process.

1. Determine the action area.

The first step in the consultation process is to determine the action area of the proposed action. The action area includes all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area is not limited to the footprint of the action nor is it limited by the Federal action agency's authority; rather, it is a biological determination of the reach of the proposed action on the listed species (FWS 2022). The action area determination should be made by a qualified subject matter expert (SME) because subsequent steps in the consultation, as well as the effects analyses, are predicated on defining a complete and accurate action area. The SME should be able to describe the extent of the action area in writing and pictorially on a map.

2. Determine protected species and critical habitats that may be present in the action area.

Once the action area is established, the SME determines what protected species and critical habitats may be present in the action area.

For protected species and critical habitats under FWS jurisdiction, the SME should query the FWS's Environmental Conservation Online System (ECOS) Information Planning and Consultation (IPaC) tool (available at: https://ecos.fws.gov/ipac/). The IPaC tool allows users to generate official species lists by entering project-specific information. However, the usefulness of this tool directly relates to the accuracy of the information entered into the system. Prior to initiating this step, the SME should be familiar enough with the potential effects of the proposed action to be able to fully define the action area and to input the action area into IPaC's mapping tool. Notably, while the IPaC tool may list species that are jointly under both Services' jurisdiction (e.g., sea turtles) or that are wholly under NMFS's jurisdiction (e.g., whales), IPaC only fulfills the 50 CFR 402.12 requirement to obtain an official species list for consultations with the FWS.[1]

[1] By regulation, the NRC is only required to obtain an official species list in cases where the NRC is required to develop a biological assessment. In such cases, the NRC also must verify the accuracy of the species list if the NRC does not begin preparation of the biological assessment within 90 days of receipt of (or concurrence with) the species list (50 CFR 402.12(e)). Nonetheless, obtaining an official species list is a best practice for all projects because it establishes communications between the NRC and the Services early in the review and ensures that the NRC considers all possible protected species and critical habitats that may be affected.

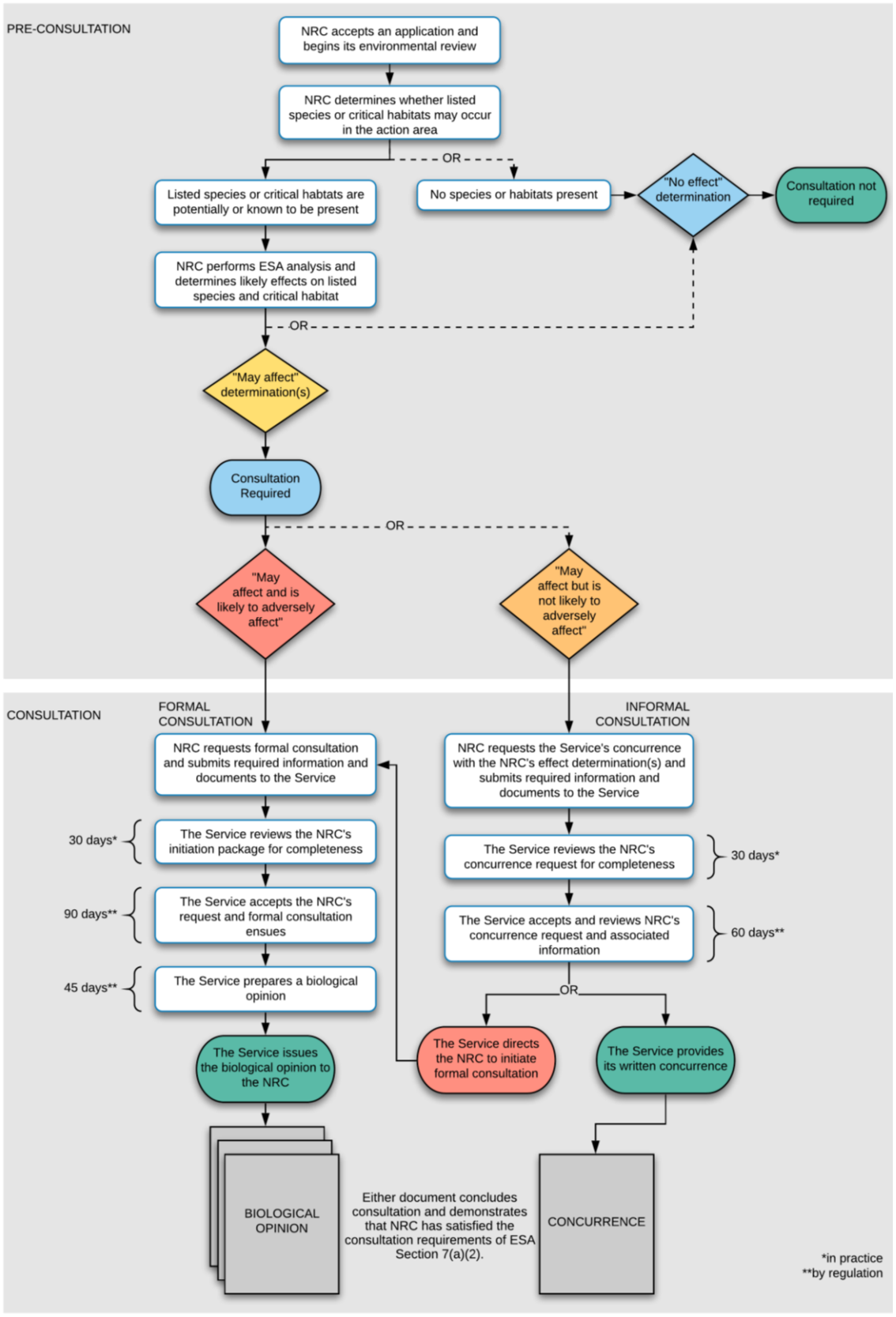

Figure A-1 Endangered Species Act Consultation Process Flowchart

For protected species and critical habitats under NMFS jurisdiction, the SME should reach out to the Protected Resources Division of the relevant NMFS regional office. While many of the NMFS regional offices maintain species lists and critical habitat mapping tools on their websites, unlike the FWS's IPaC tool, these resources do not fulfill the 50 CFR 402.12(c) requirement to obtain an official species list. A best practice is for the SME to define the action area, generate a list of protected species and critical habitats using NMFS's available online resources, and request NMFS's concurrence with that list as is allowable under 50 CFR 402.12(d). This method streamlines NMFS's review and response and can foster a positive and collaborative working relationship between the agencies.

If protected species or critical habitats may be present in the action area, the SME should proceed to the next step (determining potential effects) to determine whether consultation is required. If no protected species or critical habitats are present, consultation is not required. The SME should document this determination in the National Environmental Policy Act of 1969 (NEPA) document associated with the proposed action (e.g., environmental impact statement [EIS], supplemental environmental impact statement [SEIS], environmental assessment [EA]), in correspondence to the Services, or in a memorandum to file.

Notably, separate consultation determinations could be made for each agency in the Services. For instance, a proposed action could involve in-water work during the construction phase that could affect federally protected marine fish, but no construction activities or other components of the proposed action would affect any terrestrial species because none are present in the action area. In such a case, the NRC would be required to consult with NMFS but not the FWS.

3. Engage with the Services and initiate informal consultation.

If the NRC has not yet engaged directly with the Services during the previous step(s), the SME should reach out to the Services to establish points of contact and to orient Services staff regarding the proposed action. This is particularly important in cases where formal consultation may be required so that the Services can plan and designate staff resources for the development of the biological opinion. This step is also an opportunity for the SME to gather more information on the relevant protected species and critical habitats. Service staff may be able to point the SME to surveys, studies, and other available species data or connect the SME with local researchers and species experts. Because informal consultation includes all discussions and correspondence between the Services and the NRC (50 CFR 402.13), this step functionally initiates informal consultation. Therefore, the SME should document substantive discussions with the Services, researchers, or species experts in meeting summaries and should add any related correspondence to the NRC's Agencywide Documents Access and Management System (ADAMS).

4. Determine and document potential effects on protected species and critical habitats.

The next step in the consultation process is to determine the potential effects of the proposed action on the identified protected species and critical habitats. The SME typically performs this analysis concurrently with the NEPA review. The SME should rely on the application; available ecological surveys, monitoring, and studies; views of recognized species experts; scientific literature; and other relevant information to perform the ESA analysis. Based on the analysis, the SME makes an effect determination for each protected species and critical habitat as identified below in Table A-1.

Table A-1 Possible Endangered Species Act Effect Determinations Made by the Federal Action Agency

Listed Species	Proposed Species	Designated or Proposed Critical Habitat
"may affect and is likely to adversely affect"	"may affect and is likely to adversely affect"	"is likely to destroy or adversely modify"
"may affect but is not likely to adversely affect"	"may affect but is not likely to adversely affect"	"is not likely to destroy or adversely modify"
"no effect"	"no effect"	"no effect"

The SME documents the ESA analysis and effect determination(s) in a biological assessment, biological evaluation, or directly within the NEPA document.

The SME prepares a biological assessment only for those actions that meet certain regulatory criteria. Biological assessments are required under 50 CFR 402.12(b) for proposed actions involving major construction activities, which are those actions that have construction-type impacts and that meet the definition of a major Federal action requiring an EIS under NEPA.[2] The contents of a biological assessment are at the discretion of the Federal agency and will depend on the nature of the proposed action. The ESA regulations at 50 CFR 402.12(f) suggest that Federal agencies consider including the following information in the biological assessment:

- results of site surveys, studies, and inspections of the action area to determine if listed or proposed species are present or occur seasonally
- views of recognized experts on the species at issue
- review of pertinent scientific literature and related information
- analysis of the effects of the action on the species and habitat, including cumulative effects, and the results of any related studies
- analysis of alternate actions considered by the Federal agency.

Biological assessments must be completed within 180 days after the NRC's receipt of (or the Services' concurrence with) the species list unless the NRC and the Services agree to a different timeline (50 CFR 402.12(i)). If an applicant or licensee is involved, the 180-day period may not be extended unless the NRC provides the applicant or licensee with a written statement setting forth the estimated length of the proposed extension and the reasons why such an extension is necessary before the close of the initial 180-day period.

If the proposed action does not require a biological assessment, the SME prepares a biological evaluation or prepares written input to be incorporated directly into the NEPA document. If the ESA analysis is complex, lengthy, or will likely require formal consultation, the SME prepares a biological evaluation. A biological evaluation is a stand-alone document that is similar in format and content to a biological assessment, and it should contain the elements described above. The primary distinction is that a biological evaluation is prepared for a proposed action that does not meet the regulatory criteria for a biological assessment. The 180-day preparation timeline does not apply to biological evaluations.

[2] See 50 CFR 402.02 for the complete regulatory definition of this term.

If the ESA analysis is relatively straightforward, will only require informal consultation, or will not require consultation, the SME documents the ESA analysis directly in the NEPA document. The NEPA document should clearly identify the ESA analysis with appropriate headings and subheadings and include the SME's effect determinations for each protected species and critical habitat as identified in Table A-1.

For proposed actions involving formal consultation, Federal agencies must submit certain information to the Services with the consultation request. If a biological assessment or biological evaluation is being prepared to support formal consultation, the SME should include the following information in accordance with 50 CFR 402.14(c) and summarized as follows:

- description of the proposed action and any mitigation measures in sufficient detail to assess the effects of the action on protected species and critical habitat, including
  - the purpose, duration, timing, and location of the action
  - the specific components of the action and how they will be carried out
  - maps, drawings, blueprints, or similar schematics of the action
  - any other available information related to the nature and scope of the proposed action relevant to its effects on protected species or critical habitat.
- map or description of the action area
- available information on the presence, abundance, density, or periodic occurrence of listed species and the condition and location of the species' habitat, including any critical habitat
- description of the effects of the action and an analysis of any cumulative effects
- summary of any relevant information provided by the applicant or licensee
- any other relevant available information on the effects of the proposed action, including any EISs, EAs, or other relevant reports.

If protected species or critical habitats under the jurisdiction of both agencies of the Services may be affected by the proposed action, the SME should prepare two separate biological assessments or biological evaluations—one for each of the Services.

A best practice is for the SME to provide the applicant or licensee an opportunity to review and comment on the draft biological assessment or biological evaluation. The applicant or licensee may have more in-depth knowledge of the proposed action and the potential adverse effects of that action. The applicant or licensee will also have a better understanding of what potential strategies could feasibly be implemented to reduce incidental take or to mitigate or offset adverse effects. Engaging the applicant or licensee at this stage is especially important when the NRC is reinitiating consultation for an NRC-licensed facility that already has a biological opinion in place.

The SME may also share a draft of part or all of the biological assessment or biological evaluation with the Services for the purpose of ensuring that the NRC has included all relevant information required by the Services to initiate the consultation. This step is particularly helpful if the Services intend to adopt part or all of the NRC's initiation package in its biological opinion through the optional collaborative process described at 50 CFR 402.14(h)(3).

The NRC typically issues biological assessments and biological evaluations as stand-alone documents. However, the NRC also may opt to incorporate the biological assessment or biological evaluation into the NEPA document associated with the proposed action under 50 CFR 402.06. The SME, along with the project manager and NRC management, should carefully weigh the benefits and risks of this option. Incorporating the biological assessment or biological evaluation into the NEPA document can delay the progression of consultation because the NRC must wait until the NEPA document is issued to initiate consultation. Typically, this option should be reserved for simple informal consultations that involve few protected species or critical habitats.

5. Determine the appropriate type of consultation

The SME's effect determination(s) dictate whether consultation is required and the type of consultation that is appropriate (e.g., formal, informal, conference, or no consultation). Table A-2 summarizes the appropriate type of consultation or conference for each possible effect determination.

Table A-2 Appropriate Type of Consultation by Endangered Species Act Effect Determination

Type of Consultation	Listed Species	Proposed Species	Designated Critical Habitats	Proposed Critical Habitats
Formal Consultation	"may affect and is likely to adversely affect"	N/A	"is likely to destroy or adversely modify"	N/A
Informal Consultation	"may affect but is not likely to adversely affect"	N/A	"is not likely to destroy or adversely modify"	N/A
Conference	N/A	"may affect and is likely to adversely affect"	N/A	"is likely to destroy or adversely modify"
No Consultation or Conference	"no effect"	"may affect but is not likely to adversely affect"[(a)] or "no effect"	"no effect"	"is not likely to destroy or adversely modify" or "no effect"

N/A = not applicable

(a) Although not required, it is a best practice to confer with the Services when a proposed action may affect but is not likely to adversely affect proposed species.

For a given project, effect determinations among the protected species and critical habitats may vary. For instance, a proposed action may affect but is not likely to adversely affect sea turtles but would have no effect on the Nassau grouper (*Epinephelus striatus*). In this case, informal consultation with NMFS would be appropriate for sea turtles, but the NRC would not be required to consult with NMFS for the Nassau grouper. For another proposed action, the NRC might determine that a proposed action may affect and is likely to adversely affect the rufa red knot (*Calidris canutus rufa*) and northern long-eared bat (*Myotis septentrionalis*) but that the action is not likely to adversely affect several species of freshwater mussels. In this case, formal consultation with the FWS would be appropriate. The formal consultation could address all involved species even though the effect determinations for the freshwater mussels alone would only rise to the informal consultation level.

Notably, the threshold for a conference is higher than the threshold for consultation. The NRC is only required to confer with the Services if a proposed action is likely to jeopardize the continued existence of proposed species or is likely to destroy or adversely modify proposed critical habitat. However, the Services, and not Federal action agencies, make jeopardy determinations. Effectively, this means that the NRC should confer with the Services in most circumstances in which a proposed action may affect and is likely to adversely affect a proposed species to determine whether adverse effects could result in jeopardy. However, it is a best practice for the NRC to confer with the Services if a proposed actions may affect but is not likely to adversely affect proposed species or may affect but is not likely to adversely modify or destroy proposed critical habitat because the NRC will be required to consult with the Services if the species or habitat are subsequently listed or designated. For proposed actions that require the NRC to develop a biological assessment, the biological assessment must consider proposed species and proposed critical habitats in addition to listed species and designated critical habitats (50 CFR 402.12(a)).

If both consultation and a conference are required for a given project, the NRC and the Services typically conduct the two processes concurrently.

6. Request the Services' concurrence, formal consultation, or conference.

When the document containing the NRC's ESA analysis is ready for issuance (e.g., biological assessment, biological evaluation, or NEPA document), the SME prepares a request for the Services' concurrence as part of informal consultation, a request for formal consultation, or a request for conference, as described in the subsections below.

In cases where the SME coordinated with the Services during its review, but the SME ultimately determined that the proposed action would have no effect on protected species or critical habitats, the NRC does not need to engage with the Services any further. However, in such instances, a best practice is to notify the relevant Service(s) of the NRC's "no effect" determination(s). For instance, the SME can send the Services an email or letter upon issuance of the NEPA document that explains the NRC's "no effect" determination(s), provides information on the availability of the NEPA document, and gives details on how the Services can submit public comments (in the case of a draft SEIS, draft EIS, or draft EA). The SME should be sure to add any such correspondence to ADAMS as part of fully documenting the consultation.

a. Request the Services' concurrence.

For "may affect but is not likely to adversely affect" listed species and "is not likely to destroy or adversely modify" designated critical habitat determinations, the SME prepares a written request for the Services to concur with the NRC's determinations. The request should include a copy of the NRC's ESA analysis. By regulation, the request must also include sufficient information for the Services to determine if it concurs (50 CFR 402.13(c)(1)).

The Services provides its written concurrence or non-concurrence within 60 days of receipt of the NRC's request (50 CFR 402.13(c)(2)). However, consultation may be extended through agreement between the Federal action agency, the Services, and any applicant.

Notably, if the nature of the proposed action requires the NRC to develop a biological assessment, the ESA regulations afford the Services 30 days, rather than 60 days, to

review and provide written concurrence or non-concurrence. In such cases, the SME should coordinate with the Services prior to submitting the biological assessment and concurrence request to establish the most appropriate timeline based on a combination of the potential effects on listed species and critical habitats, NRC review timeline, staff availability from the Services, and other relevant factors.

If after its review, the Services concur with the NRC's ESA effect determination(s), the informal consultation is concluded, and NRC's ESA Section 7(a)(2) obligations for the proposed action are fulfilled. The SME should add the Services' written concurrence to ADAMS and should prepare input for the final NEPA document that reports the results of the consultation.

If the Services do not concur, the SME and staff from the Services should discuss the reasons for the non-concurrence. In some cases, the NRC or applicant can submit additional information to support the Services' subsequent concurrence. In other cases, the Services may determine that the proposed action involves potential for take and requires the Services to formulate a biological opinion and ITS. The appropriate next step in such a case would be for the NRC to prepare a request for formal consultation, as described below.

b. Request and engage in formal consultation.

For "may affect and is likely to adversely affect" listed species and "is likely to destroy or adversely modify" designated critical habitat determinations, the SME prepares a written request for formal consultation with the relevant Service(s). The request must include all information specified at 50 CFR 402.14(c), as summarized previously under Review Procedure Step 4.

Formal consultation takes places over a 135-day timeline (50 CFR 402.14(e)). During the initial 90 days, the NRC and the Services exchange information and engage in discussions concerning the potential effects of the proposed action. The Services may request that the NRC submit additional information to support its review of the proposed action in a process that is like the NRC's request for additional information (RAI) process.

The regulations allow for applicants or licensees to be a party to the consultation, and the SME should seek to include the applicant or licensee in the consultation to the extent possible. It also is a best practice to engage the applicant or licensee when responding to any inquiries from the Services to ensure that the NRC's responses are accurate and complete.

Following the initial 90 days, the Services have 45 days thereafter to complete the biological opinion and deliver it to the Federal agency and applicant or licensee. The biological opinion evaluates the nature and extent of effects of the action on listed species and critical habitats and must include the information specified at 50 CFR 402.14(h)(1) and 50 CFR 402.14(h)(2). The biological opinion may include an ITS consisting of the:

- level of anticipated take of listed species
- reasonable and prudent measures necessary or appropriate to minimize adverse impacts

- terms and conditions that implement reasonable and prudent measures, such as reporting requirements.

Biological opinions may also include conservation recommendations, which are discretionary measures to minimize or avoid adverse effects on listed species or critical habitats. Conservation recommendations can also address the development of information on listed species or critical habitats, such as further study or research that would enhance the understanding of a listed species within the action area. The NRC and the applicant or licensee may, but are not required to, implement conservation recommendations.

The ESA regulations allow Federal action agencies to request a copy of and to comment on a draft of the biological opinion (50 CFR 402.14(g)(5)). Applicants or licensees may also comment on the draft biological opinion through this provision. The Services cannot issue its biological opinion prior to the end of the 45-day period (or extended timeline, as previously agreed upon and as described below) while the draft is under review by the NRC. However, if the Federal action agency submits comments to the Services regarding the draft biological opinion within 10 days of the deadline for issuing the opinion, the Services are entitled to an automatic 10-day extension. The NRC's standard practice is to always request to review a draft of the biological opinion and to share that draft with the applicant or licensee for its review and comment. This step is especially important to ensure that the draft reasonable and prudent measures and terms and conditions are feasible and implementable.

The Services may adopt all or part of the NRC's formal consultation initiation package, including the biological assessment or biological evaluation, within its biological opinion (50 CFR 402.14(h)(3)). The ESA regulations also allow for the NRC and the Services to collaborate during the NRC's development of the biological assessment or biological evaluation and the associated initiation package such that the Services can more fully adopt the NRC's analysis as its biological opinion (50 CFR 402.14(h)(4)). In such a case, the Services would formulate any supplementary analyses it deems necessary as well as the ITS.

Compliance with the ITSs of biological opinions protects both the NRC and the applicant or licensee from penalties and other enforcement action under ESA Section 11 because any take that is subject to and in compliance with an ITS is not prohibited under the ESA. For consultations resulting in the Services' issuance of a biological opinion, the NRC requires its licensees to comply with the ITS of the biological opinion by incorporating environmental conditions into power reactor license(s). Therefore, the SME should closely coordinate with the project manager, management, and project attorneys for consultations that will result in a biological opinion to ensure that the appropriate conditions are incorporated into the new, renewed, or amended license. The NRC's Interagency Consultation Coordinator should also be involved in all formal consultations involving the formulation of a biological opinion.

Formal consultation may be extended through agreement between the Federal action agency, the Services, and any applicant or licensee. If an applicant or licensee is involved and the Services requires additional time to complete the consultation, within the initial 90-day period, the Services must submit to the applicant or licensee a written statement specifying the reasons why a longer period is required, the information that is required to complete the consultation, and the estimated date on which the consultation will be completed (50 CFR 402.14(e)). One reason that consultation may be extended is

if the Services determine that additional data would provide a better information base from which to formulate a biological opinion (50 CFR 402.14(f)).

A best practice is for the SME to discuss the timeline of the consultation with the Services prior to initiating the consultation. Section 7 consultation, when it is required, should be completed prior to the NRC deciding on a proposed action. Early coordination on a mutually agreeable timeline is the best way to ensure that consultation will conclude in a timely manner.

c. Request and engage in conference.

For "may affect and is likely to adversely affect" proposed species and "may destroy or adversely modify" proposed critical habitat determinations, the SME prepares a written request for conference with the Services. Conferences are conducted in a similar manner to consultations, and the applicant or licensee should be involved to the extent practicable. The regulations do not specify a particular timeline for conferences. Therefore, it is particularly important for the SME to establish a timeline with the Services at the outset of the conference.

During the conference, the Services make advisory recommendations on ways to minimize or avoid adverse effects to the proposed species or proposed critical habitat. The outcome of a conference is either a conference report or a conference opinion. A conference report includes the Services' written documentation of the conclusions reached during the conference, along with any discretionary recommendations. A conference opinion may include an ITS. However, that ITS would not become effective unless the Services adopt the conference opinion as its biological opinion once the listing action is final.

If during the conference or prior to completion of the proposed action, the Services list the proposed species or designates the proposed critical habitat, the Federal agency must review the action to determine whether formal consultation is required. If formal consultation is required, the SME should prepare a request to initiate formal consultation as described in Review Procedure Step 6.b. If formal consultation is not required but the proposed action could still result in effects on the newly listed species or newly designated critical habitat, the NRC must seek the Services' concurrence with its "may affect but is not likely to adversely affect" or "may affect but is not likely to destroy or adversely modify" critical habitat determinations. In past NRC experiences of such circumstances, the Services have written a brief letter confirming that the information in its conference report remains valid and that the conclusions reached in that report constitute the Services' concurrence pursuant to ESA Section 7(a)(2).

If both consultation and conference are required for a given project, the NRC and Services typically conduct the two processes concurrently, and the Services may issue one document (e.g., concurrence letter or biological opinion) that concludes both processes.

Although the NRC is only required to consult with the Services if a proposed action is likely to jeopardize the continued existence of proposed species or is likely to destroy or adversely modify proposed critical habitat, it is a best practice for the NRC to confer with the Services if effects on proposed species or proposed critical habitats are possible because the NRC will be required to consult with the Services if the species or habitats are subsequently listed or designated.

7. Document conclusion of consultation or conference.

Completion of the consultation or conference is documented by the Services' letter of concurrence, biological opinion, conference report, or conference opinion. The SME ensures that these documents are added to ADAMS as part of the consultation record. The SME also documents the outcome of consultation in the NEPA document associated with the proposed action in accordance with 50 CFR 402.06(b). In cases where a final EIS or SEIS is issued prior to the conclusion of consultation, the SME prepares input to the record of decision documenting the outcome of the consultation. In cases where the final EA and Finding of No Significant Impact (FONSI) are issued prior to the conclusion of consultation, the NRC can consider issuing a *Federal Register* notice that corrects or addends the EA and FONSI.

8. Reinitiate consultation.

The ESA regulations specify four conditions under which Federal agencies must reinitiate consultation. These conditions are (50 CFR 402.16)

- the level of allowable take specified in the incidental take is exceeded
- new information reveals effects not previously considered
- the action is modified in a manner that causes new effects
- a new species is listed or critical habitat designated that may be affected.

Reinitiated consultation is conducted in a similar manner as the initial consultation. The outcome of reinitiated consultation is a letter of concurrence from the Services or a new or amended biological opinion.

A.2 Magnuson-Stevens Fishery Conservation and Management Act

A.2.1 Overview of the Act and Consultation Responsibilities

Congress enacted the MSA in 1976 to foster long-term biological and economic sustainability of the Nation's marine fisheries. The MSA is a comprehensive, multi-purposed statute. Its key objectives include preventing overfishing, rebuilding overfished stocks, increasing long-term economic and social benefits, and ensuring a safe and sustainable supply of seafood. NOAA, together with eight regional Fishery Management Councils established under the MSA, implement the provisions of the MSA.

The MSA directs the Fishery Management Councils, in conjunction with NMFS, to designate areas of EFH and to manage marine resources within those areas. EFH is defined as the coastal and marine waters and substrate necessary for fish to spawn, breed, feed, or grow to maturity (50 CFR 600.10). NMFS further defines "waters," "substrate," and "necessary" at 50 CFR 600.10. EFH applies to federally managed finfish and shellfish (herein referred to as "EFH species"). As of 2022, the Councils and NMFS have designated EFH for nearly 1,000 species at multiple life stages.

The Fishery Management Councils may also designate some EFH as a habitat areas of particular concern (HAPC) if that habitat exhibits one or more of the following traits: rare, stressed by development, possessing important ecological functions for EFH species, or especially vulnerable to anthropogenic degradation. HAPC can cover a specific location (e.g., an estuary bank or a single spawning location) or cover habitat type that is found at many

locations (e.g., coral, nearshore nursery areas, or pupping grounds). HAPC designation does not convey additional restrictions or protections on an area. The designation simply focuses increased scrutiny, study, or mitigation planning compared to surrounding areas because HAPC represent high-priority areas for conservation, management, or research and are necessary for healthy ecosystems and sustainable fisheries. The Fishery Management Councils may, however, restrict the use or possession of fishing gear types within HAPC. The geographic boundaries of HAPC are subject to refinement through amendments, as research better informs management decisions (NOAA 2020).

Section 305(b) of the MSA contains interagency consultation requirements pertaining to Federal agencies and their actions. Under MSA Section 305(b)(2), Federal agencies must consult with NMFS for actions that may adversely affect EFH. Private actions with a Federal nexus, such as construction and operation of facilities that involve Federal licensing or approval, also are subject to consultation. Therefore, the NRC's issuance of initial or subsequent renewed licenses may trigger consultation requirements. Consultation pursuant to MSA Section 305(b) is commonly referred to as "EFH consultation."

NMFS maintains regulations that implement MSA Section 305 at 50 CFR Part 600, "Magnuson–Stevens Act Provisions." Subpart K of these regulations prescribes the EFH interagency consultation requirements. Subpart J includes definitions and other information relevant to EFH. The NRC also relies upon NMFS's detailed procedural guidance for conducting EFH consultation in *Essential Fish Habitat Consultation Guidance* (NMFS 2004a) and *Preparing Essential Fish Habitat Assessments: A Guide for Federal Action Agencies* (NMFS 2004b).

Consultation may be abbreviated, expanded, or programmatic. Generally, the appropriate type of consultation relates to effect determinations made by the Federal agency, as described below. NMFS regulations also allow for general concurrences concerning EFH. Because situations are rare in which a general concurrence would apply to an NRC action, this guidance does not specifically address this provision of the EFH regulations.

A.2.2 Types of EFH Consultation

A.2.2.1 Abbreviated and Expanded Consultation

Abbreviated consultation is appropriate when a Federal agency determines that an action would involve "minimal adverse effects" on EFH. Abbreviated consultation allows NMFS to determine quickly whether, and to what degree, a Federal action may adversely affect EFH. This type of consultation is used when the adverse effects of an action can be alleviated through minor modifications to the action.

Expanded consultation is appropriate when a Federal agency determines that an action may result in "substantial adverse effects." Substantial adverse effects are effects that may pose a relatively serious threat to EFH and typically could not be alleviated through minor modifications to a proposed action. Expanded consultation allows more opportunity for the Federal agency and NMFS to work together to review the action's impacts on EFH and for NMFS to develop measures to avoid, minimize, mitigate, or otherwise offset adverse effects.

A Federal agency may also determine that an action would involve "more than minimal but less than substantial adverse effects." In such cases, the NRC should work with NMFS to determine which type of consultation (abbreviated or expanded) is most appropriate for the given action.

The processes for abbreviated and expanded consultations are nearly identical. The primary difference is the timeframe for each step. For both abbreviated and expanded consultations,

the NRC staff submits an EFH assessment to NMFS and requests to initiate EFH consultation. If the action will adversely affect EFH, NMFS formulates EFH Conservation Recommendations, which may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects. If NMFS determines that the action would not adversely affect EFH or that no EFH Conservation Recommendations are needed, NMFS notifies the NRC informally or in writing.

If NMFS provides the NRC with EFH Conservation Recommendations, the NRC must prepare a detailed written response within 30 days of receiving the recommendations. This 30-day timeframe applies to both abbreviated and expanded consultation. In the response, the NRC staff must include a description of measures proposed for avoiding, mitigating, or offsetting the impact of the activity on EFH. If the NRC's response is inconsistent with any of the NMFS's EFH Conservation Recommendations, the response must be provided at least 10 days prior to the final agency decision and must explain the NRC's reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS. The NRC's response completes consultation.

A.2.2.2 Programmatic Consultation

Programmatic consultation is appropriate when a Federal action is a funding program, large-scale planning effort, or other project where enough information is available to address all reasonably foreseeable adverse effects on EFH of an entire program, parts of a program, or several similar individual actions occurring within a given geographic area. Programmatic consultation allows the Federal agency and NMFS to address many individual actions that may adversely affect EFH at one time and for NMFS to develop programmatic EFH Conservation Recommendations. For instance, the Federal Highway Administration and U.S. Army Corps of Engineers undertake programmatic consultation with NMFS for multi-part, multi-year development projects. Within NRC, the types of agency actions that may be appropriate for programmatic consultation include rulemakings or proposed actions that involve development of a GEIS.

The process for programmatic consultation is like the process described above for abbreviated and expanded consultations. However, a wider variety of outcomes are possible (see Review Procedure Step 6 below). NMFS may formulate programmatic EFH Conservation Recommendations. Such recommendations may cover all individual actions, or NMFS could require individual consultations for some or all actions or components of the project.

If NMFS provides the NRC with EFH Conservation Recommendations as part of a programmatic consultation, the NRC must prepare a detailed written response within 30 days of receiving the recommendations. The NRC's response completes consultation.

A.2.2.3 No Consultation

EFH consultation is not required when the Federal agency determines that an action would have "no adverse effects" on EFH.

A.2.3 EFH Consultation Process

This section describes each step in determining whether EFH consultation is necessary and within the consultation process itself. Figure A-2 illustrates the EFH pre-consultation and consultation process.

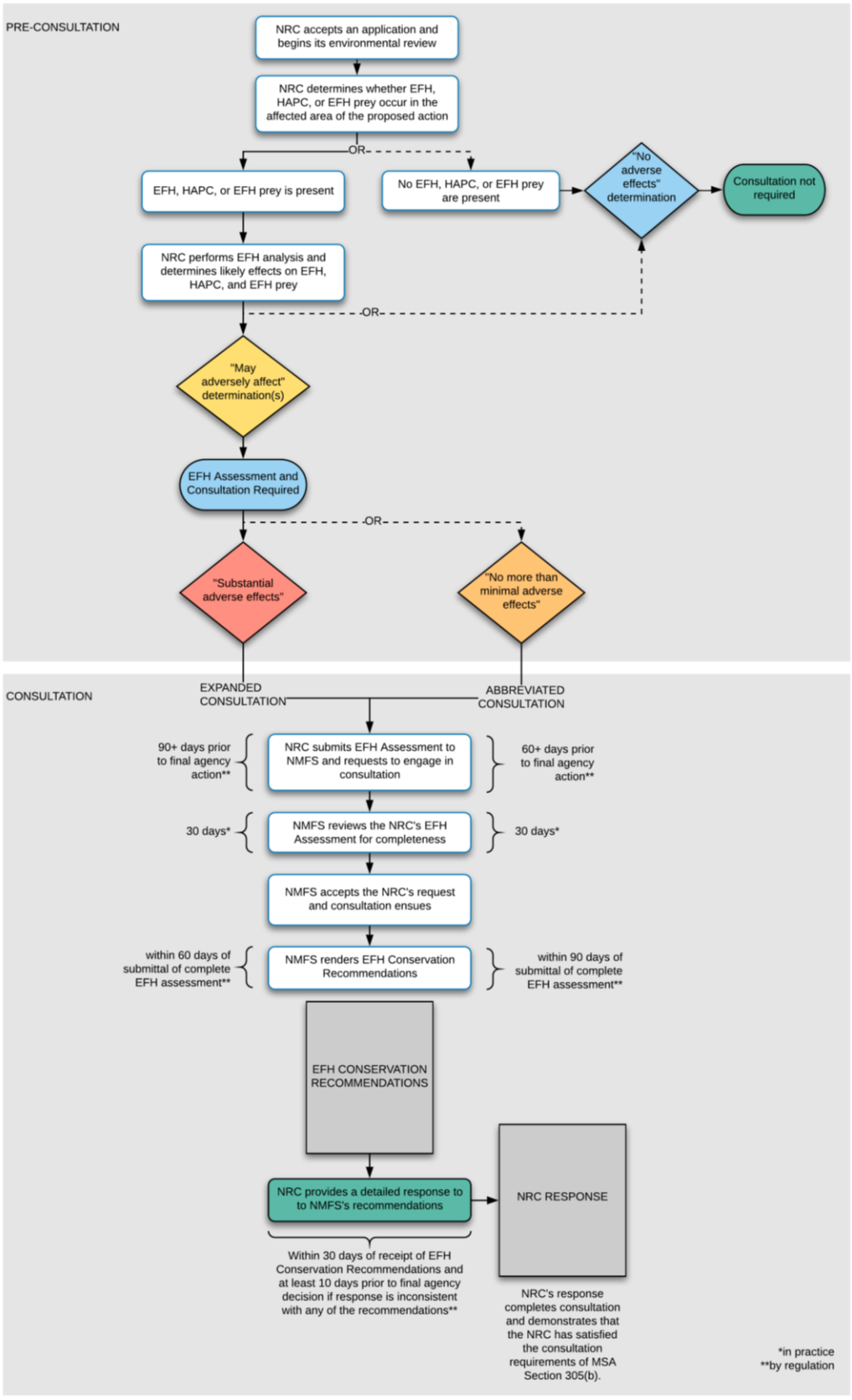

Figure A-2 Essential Fish Habitat Consultation Process Flowchart

1. *Determine the affected area.*

The first step in the consultation process is to determine the area that would be affected by the proposed action. This step is like determining the ESA action area (see Section 4.6.11.3, Review Procedure Step 1). Unlike the ESA, however, the MSA and its regulations do not specifically prescribe or define terminology for the affected area. For projects involving both an ESA analysis and EFH analysis, the ESA action area and the EFH affected area are likely identical; both should account for all areas over which direct or indirect impacts to ecological receptors could occur. A primary difference between the two could be that an ESA action area may involve large areas of land that do not apply to the EFH affected area if that land does not contain any aquatic habitat or features.

The affected area determination should be made by a qualified SME because subsequent steps in the consultation, as well as the effects analyses, are predicated on defining a complete and accurate affected area. The SME should be able to describe the extent of the affected area in writing and pictorially on a map.

2. *Determine the EFH that may be present in the affected area.*

Once the affected area is established, the SME determines what EFH may be present in that area. The Fishery Management Councils and NMFS designate EFH by species and life stage.

To determine EFH, the SME should query the NMFS's Essential Fish Habitat Mapper tool (available at: https://www.habitat.noaa.gov/apps/efhmapper/). This tool allows users to view spatial representations of fish species, their life stages, and important habitats. The mapper displays data layers for EFH, HAPC, and EFH areas protected from fishing. It also includes links to supporting materials, such as fishery management plans, which contain the official regulatory EFH descriptions. Prior to initiating this step, the SME should be familiar enough with the potential effects of the proposed action to be able to fully define the affected area and to input that area into the mapping tool.

The SME should compare EFH mapper results with habitat characteristics documented in scientific literature and the descriptions of EFH in relevant fishery management plans and other regulatory documents to ultimately determine the relevant EFH species and life stages.

Although it is not required by regulation, it is a best practice to reach out to the Habitat Conservation Division of the relevant NMFS regional office to confirm the accuracy and completeness of the EFH mapper results and the SME's determination of relevant EFH species and life stages. This is particularly valuable in determining whether the NRC should consider any prey of EFH species in its EFH analysis. For instance, if a given species with designated EFH downstream of an NRC-licensed facility consumes diadromous fish that occur upriver of the facility, effects of the proposed action on those prey fish would be relevant to the NRC staff's EFH analysis. NMFS can help identify such cases that may not appear within EFH mapper results. NMFS may also be able to assist the SME in ruling out, streamlining, or grouping EFH species and life stages in cases where the EFH mapper results are numerous.

If EFH, HAPC, or EFH prey are present in the affected area, the SME should proceed to the next step (determining potential effects) to determine whether consultation is required. If no

EFH, HAPC, or EFH prey are present, consultation is not required. The SME should document this determination in the NEPA document associated with the proposed action (e.g., EIS, SEIS, or EA), in correspondence to NMFS, or in a memo to file.

3. Engage with NMFS

If the NRC has not yet engaged directly with NMFS during the previous step(s), the SME should reach out to the Habitat Conservation Division of the relevant regional office to establish points of contact and to orient NMFS staff to the proposed action. This also helps NMFS plan and designate staff resources so that both agencies (NRC and NMFS) can meet the consultation timelines prescribed in the regulations. This step is also an opportunity for the SME to gather more information on the EFH species, their life stages, habitat characteristics, and HAPC. NMFS staff may be able to point the SME to surveys, studies, and other available species data or connect the SME with local researchers and species experts. The SME should document any substantive discussions with the Services, researchers, or species experts in meeting summaries and should add any related correspondence to ADAMS.

4. Determine and document potential effects on EFH.

The next step in the consultation process is to determine the potential effects of the proposed action on the EFH of the identified EFH species, life stages, and their prey and on HAPC, if applicable. The SME typically performs this analysis concurrently with the NEPA review. The SME should rely on the application; available ecological surveys, monitoring, and studies; views of recognized species experts; scientific literature; and other relevant information to perform the EFH analysis. Based on the analysis, the SME makes an effect determination for the EFH of each EFH species, life stage, and their prey and each HAPC as identified below in Table A-3.

Table A-3 Possible Essential Fish Habitat Effect Determinations Made by the Federal Action Agency

Essential Fish Habitat Effect Determinations	Spatial Extent	Duration
"substantial adverse effects"	surface area, depth, and seasonality described in writing with explicit measurements, to the extent possible, or pictorially on a map	temporary v. permanent
"more than minimal but less than substantial adverse effects"		short-term v. long-term
"minimal adverse effects"		
"no adverse effects"		

Importantly, EFH effect determinations characterize the effects on the *habitat* of the EFH species and their life stages. They do not characterize the effects on the species or the life stages themselves. Similarly, effect determinations for EFH prey characterize the effects on the prey as a food resource rather than the effects on the prey species themselves. For instance, a proposed action that involves water withdrawal from a river for cooling purposes could cause habitat loss (i.e., temporary or permanent physical loss of a portion of the water column). Associated effluent discharge could cause chemical or biological (i.e., temperature and dissolved oxygen content) alterations to the habitat. With respect to prey species, water

withdrawals could impinge or entrain prey organisms, which would represent a reduction in available food resources for EFH species within that habitat.

HAPC are subsets of EFH that merit special considerations to conserve the habitat. The Fishery Management Councils and NMFS identify HAPC within designated EFH based on the importance of the habitat's ecological function; the extent to which the habitat is sensitive to human-induced environmental degradation; whether, and to what extent, development activities are, or will be, stressing the habitat type; and the rarity of the habitat type (50 CFR 600.815(a)(8)). If an HAPC is present, the SME should make separate effect determinations for the EFH and the HAPC within that EFH. Actions that occur in HAPC may receive more scrutiny by NMFS when developing conservation recommendations.

In addition to each EFH effect determination, NMFS recommends that Federal agencies characterize effects in terms of spatial extent and duration (NMFS 2004b). To the extent possible, the SME should describe these aspects of the impacts. Spatial extent can be characterized in terms of surface area, depth, and seasonality. Duration includes whether the effects are temporary or permanent and short-term or long-term.

The SME documents the EFH analysis and effect determination(s) in an EFH assessment or directly within the NEPA document. EFH assessments are required for any proposed action that may adversely affect EFH (50 CFR 600.920(e)(1)). This includes the following effect determinations identified in Table A-3: "substantial adverse effects," "more than minimal but less than substantial adverse effects," and "minimal adverse effects." The level of detail in an EFH assessment should be commensurate with the complexity and magnitude of the potential adverse effects of the action (50 CFR 600.920(e)(2)). The EFH assessment must contain the following (50 CFR 600.920(e)(3)):

- a description of the action
- an analysis of the potential adverse effects on EFH and EFH species
- the Federal agency's conclusions regarding the effects of the action on EFH
- proposed mitigation, if applicable.

If appropriate, the EFH assessment should also include (50 CFR 600.920(e)(4))

- the results of site surveys, studies, and inspections that evaluate the habitat and the site-specific effects of the project
- the views of recognized experts on the habitat or species that may be affected
- a review of pertinent scientific literature and related information
- an analysis of alternate actions considered by the Federal agency
- any other relevant information.

If a Federal agency has previously completed an EFH assessment for a similar action, the EFH regulations allow for the agency to incorporate by reference the previous assessment, supplemented with any relevant new project-specific information (50 CFR 600.920(e)(4)).

The NRC typically issues EFH assessments as stand-alone documents. However, the NRC also may opt to incorporate the EFH assessment into the NEPA document associated with the proposed action under 50 CFR 600.920(f)(ii). In such cases, the NRC must clearly

identify the relevant section of the document as the EFH assessment. The SME, along with the project manager and NRC management, should carefully weigh the benefits and risks of this option. Incorporating the EFH assessment into the NEPA document can delay the progression of consultation because the NRC must wait until the NEPA document is issued to initiate consultation. Typically, this option should be reserved for abbreviated consultations that involve few EFH species, life stages, or prey and that do not involve any HAPC.

If the proposed action would result in "no adverse effects," consultation is not required, and the SME documents the EFH analysis directly in the NEPA document. The NEPA document should clearly identify the EFH analysis with appropriate headings and subheadings and include the SME's effect determinations for the EFH of each EFH species, life stage, and their prey and each HAPC as identified in Table A-3.

5. Determine the appropriate type of consultation.

The SME's effect determination(s) dictate whether consultation is required and the type of consultation that is appropriate (e.g., abbreviated, expanded, programmatic, or no consultation). Table A-4 summarizes the appropriate type of consultation for each possible effect determination.

Table A-4 Appropriate Type of Consultation by Type of Proposed Action and Essential Fish Habitat Effect Determination

Types of Consultation	Type of Proposed Action	EFH Effect Determination
Abbreviated Consultation	individual proposed action	"minimal adverse effects" or "more than minimal, but less than adverse effects"(a)
Expanded Consultation	individual proposed action	"substantial adverse effects" or "more than minimal, but less than adverse effects"(a)
Programmatic Consultation	proposed actions with a large number of individual actions, such as rulemakings or those involving development of a GEIS	no more than "minimal adverse effects" either individually or cumulatively
No Consultation	any	"no adverse effects"

EFH = essential fish habitat; GEIS = generic environmental impact statement.

(a) For this finding, the NRC should work with NMFS to determine whether abbreviated or expanded consultation is most appropriate.

For a given project, EFH effect determinations among the affected EFH species and life stages may vary. For instance, a proposed action may result in no more than minimal adverse effects on EFH of summer flounder (*Paralichthys dentatus*) (larvae, juveniles, and adults), Atlantic butterfish (*Peprilus triacanthus*) (juveniles and adults), and bluefish (*Pomatomus saltatrix*) (juveniles), but may have no adverse effects on the EFH of any life stages of black sea bass (*Centropristis striata*) or Atlantic herring (*Clupea harengus*). In this case, abbreviated consultation would be appropriate to address the minimal adverse effects on summer flounder, Atlantic butterfish, and bluefish, but the consultation would not be required to address either black sea bass or Atlantic herring unless NMFS disagrees with the NRC's "no adverse effect" findings. For another proposed action, the NRC might

determine that a proposed action would have substantial adverse effects on the larvae and juveniles of summer flounder and windowpane flounder (*Scophthalmus aquosus*) but would have no adverse effects on the EFH of juveniles and adults of these species. In this case, expanded consultation would be appropriate to address the larvae and juvenile life stages.

6. Initiate and engage in consultation.

When the EFH assessment or NEPA document containing the EFH assessment is ready for issuance, the SME prepares a request to initiate consultation with NMFS. The request should specify the type of consultation being requested (i.e., abbreviated, expanded, or programmatic) and why the action meets the criteria for that type of consultation. The NRC staff must submit the EFH assessment at least 60 days prior to the final agency decision on the action for abbreviated consultation and at least 90 days prior to the final agency decision for expanded consultation.

Both abbreviated and expanded consultations begin when NMFS receives the EFH assessment and written request for consultation. Programmatic consultations also begin in this manner, although the EFH regulations allow for NMFS to also initiate programmatic consultations by requesting pertinent information from the Federal agency (50 CFR 600.920(j)(2)).

During consultation, the NRC and NMFS exchange information and engage in discussions concerning the potential effects of the proposed action. The agencies may work together to develop measures to avoid, minimize, mitigate, or otherwise offset adverse effects. NMFS may request that the NRC submit additional information to support its review of the proposed action in a process that is like the NRC's RAI process.

Although the EFH regulations do not specifically describe the role of Federal applicants or licensees, in practice, the NRC usually requests to involve the applicant or licensee to the extent possible, and NMFS is typically amenable to this request. It is also a best practice to engage the applicant or licensee when responding to any inquiries from NMFS to ensure that the NRC's responses are accurate and complete.

If the proposed action will adversely affect EFH, NMFS formulates EFH Conservation Recommendations, which may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects. NMFS must provide such recommendations to the NRC within 30 days for abbreviated consultation or within 60 days for expanded consultation. If NMFS determines that the action would not adversely affect EFH or that no EFH Conservation Recommendations are needed, NMFS notifies the NRC informally or in writing, and such notification concludes consultation.

If NMFS provides the NRC with EFH Conservation Recommendations, the NRC must prepare a detailed written response within 30 days of receiving the recommendations. This 30-day timeframe applies to both abbreviated and expanded consultation. In the response, the NRC staff must include a description of measures proposed for avoiding, mitigating, or offsetting the impact of the activity on EFH. If the NRC's response is inconsistent with any of the NMFS's EFH Conservation Recommendations, the response must be provided at least 10 days prior to the final agency decision and must explain the NRC's reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS. The NRC's response completes consultation.

The process for programmatic consultation is similar. However, five outcomes are possible. NMFS may:

1. Formulate programmatic EFH Conservation Recommendations that cover all individual actions of the program.
2. Formulate programmatic recommendations that cover individual actions, but that require individual consultations for some or all actions.
3. Determine that no programmatic recommendations can be developed and that all individual actions will require individual consultation.
4. Determine that all individual actions qualify for a General Concurrence, as defined in the MSA.
5. Determine that there are no adverse effects and that no recommendations are needed.

If NMFS provides the NRC with EFH Conservation Recommendations as part of a programmatic consultation, the NRC must prepare a detailed written response within 30 days of receiving the recommendations. The NRC's response completes consultation.

7. Document the conclusion of consultation.

Completion of the consultation is documented by the NRC's response to NMFS's EFH Conservation Recommendations or, in cases where the action would not adversely affect EFH, NMFS's notification to NRC that no EFH Conservation Recommendations are needed. The SME ensures that these documents are added to ADAMS as part of the consultation record. The SME also documents the outcome of consultation in the NEPA document associated with the proposed action. In cases where a final EIS or SEIS is issued prior to the conclusion of consultation, the SME prepares input to the record of decision that documents the outcome of the consultation. In cases where the final EA and FONSI are issued prior to the conclusion of consultation, the NRC can consider issuing a *Federal Register* notice that corrects or addends the EA and FONSI.

8. Perform supplemental consultation.

The EFH regulations specify two conditions under which Federal agencies must reinitiate consultation. These conditions are (50 CFR 600.920(l))

- if the Federal agency substantially revises its plans for an action in a manner that may adversely affect EFH, or
- if new information becomes available that affects the basis for NMFS EFH Conservation Recommendations

Supplemental consultation is conducted in a similar manner as initial consultation. The outcome of supplemental consultation is NMFS's formulation of new or revised EFH Conservation Recommendations. The NRC has the same regulatory responsibility to reply to such recommendations within 30 days as during the initial consultation.

A.3 National Marine Sanctuaries Act

A.3.1 Overview of the Act and Consultation Responsibilities

Congress enacted the NMSA in 1972 to protect areas of the marine environment that have special national significance. The NMSA authorizes the Secretary of Commerce to establish the National Marine Sanctuary System and designate sanctuaries within that system. The Office of National Marine Sanctuaries (ONMS) is charged with comprehensively managing this system, which includes 15 sanctuaries and the Papahānaumokuākea and Rose Atoll marine national monuments, encompassing more than 600,000 square miles of marine and Great Lakes waters from Washington State to the Florida Keys, and from Lake Huron to American Samoa. Within these areas, sanctuary resources include any living or nonliving resource of a national marine sanctuary that contributes to the conservation, recreational, ecological, historical, educational, cultural, archaeological, scientific, or aesthetic value of the sanctuary. As of 2022, four additional sanctuaries are proposed for designation. Maps of designated and proposed sanctuaries are available at: https://sanctuaries.noaa.gov/about/maps.html.

In 1992, Congress amended the NMSA to require interagency coordination. Pursuant to Section 304(d) of the NMSA, Federal agencies must consult with ONMS when their proposed actions are likely to destroy, cause the loss of, or injure a sanctuary resource. Private actions with a Federal nexus, such as construction and operation of facilities that involve Federal licensing or approval, are also subject to consultation. Therefore, the NRC's issuance of initial or subsequent renewed licenses may trigger consultation requirements. Consultation pursuant to NMSA Section 304(d) is commonly referred to as "NMSA consultation."

NOAA has not promulgated regulations concerning NMSA Section 304(d). In 2008, NOAA issued an advance notice of proposed rulemaking in the *Federal Register* soliciting comments on whether development of regulations implementing certain aspects of the NMSA Section 304(d) consultation provisions is appropriate (73 FR 50259). NOAA later withdrew its proposal in 2011. However, the ONMS has issued guidance for conducting NMSA consultation, which the NRC relies upon, in *Overview of Conducting Consultation Pursuant to Section 304(d) of the National Marine Sanctuaries Act* (NOAA 2009).

A.3.2 NMSA Consultation

A.3.2.1 NMSA Consultation

Unlike ESA Section 7 or EFH consultation, for which there are each several possible types of consultation depending on the specific circumstances, the ONMS's guidance prescribes only a single process for consultation. NMSA consultation is required when a Federal agency determines that an action "is likely to destroy, cause the loss of, or injure" a sanctuary resource. Federal actions subject to consultation may be inside or outside the boundary of a national marine sanctuary.

NMSA consultation begins when a Federal agency submits a sanctuary resource statement to the ONMS and requests to initiate consultation. If the ONMS determines that sanctuary resources are not likely to be injured by the proposed action, the ONMS will so notify the action agency and consultation is concluded. If the ONMS finds that the proposed action will be likely to injure sanctuary resources, it will, in coordination with the Federal agency, develop recommended reasonable and prudent alternatives to protect against injury. Upon receipt of the recommended alternatives, the Federal agency must discuss the alternatives with the ONMS. If

the Federal agency fully incorporates the recommended alternatives into the proposed action, no further consultation is necessary prior to conducting the action. If the Federal agency does not follow the recommended alternatives, the agency must provide a written explanation to the ONMS that describes the reasons for not following the alternatives.

If the Federal agency does not adopt the recommended alternatives and sanctuary resources are subsequently injured because of the proposed action, Section 304(d)(4) of the NMSA requires agencies to promptly prevent further damage and to restore or replace the sanctuary resources in a manner approved by the ONMS.

A.3.2.2 No Consultation

NMSA consultation is not required when the Federal agency determines that an action "is not likely to destroy, cause the loss of, or injure" a sanctuary resource.

A.3.3 NMSA Consultation Process

This section describes each step in determining whether NMSA consultation is necessary and within the consultation process itself. Figure A-3 illustrates the NMSA pre-consultation and consultation process.

1. Determine the affected area.

The first step in the consultation process is to determine the area that would be affected by the proposed action. This step is like determining the ESA action area (see Section 4.6.11.3, Review Procedure Step 1). Unlike the ESA, however, the NMSA and ONMS's guidance do not specifically prescribe or define terminology for the affected area. For projects involving an ESA analysis, EFH analysis and/or an NMSA analysis, the ESA action area, the EFH affected area, and/or the NMSA affected area are likely identical; each should account for all areas over which direct or indirect impacts to ecological receptors could occur. Primary differences could be that an ESA action area may involve large areas of land that do not apply to the NMSA affected area. The EFH affected area could include freshwater bodies or non-marine aquatic habitats or features that do not apply to the NMSA affected area. Notably, although most national marine sanctuaries are marine, two are within the Great Lakes (Thunder Bay National Marine Sanctuary in Lake Huron and Wisconsin Shipwreck Coast National Marine Sanctuary in Lake Michigan), and one is currently proposed within Lake Ontario as of 2022.

The affected area determination should be made by a qualified SME because subsequent steps in the consultation, as well as the effects analyses, are predicated on defining a complete and accurate affected area. The SME should be able to describe the extent of the affected area in writing and pictorially on a map.

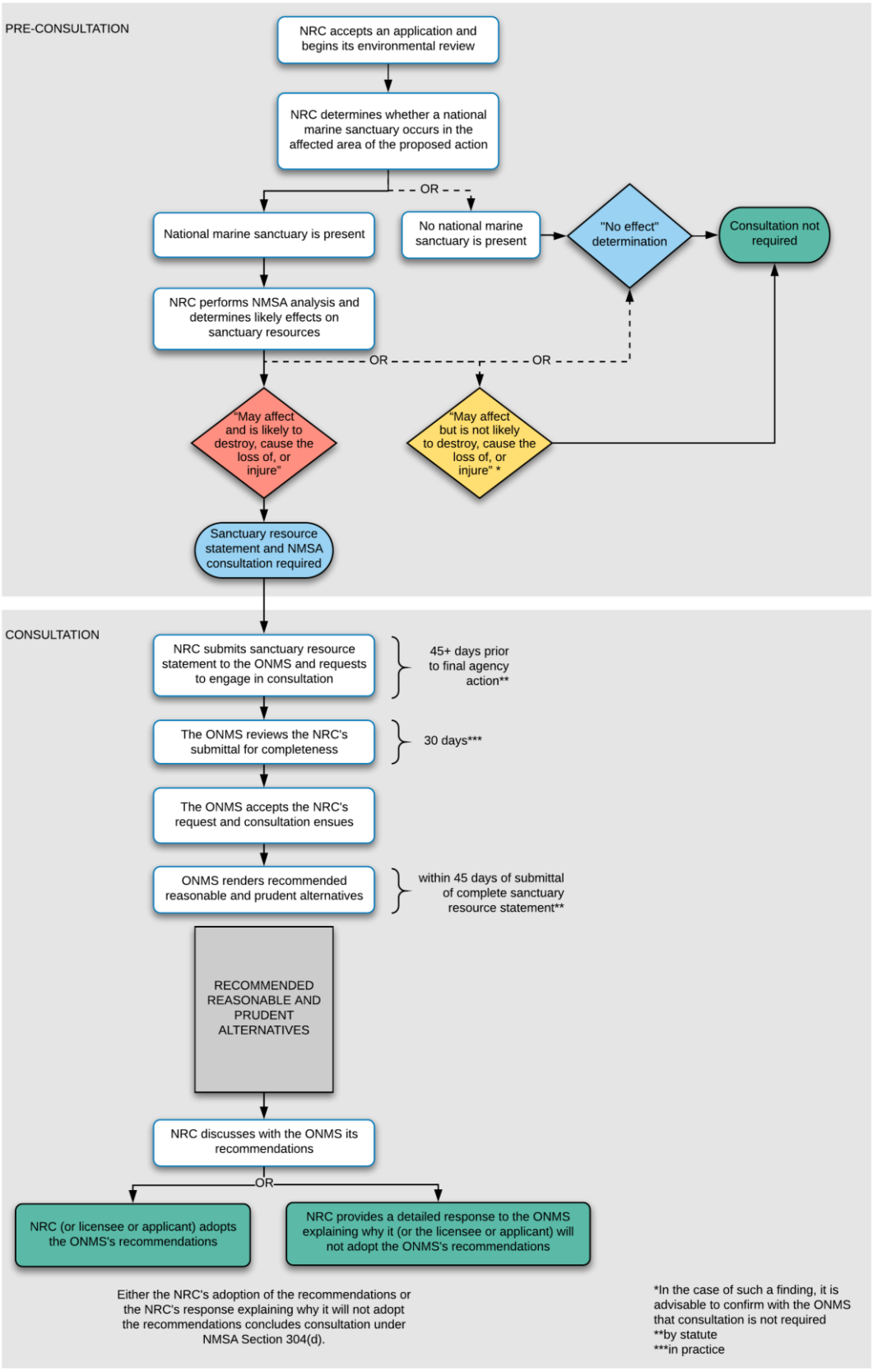

Figure A-3 National Marine Sanctuaries Act Consultation Process Flowchart

2. Determine the sanctuary resources that may be present in the affected area.

Once the affected area is established, the SME determines what national marine sanctuary (or sanctuaries) are present in that area and what sanctuary resources are relevant to the review. The term "sanctuary resource" is very broad and includes virtually every living and nonliving component of the sanctuary ecosystem.[3] Table A-5 includes examples of types of sanctuary resources. The complete regulatory definition of this term can be found at 15 CFR 922.3.

Table A-5 Types of Sanctuary Resources

Types of Sanctuary Resources	
substratum of the area of the Sanctuary	phytoplankton and zooplankton
submerged features[(a)] and the surrounding seabed	fish
carbonate rock, corals, and other bottom formations	seabirds
coralline algae and other marine plants and algae	sea turtles and other marine reptiles
marine invertebrates	marine mammals
brine-seep biota	historic resources[(b)]

(a) Submerged features may include man-made features, such as artificial coral reef structures and shipwrecks.
(b) Because sanctuary resources include historic resources, this review necessitates coordination with the historic and cultural resource review to determine whether any historic resources are present that would be relevant to the NMSA consultation. In such cases, multiple NRC staff may be involved in discussions with the ONMS.

To determine what sanctuaries occur in the affected area, the SME should refer to the ONMS website, which contains maps, descriptions, and other information on the National Marine Sanctuary System (available at: https://sanctuaries.noaa.gov/). For each sanctuary, the ONMS maintains a sanctuary management plan that describes in detail the sanctuary and its living and non-living marine resources. Although it is not required, it is a best practice to reach out to the local ONMS office to discuss the proposed action and the sanctuary resources that may be of particular concern.

If a national marine sanctuary is present in the affected area, the SME should proceed to the next step (determining potential effects) to determine whether consultation is required. If no national marine sanctuary is present, consultation is not required. For coastal projects and those near Great Lakes, the SME should document this determination in the NEPA document associated with the proposed action (e.g., EIS, SEIS, or EA) or in a memo to file. For inland projects and other situations where a national marine sanctuary would not be affected by the proposed action, no specific documentation is necessary.

3. Engage with ONMS.

If the NRC has not yet engaged directly with the ONMS during the previous step(s), the SME should reach out to the local ONMS office to establish points of contact and to orient ONMS staff to the proposed action. This also helps the ONMS plan and designate staff resources for the consultation. This step is also an opportunity for the SME to gather more information on the sanctuary resources that may be affected. ONMS staff may be able to point the SME to surveys, studies, and other available data or connect the SME with local researchers and experts. The SME should document any substantive discussions with the

[3] Thunder Bay and Hawaiian Island Humpback Whale national marine sanctuaries have a more limited definition of sanctuary resources. See 15 CFR 922.3 and 15 CFR 922.182, respectively.

ONMS, researchers, or other experts in meeting summaries and should add any related correspondence to ADAMS.

4. Determine and document potential effects on sanctuary resources.

The next step in the consultation process is to determine the potential effects of the proposed action on sanctuary resources. The SME typically performs this analysis concurrently with the NEPA review. The SME should rely on the application; available ecological surveys, monitoring, and studies; views of recognized species experts; scientific literature; and other relevant information to perform the NMSA analysis. Based on the analysis, the SME makes an effect determination concerning sanctuary resources as identified below in Table A-6.

Table A-6 Possible National Marine Sanctuaries Act Effect Determinations Made by the Federal Action Agency

NMSA Effect Determinations
"May affect and is likely to destroy, cause the loss of, or injure"
"May affect but is not likely to destroy, cause the loss of, or injure"
"No effect"

The SME documents the NMSA analysis and effect determination(s) in a sanctuary resource statement or directly within the NEPA document. Sanctuary resource statements are required for any proposed action that is likely to injure a sanctuary resource. The level of detail in a sanctuary resource statement should be commensurate with the complexity and magnitude of the potential adverse effects of the action. Sanctuary resource statements may include the following, for example (NOAA 2009):

- purpose or objectives of the proposed action
- location of the action and any alternative locations
- methods and means for carrying out the action and any alternative methods available
- equipment proposed to be used and any alternative equipment
- documentation that supports the determination of the likelihood of the action causing injury to sanctuary resources
- results of site surveys, studies, and inspections that evaluate the affected area of the project
- views of recognized experts on the sanctuary resources that may be affected
- review of pertinent scientific literature and related information
- analysis of alternate actions considered by the Federal agency
- copies of any Federal, territory, State, local or Indian Tribe authorizations, permits, licenses, or other forms of approval (or applications for authorizations, permits, or licenses, if not yet granted) required for the project or a summary of such approvals that have been sought
- copies of pertinent reports, including, but not limited to, any EIS, EA, or biological assessment prepared, and any other relevant information.

The NRC may also opt to incorporate the sanctuary resource statement into the NEPA document associated with the proposed action. In such cases, the NRC should clearly identify the relevant section of the document as the sanctuary resource statement. The SME, along with the project manager and NRC management, should carefully weigh the benefits and risks of this option. Incorporating the sanctuary resource statement into the NEPA document can delay the progression of consultation because the NRC must wait until the NEPA document is issued to initiate consultation.

Notably, sanctuary resources can include historic resources in addition to ecological resources. Thus, the ecology SME should coordinate with the historic and cultural resource SME to determine whether any historic resources are present that would be relevant to the NMSA consultation. In such cases, both NRC SMEs should be involved in discussions with the ONMS. It may also be appropriate for the historic and cultural resource SME to prepare input to the sanctuary resource statement concerning the potential effects of the proposed action on the historic resources of the sanctuary.

The SME should also be aware as to whether the proposed action will require a special use permit for activities otherwise prohibited in sanctuaries under 15 CFR Part 922. If a proposed Federal action requires both NMSA consultation and a special use permit, the ONMS will conduct both processes simultaneously, to the extent practicable. For example, a dredging project conducted by a Federal agency within a national marine sanctuary may require both a permit and trigger NMSA consultation. For most NRC agency actions where this might apply, the licensee or applicant would be responsible for obtaining the special use permit, and the NRC would be responsible for conducting NMSA consultation. The SME should alert the ONMS of this unique situation early in the process so that the ONMS can coordinate timelines for the two processes.

If the proposed action would result in "no effect," consultation is not required, and the SME documents the NMSA analysis directly in the NEPA document. The NEPA document should clearly identify the NMSA analysis with appropriate headings and subheadings and include the SME's effect determination(s) for the sanctuary resources as identified in Table A-6.

5. Determine whether consultation is required.

The SME's effect determination(s) dictate whether NMSA consultation is required.[4] Consultation is required if the proposed action may affect and is likely to destroy, cause the loss of, or injure any sanctuary resource of a national marine sanctuary. Consultation is not required for "may affect but is not likely to destroy, cause the loss of, or injure" and "no effect" findings. However, in cases where the SME makes a "not likely" finding, it is a best practice to discuss this determination with the ONMS to confirm that consultation is not required.

6. Initiate and engage in consultation.

When the sanctuary resource statement or NEPA document containing the sanctuary resource statement is ready for issuance, the SME prepares a request to initiate

[4] For Stellwagen Bank National Marine Sanctuary, the Oceans Act of 1992 prescribes a lower threshold for consultation related to this sanctuary. In accordance with Section 2002(e) of this act, consultation is required if the proposed action may affect sanctuary resources of Stellwagen Bank National Marine Sanctuary.

consultation with the ONMS. The NRC staff must submit the sanctuary resource statement at least 45 days prior to the final agency decision.

Upon receipt of the NRC's request, the ONMS performs a completeness evaluation to determine whether the sanctuary resource statement contains sufficient information to evaluate the proposed action's likelihood of injury and to develop any necessary reasonable prudent alternatives to protect sanctuary resources. The ONMS may request that the NRC submit additional information to support its review of the proposed action in a process like the NRC's RAI process.

Once the ONMS determines that the sanctuary resource statement is complete, consultation begins, including the ONMS's 45-day period to recommend alternatives. During consultation, the NRC and the OMNS exchange information and engage in discussions concerning the potential effects of the proposed action. The agencies may work together to develop recommended alternatives to protect against injury to sanctuary resources.

Although the ONMS's guidance does not specifically describe the role of Federal applicants or licensees, in practice, the NRC usually requests to involve the applicant or licensee to the extent possible, and the ONMS is typically amenable to this request. It is also a best practice to engage the applicant or licensee when responding to any inquiries from the ONMS to ensure that the NRC's responses are accurate and complete.

If the proposed action may injure sanctuary resources, the ONMS formulates recommended reasonable and prudent alternatives. In the context of NMSA Section 304(d), these alternatives can best be understood as those actions necessary to protect sanctuary resources. Alternatives generally focus on the location, timing, and methods of the proposed action. For example, the ONMS may recommend that the proposed action be conducted

- at an alternate location, including a location outside the sanctuary(ies)
- during a different season or that it be delayed for a specified period of time
- with alternative equipment or procedures
- with some combination of these recommendations.

If the ONMS provides the NRC with recommended alternatives, the NRC must discuss the recommendations with the ONMS. If the NRC (or licensee or applicant) plans to fully implement the recommended alternatives and fully incorporate them into the proposed action, the NRC need not take any further action beyond this discussion. If the NRC (or licensee or applicant) does not follow the recommended alternatives, the NRC must prepare a written response that describes the reasons for not implementing the alternatives. The NRC's response completes consultation.

7. Document the conclusion of the consultation.

Completion of the consultation is documented by the NRC's response to the ONMS's recommended alternatives or, where the NRC (or licensee or applicant) adopts the alternatives, documentation of the NRC's discussion with the ONMS regarding how such alternatives will be incorporated into the proposed action. The SME ensures that these documents are added to ADAMS as part of the consultation record. The SME also documents the outcome of consultation in the NEPA document associated with the

proposed action. In cases where a final EIS or SEIS is issued prior to the conclusion of consultation, the SME prepares input to the record of decision documenting the outcome of the consultation. In cases where the final EA and FONSI are issued prior to the conclusion of consultation, the NRC can consider issuing a *Federal Register* notice that corrects or addends the EA and FONSI.

8. Conduct post-consultation activities.

Section 304(d)(4) of the NMSA requires Federal agencies that do not adopt ONMS recommendations to take certain steps if their action results in injury to sanctuary resources. First, upon injury, the Federal agency must promptly develop and implement measures to mitigate further damage. Once the injury to sanctuary resources has been stopped, the NMSA requires Federal agencies to restore or replace the resources in a manner approved by the ONMS. Restoration or replacement can take many forms depending on the type of injury caused and the nature of the resource. In such cases, the Federal agency develops a restoration plan for ONMS approval.

9. Conduct further consultation.

The ONMS's guidance (NOAA 2009) directs Federal agencies to determine if a new NMSA consultation is required in cases where the proposed action changes such that the nature or likelihood of injury to sanctuary resources changes. The new consultation is conducted in a similar manner as initial consultation. The outcome of new consultation is the ONMS's formulation of new or revised recommended reasonable and prudent alternatives. If not fully adopted, the NRC has the same responsibility to reply to such recommendations as during the initial consultation.

A.4 References

15 CFR Part 922. *Code of Federal Regulations*, Title 15, *Commerce and Foreign Trade*, Title 922, "National Marine Sanctuary Program Regulations."

50 CFR Part 402. *Code of Federal Regulations,* Title 50, *Wildlife and Fisheries*, Part 402, "Interagency Cooperation—Endangered Species Act of 1973, as Amended."

50 CFR Part 600. *Code of Federal Regulations*. Title 50, *Wildlife and Fisheries*, Part 600, "Magnuson-Stevens Act Provisions."

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NOAA (National Oceanic and Atmospheric Administration). 2020. "Habitat Areas of Particular Concern within Essential Fish Habitat." Washington, D.C. Accessed May 19, 2022, at https://www.fisheries.noaa.gov/southeast/habitat-conservation/habitat-areas-particular-concern-within-essential-fish-habitat.

Sustainable Fisheries Act of 1996. 16 U.S.C. § 1801 Note. Public Law 104-297, October 11, 1996, 110 Stat. 3559.

APPENDIX B

NATIONAL HISTORIC PRESERVATION ACT SECTION 106 REVIEW AND CONSULTATION

As discussed in Section 3.7 of the LR GEIS, historic and cultural resources vary widely from site to site; there is no generic way of determining their existence or significance. Thus, impacts must be analyzed on a plant-specific basis, and the U.S. Nuclear Regulatory Commission (NRC) is required to complete a National Historic Preservation Act (NHPA) Section 106 review (54 U.S.C. § 300101 et seq.) prior to issuing a renewed license.[1] Issuing a renewed license (initial LR or SLR) is a Federal undertaking[2] that requires compliance with the NHPA Section 106.

B.1 National Historic Preservation Act

Section 106 of the NHPA requires Federal agencies to consider and evaluate the effects of their undertakings on historic properties in consultation with the State Historic Preservation Office (SHPO) and/or the Tribal Historic Preservation Office (THPO), Advisory Council on Historic Preservation (ACHP), Indian Tribes, the public, and additional consulting parties with a demonstrated interest in the undertaking. Additional parties may participate as consulting parties due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties (e.g., license renewal applicants, certified local governments, local historical societies, and State-recognized Tribes). For further information regarding potential consulting parties, see 36 *Code of Federal Regulations* (CFR) 800.2(c).

A historic property is a historic and cultural resource that has been determined to be historically significant within the scope of the NHPA if it has been determined eligible for listing or is listed on the National Register of Historic Places. Per 36 CFR 800.16(l)(1), a historic property is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior. Subpart B of 36 CFR Part 800 prescribes four primary steps within Section 106 consultation:

- Step 1: Initiate the Section 106 Process (36 CFR 800.3) – This step consists of establishing the undertaking (initial LR or SLR), identifying consulting parties, and determining the scope of potential effects from the undertaking by defining the direct and indirect area of potential effects (APE).

[1] The regulations at 36 CFR 800.1(c) allows the Federal agency to authorize nondestructive project planning activities before completing compliance with Section 106, provided that such actions do not restrict the subsequent consideration of alternatives to avoid, minimize, or mitigate the undertaking's adverse effects on historic properties.

[2] As defined in 36 CFR 800.16 (y), an undertaking "means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license, or approval." Licensees and license applicants initiate the Federal action by submitting an application to the NRC. Therefore, there is no Federal undertaking until the NRC receives an application requesting a licensing action.

- Step 2: Identify Historic Properties (36 CFR 800.4) – Identify historic properties located within the APE and determine if these will be affected by license renewal. This step consists of determining the scope of the identification efforts, executing the identification, determining the eligibility of the identified historic and cultural resources, and establishing if historic properties will be affected and, if not, concluding with a finding of no historic properties affected.
- Step 3: Assess Adverse Effects (36 CFR 800.5) – Assess adverse effects of license renewal on identified historic properties. If historic properties will be affected, this step consists of evaluating whether historic properties will be adversely affected or not.
- Step 4: Resolve Adverse Effects (36 CFR 800.6) – Resolve adverse effects by avoiding, minimizing, or mitigating the effects. Mitigation activities are formalized in an NHPA Section 106 Memorandum of Agreement (MOA) or a Programmatic Agreement (PA).

In addition to Section 106 of the NHPA, the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.) requires Federal agencies to consider the potential effects of their actions on the "affected human environment," which includes "aesthetic, historic, and cultural resources as these terms are commonly understood, including such resources as sacred sites" (CEQ and ACHP 2013). For NEPA compliance, impacts on cultural resources that are not eligible for or listed in the NRHP would also need to be considered (CEQ and ACHP 2013).

B.2 Coordination of NHPA Section 106 Review and Consultation with the National Environmental Policy Act

The NHPA Section 106 regulations at 36 CFR 800.8(c) "Use of the NEPA process for Section 106 purposes," allow Federal agencies to coordinate Section 106 consultation requirements through the NEPA public involvement and review documentation. This process requires that during the preparation of an EA or EIS, agencies must meet certain procedural requirements set out in 36 CFR § 800.8(c)(1), (2), (3), and (4) and the four "standards," set forth in 36 CFR § 800.8(c)(i)-(iv) (CEQ and ACHP 2013). Figure B-1 illustrates the coordination process allowed by 36 CFR 800.8(c). Consultation occurs throughout the key steps listed in the Figure B-1.

The supplemental environmental impact statement (SEIS) serves as the administrative record and is the main vehicle for consultation when coordinating NHPA Section 106 through the NEPA process because it contains all of the information necessary to complete the process and it is sent to all consulting parties for their review, comment, and concurrence.

This appendix describes the steps in coordinating the Section 106 process with NEPA for license renewal applications.

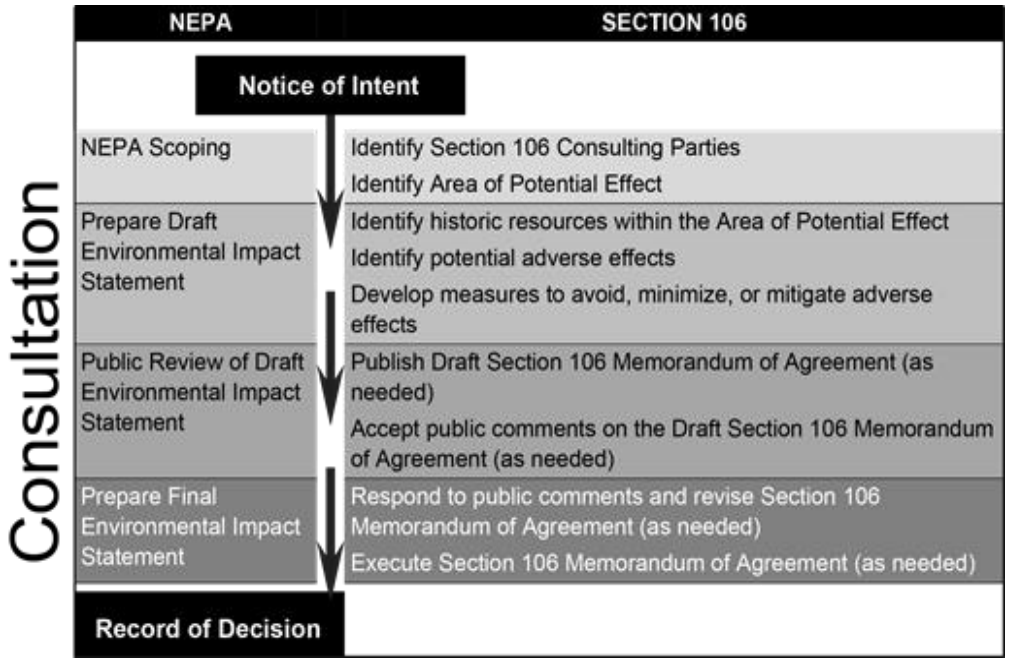

Figure B-1 Coordinating National Environmental Policy Act and National Historic Preservation Act Section 106 Reviews

B.2.1 Step 1: Initiate the Section 106 Process

Establish the Undertaking. The NRC has determined that issuance of a renewed license (initial LR or SLR) is a Federal undertaking that requires compliance with the NHPA Section 106.

Determine scope of undertaking by defining the APE. For license renewal, the APE includes lands within the nuclear power plant site boundary and the transmission lines up to the first substation that may be directly (e.g., physically) affected by land-disturbing or other operational activities associated with continued plant operations and maintenance and/or refurbishment activities. The APE may extend beyond the nuclear plant site when these activities may indirectly (e.g., visual and auditory) affect historic properties. This determination is made irrespective of land ownership or control.

Identify Consulting Parties. Identify the appropriate SHPO or THPO, Indian Tribes, Native Hawaiian organizations, local governments, preservation organizations, and individuals who may be concerned with the possible effects of license renewal on historic properties in a manner consistent with 36 CFR 800.3(f). In addition to these parties, additional consulting parties can include certain individuals and organizations with a demonstrated interest in an undertaking (e.g., license renewal applicants, State-recognized Tribes, and local historical societies). Tribal liaisons in the Office of Nuclear Material Safety and Safeguards can support identifying tribal contact information and provide programmatic support when requested. Additional resources that can be helpful in obtaining contact information include the following:

- SHPO, State and Tribal government officials
- U.S. Department of Interior Bureau of Indian Affairs Tribal Leaders Directory
- National Association of Tribal Preservation Officers
- U.S. Department of Housing and Urban Development's Tribal Directory Assessment Tool

- U.S. Department of Interior National Park Service Tribal Historic Preservation Officers online databases.

NHPA Section 106 consultation is the responsibility of the Federal agency and should be conducted in accordance with 36 CFR Part 800. While license applicants may have engaged with the SHPO/THPO and Indian Tribes during the development of its environmental report, the NRC is required to consult with the SHPO/THPO and Indian Tribes that attach religious and cultural significance to historic properties that could be affected by the undertaking. Early coordination with consulting parties is essential to the development of the plant-specific SEIS.

Once the NRC staff has identified the relevant consulting parties, the staff initiates NHPA Section 106 consultation by letter, notifying parties of the scope of the undertaking and inviting them to participate in the Section 106 process and provide comments and input on historic properties and other historic and cultural resources. Consultation letters should be mailed to the consulting parties in parallel with publication of notice of intent to prepare a SEIS and conduct scoping in the *Federal Register*. In accordance with 36 CFR 800.8(c), the consultation letters should notify the ACHP, SHPOs/THPOs, and Indian Tribes that the NRC intends to comply with NHPA Section 106 through the NEPA process. The following information should also be provided in the consultation letters:

- location of the undertaking
- description of the undertaking
- definition of the APE
- how comments can be submitted
- when the scoping period ends
- details of scoping public meeting (if conducted)
- any environmental review milestones (e.g., expected issuance of the draft SEIS)
- an NRC Section 106 point of contact
- relevant maps of the direct and indirect APE.

B.2.2 Step 2: Identify Historic Properties

Identify and evaluate relevant historic properties within the APE. Review existing information on historic properties within the APE. Use information provided by the applicant's or licensee's environmental report, background research, records searches performed at SHPO's/THPO's office, oral history interviews, ethnographic studies, information gathered through consultation, field survey results, and site visits to identify historic properties. NHPA regulations require Federal agencies to make a reasonable and good faith effort to identify properties that the undertaking may affect, and both listed NRHP properties and unlisted properties within the APE may be relevant to Section 106 consultation.

In consultation with the SHPO/THPO and any Indian Tribe that attaches religious and cultural significance to identified properties, the NRC should apply the NRHP criteria (36 CFR 60.4) to properties identified within the APE that have not been previously evaluated for NRHP eligibility. Indian Tribes possess special expertise in identifying historic properties of religious and cultural significance to them and assessing their eligibility. If the NRC determines that any of the NRHP criteria are met and the SHPO/THPO agrees, the property shall be considered eligible for the

NRHP for Section 106 purposes. If the NRC determines the criteria are not met and the SHPO/THPO agrees, the resource shall be considered not eligible. For historic or cultural resources that do not meet the criteria to be considered a historic property under the NHPA, the NRC will assess whether there would or would not be any potential significant impacts on these resources through the NEPA process.

B.2.3 Step 3: Assess Effects

Determine if adverse effects exist. Once eligibility determinations are complete, the NRC and consulting parties work to determine whether the license renewal (initial LR or SLR) will have adverse effects on the identified historic properties. An adverse effect occurs when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR 800.5(a)(1)). Adverse effects may include physical destruction or damage to all or part of a historic property as well as the introduction of visual or audible elements. For additional examples of adverse effects see 36 CFR 800.5(a)(2). The NRC may propose a finding of no adverse effect when the undertaking's (license renewal) effects do not meet the criteria of paragraph 36 CFR 800.5(a)(1).

No adverse effect. The NRC concludes no adverse effect on historic properties when no historic properties have been identified in the APE or if historic properties are present, but there will be no effect consistent with 36 CFR 800.16(i) (e.g., because effects will be avoided). This determination should be documented in the draft SEIS in accordance with 36 CFR 800.11(e). NRC staff should also identify and discuss the APE, historic properties and historic and cultural resources within the APE, consulting parties, and summarize scoping comments received from consulting parties. The draft SEIS should be provided to the SHPO/THPO, ACHP, Indian Tribes, and other consulting parties for review when the draft SEIS is issued for public comment. The draft SEIS is transmitted to all consulting parties with an accompanying cover letter that summarizes the relevant NHPA Section 106 and NEPA findings.

Resolve comments on the draft SEIS. Based on comments received on the draft SEIS, additional consultation may be needed. If the SHPO/THPO or any consulting party notifies the NRC in writing that they disagree and object with the findings in the draft SEIS, proceed with Step 4 below.

Other responses (e.g., concurrence with findings, comments for consideration, corrections) to the NRC letters that accompany the draft SEIS are considered in the final SEIS. Based on comments received on the draft EIS, the historic and cultural resources sections in the final SEIS would be updated to include responses to consultation letters, SHPO concurrences with determinations of eligibility and finding of effect, as well as address any additional concerns raised by consulting parties. The final SEIS would be transmitted to consulting parties with a cover letter that describes any changes made based on responses and points to those specific sections of the final SEIS in which changes were made and to formal responses made in the comment-response section of the final SEIS. The letter should clearly indicate that the NHPA Section 106 consultation process is closed.

In accordance with 36 CFR 800.3(c)(4), if the SHPO/THPO agrees or does not respond by the close of the 30-day review period, and no other consulting party objects, then the NHPA Section 106 process is closed, and the NRC may proceed with the action.

Adverse effect. If the NRC determines that license renewal would have an adverse effect on historic properties, the process discussed under Step 4 should be followed.

B.2.4 Step 4: Resolve Adverse Effects

If the NRC determines that there is an adverse effect to historic properties, the staff would continue consultation with the SHPO/THPO and other consulting parties to assess measures to avoid, minimize, or mitigate adverse effects to historic properties. Similarly, if a consulting party disagrees with the NRC's determination and notifies the NRC in writing that it disagrees with the finding and specifies the reasons for the disagreement in the notification, the NRC shall continue to work with the consulting parties to resolve the disagreement or request review by the ACHP.

As part of the resolution process, the NRC and the consulting parties can develop measures to avoid, minimize, or mitigate the adverse effects. Such measures are typically documented in a MOA or PA. The NRC may invite the ACHP to participate in resolving adverse effects when (1) the NRC wants the ACHP's participation, (2) a National Historic Landmark (a historic property that has been recognized by the Secretary of the Interior as possessing national significance) will be adversely affected, or (3) a PA will be prepared.

If the NRC enters into a MOA as part of resolving any adverse effects upon historic properties, then the NRC must reference the MOA in the draft SEIS for public comment. MOA or PA signatories typically include the NRC, SHPO(s), THPO(s), and the ACHP, if it joined the consultation. The NRC may also invite other parties to sign or concur with the agreement, such as the applicant or licensee and Indian Tribes. The MOA or PA signatories have sole authority to execute, amend, or terminate the agreement. Execution of an MOA or a PA completes the Section 106 consultation and fulfills the NRC's obligations under NHPA Section 106 for that undertaking. However, the MOA or PA must be fully implemented for the NRC to remain in compliance with the NHPA.

B.2.5 Record of Decision and Issuance of License

The NRC must provide written communication to federally recognized Tribes who provided input on the proposed license renewal, as soon as practical, after the NRC has issued the record of decision. This written response should inform the Tribe of the NRC's final decision, describe how the NRC considered the Tribe's input, and respond to the Tribe's comments.

B.3 References

36 CFR Part 60. Code of Federal Regulations, Title 36, Parks, Forests, and Public Property, Part 60, "National Register of Historic Places."

36 CFR Part 800. Code of Federal Regulations, Title 36, Parks, Forests, and Public Property, Part 800, "Protection of Historic Properties."

CEQ and ACHP (Council on Environmental Quality and Advisory Council on Historic Preservation). 2013. NEPA and NHPA: A Handbook for Integrating NEPA and Section 106. Washington, D.C. ADAMS Accession No. ML14172A044.

National Environmental Policy Act of 1969 (NEPA), as amended. 42 U.S.C. § 4321 et seq.

National Historic Preservation Act. 54 U.S.C. § 300101 et seq.

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This document provides guidance to U.S. Nuclear Regulatory Commission staff in implementing the provisions in Title 10 of the Code of Federal Regulations Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions" when conducting environmental reviews of applications for the initial and subsequent renewal of a nuclear power plant operating license(s). This standard review plan guides the staff in preparing a plant-specific supplemental environmental impact statement to NUREG-1437, Revision 2, Generic Environmental Impact Statement for License Renewal of Nuclear Plants. This document supplements NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants, which provides guidance for the environmental reviews of construction permits, initial operating licenses, early site permits, and combined licenses for new nuclear power plants.

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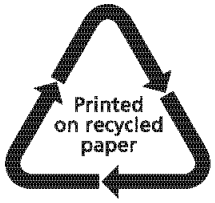

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