



NUREG-1555, Supplement 1  
Revision 2

# **Standard Review Plans for Environmental Reviews for Nuclear Power Plants**

## **Supplement 1: Operating License Renewal**

Draft Report for Comment

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# **Standard Review Plans for Environmental Reviews for Nuclear Power Plants**

## **Supplement 1: Operating License Renewal**

### **Draft Report for Comment**

Manuscript Completed: February 2023  
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17 For any questions about the material in this report, please contact: Jennifer Davis,  
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20 [Jennifer.Davis@nrc.gov](mailto:Jennifer.Davis@nrc.gov) or [Kevin.Folk@nrc.gov](mailto:Kevin.Folk@nrc.gov).

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## ABSTRACT

2 This document provides guidance to U.S. Nuclear Regulatory Commission staff in implementing  
3 the provisions in Title 10 of the *Code of Federal Regulations* Part 51, “Environmental Protection  
4 Regulations for Domestic Licensing and Related Regulatory Functions,” when conducting  
5 environmental reviews of applications for the initial and subsequent renewal of a nuclear power  
6 plant operating license(s). This standard review plan guides the staff in preparing a nuclear  
7 power plant-specific supplemental environmental impact statement to NUREG-1437, Revision  
8 2, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. This  
9 document supplements NUREG-1555, *Standard Review Plans for Environmental Reviews for  
10 Nuclear Power Plants*, which provides guidance for the environmental reviews of construction  
11 permits, initial operating licenses, early site permits, and combined licenses for new nuclear  
12 power plants.

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## EXECUTIVE SUMMARY

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

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

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

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

### 19 **NRC's Implementation of the National Environmental Policy Act**

20 This ESRP demonstrates how the NRC staff meets the provisions in Title 10 of the *Code of  
21 Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations for Domestic  
22 Licensing and Related Regulatory Functions," to conduct environmental reviews for the renewal  
23 of operating licenses and prepare plant-specific SEISs to the LR GEIS. The NRC regulations at  
24 10 CFR Part 51 implement Section 102(2) of the National Environmental Policy Act of 1969  
25 (NEPA). The NRC published the license renewal provisions of 10 CFR Part 51 in the *Federal  
26 Register* on December 18, 1996 (61 FR 66537), which became effective on January 17, 1997.  
27 The NRC's intention in developing the rule was to improve the efficiency of the environmental  
28 review process for the renewal of nuclear power plant operating licenses. These provisions also  
29 support the analyses conducted for and reported in the LR GEIS.

### 30 ***Environmental Review Process***

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

1 The NRC's environmental (NEPA) review process consists of the following actions required by  
2 10 CFR Part 51:

- 3 • Publish a notice of intent to conduct an initial LR or SLR environmental review and to  
4 prepare a plant-specific SEIS to the LR GEIS in the *Federal Register* (see 10 CFR 51.27,  
5 "Notice of Intent"; 10 CFR 51.95(c), "Post Construction Environmental Impact Statements:  
6 Operating License Renewal Stage"; and 10 CFR 51.116, "Notice of Intent") and send copies  
7 of the notice to appropriate Federal, State, and local agencies and Indian Tribes;<sup>1</sup> public  
8 interest groups; and any other persons (e.g., representatives of environmental justice  
9 communities<sup>2</sup>) that have expressed interest in the initial LR or SLR environmental review  
10 (see 10 CFR 51.116, "Notice of Intent"). The notice describes the proposed action, explains  
11 the NRC scoping process, provides information about public meeting locations and where  
12 copies of the ER are available for public examination, and invites members of the public to  
13 participate in the scoping process.
- 14 • Conduct scoping (see 10 CFR 51.28, "Scoping—Participants," 10 CFR 51.29, "Scoping—  
15 Environmental Impact Statement and Supplement to Environmental Impact Statement";  
16 10 CFR 51.71, "Draft Environmental Impact Statement—Contents"; 10 CFR 51.95(c)(1);  
17 and 40 CFR 1506.6(b)(3), "Public Involvement"). The scoping process includes identifying  
18 environmental issues and inviting State and local agency officials, Indian Tribes,  
19 representatives of environmental justice communities, environmental interest groups, and  
20 other members of the public to participate in the scoping process. Scoping provides an  
21 opportunity for any member of the public to identify environmental issues and concerns they  
22 believe are significant that may not have been adequately addressed in the ER.  
23 Environmental issues may be introduced in oral statements made at the scoping meeting or  
24 in written comments sent directly to the NRC or submitted via <https://www.regulations.gov/>.  
25 During scoping, staff can visit the nuclear power plant and, if requested, meet with officials  
26 from local, regional, and State agencies and Indian Tribes and representatives of  
27 environmental justice communities and environmental interest groups. Depending on the  
28 issues and concerns raised during scoping, the staff may request additional information from  
29 the applicant.
- 30 • Prepare a plant-specific draft SEIS to the LR GEIS (see 10 CFR 51.70, "Draft Environmental  
31 Impact Statement—General"; 10 CFR 51.71, "Draft Environmental Impact Statement—  
32 Contents"; and 10 CFR 51.95[c]), "Operating license renewal stage." In developing the draft  
33 SEIS, the NRC staff will evaluate (verify and validate) information provided by the applicant  
34 and will seek and collect information from independent sources.
- 35 • Distribute the draft SEIS for comment (see 10 CFR 51.73, "Request for Comments on Draft  
36 Environmental Impact Statement," and 10 CFR 51.74, "Distribution of Draft Environmental  
37 Impact Statement and Supplement to Draft Environmental Impact Statement; News  
38 Releases"). The U.S. Environmental Protection Agency (EPA) and the NRC will publish  
39 separate notices of the availability in the *Federal Register*. Copies of the draft SEIS will be  
40 distributed to appropriate Federal, State, and local agencies and Indian Tribes;  
41 environmental justice communities; environmental interest groups, organizations, and  
42 individuals who expressed interest and participated in the environmental review; and any  
43 other individuals who request a copy (see 10 CFR 51.74, "Distribution of Draft

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<sup>1</sup> 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).

<sup>2</sup> 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.



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

- 5 • Prepare a final SEIS to the LR GEIS (see 10 CFR 51.90, “Final Environmental Impact  
6 Statement— General”; 10 CFR 51.91, “Final Environmental Impact Statement—Contents”;  
7 and 10 CFR 51.95[c]), “Operating license renewal stage.” In developing the final SEIS,  
8 the NRC staff will respond to all comments, prepare responses and revise the SEIS, if  
9 necessary. This includes determining whether comments identify new and significant  
10 information that was not considered in the LR GEIS. After addressing public comments, the  
11 staff will determine whether the adverse environmental impacts of license renewal are so  
12 great that preserving the option of license renewal for energy planning decisionmakers  
13 would be unreasonable. The NRC then will submit the final SEIS to EPA, and both  
14 agencies will publish notices of availability in the *Federal Register* (see 10 CFR 51.93,  
15 “Distribution of Final Environmental Impact Statement and Supplement to Final  
16 Environmental Impact Statement; News Releases,” and 10 CFR 51.118, “Final  
17 Environmental Impact Statement—Notice of Availability”). Copies of the final SEIS will be  
18 distributed to Federal, State, and local agencies and Indian Tribes; environmental justice  
19 communities; environmental interest groups, organizations, and individuals who expressed  
20 interest and participated in the environmental review; and any other organizations or  
21 individuals who request a copy.
- 22 • The Commission may hold a hearing if it determines that it is in the public interest or if a  
23 request for hearing and petition to intervene are granted. In accordance with 10 CFR  
24 2.105(a)(10), “Notice of Proposed Action,” the NRC will issue a notice of opportunity for  
25 hearing as soon as practicable. Any person whose interest may be affected by the initial LR  
26 or SLR action may request a hearing. (See also 10 CFR 51.104, “NRC Proceeding Using  
27 Public Hearings; Consideration of Environmental Impact Statement.”)
- 28 • Prepare a record of decision (see 10 CFR 51.103, “Record of Decision—General”).  
29 Among other things, the record of decision will summarize the impacts of initial LR or SLR  
30 and the energy replacement alternatives considered in the SEIS, the measures taken to  
31 minimize and/or reduce any adverse environmental effects, and any license conditions  
32 adopted in connection with mitigation measures. In making a final decision on initial or  
33 subsequent license renewal, the NRC will determine whether the adverse environmental  
34 impacts of license renewal are so great that preserving the option of license renewal for  
35 energy planning decisionmakers would be unreasonable. The NRC publishes the  
36 Commission’s final decision on whether to renew the nuclear plant operating license in the  
37 *Federal Register*.

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

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

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

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

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

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

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

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

### 25 ***The Generic Environmental Impact Statement for License Renewal of Nuclear Plants*** 26 **(LR GEIS; NUREG-1437)**

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

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

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<sup>3</sup> 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).

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

6 The NRC staff reviewed and evaluated the environmental issues and impact findings in the  
7 2013 LR GEIS to determine if the findings presented in the 2013 LR GEIS support the scope of  
8 license renewal, including initial LR and SLR terms and to update or revise those findings as  
9 appropriate. The NRC considered changes in applicable laws and regulations, new data in its  
10 possession, collective experience, and lessons learned and knowledge gained from conducting  
11 environmental reviews for initial LR and SLR since development of the 2013 LR GEIS. In doing  
12 so, the NRC considered the need to modify, add, group, subdivide, or delete any of the 78  
13 issues in the 2013 LR GEIS.

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

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

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

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

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

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

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

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

#### 16 ***Scope of the Environmental Standard Review Plans***

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

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

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

#### 30 ***Organization of the Environmental Standard Review Plans***

31 The ESRPs are grouped into the following six chapters.

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

1 Chapters 1 through 3 are descriptive in nature. They guide the review of the purpose and need  
2 for the proposed action, the identification of reasonable alternatives to the proposed action, and  
3 the description of the nuclear power plant site and the affected environment. Chapters 4 and 5  
4 address the analysis of environmental impacts. They guide the review of the potential  
5 environmental impacts associated with continued plant operations and refurbishment associated  
6 with license renewal. Chapter 6 addresses comparison of the proposed action with reasonable  
7 alternatives and the summarization of the conclusions regarding the environmental impacts of  
8 license renewal. Note: The organization of chapters, supporting appendices, and the order of  
9 subject matter areas presented in individual SEISs prepared pursuant to the LR GEIS, NUREG-  
10 1437, Revision 2, may differ from the organization of the sections of this ESRP document.

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

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

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

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

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

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

- 32 • applicant's ER
- 33 • previous NRC environmental analyses (e.g., final environmental statements, SEISs and  
34 other EISs, and environmental assessments)
- 35 • applicant's Safety Analysis Report or Updated Final Safety Analysis Reports
- 36 • NRC Safety Evaluation Reports
- 37 • *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*, NUREG-  
38 1437, Revision 2 (NRC 2023a)
- 39 • other Federal, State, and local agencies and Indian Tribes

- 1 • other publicly available information.

## 2 ***New and Significant Information***

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

12 The process for identifying new and significant information should consider:

- 13 • **The applicant's ER.** Applicants for an initial LR or SLR are required by 10 CFR  
14 51.53(c)(3)(iv) to disclose new and significant information regarding the environmental  
15 impacts of license renewal of which they are aware. In reviewing the applicant's ER, the  
16 NRC staff must consider the applicant's process for discovering and evaluating the  
17 significance of any new information. Is the process adequate to ensure a reasonable  
18 likelihood that the applicant would be aware of new information, if it existed?
- 19 • **Records of public meetings and correspondence related to the application.** Compare  
20 information presented by the public with information considered in the LR GEIS. Is the  
21 information new in the sense that it postdates the analysis conducted for the LR GEIS?
- 22 • **Environmental quality standards and regulations.** Have the applicable environmental  
23 quality standards and regulations changed since the analysis conducted for the LR GEIS?  
24 If so, do the changes affect the NRC evaluation of applications for license renewal?
- 25 • **Technical and scientific literature.** Does recent technical and scientific literature contain  
26 information that would alter conclusions in the LR GEIS for Category 1 issues? Does the  
27 information indicate that there may be environmental impacts that were not considered in  
28 the LR GEIS?

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

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

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

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

## 11 **General Instructions**

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

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

- 1 authorized States or Indian Tribes) responsible for implementation of the Clean Water Act;  
2 and State agencies responsible for Coastal Zone Management Act consistency  
3 determinations and Clean Air Act State Implementation Plans. The reviewer should initiate  
4 these consultations early in the environmental review process and should coordinate these  
5 with the EPM.
- 6 • **Consultation with the Applicant.** All consultations or discussions with the applicant are  
7 made through the EPM.
  - 8 • **Site Visit.** Most reviewers benefit from an in-person visit to the nuclear plant site. This visit  
9 provides the reviewer with firsthand knowledge of the site and the location and position of  
10 facilities. It also allows the reviewer an opportunity to study the environment around the  
11 nuclear plant site and meet with knowledgeable licensee staff with responsibility for  
12 environmental management and compliance at the plant site. The site visit and associated  
13 meetings can be supplemented with virtual site tours and meetings.
  - 14 • **Depth of Review.** The reviewer must conduct an environmental impact analysis in  
15 sufficient depth to permit verification and validation of the analysis and conclusions.
  - 16 • **Data Age.** If data are more than five years old, consider and explain, as appropriate,  
17 whether the data, studies, operation experience, etc. are relevant in describing the affected  
18 environmental and assessing the impacts of license renewal. For example, show that both  
19 the potentially affected resources and the effects of nuclear power plant continued  
20 operations and refurbishment on those resources have remained, and can be expected to  
21 remain, unchanged or similar over the license renewal term (initial or SLR).
  - 22 • **Consideration of Mitigation.** Mitigation measures should be considered in proportion to  
23 the level of impact when adverse impacts are identified. Statements also should describe  
24 the potential effectiveness of mitigation measures.
  - 25 • **Best Management Practices.** The reviewer must evaluate the applicant's commitments to  
26 use practices that minimize, reduce, or avoid adverse impacts. These practices, often  
27 referred to as best management practices, are activities that can mitigate potential adverse  
28 environmental impacts.
  - 29 • **Quality Assurance.** Reviewers should identify and evaluate the quality assurance  
30 measures taken by the applicant in the collection and analysis of data. Quality assurance  
31 measures are also evaluated when computer models have been used to predict  
32 environmental impacts.
  - 33 • **Findings.** Findings should reflect "consensus" agreement among reviewers. This requires  
34 input from the reviewer, the EPM, and any other NRC reviewers affected by the findings.
  - 35 • **Documentation.** Each reviewer should maintain documentation, logs, and other records of  
36 communication and consultation with outside agencies and organizations.
  - 37 • **Definitions.** Use of the following terminology applies only to the environmental review  
38 process. Terms such as plant and station, used in a SEIS, continue to reflect the choice of  
39 terms used to identify the nuclear plant (e.g., Calvert Cliffs Nuclear Power Plant, Oconee  
40 Nuclear Station).
    - 41 – station: Consists of all facilities (reactor containment, turbine, and control buildings,  
42 intakes, discharges, etc.) located on the nuclear power plant site. Generally, the station  
43 includes everything located on the applicant's property that supports the existing  
44 reactor(s). In some cases, intake and discharge structures may be located offsite, but  
45 are considered part of the station. Transmission lines and their associated facilities are



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



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## ABBREVIATIONS AND ACRONYMS

APE	area of potential effects
CEQ	Council on Environmental Quality
CFR	<i>Code of Federal Regulations</i>
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	<i>Generic Environmental Impact Statement for License Renewal of Nuclear Power Plant</i> (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	<i>National Register of Historic Places</i>
ONMS	Office of National Marine Sanctuaries (of the National Oceanic and Atmospheric Administration)

1		
2	ROW(s)	right(s)-of-way
3		
4	SAMA	severe accident mitigation alternatives
5	SAMDA	severe accident mitigation design alternatives
6	SEIS	supplemental environmental impact statement
7	SHPO	State Historic Preservation Officer
8	SLR	subsequent license renewal
9	SME	subject matter expert
10		
11	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 **1.4 Evaluation Findings**

2 The reviewer should prepare one or more introductory paragraphs for the supplemental  
3 environmental impact statement (SEIS) and should include the purpose and need for license  
4 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.

5

1           **2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION**

2   **2.1 Overview**

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

8   **2.1.1 Areas of Review**

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

13   **2.1.2 Acceptance Criteria**

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

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

19   Technical Rationale

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

24   **2.1.3 Review Procedures**

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

29   **2.1.4 Evaluation Findings**

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

1 **2.2 General Plant Information**

2 **2.2.1 Areas of Review**

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

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

13 **Data and Information Needs**

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

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



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

## 28 **2.2.2 Acceptance Criteria**

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

- 32 • 10 CFR 51.52, concerning criteria related to nuclear power plant-specific (hereafter called  
33 plant-specific) analysis of the effects of transportation of fuel and waste to and from the  
34 facility. Note: Generic determinations have been made that the impacts in Table S-4 are  
35 bounding for fuel with uranium enrichment of up to 5 percent by weight irradiated to 62,000  
36 megawatt days per ton, provided that fuel is shipped more than five years after discharge  
37 from the reactor.
- 38 • 10 CFR 51.53(c)(2). The report must contain a description of the proposed action, including  
39 the applicant's plans to modify the facility or its administrative control procedures as  
40 described in accordance with 10 CFR 54.21 of this chapter. This report must describe in  
41 detail the affected environment around the plant, the modifications directly affecting the  
42 environment or any plant effluents, and any planned refurbishment activities. In addition,

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

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

## 8 Technical Rationale

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

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

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

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

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

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

### 35 **2.2.3 Review Procedures**

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

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

- 1 2. Determine the relationship of the plant design and layout to the surrounding environment,  
 2 including any aesthetic features of the site and vicinity.
- 3 3. Identify maps and drawings that show relevant features of the plant, the site, and the region.  
 4 The maps and drawings also should identify significant offsite features, if any, in the vicinity  
 5 (i.e., Federal facilities, including national parks, forests, wildlife areas, Indian reservation and  
 6 trust lands).

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

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

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

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

Component	Design Details
Cooling towers (from the environmental report [ER])	<ul style="list-style-type: none"> <li>• Type of configuration</li> <li>• Materials of construction</li> <li>• Number and arrangement</li> <li>• Rated heat-dissipation capacity</li> </ul>
Cooling lakes and ponds (from the ER)	<ul style="list-style-type: none"> <li>• Surface area</li> <li>• Volume</li> <li>• Bathymetry</li> </ul>
Spray ponds or canals (from the ER)	<ul style="list-style-type: none"> <li>• Arrangement and configuration of spray modules</li> <li>• Pond or canal geometry</li> <li>• Surface area and water volume</li> </ul>
Condenser (from the ER)	<ul style="list-style-type: none"> <li>• Heat transfer area and materials of construction</li> <li>• Antifouling treatment</li> </ul>

26

1

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

<b>Component</b>	<b>Design Details</b>
Cooling towers (from the ER)	<ul style="list-style-type: none"> <li>• Input and discharge flow rates and temperatures for monthly average meteorological conditions</li> <li>• Wet-bulb temperature, approach to wet-bulb, and range</li> <li>• Performance curves</li> <li>• Air flow</li> <li>• Power consumption noise levels</li> <li>• Drift rate and drop size</li> </ul>
Cooling lakes and ponds (from the ER)	<ul style="list-style-type: none"> <li>• Flow rates (through condenser)</li> <li>• Flow-through times</li> <li>• Flow pattern</li> <li>• Monthly average water temperatures (mean for entire lake or pond, inlet [from condenser], outlet [to condenser])</li> <li>• Surface elevation (mean, maximum, minimum)</li> </ul>
Spray ponds or canals (from the ER)	<ul style="list-style-type: none"> <li>• Flow rates (through condenser)</li> <li>• Flow-through times</li> <li>• Flow pattern</li> <li>• Monthly average water temperatures (inlet [from condenser], outlet [to condenser])</li> <li>• Surface elevation (mean, maximum, minimum)</li> <li>• Spray system operating parameters (e.g., power consumption, drop size)</li> </ul>
Condenser (from the ER)	<ul style="list-style-type: none"> <li>• Condenser flow rate</li> <li>• Temperature differential across condenser</li> <li>• Time-of-passage through system (including intake and discharge system passage times)</li> </ul>

- 2 • For intake systems, include:
- 3 – drawing of the intake structure showing the relationship of the structure to the water
- 4 surface, bottom geometry, and shoreline
- 5 – location of the intake in relation to the outfall
- 6 – description of the cooling-water pumping facility
- 7 – description of the trash racks, traveling screens, trash baskets, and fish return devices
- 8 – performance characteristics (e.g., flow rates, intake velocities) for the operational modes
- 9 identified
- 10 – performance characteristics for specific intake related functions, such as de-icing, trash
- 11 rack clearing, screen washing, trash basket removal, or fish return system operation
- 12 – location and description of components for the addition of chemicals (e.g., corrosion
- 13 inhibitors, antifouling agents) to the intake system.
- 14

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

#### 23 **2.2.4 Evaluation Findings**

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

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

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

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

1 **2.3 Refurbishment Activities**

2 **2.3.1 Areas of Review**

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

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

11 **Data and Information Needs**

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

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

25 **2.3.2 Acceptance Criteria**

26 The reviewer should ensure that the introductory and descriptive paragraphs prepared under  
27 this ESRP are consistent with the applicable acceptance criteria specified in Sections 1.2 and  
28 2.2.2.

29 **Technical Rationale**

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

1 **2.3.3 Review Procedures**

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

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

15 **2.3.4 Evaluation Findings**

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

18 **2.4 Employment**

19 **2.4.1 Areas of Review**

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

25 **Data and Information Needs**

26 The following data or information may be needed:

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

33 **2.4.2 Acceptance Criteria**

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

1 Technical Rationale

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

6 **2.4.3 Review Procedures**

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

- 8 1. Review the employment discussion in the LR GEIS (NUREG-1437, Revision 2; NRC  
9 2023a).
- 10 2. Review the plant employment information in the applicant's ER, including the number of  
11 workers needed during maintenance and refueling outages and annual average  
12 employment.
- 13 3. Evaluate the number of workers required to support any refurbishment activity described in  
14 Section 2.3 and determine the residential distribution of the refurbishment workforce.
- 15 4. Determine if the applicant plans to change the annual average number of onsite workers  
16 during and in support of license renewal and refurbishment activities, if any.

17 **2.4.4 Evaluation of Findings**

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

22 **2.5 Alternatives to the Proposed Action**

23 **2.5.1 Areas of Review**

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

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

32 Data and Information Needs

33 The reviewer for this ESRP requires the following information:

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



1 **2.5.2 Acceptance Criteria**

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

- 5 • 10 CFR 51.45(b)(3), concerning alternatives to the proposed action. The discussion of  
6 alternatives shall be sufficiently complete to aid the Commission in developing and  
7 exploring, pursuant to Section 102(2)(E) of National Environmental Policy Act of 1969  
8 (NEPA), “appropriate alternatives to recommended courses of action in any proposal which  
9 involves unresolved conflicts concerning alternative uses of available resources.” To the  
10 extent practicable, the environmental impacts of license renewal and the replacement power  
11 alternatives should be presented in comparative form.
- 12 • 10 CFR 51.53(c)(3)(iii). The report must contain a consideration of alternatives for reducing  
13 adverse impacts, as required by Section 51.45(c), for all Category 2 license renewal issues  
14 in Appendix B to Subpart A of this part. No such consideration is required for Category 1  
15 issues in Appendix B to Subpart A of this part.
- 16 • 10 CFR 51, Appendix A(5), concerning alternatives including the proposed action
- 17 • 10 CFR 51.71(d), concerning the draft EIS will include a preliminary analysis that considers  
18 and weighs the environmental effects of the proposed action, the environmental impacts of  
19 alternatives to the proposed action, and alternatives available for reducing or avoiding  
20 adverse environmental effects
- 21 • 10 CFR 51.95(c), concerning renewal of an operating license or combined license for a  
22 nuclear power plant. Under Parts 52 or 54 of this chapter, the Commission shall prepare an  
23 EIS, which is a supplement to the Commission’s NUREG-1437, Revision 2, “Generic  
24 Environmental Impact Statement for License Renewal of Nuclear Plants.”
- 25 • 10 CFR 51.103(a)(2). Identify all alternatives considered by the Commission in reaching the  
26 decision, state that these alternatives were included in the range of alternatives discussed in  
27 the environmental impact statement and specify the alternative or alternatives which were  
28 considered to be environmentally preferable.
- 29 • 10 CFR 51, Appendix A(4), “Purpose of and Need for Action.” The alternative of no-action  
30 will be discussed.
- 31 • 10 CFR 51, Appendix A(7), concerning the environmental consequences of alternatives,  
32 including the proposed actions and any mitigating actions which may be taken. Alternatives  
33 eliminated from detailed study will be identified and a discussion of those alternatives will be  
34 confined to a brief statement of the reasons why the alternatives were eliminated. The level  
35 of information for each alternative considered in detail will reflect the depth of analysis  
36 required for sound decisionmaking.

37 Technical Rationale

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

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

### 3 **2.5.3 Review Procedures**

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

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

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

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

### 31 **2.5.4 Evaluation Findings**

32 The reviewer of information covered by this ESRP should prepare discussions for the SEIS  
33 describing reasonable alternatives to the proposed action in sufficient detail and in similar  
34 format to the proposed action to support the environmental analysis and comparison of the  
35 effects of these alternatives with the effects of continued plant operations. The information  
36 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).

- 1 • 10 CFR Part 51, Appendix A to Subpart A, paragraph 6, concerning affected environment.  
2 The environmental impact statement will succinctly describe the environment to be affected  
3 by the proposed action. Data and analyses in the statement will be commensurate with the  
4 importance of the impact, with less important material summarized, consolidated, or simply  
5 referenced. Effort and attention will be concentrated on important issues; useless bulk will  
6 be eliminated.
- 7 • 10 CFR Part 51, Appendix B to Subpart A, “Environmental Effect of Renewing the Operating  
8 License of a Nuclear Power Plant,” Table B-1, “Summary of Findings on Environmental  
9 Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants.”
- 10 • Additional regulatory positions and specific criteria in support of the regulations identified  
11 above are as follows:
  - 12 – LIC-203, Revision 4, Procedural Guidance for Categorical Exclusions, Environmental  
13 Assessments, and Considering Environmental Issues (NRC 2020c).

## 14 Technical Rationale

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

### 20 **3.1.3 Review Procedures**

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

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

### 29 **3.1.4 Evaluation Findings**

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

## 34 **3.2 Land Use and Visual Resources**

### 35 **3.2.1 Areas of Review**

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

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

### 8 Data and Information Needs

9 The following data or information may be needed:

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

### 33 **3.2.2 Acceptance Criteria**

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

- 36 • 15 CFR Part 930, the regulations governing implementation of the requirement for Federal  
37 consistency with approved coastal management programs (as set forth in the Coastal Zone  
38 Management Act of 1972).

1 **3.2.3 Review Procedures**

2 The following review steps are suggested:

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

14 **3.2.4 Evaluation Findings**

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

18 **3.3 Meteorology, Air Quality, and Noise**

19 **3.3.1 Areas of Review**

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

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

28 **Data and Information Needs**

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

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

- 1 • summary of meteorological data from the onsite meteorological program for the most recent  
2 5-year period
- 3 • descriptions of meteorological phenomena, if any, associated with the plant's cooling system  
4 operation
- 5 • description of regional air quality, including the locations of mandatory Federal Class I areas  
6 and nonattainment and/or maintenance areas in the region
- 7 • map of the region within a 50-mile (80-kilometer) radius of the nonattainment and  
8 maintenance areas of the site
- 9 • list of onsite emission sources and emission data for all criteria pollutants on an annual  
10 basis
- 11 • if refurbishment activities are planned, an estimate of additional workers, area of land  
12 disturbed for waste storage or laydown areas, vehicle emissions, construction equipment  
13 emissions, and fugitive dust emissions
- 14 • any current or past noise studies and analyses conducted in the vicinity of the site
- 15 • nearby sensitive receptors such as residences, schools, and nursing homes
- 16 • list of primary offsite noise generating sources in the vicinity of the site
- 17 • list of principal onsite noise-generating sources, with given distances to the nearest site  
18 boundary and nearby sensitive receptors.

### 19 **3.3.2 Acceptance Criteria**

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

- 23 • 40 CFR Part 50 concerning the National Ambient Air Quality Standards
- 24 • 40 CFR Part 51, Subpart W, concerning requirements related to applicable implementation  
25 plans
- 26 • 40 CFR Part 51, Appendix W, concerning air quality models
- 27 • 40 CFR Part 52 concerning Implementation Plans
- 28 • 40 CFR Part 81, Subparts C and D, concerning attainment status designations approved by  
29 the U.S. Environmental Protection Agency (EPA) and identification of mandatory Class I  
30 Federal areas
- 31 • 40 CFR Part 93, Subpart B, concerning requirements for determining conformity of Federal  
32 actions to State or Federal implementation plans.

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

- 35 • Regulatory Guide 1.23, Meteorological Monitoring Programs for Nuclear Power Plants (NRC  
36 2007a)
- 37 • ESRP 2.7 in NUREG-1555 (NRC 2000) provides guidance on onsite meteorological  
38 measurements for use in licensing applications.

1 **3.3.3 Review Procedures**

2 The following review steps are suggested:

- 3 1. Review the air quality discussion in the *Generic Environmental Impact Statement for License*  
4 *Renewal of Nuclear Plants* (LR GEIS; NUREG-1437, Revision 2; NRC 2023a) to identify the  
5 information considered and the conclusions reached. This step establishes the base for  
6 evaluation of information identified by the applicant, the public, and the staff.
- 7 2. Obtain descriptions of the site meteorological, climatological, dispersion characteristics, and  
8 acoustic (noise) environment.
- 9 3. Obtain recent meteorological data for the site and climatological data for the region  
10 surrounding the site.
- 11 4. Obtain the air-quality attainment status and available air-quality data for the region.
- 12 5. Obtain an inventory of onsite air emission sources, air emissions, and noise-generating  
13 sources.
- 14 6. Determine if license renewal will result in an increase in air emissions (e.g., additional  
15 worker vehicle emissions from refurbishment activities).
- 16 7. If site is located in a designated attainment area, continue the review at Step 9. If site is  
17 located in a designated non-attainment or maintenance area and license renewal will result  
18 in an increase in air emissions, proceed to Step 8 for a conformity determination.
- 19 8. Determine if air emissions will exceed de minimis threshold levels specified in 40 CFR  
20 93.153(b), commonly referred to as an applicability analysis. If de minimis levels are not  
21 exceeded, proceed to Step 9. If de minimis levels are exceeded, a conformity determination  
22 must be completed. A conformity determination can be conducted via different methods,  
23 including air quality modeling to demonstrate that air emissions will not cause or contribute  
24 to a violation of the national ambient air quality standards. Models approved by the EPA for  
25 air quality calculations are listed in Appendix W of 40 CFR Part 51.
- 26 9. Prepare a section for the SEIS that presents an updated summary of the meteorology,  
27 climatology, air quality, and noise environment for the plant site and region. The summary  
28 should address normal conditions and historic severe weather. If an applicability analysis or  
29 conformity determination was conducted, this should be documented in the SEIS. The  
30 section should describe and summarize the meteorological data used in atmospheric model  
31 calculations for the conformity determination. The atmospheric models used should be  
32 identified in the SEIS, but detailed model descriptions should be avoided.

33 **3.3.4 Evaluation Findings**

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



1 **3.4 Geologic Environment**

2 **3.4.1 Areas of Review**

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

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

10 **Data and Information Needs**

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

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

27 **3.4.2 Acceptance Criteria**

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

30 **3.4.3 Review Procedures**

31 The following review steps are suggested:

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

- 1 2. Obtain descriptions of regional and local geology, soils, geologic resources, and seismic  
2 setting.
- 3 3. Obtain descriptions of the site geology, soils, geologic resources, and seismic setting from  
4 prior environmental documents.
- 5 4. Obtain descriptions of seismic potential at the site and seismic history, including the largest  
6 known local and historic regional earthquake and safe-shutdown earthquake for the plant.
- 7 5. Obtain descriptions of any onsite erosion control plans and run-off best management  
8 practices.
- 9 6. Prepare a section for the SEIS that presents an updated summary of the geology and soils,  
10 including significant geologic resources, and seismic setting for the plant site and  
11 surrounding region.

#### 12 **3.4.4 Evaluation Findings**

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

### 18 **3.5 Water Resources**

#### 19 **3.5.1 Areas of Review**

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

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

#### 32 **Data and Information Needs**

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

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

- 1 (recreational, navigational, instream, etc.) that may be affected by continued plant  
2 operations and refurbishment. This should include any bodies of water or aquifers at  
3 distances close enough to affect or be adversely affected by plant operations. This should  
4 also include a quantitative description of any water uses that provide potential liquid  
5 pathways for both radiological and nonradiological effluents. The following should be  
6 included:
- 7 – locations of diversions and returns concerning the site and the water body
  - 8 – identification of the water body
  - 9 – average monthly withdrawal and return rate for each surface water diversion by use  
10 category
  - 11 – locations and depths of wells in relation to the site
  - 12 – identification of aquifers, including any EPA-designated sole source aquifers
  - 13 – the average monthly groundwater withdrawal rates by use category
  - 14 – identification of water bodies and locations within a 6-mile (10-kilometer) radius of the  
15 plant site, including any delineated floodplains or zones of inundation for adjoining and  
16 onsite surface water features (maps may be useful)
  - 17 – the type and location of activity on the identified water body (maps may be useful).
- 18 • Summary of statutory and other legal restrictions relating to water use or specific water-body  
19 restrictions on water use imposed by Federal or State regulations
  - 20 • Water-use (water balance) diagram for the plant showing flow rates to and from the various  
21 water systems (e.g., circulating water system, sanitary system, radwaste and chemical  
22 waste systems, service water systems), points of consumption, and source and discharge  
23 locations.
  - 24 • For the water-use diagram, the data and narrative description for maximum water  
25 consumption, water consumption during periods of minimum water availability, and average  
26 operation by month and by plant operating status
  - 27 • A description of any other station water uses showing flow rates to and from the facility,  
28 average water consumption, and maximum water consumption:
    - 29 – For surface waters: Water temperature, suspended solids, total dissolved solids,  
30 hardness, turbidity, color, odor, pH, conductivity, dissolved oxygen, biological oxygen  
31 demand, chemical oxygen demand, phosphorus forms (total and orthophosphate),  
32 nitrogen forms (ammonia, nitrate, nitrite, organic), alkalinity, chlorides, sulfate, sodium,  
33 potassium, calcium, magnesium, heavy metals (e.g., mercury, lead), phytoplankton  
34 (chlorophyll a), and indicator microorganisms (e.g., total coliform, fecal coliforms,  
35 dinoflagellates, blue-green algae)
    - 36 – For groundwater: The above-surface-water data, minus phytoplankton and with silica,  
37 iron, and bicarbonate added.
  - 38 • Other nuclear power plant site-specific water-quality characteristics
  - 39 • Descriptions of preexisting aquatic environmental stresses and their effects on surface or  
40 groundwater quality for waters that interact with the plant (e.g., water bodies at or near the  
41 site that do not meet established water-quality standards). These should include State  
42 Clean Water Act (CWA; 33 U.S.C. § 1251 et seq.) Section 303(d) lists of impaired waters  
43 which classify the quality of each of the State's water bodies.

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

### 6 **3.5.2 Acceptance Criteria**

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

- 9 • 10 CFR 51.53(c)(3)(ii)(A). If the applicant's plant utilizes cooling towers or cooling ponds  
10 and withdraws makeup water from a river, an assessment of the impact of the proposed  
11 action on water availability and competing water demands, the flow of the river, and related  
12 impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be  
13 provided. The applicant shall also provide an assessment of the impacts of the withdrawal  
14 of water from the river on alluvial aquifers during low flow.
- 15 • 10 CFR 51.53(c)(3)(ii)(C). If the applicant's plant pumps more than 100 gallons (total onsite)  
16 of groundwater per minute, an assessment of the impact of the proposed action on  
17 groundwater must be provided.
- 18 • 10 CFR 51.53(c)(3)(ii)(D). If the applicant's plant utilizes cooling ponds, an assessment of  
19 the impact of the proposed action on groundwater quality must be provided.
- 20 • 10 CFR 51.53(c)(3)(ii)(P). An applicant shall assess the impact of any documented  
21 inadvertent releases of radionuclides into groundwater. The applicant shall include in its  
22 assessment a description of any groundwater protection program used for the surveillance  
23 of piping and components containing radioactive liquids for which a pathway to groundwater  
24 may exist. The assessment must also include a description of any past inadvertent releases  
25 and the projected impact to the environment (e.g., aquifers, rivers, lakes, ponds, the ocean)  
26 during the license renewal term.
- 27 • 33 CFR Part 330, Appendix A, concerning conditions, limitations, and restrictions on  
28 construction activities
- 29 • 40 CFR Part 121, State Certification of Activities Requiring a Federal License or Permit
- 30 • 40 CFR Parts 122–133, Water Programs, concerning NPDES permit conditions for  
31 discharges, including storm-water discharges and water quality standards
- 32 • 40 CFR Part 147, concerning restrictions on waste disposal options
- 33 • 40 CFR Part 149, concerning possible supplemental restrictions on waste disposal and  
34 water use in or above a sole source aquifer
- 35 • 40 CFR Part 165, concerning the disposal and storage of pesticides and pesticide  
36 containers
- 37 • 40 CFR Part 403, concerning waste effluents
- 38 • 40 CFR Part 423, concerning effluent limitations for the steam electric power generating  
39 point source category
- 40 • 40 CFR Parts 700–716, concerning practices and procedures for managing toxic chemicals
- 41 • Federal, State, regional, local, and Indian Tribe water laws and water rights.

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

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

### 20 **3.5.3 Review Procedures**

21 The following review steps are suggested:

- 22 1. Identify consumptive water uses that could affect the water supply of the plant or that may  
23 be adversely affected by the plant, including the following important characteristics:
  - 24 – water source
  - 25 – locations of diversions and returns
  - 26 – amount and time variation of use
  - 27 – water rights.
- 28 2. Identify recreational, navigational, and other nonconsumptive water uses. The important  
29 characteristics to be specified are
  - 30 – location
  - 31 – activity
  - 32 – amount and time variation of use.
- 33 3. Identify the water uses that provide potential pathways for both radiological and  
34 nonradiological effluents, including the following important characteristics:
  - 35 – water sources
  - 36 – location of diversions for consumptive uses
  - 37 – location of receptors for nonconsumptive uses
  - 38 – effluent discharges and pollutant characteristics
  - 39 – amount and time variation of each water use and discharge.

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

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

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

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

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

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

6   When evaluating the adequacy of this material,

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

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

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

#### 23   **3.5.4   Evaluation Findings**

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

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

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

1 **3.6 Ecological Resources**

2 **3.6.1 Areas of Review**

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

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

13 **Data and Information Needs**

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

17 **Terrestrial Resources**

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

34 **Aquatic Resources**

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



- 1       – descriptions of the aquatic habitats of the waterbodies (e.g., nearshore, benthic, open
- 2       water, etc.)
- 3       – size, bathymetry, temperature regimes, streamflow and discharge, salinity, tidal flows,
- 4       typical seasonal fluctuations, sediment types, and general water quality
- 5       – main channel, dams, and any flood controls
- 6       – additional human uses of the waterbody other than for nuclear power plant cooling
- 7       (e.g., recreational, industrial, etc.)
- 8       • relevant watershed(s), including source and receiving waterbodies
- 9       • information on characteristic plant and animal species associated with each affected
- 10      waterbody, especially those species vulnerable to impingement and entrainment
- 11      • descriptions of other aquatic habitats or features on the site
- 12      • information on fish stocking programs
- 13      • copies of aquatic surveys, studies, and monitoring performed on or near the site
- 14      (e.g., regional fishery studies; endangered and threatened species monitoring; baseline,
- 15      impingement, entrainment, thermal, and other studies performed in connection with CWA
- 16      Section 316(a) and (b) requirements)
- 17      • information on important aquatic species and habitats (e.g., keystone species, indicator
- 18      species, representative species, state-listed species, recreational and commercially
- 19      important fisheries, spawning and rearing areas, waters within Federal or State parks and
- 20      preserves)
- 21      • information on non-native, nuisance, and invasive species of local or regional concern
- 22      • information concerning the length of in-scope transmission lines; locations where ROWs
- 23      cross waterbodies, aquatic features, or other important or sensitive habitats; and line
- 24      termination points (e.g., substation or point at which in-scope portion of the lines ends).
- 25      Federally Protected Ecological Resources
- 26      • sufficient information on the proposed action to define the Endangered Species Act (ESA)
- 27      action area (e.g., all areas to be affected directly or indirectly by the Federal action and not
- 28      merely the immediate area involved in the action (50 CFR 402.02)
- 29      • information on endangered and threatened species (collectively, “listed species”) and critical
- 30      habitats protected under the ESA that are potentially present in the action area under both
- 31      U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS)
- 32      jurisdiction (collectively, “the Services”)
- 33      • information on designated essential fish habitat (EFH), including habitats of particular
- 34      concern, designated under the Magnuson-Stevens Fishery Conservation and Management
- 35      Act (MSA) that are present in the area
- 36      • information on national marine sanctuaries protected under the National Marine Sanctuaries
- 37      Act (NMSA) that are present in the area.

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

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

### 15 **3.6.2 Acceptance Criteria**

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

- 18 • 10 CFR 51.53(c)(3)(ii)(A). If the applicant's plant utilizes cooling towers or cooling ponds  
19 and withdraws makeup water from a river, an assessment of the impact of the proposed  
20 action on water availability and competing water demands, the flow of the river, and related  
21 impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be  
22 provided.
- 23 • 10 CFR 51.53(c)(3)(ii)(B). If the applicant's plant utilizes once-through cooling or cooling  
24 pond water intake and discharge systems, the applicant shall provide a copy of current  
25 Clean Water Act 316(b) Best Technology Available determinations and, if applicable, a  
26 316(a) variance in accordance with 40 CFR Part 125 or equivalent State permits and  
27 supporting documentation. If the applicant cannot provide these documents, it shall assess  
28 the impact of the proposed action on fish and shellfish resources resulting from impingement  
29 mortality and entrainment and thermal discharges.
- 30 • 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of  
31 refurbishment, continued operations, and other license-renewal-related construction  
32 activities on important plant and animal habitats. Additionally, the applicant shall assess the  
33 impact of the proposed action on federally protected ecological resources in accordance  
34 with Federal laws protecting such resources, including but not limited to the Endangered  
35 Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the  
36 National Marine Sanctuaries Act.
- 37 • 40 CFR Part 122 and 40 CFR Part 125, concerning impingement mortality and entrainment  
38 at existing facilities subject to CWA Section 316(b)
- 39 • 40 CFR Part 423, concerning thermal effluent discharges subject to CWA Section 316(a)
- 40 • 50 CFR Part 402, concerning interagency consultation for federally listed species and critical  
41 habitats protected under the ESA
- 42 • 50 CFR Part 600, concerning interagency consultation for EFH protected under the MSA.

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

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

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

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

- 18 • Regulatory Guide 4.11, Rev. 2, Terrestrial Environmental Studies for Nuclear Power  
19 Stations (NRC 2012b) contains technical guidance for designing terrestrial environmental  
20 studies and performing analyses for applicants and reactor licensees subject to 10 CFR Part  
21 50, 10 CFR Part 52, and 10 CFR Part 54 who must meet the environmental requirements of  
22 10 CFR Part 51. The guidance addresses designing adequate baseline studies; identifying  
23 important species and habitats; and performing terrestrial impact analyses, including the  
24 effects of habitat loss, noise, wildlife displacement, bird and bat collisions with plant  
25 structures, avian electrocution, cooling tower drift, and hydrological impacts to terrestrial  
26 habitats.
- 27 • Regulatory Guide 4.24, Rev. 0, Aquatic Environmental Studies for Nuclear Power Stations  
28 (NRC 2017a), contains technical guidance for designing aquatic environmental studies and  
29 performing analyses for applicants and reactor licensees subject to 10 CFR Part 50, 10 CFR  
30 Part 52, and 10 CFR Part 54 who must meet the environmental requirements of 10 CFR  
31 Part 51. The guidance addresses designing adequate baseline studies; identifying  
32 important species and habitats; and performing terrestrial impact analyses, including the  
33 effects of habitat modification, noise and pressure, impingement and entrainment, effluent  
34 discharge, cooling tower drift, and transmission line water crossings.

### 35 **3.6.3 Review Procedures**

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

#### 39 Terrestrial Resources

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

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

### 23 Aquatic Resources

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

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

## 28 Federally Protected Ecological Resources

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

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

3            • Essential Fish Habitat

- 4            – Define the affected area (see Appendix A.2.3, Review Procedure Step 1).
- 5            – Identify the EFH present in the affected area and the federally managed species and life  
6            stages to which the EFH applies.
- 7            – Describe the distribution, habitat preferences, and diet of each federally managed  
8            species and life stage.
- 9            – Describe the physical and biological characteristics of the EFH by species and life stage.  
10           Give special attention to habitats of particular concern, when applicable.
- 11           – If EFH consultation is anticipated, refer to the EFH regulations at Section 305 at 50 CFR  
12           Part 600, “Magnuson–Stevens Act Provisions,”; NMFS’s guidance for conducting EFH  
13           consultation in Essential Fish Habitat Consultation Guidance (NMFS 2004a) and  
14           Preparing Essential Fish Habitat Assessments: A Guide for Federal Action Agencies  
15           (NMFS 2004b); and Appendix A of this ESRP for additional information that may be  
16           required.

17           • Sanctuary Resources

- 18           – Define the affected area (see Appendix A.3.3, Review Procedure Step 1).
- 19           – Identify the national marine sanctuary in the affected area and describe the location in  
20           relation to the nuclear power plant site. Include maps, when available.
- 21           – Describe the marine resources of the sanctuary, including living and nonliving resources.
- 22           – If NMSA consultation is anticipated, refer to the National Oceanic and Atmospheric  
23           Administration (NOAA) Office of National Marine Sanctuaries’ (ONMS) guidance for  
24           conducting NMSA consultation in *Overview of Conducting Consultation Pursuant to*  
25           *Section 304(d) of the National Marine Sanctuaries Act* (NOAA 2009) and Appendix A of  
26           this ESRP for additional information that may be required.

27           **3.6.4      Evaluation Findings**

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

37           **3.7      Historic and Cultural Resources**

38           **3.7.1      Areas of Review**

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

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

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

#### 19 Data and Information Needs

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

- 25 • Description of the APE. For license renewal (initial LR or SLR), the APE includes lands  
26 within the nuclear power plant site boundary and the transmission lines up to the first  
27 substation that may be directly (e.g., physically) affected by land-disturbing or other  
28 operational activities associated with continued plant operations and maintenance and/or  
29 refurbishment activities.
- 30 • Cultural background for the APE and surrounding region from the beginning of human  
31 settlement to the present.
- 32 • Historic use of the land and the activities that have occurred within the APE and the  
33 surrounding area documenting past levels of ground disturbance.
- 34 • Copy of the site map that identifies the direct and indirect APE (e.g., including scope  
35 transmission lines, and in the vicinity).
- 36 • All past and current (for license renewal) historic and cultural resource investigations  
37 conducted within and surrounding the APE.
- 38 • Historic properties within the APE, NRHP eligibility status, and if available, SHPO/THPO,  
39 Indian Tribes, and other consulting parties’ comments in support of NRC’s NHPA Section  
40 106 review.

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<sup>1</sup> 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.



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

### 8 **3.7.2 Acceptance Criteria**

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

- 11 • 10 CFR 51.53(c)(3)(ii)(K). All applicants shall identify any potentially affected historic and  
12 cultural resources and historic properties and assess whether future plant operations and  
13 any planned refurbishment activities would affect these resources in accordance with  
14 Section 106 of the National Historic Preservation Act and in the context of the National  
15 Environmental Policy Act.
- 16 • 36 CFR Part 800, "Protection of Historic Properties" – The implementing regulations define  
17 require Federal agencies to take into account the effects of their undertakings on historic  
18 properties included in or eligible for inclusion in the NRHP in consultation with consulting  
19 parties as defined under 36 CFR 800.8(c)(1)(i). Under this regulation, the NRC is required  
20 to identify and evaluate all historic properties in the APE and take measures to avoid,  
21 minimize, or mitigate adverse effects. As indicated in 36 CFR 800.8(c), Section 106 can be  
22 integrated with NEPA reviews. The NRC must complete the NHPA Section 106 review  
23 process prior to issuance of an initial or subsequent renewed license.
- 24 • 36 CFR Part 60, "National Register of Historic Places" – The regulations contain the  
25 National Park Service's NRHP—the official list of the Nation's historic places worthy of  
26 preservation.
- 27 • 36 CFR Part 63, "Determinations of Eligibility for Inclusion in the National Register of Historic  
28 Places" – contains guidance for evaluating historic properties and determining whether a  
29 property is eligible for listing in the NRHP.

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

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

1 Executive Orders

2 Executive Order 13175, “Consultation and Coordination with Indian Tribal Governments” (65 FR  
3 67249) – This Order seeks “to establish regular and meaningful consultation and collaboration  
4 with tribal officials, in the development of Federal policies that have tribal implications, to  
5 strengthen the United States government-to-government relationships with tribes, and to reduce  
6 imposition of unfunded mandates upon Indian tribes.” The NRC voluntarily complies with this  
7 Executive Order and has issued a Tribal Policy Statement (82 FR 2402).

8 NRC Policy and Guidance

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

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

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

24 **3.7.3 Review Procedures**

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

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

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

#### 24 **3.7.4 Evaluation Findings**

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

### 35 **3.8 Socioeconomics**

#### 36 **3.8.1 Areas of Review**

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

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

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

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

## 12 Data and Information Needs

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

15 The following data or information may be needed:

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

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

### 9       **3.8.2     Acceptance Criteria**

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

### 12      **3.8.3     Review Procedures**

13      The following review steps are suggested:

- 14      1. Review socioeconomic discussions in the LR GEIS.
- 15      2. Determine if there is new information that should be evaluated. The following sources of  
16      information should be included in the search for new information:
  - 17         – any new socioeconomic-related information in the applicant’s ER
  - 18         – any new socioeconomic information from scoping
- 19      3. Compile socioeconomic information on counties within the ROI.
- 20      4. Describe the following:
  - 21         – power plant employment and expenditures
  - 22         – regional economic characteristics
  - 23         – demographic characteristics
  - 24         – housing and community services
  - 25         – tax revenue
  - 26         – local transportation
- 27      5. Prepare socioeconomic affected environment discussion for the SEIS.

### 28      **3.8.4     Evaluation Findings**

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

1 **3.9 Human Health**

2 **3.9.1 Areas of Review**

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

8 **Data and Information Needs**

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

- 11 • A description of the radioactive liquid, gaseous, and solid waste management and effluent  
12 control systems and information on effluents released into the environment and waste  
13 stored onsite
- 14 • Historical data on occupational doses to plant workers (from NUREG-0713, “Occupational  
15 Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities”; NRC  
16 2016)
- 17 • Description of the radiological environmental monitoring program and environmental data  
18 (from the applicant’s annual environmental operating reports)
- 19 • Historical maximum doses to a member of the public (from the applicant’s annual radioactive  
20 effluent release reports)
- 21 • Information on the potential changes in radiological impacts from continued plant operations  
22 during the renewal term
- 23 • Information on the radiological impacts of refurbishment
- 24 • Description of the site’s industrial safety program to include physical occupational hazards,  
25 chemical hazards, occupational microbiological hazards, and occupational electrical hazards  
26 (e.g., electromagnetic fields and electric shock)
- 27 • Description of the microbiological hazards for members of the public for plants that use a  
28 cooling pond, lake, canal, or that discharge into waters of the United States accessible to  
29 the public
- 30 • Description of the in-scope transmission lines and adherence to National Electrical Safety  
31 Code (NESC) standards.

32 **3.9.2 Acceptance Criteria**

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

- 35 • 10 CFR 51.53(c)(3)(ii)(G). If the applicant’s plant uses a cooling pond, lake, canal, or  
36 discharges into waters of the United States accessible to the public, an assessment of the  
37 impact of the proposed action on public health from thermophilic organisms in the affected  
38 water must be provided.

- 1 • 10 CFR 51.53(c)(3)(ii)(H). If the applicant's transmission lines that were constructed for the  
2 specific purpose of connecting the plant to the transmission system do not meet the  
3 recommendations of the National Electric Safety Code for preventing electric shock from  
4 induced currents, an assessment of the impact of the proposed action on the potential shock  
5 hazard from the transmission lines must be provided.

### 6 **3.9.3 Review Procedures**

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

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

1 **3.9.4 Evaluation Findings**

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

9 **3.10 Environmental Justice**

10 **3.10.1 Areas of Review**

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

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

17 **Data and Information Needs**

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

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

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

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



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

### 4 **3.10.2 Acceptance Criteria**

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

- 7 • Executive Order 12898 (59 FR 7629) concerning Federal actions to address environmental  
8 justice in minority and low-income populations
- 9 • “Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory  
10 and Licensing Actions,” (69 FR 52040) affirms the Commission’s commitment to the general  
11 goals of Executive Order 12898 and strives to meet those goals as part of the NEPA review  
12 for licensing actions.
- 13 • 10 CFR 51.53(c)(3)(ii)(N). Applicants shall provide information on the general demographic  
14 composition of minority and low-income populations and communities (by race and  
15 ethnicity), and Indian Tribes in the vicinity of the nuclear power plant that could be  
16 disproportionately affected by license renewal, including continued reactor operations and  
17 refurbishment activities.

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

- 20 • Council on Environmental Quality (CEQ) guidance for addressing environmental justice,  
21 Environmental Justice: Guidance under the National Environmental Policy Act, December  
22 10, 1997 (CEQ 1997)
- 23 • Federal Interagency Working Group on Environmental Justice and NEPA Committee,  
24 Promising Practices for EJ Methodologies in NEPA Reviews, March 2016 (EJ IWG 2016)
- 25 • Guidance for specific information requirements for the environmental justice review is  
26 contained in Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-203,  
27 Revision 4: Procedural Guidance for Categorical Exclusions, Environmental Assessments,  
28 and Considering Environmental Issues. LIC-203 (NRC 2020c) is revised periodically. Refer  
29 to the latest revision for current guidance.

### 30 **3.10.3 Review Procedures**

31 The review procedure should be as follows:

- 32 1. Identify minority populations, low-income populations, and Indian Tribes within a 50-mile  
33 (80-kilometer) radius of the nuclear power plant. For each census block group within this  
34 area, minority and low-income populations are identified when (1) the minority or low-income  
35 population of an impacted area exceeds 50 percent or (2) the minority or low-income  
36 population percentage of the impacted area is meaningfully greater than the minority or low-  
37 income population percentage in the general population or other appropriate unit of  
38 geographic analysis (e.g., 50-mile radius geographic area or county). All block groups with  
39 minority and low-income percentages higher than the percentage for the geographic area  
40 and all affected Indian Tribes should be identified on the maps.
- 41 2. Identify environmental justice issues and unique characteristics of minority and low-income  
42 populations/communities and affected Indian Tribes during scoping.

- 1 3. Determine geographic distribution by race, ethnicity, and poverty, as well as delineation of  
2 Tribal lands. Identify any unique characteristics of minority and low-income populations and  
3 the “special character” of communities and affected Indian Tribes near the nuclear power  
4 plant.
- 5 – Minority populations are individual(s) who self-identify as members of the following  
6 population groups:
- 7     ▪ Race: (Not Hispanic or Latino)
- 8         a) Black or African American
- 9         b) American Indian or Alaska Native
- 10        c) Asian
- 11        d) Native Hawaiian and Other Pacific Islander
- 12        e) some other race
- 13        f) two or more races
- 14        g) Ethnicity: Hispanic or Latino (of any race)
- 15 – Low-income population is defined as individuals or families living below the poverty level  
16 as defined by the U.S. Census Bureau (e.g., the U.S. Census Bureau’s Current  
17 Population Reports, Series P-60 on Income and Poverty).
- 18 – Sources of information for determining geographic distribution and location of minority  
19 populations, low-income populations, and Indian Tribes:
- 20     ▪ Online or other GIS tools (e.g., ArcGIS, EJScreen, or CAPS).

#### 21 **3.10.4 Evaluation Findings**

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

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

1 **3.11 Waste Management**

2 **3.11.1 Areas of Review**

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

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

7 **Data and Information Needs**

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

11 **Radioactive Waste Systems**

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

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

#### 6 Nonradioactive Waste Systems

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

#### 21 **3.11.2 Acceptance Criteria**

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

- 25 • 10 CFR 50.34a, Design objectives for equipment to control releases of radioactive material  
26 in effluents - nuclear power reactors
- 27 • 10 CFR 50.36a, Technical specifications on effluents from nuclear power reactors
- 28 • 10 CFR Part 20, Standards for Protection Against Radiation
- 29 • 10 CFR 50.72, Immediate notification requirements for operating nuclear power reactors
- 30 • 10 CFR 50.73, Licensee event report system
- 31 • 10 CFR 50.75(g), Reporting and recordkeeping for decommissioning planning
- 32 • 10 CFR Part 50, Appendix I, Numerical Guides for Design Objectives and Limiting  
33 Conditions for Operation to Meet the Criterion "As Low As Is Reasonably Achievable" for  
34 Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents
- 35 • 10 CFR Part 50, Appendix A; Design Criteria 60, Control of Releases of Radioactive  
36 Materials to the Environment
- 37 • 10 CFR Part 50, Appendix A; Design Criteria 61, Fuel storage and handling and radioactivity  
38 control
- 39 • 10 CFR Part 50, Appendix A; Design Criteria 64, Monitoring Radioactivity Releases

- 1 • 40 CFR Part 190, Environmental Radiation Protection Standards for Nuclear Power  
2 Operations.

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

- 5 • Regulatory Guide 1.109, Calculation of Annual Doses to Man from Routine Releases of  
6 Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50,  
7 Appendix I (NRC 1977)
- 8 • Regulatory Guide 4.1, Programs for Monitoring Radioactivity in the Environs of Nuclear  
9 Power Plants (NRC 2009b)
- 10 • Regulatory Guide 4.2, Preparation of Environmental Reports for Nuclear Power Stations  
11 (NRC 2018b)
- 12 • Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Program (Normal  
13 Operation) - Effluent Streams and the Environment (NRC 2007b)
- 14 • Regulatory Guide 1.21, Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes  
15 and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-  
16 Cooled Nuclear Power Plants (NRC 2021)
- 17 • Regulatory Guide 1.143, Design Guidance for Radioactive Waste Management Systems,  
18 Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants (NRC  
19 2001)
- 20 • Power reactor licensees are required to keep the public dose from radioactive effluents  
21 ALARA. The ALARA criteria is contained in Appendix I of 10 CFR Part 50.
- 22 • As further specified in Appendix I to 10 CFR Part 50 concerning their effluent discharges,  
23 “The licensee shall establish an appropriate surveillance and monitoring program  
24 to:  
25 1. Provide data on quantities of radioactive material released in liquid and  
26 gaseous effluents;  
27 2. Provide data on measurable levels of radiation and radioactive materials in  
28 the environment to evaluate the relationship between quantities of radioactive  
29 material released in effluents and resultant radiation doses to individuals from  
30 principal pathways of exposure; and  
31 3. Identify changes in the use of unrestricted areas (e.g., for agricultural  
32 purposes) to permit modifications in monitoring programs for evaluating  
33 doses to individuals from principal pathways of exposure.”

### 34 **3.11.3 Review Procedures**

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

1 Radioactive Waste Systems

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

26 Nonradioactive Waste Systems

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

1 **3.11.4 Evaluation Findings**

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

8 **3.12 Greenhouse Gas Emissions and Climate Change**

9 **3.12.1 Areas of Review**

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

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

22 **Data and Information Needs**

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

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

1 **3.12.2 Acceptance Criteria**

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

- 5 • 10 CFR 51.53(c)(3)(ii)(Q). Applicants shall include an assessment of the effects of any  
6 observed and projected future changes in climate on environmental resource areas that are  
7 affected by license renewal, as well as any mitigation measures implemented at the  
8 applicant’s plant to address climate change impacts.

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

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

- 19 • Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section  
20 202(a) of the Clean Air Act; Final Rule (74 FR 66496) – This rule summarizes the  
21 Environmental Protection Agency’s (EPA) finding that GHGs in the atmosphere endanger  
22 public health and welfare.
- 23 • 40 CFR Part 98, “Mandatory Greenhouse Gas Reporting” – Establishes mandatory GHG  
24 reporting requirements for certain facilities and contains multiple provisions relevant to the  
25 air resources reviewer. 40 CFR 98.6 defines various terms, including an explicit definition of  
26 compounds included in the term “greenhouse gas.” 40 CFR 98.2 establishes an annual  
27 reporting threshold of 25,000 metric tons of carbon dioxide (CO<sub>2</sub>) equivalent per year for  
28 certain facilities, including stationary fuel combustion units.

29 **3.12.3 Review Procedures**

30 The review procedure should be as follows:

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



- 1 4. Tabulate and compare GHG emission sources from normal plant operations and  
2 refurbishment activities, GHG emissions from replacement power alternatives, and county-  
3 level emissions.
- 4 5. Discuss regional observed changes in climate and climate change information from national  
5 climate assessment reports and available onsite monitoring.

6 **3.12.4 Evaluation Findings**

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



## 1 4.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATING ACTIONS

### 2 4.1 Overview

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

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

#### 19 4.1.1 Areas of Review

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

#### 27 4.1.2 Acceptance Criteria

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

- 30 • Title 10 of the *Code of Federal Regulations* 51.45(c) (10 CFR 51.45(c)), "Analysis." The  
31 environmental report (ER) must include an analysis that considers and balances the  
32 environmental effects of the proposed action, the environmental impacts of replacement  
33 power alternatives, and alternatives available for reducing or avoiding adverse  
34 environmental effects.
- 35 • 10 CFR 51.53(c)(2). The report must contain a description of the proposed action, including  
36 the applicant's plans to modify the facility or its administrative control procedures as  
37 described in accordance with 10 CFR 54.21 of this chapter. This report must describe in  
38 detail the affected environment around the plant, the modifications directly affecting the  
39 environment or any plant effluents, and any planned refurbishment activities. In addition,  
40 the applicant shall discuss in this report the environmental impacts of alternatives and any  
41 other matters discussed in 10 CFR 51.45.

- 1 • 10 CFR 51.70(b). The draft environmental impact statement will be concise, clear, and  
2 analytic, and written in plain language with appropriate graphics....The format provided in  
3 Section 1(a) of Appendix A of this subpart should be used. The NRC staff will independently  
4 evaluate and be responsible for the reliability of all information used in the draft  
5 environmental impact statement.
- 6 • 10 CFR 51.71(d), concerning the draft environmental impact statement (EIS) will include a  
7 preliminary analysis that considers and weighs the environmental effects of the proposed  
8 action; the environmental impacts of alternatives to the proposed action; and alternatives  
9 available for reducing or avoiding adverse environmental effects, and compliance with  
10 environmental-quality standards and requirements that have been imposed by Federal,  
11 State, regional, and local agencies and Indian Tribes. A draft SEIS for license renewal will  
12 rely on conclusions as amplified by the supporting information in the LR GEIS for Category 1  
13 issues.
- 14 • 10 CFR 51.95(c), concerning renewal of an operating license or combined license for a  
15 nuclear power plant. Under Parts 52 or 54 of this chapter, the Commission shall prepare an  
16 EIS, which is a supplement to the Commission’s NUREG-1437, “Generic Environmental  
17 Impact Statement for License Renewal of Nuclear Plants.”
- 18 • 10 CFR Part 51, Appendix A to Subpart A, paragraph 7, concerning the environmental  
19 consequences of alternatives, including the proposed actions and any mitigating actions  
20 which may be taken. Alternatives eliminated from detailed study will be identified and a  
21 discussion of those alternatives will be confined to a brief statement of the reasons why the  
22 alternatives were eliminated. The level of information for each alternative considered in  
23 detail will reflect the depth of analysis required for sound decisionmaking.
- 24 • 10 CFR Part 51, Appendix B to Subpart A, “Environmental Effect of Renewing the Operating  
25 License of a Nuclear Power Plant,” Table B-1, “Summary of Findings on Environmental  
26 Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants.”

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

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

### 31 Technical Rationale

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

### 38 **4.1.3 Review Procedures**

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

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

<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
<b>Land Use</b>		
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) <sup>(a)</sup>	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.
<b>Visual Resources</b>		
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.
<b>Air Quality</b>		
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.
Air quality effects of transmission lines <sup>(a)</sup>	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.
<b>Noise</b>		
Noise impacts	1	SMALL. Noise levels would remain below regulatory guidelines for offsite receptors during continued operations and refurbishment associated

<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
		with license renewal.
<b>Geologic Environment</b>		
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.
<b>Surface Water Resources</b>		
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

<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
		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.
<b>Groundwater Resources</b>		
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.
<b>Terrestrial Resources</b>		
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

<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
		impacts are not expected to be significant issues during the license renewal term.
Bird collisions with plant structures and transmission lines <sup>(a)</sup>	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 <sup>(a)</sup>	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 <sup>(a)</sup>	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.
<b>Aquatic Resources</b>		
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.



<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
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.

<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
Impacts of transmission line right-of-way (ROW) management on aquatic resources <sup>(a)</sup>	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.
<b>Socioeconomics</b>		
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.
<b>Human Health</b>		
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

<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
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) <sup>(a)</sup>	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.
<b>Postulated Accidents</b>		
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 <sup>(b)</sup>	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.
<b>Waste Management</b>		
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.
Offsite radiological impacts of spent nuclear fuel and high-level waste disposal	1	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.
Mixed-waste storage and 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.
Nonradioactive 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.

<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
<b>Greenhouse Gas Emissions and Climate Change</b>		
Greenhouse gas impacts on climate change	1	<p>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.</p> <p>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.</p>
<b>Uranium Fuel Cycle</b>		
Offsite radiological impacts – individual impacts from other than the disposal of spent fuel and high-level waste	1	<p>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.</p>
Offsite radiological impacts – collective impacts from other than the disposal of spent fuel and high-level waste	1	<p>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.</p> <p>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.</p>
Nonradiological impacts of the uranium fuel cycle	1	<p>SMALL. The nonradiological impacts of the uranium fuel cycle resulting from the renewal of an operating license for any plant would be small.</p>
Transportation	1	<p>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.</p>

Environmental Issue	Category	Impact Finding
<b>Termination of Nuclear Power Plant Operations and Decommissioning</b>		
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.
<p>1 (a) This issue applies only to the in-scope portion of electric power transmission lines, which are defined as  2 transmission lines that connect the nuclear power plant to the substation where electricity is fed into the regional  3 power distribution system and transmission lines that supply power to the nuclear plant from the grid.  4 (b) Although the NRC does not anticipate any license renewal applications for nuclear power plants for which a  5 previous severe accident mitigation design alternative (SAMDA) or severe accident mitigation alternative (SAMA)  6 analysis has not been performed, alternatives to mitigate severe accidents must be considered for all plants that  7 have not considered such alternatives and would be the functional equivalent of a Category 2 issue requiring site-  8 specific analysis.</p>		

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

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

Environmental Issue	Category	Impact Finding
<b>Surface Water Resources</b>		
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.
<b>Groundwater Resources</b>		
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-

<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
		specific characteristics.
<b>Terrestrial Resources</b>		
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.
<b>Aquatic Resources</b>		
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.

<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
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.
<b>Federally Protected Ecological Resources</b>		
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)



<b>Environmental Issue</b>	<b>Category</b>	<b>Impact Finding</b>
		would be required if license renewal could destroy, cause the loss of, or injure sanctuary resources.
<b>Historic and Cultural Resources</b>		
Historic and cultural resources <sup>(a)</sup>	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.
<b>Human Health</b>		
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 <sup>(a)</sup>	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.
<b>Environmental Justice</b>		
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.
<b>Greenhouse Gas Emissions and Climate Change</b>		
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.
<b>Cumulative Effects</b>		
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.
1 2 3	(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 **4.1.4 Evaluation Findings**

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

7 **4.2 Land Use and Visual Resources**

8 **4.2.1 Areas of Review**

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

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

18 **Data and Information Needs**

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

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

30 **4.2.2 Acceptance Criteria**

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

1 **4.2.3 Review Procedures**

2 The following review steps are suggested:

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

16 **4.2.4 Evaluation Findings**

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

20 **4.3 Air Quality and Noise**

21 **4.3.1 Areas of Review**

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

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

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

32 **Data and Information Needs**

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

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

1 **4.3.2 Acceptance Criteria**

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

4 **4.3.3 Review Procedures**

5 Suggested steps for the review process are as follows:

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

23 **4.3.4 Evaluation Findings**

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

28 **4.4 Geology and Soils**

29 **4.4.1 Areas of Review**

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

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

1 Data and Information Needs

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

- 4 • the applicant’s ER
- 5 • the LR GEIS
- 6 • new information on geology and soils identified by the public and other information sources.

7 **4.4.2 Acceptance Criteria**

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

10 **4.4.3 Review Procedures**

11 Suggested steps for the review process are as follows:

- 12 1. Review the discussion of geology and soils impacts in the LR GEIS to identify the  
13 information considered and the conclusions reached. This step establishes the basis for  
14 evaluating information identified by the applicant, the public, and the staff. The following  
15 table lists the geology and soils issue addressed in the LR GEIS.
- 16 2. Determine if there is new information on these issues that should be evaluated. The  
17 following sources of information should be included in the search for new information:
  - 18 – The applicant’s ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new  
19 and significant information regarding the environmental impacts of license renewal of  
20 which it is aware. In reviewing the applicant’s ER, consider the applicant’s process for  
21 discovering new information and evaluating the significance of any new information  
22 discovered.
  - 23 – Records of public scoping meetings and correspondence related to the application.  
24 Compare information presented by the public with information considered in the LR  
25 GEIS.
- 26 3. Evaluate the significance of new information.
- 27 4. Prepare a section for the SEIS describing the search for new information, summarizing new  
28 information found, presenting results of evaluation of significance, and adopting conclusions  
29 from the LR GEIS modified as necessary to account for new and significant information.

30 **4.4.4 Evaluation Findings**

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

1 **4.5 Water Resources**

2 **4.5.1 Areas of Review**

3 This ESRP provides guidance for the analysis of surface water and groundwater impacts from  
4 continued plant operations during the license renewal term and refurbishment. Surface water  
5 and groundwater impacts are discussed in the LR GEIS, NUREG-1437, Revision 2 (NRC  
6 2023a).

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

12 **4.5.2 Acceptance Criteria (General for Water Resources Issues)**

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

- 16 • 10 CFR 51.53(c)(3)(ii)(A). If the applicant's plant utilizes cooling towers or cooling ponds  
17 and withdraws makeup water from a river, an assessment of the impact of the proposed  
18 action on water availability and competing water demands, the flow of the river, and related  
19 impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be  
20 provided. The applicant shall also provide an assessment of the impacts of the withdrawal  
21 of water from the river on alluvial aquifers during low flow.
- 22 • 10 CFR 51.53(c)(3)(ii)(C). If the applicant's plant pumps more than 100 gallons (total onsite)  
23 of groundwater per minute, an assessment of the impact of the proposed action on  
24 groundwater must be provided.
- 25 • 10 CFR 51.53(c)(3)(ii)(D). If the applicant's plant utilizes cooling ponds, an assessment of  
26 the impact of the proposed action on groundwater quality must be provided.
- 27 • 10 CFR 51.53(c)(3)(ii)(P). An applicant shall assess the impact of any documented  
28 inadvertent releases of radionuclides into groundwater. The applicant shall include in its  
29 assessment a description of any groundwater protection program used for the surveillance  
30 of piping and components containing radioactive liquids for which a pathway to groundwater  
31 may exist. The assessment must also include a description of any past inadvertent releases  
32 and the projected impact to the environment (e.g., aquifers, rivers, lakes, ponds, the ocean)  
33 during the license renewal term.
- 34 • 40 CFR Part 6, Appendix A, concerning procedures on floodplain management and  
35 wetlands protection
- 36 • Federal, State, regional, and local agencies and Indian Tribe water laws and water rights
- 37 • 40 CFR Part 121, State Certification of Activities Requiring a Federal License or Permit
- 38 • 40 CFR Part 122, concerning the NPDES permit conditions for discharges including  
39 stormwater discharges
- 40 • 40 CFR Part 124, concerning the NPDES permit process
- 41 • 40 CFR Part 125, concerning water-quality standards for the NPDES program

- 1 • 40 CFR Part 133, concerning treated effluents
- 2 • 40 CFR Part 149, concerning possible supplemental restrictions on waste disposal and
- 3 water use in or above a sole source aquifer
- 4 • 40 CFR Part 165, concerning the disposal and storage of pesticides
- 5 • 40 CFR Part 403, concerning pretreatment of waste effluents
- 6 • 40 CFR Part 423, concerning effluent limitations for the steam electric power generating
- 7 point source category.

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

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

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

28 **4.5.3 Review Procedures (General for Water Resources Issues)**

- 29 1. Review the discussion of surface water and groundwater issues in the LR GEIS to identify  
 30 the information considered and the conclusions reached. This step establishes the basis for  
 31 evaluating information identified by the applicant, the public, and the staff.
- 32 2. Determine if there is new information on these issues that should be evaluated. The  
 33 following sources of information should be included in the search for new information:
  - 34 – The applicant's ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new  
 35 and significant information regarding the environmental impacts of license renewal of  
 36 which it is aware. In reviewing the applicant's ER, consider the applicant's process for  
 37 discovering new information and evaluating the significance of any new information  
 38 discovered.
  - 39 – Records of public scoping meetings and correspondence related to the application.  
 40 Compare information presented by the public with information considered in the LR  
 41 GEIS.
  - 42 – Identify relative sources of information used for evaluating impacts, including:

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

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

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

#### 25 **4.5.4 Evaluation Findings**

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

#### 30 **4.5.5 Surface Water Use Conflicts (Plants With Cooling Ponds Or Cooling Towers 31 Using Makeup Water From A River)**

##### 32 *4.5.5.1 Areas of Review*

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

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



1 Data and Information Needs

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

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

8 *4.5.5.2 Acceptance Criteria*

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

11 *4.5.5.3 Review Procedures*

12 Suggested steps for the review process are as follows:

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

- 1 – Federal, State, regional, local and Indian Tribe standards and regulations applicable to  
2 water use including surface water withdrawal registration and reporting and consumptive  
3 water use and return flows
- 4 – proposed means to ensure operational compliance with water use standards and  
5 regulations.
- 6 7. Prepare a statement for the SEIS that:
- 7 – analyzes the impacts of continued plant operations and refurbishment
- 8 – describes measures to mitigate adverse impacts
- 9 – provides the significance level of the environmental impacts
- 10 – describes any new information developed or used in the plant-specific assessment.

#### 11 *4.5.5.4 Evaluation Findings*

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

### 16 **4.5.6 Groundwater Use Conflicts (Plants That Withdraw More Than 100 Gallons Per** 17 **Minute [gpm])**

#### 18 *4.5.6.1 Areas of Review*

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

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

#### 26 Data and Information Needs

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

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

#### 33 *4.5.6.2 Acceptance Criteria*

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

1 4.5.6.3 *Review Procedures*

2 Suggested steps for the review process are as follows:

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

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

5 7. Prepare a statement for the SEIS that:

- 6 – analyzes the impacts of continued plant operations and refurbishment
- 7 – describes measures to mitigate adverse impacts
- 8 – provides the significance level of the environmental impacts
- 9 – describes any new information developed or used in the plant-specific assessment.

10 **4.5.6.4 Evaluation Findings**

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

15 **4.5.7 Groundwater Use Conflicts (Plants With Closed-Cycle Cooling Systems That**  
16 **Withdraw Makeup Water From A River)**

17 **4.5.7.1 Areas of Review**

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

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

24 **Data and Information Needs**

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

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

31 **4.5.7.2 Acceptance Criteria**

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

1 4.5.7.3 *Review Procedures*

2 Suggested steps for the review process are as follows:

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

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

#### 18 4.5.7.4 *Evaluation Findings*

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

### 23 4.5.8 **Groundwater Quality Degradation (Plants With Cooling Ponds)**

#### 24 4.5.8.1 *Areas of Review*

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

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

#### 31 Data and Information Needs

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

- 34 • the applicant's ER
- 35 • the LR GEIS

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

3 *4.5.8.2 Acceptance Criteria*

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

6 *4.5.8.3 Review Procedures*

7 Suggested steps for the review process are as follows:

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

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

22 8. Review the applicant's ER, including:

- 23 – the applicant's process for identifying new and potentially significant information
- 24 – any new information included in the ER on the groundwater quality degradation issues  
25 known to the applicant and the public
- 26 – any currently employed or proposed practices and measures to control or limit  
27 operational water-use impact
- 28 – summary of statutory and other legal restrictions relating to water quality or specific  
29 restrictions on groundwater use and quality imposed by State or Federal regulations
- 30 – proposed means to ensure operational compliance with water use and water quality  
31 standards and regulations.

32 9. Prepare a statement for the SEIS that:

- 33 – analyzes the impacts of continued plant operations and refurbishment
- 34 – describes measures to mitigate adverse impacts
- 35 – provides the significance level of the environmental impacts
- 36 – describes any new information developed or used in the plant-specific assessment.

37 *4.5.8.4 Evaluation Findings*

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



1 **4.5.9 Radionuclides Released to Groundwater**

2 *4.5.9.1 Areas of Review*

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

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

10 Data and Information Needs

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

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

17 *4.5.9.2 Acceptance Criteria*

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

20 *4.5.9.3 Review Procedures*

21 Suggested steps for the review process are as follows:

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

- 1       – for plants that rely on a system other than a groundwater monitoring system composed
- 2       of wells, describe the program used for preventing, detecting, and responding to
- 3       inadvertent releases of radioactive materials into the groundwater.
- 4    3. Review the applicant's ER, including
- 5       – the applicant's process for identifying new and potentially significant information
- 6       – any new information included in the ER on incidents regarding radionuclides released to
- 7       groundwater known to the applicant or the public
- 8       – any currently employed or proposed practices and measures to control or limit
- 9       operational groundwater quality impact (best management practices)
- 10      – summary of statutory and other legal restrictions relating to water quality or specific
- 11      restrictions on groundwater use and quality imposed by State or Federal regulations
- 12      – proposed means to ensure operational compliance with water use and water quality
- 13      standards and regulations.
- 14    4. Prepare a statement for the SEIS that
- 15      – analyzes the impacts of continued plant operations and refurbishment
- 16      – describes measures to mitigate adverse impacts, if any
- 17      – provides the significance level of the environmental impacts, if any
- 18      – describes any new information developed or used in the plant-specific assessment.

#### 19    4.5.9.4    *Evaluation Findings*

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

## 24    **4.6    Ecological Resources**

### 25    **4.6.1    Areas of Review**

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

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

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

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

#### 7 Data and Information Needs

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

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

#### 27 **4.6.2 Acceptance Criteria (General for Ecological Resources Issues)**

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

- 30 • 40 CFR Part 122 and 40 CFR Part 125, concerning impingement mortality and entrainment  
31 at existing facilities subject to Clean Water Act (CWA) Section 316(b)
- 32 • 40 CFR Part 423, concerning thermal effluent discharges subject to CWA Section 316(a)
- 33 • 50 CFR Part 402, concerning interagency consultation for federally listed species and critical  
34 habitats protected under the ESA
- 35 • 50 CFR Part 600, concerning interagency consultation for essential fish habitat (EFH)  
36 protected under the MSA.

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

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

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

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

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

15 **4.6.3 Review Procedures (General For Ecological Resources Issues)**

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

- 24 1. Review the discussion of ecological resource impacts in the LR GEIS. This step establishes  
 25 the basis for evaluating information identified by the applicant, relevant Federal and State  
 26 resource agencies, affected Indian Tribes, the public, and the staff. Table 4-1 and Table 4-2  
 27 identify the 24 ecological resource issues (15 Category 1 and 9 Category 2) evaluated in the  
 28 LR GEIS and codified in Table B-1 in Appendix B to Subpart A of 10 CFR Part 51.
- 29 2. Review the discussion of license renewal and its impacts on ecological resources provided  
 30 in the applicant's ER.
- 31 3. Identify the relevant sources of information, which may include:
  - 32 – Surveys, studies, and monitoring. Summarize any surveys, studies, and monitoring that  
 33 provide site-specific, local, or regional data on ecological resources and that are relevant  
 34 to assessing the environmental impacts of license renewal and alternatives. Include the  
 35 biological entities or ecological attributes chosen for investigation, methodology, results,  
 36 and conclusions.
  - 37 – Communications with and views of relevant regulatory agencies. Document any  
 38 communications with Federal and State agencies and Indian Tribes with special  
 39 expertise or jurisdiction (e.g., EPA or other water quality permitting agencies concerning  
 40 impingement and entrainment and thermal impacts; FWS and NMFS concerning

- 1 federally listed species and critical habitats; State natural resource agencies; etc.) that  
2 are relevant to assessing impacts and are not documented elsewhere. Include the  
3 views of affected Indian Tribes in cases where culturally significant ecological resources  
4 may be affected. Discuss major points of view and significant concerns or objections  
5 raised by these entities. If relevant communications are documented elsewhere, refer  
6 the reader to the appropriate sections. Include other interested stakeholders, as  
7 appropriate.
- 8 – Other sources. Include in-text citations to other sources of information relied upon and  
9 provide full citations in a literature cited section.
- 10 4. Identify specific ecological resources and the attributes of those resources potentially at risk.  
11 Because ecological systems are complicated, only a subset of resources can be addressed.
- 12 – Identify the potentially affected ecological resources. Describe the potentially affected  
13 resources in terms of ecosystem or habitat type (e.g., oak-hickory forest, tallgrass  
14 prairie, tidal salt marsh). Give special attention to important habitats (e.g., important bird  
15 areas, known bat hibernacula, spawning and rearing areas, locally significant habitats,  
16 natural heritage areas, wildlife sanctuaries and preserves, federally or state-managed  
17 lands and waters).
- 18 – Describe the potentially affected plants and animals in terms of functional groups  
19 (e.g., plants, mammals, reptiles, fish, invertebrates, etc.) or trophic structure  
20 (e.g., producers and consumers). For instance, an aquatic system may include  
21 plankton, macrophytes, and periphyton (primary producers); zooplankton and benthic  
22 macroinvertebrates (primary consumers); and bottom feeding, planktivorous, and  
23 piscivorous fish (secondary and tertiary consumers).
- 24 – For federally protected ecological resources, identify and describe the potentially  
25 affected federally listed species and designated critical habitats under the ESA. Include  
26 candidate and proposed species and proposed critical habitats, if applicable. Identify  
27 and describe EFH, including habitats of particular concern (HAPC), by federally  
28 managed species and life stage. Identify and describe any national marine sanctuaries  
29 and the living and nonliving resources of those sanctuaries.
- 30 – Identify attributes of those resources potentially at risk. Identify the attributes of the  
31 resources of concern that are potentially at risk and that are important to protect (EPA  
32 1998). If adverse effects on a species, habitat, or other ecological resource are  
33 possible, the resource should be assessed in terms of spatial scale (e.g., local, regional,  
34 or national), temporal scale (e.g., the time frame over which stressors or effects will be  
35 evaluated), and resource value (e.g., social, economic, or ecological).
- 36 – Evaluate biodiversity, which refers to the variety of life on Earth at all its levels including  
37 genes, individuals, species, habitats, and ecosystems. As an important attribute to  
38 consider, biodiversity helps maintain the structural diversity and functional integrity of  
39 ecosystems and provides a wide pool of biological resources that can respond and  
40 adapt to various natural and human-made stressors (CEQ 1993).
- 41 5. Explain the relationships between nuclear power plant operation and ecological resource  
42 attributes. Relationships can be examined by identifying the pathways through which  
43 potential stressors act on the chosen ecological receptors and expressing these as risk  
44 hypotheses (see EPA 1998, Section 3.4.1). Risk hypotheses may be very simple, predicting  
45 the potential effect of one stressor on one receptor, or extremely complex.

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

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

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

22 8. Prepare a statement for the SEIS that:

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

#### 27 **4.6.4 Evaluation Findings**

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

#### 32 **4.6.5 Non-Cooling System Impacts on Terrestrial Resources**

##### 33 *4.6.5.1 Areas of Review*

34 This ESRP provides guidance for the review of the effects of nuclear power plant operations on  
35 terrestrial resources during an initial LR or SLR term that are unrelated to operation of the  
36 cooling system. Such activities include landscape and grounds maintenance, stormwater  
37 management, elevated noise levels and vibration, and ground-disturbing activities. Section  
38 4.6.1.1.1 of the LR GEIS discusses the impacts of this issue. The scope of this review includes  
39 (1) review of the relevant sections of the LR GEIS, (2) review of the applicant's ER, (3) review of  
40 available studies, data, and other available information related to the issue, (4) identification and  
41 disposition of any new and potentially significant information, and (5) preparation of input for the  
42 SEIS.

1 Data and Information Needs

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

4 *4.6.5.2 Acceptance Criteria*

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

- 8 • 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of  
9 refurbishment, continued operations, and other license-renewal-related construction  
10 activities on important plant and animal habitats. Additionally, the applicant shall assess the  
11 impact of the proposed action on federally protected ecological resources in accordance  
12 with Federal laws protecting such resources, including but not limited to, the Endangered  
13 Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the  
14 National Marine Sanctuaries Act.

15 *4.6.5.3 Review Procedures*

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

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

- 1 – Describe ground-disturbing activities anticipated during the license renewal period that  
2 would disturb terrestrial habitat. Include the amount of land to be disturbed, whether  
3 disturbance would be temporary or permanent, the ecological characteristics of the  
4 habitat, the species found within the area, and any unique or rare features of the habitat  
5 or species found within it. Include terrestrial habitat that would be disturbed by transport  
6 or delivery of equipment and supplies as well as laydown or storage of materials,  
7 structures, and components. Describe any related road, bridge, rail, or barge slip  
8 modifications that would occur that would affect terrestrial habitat.
- 9 4. Discuss relevant regional, state, Federal, and Indian Tribe permits and controls not already  
10 described that would reduce or mitigate non-cooling system impacts on terrestrial resources.
- 11 5. Describe site- or fleet-wide environmental procedures, wildlife management plans, best  
12 management practices, and conservation initiatives undertaken or proposed by the applicant  
13 that would benefit the terrestrial environment or otherwise mitigate non-cooling system  
14 impacts on terrestrial resources.
- 15 6. Review the applicant’s ER, including
- 16 – the applicant’s process for identifying new and potentially significant information  
17 – any new information included in the ER on ecological impact issues known to the  
18 applicant and the public.
- 19 7. Prepare a statement for the SEIS related to this issue that
- 20 – analyzes the impacts of continued plant operations and refurbishment  
21 – describes measures to mitigate adverse impacts  
22 – provides the significance level of the environmental impacts  
23 – describes any new information developed or used in the plant-specific assessment.

24 **4.6.5.4 Evaluation Findings**

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

29 **4.6.6 Water Use Conflicts with Terrestrial Resources (Plants With Cooling Ponds Or**  
30 **Cooling Towers Using Makeup Water From A River)**

31 **4.6.6.1 Areas of Review**

32 This ESRP provides guidance for the review of water use conflicts that may arise at nuclear  
33 power plants with cooling ponds or cooling towers that use makeup water from a river and how  
34 those conflicts could affect terrestrial resources during the initial LR or SLR term. Notably, this  
35 issue also applies to nuclear power plants with hybrid cooling systems that withdraw makeup  
36 water from a river (i.e., once-through cooling systems with helper cooling towers) (e.g., NRC  
37 2020b). Section 4.6.1.1.6 of the LR GEIS discusses the impacts of this issue. The scope of this  
38 review includes (1) review of the relevant sections of the LR GEIS, (2) review of the applicant’s  
39 ER, (3) review of available studies, data, and other available information related to the issue,  
40 (4) identification and disposition of any new and potentially significant information, and  
41 (5) preparation of SEIS input.



1 Data and Information Needs

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

4 4.6.6.2 *Acceptance Criteria*

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

- 8 • 10 CFR 51.53(c)(3)(ii)(A). If the applicant's plant utilizes cooling towers or cooling ponds  
9 and withdraws makeup water from a river, an assessment of the impact of the proposed  
10 action on water availability and competing water demands, the flow of the river, and related  
11 impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be  
12 provided.

13 4.6.6.3 *Review Procedures*

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

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

- 1       – Describe past water use conflicts with terrestrial resources, if any, and evaluate whether  
2       such conflicts would be likely to arise again during the license renewal term.
- 3 4. Review the applicant's ER, including
- 4       – the applicant's process for identifying new and potentially significant information
- 5       – any new information included in the ER on ecological impact issues known to the  
6       applicant and the public.
- 7 5. Prepare a statement for the SEIS related to this issue that
- 8       – analyzes the impacts of continued plant operations and refurbishment
- 9       – describes measures to mitigate adverse impacts
- 10       – provides the significance level of the environmental impacts
- 11       – describes any new information developed or used in the plant-specific assessment.

#### 12 4.6.6.4 *Evaluation Findings*

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

#### 17 **4.6.7 Impingement Mortality and Entrainment of Aquatic Organisms (Plants with 18 Once-Through Cooling Systems or Cooling Ponds)**

##### 19 4.6.7.1 *Areas of Review*

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

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

#### 37 Data and Information Needs

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

1 4.6.7.2 *Acceptance Criteria*

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

- 5 • 10 CFR 51.53(c)(3)(ii)(B). If the applicant's plant utilizes once-through cooling or cooling  
6 pond water intake and discharge systems, the applicant shall provide a copy of current  
7 Clean Water Act (CWA) 316(b) Best Technology Available determinations and, if necessary,  
8 a 316(a) variance in accordance with 40 CFR part 125, or equivalent State permits and  
9 supporting documentation. If the applicant cannot provide these documents, it shall assess  
10 the impact of the proposed action on fish and shellfish resources resulting from impingement  
11 mortality and entrainment and thermal discharges.

12 4.6.7.3 *Review Procedures*

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

- 18 1. Review the discussion of this issue in the LR GEIS.
- 19 2. Review the discussion in the applicant's ER concerning the nuclear power plant's cooling  
20 water intake structure design and operation, NPDES permit status, and impingement  
21 mortality and entrainment studies and data.
- 22 3. Review impingement and entrainment studies conducted at the nuclear power plant and any  
23 supporting monitoring and data.
- 24 4. Review the nuclear power plant's current NPDES permit and the status of the permitting  
25 authority's BTA determinations.
  - 26 – If the NPDES permitting authority has made BTA determinations for the nuclear power  
27 plant pursuant to CWA Section 316(b) in accordance with the current regulations at  
28 40 CFR Part 122 and 40 CFR Part 125, which were promulgated in 2014 (79 FR 48300),  
29 and that plant has implemented any associated requirements or those requirements  
30 would be implemented before the license renewal period, then the NRC staff assumes  
31 that adverse impacts on the aquatic environment will be minimized (see 10 CFR  
32 51.10(c); 10 CFR 51.53(c)(3)(ii)(B); 10 CFR 51.71(d)). In such cases, the reviewer can  
33 conclude that the impacts of either impingement mortality, entrainment, or both would be  
34 SMALL over the course of the license renewal term, and no additional analysis is  
35 required.
  - 36 – If the NPDES permitting authority has not made BTA determinations, the reviewer  
37 should analyze the potential impacts of impingement mortality, entrainment, or both  
38 using a weight-of-evidence approach. In this approach, the reviewer should consider  
39 multiple lines of evidence to assess the presence or absence of ecological impairment  
40 (i.e., noticeable or detectable impact) on the aquatic environment. For instance, as its  
41 lines of evidence, the staff might consider characteristics of the cooling water intake  
42 system design, the results of impingement and entrainment studies performed at the  
43 facility, and trends in fish and shellfish population abundance indices. The reviewer  
44 should then consider these lines of evidence together to predict the level of impact

- 1 (SMALL, MODERATE, or LARGE) that the aquatic environment is likely to experience  
2 over the course of the license renewal term.
- 3 5. Obtain additional information to assist in evaluating the specific nature of impingement and  
4 entrainment effects, as needed, including the following:
- 5 – location of the cooling water intake structure, intake velocities, and withdrawal volumes
  - 6 – information on screening device technologies and fish collection and return technologies
  - 7 – swimming abilities of local species or their surrogates, including burst, prolonged, or  
8 sustained speeds
  - 9 – other relevant life history characteristics of local species, such as size and susceptibility  
10 to impingement or entrainment at various life stages; population abundances and  
11 distributions; special species statuses and designations; and regional management  
12 objectives
  - 13 – physical or biological factors that might concentrate or attract organisms to the area of  
14 the intake.
- 15 6. Review the applicant's ER, including
- 16 – the applicant's process for identifying new and potentially significant information
  - 17 – any new information included in the ER on ecological impact issues known to the  
18 applicant and the public.
- 19 7. Prepare a statement for the SEIS related to this issue that
- 20 – summarizes the status of the NPDES permitting authority's CWA Section 316(b) BTA  
21 determinations
  - 22 – adopts the NPDES permitting authority's conclusions (if the permitting authority has  
23 made BTA determinations)
  - 24 – analyzes the impacts of continued plant operations and refurbishment (if the permitting  
25 authority has not made BTA determinations)
  - 26 – describes measures to mitigate adverse impacts
  - 27 – provides the significance level of the environmental impacts
  - 28 – describes any new information developed or used in the plant-specific assessment.

#### 29 4.6.7.4 *Evaluation Findings*

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

### 34 **4.6.8 Effects of Thermal Effluents on Aquatic Organisms (Plants With Once-Through 35 Cooling Systems Or Cooling Ponds)**

#### 36 4.6.8.1 *Areas of Review*

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

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

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

#### 19 Data and Information Needs

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

#### 22 *4.6.8.2 Acceptance Criteria*

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

- 26 • 10 CFR 51.53(c)(3)(ii)(B). If the applicant's plant utilizes once-through cooling or cooling  
27 pond water intake and discharge systems, the applicant shall provide a copy of current  
28 Clean Water Act (CWA) 316(b) determinations and, if necessary, a 316(a) variance in  
29 accordance with 40 CFR part 125, or equivalent State permits and supporting  
30 documentation. If the applicant cannot provide these documents, it shall assess the impact  
31 of the proposed action on fish and shellfish resources resulting from impingement mortality  
32 and entrainment and thermal discharges.

#### 33 *4.6.8.3 Review Procedures*

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

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

- 1 3. Review thermal studies conducted at the nuclear power plant and any supporting monitoring  
2 and data.
- 3 4. Review the nuclear power plant's current NPDES permit and the status of the permitting  
4 authority's CWA Section 316(a) determination.
- 5 – If the NPDES permitting authority has made a determination under CWA Section 316(a)  
6 that thermal effluent limits are sufficiently stringent to assure the protection and  
7 propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on  
8 the receiving body of water, and the nuclear power plant has implemented any  
9 associated requirements, then the NRC staff assumes that adverse impacts on the  
10 aquatic environment will be minimized (see 10 CFR 51.10(c); 10 CFR 51.53(c)(3)(ii)(B);  
11 and 10 CFR 51.71(d)). In such cases, the reviewer can conclude that thermal impacts  
12 on aquatic organisms would be SMALL over the course of the license renewal term, and  
13 no additional analysis is required.
- 14 – If the NPDES permitting authority has not granted a CWA Section 316(a) variance, the  
15 reviewer should analyze the potential impacts of thermal discharges using a weight-of-  
16 evidence approach. In this approach, the reviewer should consider multiple lines of  
17 evidence to assess the presence or absence of ecological impairment (i.e., noticeable or  
18 detectable impact) on the aquatic environment. For instance, as its lines of evidence,  
19 the reviewer might consider characteristics of the cooling water discharge system  
20 design, the results of thermal studies performed at the facility, and trends in fish and  
21 shellfish population abundance indices. The reviewer should then consider these lines  
22 of evidence together to predict the level of impact (SMALL, MODERATE, or LARGE)  
23 that the aquatic environment is likely to experience over the course of the license  
24 renewal term.
- 25 5. Obtain additional information to assist in evaluating the specific nature of thermal stresses,  
26 as needed, including the following:
- 27 – thermal plume characteristics, such as areal extent of the plume and thermal contour  
28 maps
- 29 – thermal tolerances of local species or their surrogates
- 30 – other relevant life history characteristics of local species, such as seasonal absence or  
31 presence; population abundances and distributions; special species statuses and  
32 designations; and regional management objectives
- 33 – data on fish kill events related to nuclear power plant operation
- 34 – physical or biological factors that might concentrate or attract organisms to the thermal  
35 plume.
- 36 6. Review the applicant's ER, including
- 37 – the applicant's process for identifying new and potentially significant information
- 38 – any new information included in the ER on ecological impact issues known to the  
39 applicant and the public
- 40 7. Prepare a statement for the SEIS related to this issue that
- 41 – summarizes the status of the NPDES permitting authority's CWA Section 316(a)  
42 determination
- 43 – adopts the NPDES permitting authority's conclusions (if the permitting authority has  
44 made a CWA Section 316(a) determination)

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

5    4.6.8.4    *Evaluation Findings*

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

10   **4.6.9    Water Use Conflicts with Aquatic Resources (Plants With Cooling Ponds Or**  
11    **Cooling Towers Using Makeup Water From A River)**

12    4.6.9.1    *Areas of Review*

13    This ESRP provides guidance for the review of water use conflicts that may arise at nuclear  
14    power plants with cooling ponds or cooling towers that use makeup water from a river and how  
15    those conflicts could affect aquatic resources during the initial LR or SLR term. Notably, this  
16    issue also applies to nuclear power plants with hybrid cooling systems that withdraw makeup  
17    water from a river (i.e., once-through cooling systems with helper cooling towers) (e.g., NRC  
18    2020b). Section 4.6.1.2.10 of the LR GEIS discusses the impacts of this issue. The scope of  
19    this review includes (1) review of the relevant sections of the LR GEIS, (2) review of the  
20    applicant’s ER, (3) review of available studies, data, and other available information related to  
21    the issue, (4) identification and disposition of any new and potentially significant information,  
22    and (5) preparation of SEIS input.

23    Data and Information Needs

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

26    4.6.9.2    *Acceptance Criteria*

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

- 30    • 10 CFR 51.53(c)(3)(ii)(A). If the applicant’s plant utilizes cooling towers or cooling ponds  
31    and withdraws makeup water from a river, an assessment of the impact of the proposed  
32    action on water availability and competing water demands, the flow of the river, and related  
33    impacts on stream (aquatic) and riparian (terrestrial) ecological communities must be  
34    provided.

35    4.6.9.3    *Review Procedures*

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

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

- 3 1. Review the discussion of this issue in the LR GEIS.
- 4 2. Review the discussion in the applicant's ER concerning surface water use.
- 5 3. Describe the following, with a focus on the interfaces with the aquatic environment and how  
6 site procedures, permits, and other controls minimize or mitigate impacts on the terrestrial  
7 environment.

8 – Summarize the baseline hydrologic regime of the affected surface waters, including  
9 seasonal fluctuations in flow, and conditions that could lead to extreme periods of low  
10 flow.

11 – Summarize current and anticipated consumptive water use by the nuclear power plant.

12 – Identify other users relying on the affected surface waters, including downstream  
13 municipal, agricultural, or industrial users, with which the nuclear power plant may  
14 compete.

15 – Identify aquatic habitats and species that would be especially sensitive to reduced water  
16 availability (e.g., nearshore habitat; aquatic plants; early life stages of fish and shellfish;  
17 species that rely on specific microhabitats that may not be available under low flow  
18 conditions; etc.).

19 – Discuss regional, state, Federal, and Indian Tribe permits and controls concerning water  
20 use and any agreements with water resources control boards.

21 – Summarize any other current or proposed practices and measures to control or limit  
22 operational water-use impacts.

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

- 25 4. Review the applicant's ER, including

26 – the applicant's process for identifying new and potentially significant information

27 – any new information included in the ER on ecological impact issues known to the  
28 applicant and the public

- 29 5. Prepare a statement for the SEIS related to this issue that:

30 – analyzes the impacts of continued plant operations and refurbishment

31 – describes measures to mitigate adverse impacts

32 – provides the significance level of the environmental impacts

33 – describes any new information developed or used in the plant-specific assessment.

#### 34 **4.6.10 Evaluation Findings**

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



1 **4.6.11 Endangered Species Act: Federally Listed Species and Critical Habitats**

2 *4.6.11.1 Areas of Review*

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

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

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

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

35 Data and Information Needs

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

1 4.6.11.2 *Acceptance Criteria*

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

- 5 • 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of  
6 refurbishment, continued operations, and other license-renewal-related construction  
7 activities on important plant and animal habitats. Additionally, the applicant shall assess the  
8 impact of the proposed action on federally protected ecological resources in accordance  
9 with Federal laws protecting such resources, including but not limited to, the Endangered  
10 Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the  
11 National Marine Sanctuaries Act.

12 4.6.11.3 *Review Procedures*

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

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

36 4.6.11.4 *Evaluation Findings*

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

1 **4.6.12 Magnuson-Stevens Act: Essential Fish Habitat**

2 *4.6.12.1 Areas of Review*

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

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

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

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

24 The Fishery Management Councils also may designate some EFH as a HAPC if that habitat  
25 exhibits one or more of the following traits: rare, stressed by development, possessing  
26 important ecological functions for EFH species, or especially vulnerable to anthropogenic  
27 degradation. HAPC can cover a specific location (e.g., an estuary bank or a single spawning  
28 location) or cover habitat type that is found at many locations (e.g., coral, nearshore nursery  
29 areas, pupping grounds). HAPC designation does not convey additional restrictions or  
30 protections on an area. The designation simply focuses increased scrutiny, study, or mitigation  
31 planning compared to surrounding areas because HAPC represent high-priority areas for  
32 conservation, management, or research and are necessary for healthy ecosystems and  
33 sustainable fisheries. The Fishery Management Councils may, however, restrict the use or  
34 possession of fishing gear types within HAPC. The geographic boundaries of HAPC are subject  
35 to refinement through amendments, as research better informs management decisions (NOAA  
36 2020).

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

1 Data and Information Needs

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

6 *4.6.12.2 Acceptance Criteria*

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

- 9 • 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of  
10 refurbishment, continued operations, and other license-renewal-related construction  
11 activities on important plant and animal habitats. Additionally, the applicant shall assess the  
12 impact of the proposed action on federally protected ecological resources in accordance  
13 with Federal laws protecting such resources, including but not limited to, the Endangered  
14 Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the  
15 National Marine Sanctuaries Act.

16 *4.6.12.3 Review Procedures*

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

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

1 4.6.12.4 *Evaluation Findings*

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

6 **4.6.13 National Marine Sanctuaries Act: Sanctuary Resources**

7 4.6.13.1 *Areas of Review*

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

16 Congress enacted the NMSA in 1972 to protect areas of the marine environment that have  
17 special national significance. The NMSA authorizes the Secretary of Commerce to establish the  
18 National Marine Sanctuary System and designate sanctuaries within that system. ONMS is  
19 charged with comprehensively managing this system, which includes 15 sanctuaries and the  
20 Papahānaumokuākea and Rose Atoll marine national monuments, encompassing more than  
21 600,000 square miles of marine and Great Lakes waters from Washington State to the Florida  
22 Keys, and from Lake Huron to American Samoa. Within these areas, sanctuary resources  
23 include any living or nonliving resource of a national marine sanctuary that contributes to the  
24 conservation, recreational, ecological, historical, educational, cultural, archaeological, scientific,  
25 or aesthetic value of the sanctuary. As of 2022, four additional sanctuaries are proposed for  
26 designation. Maps of designated and proposed sanctuaries are available at  
27 <https://sanctuaries.noaa.gov/about/maps.html>.

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

37 Data and Information Needs

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

1 4.6.13.2 *Acceptance Criteria*

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

- 5 • 10 CFR 51.53(c)(3)(ii)(E). All license renewal applicants shall assess the impact of  
6 refurbishment, continued operations, and other license-renewal-related construction  
7 activities on important plant and animal habitats. Additionally, the applicant shall assess the  
8 impact of the proposed action on federally protected ecological resources in accordance  
9 with Federal laws protecting such resources, including but not limited to, the Endangered  
10 Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the  
11 National Marine Sanctuaries Act.

12 4.6.13.3 *Review Procedures*

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

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

36 4.6.13.4 *Evaluation Findings*

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

1 **4.7 Historic and Cultural Resources**

2 **4.7.1 Areas of Review**

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

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

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

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

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

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

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

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

#### 14 Data and Information Needs

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

- 17 • the applicant's ER
- 18 • the LR GEIS
- 19 • new and significant information identified by the public and other information sources
- 20 • a map that identifies the APE and a site disturbance map
- 21 • cultural resource investigations (e.g., archaeological or architectural) conducted within the  
22 direct and indirect APE and surrounding area
- 23 • information related to evaluations for eligibility for the *National Register of Historic Places*  
24 (36 CFR Part 60), and associated consultations with the SHPO/THPO, Indian Tribes, and  
25 interested parties (e.g., certified local governments, local preservation officials)
- 26 • applicant's cultural resource protection procedures or Cultural Resource Management  
27 Plans.

#### 28 **4.7.2 Acceptance Criteria**

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

- 32 • 10 CFR 51.53(c)(3)(ii)(K). All applicants shall identify any potentially affected historic and  
33 cultural resources and historic properties and assess whether future plant operations and  
34 any planned refurbishment activities would affect these resources in accordance with  
35 Section 106 of the National Historic Preservation Act and in the context of the National  
36 Environmental Policy Act.
- 37 • 36 CFR Part 800, "Protection of Historic Properties"
- 38 • 36 CFR Part 60, "National Register of Historic Places"
- 39 • 36 CFR Part 63, "Determinations of Eligibility for Inclusion in the National Register of Historic  
40 Places"



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

### 2 **4.7.3 Review Procedures**

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

- 6 1. Review the discussion of the impacts of plant operations during the renewal term on historic  
7 and cultural resources in the LR GEIS to identify the information considered and the  
8 conclusions reached. This step establishes the base for evaluation of information identified  
9 by the applicant, the public, and the staff.
- 10 2. Analyze the historic and cultural resources and historic properties impacts associated with  
11 continued plant operations during the renewal term and refurbishment, as follows:
  - 12 – Define the undertaking (i.e., initial LR or SLR).
  - 13 – Describe the coordination of the NHPA Section 106 review through NEPA in accordance  
14 with 36 CFR 800.8(c).
  - 15 – Identify and discuss any activities associated with continued operations, maintenance,  
16 and refurbishment that could affect onsite or offsite historic and cultural resources  
17 located within the direct and indirect APEs. Such activities include ground-disturbing  
18 activities (e.g., land clearing, grading, excavating, road work), increases in traffic, and  
19 noise and visual intrusions.
  - 20 – Review the site disturbance map (developed by a qualified archaeologist) that indicates  
21 areas of heavy disturbance and areas of high potential for undiscovered historic and  
22 cultural resources.
  - 23 – Identify and assess effects to historic properties found in the direct and indirect APEs  
24 that may be affected by the proposed undertaking (i.e., initial LR or SLR). Use the  
25 criteria specified in 36 CFR 800.5 to assess adverse effects on historic properties.  
26 Provide a basis and documentation for how a conclusion is reached.
  - 27 – Identify and assess effects to historic and cultural resources that are not determined to  
28 be historic properties but may be considered important in the context of NEPA, as  
29 amended (e.g., sacred sites, cemeteries, local gathering areas).
  - 30 – Discuss the direct and indirect effects (e.g., ground disturbance, physical, visual,  
31 auditory, atmospheric such as fugitive dust, light, and traffic), if any, from the proposed  
32 project, and from any associated transmission lines on nearby historic properties or  
33 important historic and cultural resources.
  - 34 – Review any issues related to historic and cultural resources identified during the public  
35 scoping period.
  - 36 – Review any correspondence from the SHPO/THPO, Indian Tribes, interested parties, or  
37 local preservation officials regarding any cultural resource investigations conducted on  
38 the applicant's site.
  - 39 – If significant resources are located within the APE, review any procedures or integrated  
40 cultural resources management plans instituted by the applicant to protect the historic  
41 and cultural resources identified on the site or within the in-scope transmission line  
42 ROWs. Also, verify that the applicant has developed these procedures and plans in

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

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

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

7 – No historic properties present, the undertaking will have no effect to historic properties

8 – Historic properties present, the undertaking will have no adverse effect upon them

9 – Historic properties present, the undertaking will have an adverse effect upon one or  
10 more historic properties (see 36 CFR 800.5).

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

14 3. Prepare a statement for the SEIS that

15 – analyzes the impacts of continued plant operations and refurbishment and summarizes  
16 the information that has been reviewed, and the analyses that have been conducted

17 – describes measures to avoid, minimize, or mitigate adverse impacts

18 – provides the significance level of the environmental impacts

19 – discusses any new information developed or used in the plant-specific assessment  
20 evaluation findings.

#### 21 **4.7.4 Evaluation Findings**

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

### 27 **4.8 Socioeconomics**

#### 28 **4.8.1 Areas of Review**

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

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

1 Data and Information Needs

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

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

- 14 • a description of the applicant’s process for identifying new and significant socioeconomic  
15 information in the ER
- 16 • any new and significant plant-specific socioeconomic impact information identified during  
17 scoping
- 18 • any new and significant plant-specific socioeconomic impact information identified during  
19 site visit, staff environmental review, and discussions with applicant.

20 **4.8.2 Acceptance Criteria**

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

23 **4.8.3 Review Procedures**

24 Suggested steps for the socioeconomic review are as follows:

- 25 1. The applicant is required by NRC regulation to disclose new and significant socioeconomic  
26 information regarding the environmental impacts of license renewal of which it is aware (see  
27 10 CFR 51.53(c)(3)(iv)). In reviewing the applicant’s ER, consider the applicant’s process  
28 for discovering new socioeconomic information and evaluating the significance of any new  
29 information discovered.
- 30 2. Review public scoping meeting transcripts and related correspondence.
- 31 3. Compare any new socioeconomic information with the conclusions in the LR GEIS.
- 32 4. Evaluate the significance of any new socioeconomic information for its effect on the  
33 socioeconomic impact analysis.
- 34 5. Prepare SEIS discussion describing the search for new and significant information,  
35 summarizing any new information found and the results of the significance evaluation.  
36 Incorporate by reference the conclusions from the LR GEIS for the proposed action or  
37 modify as necessary to account for any significant new information.

1 **4.8.4 Evaluation Findings**

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

5 **4.9 Human Health**

6 **4.9.1 Areas of Review**

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

10 The scope includes (1) review of human health impacts from continued plant operations during  
11 the initial LR and SLR term and refurbishment in the LR GEIS, (2) evaluation of new information  
12 for significance, and (3) preparation of input to the SEIS. Table 4-1 lists the applicable Category  
13 1 issues and Table 4-2 lists the applicable Category 2 issues for human health identified in the  
14 LR GEIS.

15 **Data and Information Needs**

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

- 18 • the applicant’s ER  
19 • the LR GEIS  
20 • new information on human health impacts identified by the public and other information  
21 sources.

22 **4.9.2 Acceptance Criteria**

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

- 25 • 10 CFR 51.53(c)(3)(ii)(G). If the applicant's plant uses a cooling pond, lake, canal, or  
26 discharges into waters of the United States accessible to the public, an assessment of the  
27 impact of the proposed action on public health from thermophilic organisms in the affected  
28 water must be provided.
- 29 • 10 CFR 51.53(c)(3)(ii)(H). If the applicant’s transmission lines that were constructed for the  
30 specific purpose of connecting the plant to the transmission system do not meet the  
31 recommendations of the National Electric Safety Code for preventing electric shock from  
32 induced currents, an assessment of the impact of the proposed action on the potential shock  
33 hazard from the transmission lines must be provided.

34 **4.9.3 Review Procedures**

35 Suggested steps for the review process are as follows:

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

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

- 3 2. Determine whether there is any new human health impact information that should be  
4 evaluated. The following sources of information should be included in the search for new  
5 information:
  - 6 – The applicant’s ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new  
7 and significant information on the human health impacts of operating license renewal of  
8 which it is aware. In reviewing the applicant’s ER, consider the applicant’s process for  
9 discovering new information and evaluating the significance of any new information.  
10 Assess whether the process is adequate to ensure a reasonable likelihood that the  
11 applicant would be aware of new information.
  - 12 – Records of public scoping meetings and correspondence related to the operating license  
13 renewal application. Compare the human health information presented by the public  
14 with information considered in the LR GEIS. Determine whether the information post-  
15 dates the analysis leading to the LR GEIS.
  - 16 – Part 20 standards and regulations. Have the applicable standards and regulations  
17 changed since the analysis leading to the LR GEIS? If so, determine whether these  
18 changes affect the NRC evaluation of applications for license renewal.

19 3. Evaluate the significance of new human health impact information.

- 20 4. Review the applicant’s ER, including:
  - 21 – the applicant’s process for identifying new and potentially significant information
  - 22 – any new information included in the ER on human health impact issues known to the  
23 applicant and the public

24 5. Prepare a statement for the SEIS describing the search for new information, summarizing  
25 new information found, presenting results of evaluation of significance, and adopting  
26 conclusions from the LR GEIS modified as necessary to account for new and significant  
27 information.

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

30 **4.9.4 Evaluation Findings**

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

35 **4.9.5 Microbiological Hazards to the Public**

36 *4.9.5.1 Areas of Review*

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

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

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

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

#### 14 Data and Information Needs

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

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

#### 21 4.9.5.2 *Acceptance Criteria*

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

#### 24 4.9.5.3 *Review Procedures*

25 Suggested steps for the review process are as follows:

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

- 1       – The temperature increase expected for the aquatic environment that is subject to the  
2       plant’s thermal discharges.
- 3       – The results of any analyses that have been made for the presence of microorganisms.  
4       Microbiological organisms of concern for public and occupational health, include enteric  
5       pathogens (bacteria that typically exist in the intestines of animals and humans (e.g.,  
6       *Pseudomonas aeruginosa*), thermophilic fungi, bacteria (e.g., *Legionella spp.* and *Vibrio*  
7       *spp.*), free-living amoebae (e.g., *Naegleria fowleri* and *Acanthamoeba spp.*), as well as  
8       organisms that produce toxins that affect human health (e.g., dinoflagellates [*Karenia*  
9       *brevis*] and blue-green algae). In addition, analyses for the presence of unusually high  
10      concentrations of the normally present *Legionella sp.* (Legionnaires’ disease bacteria)  
11      and the free-living amoebae of the genera *Naegleria* and *Acanthamoeba* should be  
12      cited.
- 13      – A list of the outbreaks of waterborne diseases in the United States during the previous  
14      10 years in the vicinity of the plant. This list is published regularly by the Centers for  
15      Disease Control and Prevention (CDC 2017).
- 16      – An evaluation of available data concerning the occurrence and concentrations of any of  
17      the microorganisms listed above in the vicinity of the plant and a determination of  
18      whether any of them are present under conditions and in locations that might be harmful  
19      to members of the public. If such an evaluation exists, it may be obtained from the  
20      applicant or from the State Public Health Department in the State in which the plant is  
21      located.
- 22    3. Consult with the State Public Health Department and review any records associated with  
23    waterborne disease outbreaks in the region. If the State Public Health Department is  
24    concerned about such outbreaks or the potential for such outbreaks, then continue the  
25    analysis at Step 4. Otherwise, prepare a statement for the SEIS describing the plant  
26    cooling system that
- 27      – outlines the process leading to the determination that there have been no or few  
28      waterborne disease outbreaks in the region
- 29      – provides a statement from the State Public Health Department indicating their basis for  
30      not being concerned about the potential for an impact to the public health from  
31      microbiological organisms associated with the cooling system
- 32      – concludes that it appears unlikely that thermal discharges from the plant would increase  
33      the number of deleterious thermophilic microorganisms to levels that could cause a  
34      public health problem.
- 35    4. If the State advises that tests should be conducted for concentration of *Naegleria fowleri* (or  
36    other thermophilic microorganisms) in the receiving waters, the licensee should consider  
37    performing the tests when the facility has been operating at a power level typical of the level  
38    anticipated during the license renewal term for at least a month to ensure a steady state  
39    population during the sampling. Samples should be taken at locations of potential public  
40    use. An evaluation of the data should be performed, and a determination made of the  
41    magnitude of potential impacts of *Naegleria fowleri* (or other thermophilic microorganisms)  
42    on public health during the license renewal term. If the potential for an impact is  
43    determined, then continue the analysis at Step 5. If the State does not advise that tests be  
44    conducted, but they still have a concern related to the presence of deleterious thermophilic  
45    microorganisms, then continue the analysis at Step 5 without the testing. Otherwise,  
46    prepare a statement for the SEIS that

- 1       – describes the results of the tests that were performed
- 2       – provides a statement from the State Public Health Department indicating their basis for
- 3       not being concerned about the potential for an impact to the public health from
- 4       microbiological organisms associated with the cooling system because of the tests that
- 5       were performed
- 6       – concludes that it appears unlikely that thermal discharges from the plant would increase
- 7       the number of deleterious thermophilic microorganisms to levels that could cause a
- 8       public health problem.
- 9    5. Request that the applicant consider mitigative measures to minimize the potential impacts if
- 10   the results of the consultation with the State Public Health Department and/or the review of
- 11   records associated with waterborne disease outbreaks in the region show any cause for
- 12   concern regarding public health concerns related to deleterious thermophilic
- 13   microorganisms. Mitigative measures may include
- 14       – setting up and executing a monitoring program for deleterious thermophilic
- 15       microorganisms
- 16       – limiting public access to areas affected by the plant’s thermal discharges (such as
- 17       prohibiting public swimming in the mixing zone of the river).
- 18   6. Prepare a statement for the SEIS that
- 19       – describes the plant cooling system
- 20       – summarizes the information related to any waterborne disease outbreaks in the region
- 21       – provides a statement from the State Public Health Department indicating any concerns
- 22       regarding the potential for an impact to the public health from microbiological organisms
- 23       associated with the cooling system
- 24       – identifies and describes the mitigative measures considered and committed to by the
- 25       applicant
- 26       – concludes that the impacts of microbiological organisms associated with the cooling
- 27       system are SMALL, MODERATE, or LARGE within the context of the analysis in the
- 28       LR GEIS, considering the mitigative measures committed to by the applicant
- 29       – discusses any new information developed or used in the plant-specific assessment.

#### 30   4.9.5.4   *Evaluation Findings*

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

### 35   **4.9.6   Electric Shock Hazards**

#### 36   4.9.6.1   *Areas of Review*

37   This ESRP provides guidance for the review of the electric shock hazards from transmission-  
 38   line-induced currents. This issue is identified as a Category 2 issue in the LR GEIS (NUREG-  
 39   1437, Revision 2; NRC 2023a).



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

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

#### 9 Data and Information Needs

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

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

#### 16 4.9.6.2 *Acceptance Criteria*

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

- 19 • 10 CFR 51.53(c)(3)(ii)(H), concerning assessing impacts of transmission systems not  
20 meeting NESC criteria.

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

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

#### 25 4.9.6.3 *Review Procedures*

26 Suggested steps for the review process are as follows:

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

- 1 – plans to bring lines into conformance with NESC criteria if not already in compliance.
- 2 Consider basic electrical design parameters, including transmission design voltage or
- 3 voltages, line capacity, conductor type and configuration, spacing between phases,
- 4 minimum conductor clearances to ground, maximum predicted electric field strength(s)
- 5 at 1 meter above ground, the predicted electric field strength(s) at the edge of the right-
- 6 of-way in kilovolts per meter, and the design bases for these values (from the ER)
- 7 – If NESC clearance standards cannot be demonstrated, a transmission line survey
- 8 identifying sites or areas that do not meet the standards and that may not meet the
- 9 standards following anticipated changes in transmission-line operations or changes in
- 10 land use in the right-of-way.
- 11 – If the applicant does not state that in-scope transmission lines meet electrical shock
- 12 hazard of the NESC code or the applicant’s demonstration is not adequate, then
- 13 continue the review at Step 4. Otherwise, prepare a statement for the SEIS that
  - 14 ▪ describes the route of the in-scope transmission lines
  - 15 ▪ describes the line (voltage, capacity, conductor configuration, minimum
  - 16 conductor- to-ground clearance, and maximum predicted electrical field strengths
  - 17 1 meter above ground, etc.)
  - 18 ▪ provides the basis for the staff evaluation
  - 19 ▪ concludes that the system meets the criteria of the NESC
- 20 4. Identify any sites or areas where the transmission lines fail to meet the NESC clearance
- 21 standards. These areas should be shown on maps, photographs, or drawings to be
- 22 included in the SEIS.
- 23 5. Identify measures that could be taken to meet the standards in the areas where the
- 24 transmission lines fail to meet the NESC standards. Determine which measures the
- 25 applicant plans or proposes to undertake, if any, and whether those measures would result
- 26 in transmission lines meeting the standards.
- 27 6. Identify and evaluate mitigation measures for those areas where the transmission lines
- 28 would not meet NESC standards.
- 29 7. Prepare a statement for the SEIS that
  - 30 – describes the route of the in-scope transmission lines
  - 31 – describes the line (voltage, capacity, conductor configuration, minimum conductor-to-
  - 32 ground clearance, and maximum predicted electrical field strengths 1 meter above
  - 33 ground, etc.) and potential shock hazard from the transmission lines
  - 34 – identifies sites or areas where NESC standards would not be met and explains why the
  - 35 standards are not appropriate to the situation or why the applicant would not make
  - 36 modifications to meet standards
  - 37 – describes measures to mitigate potential impacts in those areas
  - 38 – provides the significance level of the environmental impacts
  - 39 – discusses any new information developed or used in the plant-specific assessment.

1 4.9.6.4 *Evaluation Findings*

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

6 **4.10 Environmental Justice**

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

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

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

24 **4.10.1 Areas of Review**

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

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

32 Guidance on environmental justice review requirements is found in NRR Office Instruction LIC-  
33 203, Revision 4: “Procedural Guidance for Categorical Exclusions, Environmental  
34 Assessments, and Considering Environmental Issues” (NRC 2020c).

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

1 Data and Information Needs

2 The following data or information may be needed:

- 3 • the applicant’s ER
- 4 • any new and significant plant-specific environmental justice impact information and  
5 concerns identified during scoping
- 6 • any new and significant plant-specific environmental justice impact information and  
7 concerns identified during consultations with representatives of environmental justice  
8 communities and Indian Tribes.

9 **4.10.2 Acceptance Criteria**

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

- 12 • Executive Order 12898 (59 FR 7629), concerning Federal actions to address environmental  
13 justice in minority and low-income populations
- 14 • “Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory  
15 and Licensing Actions,” (69 FR 52040) affirms the Commission’s commitment to the general  
16 goals of Executive Order 12898 and strives to meet those goals as part of its NEPA review  
17 for licensing actions.
- 18 • 10 CFR 51.53(c)(3)(ii)(N). Applicants shall provide information on the general demographic  
19 composition of minority and low-income populations and communities (by race and  
20 ethnicity), and Indian Tribes in the vicinity of the nuclear power plant that could be  
21 disproportionately affected by license renewal, including continued reactor operations and  
22 refurbishment activities.

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

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

32 **4.10.3 Review Procedures**

33 The review procedure should be as follows:

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

- 1       – Impacts that could potentially affect or cause concern to minority populations, low-  
2 income populations, and Indian Tribes are evaluated in other environmental resource  
3 areas (e.g., air and water quality, socioeconomics, and cultural resources) during the  
4 license renewal environmental review. Any potential effects and/or concerns should be  
5 summarized in the environmental justice impacts section of the SEIS.
- 6       – In considering human health and environmental effects to minority populations, low-  
7 income populations, and Indian Tribes, different patterns of consumption of natural  
8 resources should also be considered (i.e., differences in rates and/or pattern of fish,  
9 vegetable, water, and/or wildlife subsistence consumption reflective of the unique  
10 characteristics of these populations and the “special character” of communities located  
11 near the nuclear plant) (see Section 4–4 of Executive Order 12898, “Subsistence  
12 Consumption of Fish and Wildlife”; 59 FR 7629).
- 13       – Consider whether there are any means or pathways for minority populations, low-income  
14 populations, or Indian Tribes to be disproportionately affected by license renewal-related  
15 activities. Examine the potential impacts to special pathway receptors (e.g., American  
16 Indian, Hispanic, and others living a traditional lifestyle pattern of subsistence). For  
17 example, special pathway impacts consider levels of contaminants in native vegetation,  
18 crops, soils and sediments, surface water, fish, and game animals in the vicinity of  
19 nuclear plant sites.
- 20       – Sources of information include
  - 21           ▪ Radiological Environmental Monitoring Program, annual radiological  
22 environmental operating reports
  - 23           ▪ State radiological monitoring programs.
- 24 3. Determine if human health or environmental effects are disproportionately high and adverse.
- 25       – Consider the following questions:
  - 26           ▪ Would the human health or environmental effects be greater for minority  
27 populations, low-income populations, or Indian Tribes than the general  
28 population?
  - 29           ▪ Would any of these effects not be experienced by the general population?
  - 30           ▪ Would the human health or environmental effects on minority populations, low-  
31 income populations, or Indian Tribes be significant, unacceptable, or above  
32 generally accepted norms such as regulatory limits or State and local statutes  
33 and ordinances? Should each human health or environmental effect, and where  
34 appropriate, the cumulative and multiple effects, be reviewed for significance?
- 35       – To the extent practicable, identify mitigation measures that reflect the needs and  
36 preferences of the affected minority population, low-income population, or Indian Tribe  
37 and environmental justice communities.

#### 38 **4.10.4 Evaluation Findings**

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

1 **4.11 Waste Management**

2 **4.11.1 Areas of Review**

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

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

10 **Data and Information Needs**

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

- 13 • a description of the applicant’s process for identifying new and potentially significant  
14 information
- 15 • any new information included in the ER on waste management, pollution prevention and  
16 waste minimization at the plant.
- 17 • the LR GEIS

18 **4.11.2 Acceptance Criteria**

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

21 **4.11.3 Review Procedures**

22 Suggested steps for the review process are as follows:

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

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

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

3 3. Evaluate the significance of new information.

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

#### 7 **4.11.4 Evaluation Findings**

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

### 12 **4.12 Greenhouse Gas Emissions and Climate Change**

#### 13 **4.12.1 Areas of Review**

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

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

#### 25 **Data and Information Needs**

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

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

#### 32 **4.12.2 Acceptance Criteria (General for Greenhouse Gas Emissions and Climate 33 Change Issues)**

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

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

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

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

16 40 CFR Part 98, “Mandatory Greenhouse Gas Reporting” – Establishes mandatory  
17 GHG reporting requirements for certain facilities and contains multiple provisions  
18 relevant to the air resources reviewer. 40 CFR 98.6 defines various terms, including  
19 an explicit definition of compounds included in the term “greenhouse gas.” 40 CFR  
20 98.2 establishes an annual reporting threshold of 25,000 metric tons of carbon dioxide  
21 (CO<sub>2</sub>) equivalent per year for certain facilities, including stationary fuel combustion  
22 units.

#### 23 **4.12.3 Review Procedures (General For Greenhouse Gas Emissions And Climate** 24 **Change Issues)**

25 Suggested steps for the review process are as follows:

- 26 1. Review the discussion of GHGs and climate change issues in the LR GEIS to identify the  
27 information considered and the conclusions reached. This step establishes the basis for  
28 evaluating information identified by the applicant, the public, and the staff. Table 4-1 lists  
29 the applicable Category 1 issue and Table 4-2 lists the applicable Category 2 issue for GHG  
30 emissions and climate change identified in the LR GEIS.
- 31 2. Determine if there is new information on these issues that should be evaluated. The  
32 following sources of information should be included in the search for new information:
  - 33 – The applicant’s ER. An applicant is required by 10 CFR 51.53(c)(3)(iv) to disclose new  
34 and significant information regarding the environmental impacts of license renewal of  
35 which it is aware. In reviewing the applicant’s ER, consider the applicant’s process for  
36 discovering new information and evaluating the significance of any new information  
37 discovered.
  - 38 – Records of public scoping meetings and correspondence related to the application.  
39 Compare information presented by the public with information considered in the LR  
40 GEIS.



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

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

#### 25 **4.12.4 Evaluation Findings**

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

#### 30 **4.12.5 Climate Change Impacts on Environmental Resources**

#### 31 **4.12.6 Areas of Review**

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

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

1 Data and Information Needs

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

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

9 **4.12.7 Acceptance Criteria**

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

- 12 • 10 CFR 51.53(c)(3)(ii)(Q). Applicants shall include an assessment of the effects of any  
13 observed and projected changes in climate on environmental resource areas that are  
14 affected by license renewal, as well as any mitigation measures implemented at the  
15 applicant’s plant to address climate change impacts.

16 **4.12.8 Review Procedures**

17 Suggested steps for the review process are as follows:

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

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

#### 8 **4.12.9 Evaluation Findings**

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

#### 14 **4.13 Cumulative Effects**

##### 15 **4.13.1 Areas Of Review**

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

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

##### 24 **4.13.2 Acceptance Criteria**

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

- 27 • Cumulative effects is a Category 2 issue and requires a plant-specific analysis (see 10 CFR  
28 51.53(c)(3)(ii)(O)). CEQ defines cumulative effects in 40 CFR 1508.1(g)(3) as “the effects  
29 on the environment that result from the incremental effects of the action when added to the  
30 effects of other past, present, and reasonably foreseeable actions regardless of what  
31 agency (Federal or non-Federal) or person undertakes such other actions. Cumulative  
32 effects can result from individually minor but collectively significant actions taking place over  
33 a period of time.” Cumulative effect analyses should consider new and ongoing activities,  
34 such as license renewal, that are conducted, regulated, or approved by a Federal agency.  
35 The goal of the analysis is to introduce environmental considerations into the planning  
36 process as early as needed to improve decisionmaking. Actions to be considered in  
37 cumulative impact analyses include activities associated with license renewal (e.g.,  
38 continued reactor operations and refurbishment), that are conducted, regulated, or approved  
39 by a Federal agency.

1 **4.13.3 Review Procedures**

2 Suggested steps for the review process are as follows:

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

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

#### 8   **4.13.4   Evaluation Findings**

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

#### 12   **4.14   Impacts Common to All Alternatives**

##### 13   **4.14.1   Uranium Fuel Cycle**

###### 14   *4.14.1.1   Areas of Review*

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

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

###### 23   Data and Information Needs

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

- 26   • a description of the applicant’s process for identifying new and potentially significant  
27    information on environmental issues related to the uranium fuel cycle during the renewal  
28    term
- 29   • new information on the uranium fuel cycle during the renewal term known to the applicant
- 30   • new and potentially significant information on the uranium fuel cycle identified by the public
- 31   • a list of environmental issues related to the uranium fuel cycle during the renewal term for  
32    which there is significant new information.

###### 33   *4.14.1.2   Acceptance Criteria*

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

1 **4.14.1.3 Review Procedures**

2 Suggested steps for the review process are as follows:

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

19 **4.14.1.4 Evaluation Findings**

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

24 **4.14.2 Replacement Power Alternative Fuel Cycles**

25 **4.14.2.1 Areas of Review**

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

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

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

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

#### 6 Data and Information Needs

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

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

#### 12 *4.14.2.2 Acceptance Criteria*

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

#### 15 *4.14.2.3 Review Procedures*

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

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

- 1 on the LR GEIS, the applicant's ER, and the integrated resource plans for the area(s)  
2 or region(s) currently or (if different) likely to be served by the nuclear power plant.  
3 Assume appropriate mitigation measures (for example emission control technologies  
4 and best management practices) for each replacement power alternative.
- 5 – Describe the impacts in sufficient detail so that reviewers may compare the adverse  
6 and beneficial impacts of the alternatives with those of renewing the operating license.  
7 Impact analyses should consider land use, water quality, air quality, ecological  
8 resources, human health, social and economic systems, waste management, aesthetics,  
9 and cultural resources. The impacts analyses should include direct, indirect, and  
10 cumulative impacts. For each alternative, the analysis should identify and, to the extent  
11 possible, quantify, unavoidable adverse impacts, irreversible and irretrievable resource  
12 commitments, and tradeoffs between short-term use and long-term productivity of the  
13 environment. To the extent possible, each alternative should be analyzed on a nuclear  
14 power plant site- or region-specific basis. Each impact should be analyzed in proportion  
15 to its significance.
- 16 Data provided in the applicant's ER are adequate if they describe:
- 17 – The degree to which the local environmental resources would be affected by use of  
18 replacement power alternatives. These data agree with data obtained from other  
19 sources, when available.
- 20 – The significance or potential significance of such environmental impacts. SMALL  
21 impacts result when no discernible change in environmental resources occurs as a result  
22 of using replacement power alternatives. MODERATE impacts result when there is a  
23 discernible change. LARGE impacts occur when there is substantial disruption of  
24 environmental resources.
- 25 – Any mitigative measures for which credit is being taken to reduce environmental  
26 concerns.
- 27 – Supplemental data obtained from other individuals and organizations may be useful in  
28 determining the completeness of the applicant's identification of housing impacts.
- 29 – Consider and evaluate potential mitigation measures or alternatives that might reduce or  
30 eliminate the adverse impacts or the disproportionate distribution of the impacts in those  
31 cases where the impacts are MODERATE or LARGE. These may have been  
32 considered in the applicant's ER.
- 33 – Based on the results of the assessments listed above, prepare the following for the  
34 SEIS:
- 35 ▪ a summary statement (qualitative or quantitative, as appropriate) about the  
36 degree to which environmental resources are expected to receive impacts from  
37 replacement power alternatives, together with the significance of these impacts
  - 38 ▪ a discussion of the reasoning (e.g., based on locations and changes in  
39 population, local government revenue base, ecological impacts on other nearby  
40 plant sites or transmission corridors) behind the estimated degree of impact
  - 41 ▪ a discussion of any mitigative measures for which credit is being taken to reduce  
42 environmental concerns.



1 4.14.2.4 *Evaluation Findings*

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

5 **4.14.3 Termination of Nuclear Plant Operations and Decommissioning**

6 4.14.3.1 *Areas of Review*

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

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

15 Data and Information Needs

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

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

28 4.14.3.2 *Acceptance Criteria*

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

32 4.14.3.3 *Review Procedures*

33 The following review steps are suggested:

- 34 1. The applicant is required by NRC regulation to disclose new and significant information  
35 regarding the environmental impacts of license renewal of which it is aware (see 10 CFR  
36 51.53(c)(3)(iv)). In reviewing the applicant's ER, consider the applicant's process for  
37 discovering new information and evaluating the significance of any new information  
38 discovered.

- 1 2. Review public scoping meeting transcripts and related correspondence. Compare any new  
2 information with the conclusions in the LR GEIS.
- 3 3. Evaluate the significance of any new information for its effect on the impact analysis.
- 4 4. Prepare SEIS discussion describing the search for new and significant information,  
5 summarizing any new information found and the results of the significance evaluation.  
6 Incorporate by reference the conclusions from the LR GEIS for the proposed action or  
7 modify as necessary to account for any significant new information.

#### 8 *4.14.3.4 Evaluation Findings*

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

## 12 **4.15 References**

### 13 **4.15.1 Areas of Review**

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

### 16 **4.15.2 Acceptance Criteria**

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

- 19 • 10 CFR 51.70(b), concerning preparation of a draft EIS that is concise, clear, analytical, and  
20 written in plain language

### 21 **4.15.3 Review Procedures**

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

### 25 **4.15.4 Evaluation Findings**

26 The reviewer of information covered by this ESRP should prepare the SEIS section that lists  
27 references cited in the SEIS sections covering environmental impacts. The completed  
28 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

- 1 • 10 CFR 51.95(c), concerning renewal of an operating license or combined license for a  
2 nuclear power plant. Under Parts 52 or 54 of this chapter, the Commission shall prepare an  
3 environmental impact statement, which is a supplement to the Commission's NUREG-1437,  
4 "Generic Environmental Impact Statement for License Renewal of Nuclear Plants."
- 5 • 10 CFR Part 51, Appendix A to Subpart A, paragraph 7, concerning the environmental  
6 consequences of alternatives, including the proposed actions and any mitigating actions  
7 which may be taken. Alternatives eliminated from detailed study will be identified and a  
8 discussion of those alternatives will be confined to a brief statement of the reasons why the  
9 alternatives were eliminated. The level of information for each alternative considered in  
10 detail will reflect the depth of analysis required for sound decisionmaking.
- 11 • 10 CFR Part 51, Appendix B to Subpart A, "Environmental Effect of Renewing the Operating  
12 License of a Nuclear Power Plant," Table B-1, "Summary of Findings on Environmental  
13 Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants."

#### 14 Technical Rationale

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

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

#### 25 **5.1.3 Review Procedures**

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

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

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

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

1 **5.1.4 Evaluation Findings**

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

7 **5.2 Postulated Accidents**

8 **5.2.1 Areas of Review**

9 This ESRP provides guidance for the review of environmental impacts of postulated plant  
10 accidents during the license renewal term (initial LR or SLR) and preparation of input to the  
11 SEIS. These issues are discussed in Section 4.9.1.2 and Appendix E of the LR GEIS (NUREG-  
12 1437, Revision 2; NRC 2023a).

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

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

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

28 **Data and Information Needs (General for Postulated Accidents)**

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

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

1 **5.2.2 Acceptance Criteria (General for Postulated Accidents)**

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

4 **5.2.3 Review Procedures**

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

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

11 Suggested steps for the review process are as follows:

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

33 **5.2.4 Evaluation Findings**

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

1 shall be included in the text: “the probability-weighted consequences of severe accidents are  
2 SMALL.”

### 3 **5.3 Severe Accident Mitigation Alternatives**

#### 4 **5.3.1 Areas of Review**

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

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

#### 20 Data and Information Needs

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

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

- 1 • Applicants for boiling water reactor licenses should assess SAMAs from other boiling water  
2 reactor applications; likewise, applicants for pressurized water reactor licenses should  
3 assess SAMAs from other pressurized water reactor applications.
- 4 • If there is a basis for excluding this body of SAMAs from the pool of “new information” to be  
5 evaluated for significance, the rationale should be documented.
- 6 • Other data needs include those provided in NEI 17-04, Section 3.1 based on the relevant  
7 assessment stage reached (NEI 2019).
- 8 • Consistent with guidance in NRC Regulatory Guide 4.2, Supplement 1, Revision 2 (NRC  
9 2023b), the ER should briefly describe the processes that were used for identifying new  
10 information and determining its significance. If a determination is made that no new and  
11 significant information exists, then the ER should state this determination.
- 12 • Alternatively, if a determination is made that one or more “potentially significant” SAMAs are  
13 also potentially cost beneficial, then the ER should describe those SAMAs and state that  
14 “new and significant” information has been identified. The ER also should indicate whether  
15 the “new and significant” SAMAs are aging-related and describe supplementary actions to  
16 be taken relative to their discovery, if any.

### 17 **5.3.2 Acceptance Criteria**

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

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

- 29 • 10 CFR 51.53(c)(3)(ii)(L), “If the staff has not previously considered severe accident  
30 mitigation alternatives for the applicant’s plant in an environmental impact statement or  
31 related supplement or in an environmental assessment, a consideration of alternatives to  
32 mitigate severe accidents must be provided.”

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

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



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

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

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

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

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

#### 34 Technical Rationale

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

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

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

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

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

### 15 **5.3.3 Review Procedures**

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

23 Suggested steps for the review process are as follows:

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

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

3 **5.3.4 Evaluation Findings**

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

8 **5.4 References**

9 **5.4.1 Areas of Review**

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

11 **5.4.2 Acceptance Criteria**

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

- 14 • 10 CFR 51.70(b), concerning preparation of a draft EIS that is concise, clear, analytic, and  
15 written in plain language.

16 **5.4.3 Review Procedures**

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

20 **5.4.4 Evaluation Findings**

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



1

## 6.0 SUMMARY AND CONCLUSIONS

### 2 6.1 Areas of Review

3 This environmental standard review plan (ESRP) provides guidance on preparing these  
 4 chapters and supporting discussions of the supplemental environmental impact statement  
 5 (SEIS) that integrates the conclusions for issues designated Category 1 or resolved Category 2  
 6 in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (LR  
 7 GEIS; NUREG-1437, Revision 2; NRC 2023a); information developed for those open Category  
 8 2 issues applicable to the plant; and new and significant information. The chapter discussions  
 9 must conclude whether the adverse environmental impacts of license renewal are so great that  
 10 preserving the option of license renewal for energy planning decisionmakers would be  
 11 unreasonable.

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

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

### 21 Data and Information Needs

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

- 24 • the discussion of environmental impacts of license renewal (initial LR or SLR) in the LR  
 25 GEIS
- 26 • the discussion of plant-specific environmental impacts of license renewal (initial LR or SLR)  
 27 in the applicant’s environmental report
- 28 • the summary of environmental impact analyses conducted for the SEIS.

### 29 6.2 Acceptance Criteria

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

- 32 • Title 10 of the *Code of Federal Regulations* 51.70(b) (10 CFR 51.70(b)), concerning a  
 33 concise, clear, analytic EIS written in plain language
- 34 • 10 CFR 51.71(d), concerning the draft environmental impact statement will include a  
 35 preliminary analysis that considers and weighs the environmental effects of the proposed  
 36 action; the environmental impacts of replacement power alternatives; and alternatives  
 37 available for reducing or avoiding adverse environmental effects, among other things

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

## 12 Technical Rationale

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

### 19 **6.3 Review Procedures**

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

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

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

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

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

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

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

#### 4 **6.4 Evaluation Findings**

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





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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).

1 Section 7 consultation may be informal or formal. Generally, the appropriate type of  
2 consultation relates to the effect determinations made by the Federal agency, as described  
3 below. For proposed species and proposed critical habitats (those species or habitats for which  
4 the Services have issued proposed listing or designation rules, but for which final rules have yet  
5 to be issued or adopted), the regulations prescribe a process called a conference. Informal  
6 consultation, formal consultation, and conference are described below. The Services'  
7 regulations also allow for early, special, and emergency consultations. Because instances that  
8 would necessitate these types of consultation rarely arise for NRC actions, this guidance does  
9 not specifically address early, special, and emergency consultation.

## 10 **A.1.2 Types of ESA Section 7 Consultation**

### 11 *A.1.2.1 Formal Consultation*

12 Formal Section 7 consultation is appropriate when a Federal agency determines that an action  
13 “may affect and is likely to adversely affect” listed species or critical habitats. For any action in  
14 which take of listed species or destruction or adverse modification of critical habitat may occur,  
15 formal consultation is required.

16 As the Federal action agency, the NRC is responsible for initiating formal consultation if it is  
17 required. The NRC staff must provide the Services with relevant information to support its  
18 request for formal consultation, including a biological assessment, if required. The staff must  
19 provide the Services with the best scientific and commercial data available, and the Services  
20 may request additional information during the consultation process.

21 Formal consultation takes place over a 135-day timeline (50 CFR 402.14(e)). However,  
22 consultation may be extended through agreement between the Federal action agency, the  
23 Services, and any applicant.

24 The outcome of formal consultation is the Services' formulation of a biological opinion. A  
25 biological opinion evaluates the nature and extent of effects of the action on listed species and  
26 critical habitats. It is prepared by the FWS or NMFS and documents the Services' assessment  
27 of effects to listed species and critical habitat and whether the Federal action is likely to  
28 jeopardize the continued existence of those species or result in destruction or adverse  
29 modification of critical habitat. Biological opinions may include an incidental take statement  
30 (ITS) consisting of the level of anticipated take, reasonable and prudent measures, and terms  
31 and conditions. Any take that is subject to and in compliance with an ITS is not prohibited under  
32 the ESA. Biological opinions may also include discretionary conservation recommendations.

33 For consultations resulting in the Services' issuance of a biological opinion, the NRC requires its  
34 licensees to comply with the ITS of the biological opinion by incorporating environmental  
35 conditions into the relevant NRC facility license(s). As conditions of NRC-issued licenses, the  
36 NRC has a continuing duty to monitor compliance at facilities with valid biological opinions. This  
37 role is performed by the NRC's Interagency Consultation Coordinator. The NRC may exclude  
38 specific ITS requirements from its license(s) if another Federal agency will require those actions  
39 be taken.

### 40 *A.1.2.2 Informal Consultation*

41 Informal Section 7 consultation is appropriate when a Federal agency determines that an action  
42 “may affect but is not likely to adversely affect” listed species or critical habitats. This type of

1 consultation is a less-structured approach to meeting Section 7 requirements. It includes  
2 discussions, correspondence, and meetings between the NRC staff and representatives of the  
3 Services. It can also include exploring ways to modify the action to reduce or remove adverse  
4 effects and can help the agencies determine the need to engage in formal consultation.

5 As part of informal consultation, the NRC staff submits ESA effect determination(s) or a  
6 biological assessment (if one is required) to the Services, along with supporting information, and  
7 requests the Services' concurrence with its determination(s) that the action is not likely to  
8 adversely affect listed species or critical habitats. The Services review the supporting  
9 information and respond that either (1) the Services concur that the action is not likely to  
10 adversely affect listed species or critical habitats, which concludes consultation, or (2) that  
11 formal consultation is required.

12 Informal consultation takes place over a 60-day timeline (50 CFR 402.13(c)(2)). However,  
13 consultation may be extended through agreement between the Federal action agency, the  
14 Services, and any applicant.

### 15 *A.1.2.3 Conference*

16 Conference is required for Federal actions that are likely to jeopardize the continued existence  
17 of any proposed species or result in the destruction or adverse modification of proposed critical  
18 habitat. A proposed species is a species for which the Services have issued a proposed rule to  
19 list as endangered or threatened under the ESA. Proposed critical habitat is habitat for which  
20 the Services have issued a proposed rule to designate as critical under the ESA. For actions  
21 requiring conference, the Federal agency typically makes ESA effect determinations of "may  
22 affect and is likely to adversely affect" for proposed species and "may destroy or adversely  
23 modify" for proposed critical habitat. Notably, the threshold for a conference is higher than the  
24 threshold for consultation; the regulations only require conference if an action may jeopardize  
25 the continued existence of a proposed species.

26 In practice, conferences are conducted similarly to consultations. The outcome of a conference  
27 is either the Services' issuance of a conference opinion or the Services' written documentation  
28 of the conclusions reached during the conference, along with any recommendations, in a  
29 conference report. The Services' recommendations are discretionary because the NRC is not  
30 prohibited from jeopardizing the continued existence of a proposed species or from adversely  
31 modifying proposed critical habitat. However, as soon as a listing action is finalized, the  
32 prohibition against jeopardy or adverse modification applies regardless of the stage of the  
33 action.

34 A conference does not fulfill a Federal agency's duty to consult under ESA Section 7(a)(2) if  
35 the Services subsequently list the proposed species or designate the proposed critical habitat.  
36 Upon listing or designation, the Federal agency must initiate consultation with the Services as  
37 appropriate and as described previously. However, information developed during the  
38 conference can help streamline the subsequent consultation process such that the Federal  
39 agency and the Services can focus the consultation on significant new information developed  
40 during the listing process and significant changes to the Federal action that would alter the  
41 content of the Services' conference opinion or written conclusion. Additionally, the Services  
42 may adopt its conference opinion as the biological opinion after the species is listed or critical  
43 habitat is designated.

1 A.1.2.4 No Consultation

2 Section 7 consultation is not required when the Federal agency determines that an action would  
3 have “no effect” on listed or proposed species or on proposed or designated critical habitats.  
4 “No effect” determinations are made at the Federal agency’s discretion and do not require  
5 concurrence from the Services.

6 A.1.3 ESA Section 7 Consultation Process

7 This section describes each step in determining whether ESA consultation is necessary and  
8 within the consultation process itself. Figure A-1 illustrates the ESA pre-consultation and  
9 consultation process.

10 1. Determine the action area.

11 The first step in the consultation process is to determine the action area of the proposed  
12 action. The action area includes all areas to be affected directly or indirectly by the Federal  
13 action and not merely the immediate area involved in the action (50 CFR 402.02). The  
14 action area is not limited to the footprint of the action nor is it limited by the Federal action  
15 agency’s authority; rather, it is a biological determination of the reach of the proposed action  
16 on the listed species (FWS 2022). The action area determination should be made by a  
17 qualified subject matter expert (SME) because subsequent steps in the consultation, as well  
18 as the effects analyses, are predicated on defining a complete and accurate action area.  
19 The SME should be able to describe the extent of the action area in writing and pictorially on a  
20 map.

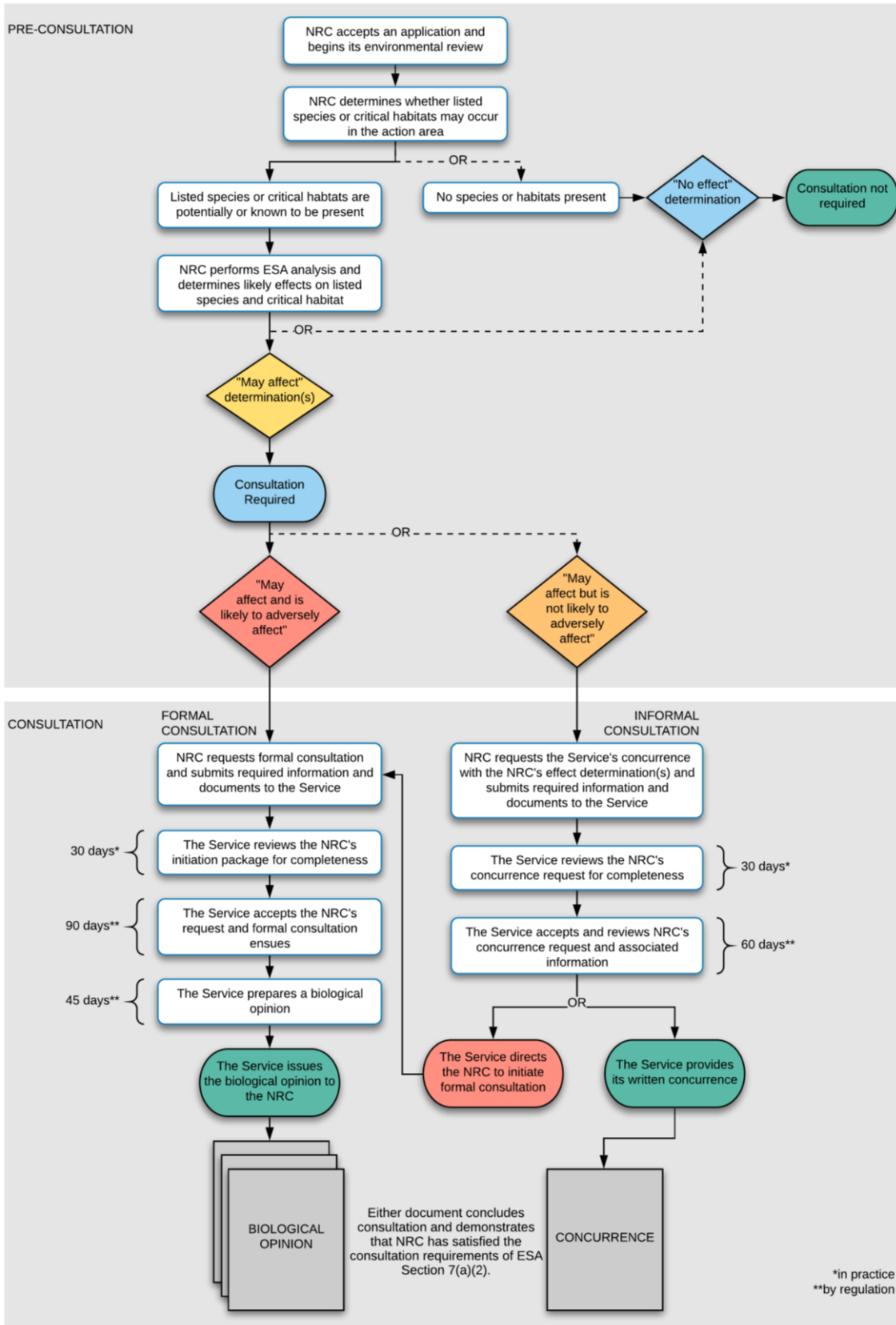
21 2. Determine protected species and critical habitats that may be present in the action area.

22 Once the action area is established, the SME determines what protected species and critical  
23 habitats may be present in the action area.

24 For protected species and critical habitats under FWS jurisdiction, the SME should query the  
25 FWS’s Environmental Conservation Online System (ECOS) Information Planning and  
26 Consultation (IPaC) tool (available at: <https://ecos.fws.gov/ipac/>). The IPaC tool allows  
27 users to generate official species lists by entering project-specific information. However, the  
28 usefulness of this tool directly relates to the accuracy of the information entered into the  
29 system. Prior to initiating this step, the SME should be familiar enough with the potential  
30 effects of the proposed action to be able to fully define the action area and to input the  
31 action area into IPaC’s mapping tool. Notably, while the IPaC tool may list species that are  
32 jointly under both Services’ jurisdiction (e.g., sea turtles) or that are wholly under NMFS’s  
33 jurisdiction (e.g., whales), IPaC only fulfills the 50 CFR 402.12 requirement to obtain an  
34 official species list for consultations with the FWS.<sup>1</sup>

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<sup>1</sup> 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.



1  
2

Figure A-1 Endangered Species Act Consultation Process Flowchart

1 For protected species and critical habitats under NMFS jurisdiction, the SME should reach  
2 out to the Protected Resources Division of the relevant NMFS regional office. While many  
3 of the NMFS regional offices maintain species lists and critical habitat mapping tools on their  
4 websites, unlike the FWS's IPaC tool, these resources do not fulfill the 50 CFR 402.12(c)  
5 requirement to obtain an official species list. A best practice is for the SME to define the  
6 action area, generate a list of protected species and critical habitats using NMFS's available  
7 online resources, and request NMFS's concurrence with that list as is allowable under  
8 50 CFR 402.12(d). This method streamlines NMFS's review and response and can foster a  
9 positive and collaborative working relationship between the agencies.

10 If protected species or critical habitats may be present in the action area, the SME should  
11 proceed to the next step (determining potential effects) to determine whether consultation is  
12 required. If no protected species or critical habitats are present, consultation is not required.  
13 The SME should document this determination in the National Environmental Policy Act of  
14 1969 (NEPA) document associated with the proposed action (e.g., environmental impact  
15 statement [EIS], supplemental environmental impact statement [SEIS], environmental  
16 assessment [EA]), in correspondence to the Services, or in a memorandum to file.

17 Notably, separate consultation determinations could be made for each agency in the  
18 Services. For instance, a proposed action could involve in-water work during the  
19 construction phase that could affect federally protected marine fish, but no construction  
20 activities or other components of the proposed action would affect any terrestrial species  
21 because none are present in the action area. In such a case, the NRC would be required to  
22 consult with NMFS but not the FWS.

### 23 3. *Engage with the Services and initiate informal consultation.*

24 If the NRC has not yet engaged directly with the Services during the previous step(s), the  
25 SME should reach out to the Services to establish points of contact and to orient Services  
26 staff regarding the proposed action. This is particularly important in cases where formal  
27 consultation may be required so that the Services can plan and designate staff resources for  
28 the development of the biological opinion. This step is also an opportunity for the SME to  
29 gather more information on the relevant protected species and critical habitats. Service staff  
30 may be able to point the SME to surveys, studies, and other available species data or  
31 connect the SME with local researchers and species experts. Because informal  
32 consultation includes all discussions and correspondence between the Services and the  
33 NRC (50 CFR 402.13), this step functionally initiates informal consultation. Therefore, the  
34 SME should document substantive discussions with the Services, researchers, or species  
35 experts in meeting summaries and should add any related correspondence to the NRC's  
36 Agencywide Documents Access and Management System (ADAMS).

### 37 4. *Determine and document potential effects on protected species and critical habitats.*

38 The next step in the consultation process is to determine the potential effects of the  
39 proposed action on the identified protected species and critical habitats. The SME typically  
40 performs this analysis concurrently with the NEPA review. The SME should rely on the  
41 application; available ecological surveys, monitoring, and studies; views of recognized  
42 species experts; scientific literature; and other relevant information to perform the ESA  
43 analysis. Based on the analysis, the SME makes an effect determination for each protected  
44 species and critical habitat as identified below in Table A-1.



1 **Table A-1 Possible Endangered Species Act Effect Determinations Made by the Federal**  
 2 **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"

3 The SME documents the ESA analysis and effect determination(s) in a biological  
 4 assessment, biological evaluation, or directly within the NEPA document.

5 The SME prepares a biological assessment only for those actions that meet certain  
 6 regulatory criteria. Biological assessments are required under 50 CFR 402.12(b) for  
 7 proposed actions involving major construction activities, which are those actions that have  
 8 construction-type impacts and that meet the definition of a major Federal action requiring an  
 9 EIS under NEPA.<sup>2</sup> The contents of a biological assessment are at the discretion of the  
 10 Federal agency and will depend on the nature of the proposed action. The ESA regulations  
 11 at 50 CFR 402.12(f) suggest that Federal agencies consider including the following  
 12 information in the biological assessment:

- 13 • results of site surveys, studies, and inspections of the action area to determine if listed or  
 14 proposed species are present or occur seasonally
- 15 • views of recognized experts on the species at issue
- 16 • review of pertinent scientific literature and related information
- 17 • analysis of the effects of the action on the species and habitat, including cumulative  
 18 effects, and the results of any related studies
- 19 • analysis of alternate actions considered by the Federal agency.

20 Biological assessments must be completed within 180 days after the NRC's receipt of (or  
 21 the Services' concurrence with) the species list unless the NRC and the Services agree to a  
 22 different timeline (50 CFR 402.12(i)). If an applicant or licensee is involved, the 180-day  
 23 period may not be extended unless the NRC provides the applicant or licensee with a  
 24 written statement setting forth the estimated length of the proposed extension and the  
 25 reasons why such an extension is necessary before the close of the initial 180-day period.

26 If the proposed action does not require a biological assessment, the SME prepares a  
 27 biological evaluation or prepares written input to be incorporated directly into the NEPA  
 28 document. If the ESA analysis is complex, lengthy, or will likely require formal consultation,  
 29 the SME prepares a biological evaluation. A biological evaluation is a stand-alone  
 30 document that is similar in format and content to a biological assessment, and it should  
 31 contain the elements described above. The primary distinction is that a biological evaluation  
 32 is prepared for a proposed action that does not meet the regulatory criteria for a biological  
 33 assessment. The 180-day preparation timeline does not apply to biological evaluations.

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<sup>2</sup> See 50 CFR 402.02 for the complete regulatory definition of this term.

1 If the ESA analysis is relatively straightforward, will only require informal consultation, or will  
2 not require consultation, the SME documents the ESA analysis directly in the NEPA  
3 document. The NEPA document should clearly identify the ESA analysis with appropriate  
4 headings and subheadings and include the SME's effect determinations for each protected  
5 species and critical habitat as identified in Table A-1.

6 For proposed actions involving formal consultation, Federal agencies must submit certain  
7 information to the Services with the consultation request. If a biological assessment or  
8 biological evaluation is being prepared to support formal consultation, the SME should  
9 include the following information in accordance with 50 CFR 402.14(c) and summarized as  
10 follows:

- 11 • description of the proposed action and any mitigation measures in sufficient detail to  
12 assess the effects of the action on protected species and critical habitat, including
  - 13 – the purpose, duration, timing, and location of the action
  - 14 – the specific components of the action and how they will be carried out
  - 15 – maps, drawings, blueprints, or similar schematics of the action
  - 16 – any other available information related to the nature and scope of the proposed  
17 action relevant to its effects on protected species or critical habitat.
- 18 • map or description of the action area
- 19 • available information on the presence, abundance, density, or periodic occurrence of  
20 listed species and the condition and location of the species' habitat, including any critical  
21 habitat
- 22 • description of the effects of the action and an analysis of any cumulative effects
- 23 • summary of any relevant information provided by the applicant or licensee
- 24 • any other relevant available information on the effects of the proposed action, including  
25 any EISs, EAs, or other relevant reports.

26 If protected species or critical habitats under the jurisdiction of both agencies of the Services  
27 may be affected by the proposed action, the SME should prepare two separate biological  
28 assessments or biological evaluations—one for each of the Services.

29 A best practice is for the SME to provide the applicant or licensee an opportunity to review  
30 and comment on the draft biological assessment or biological evaluation. The applicant or  
31 licensee may have more in-depth knowledge of the proposed action and the potential  
32 adverse effects of that action. The applicant or licensee will also have a better  
33 understanding of what potential strategies could feasibly be implemented to reduce  
34 incidental take or to mitigate or offset adverse effects. Engaging the applicant or licensee at  
35 this stage is especially important when the NRC is reinitiating consultation for an NRC-  
36 licensed facility that already has a biological opinion in place.

37 The SME may also share a draft of part or all of the biological assessment or biological  
38 evaluation with the Services for the purpose of ensuring that the NRC has included all  
39 relevant information required by the Services to initiate the consultation. This step is  
40 particularly helpful if the Services intend to adopt part or all of the NRC's initiation package  
41 in its biological opinion through the optional collaborative process described at  
42 50 CFR 402.14(h)(3).

1 The NRC typically issues biological assessments and biological evaluations as stand-alone  
 2 documents. However, the NRC also may opt to incorporate the biological assessment or  
 3 biological evaluation into the NEPA document associated with the proposed action under 50  
 4 CFR 402.06. The SME, along with the project manager and NRC management, should  
 5 carefully weigh the benefits and risks of this option. Incorporating the biological assessment  
 6 or biological evaluation into the NEPA document can delay the progression of consultation  
 7 because the NRC must wait until the NEPA document is issued to initiate consultation.  
 8 Typically, this option should be reserved for simple informal consultations that involve few  
 9 protected species or critical habitats.

10 5. Determine the appropriate type of consultation

11 The SME's effect determination(s) dictate whether consultation is required and the type of  
 12 consultation that is appropriate (e.g., formal, informal, conference, or no consultation).  
 13 Table A-2 summarizes the appropriate type of consultation or conference for each possible  
 14 effect determination.

15 **Table A-2 Appropriate Type of Consultation by Endangered Species Act Effect**  
 16 **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" <sup>(a)</sup> or "no effect"	"no effect"	"is not likely to destroy or adversely modify" or "no effect"

17 N/A = not applicable

18 (a) Although not required, it is a best practice to confer with the Services when a proposed action may affect but is  
 19 not likely to adversely affect proposed species.

20 For a given project, effect determinations among the protected species and critical habitats  
 21 may vary. For instance, a proposed action may affect but is not likely to adversely affect sea  
 22 turtles but would have no effect on the Nassau grouper (*Epinephelus striatus*). In this case,  
 23 informal consultation with NMFS would be appropriate for sea turtles, but the NRC would not  
 24 be required to consult with NMFS for the Nassau grouper. For another proposed action, the  
 25 NRC might determine that a proposed action may affect and is likely to adversely affect the  
 26 rufa red knot (*Calidris canutus rufa*) and northern long-eared bat (*Myotis septentrionalis*) but  
 27 that the action is not likely to adversely affect several species of freshwater mussels. In this  
 28 case, formal consultation with the FWS would be appropriate. The formal consultation could  
 29 address all involved species even though the effect determinations for the freshwater  
 30 mussels alone would only rise to the informal consultation level.

1 Notably, the threshold for a conference is higher than the threshold for consultation. The  
2 NRC is only required to confer with the Services if a proposed action is likely to jeopardize  
3 the continued existence of proposed species or is likely to destroy or adversely modify  
4 proposed critical habitat. However, the Services, and not Federal action agencies, make  
5 jeopardy determinations. Effectively, this means that the NRC should confer with the  
6 Services in most circumstances in which a proposed action may affect and is likely to  
7 adversely affect a proposed species to determine whether adverse effects could result in  
8 jeopardy. However, it is a best practice for the NRC to confer with the Services if a  
9 proposed actions may affect but is not likely to adversely affect proposed species or may  
10 affect but is not likely to adversely modify or destroy proposed critical habitat because the  
11 NRC will be required to consult with the Services if the species or habitat are subsequently  
12 listed or designated. For proposed actions that require the NRC to develop a biological  
13 assessment, the biological assessment must consider proposed species and proposed  
14 critical habitats in addition to listed species and designated critical habitats  
15 (50 CFR 402.12(a)).

16 If both consultation and a conference are required for a given project, the NRC and the  
17 Services typically conduct the two processes concurrently.

18 6. *Request the Services' concurrence, formal consultation, or conference.*

19 When the document containing the NRC's ESA analysis is ready for issuance (e.g.,  
20 biological assessment, biological evaluation, or NEPA document), the SME prepares a  
21 request for the Services' concurrence as part of informal consultation, a request for formal  
22 consultation, or a request for conference, as described in the subsections below.

23 In cases where the SME coordinated with the Services during its review, but the SME  
24 ultimately determined that the proposed action would have no effect on protected species or  
25 critical habitats, the NRC does not need to engage with the Services any further. However,  
26 in such instances, a best practice is to notify the relevant Service(s) of the NRC's "no effect"  
27 determination(s). For instance, the SME can send the Services an email or letter upon  
28 issuance of the NEPA document that explains the NRC's "no effect" determination(s),  
29 provides information on the availability of the NEPA document, and gives details on how the  
30 Services can submit public comments (in the case of a draft SEIS, draft EIS, or draft EA).  
31 The SME should be sure to add any such correspondence to ADAMS as part of fully  
32 documenting the consultation.

33 a. *Request the Services' concurrence.*

34 For "may affect but is not likely to adversely affect" listed species and "is not likely to  
35 destroy or adversely modify" designated critical habitat determinations, the SME  
36 prepares a written request for the Services to concur with the NRC's determinations.  
37 The request should include a copy of the NRC's ESA analysis. By regulation, the  
38 request must also include sufficient information for the Services to determine if it concurs  
39 (50 CFR 402.13(c)(1)).

40 The Services provides its written concurrence or non-concurrence within 60 days of  
41 receipt of the NRC's request (50 CFR 402.13(c)(2)). However, consultation may be  
42 extended through agreement between the Federal action agency, the Services, and any  
43 applicant.

44 Notably, if the nature of the proposed action requires the NRC to develop a biological  
45 assessment, the ESA regulations afford the Services 30 days, rather than 60 days, to

1 review and provide written concurrence or non-concurrence. In such cases, the SME  
2 should coordinate with the Services prior to submitting the biological assessment and  
3 concurrence request to establish the most appropriate timeline based on a combination  
4 of the potential effects on listed species and critical habitats, NRC review timeline, staff  
5 availability from the Services, and other relevant factors.

6 If after its review, the Services concur with the NRC's ESA effect determination(s), the  
7 informal consultation is concluded, and NRC's ESA Section 7(a)(2) obligations for the  
8 proposed action are fulfilled. The SME should add the Services' written concurrence to  
9 ADAMS and should prepare input for the final NEPA document that reports the results of  
10 the consultation.

11 If the Services do not concur, the SME and staff from the Services should discuss the  
12 reasons for the non-concurrence. In some cases, the NRC or applicant can submit  
13 additional information to support the Services' subsequent concurrence. In other cases,  
14 the Services may determine that the proposed action involves potential for take and  
15 requires the Services to formulate a biological opinion and ITS. The appropriate next  
16 step in such a case would be for the NRC to prepare a request for formal consultation,  
17 as described below.

18 *b. Request and engage in formal consultation.*

19 For "may affect and is likely to adversely affect" listed species and "is likely to destroy or  
20 adversely modify" designated critical habitat determinations, the SME prepares a written  
21 request for formal consultation with the relevant Service(s). The request must include all  
22 information specified at 50 CFR 402.14(c), as summarized previously under Review  
23 Procedure Step 4.

24 Formal consultation takes places over a 135-day timeline (50 CFR 402.14(e)). During  
25 the initial 90 days, the NRC and the Services exchange information and engage in  
26 discussions concerning the potential effects of the proposed action. The Services may  
27 request that the NRC submit additional information to support its review of the proposed  
28 action in a process that is like the NRC's request for additional information (RAI)  
29 process.

30 The regulations allow for applicants or licensees to be a party to the consultation, and  
31 the SME should seek to include the applicant or licensee in the consultation to the extent  
32 possible. It also is a best practice to engage the applicant or licensee when responding  
33 to any inquiries from the Services to ensure that the NRC's responses are accurate and  
34 complete.

35 Following the initial 90 days, the Services have 45 days thereafter to complete the  
36 biological opinion and deliver it to the Federal agency and applicant or licensee. The  
37 biological opinion evaluates the nature and extent of effects of the action on listed  
38 species and critical habitats and must include the information specified at 50 CFR  
39 402.14(h)(1) and 50 CFR 402.14(h)(2). The biological opinion may include an ITS  
40 consisting of the:

- 41 • level of anticipated take of listed species
- 42 • reasonable and prudent measures necessary or appropriate to minimize adverse  
43 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

1 if the Services determine that additional data would provide a better information base  
2 from which to formulate a biological opinion (50 CFR 402.14(f)).

3 A best practice is for the SME to discuss the timeline of the consultation with the  
4 Services prior to initiating the consultation. Section 7 consultation, when it is required,  
5 should be completed prior to the NRC deciding on a proposed action. Early coordination  
6 on a mutually agreeable timeline is the best way to ensure that consultation will conclude  
7 in a timely manner.

8 *c. Request and engage in conference.*

9 For “may affect and is likely to adversely affect” proposed species and “may destroy or  
10 adversely modify” proposed critical habitat determinations, the SME prepares a written  
11 request for conference with the Services. Conferences are conducted in a similar  
12 manner to consultations, and the applicant or licensee should be involved to the extent  
13 practicable. The regulations do not specify a particular timeline for conferences.  
14 Therefore, it is particularly important for the SME to establish a timeline with the Services  
15 at the outset of the conference.

16 During the conference, the Services make advisory recommendations on ways to  
17 minimize or avoid adverse effects to the proposed species or proposed critical habitat.  
18 The outcome of a conference is either a conference report or a conference opinion. A  
19 conference report includes the Services’ written documentation of the conclusions  
20 reached during the conference, along with any discretionary recommendations. A  
21 conference opinion may include an ITS. However, that ITS would not become effective  
22 unless the Services adopt the conference opinion as its biological opinion once the  
23 listing action is final.

24 If during the conference or prior to completion of the proposed action, the Services list  
25 the proposed species or designates the proposed critical habitat, the Federal agency  
26 must review the action to determine whether formal consultation is required. If formal  
27 consultation is required, the SME should prepare a request to initiate formal consultation  
28 as described in Review Procedure Step 6.b. If formal consultation is not required but the  
29 proposed action could still result in effects on the newly listed species or newly  
30 designated critical habitat, the NRC must seek the Services’ concurrence with its “may  
31 affect but is not likely to adversely affect” or “may affect but is not likely to destroy or  
32 adversely modify” critical habitat determinations. In past NRC experiences of such  
33 circumstances, the Services have written a brief letter confirming that the information in  
34 its conference report remains valid and that the conclusions reached in that report  
35 constitute the Services’ concurrence pursuant to ESA Section 7(a)(2).

36 If both consultation and conference are required for a given project, the NRC and  
37 Services typically conduct the two processes concurrently, and the Services may issue  
38 one document (e.g., concurrence letter or biological opinion) that concludes both  
39 processes.

40 Although the NRC is only required to consult with the Services if a proposed action is  
41 likely to jeopardize the continued existence of proposed species or is likely to destroy or  
42 adversely modify proposed critical habitat, it is a best practice for the NRC to confer with  
43 the Services if effects on proposed species or proposed critical habitats are possible  
44 because the NRC will be required to consult with the Services if the species or habitats  
45 are subsequently listed or designated.

1 7. *Document conclusion of consultation or conference.*

2 Completion of the consultation or conference is documented by the Services' letter of  
3 concurrence, biological opinion, conference report, or conference opinion. The SME  
4 ensures that these documents are added to ADAMS as part of the consultation record. The  
5 SME also documents the outcome of consultation in the NEPA document associated with  
6 the proposed action in accordance with 50 CFR 402.06(b). In cases where a final EIS or  
7 SEIS is issued prior to the conclusion of consultation, the SME prepares input to the record  
8 of decision documenting the outcome of the consultation. In cases where the final EA and  
9 Finding of No Significant Impact (FONSI) are issued prior to the conclusion of consultation,  
10 the NRC can consider issuing a *Federal Register* notice that corrects or addends the EA  
11 and FONSI.

12 8. *Reinitiate consultation.*

13 The ESA regulations specify four conditions under which Federal agencies must reinitiate  
14 consultation. These conditions are (50 CFR 402.16)

- 15 • the level of allowable take specified in the incidental take is exceeded
- 16 • new information reveals effects not previously considered
- 17 • the action is modified in a manner that causes new effects
- 18 • a new species is listed or critical habitat designated that may be affected.

19 Reinitiated consultation is conducted in a similar manner as the initial consultation. The  
20 outcome of reinitiated consultation is a letter of concurrence from the Services or a new or  
21 amended biological opinion.

22 **A.2 Magnuson-Stevens Fishery Conservation and Management Act**

23 **A.2.1 Overview of the Act and Consultation Responsibilities**

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

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

37 The Fishery Management Councils may also designate some EFH as a habitat areas of  
38 particular concern (HAPC) if that habitat exhibits one or more of the following traits: rare,  
39 stressed by development, possessing important ecological functions for EFH species, or  
40 especially vulnerable to anthropogenic degradation. HAPC can cover a specific location  
41 (e.g., an estuary bank or a single spawning location) or cover habitat type that is found at many



1 locations (e.g., coral, nearshore nursery areas, or pupping grounds). HAPC designation does  
2 not convey additional restrictions or protections on an area. The designation simply focuses  
3 increased scrutiny, study, or mitigation planning compared to surrounding areas because HAPC  
4 represent high-priority areas for conservation, management, or research and are necessary for  
5 healthy ecosystems and sustainable fisheries. The Fishery Management Councils may,  
6 however, restrict the use or possession of fishing gear types within HAPC. The geographic  
7 boundaries of HAPC are subject to refinement through amendments, as research better informs  
8 management decisions (NOAA 2020).

9 Section 305(b) of the MSA contains interagency consultation requirements pertaining to Federal  
10 agencies and their actions. Under MSA Section 305(b)(2), Federal agencies must consult with  
11 NMFS for actions that may adversely affect EFH. Private actions with a Federal nexus, such as  
12 construction and operation of facilities that involve Federal licensing or approval, also are  
13 subject to consultation. Therefore, the NRC's issuance of initial or subsequent renewed  
14 licenses may trigger consultation requirements. Consultation pursuant to MSA Section 305(b) is  
15 commonly referred to as "EFH consultation."

16 NMFS maintains regulations that implement MSA Section 305 at 50 CFR Part 600, "Magnuson–  
17 Stevens Act Provisions." Subpart K of these regulations prescribes the EFH interagency  
18 consultation requirements. Subpart J includes definitions and other information relevant to EFH.  
19 The NRC also relies upon NMFS's detailed procedural guidance for conducting EFH  
20 consultation in *Essential Fish Habitat Consultation Guidance* (NMFS 2004a) and *Preparing*  
21 *Essential Fish Habitat Assessments: A Guide for Federal Action Agencies* (NMFS 2004b).

22 Consultation may be abbreviated, expanded, or programmatic. Generally, the appropriate type  
23 of consultation relates to effect determinations made by the Federal agency, as described  
24 below. NMFS regulations also allow for general concurrences concerning EFH. Because  
25 situations are rare in which a general concurrence would apply to an NRC action, this guidance  
26 does not specifically address this provision of the EFH regulations.

## 27 **A.2.2 Types of EFH Consultation**

### 28 *A.2.2.1 Abbreviated and Expanded Consultation*

29 Abbreviated consultation is appropriate when a Federal agency determines that an action would  
30 involve "minimal adverse effects" on EFH. Abbreviated consultation allows NMFS to determine  
31 quickly whether, and to what degree, a Federal action may adversely affect EFH. This type of  
32 consultation is used when the adverse effects of an action can be alleviated through minor  
33 modifications to the action.

34 Expanded consultation is appropriate when a Federal agency determines that an action may  
35 result in "substantial adverse effects." Substantial adverse effects are effects that may pose a  
36 relatively serious threat to EFH and typically could not be alleviated through minor modifications  
37 to a proposed action. Expanded consultation allows more opportunity for the Federal agency  
38 and NMFS to work together to review the action's impacts on EFH and for NMFS to develop  
39 measures to avoid, minimize, mitigate, or otherwise offset adverse effects.

40 A Federal agency may also determine that an action would involve "more than minimal but less  
41 than substantial adverse effects." In such cases, the NRC should work with NMFS to determine  
42 which type of consultation (abbreviated or expanded) is most appropriate for the given action.

43 The processes for abbreviated and expanded consultations are nearly identical. The primary  
44 difference is the timeframe for each step. For both abbreviated and expanded consultations,

1 the NRC staff submits an EFH assessment to NMFS and requests to initiate EFH consultation.  
2 If the action will adversely affect EFH, NMFS formulates EFH Conservation Recommendations,  
3 which may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects. If  
4 NMFS determines that the action would not adversely affect EFH or that no EFH Conservation  
5 Recommendations are needed, NMFS notifies the NRC informally or in writing.

6 If NMFS provides the NRC with EFH Conservation Recommendations, the NRC must prepare a  
7 detailed written response within 30 days of receiving the recommendations. This 30-day  
8 timeframe applies to both abbreviated and expanded consultation. In the response, the NRC  
9 staff must include a description of measures proposed for avoiding, mitigating, or offsetting the  
10 impact of the activity on EFH. If the NRC's response is inconsistent with any of the NMFS's  
11 EFH Conservation Recommendations, the response must be provided at least 10 days prior to  
12 the final agency decision and must explain the NRC's reasons for not following the  
13 recommendations, including the scientific justification for any disagreements with NMFS. The  
14 NRC's response completes consultation.

#### 15 *A.2.2.2 Programmatic Consultation*

16 Programmatic consultation is appropriate when a Federal action is a funding program, large-  
17 scale planning effort, or other project where enough information is available to address all  
18 reasonably foreseeable adverse effects on EFH of an entire program, parts of a program, or  
19 several similar individual actions occurring within a given geographic area. Programmatic  
20 consultation allows the Federal agency and NMFS to address many individual actions that may  
21 adversely affect EFH at one time and for NMFS to develop programmatic EFH Conservation  
22 Recommendations. For instance, the Federal Highway Administration and U.S. Army Corps of  
23 Engineers undertake programmatic consultation with NMFS for multi-part, multi-year  
24 development projects. Within NRC, the types of agency actions that may be appropriate for  
25 programmatic consultation include rulemakings or proposed actions that involve development of  
26 a GEIS.

27 The process for programmatic consultation is like the process described above for abbreviated  
28 and expanded consultations. However, a wider variety of outcomes are possible (see Review  
29 Procedure Step 6 below). NMFS may formulate programmatic EFH Conservation  
30 Recommendations. Such recommendations may cover all individual actions, or NMFS could  
31 require individual consultations for some or all actions or components of the project.

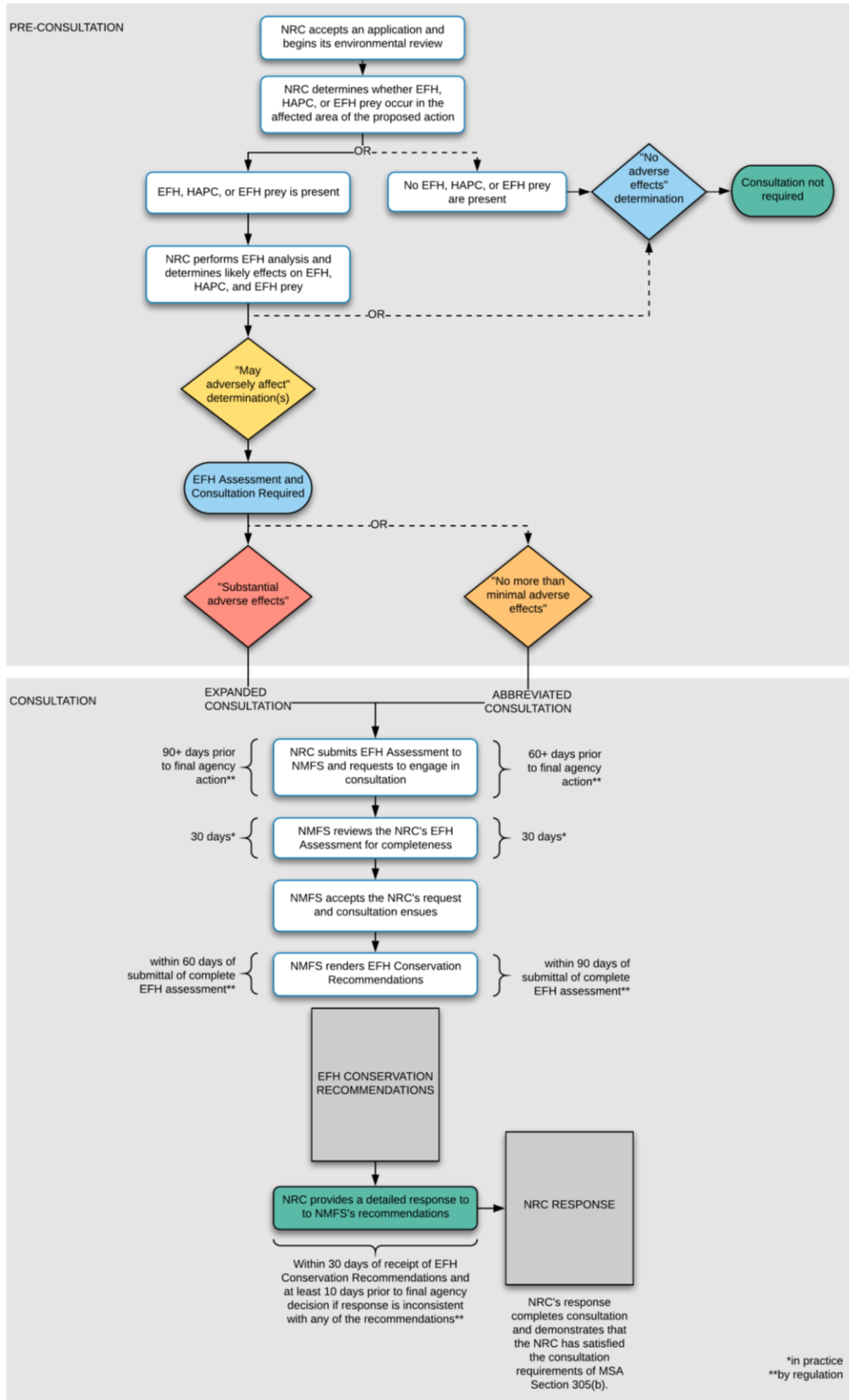
32 If NMFS provides the NRC with EFH Conservation Recommendations as part of a  
33 programmatic consultation, the NRC must prepare a detailed written response within 30 days of  
34 receiving the recommendations. The NRC's response completes consultation.

#### 35 *A.2.2.3 No Consultation*

36 EFH consultation is not required when the Federal agency determines that an action would  
37 have "no adverse effects" on EFH.

### 38 **A.2.3 EFH Consultation Process**

39 This section describes each step in determining whether EFH consultation is necessary and  
40 within the consultation process itself. Figure A-2 illustrates the EFH pre-consultation and  
41 consultation process.



1  
2

Figure A-2 Essential Fish Habitat Consultation Process Flowchart

1    1. *Determine the affected area.*

2       The first step in the consultation process is to determine the area that would be affected by  
3       the proposed action. This step is like determining the ESA action area (see  
4       Section 4.6.11.3, Review Procedure Step 1). Unlike the ESA, however, the MSA and its  
5       regulations do not specifically prescribe or define terminology for the affected area. For  
6       projects involving both an ESA analysis and EFH analysis, the ESA action area and the  
7       EFH affected area are likely identical; both should account for all areas over which direct or  
8       indirect impacts to ecological receptors could occur. A primary difference between the two  
9       could be that an ESA action area may involve large areas of land that do not apply to the  
10      EFH affected area if that land does not contain any aquatic habitat or features.

11      The affected area determination should be made by a qualified SME because subsequent  
12      steps in the consultation, as well as the effects analyses, are predicated on defining a  
13      complete and accurate affected area. The SME should be able to describe the extent of the  
14      affected area in writing and pictorially on a map.

15    2. *Determine the EFH that may be present in the affected area.*

16      Once the affected area is established, the SME determines what EFH may be present in  
17      that area. The Fishery Management Councils and NMFS designate EFH by species and life  
18      stage.

19      To determine EFH, the SME should query the NMFS's Essential Fish Habitat Mapper tool  
20      (available at: <https://www.habitat.noaa.gov/apps/efhmapper/>). This tool allows users to view  
21      spatial representations of fish species, their life stages, and important habitats. The mapper  
22      displays data layers for EFH, HAPC, and EFH areas protected from fishing. It also includes  
23      links to supporting materials, such as fishery management plans, which contain the official  
24      regulatory EFH descriptions. Prior to initiating this step, the SME should be familiar enough  
25      with the potential effects of the proposed action to be able to fully define the affected area  
26      and to input that area into the mapping tool.

27      The SME should compare EFH mapper results with habitat characteristics documented in  
28      scientific literature and the descriptions of EFH in relevant fishery management plans and  
29      other regulatory documents to ultimately determine the relevant EFH species and life  
30      stages.

31      Although it is not required by regulation, it is a best practice to reach out to the Habitat  
32      Conservation Division of the relevant NMFS regional office to confirm the accuracy and  
33      completeness of the EFH mapper results and the SME's determination of relevant EFH  
34      species and life stages. This is particularly valuable in determining whether the NRC should  
35      consider any prey of EFH species in its EFH analysis. For instance, if a given species with  
36      designated EFH downstream of an NRC-licensed facility consumes diadromous fish that  
37      occur upriver of the facility, effects of the proposed action on those prey fish would be  
38      relevant to the NRC staff's EFH analysis. NMFS can help identify such cases that may not  
39      appear within EFH mapper results. NMFS may also be able to assist the SME in ruling out,  
40      streamlining, or grouping EFH species and life stages in cases where the EFH mapper  
41      results are numerous.

42      If EFH, HAPC, or EFH prey are present in the affected area, the SME should proceed to the  
43      next step (determining potential effects) to determine whether consultation is required. If no

1 EFH, HAPC, or EFH prey are present, consultation is not required. The SME should  
 2 document this determination in the NEPA document associated with the proposed action  
 3 (e.g., EIS, SEIS, or EA), in correspondence to NMFS, or in a memo to file.

4 3. *Engage with NMFS*

5 If the NRC has not yet engaged directly with NMFS during the previous step(s), the SME  
 6 should reach out to the Habitat Conservation Division of the relevant regional office to  
 7 establish points of contact and to orient NMFS staff to the proposed action. This also helps  
 8 NMFS plan and designate staff resources so that both agencies (NRC and NMFS) can meet  
 9 the consultation timelines prescribed in the regulations. This step is also an opportunity for  
 10 the SME to gather more information on the EFH species, their life stages, habitat  
 11 characteristics, and HAPC. NMFS staff may be able to point the SME to surveys, studies,  
 12 and other available species data or connect the SME with local researchers and species  
 13 experts. The SME should document any substantive discussions with the Services,  
 14 researchers, or species experts in meeting summaries and should add any related  
 15 correspondence to ADAMS.

16 4. *Determine and document potential effects on EFH.*

17 The next step in the consultation process is to determine the potential effects of the  
 18 proposed action on the EFH of the identified EFH species, life stages, and their prey and on  
 19 HAPC, if applicable. The SME typically performs this analysis concurrently with the NEPA  
 20 review. The SME should rely on the application; available ecological surveys, monitoring,  
 21 and studies; views of recognized species experts; scientific literature; and other relevant  
 22 information to perform the EFH analysis. Based on the analysis, the SME makes an effect  
 23 determination for the EFH of each EFH species, life stage, and their prey and each HAPC  
 24 as identified below in Table A-3.

25 **Table A-3 Possible Essential Fish Habitat Effect Determinations Made by the Federal**  
 26 **Action Agency**

Essential Fish Habitat Effect Determinations	Spatial Extent	Duration
"substantial adverse effects"	surface area, depth, and	temporary v. permanent
"more than minimal but less than substantial adverse effects"	seasonality described in writing with explicit measurements, to the extent possible, or pictorially on a	short-term v. long-term
"minimal adverse effects"	map	
"no adverse effects"		

27 Importantly, EFH effect determinations characterize the effects on the *habitat* of the EFH  
 28 species and their life stages. They do not characterize the effects on the species or the life  
 29 stages themselves. Similarly, effect determinations for EFH prey characterize the effects on  
 30 the prey as a food resource rather than the effects on the prey species themselves. For  
 31 instance, a proposed action that involves water withdrawal from a river for cooling purposes  
 32 could cause habitat loss (i.e., temporary or permanent physical loss of a portion of the water  
 33 column). Associated effluent discharge could cause chemical or biological (i.e., temperature  
 34 and dissolved oxygen content) alterations to the habitat. With respect to prey species, water

1 withdrawals could impinge or entrain prey organisms, which would represent a reduction in  
2 available food resources for EFH species within that habitat.

3 HAPC are subsets of EFH that merit special considerations to conserve the habitat. The  
4 Fishery Management Councils and NMFS identify HAPC within designated EFH based on  
5 the importance of the habitat's ecological function; the extent to which the habitat is  
6 sensitive to human-induced environmental degradation; whether, and to what extent,  
7 development activities are, or will be, stressing the habitat type; and the rarity of the habitat  
8 type (50 CFR 600.815(a)(8)). If an HAPC is present, the SME should make separate effect  
9 determinations for the EFH and the HAPC within that EFH. Actions that occur in HAPC may  
10 receive more scrutiny by NMFS when developing conservation recommendations.

11 In addition to each EFH effect determination, NMFS recommends that Federal agencies  
12 characterize effects in terms of spatial extent and duration (NMFS 2004b). To the  
13 extent possible, the SME should describe these aspects of the impacts. Spatial extent can  
14 be characterized in terms of surface area, depth, and seasonality. Duration includes  
15 whether the effects are temporary or permanent and short-term or long-term.

16 The SME documents the EFH analysis and effect determination(s) in an EFH assessment or  
17 directly within the NEPA document. EFH assessments are required for any proposed action  
18 that may adversely affect EFH (50 CFR 600.920(e)(1)). This includes the following effect  
19 determinations identified in Table A-3: "substantial adverse effects," "more than minimal but  
20 less than substantial adverse effects," and "minimal adverse effects." The level of detail in  
21 an EFH assessment should be commensurate with the complexity and magnitude of the  
22 potential adverse effects of the action (50 CFR 600.920(e)(2)). The EFH assessment must  
23 contain the following (50 CFR 600.920(e)(3)):

- 24 • a description of the action
- 25 • an analysis of the potential adverse effects on EFH and EFH species
- 26 • the Federal agency's conclusions regarding the effects of the action on EFH
- 27 • proposed mitigation, if applicable.

28 If appropriate, the EFH assessment should also include (50 CFR 600.920(e)(4))

- 29 • the results of site surveys, studies, and inspections that evaluate the habitat and the site-  
30 specific effects of the project
- 31 • the views of recognized experts on the habitat or species that may be affected
- 32 • a review of pertinent scientific literature and related information
- 33 • an analysis of alternate actions considered by the Federal agency
- 34 • any other relevant information.

35 If a Federal agency has previously completed an EFH assessment for a similar action, the  
36 EFH regulations allow for the agency to incorporate by reference the previous assessment,  
37 supplemented with any relevant new project-specific information (50 CFR 600.920(e)(4)).

38 The NRC typically issues EFH assessments as stand-alone documents. However, the NRC  
39 also may opt to incorporate the EFH assessment into the NEPA document associated with  
40 the proposed action under 50 CFR 600.920(f)(ii). In such cases, the NRC must clearly

1 identify the relevant section of the document as the EFH assessment. The SME, along with  
 2 the project manager and NRC management, should carefully weigh the benefits and risks of  
 3 this option. Incorporating the EFH assessment into the NEPA document can delay the  
 4 progression of consultation because the NRC must wait until the NEPA document is issued  
 5 to initiate consultation. Typically, this option should be reserved for abbreviated  
 6 consultations that involve few EFH species, life stages, or prey and that do not involve any  
 7 HAPC.

8 If the proposed action would result in “no adverse effects,” consultation is not required, and  
 9 the SME documents the EFH analysis directly in the NEPA document. The NEPA document  
 10 should clearly identify the EFH analysis with appropriate headings and subheadings and  
 11 include the SME’s effect determinations for the EFH of each EFH species, life stage, and  
 12 their prey and each HAPC as identified in Table A-3.

13 **5. Determine the appropriate type of consultation.**

14 The SME’s effect determination(s) dictate whether consultation is required and the type of  
 15 consultation that is appropriate (e.g., abbreviated, expanded, programmatic, or no  
 16 consultation). Table A-4 summarizes the appropriate type of consultation for each possible  
 17 effect determination.

18 **Table A-4 Appropriate Type of Consultation by Type of Proposed Action and Essential**  
 19 **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” <sup>(a)</sup>
Expanded Consultation	individual proposed action	“substantial adverse effects” or “more than minimal, but less than adverse effects” <sup>(a)</sup>
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”

20 EFH = essential fish habitat; GEIS = generic environmental impact statement.

21 (a) For this finding, the NRC should work with NMFS to determine whether abbreviated or expanded consultation is  
 22 most appropriate.

23 For a given project, EFH effect determinations among the affected EFH species and life  
 24 stages may vary. For instance, a proposed action may result in no more than minimal  
 25 adverse effects on EFH of summer flounder (*Paralichthys dentatus*) (larvae, juveniles, and  
 26 adults), Atlantic butterfish (*Peprilus triacanthus*) (juveniles and adults), and bluefish  
 27 (*Pomatomus saltatrix*) (juveniles), but may have no adverse effects on the EFH of any life  
 28 stages of black sea bass (*Centropristis striata*) or Atlantic herring (*Clupea harengus*). In this  
 29 case, abbreviated consultation would be appropriate to address the minimal adverse effects  
 30 on summer flounder, Atlantic butterfish, and bluefish, but the consultation would not be  
 31 required to address either black sea bass or Atlantic herring unless NMFS disagrees with  
 32 the NRC’s “no adverse effect” findings. For another proposed action, the NRC might

1 determine that a proposed action would have substantial adverse effects on the larvae and  
2 juveniles of summer flounder and windowpane flounder (*Scophthalmus aquosus*) but would  
3 have no adverse effects on the EFH of juveniles and adults of these species. In this case,  
4 expanded consultation would be appropriate to address the larvae and juvenile life stages.

5 6. *Initiate and engage in consultation.*

6 When the EFH assessment or NEPA document containing the EFH assessment is ready for  
7 issuance, the SME prepares a request to initiate consultation with NMFS. The request  
8 should specify the type of consultation being requested (i.e., abbreviated, expanded, or  
9 programmatic) and why the action meets the criteria for that type of consultation. The NRC  
10 staff must submit the EFH assessment at least 60 days prior to the final agency decision on  
11 the action for abbreviated consultation and at least 90 days prior to the final agency decision  
12 for expanded consultation.

13 Both abbreviated and expanded consultations begin when NMFS receives the EFH  
14 assessment and written request for consultation. Programmatic consultations also begin  
15 in this manner, although the EFH regulations allow for NMFS to also initiate programmatic  
16 consultations by requesting pertinent information from the Federal agency  
17 (50 CFR 600.920(j)(2)).

18 During consultation, the NRC and NMFS exchange information and engage in discussions  
19 concerning the potential effects of the proposed action. The agencies may work together to  
20 develop measures to avoid, minimize, mitigate, or otherwise offset adverse effects. NMFS  
21 may request that the NRC submit additional information to support its review of the  
22 proposed action in a process that is like the NRC's RAI process.

23 Although the EFH regulations do not specifically describe the role of Federal applicants or  
24 licensees, in practice, the NRC usually requests to involve the applicant or licensee to the  
25 extent possible, and NMFS is typically amenable to this request. It is also a best practice to  
26 engage the applicant or licensee when responding to any inquiries from NMFS to ensure  
27 that the NRC's responses are accurate and complete.

28 If the proposed action will adversely affect EFH, NMFS formulates EFH Conservation  
29 Recommendations, which may include measures to avoid, minimize, mitigate, or otherwise  
30 offset adverse effects. NMFS must provide such recommendations to the NRC within 30  
31 days for abbreviated consultation or within 60 days for expanded consultation. If NMFS  
32 determines that the action would not adversely affect EFH or that no EFH Conservation  
33 Recommendations are needed, NMFS notifies the NRC informally or in writing, and such  
34 notification concludes consultation.

35 If NMFS provides the NRC with EFH Conservation Recommendations, the NRC must  
36 prepare a detailed written response within 30 days of receiving the recommendations. This  
37 30-day timeframe applies to both abbreviated and expanded consultation. In the response,  
38 the NRC staff must include a description of measures proposed for avoiding, mitigating, or  
39 offsetting the impact of the activity on EFH. If the NRC's response is inconsistent with any  
40 of the NMFS's EFH Conservation Recommendations, the response must be provided at  
41 least 10 days prior to the final agency decision and must explain the NRC's reasons for not  
42 following the recommendations, including the scientific justification for any disagreements  
43 with NMFS. The NRC's response completes consultation.



1 The process for programmatic consultation is similar. However, five outcomes are possible.  
2 NMFS may:

- 3 1. Formulate programmatic EFH Conservation Recommendations that cover all individual  
4 actions of the program.
- 5 2. Formulate programmatic recommendations that cover individual actions, but that require  
6 individual consultations for some or all actions.
- 7 3. Determine that no programmatic recommendations can be developed and that all  
8 individual actions will require individual consultation.
- 9 4. Determine that all individual actions qualify for a General Concurrence, as defined in the  
10 MSA.
- 11 5. Determine that there are no adverse effects and that no recommendations are needed.

12 If NMFS provides the NRC with EFH Conservation Recommendations as part of a  
13 programmatic consultation, the NRC must prepare a detailed written response within  
14 30 days of receiving the recommendations. The NRC's response completes consultation.

15 7. *Document the conclusion of consultation.*

16 Completion of the consultation is documented by the NRC's response to NMFS's EFH  
17 Conservation Recommendations or, in cases where the action would not adversely affect  
18 EFH, NMFS's notification to NRC that no EFH Conservation Recommendations are needed.  
19 The SME ensures that these documents are added to ADAMS as part of the consultation  
20 record. The SME also documents the outcome of consultation in the NEPA document  
21 associated with the proposed action. In cases where a final EIS or SEIS is issued prior to  
22 the conclusion of consultation, the SME prepares input to the record of decision that  
23 documents the outcome of the consultation. In cases where the final EA and FONSI are  
24 issued prior to the conclusion of consultation, the NRC can consider issuing a *Federal*  
25 *Register* notice that corrects or adds the EA and FONSI.

26 8. *Perform supplemental consultation.*

27 The EFH regulations specify two conditions under which Federal agencies must reinstate  
28 consultation. These conditions are (50 CFR 600.920(l))

- 29 • if the Federal agency substantially revises its plans for an action in a manner that may  
30 adversely affect EFH, or
- 31 • if new information becomes available that affects the basis for NMFS EFH Conservation  
32 Recommendations

33 Supplemental consultation is conducted in a similar manner as initial consultation. The  
34 outcome of supplemental consultation is NMFS's formulation of new or revised EFH  
35 Conservation Recommendations. The NRC has the same regulatory responsibility to reply  
36 to such recommendations within 30 days as during the initial consultation.

1 **A.3 National Marine Sanctuaries Act**

2 **A.3.1 Overview of the Act and Consultation Responsibilities**

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

15 In 1992, Congress amended the NMSA to require interagency coordination. Pursuant to  
16 Section 304(d) of the NMSA, Federal agencies must consult with ONMS when their proposed  
17 actions are likely to destroy, cause the loss of, or injure a sanctuary resource. Private actions  
18 with a Federal nexus, such as construction and operation of facilities that involve Federal  
19 licensing or approval, are also subject to consultation. Therefore, the NRC’s issuance of initial  
20 or subsequent renewed licenses may trigger consultation requirements. Consultation pursuant  
21 to NMSA Section 304(d) is commonly referred to as “NMSA consultation.”

22 NOAA has not promulgated regulations concerning NMSA Section 304(d). In 2008, NOAA  
23 issued an advance notice of proposed rulemaking in the *Federal Register* soliciting comments  
24 on whether development of regulations implementing certain aspects of the NMSA  
25 Section 304(d) consultation provisions is appropriate (73 FR 50259). NOAA later withdrew its  
26 proposal in 2011. However, the ONMS has issued guidance for conducting NMSA consultation,  
27 which the NRC relies upon, in *Overview of Conducting Consultation Pursuant to Section 304(d)*  
28 *of the National Marine Sanctuaries Act* (NOAA 2009).

29 **A.3.2 NMSA Consultation**

30 *A.3.2.1 NMSA Consultation*

31 Unlike ESA Section 7 or EFH consultation, for which there are each several possible types of  
32 consultation depending on the specific circumstances, the ONMS’s guidance prescribes only a  
33 single process for consultation. NMSA consultation is required when a Federal agency  
34 determines that an action “is likely to destroy, cause the loss of, or injure” a sanctuary resource.  
35 Federal actions subject to consultation may be inside or outside the boundary of a national  
36 marine sanctuary.

37 NMSA consultation begins when a Federal agency submits a sanctuary resource statement to  
38 the ONMS and requests to initiate consultation. If the ONMS determines that sanctuary  
39 resources are not likely to be injured by the proposed action, the ONMS will so notify the action  
40 agency and consultation is concluded. If the ONMS finds that the proposed action will be likely  
41 to injure sanctuary resources, it will, in coordination with the Federal agency, develop  
42 recommended reasonable and prudent alternatives to protect against injury. Upon receipt of the  
43 recommended alternatives, the Federal agency must discuss the alternatives with the ONMS. If

1 the Federal agency fully incorporates the recommended alternatives into the proposed action,  
2 no further consultation is necessary prior to conducting the action. If the Federal agency does  
3 not follow the recommended alternatives, the agency must provide a written explanation to the  
4 ONMS that describes the reasons for not following the alternatives.

5 If the Federal agency does not adopt the recommended alternatives and sanctuary resources  
6 are subsequently injured because of the proposed action, Section 304(d)(4) of the NMSA  
7 requires agencies to promptly prevent further damage and to restore or replace the sanctuary  
8 resources in a manner approved by the ONMS.

9 *A.3.2.2 No Consultation*

10 NMSA consultation is not required when the Federal agency determines that an action “is not  
11 likely to destroy, cause the loss of, or injure” a sanctuary resource.

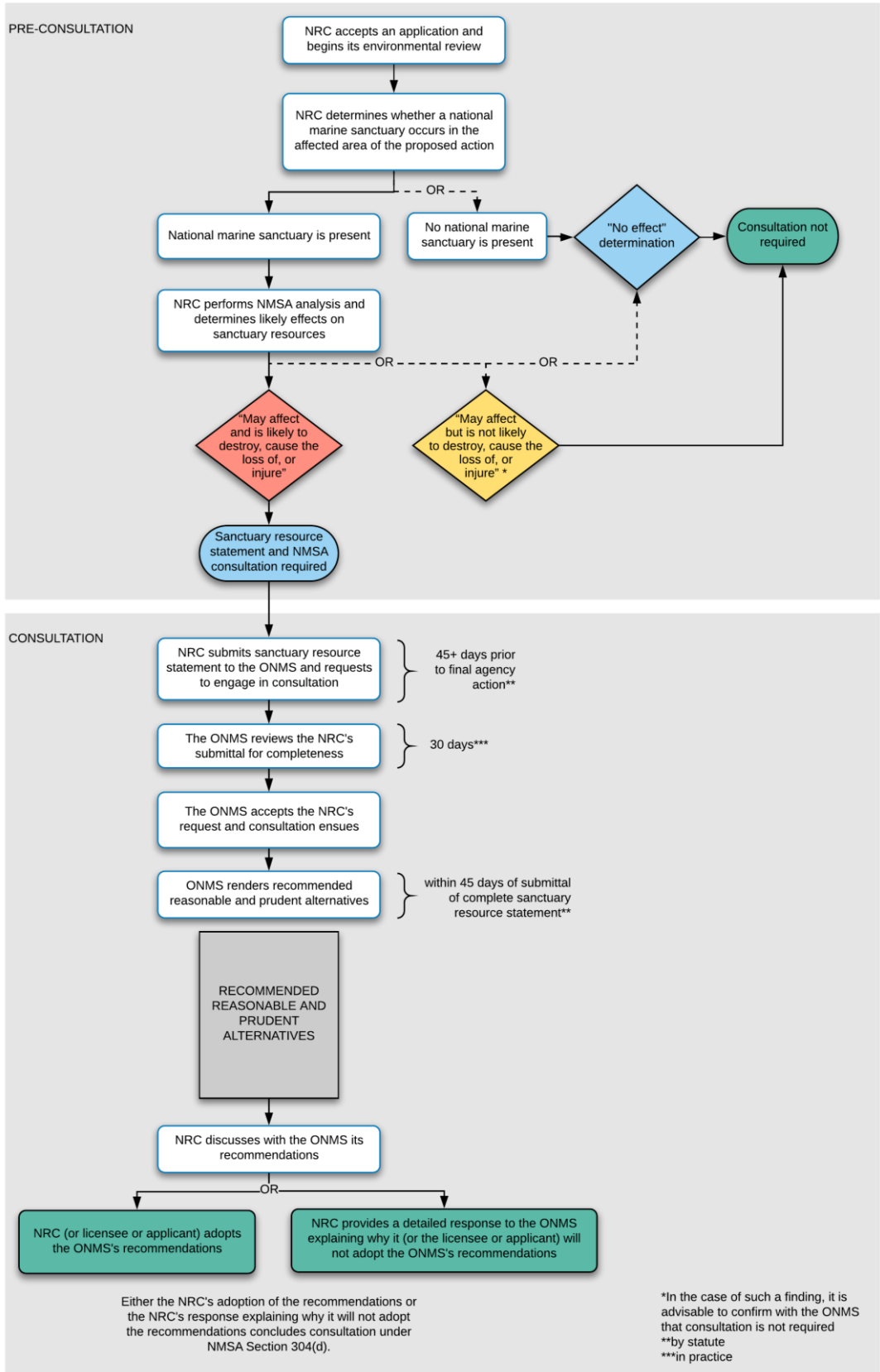
12 **A.3.3 NMSA Consultation Process**

13 This section describes each step in determining whether NMSA consultation is necessary and  
14 within the consultation process itself. Figure A-3 illustrates the NMSA pre-consultation and  
15 consultation process.

16 *1. Determine the affected area.*

17 The first step in the consultation process is to determine the area that would be affected by  
18 the proposed action. This step is like determining the ESA action area (see  
19 Section 4.6.11.3, Review Procedure Step 1). Unlike the ESA, however, the NMSA and  
20 ONMS’s guidance do not specifically prescribe or define terminology for the affected area.  
21 For projects involving an ESA analysis, EFH analysis and/or an NMSA analysis, the ESA  
22 action area, the EFH affected area, and/or the NMSA affected area are likely identical; each  
23 should account for all areas over which direct or indirect impacts to ecological receptors  
24 could occur. Primary differences could be that an ESA action area may involve large areas  
25 of land that do not apply to the NMSA affected area. The EFH affected area could include  
26 freshwater bodies or non-marine aquatic habitats or features that do not apply to the NMSA  
27 affected area. Notably, although most national marine sanctuaries are marine, two are  
28 within the Great Lakes (Thunder Bay National Marine Sanctuary in Lake Huron and  
29 Wisconsin Shipwreck Coast National Marine Sanctuary in Lake Michigan), and one is  
30 currently proposed within Lake Ontario as of 2022.

31 The affected area determination should be made by a qualified SME because subsequent  
32 steps in the consultation, as well as the effects analyses, are predicated on defining a  
33 complete and accurate affected area. The SME should be able to describe the extent of the  
34 affected area in writing and pictorially on a map.  
35



1

2

**Figure A-3 National Marine Sanctuaries Act Consultation Process Flowchart**

1 2. *Determine the sanctuary resources that may be present in the affected area.*

2 Once the affected area is established, the SME determines what national marine sanctuary  
 3 (or sanctuaries) are present in that area and what sanctuary resources are relevant to the  
 4 review. The term “sanctuary resource” is very broad and includes virtually every living and  
 5 nonliving component of the sanctuary ecosystem.<sup>3</sup> Table A-5 includes examples of types of  
 6 sanctuary resources. The complete regulatory definition of this term can be found at 15  
 7 CFR 922.3.

8 **Table A-5 Types of Sanctuary Resources**

<b>Types of Sanctuary Resources</b>	
substratum of the area of the Sanctuary	phytoplankton and zooplankton
submerged features <sup>(a)</sup> 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 <sup>(b)</sup>

9 (a) Submerged features may include man-made features, such as artificial coral reef structures and shipwrecks.  
 10 (b) Because sanctuary resources include historic resources, this review necessitates coordination with the historic  
 11 and cultural resource review to determine whether any historic resources are present that would be relevant to  
 12 the NMSA consultation. In such cases, multiple NRC staff may be involved in discussions with the ONMS.

13 To determine what sanctuaries occur in the affected area, the SME should refer to the  
 14 ONMS website, which contains maps, descriptions, and other information on the National  
 15 Marine Sanctuary System (available at: <https://sanctuaries.noaa.gov/>). For each sanctuary,  
 16 the ONMS maintains a sanctuary management plan that describes in detail the sanctuary  
 17 and its living and non-living marine resources. Although it is not required, it is a best  
 18 practice to reach out to the local ONMS office to discuss the proposed action and the  
 19 sanctuary resources that may be of particular concern.

20 If a national marine sanctuary is present in the affected area, the SME should proceed to the  
 21 next step (determining potential effects) to determine whether consultation is required. If no  
 22 national marine sanctuary is present, consultation is not required. For coastal projects and  
 23 those near Great Lakes, the SME should document this determination in the NEPA  
 24 document associated with the proposed action (e.g., EIS, SEIS, or EA) or in a memo to file.  
 25 For inland projects and other situations where a national marine sanctuary would not be  
 26 affected by the proposed action, no specific documentation is necessary.

27 3. *Engage with ONMS.*

28 If the NRC has not yet engaged directly with the ONMS during the previous step(s), the  
 29 SME should reach out to the local ONMS office to establish points of contact and to orient  
 30 ONMS staff to the proposed action. This also helps the ONMS plan and designate staff  
 31 resources for the consultation. This step is also an opportunity for the SME to gather more  
 32 information on the sanctuary resources that may be affected. ONMS staff may be able to  
 33 point the SME to surveys, studies, and other available data or connect the SME with local  
 34 researchers and experts. The SME should document any substantive discussions with the

<sup>3</sup> 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.

1 ONMS, researchers, or other experts in meeting summaries and should add any related  
2 correspondence to ADAMS.

3 4. *Determine and document potential effects on sanctuary resources.*

4 The next step in the consultation process is to determine the potential effects of the  
5 proposed action on sanctuary resources. The SME typically performs this analysis  
6 concurrently with the NEPA review. The SME should rely on the application; available  
7 ecological surveys, monitoring, and studies; views of recognized species experts; scientific  
8 literature; and other relevant information to perform the NMSA analysis. Based on the  
9 analysis, the SME makes an effect determination concerning sanctuary resources as  
10 identified below in Table A-6.

11 **Table A-6 Possible National Marine Sanctuaries Act Effect Determinations Made by the**  
12 **Federal Action Agency**

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<b>NMSA Effect Determinations</b>
“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”

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13 The SME documents the NMSA analysis and effect determination(s) in a sanctuary resource  
14 statement or directly within the NEPA document. Sanctuary resource statements are  
15 required for any proposed action that is likely to injure a sanctuary resource. The level of  
16 detail in a sanctuary resource statement should be commensurate with the complexity and  
17 magnitude of the potential adverse effects of the action. Sanctuary resource statements  
18 may include the following, for example (NOAA 2009):

- 19 • purpose or objectives of the proposed action
- 20 • location of the action and any alternative locations
- 21 • methods and means for carrying out the action and any alternative methods available
- 22 • equipment proposed to be used and any alternative equipment
- 23 • documentation that supports the determination of the likelihood of the action causing  
24 injury to sanctuary resources
- 25 • results of site surveys, studies, and inspections that evaluate the affected area of the  
26 project
- 27 • views of recognized experts on the sanctuary resources that may be affected
- 28 • review of pertinent scientific literature and related information
- 29 • analysis of alternate actions considered by the Federal agency
- 30 • copies of any Federal, territory, State, local or Indian Tribe authorizations, permits,  
31 licenses, or other forms of approval (or applications for authorizations, permits, or  
32 licenses, if not yet granted) required for the project or a summary of such approvals that  
33 have been sought
- 34 • copies of pertinent reports, including, but not limited to, any EIS, EA, or biological  
35 assessment prepared, and any other relevant information.

1 The NRC may also opt to incorporate the sanctuary resource statement into the NEPA  
2 document associated with the proposed action. In such cases, the NRC should clearly  
3 identify the relevant section of the document as the sanctuary resource statement. The  
4 SME, along with the project manager and NRC management, should carefully weigh the  
5 benefits and risks of this option. Incorporating the sanctuary resource statement into the  
6 NEPA document can delay the progression of consultation because the NRC must wait until  
7 the NEPA document is issued to initiate consultation.

8 Notably, sanctuary resources can include historic resources in addition to ecological  
9 resources. Thus, the ecology SME should coordinate with the historic and cultural resource  
10 SME to determine whether any historic resources are present that would be relevant to the  
11 NMSA consultation. In such cases, both NRC SMEs should be involved in discussions with  
12 the ONMS. It may also be appropriate for the historic and cultural resource SME to prepare  
13 input to the sanctuary resource statement concerning the potential effects of the proposed  
14 action on the historic resources of the sanctuary.

15 The SME should also be aware as to whether the proposed action will require a special use  
16 permit for activities otherwise prohibited in sanctuaries under 15 CFR Part 922. If a  
17 proposed Federal action requires both NMSA consultation and a special use permit, the  
18 ONMS will conduct both processes simultaneously, to the extent practicable. For example,  
19 a dredging project conducted by a Federal agency within a national marine sanctuary may  
20 require both a permit and trigger NMSA consultation. For most NRC agency actions where  
21 this might apply, the licensee or applicant would be responsible for obtaining the special use  
22 permit, and the NRC would be responsible for conducting NMSA consultation. The SME  
23 should alert the ONMS of this unique situation early in the process so that the ONMS can  
24 coordinate timelines for the two processes.

25 If the proposed action would result in “no effect,” consultation is not required, and the SME  
26 documents the NMSA analysis directly in the NEPA document. The NEPA document should  
27 clearly identify the NMSA analysis with appropriate headings and subheadings and include  
28 the SME’s effect determination(s) for the sanctuary resources as identified in Table A-6.

29 *5. Determine whether consultation is required.*

30 The SME’s effect determination(s) dictate whether NMSA consultation is required.<sup>4</sup>  
31 Consultation is required if the proposed action may affect and is likely to destroy, cause the  
32 loss of, or injure any sanctuary resource of a national marine sanctuary. Consultation is not  
33 required for “may affect but is not likely to destroy, cause the loss of, or injure” and “no  
34 effect” findings. However, in cases where the SME makes a “not likely” finding, it is a best  
35 practice to discuss this determination with the ONMS to confirm that consultation is not  
36 required.

37 *6. Initiate and engage in consultation.*

38 When the sanctuary resource statement or NEPA document containing the sanctuary  
39 resource statement is ready for issuance, the SME prepares a request to initiate

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<sup>4</sup> 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.

1 consultation with the ONMS. The NRC staff must submit the sanctuary resource statement  
2 at least 45 days prior to the final agency decision.

3 Upon receipt of the NRC's request, the ONMS performs a completeness evaluation to  
4 determine whether the sanctuary resource statement contains sufficient information to  
5 evaluate the proposed action's likelihood of injury and to develop any necessary reasonable  
6 prudent alternatives to protect sanctuary resources. The ONMS may request that the NRC  
7 submit additional information to support its review of the proposed action in a process like  
8 the NRC's RAI process.

9 Once the ONMS determines that the sanctuary resource statement is complete, consultation  
10 begins, including the ONMS's 45-day period to recommend alternatives. During  
11 consultation, the NRC and the OMNS exchange information and engage in discussions  
12 concerning the potential effects of the proposed action. The agencies may work together to  
13 develop recommended alternatives to protect against injury to sanctuary resources.

14 Although the ONMS's guidance does not specifically describe the role of Federal applicants  
15 or licensees, in practice, the NRC usually requests to involve the applicant or licensee to the  
16 extent possible, and the ONMS is typically amenable to this request. It is also a best  
17 practice to engage the applicant or licensee when responding to any inquiries from the  
18 ONMS to ensure that the NRC's responses are accurate and complete.

19 If the proposed action may injure sanctuary resources, the ONMS formulates recommended  
20 reasonable and prudent alternatives. In the context of NMSA Section 304(d), these  
21 alternatives can best be understood as those actions necessary to protect sanctuary  
22 resources. Alternatives generally focus on the location, timing, and methods of the  
23 proposed action. For example, the ONMS may recommend that the proposed action be  
24 conducted

- 25 • at an alternate location, including a location outside the sanctuary(ies)
- 26 • during a different season or that it be delayed for a specified period of time
- 27 • with alternative equipment or procedures
- 28 • with some combination of these recommendations.

29 If the ONMS provides the NRC with recommended alternatives, the NRC must discuss the  
30 recommendations with the ONMS. If the NRC (or licensee or applicant) plans to fully  
31 implement the recommended alternatives and fully incorporate them into the proposed  
32 action, the NRC need not take any further action beyond this discussion. If the NRC (or  
33 licensee or applicant) does not follow the recommended alternatives, the NRC must prepare  
34 a written response that describes the reasons for not implementing the alternatives. The  
35 NRC's response completes consultation.

36 *7. Document the conclusion of the consultation.*

37 Completion of the consultation is documented by the NRC's response to the ONMS's  
38 recommended alternatives or, where the NRC (or licensee or applicant) adopts the  
39 alternatives, documentation of the NRC's discussion with the ONMS regarding how such  
40 alternatives will be incorporated into the proposed action. The SME ensures that these  
41 documents are added to ADAMS as part of the consultation record. The SME also  
42 documents the outcome of consultation in the NEPA document associated with the



1 proposed action. In cases where a final EIS or SEIS is issued prior to the conclusion of  
2 consultation, the SME prepares input to the record of decision documenting the outcome of  
3 the consultation. In cases where the final EA and FONSI are issued prior to the conclusion  
4 of consultation, the NRC can consider issuing a *Federal Register* notice that corrects or  
5 addends the EA and FONSI.

6 8. *Conduct post-consultation activities.*

7 Section 304(d)(4) of the NMSA requires Federal agencies that do not adopt ONMS  
8 recommendations to take certain steps if their action results in injury to sanctuary resources.  
9 First, upon injury, the Federal agency must promptly develop and implement measures to  
10 mitigate further damage. Once the injury to sanctuary resources has been stopped, the  
11 NMSA requires Federal agencies to restore or replace the resources in a manner approved  
12 by the ONMS. Restoration or replacement can take many forms depending on the type of  
13 injury caused and the nature of the resource. In such cases, the Federal agency develops a  
14 restoration plan for ONMS approval.

15 9. *Conduct further consultation.*

16 The ONMS's guidance (NOAA 2009) directs Federal agencies to determine if a new NMSA  
17 consultation is required in cases where the proposed action changes such that the nature or  
18 likelihood of injury to sanctuary resources changes. The new consultation is conducted in a  
19 similar manner as initial consultation. The outcome of new consultation is the ONMS's  
20 formulation of new or revised recommended reasonable and prudent alternatives. If not fully  
21 adopted, the NRC has the same responsibility to reply to such recommendations as during  
22 the initial consultation.

23 **A.4 References**

24 15 CFR Part 922. *Code of Federal Regulations*, Title 15, *Commerce and Foreign Trade*, Title  
25 922, "National Marine Sanctuary Program Regulations."

26 50 CFR Part 402. *Code of Federal Regulations*, Title 50, *Wildlife and Fisheries*, Part 402,  
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## 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.<sup>1</sup> Issuing a renewed license (initial LR or SLR) is a Federal undertaking<sup>2</sup> 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).

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<sup>1</sup> 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.

<sup>2</sup> 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.

- 1 • Step 2: Identify Historic Properties (36 CFR 800.4) – Identify historic properties located  
2 within the APE and determine if these will be affected by license renewal. This step consists  
3 of determining the scope of the identification efforts, executing the identification, determining  
4 the eligibility of the identified historic and cultural resources, and establishing if historic  
5 properties will be affected and, if not, concluding with a finding of no historic properties  
6 affected.
- 7 • Step 3: Assess Adverse Effects (36 CFR 800.5) – Assess adverse effects of license  
8 renewal on identified historic properties. If historic properties will be affected, this step  
9 consists of evaluating whether historic properties will be adversely affected or not.
- 10 • Step 4: Resolve Adverse Effects (36 CFR 800.6) – Resolve adverse effects by avoiding,  
11 minimizing, or mitigating the effects. Mitigation activities are formalized in an NHPA Section  
12 106 Memorandum of Agreement (MOA) or a Programmatic Agreement (PA).

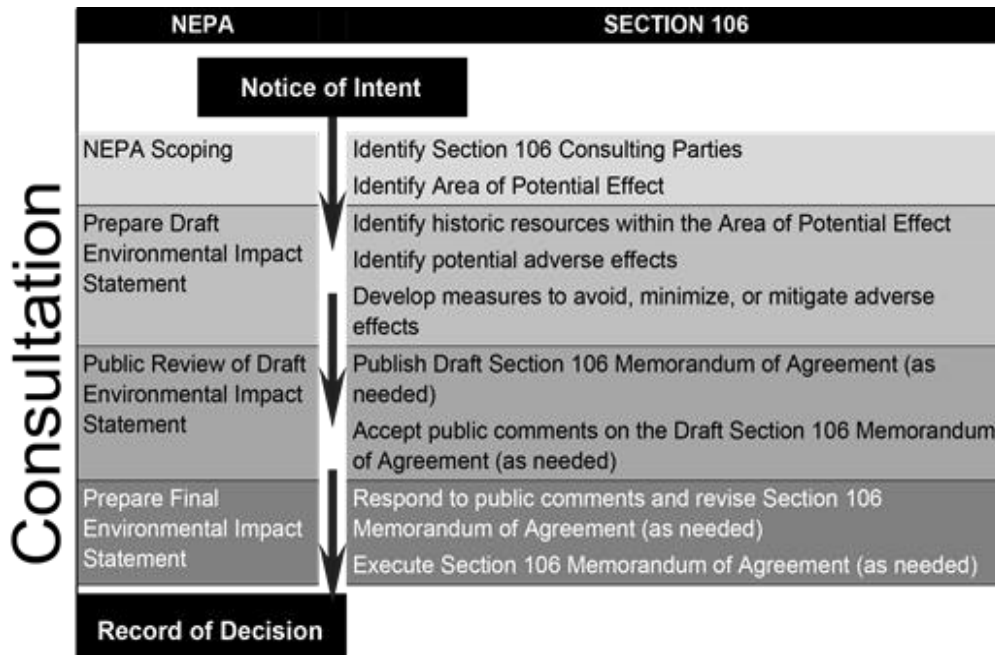
13 In addition to Section 106 of the NHPA, the National Environmental Policy Act (NEPA) (42  
14 U.S.C. § 4321 et seq.) requires Federal agencies to consider the potential effects of their  
15 actions on the “affected human environment,” which includes “aesthetic, historic, and cultural  
16 resources as these terms are commonly understood, including such resources as sacred sites”  
17 (CEQ and ACHP 2013). For NEPA compliance, impacts on cultural resources that are not  
18 eligible for or listed in the NRHP would also need to be considered (CEQ and ACHP 2013).

## 19 **B.2 Coordination of NHPA Section 106 Review and Consultation with the** 20 **National Environmental Policy Act**

21 The NHPA Section 106 regulations at 36 CFR 800.8(c) “Use of the NEPA process for Section  
22 106 purposes,” allow Federal agencies to coordinate Section 106 consultation requirements  
23 through the NEPA public involvement and review documentation. This process requires that  
24 during the preparation of an EA or EIS, agencies must meet certain procedural requirements set  
25 out in 36 CFR § 800.8(c)(1), (2), (3), and (4) and the four “standards,” set forth in 36 CFR §  
26 800.8(c)(i)-(iv) (CEQ and ACHP 2013). Figure B-1 illustrates the coordination process allowed  
27 by 36 CFR 800.8(c). Consultation occurs throughout the key steps listed in the Figure B-1.

28 The supplemental environmental impact statement (SEIS) serves as the administrative record  
29 and is the main vehicle for consultation when coordinating NHPA Section 106 through the  
30 NEPA process because it contains all of the information necessary to complete the process and  
31 it is sent to all consulting parties for their review, comment, and concurrence.

32 This appendix describes the steps in coordinating the Section 106 process with NEPA for  
33 license renewal applications.  
34



1  
2 **Figure B-1 Coordinating National Environmental Policy Act and National Historic**  
3 **Preservation Act Section 106 Reviews**

4 **B.2.1 Step 1: Initiate the Section 106 Process**

5 *Establish the Undertaking.* The NRC has determined that issuance of a renewed license (initial  
6 LR or SLR) is a Federal undertaking that requires compliance with the NHPA Section 106.

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

14 *Identify Consulting Parties.* Identify the appropriate SHPO or THPO, Indian Tribes, Native  
15 Hawaiian organizations, local governments, preservation organizations, and individuals who  
16 may be concerned with the possible effects of license renewal on historic properties in a manner  
17 consistent with 36 CFR 800.3(f). In addition to these parties, additional consulting parties can  
18 include certain individuals and organizations with a demonstrated interest in an undertaking  
19 (e.g., license renewal applicants, State-recognized Tribes, and local historical societies). Tribal  
20 liaisons in the Office of Nuclear Material Safety and Safeguards can support identifying tribal  
21 contact information and provide programmatic support when requested. Additional resources  
22 that can be helpful in obtaining contact information include the following:

- 23 • SHPO, State and Tribal government officials
- 24 • U.S. Department of Interior Bureau of Indian Affairs Tribal Leaders Directory
- 25 • National Association of Tribal Preservation Officers
- 26 • U.S. Department of Housing and Urban Development's Tribal Directory Assessment Tool

- 1 • U.S. Department of Interior National Park Service Tribal Historic Preservation Officers online  
2 databases.

3 NHPA Section 106 consultation is the responsibility of the Federal agency and should be  
4 conducted in accordance with 36 CFR Part 800. While license applicants may have engaged  
5 with the SHPO/THPO and Indian Tribes during the development of its environmental report, the  
6 NRC is required to consult with the SHPO/THPO and Indian Tribes that attach religious and  
7 cultural significance to historic properties that could be affected by the undertaking. Early  
8 coordination with consulting parties is essential to the development of the plant-specific SEIS.

9 Once the NRC staff has identified the relevant consulting parties, the staff initiates NHPA  
10 Section 106 consultation by letter, notifying parties of the scope of the undertaking and inviting  
11 them to participate in the Section 106 process and provide comments and input on historic  
12 properties and other historic and cultural resources. Consultation letters should be mailed to the  
13 consulting parties in parallel with publication of notice of intent to prepare a SEIS and conduct  
14 scoping in the *Federal Register*. In accordance with 36 CFR 800.8(c), the consultation letters  
15 should notify the ACHP, SHPOs/THPOs, and Indian Tribes that the NRC intends to comply with  
16 NHPA Section 106 through the NEPA process. The following information should also be  
17 provided in the consultation letters:

- 18 • location of the undertaking
- 19 • description of the undertaking
- 20 • definition of the APE
- 21 • how comments can be submitted
- 22 • when the scoping period ends
- 23 • details of scoping public meeting (if conducted)
- 24 • any environmental review milestones (e.g., expected issuance of the draft SEIS)
- 25 • an NRC Section 106 point of contact
- 26 • relevant maps of the direct and indirect APE.

## 27 **B.2.2 Step 2: Identify Historic Properties**

28 *Identify and evaluate relevant historic properties within the APE.* Review existing information  
29 on historic properties within the APE. Use information provided by the applicant's or licensee's  
30 environmental report, background research, records searches performed at SHPO's/THPO's  
31 office, oral history interviews, ethnographic studies, information gathered through consultation,  
32 field survey results, and site visits to identify historic properties. NHPA regulations require  
33 Federal agencies to make a reasonable and good faith effort to identify properties that the  
34 undertaking may affect, and both listed NRHP properties and unlisted properties within the APE  
35 may be relevant to Section 106 consultation.

36 In consultation with the SHPO/THPO and any Indian Tribe that attaches religious and cultural  
37 significance to identified properties, the NRC should apply the NRHP criteria (36 CFR 60.4) to  
38 properties identified within the APE that have not been previously evaluated for NRHP eligibility.  
39 Indian Tribes possess special expertise in identifying historic properties of religious and cultural  
40 significance to them and assessing their eligibility. If the NRC determines that any of the NRHP  
41 criteria are met and the SHPO/THPO agrees, the property shall be considered eligible for the

1 NRHP for Section 106 purposes. If the NRC determines the criteria are not met and the  
2 SHPO/THPO agrees, the resource shall be considered not eligible. For historic or cultural  
3 resources that do not meet the criteria to be considered a historic property under the NHPA, the  
4 NRC will assess whether there would or would not be any potential significant impacts on these  
5 resources through the NEPA process.

### 6 **B.2.3 Step 3: Assess Effects**

7 *Determine if adverse effects exist.* Once eligibility determinations are complete, the NRC and  
8 consulting parties work to determine whether the license renewal (initial LR or SLR) will have  
9 adverse effects on the identified historic properties. An adverse effect occurs when an  
10 undertaking may alter, directly or indirectly, any of the characteristics of a historic property that  
11 qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the  
12 property's location, design, setting, materials, workmanship, feeling, or association (36 CFR  
13 800.5(a)(1)). Adverse effects may include physical destruction or damage to all or part of a  
14 historic property as well as the introduction of visual or audible elements. For additional  
15 examples of adverse effects see 36 CFR 800.5(a)(2). The NRC may propose a finding of no  
16 adverse effect when the undertaking's (license renewal) effects do not meet the criteria of  
17 paragraph 36 CFR 800.5(a)(1).

18 *No adverse effect.* The NRC concludes no adverse effect on historic properties when no  
19 historic properties have been identified in the APE or if historic properties are present, but there  
20 will be no effect consistent with 36 CFR 800.16(i) (e.g., because effects will be avoided). This  
21 determination should be documented in the draft SEIS in accordance with 36 CFR 800.11(e).  
22 NRC staff should also identify and discuss the APE, historic properties and historic and cultural  
23 resources within the APE, consulting parties, and summarize scoping comments received from  
24 consulting parties. The draft SEIS should be provided to the SHPO/THPO, ACHP, Indian  
25 Tribes, and other consulting parties for review when the draft SEIS is issued for public  
26 comment. The draft SEIS is transmitted to all consulting parties with an accompanying cover  
27 letter that summarizes the relevant NHPA Section 106 and NEPA findings.

28 *Resolve comments on the draft SEIS.* Based on comments received on the draft SEIS,  
29 additional consultation may be needed. If the SHPO/THPO or any consulting party notifies the  
30 NRC in writing that they disagree and object with the findings in the draft SEIS, proceed with  
31 Step 4 below.

32 Other responses (e.g., concurrence with findings, comments for consideration, corrections) to  
33 the NRC letters that accompany the draft SEIS are considered in the final SEIS. Based on  
34 comments received on the draft EIS, the historic and cultural resources sections in the final  
35 SEIS would be updated to include responses to consultation letters, SHPO concurrences with  
36 determinations of eligibility and finding of effect, as well as address any additional concerns  
37 raised by consulting parties. The final SEIS would be transmitted to consulting parties with a  
38 cover letter that describes any changes made based on responses and points to those specific  
39 sections of the final SEIS in which changes were made and to formal responses made in the  
40 comment-response section of the final SEIS. The letter should clearly indicate that the NHPA  
41 Section 106 consultation process is closed.

42 In accordance with 36 CFR 800.3(c)(4), if the SHPO/THPO agrees or does not respond by the  
43 close of the 30-day review period, and no other consulting party objects, then the NHPA Section  
44 106 process is closed, and the NRC may proceed with the action.

1 *Adverse effect.* If the NRC determines that license renewal would have an adverse effect on  
2 historic properties, the process discussed under Step 4 should be followed.

### 3 **B.2.4 Step 4: Resolve Adverse Effects**

4 If the NRC determines that there is an adverse effect to historic properties, the staff would  
5 continue consultation with the SHPO/THPO and other consulting parties to assess measures to  
6 avoid, minimize, or mitigate adverse effects to historic properties. Similarly, if a consulting party  
7 disagrees with the NRC's determination and notifies the NRC in writing that it disagrees with the  
8 finding and specifies the reasons for the disagreement in the notification, the NRC shall  
9 continue to work with the consulting parties to resolve the disagreement or request review by  
10 the ACHP.

11 As part of the resolution process, the NRC and the consulting parties can develop measures to  
12 avoid, minimize, or mitigate the adverse effects. Such measures are typically documented in a  
13 MOA or PA. The NRC may invite the ACHP to participate in resolving adverse effects when  
14 (1) the NRC wants the ACHP's participation, (2) a National Historic Landmark (a historic  
15 property that has been recognized by the Secretary of the Interior as possessing national  
16 significance) will be adversely affected, or (3) a PA will be prepared.

17 If the NRC enters into a MOA as part of resolving any adverse effects upon historic properties,  
18 then the NRC must reference the MOA in the draft SEIS for public comment. MOA or PA  
19 signatories typically include the NRC, SHPO(s), THPO(s), and the ACHP, if it joined the  
20 consultation. The NRC may also invite other parties to sign or concur with the agreement, such  
21 as the applicant or licensee and Indian Tribes. The MOA or PA signatories have sole authority  
22 to execute, amend, or terminate the agreement. Execution of an MOA or a PA completes the  
23 Section 106 consultation and fulfills the NRC's obligations under NHPA Section 106 for that  
24 undertaking. However, the MOA or PA must be fully implemented for the NRC to remain in  
25 compliance with the NHPA.

### 26 **B.2.5 Record of Decision and Issuance of License**

27 The NRC must provide written communication to federally recognized Tribes who provided input  
28 on the proposed license renewal, as soon as practical, after the NRC has issued the record of  
29 decision. This written response should inform the Tribe of the NRC's final decision, describe  
30 how the NRC considered the Tribe's input, and respond to the Tribe's comments.

## 31 **B.3 References**

32 36 CFR Part 60. Code of Federal Regulations, Title 36, Parks, Forests, and Public Property,  
33 Part 60, "National Register of Historic Places."

34 36 CFR Part 800. Code of Federal Regulations, Title 36, Parks, Forests, and Public Property,  
35 Part 800, "Protection of Historic Properties."

36 CEQ and ACHP (Council on Environmental Quality and Advisory Council on Historic  
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38 Washington, D.C. ADAMS Accession No. ML14172A044.

39 National Environmental Policy Act of 1969 (NEPA), as amended. 42 U.S.C. § 4321 et seq.

40 National Historic Preservation Act. 54 U.S.C. § 300101 et seq.



<b>NRC FORM 335</b> (12-2010) NRCMD 3.7	<b>U.S. NUCLEAR REGULATORY COMMISSION</b>  <b>BIBLIOGRAPHIC DATA SHEET</b> <i>(See instructions on the reverse)</i>	<b>1. REPORT NUMBER</b> <i>(Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.)</i> NUREG-1555, Supplement 1, Revision 2 Draft Report				
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<b>10. SUPPLEMENTARY NOTES</b>						
<b>11. ABSTRACT</b> <i>(200 words or less)</i> 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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