[7590-01-P]

NUCLEAR REGULATORY COMMISSION

10 CFR Part 51

[NRC-2018-0296]

RIN 3150-AK32

Renewing Nuclear Power Plant Operating Licenses – Environmental Review

AGENCY: Nuclear Regulatory Commission.

ACTION: Final rule and guidance; issuance.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is amending its environmental protection regulations by updating the Commission's 2013 findings on the environmental effect of renewing the operating license of a nuclear power plant. This final rule redefines the number and scope of the environmental issues that must be addressed during the review of each application for license renewal. As part of this update, the NRC is issuing Revision 2 to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (LR GEIS), to account for new information and to address the impacts of initial license renewals, which the previous versions considered, as well as first subsequent license renewals. The revised LR GEIS provides the technical basis for the final rule.

DATES:

Effective Date: This final rule is effective on **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

Compliance Date: Compliance with this final rule is required by **[INSERT DATE 1 YEAR AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].**

ADDRESSES: Please refer to Docket ID NRC-2018-0296 when contacting the NRC about the availability of information for this action. You may obtain publicly available information related to this action by any of the following methods:

- **Federal Rulemaking Website:** Go to https://www.regulations.gov and search for Docket ID NRC-2018-0296.
- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly available documents online in the ADAMS Public Documents collection at https://www.nrc.gov/reading-rm/adams.html. To begin the search, select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, at 301-415-4737, or by email to PDR.Resource@nrc.gov. For the convenience of the reader, instructions about obtaining materials referenced in this document are provided in the "Availability of Documents" section.
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SUPPLEMENTARY INFORMATION:

EXECUTIVE SUMMARY:

A. Purpose of the Regulatory Action

The Atomic Energy Act of 1954, as amended (AEA) authorizes the NRC to issue licenses to operate commercial nuclear power plants for up to 40 years. The AEA and the NRC's regulations allow for the renewal of these licenses for up to an additional 20 years for each renewal term, which could either be an initial license renewal (initial LR) or subsequent license renewal (SLR). There are no limitations in the AEA or the NRC's regulations restricting the number of times a license may be renewed. The NRC's review of a license renewal application proceeds along two independent regulatory tracks: one for safety issues and another for environmental issues. The NRC's regulations for the license renewal safety review are set forth in part 54 of title 10 of the *Code of Federal Regulations* (10 CFR), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." The NRC's environmental protection regulations are set forth in 10 CFR part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

The license renewal application includes both general and technical information that demonstrates that an applicant is in compliance with the NRC's regulations in 10 CFR part 54. During the safety review, the license renewal applicant must demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended

operation. Information in the application must be sufficiently detailed to permit the NRC staff to complete its review and develop the safety finding.

Separate from the safety analysis, the applicant prepares an evaluation of the potential impacts to the environment of facility operation for an additional 20 years, which the NRC uses to inform its environmental analysis. Under the NRC's environmental protection regulations in 10 CFR part 51, which implement the National Environmental Policy Act (NEPA), renewal of a nuclear power plant operating license requires the preparation of an environmental impact statement (EIS). To support the preparation of these EISs, the NRC issued a final rule in 1996 (61 FR 28467) and a supporting analysis in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (LR GEIS). The LR GEIS defines which impacts would essentially be the same at all nuclear power plants or a subset of plants (i.e., generic or Category 1 issues) and which impacts could be different at different plants and would require a plant-specific analysis to determine the impacts (Category 2 issues). The determinations are codified in Table B–1, "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants," of appendix B to subpart A of 10 CFR part 51 (hereafter referred to as "Table B–1").[1] For each license renewal application, those impacts that require a plant-specific analysis must be analyzed by the applicant in its environmental report and by the NRC in a supplemental environmental impact statement (SEIS) to NUREG-1437. The 1996 rule was amended in 2013 (78 FR 37281) by the issuance of an updated rule and publication of LR GEIS, Revision 1. In 2014, the NRC issued a final rule that addressed the generic determination of the environmental impacts of continued storage of spent nuclear fuel beyond a reactor's licensed life for operation (79 FR 56238). That rule amended 10 CFR part 51 by revising the findings of two environmental issues listed in Table B–1.

[1] As stated in the introductory paragraph of appendix B to subpart A of 10 CFR part 51, the Commission has assessed the environmental impacts associated with granting a renewed operating license for a nuclear power plant to a licensee who holds either an operating license or construction permit as of June 30, 1995.

This final rule redefines the number and scope of the environmental issues that must be addressed by the NRC and applicants during license renewal environmental reviews. These changes are based primarily on the lessons learned and knowledge gained from initial LR and SLR reviews performed by the NRC since development of the 2013 LR GEIS. The changes also address Commission direction in Staff Requirements Memorandum (SRM)-SECY-22-0024, "Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses – Environmental Review (RIN 3150-AK32, NRC-2018-0296)," by thoroughly evaluating SLR in this review and update. In addition, new scientific research, public comments, changes in environmental regulations and impacts methodology, and other new information were considered in evaluating the nature and significance of impacts associated with license renewal.

B. Major Provisions

In the 2013 rule, there were 78 environmental issues, 17 of which required a plant-specific analysis (Category 2 issues) during license renewal environmental reviews. In this final rule, there are 80 environmental issues, 20 of which require a plant-specific analysis. The following points summarize the primary changes to the NRC's requirements in part 51:

1. Several issues were consolidated, including some issues that were combined with other related Category 1 or Category 2 issues.

2. One new Category 1 issue was added: "Greenhouse gas impacts on climate change."

3. One issue was changed from Category 2 to Category 1: "Severe accidents."

4. Two new Category 2 issues were added: "Climate change impacts on environmental resources" and "National Marine Sanctuaries Act: sanctuary resources."

5. One Category 2 issue was divided into three separate Category 2 issues: "Endangered Species Act: federally listed species and critical habitats under U.S. Fish and Wildlife Service jurisdiction," "Endangered Species Act: federally listed species and

critical habitats under National Marine Fisheries Service jurisdiction," and "Magnuson-Stevens Act: essential fish habitat."

C. Costs and Benefits

The NRC prepared a regulatory analysis to determine the expected quantitative and qualitative costs and benefits of the final rule and associated guidance. The regulatory analysis concluded that the final rule and associated guidance result in undiscounted total net savings of $89.5 million to the industry and $36 million to the NRC.

The regulatory analysis also reflected qualitative factors to be considered in the NRC's rulemaking decision. Qualitative factors include regulatory stability, predictability, and clarity in the licensing process. The final rule reduces the cost to the industry of preparing environmental reports for license renewal applications by focusing resources on plant-specific analyses. The NRC also recognizes similar reductions in cost and will be able to better focus its resources on plant-specific environmental issues during reviews of reactor license renewal applications.

For more information, see the regulatory analysis (available as indicated in Section XVI, "Availability of Documents" section of this document).

TABLE OF CONTENTS:

I. Background

NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," (LR GEIS) is intended to streamline the NRC's license renewal environmental review by documenting a systematic approach that the NRC uses to evaluate the environmental impacts of renewing the operating licenses of commercial nuclear power plants. The LR GEIS also provides the technical basis for Table B–1, in appendix B to subpart A, and the Commission's other license renewal regulations in 10 CFR part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." This "Background" section provides an overview of the environmental review process and the rulemaking history related to the license renewal process under which a power reactor licensee may apply for a renewal of its operating license.

A. Environmental Review—Current 10 CFR Part 51 Regulations

As a Federal agency, the NRC must comply with the National Environmental Policy Act (NEPA) by assessing the potential environmental effects (impacts) of a proposed agency action before approving or disapproving that proposed action. The regulations implementing the NRC's NEPA review are found in 10 CFR part 51.

Under NEPA, Federal agencies prepare an environmental impact statement (EIS) for any major Federal action significantly affecting the quality of the human

environment. In addition, the Commission has identified at § 51.20 certain categories of NRC proposed actions that require the preparation of an EIS, including the renewal of a license to operate a nuclear power reactor.[2] For each plant-specific review, the NRC prepares a supplemental environmental impact statement (SEIS) to the LR GEIS.

The NRC's provisions at § 51.53(c) require an applicant for renewal of a nuclear power plant license to submit with its application a separate document entitled "Applicant's Environmental Report—Operating License Renewal Stage" that describes 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 report must address the environmental impacts of alternatives and any other matters described in § 51.45, which include the following: (1) the impact of the proposed action on the environment, (2) any adverse environmental impacts that cannot be avoided, (3) alternatives to the proposed action, (4) the relationship between local short-term uses of the environment and maintenance and enhancement of long-term productivity, and (5) any irreversible or irretrievable commitments of resources. Within its environmental report, the applicant is required to include analyses of the environmental impacts of the proposed action, including the impacts of refurbishment activities, if any, associated with license renewal and the impacts of operation during the renewal term, for those issues identified as Category 2 issues in appendix B to subpart A of 10 CFR part 51. Additionally, the applicant is required to provide any new and significant information of which it is aware in its environmental report. If there is no new and significant information for a Category 1 issue, the applicant can rely on that Category 1 generic finding and analyses in the LR GEIS. The applicant's environmental report informs the NRC's independent evaluation.

Before making a decision on a license renewal application for a nuclear power plant, the NRC is required to prepare and distribute, for public comment, a draft SEIS. The draft SEIS assesses the potential environmental impacts that may result from

[2] The term *Nuclear reactor* is defined in § 50.2, "Definitions."

continued nuclear power plant operation and any proposed refurbishment activities during the renewal term (initial license renewal (initial LR) or subsequent license renewal (SLR)). In preparing the draft SEIS, the NRC staff will rely on the findings in Table B–1 for Category 1 issues and analyze the potential environmental impacts of the proposed action (license renewal) on the affected environment and specific environmental resources (e.g., groundwater) for Category 2 issues. Additionally, the NRC will consider any potentially new and significant information for Category 1 issues and for uncategorized issues. An environmental issue may remain uncategorized where the impact level remains unknown or uncertain, such as any activity or aspect associated with the nuclear power plant operations that can act upon the environment in a manner or an intensity not previously recognized or quantified. Within each environmental resource area, the NRC staff will analyze issues that correspond to specific, potential environmental impacts at the specific site (e.g., within the groundwater resource area, groundwater quality degradation resulting from water withdrawals). In the draft SEIS, the NRC staff also will evaluate alternatives to the proposed action.

After analyzing the potential environmental impacts for each issue, the NRC assigns one of the following three significance levels to describe its evaluation of those impacts on that issue in either the LR GEIS or a plant-specific SEIS:

SMALL—The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered SMALL.

MODERATE—The environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE—The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

In assessing the significance of environmental impacts for some environmental resources (e.g., federally protected ecological resources and historic properties that require interagency consultation with Federal agencies or Indian Tribes[3]), the NRC assigns the appropriate impact level (other than SMALL, MODERATE, or LARGE) in accordance with the terminology used in the relevant statutes and their implementing regulations. The NRC conducts consultations under specific statutes, as appropriate.[4]

The NRC will document its environmental review and analysis through the preparation of a draft SEIS that will be published for public comment in the *Federal Register*, with a minimum 45-day comment period, in accordance with § 51.73. Further, as provided in § 51.74, the NRC will distribute the draft SEIS to the U.S. Environmental Protection Agency (EPA), other Federal agencies that have a special expertise or jurisdiction with respect to any potential environmental impact that may be relevant to the proposed action, the applicant, and appropriate State, Tribal, and local agencies and clearinghouses.

Following the public comment period, the NRC will analyze any comments received, revise its environmental analyses as appropriate, and then prepare the final SEIS in accordance with the requirements of § 51.91. Under § 51.93, the NRC will distribute the final SEIS to many of the same entities as the draft SEIS and to each commenter. The NRC also will publish a notice of availability for the final SEIS in the *Federal Register*. As set forth in § 51.102 and following the preparation and distribution of the final SEIS, the NRC will prepare and issue the record of decision, which is a concise, publicly available statement that documents the agency's decision, as informed by the final SEIS and final safety evaluation report. The requirements for a record of decision are described in § 51.103, and include stating the NRC's decision (e.g., the

[3] 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. 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).

[4] Plant-specific license renewal reviews may include consultations under the Endangered Species Act (16 U.S.C. 1531 et seq.), Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.), National Marine Sanctuaries Act (16 U.S.C. § 1431 et seq.), and National Historic Preservation Act (54 U.S.C. 300101 et seq.). See NRC Tribal Policy Statement (82 FR 2402).

approval or disapproval of the license renewal application), identifying the alternatives (including the proposed action) considered by the agency, and a statement as to whether the NRC has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the alternative selected and if not, to explain why those measures were not adopted. Further, the record of the decision will include a determination by the NRC as to 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, which is the purpose and need of license renewal.

B. Rulemaking History

In 1986, the NRC initiated a program to develop license renewal regulations and associated regulatory guidance in anticipation of receiving applications for the renewal of nuclear power plant operating licenses. In 1996, the NRC published a final rule that amended the environmental protection regulations in 10 CFR part 51 to include provisions for applicants seeking to renew an operating license for up to an additional 20 years (61 FR 28467; June 5, 1996). The 1996 final rule was based upon the analyses and findings of a May 1996 NRC environmental impact statement, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants,” NUREG-1437 (the “1996 LR GEIS”).

Based upon the findings of the 1996 LR GEIS, the 1996 final rule identified those license renewal environmental issues for which a generic analysis had been determined to be appropriate (Category 1 issues). Similarly, based upon the findings of the 1996 LR GEIS, the 1996 final rule identified those environmental impacts for which a site- or plant-specific analysis was required, both by the applicant in its environmental report and by the NRC in its SEIS (Category 2 issues). The 1996 final rule, among other amendments to 10 CFR part 51, added appendix B to subpart A of 10 CFR part 51, “Environmental Effect of Renewing the Operating License of a Nuclear Power Plant.”

Appendix B included Table B–1 which summarized and codified the findings of the 1996 LR GEIS.

In preparing the 1996 LR GEIS, the Commission based its generic assessment on the following factors:

(1) License renewal will involve nuclear power plants for which the environmental impacts of operation are well understood as a result of lessons learned and knowledge gained from operating experience and completed license renewals.

(2) Activities associated with license renewal are expected to be within this range of operating experience; thus, environmental impacts can be reasonably predicted.

(3) Changes in the environment around nuclear power plants are gradual and predictable.

The 1996 LR GEIS improved the efficiency of the license renewal process in the following ways: (1) providing an evaluation of the types of environmental impacts that may occur from renewing commercial nuclear power plant operating licenses, (2) identifying and assessing impacts that are expected to be generic (i.e., the same or similar) at all nuclear power plants or plants with specified plant or site characteristics, and (3) defining the number and scope of environmental impacts that need to be addressed in plant-specific SEISs to the 1996 LR GEIS.

As identified in the 1996 final rule, a Category 1 issue is an issue that meets the following criteria: (1) the environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristic; (2) a single significance level (i.e., small, moderate, or large) has been assigned to the impacts (except for certain issues discussed below in more detail); and (3) mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation. A Category 2 issue is defined as an

issue where one or more of Category 1 criteria cannot be met, and therefore, additional plant-specific review is required.

As stated in the 1996 final rule, the NRC recognized that environmental issues might change over time and that additional issues may need to be considered. As further stated in the introductory text to Table B–1, the NRC indicated that it intended to review the material in Table B–1 on a 10-year basis.

On December 18, 1996 (61 FR 66537), the NRC amended the 1996 final rule to incorporate minor clarifying and conforming changes and to add language omitted from Table B–1.

In 1999, the NRC amended 10 CFR part 51, including Table B–1, to expand the generic findings pertaining to the environmental impacts resulting from transportation of fuel and waste to and from a single nuclear power plant (64 FR 48496; September 3, 1999). This final rule also incorporated rule text consistent with the 1996 LR GEIS to address local traffic impacts attributable to the continued operations of a nuclear power plant during the license renewal term.

In 2013, the NRC completed the first 10-year review and update of the 1996 LR GEIS and published a final rule (78 FR 37281; June 20, 2013) that amended Table B–1 by updating the Commission's 1996 findings on the environmental impacts related to the renewal of nuclear power plant operating licenses and other NRC environmental protection regulations (e.g., 10 CFR 51.53, which sets forth the contents of the applicant's environmental report, 10 CFR 51.75, and 10 CFR 51.95). The 2013 final rule redefined the number and scope of the environmental issues that must be addressed by the NRC and applicants during license renewal environmental reviews. These changes were primarily based on lessons learned and knowledge gained from license renewal environmental reviews conducted by the NRC since 1996. Together with the final rule, the NRC issued a revised LR GEIS, NUREG-1437 Revision 1 (the "2013 LR GEIS"), as well as Revision 1 of Regulatory Guide (RG) 4.2, Supplement 1, "Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications," and

Revision 1 to NUREG-1555, Supplement 1, “Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Operating License Renewal.”

On July 31, 2013 (78 FR 46255), the NRC issued a final rule to incorporate minor clarifying and conforming changes and revise the statutory authority that was cited in the authority citation for the final rule.

In 2014, the NRC published a final rule titled “Continued Storage of Spent Nuclear Fuel” that revised the generic determination regarding the environmental impacts of the continued storage of spent nuclear fuel beyond a reactor’s licensed life for operation and prior to ultimate disposal (79 FR 56238; September 14, 2014). The continued storage final rule also made conforming amendments to the determinations of environmental effects of renewing the operating license of a nuclear power plant. These changes addressed issues related to the onsite storage of spent nuclear fuel, both for the license renewal term and for the period after the licensed life for reactor operations, and offsite radiological impacts of spent nuclear fuel and high-level waste disposal. Specifically, the continued storage final rule revised two environmental issues in Table B–1: (1) “Onsite storage of spent fuel” and (2) “Offsite radiological impacts of spent nuclear fuel and high-level waste disposal.”

In August 2020, the NRC issued a notice of intent to review and potentially update the 2013 LR GEIS[5] (i.e., the scoping notice) in the *Federal Register* (85 FR 47252; August 4, 2020). The comment period began in August 2020 and ended in November 2020. The scoping notice provided the public with an opportunity to submit comments and participate in the environmental scoping process, as defined in § 51.26. Specifically, the NRC invited the public to review the results of the NRC staff’s preliminary review of the LR GEIS, including a proposal to address SLR in the LR GEIS, and asked the public to provide comments and suggestions for other areas that should be updated. The NRC conducted four webinars where the staff received comments from

[5] Unless stated otherwise, references to the 2013 LR GEIS include the changes made to two environmental issues in Table B–1 as a part of the 2014 Continued Storage of Spent Nuclear Fuel final rule. These changes are discussed in Section 1.7.2 of the revised LR GEIS.

the public. All comments provided during the 2020 scoping period were considered in preparing the draft revised LR GEIS and are publicly available. The official transcripts and the scoping summary report are available as indicated in the "Availability of Documents" section of this final rule.

In July 2021, the staff submitted SECY-21-0066, "Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses – Environmental Review (RIN 3150-AK32; NRC-2018-0296)," to request Commission approval to initiate a rulemaking to amend Table B–1 and update the 2013 LR GEIS and associated guidance. The rulemaking plan also proposed to remove the word "initial" from § 51.53(c)(3), which, as described above, governs license renewal applicant's environmental reports; this change would have included applicants for SLR in the section's scope. The plan would have also made corresponding changes to the LR GEIS and the associated guidance.

In February 2022, the Commission issued SRM-SECY-21-0066, "Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses – Environmental Review (RIN 3150-AK32; NRC-2018-0296)." The Commission disapproved the staff's recommendation and directed the staff to develop a rulemaking plan that aligned with the Commission Order CLI-22-03, and recent decisions in Turkey Point, CLI-22-02, and Peach Bottom, CLI-22-04, regarding the NEPA analysis of SLR applications. These orders concluded that the staff did not conduct an adequate NEPA analysis for the SLR period and further stated that the staff cannot exclusively rely on the LR GEIS for Category 1 issues in SLR environmental reviews. The SRM also directed the staff to include in the rulemaking plan a proposal to remove the word "initial" from § 51.53(c)(3) and to revise the LR GEIS and Table B–1 and associated guidance to fully account for one term of SLR. The SRM also directed the staff to provide options for a future rulemaking effort regarding the 10-year regulatory update.

In March 2022, the staff submitted SECY-22-0024, "Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses – Environmental Review (RIN 3150-AK32; NRC-2018-0296)," to request Commission approval to initiate a rulemaking that

would align with the Commission Order CLI-22-03 and recent decisions in Orders CLI-22-02 and CLI-22-04 regarding the NEPA analysis of SLR applications, as well as to remove the word “initial” from § 51.53(c)(3) and to revise the LR GEIS and Table B–1 and associated guidance to fully account for one term of SLR. The staff also proposed to update the LR GEIS to consider new technical data from completed environmental reviews, changes to environmental laws and regulations, and other information.

In April 2022, the Commission issued SRM-SECY-22-0024, “Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses – Environmental Review (RIN 3150-AK32; NRC-2018-0296),” approving the staff’s recommendation to proceed with rulemaking.

In April 2022, the staff submitted SECY-22-0036, “Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses—10-Year Environmental Regulatory Update (NRC-2022-0087)” that provided options for a future rulemaking effort to incorporate further changes to the LR GEIS as part of the 10-year regulatory update to amend Table B–1. Because the current rulemaking would address all necessary issues, the staff recommended that a future rulemaking for updating the LR GEIS and Table B–1 be deferred, to begin no sooner than FY 2031. The staff further recommended that the current update of the LR GEIS constitute the update for this review cycle.

In June 2022, the Commission issued SRM-SECY-22-0036 approving the staff’s recommendation.

II. Discussion

A. Amendments

The amendments to 10 CFR part 51 in this final rule revise the existing requirements for environmental reviews of applications for license renewal of operating nuclear power plants. The amendments codify the updated generic conclusions of the revised LR GEIS for those issues for which a generic conclusion regarding the potential environmental effects (impacts) of issuing an initial or subsequent renewed license for a

nuclear power plant can be reached. These conclusions have been updated to specifically account for one term of SLR as well as initial LR and other new information since the last LR GEIS update. These issues are identified as Category 1 issues in the revised LR GEIS. The Category 1 issues identified and described in the revised LR GEIS may be applied to any application for initial LR or first SLR for operating nuclear power plants covered by the LR GEIS and have been determined to have a SMALL impact for all plants or a subset of plants. Table B–1 in appendix B to subpart A of 10 CFR part 51 summarizes and codifies the Commission's findings for all Category 1 issues. The revisions to Table B–1 account for one term of SLR; reflect lessons learned, knowledge gained, and experience from license renewal environmental reviews performed since development of the 2013 LR GEIS; consider changes to applicable laws and regulations; and factor in new scientific data and methodology with respect to the assessment of potential environmental impacts of nuclear power plant license renewal. In addition, the amendments include conforming changes to the provisions of § 51.53(c)(3) and § 51.95. These changes are intended to maintain the accuracy of the LR GEIS and ensure that future environmental reviews meet the "hard look" standard to fully account for the environmental impacts of initial LR and SLR, as documented in the revised LR GEIS.

B. The Fiscal Responsibility Act of 2023

The NRC has made targeted changes to the LR GEIS to address amendments to the NEPA statute in the Fiscal Responsibility Act of 2023 (Public Law No. 118-5, 137 Stat. 10) (FRA). Among other things, these amendments add to NEPA a new section 107(e), which establishes page limits for environmental impact statements, including 300 pages for environmental impact statements for agency actions of "extraordinary complexity." The NRC finds that, to the extent that section 107(e) applies to the LR GEIS, a 300-page limit is appropriate because the LR GEIS addresses a proposed action of "extraordinary complexity" in light of the complicated systems, structures, and

components deployed in operating nuclear power plants; the number of resource areas addressed; and the variety of environments in which nuclear power plants operate. Thus, changes to the LR GEIS include the relocation of certain text and other materials from Chapters 2, 3, and 4, and Chapters 6, 7, and 8 in their entirety, to the appendices to revise the document to be less than 300-pages (not including appendices, citations, figures, tables, and other graphics).

The FRA also introduced a 2-year timeline for completing an EIS from when the agency identified a need for the EIS in section 107(g), although that timeline may be extended. As discussed in section I.B., the NRC concluded that the LR GEIS did not address SLR in February of 2022, when the Commission directed the staff to provide the rulemaking plan that led to the revised LR GEIS, which serves as the technical basis for this final rule. Therefore, to the extent that section 107(g) of NEPA may apply to this action, the NRC has extended the deadline for completing this EIS by 6 months to allow adequate time to prepare and publish the final LR GEIS.

C. Environmental Impacts Review

In the revised LR GEIS, the NRC evaluated the Category 1 generic findings from the 2013 LR GEIS and determined that many of the environmental impacts of continued nuclear power plant operations and refurbishment during the renewal term (initial LR or SLR) would be SMALL. However, license renewal applicants in their environmental reports and the NRC staff in the SEIS would still need to evaluate whether new and significant information exists that would require a plant-specific analysis for that issue.

In the revised LR GEIS, the NRC identified a total of 80 environmental issues that may be associated with operation and refurbishment during the renewal term. Chapter 4 of the revised LR GEIS describes the impact findings and impact significance level of SMALL, MODERATE, or LARGE, or a range where applicable, for each Category 1 and Category 2 issue. Of the 80 issues, the NRC identified 59 environmental issues as Category 1 issues. Applicants and the NRC staff are required to rely on the

generic finding for each Category 1 issue as supported by the analysis in the revised LR GEIS, as codified in Table B–1.

The revised LR GEIS identifies 20 environmental issues as Category 2 issues. These issues cannot be evaluated generically and must be evaluated by the applicant, in its environmental report, and the NRC staff, in the draft SEIS, using plant-specific information. For example, for the issue “Surface water use conflicts (plants with cooling ponds or cooling towers using makeup water from a river)” the revised LR GEIS concludes that impacts could be of SMALL or MODERATE significance based on site-specific factors that exacerbate consumptive water use by a nuclear power plant. The factors include increased water demand due to population growth; changes in water demand by industrial, agricultural, or other users of the same water source; drought and river low-flow conditions, and reduced water availability over time due to climate change. Therefore, the potential for water use conflicts must be addressed on a plant-specific basis.

For one environmental issue, “Electromagnetic fields (EMF),” the revised LR GEIS identified the category as “N/A” (not applicable). Studies of 60-Hz EMFs have not uncovered consistent evidence linking harmful effects with field exposures. Because the state of the science is currently inadequate, no generic conclusion on human health impacts is possible. If, in the future, the Commission finds that a general agreement has been reached by appropriate Federal health agencies that there are adverse health effects from EMFs, the Commission will then treat this issue in a manner similar to a Category 2 issue and require applicants to submit plant-specific reviews of these health effects in their environmental report. Until such time, applicants are not required to submit information on this issue.

D. Revised Generic Environmental Impact Statement for License Renewal of Nuclear

Power Plants

This revision evaluates the environmental issues and findings of the 2013 LR GEIS and updates the analysis and assumptions to fully account for both initial LR and SLR. Lessons learned, knowledge gained, and experience from license renewal environmental reviews performed by the NRC since development of the 2013 LR GEIS provided an important source of new information for this assessment. This review included an examination of previous site-specific considerations of potential new and significant information for Category 1 issues. In addition, changes in environmental regulations and impact methodology and other new information from scientific literature and nuclear power plant operations were considered in evaluating the significance of impacts associated with initial LR and SLR. Public comments on previous plant-specific license renewal environmental reviews were analyzed to assess the existing environmental issues and identify new ones. The purpose of this evaluation was to review the findings presented in the 2013 LR GEIS and to ensure that the analysis and assumptions support SLR environmental reviews. In doing so, the NRC considered the need to modify, add to, or delete any of the 78 environmental issues in the 2013 LR GEIS and codified in Table B–1. This evaluation identified 80 environmental issues for detailed consideration in this LR GEIS revision. No environmental issues identified in Table B–1 and evaluated in the 2013 LR GEIS were eliminated, but certain issues were consolidated, and one issue was subdivided into three separate issues. Two new Category 2 issues and one new Category 1 issue were added.

In the revised LR GEIS, the environmental impacts of continued nuclear power plant operations during the license renewal term (initial LR or SLR) and associated refurbishment activities are organized by environmental resource area. This analysis provides the technical basis for the 80 identified environmental issues. Additionally, the NRC also considered a range of replacement energy alternatives to the proposed action (license renewal) as described in the revised LR GEIS. This discussion of potential alternatives will inform the plant-specific alternatives analyses in the SEISs. The revised

LR GEIS considers and evaluates the 80 environmental issues within the context of the following environmental resource (i.e., subject matter) areas: (1) land use and visual resources, (2) air quality and noise, (3) geologic environment, (4) water resources (surface water and groundwater resources), (5) ecological resources (terrestrial resources, aquatic resources, and federally protected ecological resources), (6) historic and cultural resources, (7) socioeconomics, (8) human health (radiological and nonradiological hazards and postulated accidents), (9) environmental justice, (10) waste management and pollution prevention (radioactive and nonradioactive waste and spent nuclear fuel), (11) greenhouse gas emissions and climate change, (12) cumulative effects, and (13) impacts common to all alternatives (uranium fuel cycle and termination of nuclear power plant operations and decommissioning). This final rule revises Table B–1 in appendix B to subpart A of 10 CFR part 51 to reflect the changes in the revised LR GEIS.

In the revised LR GEIS, the NRC used the following general analytical approach to evaluate potential environmental impacts: (1) describe the nuclear power plant activity or aspect of plant operations or refurbishment that could affect a resource; (2) identify the resource that is affected; (3) evaluate past license renewal reviews and other available information, including information related to impacts during a SLR term; (4) assess the nature and magnitude of the potential environmental impact (effect) from initial LR or SLR on the affected resource; (5) characterize the significance of the effect; (6) determine whether the results of the analysis apply to all or a specific subset of nuclear power plants, i.e., whether the environmental issue is Category 1 (generic) or Category 2 (requiring plant-specific analysis); and (7) consider additional mitigation measures for reducing adverse impacts. Identification of environmental issues was conducted in an iterative rather than a stepwise manner. For example, after information was collected and the level of significance was reviewed, the NRC reexamined environmental issues and their associated impacts to determine if any issues should be removed, added, consolidated, or divided.

The Commission would like to emphasize that in complying with the NRC's environmental regulations under § 51.53(c)(3)(iv), as required by NEPA, applicants are required to provide any new and significant information regarding the environmental impacts of license renewal of which the applicant is aware, including for Category 1 issues and for uncategorized issues. The amendments in this final rule do not change this requirement.

The revised LR GEIS retains the 2013 LR GEIS definitions for Category 1 and Category 2 issues. The revised LR GEIS discusses six major types of changes to the categorization of issues:

(1) *New Category 1 Issue*: This is a Category 1 issue not previously listed in the 2013 LR GEIS. The applicant will not need to assess this issue in its environmental report. Under § 51.53(c)(3)(iv), however, the applicant is responsible for disclosing in the environmental report any "new and significant information" of which the applicant is aware. The NRC has addressed the environmental impacts of all Category 1 issues generically for all plants or a specific subset of plants in the revised LR GEIS.

(2) *New Category 2 Issue*: This is a Category 2 issue not previously listed in the 2013 LR GEIS. For the new Category 2 issue, the applicant will have to conduct an analysis of the potential environmental impacts related to the issue and include it in the environmental report. The analysis must include a discussion of (i) the possible alternatives for reducing adverse impacts associated with license renewal and (ii) the environmental impacts of alternatives to license renewal.

(3) *Existing Issue Category Change from Category 2 to Category 1*: This is an issue that was considered as Category 2 in the 2013 LR GEIS and will now be considered as Category 1 in the revised LR GEIS. An applicant will no longer be required to conduct a plant-specific analysis on the environmental impacts associated with this issue. Consistent with the requirements of § 51.53(c)(3)(iv), an applicant will be required to describe in its environmental report any "new and significant information" of which it is aware.

(4) *Consolidation of an Existing Category 1 Issue into an Existing Category 2 issue*: This is an issue where an existing Category 1 issue in the 2013 LR GEIS has a similar scope as an existing Category 2 issue and has been consolidated into the Category 2 issue. Therefore, for the new, consolidated Category 2 issue, the applicant will have to conduct a plant-specific analysis of the potential environmental impacts related to that issue and include it in the environmental report. The analysis must include a discussion of (i) the possible alternatives for reducing adverse impacts associated with license renewal and (ii) the environmental impacts of alternatives to license renewal.

(5) *Consolidation of One or More Existing Category 1 Issues into an Existing Category 1 Issue*: This is an issue that was considered Category 1 in the 2013 LR GEIS and will remain so. The issue has been revised by consolidating similar aspects of one or more Category 1 issues, in whole or in part, into the existing Category 1 issue and which affect the same environmental resources. Consistent with the requirements of § 51.53(c)(3)(iv), an applicant will only be required to describe in its environmental report any “new and significant information” of which it is aware.

(6) *Subdividing an Existing Category 2 Issue into Multiple Category 2 Issues:* This is an existing Category 2 issue in the 2013 LR GEIS that has been divided into multiple, new Category 2 issues in order to more clearly address specific categories of environmental resource impacts. For the new, separate Category 2 issues, the applicant will have to conduct analyses of the potential environmental impacts related to each separate issue, as applicable, and include them in the environmental report. The analyses must include a discussion of (i) the possible alternatives for reducing adverse impacts associated with license renewal and (ii) the environmental impacts of alternatives to license renewal.

E. Actions and Basis for Changes to 10 CFR Part 51

Appendix B to Subpart A of 10 CFR Part 51

This final rule revises the introductory paragraph in appendix B to subpart A of 10 CFR part 51 to indicate the applicability to initial LR and one term of SLR and to update the findings on environmental issues with the data supported by the analyses in the revised LR GEIS.

This final rule modifies the language of the introductory paragraph to clarify that Table B-1 is applicable to nuclear power plant licensees that held an operating license, construction permit, or combined license as of June 30, 1995.

This final rule renames the title of Table B–1, "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants," as "Summary of Findings on Environmental Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants," to specify the applicability to initial LR and SLR environmental reviews.

The revised LR GEIS provides a summary change table comparing the 78 environmental issues in the 2013 LR GEIS with the 80 environmental issues in the revised LR GEIS. This final rule amends Table B–1 to reflect the changes made in the revised LR GEIS. As documented in the revised LR GEIS, for each of the 80 environmental issues, the scope has been expanded to fully account for the impacts of continued nuclear power plant operations and any refurbishment during the initial LR or SLR term. The changes to Table B–1 are described below:

(i) Land Use

(1) *Onsite Land Use*, (2) *Offsite Land Use*, and (3) *Offsite Land Use in Transmission Line Right-of-Ways (ROWs)*—"Onsite land use," "Offsite land use," and "Offsite land use in transmission line right-of-ways (ROWs)" are Category 1 issues. There are no changes to the finding column of Table B–1 for these issues.

(ii) Visual Resources

(4) *Aesthetic Impacts*—"Aesthetic impacts" is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(iii) Air Quality

(5) *Air Quality Impacts*—This final rule renames "Air quality impacts (all plants)" as "Air quality impacts"; it is a Category 1 issue. The final rule makes minor clarifying changes and revisions to the order of the topics discussed in the finding column of Table B–1 for this issue.

(6) *Air Quality Effects of Transmission Lines*—"Air quality effects of transmission lines" is a Category 1 issue. This final rule makes minor clarifying changes to the finding column of Table B–1 for this issue.

(iv) Noise

(7) Noise Impacts—"*Noise impacts"* is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(v) Geologic Environment

(8) Geology and Soils—"*Geology and soils"* is a Category 1 issue. This final rule makes minor clarifying changes to the finding column of Table B–1 for this issue.

(vi) Surface Water Resources

(9) *Surface Water Use and Quality (Non-Cooling System Impacts)*, (10) *Altered Current Patterns at Intake and Discharge Structures*, (11) *Altered Salinity Gradients*, (12)

Altered Thermal Stratification of Lakes, (13) *Scouring Caused by Discharged Cooling Water*, (14) *Discharge of Metals in Cooling System Effluent*, (15) *Discharge of Biocides, Sanitary Wastes, and Minor Chemical Spills*, and (16) *Surface Water Use Conflicts (Plants with Once-Through Cooling Systems)*—"Surface water use and quality (non-cooling system impacts)," "Altered current patterns at intake and discharge structures," "Altered salinity gradients," "Altered thermal stratification of lakes," "Scouring caused by discharged cooling water," "Discharge of metals in cooling system effluent," Discharge of biocides, sanitary wastes, and minor chemical spills," and "Surface water use conflicts (plants with once-through cooling systems)" are Category 1 issues. There are no changes to the finding column of Table B–1 for these issues.

(17) *Surface Water Use Conflicts (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a River)*—"Surface water use conflicts (plants with cooling ponds or cooling towers using makeup water from a river)" is a Category 2 issue. There are no changes to the finding column of Table B–1 for this issue.

(18) *Effects of Dredging on Surface Water Quality*—"Effects of dredging on surface water quality" is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(19) *Temperature Effects on Sediment Transport Capacity*—"Temperature effects on sediment transport capacity" is a Category 1 issue. This final rule makes minor clarifying changes to the finding column of Table B–1 for this issue.

(vii) Groundwater Resources

(20) *Groundwater Contamination and Use (Non-Cooling System Impacts)*—"Groundwater contamination and use (non-cooling system impacts)" is a Category 1 issue. This final rule makes minor clarifying changes to the finding column of Table B–1 for this issue.

(21) *Groundwater Use Conflicts (Plants That Withdraw Less than 100 Gallons per Minute [gpm])*—"Groundwater use conflicts (plants that withdraw less than 100 gallons per minute [gpm])" is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(22) *Groundwater Use Conflicts (Plants That Withdraw More than 100 Gallons per Minute [gpm])* and (23) *Groundwater Use Conflicts (Plants with Closed-Cycle Cooling Systems That Withdraw Makeup Water from a River)*—"Groundwater use conflicts (plants that withdraw more than 100 gallons per minute [gpm])" and "Groundwater use conflicts (plants with closed-cycle cooling systems that withdraw makeup water from a river)" are Category 2 issues. There are no changes to the finding column of Table B–1 for these issues.

(24) *Groundwater Quality Degradation Resulting from Water Withdrawals*—"Groundwater quality degradation resulting from water withdrawals" is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(25) *Groundwater Quality Degradation (Plants with Cooling Ponds)*—This final rule combines a Category 1 issue, "Groundwater quality degradation (plants with cooling ponds in salt marshes)," and a Category 2 issue, "Groundwater quality degradation (plants with cooling ponds at inland sites)," and renames it "Groundwater quality degradation (plants with cooling ponds)." The combined issue is a Category 2 issue. The two issues are combined because both issues consider the possibility of groundwater quality and beneficial use becoming degraded as a result of the migration of contaminants discharged to cooling ponds. Also, for the first issue, "Groundwater quality degradation (plants with cooling ponds in salt marshes)," the NRC found that the issue was relevant to only two nuclear power plants. The combined issue reflects lessons learned and knowledge gained and new and significant information from the Turkey Point SLR review that showed that cooling ponds can impact groundwater and surface water in ways not previously considered. This combined issue also considers the

environmental effects of saltwater intrusion and encroachment on adjacent surface water and groundwater quality.

As described in the revised LR GEIS, the NRC had previously determined that plants relying on cooling ponds in salt marsh settings were expected to have a small impact on groundwater quality. However, new information indicates that the impacts of groundwater quality degradation for plants using cooling ponds in either coastal (salt marsh) settings or at inland sites could be greater than SMALL (i.e., SMALL or MODERATE), depending on site-specific differences in the cooling pond's construction and operation; water quality; site hydrogeologic conditions (including the interaction of surface water and groundwater); and the location, depth, and pump rate of any water supply wells contributing to or impacted by outflow or seepage from a cooling pond. Therefore, the combined issue is a Category 2 issue. This final rule revises the finding column of Table B–1 accordingly.

(26) *Radionuclides Released to Groundwater*—"Radionuclides released to groundwater" is a Category 2 issue. There are no changes to the finding column of Table B–1 for this issue.

(viii) Terrestrial Resources

(27) *Non-Cooling System Impacts on Terrestrial Resources*—This final rule renames "Effects on terrestrial resources (non-cooling system impacts)" as "Non-cooling system impacts on terrestrial resources." The issue is a Category 2 issue. This final rule makes clarifying changes to the finding column of Table B–1 for this issue to more precisely describe the scope of issues and resources considered and for consistency with other ecological resources (e.g., aquatic and terrestrial) issues.

(28) *Exposure of Terrestrial Organisms to Radionuclides*—"Exposure of terrestrial organisms to radionuclides" is a Category 1 issue. This final rule makes minor clarifying changes to the finding column of Table B–1 for this issue.

(29) *Cooling System Impacts on Terrestrial Resources (Plants with Once-Through Cooling Systems or Cooling Ponds)*—"Cooling system impacts on terrestrial resources (plants with once-through cooling systems or cooling ponds)" is a Category 1 issue. This issue concerns the potential impacts of once-through cooling systems and cooling ponds at nuclear power plants on terrestrial resources during the license renewal term (initial LR or SLR). Cooling system operation can alter the ecological environment in a manner that affects terrestrial resources. Such alterations may include thermal effluent additions to receiving water bodies; chemical effluent additions to surface water or groundwater; impingement of waterfowl; disturbance of terrestrial plants and wetlands associated with maintenance dredging; disposal of dredged material; and erosion of shoreline habitat.

The NRC determined that the effects of once-through cooling systems and cooling ponds on terrestrial resources would be minor and would neither destabilize nor noticeably alter any important attribute of populations of plants or animals during the license renewal term. This final rule revises the finding column of Table B–1 for this issue to more clearly describe the scope of issues and resources considered and for consistency with other ecological resource issues.

(30) *Cooling Tower Impacts on Terrestrial Plants*—This final rule renames "Cooling tower impacts on vegetation (plants with cooling towers)" as "Cooling tower impacts on terrestrial plants"; it is a Category 1 issue. This issue concerns the potential impacts of cooling tower operation on terrestrial plants during the license renewal term (initial LR or SLR). Terrestrial habitats near cooling towers can be exposed to particulates, such as salt, and can experience increased humidity, which can deposit water droplets or ice on vegetation; these effects can lead to structural damage and changes in plant communities.

The NRC determined that the effects of cooling towers on terrestrial plants would be minor and would neither destabilize nor noticeably alter any important attribute of plant populations during the license renewal term. This final rule revises the finding

column of Table B–1 for this issue to more clearly describe the scope of issues and resources considered and for consistency with other ecological resource issues.

(31) *Bird Collisions with Plant Structures and Transmission Lines*—"Bird collisions with plant structures and transmission lines" is a Category 1 issue. This issue concerns the risk of birds colliding with plant structures and transmission lines during the license renewal term (initial LR or SLR). Tall structures on nuclear power plant sites, such as cooling towers, meteorological towers, and transmission lines, create collision hazards for birds that can result in injury or death.

The NRC determined that the risk of bird collisions with site structures would remain the same for a given nuclear power plant during the license renewal term. Because the number of associated bird mortalities is small for any species, it is unlikely that losses would threaten the stability of local or migratory bird populations or result in a noticeable impairment of the function of a species within the ecosystem. This final rule revises the finding column of Table B–1 for this issue to more clearly describe the scope of issues and resources considered and for consistency with other ecological resource issues.

(32) *Water Use Conflicts with Terrestrial Resources (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a River)*—"Water use conflicts with terrestrial resources (plants with cooling ponds or cooling towers using makeup water from a river)" is a Category 2 issue. This issue concerns water use conflicts that may arise at nuclear power plants with cooling ponds or cooling towers that withdraw makeup water from a river and how those conflicts could affect terrestrial resources during the license renewal term (initial LR or SLR).

Nuclear power plant cooling systems may compete with other users relying on surface water resources, including downstream municipal, agricultural, or industrial users. For plants using cooling towers, while the volume of surface water withdrawn is substantially less than once-through systems for a similarly sized nuclear power plant, the makeup water needed to replenish the consumptive loss of water to evaporation can

be significant. Cooling ponds also require makeup water. Water use conflicts with terrestrial resources, especially riparian communities, could occur when water that supports these resources is diminished by a combination of anthropogenic uses.

The NRC identified water use conflicts with terrestrial resources at only one nuclear power plant. That nuclear power plant operator developed and implemented a water level management plan, which effectively mitigated the effects that downstream riparian communities might experience from the plant's cooling water withdrawals.

The NRC determined that water use conflicts during the license renewal term depend on numerous site-specific factors, including the ecological setting of the plant; the consumptive use of other municipal, agricultural, or industrial water users; and the plants and animals present in the area. Water use conflicts with terrestrial resources would be SMALL at most nuclear power plants with cooling ponds or cooling towers that withdraw makeup from a river but may be MODERATE at some plants.

This final rule revises the finding column of Table B–1 for this issue to more clearly describe the scope of issues and resources considered and for consistency with other ecological resource issues.

(33) *Transmission Line Right-Of-Way (ROW) Management Impacts on Terrestrial Resources*—"Transmission line right-of-way (ROW) management impacts on terrestrial resources" is a Category 1 issue. This issue concerns the effects of transmission line ROW management on terrestrial plants and animals during the license renewal term (initial LR or SLR).

Utilities maintain transmission line ROWs so that the ground cover is composed of low-growing herbaceous or shrubby vegetation and grasses. Noise and general human disturbance during ROW management can temporarily disturb wildlife and affect their behaviors. Most nuclear power plants maintain procedures to minimize or mitigate the potential impacts of ROW management. The scope of transmission lines relevant to license renewal include only the lines that connect the nuclear power plant to the first substation that feeds into the regional power distribution system. Typically, the first

substation is located on the nuclear power plant property within the primary industrial-use area or other developed portion of the plant site. Therefore, effects on terrestrial plants and animals are generally negligible.

This final rule revises the finding column of Table B–1 for this issue to more clearly describe the scope of issues and resources considered and for consistency with other ecological resource issues.

(34) *Electromagnetic Field Effects on Terrestrial Plants and Animals*—This final rule renames “Electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock)” as “Electromagnetic field effects on terrestrial plants and animals” for clarity; it is a Category 1 issue. This issue concerns the effects of electromagnetic fields (EMFs) generated by electric transmission lines at nuclear power plants on terrestrial plants and animals, including agricultural crops, honeybees, wildlife, and livestock, during the license renewal term (initial LR or SLR). Studies investigating the effects of EMFs produced by operating transmission lines up to 1,100 kV have generally not detected any ecologically significant impact on terrestrial plants and animals. Plants and animals near transmission lines have been exposed to many years of transmission line operation and associated EMFs. The scope of transmission lines relevant to license renewal include only the lines that connect the nuclear power plant to the first substation that feeds into the regional power distribution system. Therefore, the effects of EMFs on terrestrial plants and animals are generally negligible.

This final rule revises the finding column of Table B–1 for this issue to more clearly describe the scope of issues and resources considered and for consistency with other ecological resource issues.

(ix) Aquatic Resources

(35) *Impingement Mortality and Entrainment of Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds)*—This final rule combines a Category

2 issue, “Impingement and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds)” and the impingement component of a Category 1 issue, “Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses,” into one Category 2 issue, “Impingement mortality and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds).” This issue pertains to impingement mortality and entrainment of finfish and shellfish at nuclear power plants with once-through cooling systems or cooling ponds during the license renewal term (initial LR or SLR). This includes plants with helper cooling towers that are seasonally operated to reduce thermal load to the receiving water body, reduce entrainment during peak spawning periods, or reduce consumptive water use during periods of low river flow.

In the revised LR GEIS, the NRC renamed the issue to include impingement mortality, rather than simply impingement. This change is consistent with the EPA’s 2014 Clean Water Act (CWA) Section 316(b) regulations and the EPA’s assessment that impingement reduction technology is available, feasible, and has been demonstrated to be effective. Additionally, the EPA’s 2014 CWA Section 316(b) regulations establish best technology available (BTA) standards for impingement mortality based on the fact that survival is a more appropriate metric for determining environmental impact than simply looking at total impingement. Therefore, the revised LR GEIS also consolidates the impingement component of the issue “Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses” into this combined issue.

As a result of the 2014 CWA Section 316(b) regulations, nuclear power plants must submit detailed information about their cooling water intake systems as part of National Pollutant Discharge Elimination System (NPDES) permit renewal applications to inform the permitting authority’s BTA determination. Some nuclear power plants have received final BTA determinations under the 2013 CWA Section 316(b) regulations. Many others have submitted the required information and are awaiting final

determinations. The NRC expects that most operating nuclear power plants will have final BTA determinations within the next several years.

When available, the NRC relies on the expertise and authority of the NPDES permitting authority with respect to the impacts of impingement mortality and entrainment. Therefore, if the NPDES permitting authority has made BTA determinations for a nuclear power plant pursuant to CWA Section 316(b) and that plant has implemented any associated requirements or those requirements would be implemented before the license renewal period, then the NRC assumes that adverse impacts on the aquatic environment would be minimized. In such cases, the NRC concludes that the impacts of either impingement mortality, entrainment, or both would generally be SMALL over the course of the license renewal term. In cases where the NPDES permitting authority has not made BTA determinations, the NRC analyzes the potential impacts of impingement mortality, entrainment, or both using a weight-of-evidence approach and determines the level of impact (SMALL, MODERATE, or LARGE) that the aquatic environment is likely to experience over the course of the license renewal term.

The potential effects of impingement mortality and entrainment during the license renewal term depend on numerous plant-specific factors, including the ecological setting of the plant; the characteristics of the cooling system; and the characteristics of the fish, shellfish, and other aquatic organisms present in the area (e.g., life history, distribution, population trends, management objectives, etc.). Additionally, whether the NPDES permitting authority has made BTA determinations pursuant to CWA Section 316(b) and whether the nuclear power plant operator has implemented any associated requirements is also a relevant factor.

(36) *Impingement Mortality and Entrainment of Aquatic Organisms (Plants with Cooling Towers)*—This final rule combines a Category 1 issue, “Impingement and entrainment of aquatic organisms (plants with cooling towers),” and the impingement component of a Category 1 issue, “Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses,” into one Category 1 issue,

“Impingement mortality and entrainment of aquatic organisms (plants with cooling towers).” The issue pertains to impingement mortality and entrainment of finfish and shellfish at nuclear power plants with cooling towers that operate on a fully closed-cycle mode.

In the revised LR GEIS, the NRC changed the title of this issue to include impingement mortality, rather than simply impingement. This change is consistent with the EPA’s 2014 CWA Section 316(b) regulations and because assessing survival of impinged organisms is a more appropriate metric for determining environmental impact than simply looking at total impingement. Therefore, the revised LR GEIS also consolidates into this issue the impingement component of the issue “Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses.”

In the 2013 LR GEIS, the NRC found that that impingement and entrainment of finfish and shellfish at plants with cooling towers operated in a fully closed-cycle mode did not result in noticeable effects on finfish or shellfish populations within source water bodies, and this impact was not expected to be an issue during the license renewal term (initial LR or SLR). This finding is further supported by the EPA’s 2014 CWA Section 316(b) regulations for existing facilities, which state that the operation of a closed-cycle recirculating system is an essentially preapproved technology for achieving impingement mortality BTA.

The 2013 LR GEIS considered that impingement may result in sublethal effects that could increase the susceptibility of fish or finfish to predation, disease, or parasitism. However, only once-through cooling systems were anticipated to be of concern for this issue as the lower volume of water required by nuclear power plants with cooling towers that operate in a fully closed-cycle mode would minimize this potential effect. The NRC does not expect secondary effects of impingement to be of concern during the license renewal term at nuclear power plants with cooling towers, and sublethal effects of entrainment do not apply.

In considering the effects of impingement mortality and entrainment of closed-cycle cooling systems on aquatic ecology, the NRC evaluated the same issues that were evaluated for nuclear power plants with once-through cooling systems or cooling ponds. No significant impacts on aquatic populations have been reported at any existing nuclear power plants with cooling towers operating in a closed-cycle mode. As part of obtaining BTA determinations under CWA 316(b), permitting authorities may require some nuclear power plant licensees to implement additional plant-specific controls to reduce impingement mortality and entrainment. Implementation of such controls would further reduce or mitigate impingement mortality and entrainment during the license renewal term. The NRC determined that the impacts of impingement mortality and entrainment on aquatic organisms during the license renewal term would be SMALL for nuclear power plants with cooling towers operated in a fully closed-cycle mode. Therefore, the combined issue is a Category 1 issue. This final rule revises the finding column of Table B–1 accordingly.

(37) *Entrainment of Phytoplankton and Zooplankton*—This final rule renames "Entrainment of phytoplankton and zooplankton (all plants)" as "Entrainment of phytoplankton and zooplankton"; it is a Category 1 issue. The NRC found that the effects of entrainment of phytoplankton and zooplankton would be minor and would neither destabilize nor noticeably alter any important attribute of populations of these organisms in source water bodies during the license renewal term (initial LR or SLR) of any nuclear power plants. As part of obtaining the BTA entrainment determinations under Section 316(b) of the CWA (33 U.S.C. 1251 et seq.), permitting authorities may require some nuclear power plants to implement additional site-specific controls to reduce entrainment. Implementation of such controls would further reduce or mitigate entrainment of phytoplankton and zooplankton.

This final rule revises the finding column of Table B–1 for this issue to clarify the scope of issues and resources considered and indicate that the entrainment of

phytoplankton and zooplankton would be mitigated through adherence to NPDES permit conditions established pursuant to CWA Section 316(b).

(38) *Effects of Thermal Effluents on Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds)*—This final rule renames "Thermal impacts on aquatic organisms (plants with once-through cooling systems or cooling ponds)" as "Effects of thermal effluents on aquatic organisms (plants with once-through cooling systems or cooling ponds)" for clarity and consistency with other ecological resource titles; it is a Category 2 issue.

This issue pertains to acute, sublethal, and community-level effects of thermal effluents on finfish and shellfish from operation of nuclear power plants with once-through cooling systems and cooling ponds during the license renewal term (initial LR or SLR). The NRC determined that the effects of thermal effluents on aquatic organisms would be SMALL at many nuclear power plants with once-through cooling systems or ponds, but that these impacts could be MODERATE or LARGE at some plants. The potential effects of thermal effluent discharges depend on numerous site-specific factors, including the ecological setting of the plant, the characteristics of the cooling system and effluent discharges, and the characteristics of the fish, shellfish, and other aquatic organisms present in the area. Additionally, whether the NPDES permitting authority has granted a CWA Section 316(a) variance is also a relevant factor.

This final rule revises the finding column of Table B–1 for this issue to clarify the scope of issues and resources considered and for consistency with other ecological resources issues.

(39) *Effects of Thermal Effluents on Aquatic Organisms (Plants with Cooling Towers)*—The final rule renames "Thermal impacts on aquatic organisms (plants with cooling towers)" as "Effects of thermal effluents on aquatic organisms (plants with cooling towers)" for clarity and consistency with other ecological resource issue titles; it is a Category 1 issue.

This issue pertains to acute, sublethal, and community-level effects of thermal effluents on finfish and shellfish from operation of nuclear power plants with cooling towers operated in a fully closed-cycle mode. The NRC found that the effects of thermal effluents on aquatic organisms at plants with cooling towers would be minor and would neither destabilize nor noticeably alter any important attributes of aquatic populations in receiving water bodies. As part of obtaining a variance under CWA Section 316(a), permitting authorities may impose conditions concerning thermal effluent discharges at some nuclear power plants. Implementation of such conditions would further reduce or mitigate thermal impacts during the license renewal term (initial LR or SLR).

This final rule revises the finding column of Table B–1 for this issue to clarify the scope of issues and resources considered and for consistency with other ecological resources issues.

(40) *Infrequently Reported Effects of Thermal Effluents*—This final rule combines two Category 1 issues, “Infrequently reported thermal impacts (all plants)” and “Effects of cooling water discharge on dissolved oxygen, gas supersaturation, and eutrophication,” with the thermal effluent component of a Category 1 issue, “Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses,” into one, renamed Category 1 issue, “Infrequently reported effects of thermal effluents.” This issue pertains to interrelated and infrequently reported effects of thermal effluents, to include cold shock, thermal migration barriers, accelerated maturation of aquatic insects, and proliferated growth of aquatic nuisance species, as well as the effects of thermal effluents on dissolved oxygen, gas supersaturation, and eutrophication. This issue also considers sublethal stresses associated with thermal effluents that can increase the susceptibility of exposed organisms to predation, parasitism, or disease.

As described in the revised LR GEIS, the NRC determined that the infrequently reported effects of thermal effluents would be minor and would neither destabilize nor noticeably alter any important attribute of aquatic populations in receiving water bodies of any nuclear power plants during the license renewal term (initial LR or SLR). As part

of obtaining a variance under CWA Section 316(a), permitting authorities may impose conditions through the NPDES permit process concerning thermal effluent discharges at some nuclear power plants. Implementation of such conditions would further reduce or mitigate thermal impacts during the license renewal term. The NRC concluded that infrequently reported effects of thermal effluents during the license renewal term would be SMALL for all nuclear power plants. Therefore, the combined issue is a Category 1 issue. This final rule revises the finding column of Table B–1 accordingly.

(41) *Effects of Nonradiological Contaminants on Aquatic Organisms*—"Effects of nonradiological contaminants on aquatic organisms" is a Category 1 issue. This issue concerns the potential effects of nonradiological contaminants on aquatic organisms that could occur as a result of nuclear power plant operations during the license renewal term (initial LR or SLR). This issue was originally of concern because some nuclear power plants used heavy metals in condenser tubing that could leach from the tubing and expose aquatic organisms to these contaminants. Heavy metals have not been found to be of concern other than a few instances of copper contamination, and in all cases, the nuclear power plants eliminated leaching by replacing the affected piping.

In addition to heavy metals, nuclear power plants often add biocides to cooling water to kill algae, bacteria, macroinvertebrates, and other organisms that could cause buildup in plant systems and structures. Nuclear power plants typically maintain site procedures that specify when and how to treat the cooling water system with such chemicals and best management practices to minimize impacts on the ecological environment. The NPDES permits mitigate potential effects of chemical effluents by limiting the allowable concentrations in effluent discharges to ensure the protection of the aquatic community within the receiving water body.

The NRC determined that the effects of nonradiological contaminants on aquatic organisms would be minor and would neither destabilize nor noticeably alter any important attribute of populations of organisms in source water bodies during the license renewal term (initial LR or SLR) of any nuclear power plants. Continued adherence of

nuclear power plants to chemical effluent limitations established in NPDES permits would minimize the potential impacts of nonradiological contaminants on the aquatic environment. This final rule revises the finding column of Table B–1 for this issue, to more clearly describe the scope of issues and resources considered and for consistency with other ecological resources issues.

(42) *Exposure of Aquatic Organisms to Radionuclides*—"Exposure of aquatic organisms to radionuclides" is a Category 1 issue. This final rule makes minor clarifying changes to the finding column of Table B–1 for this issue.

(43) *Effects of Dredging on Aquatic Resources*—This final rule renames "Effects of dredging on aquatic organisms" as "Effects of dredging on aquatic resources"; it is a Category 1 issue. This issue concerns the effects of dredging on aquatic resources conducted to maintain the function or reliability of plant cooling systems as well as barge access during the license renewal term (initial LR or SLR).

Any dredging performed would be infrequent and would require the nuclear power plant operators to obtain permits from the U.S. Army Corps of Engineers under CWA Section 404. Best management practices and conditions associated with these permits would minimize impacts on the ecological environment.

The NRC determined that the effects of dredging on aquatic resources would be minor and would neither destabilize nor noticeably alter any important attribute of the aquatic environment during license renewal term at any nuclear power plant. The NRC assumes that nuclear power plant operators would continue to implement site environmental procedures and would obtain any necessary permits for dredging activities. Implementation of such controls would further reduce or mitigate potential effects. This final rule revises the finding column of Table B–1 for this issue, to more clearly describe the scope of issues and resources considered and for consistency with other ecological resources issues.

(44) *Water Use Conflicts with Aquatic Resources (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a River)*—"Water use conflicts with aquatic

resources (plants with cooling ponds or cooling towers using makeup water from a river)" is a Category 2 issue. This issue concerns water use conflicts that may arise at nuclear power plants with cooling ponds or cooling towers that use makeup water from a river and how those conflicts could affect aquatic resources during the license renewal term (initial LR or SLR). This issue also applies to nuclear power plants with hybrid cooling systems.

Nuclear power plant cooling systems may compete with other users relying on surface water resources, including downstream municipal, agricultural, or industrial users. Water use conflicts with aquatic resources could occur when water that supports these resources is diminished by a combination of anthropogenic uses. To date, the NRC has identified water use conflicts with aquatic resources at only one nuclear power plant. The NRC concluded that water use conflicts would be SMALL to MODERATE for this nuclear power plant. The plant operator developed and implemented a water level management plan which successfully mitigated water use conflicts. The NRC has identified no concerns about water use conflicts with aquatic resources at any other nuclear power plant with cooling ponds or cooling towers. The NRC concluded that water use conflicts with aquatic resources would be SMALL at most nuclear power plants with cooling ponds or cooling towers that withdraw makeup water from a river but may be MODERATE at some plants.

Water use conflicts during the license renewal term would depend on numerous site-specific factors including the ecological setting of the nuclear power plant; the consumptive use of other municipal, agricultural, or industrial water users; and the aquatic resources present in the area. This final rule revises the finding column of Table B–1 for this issue, to more clearly describe the scope of issues and resources considered and for consistency with other ecological resources issues.

(45) *Non-Cooling System Impacts on Aquatic Resources*—This final rule renames "Effects on aquatic resources (non-cooling system impacts)" as "Non-cooling system impacts on aquatic resources"; it is a Category 1 issue. This issue concerns the

effects of nuclear power plant operations on aquatic resources that are unrelated to the operation of the cooling system. Such activities include landscape and grounds maintenance, stormwater management, and ground-disturbing activities that could directly disturb aquatic habitat or cause runoff or sedimentation.

The NRC determined that the effects of site activities unrelated to cooling system operation would be minor and would neither destabilize nor noticeably alter any important attribute of the aquatic environment during the license renewal term (initial LR or SLR) of any nuclear power plants. The NRC assumes that nuclear power plants would continue to implement site environmental procedures and would obtain any necessary permits for activities that could affect waterways or aquatic features. This final rule revises the finding column of Table B–1 for this issue, to more clearly describe the scope of issues and resources considered and for consistency with other ecological resources issues.

(46) *Impacts of Transmission Line Right-Of-Way (ROW) Management on Aquatic Resources*—"Impacts of transmission line right-of-way (ROW) management on aquatic resources" is a Category 1 issue. This issue concerns the effects of transmission line ROW management on aquatic plants and animals during the license renewal term (initial LR or SLR).

The transmission lines relevant to license renewal include only the lines that connect the nuclear power plant to the first substation that feeds into the regional power distribution system. Typically, the first substation is located on the nuclear power plant property within the primary industrial-use area and the in-scope transmission lines for license renewal tend to occupy only industrial-use or other developed portions of nuclear power plant sites. Therefore, effects on aquatic plants and animals are generally negligible.

Most nuclear power plants maintain procedures to minimize or mitigate the potential impacts of ROW management. The NRC determined that the transmission line ROW maintenance impacts on aquatic resources during the license renewal term would

be SMALL for all nuclear power plants. This final rule revises the finding column of Table B–1 for this issue to more clearly describe the scope of issues and resources considered and for consistency with other ecological resources issues.

(x) Federally Protected Ecological Resources

(47) *Endangered Species Act: Federally Listed Species and Critical Habitats Under U.S. Fish and Wildlife Service Jurisdiction*—This final rule divides a Category 2 issue, "Threatened, endangered, and protected species and essential fish habitat," into three separate Category 2 issues, for clarity and consistency with the separate Federal statutes and interagency consultation requirements that the NRC must consider with respect to Federally protected ecological resources. When combined, the scope of the three issues is the same as the scope of the former "Threatened, endangered, and protected species and essential fish habitat" issue discussed in the 2013 LR GEIS.

The first of the three issues, "Endangered Species Act: federally listed species and critical habitats under U.S. Fish and Wildlife Service jurisdiction," concerns the potential effects of continued nuclear power plant operation and any refurbishment during the license renewal term (initial LR or SLR) on federally listed species and critical habitats protected under the Endangered Species Act (ESA) and under the jurisdiction of the U.S. Fish and Wildlife Service (FWS).

Under the ESA, the FWS is responsible for listing and managing terrestrial and freshwater species and designating critical habitat for these species. Continued operation of a nuclear power plant during the license renewal term could affect these species and their habitat. Listed species are likely to occur near all operating nuclear power plants. However, the potential for a given species to occur in the action area of a specific nuclear power plant depends on the life history, habitat requirements, and distribution of the species and the ecological environment present on or near the plant site.

The NRC may be required to consult with FWS under ESA Section 7(a)(2); such consultations are required for license renewal actions that “may affect” federally listed species and critical habitats and to ensure that the actions do not jeopardize the continued existence of those species or destroy or adversely modify those habitats.

The potential effects of continued nuclear power plant operation and any refurbishment during the license renewal term depends upon numerous site-specific factors, including the ecological setting of the plant; the listed species and critical habitats present in the action area; and the plant-specific factors related to operations, including water withdrawal, effluent discharges, and refurbishment and other ground-disturbing activities. Listing status is not static, and FWS frequently issues new rules to list or delist species and designate or remove critical habitats. Therefore, a generic determination of potential impacts on listed species and critical habitats under FWS jurisdiction during a nuclear power plant’s license renewal term is not possible. The NRC will perform a plant-specific impact assessment for each license renewal environmental review to determine the potential effects on these resources and consult with the FWS, as appropriate. Consequently, this is a Category 2 issue.

(48) *Endangered Species Act: Federally Listed Species and Critical Habitats Under National Marine Fisheries Service Jurisdiction*—The second of the three issues from the prior Category 2 issue on federally protected species, “Endangered Species Act: federally listed specifies and critical habitats under National Marine Fisheries Service jurisdiction,” concerns the potential effects of continued nuclear power plant operation and any refurbishment during the license renewal term (initial LR or SLR) on federally listed species and critical habitats protected under the ESA and under the jurisdiction of the National Marine Fisheries Service (NMFS).

Under the ESA, NMFS is responsible for listing and managing marine and anadromous species and designating critical habitat of these species. Continued operation of a nuclear power plant and any refurbishment during the license renewal term could affect these species and their habitat. The potential for a given species to

occur in the action area of a specific nuclear power plant depends on the life history, habitat requirements, and distribution of that species and the ecological environment present on or near the power plant site. In general, listed species and critical habitats under NMFS jurisdiction are only of concern at nuclear power plants that withdraw or discharge from estuarine or marine waters. However, anadromous listed species under NMFS jurisdiction may be seasonally present in the action area of plants located within freshwater reaches of rivers well upstream of the saltwater interface.

The potential effects of continued nuclear power plant operation and any refurbishment during the license renewal term depend on numerous site-specific factors, including the ecological setting of the plant; the listed species and critical habitats present in the action area; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and refurbishment and other ground-disturbing activities. Section 7(a)(2) of the ESA requires that Federal agencies consult with NMFS for actions that “may affect” federally listed species and critical habitats. Additionally, listing status is not static, and NMFS frequently issue new rules to list or delist species and designate or remove critical habitats. Therefore, a generic determination of potential impacts on listed species and critical habitats under NMFS jurisdiction during a nuclear power plant’s license renewal term is not possible. The NRC will perform a plant-specific impact assessment for each license renewal environmental review to determine the potential effects on these resources and consult with NMFS, as appropriate. Consequently, this is a Category 2 issue.

(49) *Magnuson-Stevens Act: Essential Fish Habitat*—The last of the three issues from the prior Category 2 issue on federally protected species, “Magnuson-Stevens Act: essential fish habitat,” concerns the potential effects of continued nuclear power plant operation and any refurbishment during the license renewal term (initial LR or SLR) on essential fish habitat (EFH) protected under the Magnuson-Stevens Fishery Conservation and Management Act (i.e., Magnuson-Stevens Act (MSA)).

Under the MSA, the Fishery Management Councils, in conjunction with NMFS, designate areas of EFH and manage marine resources within those areas. Within EFH, habitat areas of particular concern (HAPCs) may be designated if the area meets certain additional criteria. Continued operation of a nuclear power plant and any refurbishment during the license renewal term could affect EFH, including HAPCs. The NRC may be required to consult with NMFS under MSA Section 305(b). In cases where adverse effects on EFH are possible, the NRC has engaged NMFS in EFH consultation as part of the plant-specific license renewal environmental review and obtained EFH conservation recommendations.

The potential effects of continued nuclear power plant operation and any refurbishment during the license renewal term depends upon numerous site-specific factors, including the ecological setting of the plant; the EFH present in the affected area, including HAPCs; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and any other activities that may affect aquatic habitats during the license renewal term. Section 305(b) of the MSA requires that Federal agencies consult with NMFS for actions that may adversely affect EFH. Additionally, EFH status is not static. The NMFS and the Fishery Management Councils frequently update management plans for EFH species and issue new rules to designate or modify EFH and HAPCs. Therefore, a generic determination of potential impacts on EFH during a nuclear power plant's license renewal term is not possible. The NRC will perform a plant-specific impact assessment as part of each license renewal environmental review to determine the potential effects on these resources and consult with NMFS, as appropriate. Consequently, this is a Category 2 issue.

(50) *National Marine Sanctuaries Act: Sanctuary Resources*—This final rule adds this as a new Category 2 issue, "National Marine Sanctuaries Act: sanctuary resources," to evaluate potential effects of continued nuclear power plant operation and any refurbishment during the license renewal term (initial LR or SLR) on sanctuary resources protected under the National Marine Sanctuaries Act (NMSA).

Under the NMSA, the National Oceanic and Atmospheric Administration's (NOAA) Office of National Marine Sanctuaries (ONMS) designates and manages the National Marine Sanctuary System. Marine sanctuaries may occur near nuclear power plants located on or near marine waters as well as the Great Lakes. Currently, five operating nuclear power plants are located near designated or proposed national marine sanctuaries.

The potential impacts on marine sanctuaries are broad-ranging because such resources include any living or nonliving resource of a national marine sanctuary. With respect to ecological sanctuary resources, potential effects of particular concern include the following: (1) impingement (including entrapment) and entrainment, (2) thermal effects, (3) exposure to radionuclides and other contaminants, (4) reduction in available food resources due to impingement mortality and entrainment or thermal effects on prey species, and (5) effects associated with maintenance dredging. Additionally, the magnitude and significance of such impacts can be greater for sanctuary resources because—by virtue of being part of a national marine sanctuary—these resources are more sensitive to environmental stressors. Based on the foregoing, a generic determination of potential impacts on sanctuary resources during a nuclear power plant's license renewal term is not possible.

Depending on the NRC's effect determinations, the NRC may be required to consult with ONMS under NMSA Section 304(d). The NMSA consultation is required when a Federal agency determines that an action "is likely to destroy, cause the loss of, or injure" a sanctuary resource. Federal actions subject to consultation may be inside or outside the boundary of a national marine sanctuary.

In summary, the potential effects of continued nuclear power plant operation during the license renewal term depends upon numerous site-specific factors, including the ecological setting of the plant; the sanctuary resources present in the affected area; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and any other activities that may affect sanctuary resources during the

license renewal term. Section 304(d) of the NMSA requires that Federal agencies consult with the ONMS for actions that may injure sanctuary resources. Additionally, national marine sanctuary status is not static. The geographic extent of existing sanctuaries may change or expand in the future, and NOAA is likely to designate new sanctuaries as additional areas of conservation need are identified and assessed. Therefore, a generic determination of potential impacts on sanctuary resources during a nuclear power plant's license renewal term is not possible. The NRC will perform a plant-specific impact assessment as part of each license renewal environmental review to determine the potential effects on these resources and consult with NMFS, as appropriate. Consequently, this new issue is being established as a plant-specific, or Category 2, issue.

(xi) Historic and Cultural Resources

(51) *Historic and Cultural Resources*—"Historic and cultural resources" is a Category 2 issue. This final rule revises the finding column of Table B–1 for this issue to make clarifying changes and include a discussion of impacts on cultural resources that are not eligible for or listed in the National Register of Historic Places that would also need to be considered during plant-specific license renewal environmental reviews.

(xii) Socioeconomics

(52) *Employment and Income, Recreation and Tourism*—"Employment and income, recreation and tourism" is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(53) *Tax Revenue*—This final rule renames "Tax revenues" as "Tax revenue"; it is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(54) *Community Services and Education*, (55) *Population and Housing*, and (56) *Transportation*—"Community services and education," "Population and housing," and "Transportation" are Category 1 issues. There are no changes to the finding column of Table B–1 for these issues.

(xiii) Human Health

(57) *Radiation Exposures to Plant Workers* and (58) *Radiation Exposures to the Public*—"Radiation exposures to plant workers" and "Radiation exposures to the public" are Category 1 issues. There are no changes to the finding column of Table B–1 for these issues.

(59) *Chemical Hazards*—This final rule renames "Human health impact from chemicals" as "Chemical hazards" for clarity and to reflect the fact that chemicals can have environmental effects beyond human health. Chemical hazards can have immediate human health effects as well as potential environmental impacts from nuclear power plant discharges and chemical spills. This issue is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(60) *Microbiological Hazards to Plant Workers*—"Microbiological hazards to plant workers" is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(61) *Microbiological Hazards to the Public*—This final rule renames "Microbiological hazards to the public (plants with cooling ponds or canals or cooling towers that discharge to a river)" as "Microbiological hazards to the public" because this issue is a concern wherever receiving waters are accessible to the public and as changes in microbial populations and in the public use of water bodies might occur over time. Specifically, members of the public could be exposed to microorganisms in thermal effluents at nuclear power plants that use cooling ponds, lakes, canals, or that discharge to publicly accessible surface waters. This issue is a Category 2 issue. This final rule

revises the finding column of Table B–1 for this issue for clarity and to indicate that thermophilic microorganisms are a concern wherever waters receiving thermal effluents are accessible to the public.

(62) *Electromagnetic Fields (EMFs)*—This final rule renames "Chronic effects of electromagnetic fields (EMFs)" as "Electromagnetic fields (EMFs)" for clarity because this issue considers effects beyond those that are chronic in nature. This issue is an uncategorized issue. There are no changes to the finding column of Table B–1 for this issue.

(63) *Physical Occupational Hazards*—"Physical occupational hazards" is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(64) *Electric Shock Hazards*—"Electric shock hazards" is a Category 2 issue. There are no changes to the finding column of Table B–1 for this issue.

(xiv) Postulated Accidents

(65) *Design-Basis Accidents*—"Design-basis accidents" is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

(66) *Severe Accidents*—This final rule reclassifies the Category 2 "Severe accidents" issue as a Category 1 issue. In the 2013 LR GEIS, the issue of severe accidents was classified as a Category 2 issue to the extent that only alternatives to mitigate severe accidents must be considered for all nuclear power plants where the licensee had not previously performed a severe accident mitigation alternatives (SAMA) analysis, or similar analysis, for the plant. In the revised LR GEIS, the NRC notes that this issue will be resolved generically for the vast majority, if not all, expected license renewal applicants because the applicants who will likely reference the LR GEIS have previously completed a SAMA analysis. The NRC provides a technical basis further supporting this conclusion in Appendix E of the revised LR GEIS. Although the NRC

does not anticipate any license renewal applications for nuclear power plants for which a previous severe accident mitigation design alternative (SAMDA) or SAMA analysis has not been performed, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives, and consideration of mitigation alternatives would be the functional equivalent of a Category 2 issue requiring plant-specific analysis. Applicants are required to provide any new and significant information regarding severe accidents of which the applicant is aware.

In license renewal applications, both internal and external events were considered for impacts from reactor accidents at full power when assessing SAMAs. The impacts of all new information in the revised LR GEIS were found to not contribute sufficiently to the environmental impacts to warrant further SAMA analysis because the likelihood of finding cost-effective significant plant improvements is small. This further analysis confirms the Commission's expectation that further SAMA analysis would not be necessary for plants that have already completed one.

With regard to the severe accident impact finding, the NRC reviewed information from SEISs for both initial LR and SLR reviews completed since development of the 2013 LR GEIS and identified no new information or situations that would result in different impacts for this issue. The NRC's review of new information determined that the overall risk posed by severe accidents is less than originally stated in the 1996 LR GEIS by a significant margin. Therefore, the NRC concluded that the probability-weighted consequences of severe accidents during the initial LR or SLR terms are SMALL. This final rule revises the finding column in Table B–1 for this issue to reflect the fact that the probability-weighted consequences of severe accidents remain SMALL.

(xv) Environmental Justice

(67) *Impacts on Minority Populations, Low-Income Populations, and Indian Tribes*—This final rule renames "Minority and low-income populations" as "Impacts on

minority populations, low-income populations, and Indian Tribes"[6] to reflect the scope of environmental justice concerns addressed in this issue. Continued reactor operations during the license renewal term (initial LR or SLR) and refurbishment activities at a nuclear power plant could affect land, air, water, and ecological resources, which could result in human health or environmental effects. Consequently, minority and low-income populations and Indian Tribes could be disproportionately affected. The environmental justice impact analysis determines whether human health or environmental effects from continued reactor operations and refurbishment activities at a nuclear power plant would disproportionately affect a minority population, low-income population, or Indian Tribe and whether these effects may be high and adverse.

The NRC determined that environmental justice impacts during the license renewal term are unique to each nuclear power plant. Therefore, the issue is a Category 2 issue. This final rule revises the finding column of Table B–1 for this issue to add Indian Tribes and subsistence consumption to the scope of the finding and to make other minor clarifications.

(xvi) Waste Management

(68) *Low-Level Waste Storage and Disposal*, (69) *Onsite Storage of Spent Nuclear Fuel*, (70) *Offsite Radiological Impacts of Spent Nuclear Fuel and High-Level Waste Disposal*, (71) *Mixed-Waste Storage and Disposal*, and (72) *Nonradioactive Waste Storage and Disposal*—"Low-level waste storage and disposal," "Onsite storage of spent nuclear fuel," "Offsite radiological impacts of spent nuclear fuel and high-level waste disposal," "Mixed-waste storage and disposal," and "Nonradioactive waste storage

[6] 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). 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.

and disposal" are Category 1 issues. There are no changes to the finding column of Table B–1 for these issues.

(xvii) Greenhouse Gas Emissions and Climate Change

(73) *Greenhouse Gas Impacts on Climate Change*—This final rule adds a new Category 1 issue, "Greenhouse gas impacts on climate change," that evaluates the greenhouse gas (GHG) impacts on climate change associated with continued operation and refurbishment. The issue of GHG emissions on climate change was not considered in the 2013 LR GEIS and was not included in Table B–1. At the time of publication of the 2013 LR GEIS, insufficient data existed to support a classification of the contribution of nuclear power plant GHG emissions on climate change, either as a generic or plant-specific issue. The 2013 LR GEIS, however, included a discussion summarizing the life cycle impacts of nuclear power plant GHG emissions and climate change. Furthermore, following the issuance of Commission Order CLI-09-21, the NRC began to evaluate the direct and cumulative effects of GHG emissions and their contribution to climate change in environmental reviews for license renewal applications.

Nuclear power plants, by their very nature, do not combust fossil fuels to generate electricity and, therefore, have inherently low GHG emissions. However, nuclear power plant operations do have some GHG emission sources including diesel generators, pumps, diesel engines, boilers, refrigeration systems, electrical transmission and distribution systems, as well as mobile sources (e.g., worker vehicles and delivery vehicles). Any refurbishment activities undertaken at the nuclear power plant site could also produce GHGs due to emissions from motorized equipment, construction vehicles, and worker vehicles. Collectively, these GHG emissions when compared to different GHG emission inventories for other facilities, are minor.

The NRC concluded that the impacts of GHG emissions on climate change from continued operation during the license renewal term (initial LR or SLR) and any

refurbishment activities would be SMALL for all nuclear power plants. Therefore, this is a new Category 1 issue.

(74) *Climate Change Impacts on Environmental Resources*—This final rule adds this new Category 2 issue, "Climate change impacts on environmental resources," that evaluates the impacts of climate change on environmental resources that are affected by continued nuclear power plant operations and any refurbishment during the license renewal term (initial LR or SLR). Climate change is an environmental trend (i.e., reflected in changes in climate indicators, such as precipitation, air and water temperature, sea level rise over time) that could result in changes in the affected environment, irrespective of license renewal. The issue of climate change impacts was not identified as either a generic or plant-specific issue in the 2013 LR GEIS. However, the 2013 LR GEIS briefly described the environmental impacts that could occur on resources areas (land use, air quality, water resources, etc.) that may also be affected by license renewal. In plant-specific initial LR and SLR SEISs prepared since development of the 2013 LR GEIS, the NRC considered climate change impacts for those resources that could be incrementally affected by license renewal as part of the cumulative impact analysis.

As part of a comprehensive environmental review to meet its obligations under NEPA, the NRC must consider the impacts of climate change on environmental resource conditions that could also be affected by continued nuclear power plant operation and any refurbishment as a result of the proposed action (license renewal). License renewal environmental reviews conducted by the NRC have found that climate change effects on affected resources (e.g., water availability, sea level rise) can be equal to or greater than any direct effects associated with continued nuclear power plant operations during the license renewal term. Observed climate change has not been uniform across the United States. The accrued effects of climate change on environmental resource conditions can vary greatly based on site-specific conditions and thus are plant-specific rather than generic in nature. In support of plant operation and in conformance with environmental

permitting requirements, nuclear power plant licensees maintain systems and collect meteorological, water temperature, and other data that can inform the NRC's environmental review with respect to the impacts of climate change on environmental resource conditions.

The impacts of climate change on environmental resources that are affected by continued nuclear power plant operations and refurbishment during the license renewal term are location-specific and cannot be evaluated generically. The effects of climate change can vary regionally and climate change information at the regional and local scale is necessary to assess the impacts on the human environment for a specific location. The NRC's climate change impacts analysis will focus on reasonably foreseeable climate change impacts and predicted (future) trends on the baseline affected environment (i.e., the effects of climate change on environmental resource areas). The NRC will need to perform a plant-specific impact assessment as part of each license renewal environmental review. Therefore, this is a new Category 2 issue that cuts across multiple resource areas, similar to the cumulative effects issue, which is currently in Table B–1.

(xviii) Cumulative Effects

(75) *Cumulative Effects*—This final rule renames "Cumulative impacts" as "Cumulative effects"; it is a Category 2 issue. This final rule makes minor editorial and clarification changes to the finding column of Table B–1 for this issue to be consistent with the definition of cumulative effects as provided in the Council on Environmental Quality's revised regulation at 40 CFR 1508.1(g)(3).

(xix) Uranium Fuel Cycle

(76) *Offsite Radiological Impacts—Individual Impacts from Other than the Disposal of Spent Fuel and High-Level Waste*, (77) *Offsite Radiological Impacts—Collective Impacts from Other than the Disposal of Spent Fuel and High-Level Waste*, (78) *Nonradiological Impacts of the Uranium Fuel Cycle*, and (79) *Transportation*—"Offsite radiological impacts—individual impacts from other than the disposal of spent fuel and high-level waste," "Offsite radiological impacts—collective impacts from other than the disposal of spent fuel and high-level waste," "Nonradiological impacts of the uranium fuel cycle," and "Transportation" are Category 1 issues. There are no changes to the finding column of Table B–1 for these issues.

(xx) Termination of Nuclear Power Plant Operations and Decommissioning

(80) *Termination of Plant Operations and Decommissioning*—"Termination of plant operations and decommissioning" is a Category 1 issue. There are no changes to the finding column of Table B–1 for this issue.

This final rule revises the footnotes to Table B–1 as follows:

Footnote 1 is revised to reference the current revision of the LR GEIS.

Footnote 2 is revised to indicate that for the "Offsite radiological impacts of spent nuclear fuel and high-level waste disposal" issue, there is no single significance level to the impact.

Footnote 3 is revised to indicate that resource-specific effects or impact definitions from applicable environmental laws and executive orders, other than SMALL, MODERATE, and LARGE, apply and are used where appropriate.

Footnote 7 is added to indicate that for the "Severe accidents" issue, alternatives to mitigate severe accidents must be considered for all plants that have not already considered such alternatives and would be the functional equivalent of a Category 2 issue.

Section 51.53(c)(3), "Postconstruction Environmental Reports"

This final rule revises the introductory paragraph of Section 51.53(c)(3) to replace the words "an initial renewed license" with the words "a license renewal covered by Table B–1" to reflect that the regulation governing postconstruction environmental reports for license renewal applies to applicants seeking either an initial or subsequent renewed license following this update of the LR GEIS. Additionally, this final rule revises the text "and holding an operating license, construction permit, or combined license as of June 30, 1995" to read "for a nuclear power plant for which an operating license, construction permit, or combined license was issued as of June 30, 1995," in order to clarify that Watts Bar Nuclear Units 1 and 2, for which construction permits were issued by that date but are no longer held by the licensee, are within the scope of the LR GEIS and Table B–1. The revised language more clearly indicates that holders of renewed licenses for nuclear power plants that previously held operating licenses, construction permits, or combined licenses within the scope of the LR GEIS and Table B-1 remain within its scope during the license renewal term.

This final rule revises Section 51.53(c)(3)(ii)(B) for clarity and consistency with the methodology in CWA Sections 316(a) and (b), including the 2014 CWA Section 316(b) regulations which establish the BTA criteria based on impingement mortality, rather than total impingement.

This final rule revises Section 51.53(c)(3)(ii)(D) to delete the text "is located at an inland site and," to reflect the consolidation of two issues from the 2013 LR GEIS: "Groundwater quality degradation (plants with cooling ponds in salt marshes)," a Category 1 issue, and "Groundwater quality degradation (plants with cooling ponds at inland sites)," a Category 2 issue. The consolidated Category 2 issue in the revised LR GEIS, "Groundwater quality degradation (plants with cooling ponds)" reflects new information that cooling ponds can impact water quality at both inland and at coastal sites as a result of the migration of contaminants discharged to cooling ponds.

This final rule revises Section 51.53(c)(3)(ii)(E) for clarity and consistency with the changes related to Federally protected ecological resources in Table B–1 and the revised LR GEIS. The changes in this paragraph correspond to the changes in Table B–1 where a Category 2 issue, “Threatened, endangered, and protected species and essential fish habitat” was divided into three issues, for clarity and consistency with the separate Federal statues and interagency consultation requirements that the NRC must consider with respect to Federally protected ecological resources. Also included is a change reflecting the addition of a new Category 2 issue, “National Marine Sanctuaries Act: sanctuary resources,” which addresses the NRC consultation requirements under the Act.

This final rule revises Section 51.53(c)(3)(ii)(G) for consistency with changes to the Category 2 issue, “Microbiological hazards to the public.” The updated finding for this issue states that public health is a concern wherever receiving waters associated with nuclear power plant thermal effluents are accessible to the public.

This final rule revises Section 51.53(c)(3)(ii)(K) for clarity and consistency with the specific requirements of Section 106 of the NHPA, including the reference to NEPA, to reflect the requirement that Federal agencies must consider the potential effects of their actions on the affected human environment, which includes aesthetic, historic, and cultural resources.

This final rule revises Section 51.53(c)(3)(ii)(N) for clarity and consistency with the changes in Table B–1 and the revised LR GEIS by adding consideration of Indian Tribes and revises the terminology to refine the scope of environmental justice concerns.

This final rule revises Section 51.53(c)(3)(ii)(O) by removing the word “future,” for consistency with the revised terminology for “cumulative effects” provided by the Council on Environmental Quality.

This final rule adds a new Section 51.53(c)(3)(ii)(Q) for consistency with the changes in Table B–1 and the revised LR GEIS which includes the addition of a new Category 2 issue, “Climate change impacts on environmental resources.” The addition

requires the assessment of the effects of climate change on environmental resources that are affected by continued nuclear power plant operations and any refurbishment. The new issue was identified to improve the efficiency of reviews, address lessons learned from plant-specific reviews and information provided in public comments, and to reflect analyses already being performed by the NRC staff in environmental reviews, consistent with the Commission direction provided in CLI-09-21.

Section 51.95, "Postconstruction Environmental Impact Statements"

The final rule revises Section 51.95(c), "Operating license renewal stage," to remove the date of issuance of NUREG-1437. This change is made for clarity and to ensure that the regulation refers to the latest revision of the LR GEIS.

III. Opportunities for Public Participation

The proposed rule was published in the *Federal Register* on March 3, 2023, for a 60-day public comment period (88 FR 13329). The public comment period closed on May 2, 2023. A public meeting notice was published in the *Federal Registe*r on March 10, 2023 (88 FR 14958). During the comment period, the NRC conducted six hybrid (in-person with virtual attendance option) public meetings to promote a full understanding of the proposed rule, the draft revised LR GEIS, and associated draft guidance documents, and to receive public comments. The NRC also conducted a public meeting on November 8, 2023, on cumulative effects of regulation (CER) to discuss the effective and implementation dates for the final rule. See the "Cumulative Effects of Regulation" section of this document for additional information on stakeholder engagement. The meeting summaries and official transcripts are available as indicated in the "Availability of Documents" section of this document. The public comments informed the development of this final rule.

IV. Response and Public Comment Analysis

A. Overview

Appendix A, Section A.2, of Volume 2 of the LR GEIS (NUREG-1437, Revision 2), is the NRC's analysis of and response to public comments received on the proposed rule (see section XVI "Availability of Documents"). The NRC received 1,889 comment submissions during the public comment period that ended on May 2, 2023 (1,839 individuals submitted form letters that counted as one unique comment). A comment submission is a communication or document submitted to the NRC by an individual or entity, with one or more individual comments addressing a subject or issue. A total of 44 unique comment submissions were received during the comment period and six public meetings.

The public comment submittals are available on the Federal rulemaking website under Docket ID NRC-2018-0296. NRC's response to the public comments, including a summary of how NRC revised the proposed rule in response to public input, can be found in Appendix A.2 of the revised LR GEIS. The following sections summarize the major issues that resulted in substantive changes to this final rule and other issues raised for which no changes were made to this final rule.

B. Applicability of License Renewal Terms

As directed by the Commission in Staff Requirements SECY-22-0109, "Proposed Rule: Renewing Nuclear Power Plant Operating Licenses—Environmental Review," the proposed rule requested comment on whether the applicability of the LR GEIS should be expanded beyond two license renewal terms (i.e., initial license renewal and one subsequent license renewal term). Several comments from industry supported expansion, citing an efficient use of resources, while a few members of the public opposed it, citing insufficient information on aging management.

This final rule and LR GEIS remain applicable to one term of license renewal and one term of subsequent license renewal. Based on the public feedback received and the NRC's analysis of public input, no reason was found to deviate from the Commission's initial direction, due in part to the lack of public support, no immediate industry need, and scheduling impacts. The next review of the LR GEIS is scheduled to begin in fiscal year 2031 in accordance with SRM-SECY-22-0036, "Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses – 10-Year Environmental Regulatory Update (NRC-2022-0087)," at which point there will be another opportunity to consider expanding the scope of the LR GEIS to encompass multiple terms of SLR.

C. Comments Resulting in Changes to the Proposed Rule

Two issues were raised during the public comment period that resulted in substantive changes to the proposed rule; these comments and NRC's changes are briefly discussed in the following paragraphs.

Greenhouse Gas Emissions and Climate Change: The NRC received a comment stating, in part, that the NRC's proposal in 10 CFR 51.53(c)(3)(ii)(Q) to consider mitigation measures for climate change impacts is unneeded and duplicative. One comment noted that the NRC already has guidance for the preparation of environmental reports that direct applicants to consider potential mitigation measures for issues such as drought, consumptive surface water use, and other issues affected by climate change. The comments also stated that there is no need for the proposed new Category 2 issue or § 51.53(c)(3)(ii)(Q) to consider the additive or incremental effects of climate change or mitigation measures for purposes of the NRC's license renewal NEPA evaluation.

***NRC Response*:** The NRC disagrees that the new Category 2 issue and accompanying section 51.53(c)(3)(ii)(Q) on climate change are unnecessary. However, with respect to mitigation measures, the NRC agrees with the comment to the extent that the NRC's regulations in 10 CFR 51.53(c)(3)(iii) already require that environmental reports submitted by license renewal applicants contain a consideration of alternatives for reducing adverse impacts, as required by § 51.45(c), for all Category 2 license renewal issues in appendix B to subpart A of 10 CFR part 51. Therefore, the NRC has revised 10 CFR 51.53(c)(3)(ii)(Q) in this final rule to eliminate this duplicative requirement specific to mitigation measures for climate change impacts. The NRC also made conforming changes to Section 4.12 in Regulatory Guide 4.2, Supplement 1, Revision 2, and Section 4.12.5 in NUREG-1555, Supplement 1, Revision 2. No changes were required in the LR GEIS as a result of the comment. See also the NRC's responses to comments on this topic in the "Summary of Other Public Comments" section of this document.

***Human Health (Microbiological Hazards)*:** The NRC received a comment stating that the proposed addition to Section 3.9.2.2 of the LR GEIS regarding discharges to waters of the United States infers reference to the Clean Water Act, which has the potential to expand the scope of this issue if changes to the definition of "waters of the United States" ever occur in the future. In addition, the comment recommends limiting the scope to waters receiving discharges that are accessible to the public for recreational use.

***NRC Response*:** The NRC agrees in part and disagrees in part with the comment. The NRC agrees that reference to the Clean Water Act should be removed. Members of the public should be protected from microbiological hazards resulting from plant discharges into water bodies and not just to plant discharges into "waters of the United States." However, the NRC does not agree that the scope of the Category 2 issue, "Microbiological hazards to the public," should be limited to waters receiving discharges that are accessible to the public for "recreational use." The NRC has modified the text in

Section 3.9.2.2 of this LR GEIS; Sections 3.9 and 4.9 of Regulatory Guide 4.2, Supplement 1, Revision 2; and Sections 3.9 and 4.9 in NUREG-1555, Supplement 1, Revision 2, to reflect that members of the public could be exposed to microbiological organisms in thermal effluents at nuclear plants that use cooling ponds, lakes, canals, or that discharge to publicly accessible surface waters. The NRC also has updated the text in Chapter 2 (i.e., Table 2.1-1), Section 4.9.1.1.3 of this LR GEIS, and in Section 51.53(c)(3)(ii)(G) and Table B-1 of this final rule for consistency.

D. Summary of Other Public Comments

The NRC received comments on a variety of topics, including alternatives; meteorology, air quality, and noise; geologic environment; water resources (surface water and groundwater resources); ecological resources (terrestrial resources, aquatic resources, and federally protected ecological resources); historic and cultural resources; socioeconomics; human health (radiological and nonradiological hazards and postulated accidents); environmental justice; waste management and pollution prevention (radioactive and nonradioactive waste); greenhouse gas (GHG) emissions and climate change; cumulative effects; uranium fuel cycle; termination of nuclear power plant operations and decommissioning; general environmental concerns; NEPA process; license renewal process and rulemaking; public participation; general opposition or support of the LR GEIS, rulemaking, or license renewal; out of scope: energy cost or need for power; out of scope: emergency preparedness; out of scope: nuclear plant safety; out of scope: security and terrorism; and out of scope: nuclear plant-specific issues. Some comments received were editorial in nature, and many comments were considered outside of the scope of the license renewal environmental review process as well as this rulemaking.

Some of the more frequently mentioned issues and concerns in public comments, as well as the NRC's responses to those comments and any changes made in the final LR GEIS, are summarized in the following paragraphs. These summaries and

responses are not intended to be comprehensive of detailed comments and responses contained in LR GEIS Volume 2, Appendix A, Section A.2.

Alternatives to the proposed action. A number of comments questioned the adequacy of and basis for the NRC's consideration of energy (replacement power) alternatives in the LR GEIS.

The LR GEIS describes alternative energy sources that the NRC has identified as being potentially capable of meeting the purpose and need of the proposed action (license renewal). The NRC's analysis of replacement energy sources includes both baseload and non-baseload energy sources. The NRC further recognizes the ongoing changes in the nation's energy landscape, including continuing trends in the reduced use of many fossil fuels and the increased deployment of renewables and storage. The NRC revised Section 2.3 and Appendix D, Section D.3, of the LR GEIS to reflect the latest developments in these trends.

Categorization of environmental issues. A substantial number of comments questioned the NRC's findings with respect to many of the Category 1 issues (i.e., in the areas of surface water resources, groundwater resources, terrestrial resources, and aquatic resources) evaluated in the LR GEIS and proposed rule (i.e., Table B–1 in appendix B to subpart A of 10 CFR part 51). Many comments cited unique and site-specific information and examples from operating nuclear power plant sites to support the view that many Category 1 issues should instead be designated as Category 2, thus requiring a plant-specific environmental analysis.

As detailed in the NRC's responses to specific comments, the NRC provides its specific reasoning for categorizing environmental issues analyzed and designated in this final rule as either Category 1 or 2 in the LR GEIS, based on the methodology and criteria stated in Section 1.5 of the LR GEIS. The NRC designated issues as Category 1 with an impact of SMALL because the environmental impacts were found to be the same or similar at all plant sites. In part, while the NRC recognizes the need to consider unique issues and potential impacts at nuclear power plant sites as part of the NRC's

license renewal environmental reviews, the NRC's categorization of environmental issues as either Category 1 or 2 and associated findings were informed by lessons learned and knowledge gained from conducting initial LR and SLR environmental reviews since development of the 2013 LR GEIS.

The designation of an issue as a Category 1 issue does not mean that potential environmental impacts are not considered. During preparation of plant-specific supplements to the LR GEIS, NRC staff considers changes in nuclear power plant operating parameters, and new and potentially significant information provided by the applicant or identified through public comments, or resulting from the NRC's due diligence in reviewing relevant information. Data are reviewed in part for information that could change the conclusion in the LR GEIS with regard to an issue. Thus, even though an issue is a Category 1 issue, mechanisms are in place to conduct a full plant-specific review if new and significant information warrants such a review.

Radiological human health. A number of comments expressed concerns regarding the lack of human health studies (e.g., cancer studies around nuclear power plants), citing in particular the NRC's cancellation of a proposed National Academy of Sciences study to inform the NRC's Category 1 findings for human health issues.

With respect to specific concerns regarding human health studies and cancer risk, several studies have been performed to examine the health effects around nuclear power facilities. These studies are incorporated by reference in Section 3.9.1.4 of the LR GEIS. The NRC is not aware of any studies that are accepted by the scientific community that show a correlation between radiation dose from nuclear power facilities and cancer incidence in the general public. Further, as the NRC states in SECY-15-0104, "Analysis of Cancer Risks in Populations Near Nuclear Facilities Study," studies conducted by Canada, France, Germany, Great Britain, Spain, and Switzerland since 2008 have generally found no association between nuclear facility operations and increased cancer risks to the public that are attributable to the releases or radiation exposure. Regarding comments on the proposed National Academy of Science's cancer

study, “Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning,” the NRC declined to continue the study because it was unlikely to be able to answer the basic question about risk. The NRC’s regulatory limits for radiological protection are set to protect workers and the public from harmful effects of radiation on humans. Radiation dose limits in 10 CFR part 20 ensure adequate protection of workers and members of the public.

Greenhouse gas (GHG) emissions and climate change. Several comments expressed general support for the NRC’s consideration of GHGs and climate change in the LR GEIS and rule. A few comments, in part, indicated that the NRC’s treatment of climate change should be expanded while other comments expressed concerns with the NRC’s addition of the Category 2 issue, “Climate change impacts on environmental resources.”

Climate change is a subject of national and international interest and has been and continues to be a topic of broad public interest with respect to reactor license renewal. The implications of climate change and the high level of public interest have made this topic one that the NRC believes requires a “hard look” as required by NEPA. The NRC has concluded that 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 NRC has appropriately limited the boundaries of its inquiry of climate change impacts and the scope of the new Category 2 issue to matters germane to the NRC’s proposed action. As further discussed in Section 4.12.2 of the revised LR GEIS, the Category 2 climate change impacts issue considers those reasonably foreseeable effects on environmental resources that may also be directly affected by continued operation and refurbishment of nuclear power plants during the license renewal term. The NRC will consider climate change impacts in proportion to their significance and the magnitude of the impacts anticipated. The NRC will also use the best available climate change information and

consensus reports (e.g., U.S. Global Climate Change Research Program) and will quantify climate change impacts to the extent possible.

Postulated accidents. A large number of comments were received that were critical of various aspects of the NRC's analysis of postulated accidents and focused on severe accidents and concerned the NRC's proposal to reclassify "Severe accidents" from Category 2 to Category 1.

The NRC has reclassified the issue of "Severe accidents" as a Category 1 issue to more accurately reflect the procedural posture of the vast majority of license renewal applicants expected to reference the revised LR GEIS. Under the previous LR GEIS, the NRC resolved the impacts of severe accidents generically but required an analysis of severe accident mitigation for applicants that had not previously conducted such an analysis. For applicants that had, the issue was the "functional equivalent" of a Category 1 issue. At this time, the NRC expects most, if not all, facilities that are the subject of license renewal applications will have had a previous severe accident mitigation analysis completed. Therefore, the issue is most accurately characterized as Category 1. Moreover, the analysis in Appendix E of the revised LR GEIS further confirms the technical basis for the agency's policy of requiring only one severe accident mitigation alternatives (SAMA) analysis.

However, designation of an issue as a Category 1 issue does not mean that potential impacts are not considered. Changes in nuclear power plant operating parameters, new and significant information provided by the applicant or identified through public comments, or resulting from the NRC's due diligence in reviewing relevant information are considered during preparation of plant-specific supplements to the LR GEIS. Data are reviewed in part for information that could change the conclusion in the LR GEIS with regard to an issue. Thus, even though an issue is considered to be a Category 1 issue, mechanisms are in place to conduct a full plant-specific review if new and significant information warrants such a review.

Historic and cultural resources. A few comments stated that the regulatory requirement to consult with Tribes under Section 106 of the National Historic Preservation Act does not adequately cover a Federal agency's responsibility to consult with Indian Tribes on any Federal action that might have an impact on a Tribe. Comments referenced requirements from Executive Order 13175 and stated that a Federal agency's responsibility to consult with Indian Tribes covers more than historic preservation issues. Additional comments stated that the NRC must recognize and abide by the unique trust obligations between the United States and federally recognized Indian Tribes, and that the Tribal Policy Statement (82 FR 2402) should be referenced in the final rule.

The NRC acknowledges the comments and agrees that Tribal consultation for environmental reviews covers more than historic preservation issues. As an independent regulatory agency that does not hold in trust Tribal lands or assets or provide services to Federally recognized Tribes, the NRC fulfills its Trust Responsibility through implementation of the principles of the Tribal Policy Statement, by providing protections under its implementing regulations, and through recognition of additional obligations consistent with other applicable treaties and statutory authorities. The Tribal Policy Statement established a set of principles to guide the agency's government-to-government interactions with Federally recognized Indian Tribes and Alaska Native Tribes, promote effective government-to-government interactions with Indian Tribes, and to encourage and facilitate Tribal involvement in the areas over which the Commission has jurisdiction. The NRC's Tribal Policy Statement is consistent with the principles articulated in Executive Order 13175. The Policy Statement also underscores the NRC's commitments to conducting outreach to Tribes, engaging in timely consultation, and coordinating with other Federal agencies.

As a result of the comments, the NRC determined that the LR GEIS and staff guidance would benefit from a more detailed discussion of the NRC's Tribal Policy Statement. The NRC added a discussion (Section 1.8.7, Consultations) to Chapter 1 of

the LR GEIS and a new section (Tribal Policy Statement) to the Executive Summary of NUREG-1555, Supplement 1, Revision 2.

NEPA process. Many comments expressed concern about the adequacy of the LR GEIS revision and update process. The concerns expressed included, but were not limited to, such matters as the lack of a “hard look” and rigorous analysis of environmental impacts of license renewal as required by NEPA.

The NRC recognizes that Federal agencies are required to take a “hard look” at the potential environmental impacts associated with the agency’s proposed actions. As noted in the proposed rule, the changes to the LR GEIS as well as to the NRC’s regulations in 10 CFR part 51 and the NRC’s findings for environmental issues in Table B–1 in appendix B to subpart A of 10 CFR part 51 are designed to maintain the accuracy of the LR GEIS and ensure that future environmental reviews meet the “hard look” standard to fully account for the environmental impacts of initial LR and SLR. The revised LR GEIS provides a thorough assessment of the potential environmental impacts (effects) of renewing the operating licenses of commercial nuclear power plants for an additional 20 years beyond the current license term (whether an initial LR or SLR term), plus the number of years remaining on the current license, in accordance with applicable regulations.

License renewal and rulemaking process. Numerous comments were received on the NRC’s overall license renewal framework, as related to the process for revising the LR GEIS and this rulemaking. Comments specifically questioned why the NRC was considering SLR applications (allowing continued nuclear plant operations for up to 80 years). Comments also criticized the reasoning behind allowing license renewal applications to be submitted more than 10 years before an operating license expires.

With respect to the timing of license renewal applications, Section 54.17(c) of 10 CFR part 54 allows licensees to submit license renewal applications up to 20 years before the expiration of the licenses currently in effect. The Commission established this

earliest date for submission of license renewal applications after soliciting and considering public comments (56 FR 64943).

Facilities seeking license renewal have operated for more than 20 years before the filing of their initial LR applications, and for more than 40 years before the filing of their SLR applications. Thus, the NRC and other affected stakeholders at all levels have had decades to gain a better understanding of the environmental equilibrium and impacts of plant operations. The NRC has determined that having at least 20 years of operating experience at each power reactor facility is sufficient for the NRC to assess the environmental issues and impacts at the site and make informed generic judgments on the impacts of many environmental issues.

Public participation. A number of comments expressed concerns and disappointment with NRC's management of the public participation process. Many commenters requested extension of the comment period or stated that the comment period length was inadequate.

The NRC will continue to look for ways to improve public notifications and opportunities to comment, including the NRC's virtual (webinar) and in-person public meetings. To facilitate public involvement, the staff hosted six hybrid public meetings with 30-minute open house prior to the start of the meetings where members of the public could speak directly with and ask questions of NRC staff who authored the draft LR GEIS and proposed rule.

With regard to requests for extending the comment period on the LR GEIS and proposed rule, the 60-day comment period was appropriate for this rulemaking and consistent with NRC regulations (see 10 CFR 51.73). While the NRC believes that the provided 60-day comment period for the LR GEIS and proposed rule was appropriate, the NRC considered additional comments after the close of the comment period to the extent practicable.

V. Section-by-Section Analysis

The following paragraphs describe the specific changes made by this final rule.

10 CFR 51.53, Postconstruction Environmental Reports.

In § 51.53(c)(3), this final rule removes the text “an initial renewed license” and replaces it with “a license renewal covered by Table B–1”, to indicate applicability to initial LR and SLR. Additionally, this final rule revises the phrase “and holding an operating license, construction permit, or combined license as of June 30, 1995” to read “for a nuclear power plant for which an operating license, construction permit, or combined license was issued as of June 30, 1995,” in order to clarify that Watts Bar Nuclear Units 1 and 2, for which construction permits were issued by that date but are no longer held by the licensee, are within the scope of the LR GEIS and Table B–1. The revised language more clearly indicates that holders of renewed licenses for nuclear power plants that previously held operating licenses, construction permits, or combined licenses within the scope of the LR GEIS and Table B-1 remain within its scope during the license renewal term (initial LR or SLR).

This final rule revises paragraph (c)(3)(ii)(B) for clarity and consistency with the methodology in Clean Water Act (CWA) Sections 316(a) and (b).

This final rule revises paragraph (c)(3)(ii)(D) to remove the text “is located at an inland site and”, for consistency with consolidation of two issues related to groundwater quality degradation and corresponding updates in Table B–1.

This final rule revises paragraph (c)(3)(ii)(E) for clarity and consistency with proposed revisions to Table B–1.

This final rule revises paragraph (c)(3)(ii)(G) for consistency with revisions to Table B–1 related to the scope of the “Microbiological hazards to the public” issue. Paragraph (c)(3)(ii)(G) was revised in response to a public comment, for reasons discussed in Sections II.E and IV.C of this final rule.

This final rule revises paragraph (c)(3)(ii)(K) for clarity and consistency with the requirements of Section 106 of the National Historic Preservation Act and NEPA.

This final rule revises paragraph (c)(3)(ii)(N) for clarity and consistency with revisions to Table B–1 related to the scope of environmental justice concerns.

This final rule revises paragraph (c)(3)(ii)(O) by removing the word “future,” for consistency with the revised terminology for “cumulative effects” provided by the Council on Environmental Quality.

This final rule adds new paragraph (c)(3)(ii)(Q) to include an assessment of the effects of climate change in postconstruction environmental reports. Paragraph (c)(3)(ii)(Q) was revised in response to a public comment, for reasons discussed in Sections II.E and IV.C of this final rule.

Section 51.95, Postconstruction Environmental Impact Statements.

This final rule revises paragraph (c) to remove the date “(June 2013)”, to clarify the reference to the current revision of the LR GEIS (NUREG-1437, Revision 2).

Appendix B to Subpart A—Environmental Effect of Renewing the Operating License of a Nuclear Power Plant

This final rule revises appendix B to subpart A of 10 CFR part 51, to indicate the applicability to initial LR and one term of SLR and to update the findings on environmental issues with the data supported by the analyses in the LR GEIS (NUREG-1437, Revision 2). Footnote 3 was added to provide clarification on the range of impact findings in Table B-1.

VI. Regulatory Flexibility Certification

As required by the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission certifies that this rule does not have a significant economic impact on a

substantial number of small entities. This final rule affects nuclear power plant licensees filing for license renewal applications. The companies that own these plants do not fall within the scope of the definition of “small entities” set forth in the Regulatory Flexibility Act or the size standards established by the NRC (10 CFR 2.810).

VII. Regulatory Analysis

The NRC has prepared a regulatory analysis for this final rule. The analysis examines the costs and benefits of the alternatives considered by the NRC. The regulatory analysis is available as indicated in the “Availability of Documents” section of this document.

VIII. Backfitting and Issue Finality

This final rule codifies in 10 CFR part 51 certain environmental issues identified in the revised LR GEIS. The final rule also revises § 51.53(c)(3) to remove the word “initial.” The NRC has determined that the backfitting rule in § 50.109 and the issue finality provisions in 10 CFR part 52 do not apply to this final rule because this amendment does not involve any provision that would either constitute backfitting as that term is defined in 10 CFR chapter I or affect the issue finality of any approval issued under 10 CFR part 52.

IX. Cumulative Effects of Regulation

The NRC is following its cumulative effects of regulation (CER) process by engaging with external stakeholders throughout the rulemaking and related regulatory activities. Public involvement has included (1) the publication of notice announcing information gathering through the public scoping process to support the review to determine whether to update the LR GEIS on August 4, 2020 (85 FR 47252); (2) four public meetings conducted on August 19, 2020, and August 27, 2020 (two meetings on

each day), to receive comments on the scope of the LR GEIS; (3) publication of the proposed rule on March 3, 2023 (88 FR 13329) for comment; (4) six hybrid public meetings conducted between March 16, 2023, and April 6, 2023, to receive comments on the proposed rule, the revised LR GEIS, and associated guidance documents (88 FR 14958); and (5) a public meeting conducted on November 8, 2023, on CER to discuss the effective date and implementation date for this final rule.

X. Plain Writing

The Plain Writing Act of 2010 (Pub. L. 111-274) requires Federal agencies to write documents in a clear, concise, and well-organized manner. The NRC has written this document to be consistent with the Plain Writing Act as well as the Presidential Memorandum, "Plain Language in Government Writing," published June 10, 1998 (63 FR 31885).

XI. National Environmental Policy Act

In support of the revisions to 10 CFR part 51 concerning initial LR and SLRs, the NRC prepared Revision 2 to NUREG-1437. With regard to the corresponding changes in requirements for applications for initial LR or SLR, the NRC has determined that this is the type of action described in § 51.22(c)(3), an NRC categorical exclusion. Therefore, neither an environmental assessment nor an environmental impact statement has been prepared for this final rule, as it is procedural in nature and pertains to the type of environmental information to be reviewed.

XII. Paperwork Reduction Act Statement

This final rule contains new or amended collections of information subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). The burden to the public for the information collections(s) is estimated to average 8,562 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. The collections of information were approved by the Office of Management and Budget, approval number 3150-0021.

The information collection is being conducted to fulfill the requirements of a future applicant that submits an initial LR or SLR license application. This information will be used by the NRC to fulfill its responsibilities in the licensing review of nuclear power plants. Responses to this collection of information are mandatory. Confidential and proprietary information submitted to the NRC is protected in accordance with NRC regulations at 10 CFR § 9.17(a) and 10 CFR § 2.390(b).

You may submit comments on any aspect of the information collections, including suggestions for reducing the burden, by the following methods:

- **Federal rulemaking website:** Go to https://www.regulations.gov search for Docket ID NRC-2018-0296.
- **Mail comments to:** FOIA, Library, and Information Collections Branch, Office of the Chief Information Officer, Mail Stop: T6-A10M, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001 or to the OMB reviewer at: OMB Office of Information and Regulatory Affairs (3150–0021), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503; email: oira_submission@omb.eop.gov.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

XIII. Congressional Review Act

This final rule is a rule as defined in the Congressional Review Act (5 U.S.C. 801-808). However, the Office of Management and Budget has not found it to be a major rule as defined in the Congressional Review Act.

XIV. Voluntary Consensus Standards

The National Technology Transfer and Advancement Act of 1995, Pub. L. 104-113, requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies unless the use of such a standard is inconsistent with applicable law or otherwise impractical. In this final rule, the NRC revises various provisions of 10 CFR part 51. This action does not constitute the establishment of a standard that contains generally applicable requirements.

XV. Availability of Guidance

To support implementation of this final rule, the NRC is issuing the following guidance: (1) Regulatory Guide (RG) 4.2, “Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications,”, Revision 2, and (2) NUREG-1555, Supplement 1, Revision 2, “Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal.” The guidance documents are available as indicated in the “Availability of Documents” section of this

document. You may access information and comment submissions related to the guidance by searching on https://www.regulations.gov under Docket ID NRC-2018-0296.

For more information, see the response to public comments (available as indicated in the "Response and Public Comment Analysis" section of this document).

XVI. Availability of Documents

The documents identified in the following table are available to interested persons through one or more of the following methods, as indicated.

DOCUMENT	ADAMS ACCESSION NO. / *FEDERAL REGISTER* CITATION
Final Rule Documents	
SECY-XX-XXX, "Final Rule: Renewing Nuclear Power Plant Operating Licenses – Environmental Review (RIN 3150-AK32; NRC-2018-0296)"	ML23202A150
Regulatory Analysis for the 10 CFR Part 51, Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants	ML23205A029
Supporting Statement for Information Collections Contained in the Renewing Nuclear Power Plant Operating Licenses – Environmental Review Proposed Rule	ML23205A028
Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants (LR GEIS)	
NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," Volume 1, Revision 2, [DATE]	ML23201A224
NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," Volume 2, Revision 2, [DATE]	ML23201A225
NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," Volume 3, Revision 2, [DATE]	ML23201A226
Guidance Documents	
NUREG-1555, Supplement 1, Revision 2, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal," [DATE]	ML23201A227
Regulatory Guide 4.2, "Supplement 1, Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications," [DATE]	ML23201A144
Proposed Rule Documents	
Renewing Nuclear Power Plant Operating Licenses-Environmental Review, Proposed Rule, March 3, 2023	88 FR 13329

SECY-22-0109, “Proposed Rule: Renewing Nuclear Power Plant Operating Licenses—Environmental Review (RIN 3150-AK32; NRC-2018-0296),” December 6, 2022	ML22165A004
Draft Regulatory Analysis for the 10 CFR Part 51, Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants, December 6, 2022	ML23010A074
Draft Supporting Statement for Information Collections Contained in the Renewing Nuclear Power Plant Operating Licenses—Environmental Review Proposed Rule, March 3, 2023	ML22208A002
Public Meetings	
Renewing Nuclear Power Plant Operating Licenses-Environmental Review, Proposed Rule Public Meetings, March 10, 2023	88 FR 14958
03/16/2023 Meetings Summary: Rockville, MD, Public Meetings on Proposed Rule Renewing Nuclear Power Plant Operating Licenses—Environmental Review	ML23100A211
03/28/2023 Meeting Summary: Naperville, IL, Public Meeting on Proposed Rule Renewing Nuclear Power Plant Operating Licenses—Environmental Review	ML23100A213
03/30/2023 Meeting Summary: Westlake, TX, Public Meeting on Proposed Rule Renewing Nuclear Power Plant Operating Licenses—Environmental Review	ML23100A203
04/04/2023 Meeting Summary: King of Prussia, PA, Public Meeting on Proposed Rule Renewing Nuclear Power Plant Operating Licenses—Environmental Review	ML23100A207
04/06/2023 Meeting Summary: Decatur, GA, Public Meeting on Proposed Rule Renewing Nuclear Power Plant Operating Licenses—Environmental Review	ML23100A208
11/08/2023 Meeting Summary: Cumulative Effects of Regulations Public Meeting: Draft Final Rule Renewing Nuclear Power Plant Operating Licenses—Environmental Review	ML23331A004
Official Transcript of March 16, 2023: Rockville, MD, Public Comments-Gathering Meeting on PR-51—Renewing Nuclear Power Plant Operating Licenses—Environmental Review (Afternoon Session) (corrected)	ML23082A151
Official Transcript of March 16, 2023: Rockville, MD, Public Comments-Gathering Meeting on PR-51—Renewing Nuclear Power Plant Operating Licenses—Environmental Review (Evening Session) (corrected)	ML23082A152
Official Transcript of March 28, 2023: Naperville, IL, Public Comments-Gathering Meeting on PR-51—Renewing Nuclear Power Plant Operating Licenses—Environmental Review (corrected)	ML23107A242
Official Transcript of March 30, 2023: Westlake, TX, Public Comments-Gathering Meeting on PR-51—Renewing Nuclear Power Plant Operating Licenses—Environmental Review (corrected)	ML23107A243
Official Transcript of April 4, 2023: King of Prussia, PA, Public Comments-Gathering Meeting on PR-51—Renewing Nuclear Power Plant Operating Licenses—Environmental Review (corrected)	ML23107A244

Official Transcript of April 6, 2023, Decatur, GA, Public Comments-Gathering Meeting on PR-51—Renewing Nuclear Power Plant Operating Licenses—Environmental Review (corrected)	ML23107A245
Official Transcript of November 8, 2023, Public Meeting on Cumulative Effects of Regulations: Draft Final Rule Renewing Nuclear Power Plant Operating Licenses—Environmental Review (corrected)	ML23331A005
Related Documents	
National Research Council, "Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 1," 2012	ML15035A132
National Research Council, "Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning," 2014	ML15035A135
Continued Storage of Spent Nuclear Fuel, Final Rule, September 29, 2014	79 FR 56238
Corrected Transcript for Public Scoping Meeting to Discuss the Review and Potential Update of NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," August 27, 2020, 1:30 p.m.	ML20296A270
Corrected Transcript for Public Scoping Meeting to Discuss the Review and Potential Update of NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," August 27, 2020, 6:30 p.m.	ML20296A271
Corrected Transcript for Public Scoping Meeting to Discuss the Review and Potential Update of NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," August 19, 2020, 1:30 p.m.	ML20296A272
Corrected Transcript for Public Scoping Meeting to Discuss the Review and Potential Update of NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," August 19, 2020, 6:30 p.m.	ML20296A273
Environmental Impact Statement Scoping Process Summary Report, Review and Update of the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437), June 2021	ML21039A576
Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, Final Rule, December 18, 1996	61 FR 66537
Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments," November 6, 2000	ML040070159
Nuclear Power Plant License Renewal, Final Rule, December 13, 1991	56 FR 64943
Notice of Intent to Review and Update the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, August 4, 2020	85 FR 47252
NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," Volume 1, May 1996	ML040690705

NUREG-1437, “Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants,” Volume 2, May 1996	ML040690738
NUREG-1437, “Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants,” Volume 1, Revision 1, June 2013	ML13106A241
NUREG-1437, “Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants,” Volume 2, Revision 1, June 2013	ML13106A242
NUREG-1437, “Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants,” Volume 3, Revision 1, June 2013	ML13106A244
NUREG-1437, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Second Renewal, Regarding Subsequent License Renewal for Turkey Point Nuclear Generating Unit Nos. 3 and 4,” Supplement 5, October 2019	ML19290H346
Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, Final Rule, June 20, 2013	78 FR 37281
Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Correction, Final Rule, Correcting Amendment, July 31, 2013	78 FR 46255
SECY-15-0104, “Analysis of Cancer Risks in Populations Near Nuclear Facilities Study,” August 21, 2015	ML15141A404
SECY-21-0066, “Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses—Environmental Review (RIN 3150-AK32, NRC-2018-0296),” July 22, 2021	ML20364A008
SECY-22-0024, “Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses—Environmental Review (RIN 3150-AK32, NRC-2018-0296),” March 25, 2022	ML22062B643
SECY-22-0036, “Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses—10-Year Environmental Regulatory Update (NRC-2022-0087),” April 25, 2022	ML22083A149
SRM-SECY-21-0066, “Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses—Environmental Review (RIN 3150-AK32, NRC-2018-0296),” February 24, 2022	ML22053A308
SRM-SECY-22-0024, “Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses—Environmental Review (RIN 3150-AK32, NRC-2018-0296),” April 5, 2022	ML22096A035
SRM-SECY-22-0036, “Rulemaking Plan for Renewing Nuclear Power Plant Operating Licenses—10-Year Environmental Regulatory Update (NRC-2022-0087),” June 17, 2022	ML22168A130
U.S. Nuclear Regulatory Commission Memorandum and Order CLI-09-21, November 3, 2009	ML093070690
U.S. Nuclear Regulatory Commission Memorandum and Order CLI-22-02, February 24, 2022	ML22055A496

U.S. Nuclear Regulatory Commission Memorandum and Order CLI-22-03, February 24, 2022	ML22055A521 ML22055A526 ML22055A527 ML22055A533 ML22055A554
U.S. Nuclear Regulatory Commission Memorandum and Order CLI-22-04, February 24, 2022	ML22055A557
U.S. Nuclear Regulatory Commission Tribal Policy Statement	82 FR 2402

The NRC may post materials related to this document, including public comments, on the Federal rulemaking website at https://www.regulations.gov under Docket ID NRC-2018-0296. In addition, the Federal rulemaking website allows members of the public to receive alerts when changes or additions occur in a docket folder. The following actions are needed to subscribe: 1) navigate to the docket folder NRC-2018-0296, 2) click the “Subscribe” link, and 3) enter an email address and click on the “Subscribe” link.

List of Subjects in 10 CFR Part 51

Administrative practice and procedure, Environmental impact statements, Hazardous waste, Nuclear energy, Nuclear materials, Nuclear power plants and reactors, Reporting and recordkeeping requirements.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and 5 U.S.C. 552 and 553, the NRC is amending 10 CFR part 51 as follows:

PART 51–ENVIRONMENTAL PROTECTION REGULATIONS FOR DOMESTIC LICENSING AND RELATED REGULATORY FUNCTIONS

1. The authority citation for part 51 continues to read as follows:

Authority: Atomic Energy Act of 1954, secs. 161, 193 (42 U.S.C. 2201, 2243); Energy Reorganization Act of 1974, secs. 201, 202 (42 U.S.C. 5841, 5842); National

Environmental Policy Act of 1969 (42 U.S.C. 4332, 4334, 4335); Nuclear Waste Policy Act of 1982, secs. 144(f), 121, 135, 141, 148 (42 U.S.C. 10134(f), 10141, 10155, 10161, 10168); 44 U.S.C. 3504 note.

Sections 51.20, 51.30, 51.60, 51.80, and 51.97 also issued under Nuclear Waste Policy Act secs. 135, 141, 148 (42 U.S.C. 10155, 10161, 10168).

Section 51.22 also issued under Atomic Energy Act sec. 274 (42 U.S.C. 2021) and under Nuclear Waste Policy Act sec. 121 (42 U.S.C. 10141).

Sections 51.43, 51.67, and 51.109 also issued under Nuclear Waste Policy Act sec. 114(f) (42 U.S.C. 10134(f)).

2. Amend § 51.53 by:

a. Removing in paragraph (c)(3) introductory text, the words “an initial renewed license and holding an operating license, construction permit, or combined license as of June 30, 1995” and adding in its place the words “a license renewal covered by Table B–1 for a nuclear power plant for which an operating license, construction permit, or combined license was issued as of June 30, 1995”;

b. Revising paragraph (c)(3)(ii)(B);

c. Removing in paragraph (c)(3)(ii)(D), the words “is located at an inland site and”;

d. Revising paragraphs (c)(3)(ii)(E); (G); (K); (N);

e. Removing in paragraph (c)(3)(ii)(O) the word “future”; and

f. Adding paragraph (c)(3)(ii)(Q).

The revisions and additions read as follows:

§ 51.53 Postconstruction environmental reports.

* * * * *

(c) * * *

(3) * * *

(ii) * * *

(B) If the applicant’s plant utilizes once-through cooling or cooling pond water intake and discharge systems, the applicant shall provide a copy of current Clean Water Act 316(b) Best Technology Available determinations and, if applicable, a 316(a)

variance in accordance with 40 CFR part 125, or equivalent State permits and supporting documentation. If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from impingement mortality and entrainment and thermal discharges.

* * * * *

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

* * * * *

(G) If the applicant's plant uses a cooling pond, lake, canal, or discharges to publicly accessible surface waters, an assessment of the impact of the proposed action on public health from thermophilic organisms in the affected water must be provided.

* * * * *

(K) All applicants shall identify any potentially affected historic and cultural resources and historic properties and assess whether continued operations and any planned refurbishment activities would affect these resources in accordance with the Section 106 of the National Historic Preservation Act and in the context of the National Environmental Policy Act.

* * * * *

(N) Applicants shall provide information on the general demographic composition of minority and low-income populations and communities (by race and ethnicity) and Indian Tribes in the vicinity of the nuclear power plant that could be disproportionately affected by license renewal, including continued reactor operations and refurbishment activities.

* * * * *

(Q) Applicants shall include an assessment of the effects of any observed and projected changes in climate on environmental resource areas that are affected by license renewal.

* * * * *

§ 51.95 [Amended]

3. In § 51.95, in paragraph (c) introductory text, remove the words “(June 2013)”.

4. Revise appendix B to subpart A of 10 CFR part 51 to read as follows:

Appendix B to Subpart A of 10 CFR Part 51 – Environmental Effect of Renewing the Operating License of a Nuclear Power Plant

The Commission has assessed the environmental impacts associated with granting a renewed operating license for a licensee that held an operating license, construction permit, or combined license as of June 30, 1995. This assessment applies to applications for initial or a first (i.e., one term) subsequent license renewal. Table B–1 summarizes the Commission’s findings on the scope and magnitude of environmental impacts of renewing the operating license for a nuclear power plant as required by section 102(2) of the National Environmental Policy Act of 1969, as amended. Table B–1, subject to an evaluation of those issues identified in Category 2 as requiring further analysis and possible significant new information, represents the analysis of the environmental impacts associated with renewal of any operating license and is to be used in accordance with § 51.95(c). On a 10-year cycle, the Commission intends to review the material in this appendix and update it if necessary. A scoping notice must be

published in the *Federal Register* indicating the results of the NRC's review and inviting public comments and proposals for other areas that should be updated.

Table B–1—Summary of Findings on Environmental Issues for Initial and One Term of Subsequent License Renewal of Nuclear Power Plants[1]

Issue	Category[2]	Finding[3]
Land Use		
Onsite land use	1	SMALL. Changes in onsite land use from continued operations and refurbishment associated with license renewal would be a small fraction of the nuclear power plant site and would involve only land that is controlled by the licensee.
Offsite land use	1	SMALL. Offsite land use would not be affected by continued operations and refurbishment associated with license renewal.
Offsite land use in transmission line right-of-ways (ROWs)[4]	1	SMALL. Use of transmission line ROWs from continued operations and refurbishment associated with license renewal would continue with no change in land use restrictions.
Visual Resources		
Aesthetic impacts	1	SMALL. No important changes to the visual appearance of plant structures or transmission lines are expected from continued operations and refurbishment associated with license renewal.
Air Quality		

Air quality impacts	1	SMALL. Air quality impacts from continued operations and refurbishment associated with license renewal are expected to be small at all plants. Emissions from emergency diesel generators and fire pumps and routine operations of boilers used for space heating are minor. Impacts from cooling tower particulate emissions have been small. Emissions resulting from refurbishment activities at locations in or near air quality nonattainment or maintenance areas would be short-lived and would cease after these activities are completed. Operating experience has shown that the scale of refurbishment activities has not resulted in exceedance of the *de minimis* thresholds for criteria pollutants, and best management practices, including fugitive dust controls and the imposition of permit conditions in State and local air emissions permits, would ensure conformance with applicable State or Tribal implementation plans.
Air quality effects of transmission lines[4]	1	SMALL. Production of ozone and oxides of nitrogen from transmission lines is insignificant and does not contribute measurably to ambient levels of these gases.
Noise		
Noise impacts	1	SMALL. Noise levels would remain below regulatory guidelines for offsite receptors during continued operations and refurbishment associated with license renewal.
Geologic Environment		
Geology and soils	1	SMALL. The impact of continued operations and refurbishment activities on geology and soils would be small for all nuclear power plants and would not change appreciably during the license renewal term.
Surface Water Resources		
Surface water use and quality (non-cooling system impacts)	1	SMALL. Impacts are expected to be small if best management practices are employed to control soil erosion and spills. Surface water use associated with continued operations and refurbishment associated with license renewal would not increase significantly or would be reduced if refurbishment occurs during a plant outage.

Altered current patterns at intake and discharge structures	1	SMALL. Altered current patterns would be limited to the area in the vicinity of the intake and discharge structures. These impacts have been small at operating nuclear power plants.
Altered salinity gradients	1	SMALL. Effects on salinity gradients would be limited to the area in the vicinity of the intake and discharge structures. These impacts have been small at operating nuclear power plants.
Altered thermal stratification of lakes	1	SMALL. Effects on thermal stratification would be limited to the area in the vicinity of the intake and discharge structures. These impacts have been small at operating nuclear power plants.
Scouring caused by discharged cooling water	1	SMALL. Scouring effects would be limited to the area in the vicinity of the intake and discharge structures. These impacts have been small at operating nuclear power plants.
Discharge of metals in cooling system effluent	1	SMALL. Discharges of metals have not been found to be a problem at operating nuclear power plants with cooling-tower-based heat dissipation systems and have been satisfactorily mitigated at other plants. Discharges are monitored and controlled as part of the National Pollutant Discharge Elimination System (NPDES) permit process.
Discharge of biocides, sanitary wastes, and minor chemical spills	1	SMALL. The effects of these discharges are regulated by Federal and State 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.
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.
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 quality. Dredging is performed under permit from the U.S. Army Corps of Engineers, and possibly, from other State or local agencies.

Temperature effects on sediment transport capacity	1	SMALL. These effects have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.
Groundwater Resources		
Groundwater contamination and use (non-cooling system impacts)	1	SMALL. Extensive dewatering is not anticipated from continued operations and refurbishment associated with license renewal. Industrial practices involving the use of solvents, hydrocarbons, heavy metals, or other chemicals, and/or the use of wastewater ponds or lagoons have the potential to contaminate site groundwater, soil, and subsoil. Contamination is subject to State or U.S. 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 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 resulting from water withdrawals	1	SMALL. Groundwater withdrawals at operating nuclear power plants would not contribute significantly to groundwater quality degradation.
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-specific characteristics.
Terrestrial Resources		
Non-cooling system impacts on terrestrial resources	2	SMALL, MODERATE, or LARGE. The magnitude of effects of continued nuclear power plant operation and refurbishment, unrelated to operation of the cooling system, would depend on numerous site-specific factors, including ecological setting, planned activities during the license renewal term, and characteristics of the plants and animals present in the area. Application of best management practices and other conservation initiatives would reduce the potential for impacts.
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 impacts are not expected to be significant issues during the license renewal term.
Bird collisions with plant structures and transmission lines[4]	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.
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.
Transmission line right-of-way (ROW) management impacts on terrestrial resources[4]	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[4]	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 electromagnetic fields on terrestrial plants and animals during the license renewal term would be negligible.
Aquatic Resources		

Impingement mortality and entrainment of aquatic organisms (plants with 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 (CWA) 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.
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, 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, 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 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.

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.
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 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.
Water use conflicts with aquatic 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 aquatic communities. 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.
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.
Impacts of transmission line right-of-way (ROW) management on aquatic resources[4]	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.
Federally Protected Ecological Resources		

Endangered Species Act: federally listed species and critical habitats under U.S. Fish and Wildlife 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 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) would be required if license renewal could destroy, cause the loss of, or injure sanctuary resources.
Historic and Cultural Resources		
Historic and cultural resources[4]	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 Officers, Indian Tribes, and other interested parties.
Socioeconomics		
Employment and income, recreation and tourism	1	SMALL. Although most nuclear plants have large numbers of employees with higher than average wages and salaries, employment, income, recreation, and tourism impacts from continued operations and refurbishment associated with license renewal are expected to be small.
Tax revenue	1	SMALL. Nuclear plants provide tax revenue to local jurisdictions in the form of property tax payments, payments in lieu of tax (PILOT), or tax payments on energy production. The amount of tax revenue paid during the license renewal term as a result of continued operations and refurbishment associated with license renewal is not expected to change.

Community services and education	1	SMALL. Changes resulting from continued operations and refurbishment associated with license renewal to local community and educational services would be small. With little or no change in employment at the licensee's plant, value of the power plant, payments on energy production, and PILOT payments expected during the license renewal term, community and educational services would not be affected by continued power plant operations.
Population and housing	1	SMALL. Changes resulting from continued operations and refurbishment associated with license renewal to regional population and housing availability and value would be small. With little or no change in employment at the licensee's plant expected during the license renewal term, population and housing availability and values would not be affected by continued power plant operations.
Transportation	1	SMALL. Changes resulting from continued operations and refurbishment associated with license renewal to traffic volumes would be small.
Human Health		
Radiation exposures to plant workers	1	SMALL. Occupational doses from continued operations and refurbishment associated with license renewal are expected to be within the range of doses experienced during the current license term and would continue to be well below regulatory limits.
Radiation exposures to the public	1	SMALL. Radiation doses to the public from 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.
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 publicly accessible surface waters. Impacts would depend on site-specific characteristics.
Electromagnetic fields (EMFs)[4, 6]	N/A[5]	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.
Electric shock hazards[4]	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.
Postulated Accidents		
Design-basis accidents	1	SMALL. The NRC staff has concluded that the environmental impacts of design-basis accidents are of small significance for all plants.

Severe accidents[7]	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.
Environmental Justice		
Impacts on minority populations, low-income populations, and Indian Tribes	2	Impacts on minority populations, low-income populations, Indian Tribes, and subsistence consumption resulting from continued operations and refurbishment associated with license renewal will be addressed in nuclear plant-specific reviews.
Waste Management		
Low-level waste storage and disposal	1	SMALL. The comprehensive regulatory controls that are in place and the low public doses being achieved at reactors ensure that the radiological impacts on the environment would remain small during the license renewal term.
Onsite storage of spent nuclear fuel	1	During the license renewal term, SMALL. The expected increase in the volume of spent fuel from an additional 20 years of operation can be safely accommodated onsite during the license renewal term with small environmental impacts through dry or pool storage at all plants. For the period after the licensed life for reactor operations, the impacts of onsite storage of spent nuclear fuel during the continued storage period are discussed in NUREG-2157 and as stated in § 51.23(b), shall be deemed incorporated into this issue.

Offsite radiological impacts of spent nuclear fuel and high-level waste disposal	1	For the high-level waste and spent-fuel disposal component of the fuel cycle, the EPA established a dose limit of 0.15 mSv (15 millirem) per year for the first 10,000 years and 1.0 mSv (100 millirem) per year between 10,000 years and 1 million years for offsite releases of radionuclides at the proposed repository at Yucca Mountain, Nevada. The Commission concludes that the impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the impacts of spent fuel and high--level waste disposal, this issue is considered Category 1.
Mixed-waste storage and disposal	1	SMALL. The comprehensive regulatory controls and the facilities and procedures that are in place ensure proper handling and storage, as well as negligible doses and exposure to toxic materials for the public and the environment at all plants. License renewal would not increase the small, continuing risk to human health and the environment posed by mixed waste at all plants. The radiological and nonradiological environmental impacts of long-term disposal of mixed waste from any individual plant at licensed sites are small.
Nonradioactive waste storage and disposal	1	SMALL. No changes to systems that generate nonradioactive waste are anticipated during the license renewal term. Facilities and procedures are in place to ensure continued proper handling, storage, and disposal, as well as negligible exposure to toxic materials for the public and the environment at all plants.
Greenhouse Gas Emissions and Climate Change		

Greenhouse gas impacts on climate change	1	SMALL. Greenhouse gas impacts on climate change from continued operations and refurbishment associated with license renewal are expected to be small at all plants. Greenhouse gas emissions from routine operations of nuclear power plants are typically very minor, because such plants, by their very nature, do not normally combust fossil fuels to generate electricity. Greenhouse gas emissions from construction vehicles and other motorized equipment for refurbishment activities would be intermittent and temporary, restricted to the refurbishment period. Worker vehicle greenhouse gas emissions for refurbishment would be similar to worker vehicle emissions from normal nuclear power plant operations.
Climate change impacts on environmental resources	2	Climate change can have additive effects on environmental resource conditions that may also be directly impacted by continued operations and refurbishment during the license renewal term. The effects of climate change can vary regionally and climate change information at the regional and local scale is necessary to assess trends and the impacts on the human environment for a specific location. The impacts of climate change on environmental resources during the license renewal term are location-specific and cannot be evaluated generically.
Cumulative Effects		
Cumulative effects	2	Cumulative effects or impacts of continued operations and refurbishment associated with license renewal must be considered on a plant-specific basis. The effects depend on regional resource characteristics, the incremental resource-specific effects of license renewal, and the cumulative significance of other factors affecting the environmental resource.
Uranium Fuel Cycle		

Offsite radiological impacts—individual impacts from other than the disposal of spent fuel and high-level waste	1	SMALL. The impacts to the public from radiological exposures have been considered by the Commission in Table S-3 of this part. Based on information in the GEIS, impacts to individuals from radioactive gaseous and liquid releases, including radon-222 and technetium-99, would remain at or below the NRC's regulatory limits.
Offsite radiological impacts—collective impacts from other than the disposal of spent fuel and high-level waste	1	There are no regulatory limits applicable to collective doses to the general public from fuel-cycle facilities. The practice of estimating health effects on the basis of collective doses may not be meaningful. All fuel-cycle facilities are designed and operated to meet the applicable regulatory limits and standards. The Commission concludes that the collective impacts are acceptable. The Commission concludes that the impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the collective impacts of the uranium fuel cycle, this issue is considered Category 1.
Nonradiological impacts of the uranium fuel cycle	1	SMALL. The nonradiological impacts of the uranium fuel cycle resulting from the renewal of an operating license for any plant would be small.
Transportation	1	SMALL. The impacts of transporting materials to and from uranium-fuel-cycle facilities on workers, the public, and the environment are expected to be small.
Termination of Nuclear Power Plant Operations and Decommissioning		
Termination of plant operations and decommissioning	1	SMALL. License renewal is expected to have a negligible effect on the impacts of terminating operations and decommissioning on all resources.

[1] Data supporting this table are contained in NUREG-1437, Revision 2, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (MONTH YEAR).
[2] The numerical entries in this column are based on the following category definitions:
Category 1: For the issue, the analysis reported in the Generic Environmental Impact Statement has shown:
(1) The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristic;
(2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for offsite radiological impacts of spent nuclear fuel and high-level waste disposal and offsite radiological impacts—collective impacts from other than the disposal of spent fuel and high-level waste); and
(3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.
The generic analysis of the issue may be adopted in each plant-specific review.

Category 2: For the issue, the analysis reported in the Generic Environmental Impact Statement has shown that one or more of the criteria of Category 1 cannot be met, and therefore additional plant-specific review is required.

[3] The impact findings in this column are based on the definitions of three significance levels. Unless the significance level is identified as beneficial, the impact is adverse, or in the case of "SMALL," may be negligible. The definitions of significance follow:

SMALL—For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small as the term is used in this table.

MODERATE—For the issue, environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE—For the issue, environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

These levels are used for describing the environmental impacts of the proposed action (license renewal), as well as for the impacts of a range of reasonable alternatives to the proposed action. Resource-specific effects or impact definitions from applicable environmental laws and executive orders, other than SMALL, MODERATE, and LARGE, are used where appropriate.

For issues where probability is a key consideration (i.e., accident consequences), probability was a factor in determining significance.

[4] 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.

[5] NA (not applicable). The categorization and impact finding definitions do not apply to these issues.

[6] If, in the future, the Commission finds that, contrary to current indications, a consensus has been reached by appropriate Federal health agencies that there are adverse health effects from electromagnetic fields, the Commission will require applicants to submit plant-specific reviews of these health effects as part of their license renewal applications. Until such time, applicants for license renewal are not required to submit information on this issue.

[7] Although the NRC does not anticipate any license renewal applications for nuclear power plants for which a previous severe accident mitigation design alternative (SAMDA) or severe accident mitigation alternative (SAMA) analysis has not been performed, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives and would be the functional equivalent of a Category 2 issue requiring plant-specific analysis.

Dated: Month XX, 2024.

For the Nuclear Regulatory Commission.

Carrie M. Safford,

Secretary of the Commission.