

NUCLEAR REGULATORY COMMISSION

10 CFR Part 51

RIN 3150–AI42

[NRC–2008–0608]

**Revisions to Environmental Review for Renewal of
Nuclear Power Plant Operating Licenses**

AGENCY: Nuclear Regulatory Commission.

ACTION: Final rule.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC or the Commission) is amending its environmental protection regulations by updating the Commission’s 1996 findings on the environmental effect of renewing the operating license of a nuclear power plant. The final rule redefines the number and scope of the environmental impact issues that must be addressed by the NRC during license renewal environmental reviews. This final rule also incorporates lessons learned and knowledge gained from license renewal environmental reviews conducted by the NRC since 1996.

DATES: This regulation is effective **[INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**. However, compliance is not required until **[INSERT COMPLIANCE DATE AS DETERMINED BY THE COMMISSION]**.

ADDRESSES: Please refer to Docket ID NRC-2008-0608 when contacting the NRC about the availability of information for this final rule. You may access information and comment

submittals related to this final rulemaking, which the NRC possesses and is publicly available, by the following methods:

- **Federal Rulemaking Web Site:** Go to <http://www.regulations.gov> and search for Docket ID <NRC-2008-0608>.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may access publicly available documents online in the NRC Library at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "ADAMS Public Documents" and then 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, 301-415-4737, or by e-mail to PDR.Resource@nrc.gov. The ADAMS accession number for each document referenced in this notice (if that document is available in ADAMS) is provided the first time that a document is referenced. In addition, for the convenience of the reader, the ADAMS accession numbers are provided in a table in Section XII, "Availability of Documents," of this document.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

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EXECUTIVE SUMMARY:

Purpose of the Regulatory Action

The Atomic Energy Act of 1954 authorizes the U.S. Nuclear Regulatory Commission (NRC or the Commission) to issue commercial nuclear power plant operating licenses for up to 40 years. NRC regulations allow for the renewal of these operating licenses for up to an additional 20 years. Under the NRC's environmental protection regulations in Title 10, Part 51 of the *Code of Federal Regulations* (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 rule in 1996 to define which impacts would essentially be the same at all nuclear power plants (Category 1 issues) and which ones could be different at different plants and would require a plant-specific analysis to determine the impacts (Category 2 issues). 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 its associated EIS. The final rule amends those regulations by updating the Commission's 1996 rule. The final rule redefines the number and scope of the environmental impact issues that must be addressed by the NRC and applicants during license renewal environmental reviews. These changes are based primarily on lessons learned and knowledge gained from license renewal environmental reviews conducted by the NRC since 1996.

The NRC prepared a regulatory analysis to determine the expected quantitative and qualitative costs and benefits of the final rule. The analysis concluded that the final rule will result in net savings to the industry and the NRC. For more information, please see the regulatory analysis (ADAMS Accession No. ML110760321).

Summary of the Major Rule Changes

In the 1996 rule, there were 92 environmental impact issues, 23 of which required a plant-specific analysis (Category 2 issues) during license renewal environmental reviews. In the final rule, there are 78 environmental impact issues, 18 of which require a plant-specific analysis. The following bullets summarize the major changes to the rule:

- Based on the related nature of the issues, several Category 1 issues were consolidated with other Category 1 issues. This includes some issues that were changed from Category 2 to Category 1 and subsequently combined with other, related Category 1 issues. Similarly, several Category 2 issues were combined with related Category 2 issues.
- New Category 1 issues were added: geology and soils; effects of dredging on water quality; groundwater use and quality; exposure of terrestrial organisms to radionuclides; exposure of aquatic organisms to radionuclides; effects of dredging on aquatic organisms; impacts of transmission line right-of-way management on aquatic resources; physical occupational hazards.
- Several issues were changed from Category 2 (in the 1996 rule) to Category 1: offsite land use, air quality, public services (several issues), and population and housing.
- New Category 2 issues were added: radionuclides released to groundwater and cumulative impacts.

SUPPLEMENTARY INFORMATION:

I. Background

II. Public Meetings

III. Discussion

IV. Response to Public Comments

- A. Overview
- B. Summary of Comments Resulting in Substantive Changes to the Rule
- C. Summary of Other Comments
- V. Related Issues of Importance
 - A. Fukushima Events
 - B. Best Management Practices
 - C. Definition of “Historic Properties”
- VI. Revisions to 10 CFR 51.53
 - A. Reclassifying Category 2 Issues as Category 1 Issues
 - B. Adding New Category 2 Issues
- VII. Response to Specific Request for Voluntary Information
- VIII. Final Actions and Basis for Changes to Table B-1
- IX. Section-by-Section Analysis
- X. Guidance Documents
- XI. Agreement State Compatibility
- XII. Availability of Documents
- XIII. Voluntary Consensus Standards
- XIV. Environmental Impact—Categorical Exclusion
- XV. Paperwork Reduction Act Statement
- XVI. Plain Writing
- XVII. Regulatory Analysis
- XVIII. Regulatory Flexibility Act Certification
- XIX. Backfit Analysis
- XX. Congressional Review Act

I. Background

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 which amended the environmental protection regulations in 10 CFR Part 51 for applicants seeking to renew an operating license for up to an additional 20 years. 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 GEIS") (Vol. 1, Main Report, ADAMS Accession No. ML040690705; Vol. 2, Appendices, ADAMS Accession No. ML040690738).

Based upon the findings of the 1996 GEIS, the 1996 final rule identified those license renewal environmental impact issues for which a generic analysis had been determined to be appropriate, and therefore, did not have to be addressed by a license renewal applicant in its plant-specific environmental report or by the NRC in its plant-specific supplemental environmental impact statements (SEISs) to the 1996 GEIS. Similarly, based upon the findings of the 1996 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. The 1996 final rule, amongst 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, "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants," which summarized the findings of the 1996 GEIS.

In preparing the 1996 GEIS, the Commission determined that certain environmental impacts associated with the renewal of a nuclear power plant operating license were the same or similar for all plants and as such, could be treated on a generic basis. In this way, repetitive reviews of these environmental impacts could be avoided. The Commission based its generic assessment of certain environmental impacts 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 GEIS improved the efficiency of the license renewal process by: 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 GEIS.

In short, the 1996 final rule identified environmental impact issues (i.e., Category 1 issues)¹ that do not have to be addressed by licensees in environmental reports for nuclear

¹ A Category 1 issue is one 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 collective offsite radiological impacts from the fuel cycle and from high level waste and spent fuel disposal); 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.

power plant license renewal applications or by the NRC in plant-specific SEISs because these issues have been addressed generically for all nuclear power plants in the 1996 GEIS. Similarly, the 1996 final rule also identified environmental impact issues (i.e., Category 2 issues)² that must be addressed in plant-specific reviews by licensees in their environmental reports and by the NRC in the SEISs.

On December 18, 1996 (61 FR 66537), the NRC amended the final rule published in 1996 to incorporate minor clarifying and conforming changes and to add language omitted from Table B-1 in Appendix B to Subpart A of 10 CFR Part 51 (hereafter “Table B-1 in Appendix B to Subpart A of 10 CFR Part 51” is referred to as “Table B-1”).

1999 Final Rule

The NRC amended 10 CFR Part 51, including Table B-1, on September 3, 1999 (64 FR 48496). This amendment expanded the generic findings pertaining to the environmental impacts resulting from transportation of fuel and waste to and from a single nuclear power plant. This amendment also incorporated rule language consistent with the 1996 GEIS which addressed local traffic impacts attributable to the continued operations of a nuclear power plant during the license renewal term.

Current Rulemaking

As stated in the 1996 final rule that incorporated the findings of the GEIS in 10 CFR Part 51, the NRC recognized that environmental impact issues might change over time, and that additional issues may need to be considered. As further stated in the preamble to

² A Category 2 issue is one where one or more of the Category 1 criteria cannot be met, and therefore additional plant-specific review is required.

Table B-1, the NRC indicated that it intended to review the material in Table B-1 on a 10-year basis.

The NRC began this review on June 3, 2003, by publishing a notice of intent to revise the 1996 GEIS (68 FR 33209). As part of this process and pursuant to 10 CFR 51.29, the NRC conducted scoping and held a series of public meetings (see 74 FR 38119 for more details). The original public comment period began in June 2003 and closed in September 2003. The project was inactive for the next two years due to limited NRC staff resources and competing demands. On October 3, 2005 (70 FR 57628), the NRC reopened the public comment period and extended it until December 30, 2005.

On July 31, 2009 (74 FR 38117), the NRC published the proposed rule, "Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses," for public comment in the *Federal Register*. The proposed rule would amend 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). Together with the proposed rule, the NRC also published a notice of availability of the draft revised GEIS (ADAMS Accession No. ML090220654); a proposed Revision 1 of Regulatory Guide 4.2, Supplement 1, "Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications" (ADAMS Accession No. ML091620409); and a proposed Revision 1 to NUREG-1555, Supplement 1, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (ADAMS Accession No. ML090230497), in the *Federal Register* (74 FR 38238). All of the documents requested public comments.

The proposed amendments were based on consideration of: 1) comments received from the public during the public scoping period, 2) a review of comments received on plant-specific SEISs completed since the 1996 GEIS was issued, and 3) lessons learned and

knowledge gained from previous and ongoing license renewal environmental reviews. The history of this rulemaking is discussed in more detail in the July 31, 2009 (74 FR 38117), proposed rule. The draft revised GEIS provided the technical basis for the July 2009 proposed rule.

The proposed rule provided a 75-day public comment period which closed on October 14, 2009. The NRC received requests to extend the comment period to provide the public more time to analyze and review the legal, regulatory, and policy issues covered by the proposed rule and supporting documents. On October 7, 2009 (74 FR 51522), the NRC granted the requests, and the public comment period for the proposed rule and the proposed revisions to the GEIS, the regulatory guide, and standard review plan was extended to January 12, 2010.

II. Public Meetings

During the public comment period, the NRC conducted six public meetings to solicit comments on the proposed rule, draft revised GEIS, and related draft guidance documents. The official transcripts, written comments, and meeting summaries for the following public meetings are available electronically for public inspection at the NRC's PDR or online in the NRC Library at <http://www.nrc.gov/reading-rm/adams.html>:

- 1) September 15, 2009, Atlanta, GA (ADAMS Accession No. ML092810007);
- 2) September 17, 2009, Newton, MA (ADAMS Accession No. ML092931681);
- 3) September 24, 2009, Oak Brook, IL (ADAMS Accession No. ML092931545);
- 4) October 1, 2009, Rockville, MD (ADAMS Accession No. ML092931678);
- 5) October 20, 2009, Pismo Beach, CA (ADAMS Accession No. ML093070174); and
- 6) October 22, 2009, Dana Point, CA (ADAMS Accession No. ML093100505).

A summary of these meetings is publicly available under ADAMS Accession No. ML093070141.

On June 21, 2011, the NRC conducted another public meeting to discuss final rule implementation in Rockville, MD. No public comments were solicited at this meeting because the public comment period for the proposed rule had closed on January 12, 2010. A summary of this meeting is publicly available in ADAMS under Accession No. ML11182B535.

III. Discussion

1996 GEIS

Under the NRC's environmental protection regulations in 10 CFR Part 51, which implements Section 102(2) of NEPA, renewal of a nuclear power plant operating license requires the preparation of an EIS (see 10 CFR 51.20(b)(2)). The 1996 GEIS summarized the findings of a systematic inquiry into the environmental impacts of continued operations and refurbishment activities associated with license renewal. Of the 92 environmental issues identified and analyzed by the NRC, 69 issues were determined to be generic (i.e., Category 1); 21 were determined to be plant-specific (i.e., Category 2); and two did not fit into either category (i.e., uncategorized). Category 1 issues concern those potential environmental impacts resulting from license renewal that are common or generic to all nuclear power plants (or for some issues, to plants having a specific type of cooling system or other specified plant or site characteristic). Category 2 issues concern those potential environmental impacts resulting from license renewal that are not common or generic to all nuclear power plants, and as such, require a plant-specific analysis to determine the level of impact. The two uncategorized issues would be addressed by the NRC in each SEIS. Table B-1 summarizes the findings of the environmental impact analyses conducted for the 1996 GEIS, listing each issue and its category level.

Impact levels (small, moderate, or large) were determined for most NEPA issues (e.g., land use, air, water) evaluated in the 1996 GEIS. A small impact means that the environmental effects are not detectable, or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource. A moderate impact means that the environmental effects are sufficient to alter noticeably, but not destabilize, important attributes of the resource. A large impact means that the environmental effects would be clearly noticeable and would be sufficient to destabilize important attributes of the resource.

The 1996 GEIS has been effective in focusing the NRC's resources on important license renewal environmental impact issues and has increased the efficiency of the environmental review process. Currently, 71 nuclear units at 41 plant sites have received renewed operating licenses.

Revised GEIS

The revised GEIS (ADAMS Accession No. **MLXXXXXXXXXX**) is both an update and a re-evaluation of the potential environmental impacts arising from the renewal of an operating license for a nuclear power reactor for an additional 20 years. Lessons learned and knowledge gained during previous license renewal environmental reviews provided a significant source of new information for the revised GEIS. In addition, public comments received during previous license renewal environmental reviews were re-examined to validate existing environmental issues and identify new ones. In preparing the revised GEIS, the NRC considered the need to modify, add to, consolidate, or delete any of the 92 environmental issues evaluated in the 1996 GEIS.

In the proposed rule and draft revised GEIS, the NRC carried forward 78 environmental impact issues for detailed consideration. Fifty-eight of these issues were determined to be Category 1. Of the remaining 20 issues, 19 were determined to be Category 2 and one issue,

“Chronic effects of electromagnetic fields (EMF),” remained uncategorized.³ These issues were summarized in the July 31, 2009 (74 FR 38117), proposed rule.

Based on public comments received on the proposed rule and draft revised GEIS, a number of the environmental impact issues identified in the proposed rule were re-evaluated for detailed consideration in the final revised GEIS and are reflected in the changes made by the final rule. These changes are discussed in detail in Section VIII, “Final Actions and Basis for Changes to Table B-1,” of this document and are briefly summarized as follows:

1) “Air quality during refurbishment (nonattainment and maintenance areas)” issue was changed from a Category 2 to a Category 1 issue and renamed, “Air quality impacts (all plants).”

2) “Groundwater and soil contamination” issue was changed from a Category 2 to a Category 1 issue and consolidated with the “Groundwater use and quality” issue into a single renamed Category 1 issue, “Groundwater contamination and use (non-cooling system impacts).”

3) “Thermal impacts on aquatic organisms” issue was changed to remove several Category 1 thermal impacts issues (these Category 1 issues were consolidated together with a Category 2 thermal impact issue in the proposed rule) to create a new separate combined Category 1 issue, “Infrequently reported thermal impacts (all plants),” which also includes the previously separate “Stimulation of aquatic nuisance species (e.g., shipworms),” Category 1 thermal impact issue.

4) “Impingement and entrainment of aquatic organisms” issue was changed to remove a single impingement and entrainment Category 1 issue (consolidated with other impingement

³ “Electromagnetic fields, chronic effects” remains an uncategorized issue. Due to the lack of a scientific consensus on the impacts of chronic exposure to electromagnetic fields, the NRC has not categorized this issue and does not perform a plant-specific analysis. Once a scientific consensus is reached, the NRC will categorize the issue for license renewal.

and entrainment issues in the proposed rule) to create a new, separate Category 1 issue, “Entrainment of phytoplankton and zooplankton (all plants).”

Ultimately, 60 environmental impact issues were determined to be Category 1 and would not require additional plant-specific analysis unless new and significant information is identified during the license renewal environmental review. Of the remaining 18 issues, 17 were determined to be Category 2, and one remained uncategorized with respect to determining the impact level. These 78 issues were evaluated in the revised GEIS and are summarized in the final rule. No environmental issues identified in Table B-1 and evaluated in the 1996 GEIS were eliminated, but certain issues were consolidated or grouped according to similarities.

Environmental issues in the revised GEIS are arranged by resource area. This perspective is a change from the 1996 GEIS in which environmental issues are arranged by power plant systems (e.g., cooling systems, transmission lines) and activities (e.g., refurbishment). The structure of the revised GEIS conforms to the NRC’s standard format for EISs found in Appendix A to Subpart A of 10 CFR Part 51, “Format for Presentation of Material in Environmental Impact Statements.” The environmental impacts of license renewal activities, including plant operations, maintenance, and refurbishment activities, along with replacement power alternatives, are addressed in each resource area. The revised GEIS evaluated environmental impact issues under the following resource areas: 1) land use and visual resources; 2) air quality and noise; 3) geologic environment; 4) water resources (surface water resources and groundwater resources); 5) ecological resources (terrestrial resources, aquatic resources, special status species and habitats); 6) historic and cultural resources; 7) socioeconomics; 8) human health; 9) environmental justice; and 10) waste management and pollution prevention. The final rule revises Table B-1 to follow the organizational format of the revised GEIS.

In the 1996 GEIS, the NRC assumed that licensees would need to conduct major refurbishment activities to ensure the safe and economic operation of nuclear power plants beyond the current license term. Activities included replacement, repair, and upgrades of major components, systems, and equipment. Replacement of many systems, structures, and components included steam generators and pressurizers for pressurized water reactors and recirculation piping systems for boiling water reactors. It was assumed that many nuclear power plants would also undertake construction projects to replace or improve infrastructure. Such projects could include construction of new parking lots, roads, storage buildings, structures, and other facilities.

Licensee practice since publication of the 1996 GEIS has shown that many refurbishment activities have already taken place (e.g., steam generator and vessel head replacement). Most license renewal applicants have not identified any refurbishment activities associated with license renewal. Therefore, the revised GEIS assumes that impacts from refurbishment activities outside of license renewal have been accounted for in annual site evaluation reports, environmental operating reports, and radiological environmental monitoring program reports. Detailed analyses have not been performed for refurbishment actions in the revised GEIS. Instead, the impacts of typical activities during the license renewal term, including any refurbishment activities, are addressed for each resource area.

Environmental impacts of license renewal and the resources that could be affected are identified in the revised GEIS. The general analytical approach for identifying environmental impacts was to: 1) describe the nuclear power plant activity that could result in an environmental impact, 2) identify the resource that may be affected, 3) evaluate past license renewal reviews and other available information, 4) assess the nature and magnitude of the environmental impact on the affected resource, 5) characterize the significance of the effects,

and 6) determine whether the results of the analysis apply to all nuclear power plants (i.e., whether the impact issue is Category 1 or Category 2).

The revised GEIS, and therefore the final rule, retains the 1996 GEIS definitions of a Category 1 and Category 2 issue. While some Category 2 issues have been changed to Category 1, no Category 1 issue has been changed to Category 2. The final rule makes three major types of changes:

1) *New Category 1 Issues*: New Category 1 issues are either new Category 1 issues (i.e., not previously evaluated in the 1996 GEIS and listed in Table B-1) or multiple Category 1 issues from the 1996 GEIS (and listed as multiple Category 1 issues in Table B-1 of the current rule) that have been consolidated into a single Category 1 issue in the revised GEIS and in Table B-1. An applicant for license renewal does not need to assess the potential environmental impacts from these issues in its environmental report. However, under 10 CFR 51.53(c)(3)(iv), the applicant is still responsible for reporting in the environmental report any “new and significant information” of which the applicant is aware. If the applicant is not aware of any new and significant information that changes the conclusion in the revised GEIS, the applicant must state this determination in the environmental report. The NRC has addressed the environmental impacts of these Category 1 issues generically for all plants in the revised GEIS.

2) *New Category 2 Issues*: New Category 2 issues are either new Category 2 issues (i.e., not previously evaluated in the 1996 GEIS and listed in Table B-1) or multiple Category 2 issues from the 1996 GEIS (and listed as multiple Category 2 issues in Table B-1 of the current rule) that have been consolidated into a single Category 2 issue in the revised GEIS and in Table B-1. For each new Category 2 issue, an applicant must conduct a plant-specific assessment of the potential environmental impacts related to that issue and include it in its

environmental report. The NRC will then analyze the potential environmental impacts related to that issue in the SEIS.

3) *Existing Issue Category Changes from Category 2 to Category 1*: These are issues that were determined to be Category 2 in the 1996 GEIS and have been re-evaluated and determined to be Category 1 in the revised GEIS. Table B-1 has been amended by the final rule. An applicant is no longer required to conduct a plant-specific assessment of the environmental impacts associated with these issues in its environmental report. Similarly, the NRC is no longer required to analyze the potential environmental impacts related to that issue in the SEIS. However, consistent with the requirements of 10 CFR 51.53(c)(3)(iv), an applicant is still required to describe in its environmental report any “new and significant information” of which it is aware.

IV. Response to Public Comments

A. Overview

The public comment period for the proposed rule, draft revised GEIS, and draft guidance documents associated with this rulemaking, ended on January 12, 2010. The NRC received 32 document submissions containing comments from industry stakeholders, representatives of Federal and State agencies, and other interested parties. The NRC also received verbal comments at the six public meetings held during the public comment period. A detailed description of all public comments submitted on the proposed rule, draft revised GEIS, and draft guidance documents, and the NRC’s response to those comments, are contained in separate documents (see Section XII, “Availability of Documents,” of this document). The following section summarizes the major issues raised during the public comment period resulting in substantive changes to the rule and other issues raised for which no changes were made to the rule.

B. Summary of Comments Resulting in Substantive Changes to the Rule

Several issues were raised during the public comment period that resulted in substantive changes to the proposed rule, which are briefly discussed in the following paragraphs.

Seismic issues. Many commenters wanted seismic issues to be included in the rule and pointed out the importance of reassessing seismic conditions in determining the safety of operating nuclear power plants. Industry commenters disagreed and argued that seismology should not be considered as part of the issue of “Impacts of nuclear plants on geology and soils” in the proposed rule because it is an ongoing safety issue that is being addressed at all plants.

NRC Response. The NRC agrees with the industry commenters that consideration of seismic conditions is an ongoing safety issue. Although seismic conditions at nuclear power plants were generically discussed in the revised GEIS as part of the geologic environment, seismology was not identified as a separate issue in the revised GEIS because the NRC considered historical earthquake data for each nuclear power plant when that plant was first licensed. The NRC requires all licensees to take seismic hazards into account in order to maintain safe operating conditions at all nuclear power plants. When new seismic hazard information becomes available, the NRC evaluates the new data and models to determine if any changes are needed at existing plants. This continuous oversight process, which includes seismic safety, remains separate from license renewal and takes place on an ongoing basis at all licensed nuclear facilities.

Sections 3.4 and 4.4.1 of the revised GEIS explain that geologic and seismic conditions were considered in the original design of nuclear power plants and are part of the license bases for operating plants. Seismic conditions are attributes of the geologic environment that are not affected by continued plant operations and refurbishment and are not expected to change appreciably during the license renewal term for all nuclear power plants. The findings relative to

geologic and soil conditions were re-evaluated in the revised GEIS, and as such, the issue has been renamed, “Geology and soils,” in Table B-1, and the findings have been revised for clarity.

Air quality impacts. Several commenters objected to the issue, “Air quality (nonattainment and maintenance areas),” being listed as a Category 2 issue in the proposed rule. These commenters argued that air quality impacts would be small even in worst-case situations, because licensees are required to operate within State air permit requirements.

NRC Response. The NRC agrees with the commenters. The final rule revises Table B-1 by reclassifying the issue as a Category 1 issue. Operating experience has shown that the potential impact from emergency generators and boilers on air quality would be small for all plants and, given the infrequency and short duration of maintenance testing, would not be an air quality concern even at plants located in or adjacent to nonattainment areas.

In addition, the analysis presented in the revised GEIS has shown that the worst-case emissions from cooling tower drift and particulate emissions at operating plants were also small. Air quality impacts from vehicle, equipment, and fugitive dust emissions associated with refurbishment would also be small for most plants, but could be a cause for concern for plants located in or near air quality nonattainment or maintenance areas. However, the impacts are expected to be temporary and would cease once projects were completed. In addition, operating experience has shown that refurbishment activities have not required the large numbers of workers and extended durations conservatively predicted and analyzed in the 1996 GEIS, nor have such activities resulted in exceedances in the *de minimis* thresholds for criteria pollutants in nonattainment and maintenance areas. Consequently, the NRC agrees with these commenters’ arguments that air quality impacts would be small for all plants and, therefore, a Category 1 issue.

Groundwater and soil contamination. Several commenters objected to the new Category 2 issue, “Groundwater and soil contamination,” in the proposed rule and asserted that

contamination from industrial practices is addressed by the U.S. Environmental Protection Agency (EPA) and State regulations that monitor and address these impacts. Specifically, the use, storage, disposal, release, and/or cleanup of spilled or leaked solvents, hydrocarbons, and other potentially hazardous materials are governed by the Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act; Toxic Substances Control Act; Federal Insecticide, Fungicide, and Rodenticide Act; and the Federal Water Pollution Control Act (also known as the Clean Water Act (CWA)).

NRC Response. While classified as a Category 2 issue in the proposed rule, further consideration of the “Groundwater and soil contamination” issue and public comments revealed that the potential impacts on groundwater and soil quality from common industrial practices (e.g., the use, handling, storage, and disposal of chemicals, petroleum products, waste, and hazardous material) can be addressed generically because industrial practices employed by nuclear power plants are not unique, but common to all industrial facilities. The NRC concludes that the overall impact of industrial practices on groundwater use and quality from past and current operations is small for all nuclear power plants and not expected to change appreciably during the license renewal term. The NRC agrees with the commenters to the extent that clarification was needed and that common industrial practices that can cause groundwater or soil contamination can be addressed generically as a Category 1 issue.

Further, the final rule combines the reclassified “Groundwater and soil contamination” issue with the Category 1 proposed rule issue, “Groundwater use and quality,” and renames the consolidated Category 1 issue as “Groundwater contamination and use (non-cooling system impacts).” These issues were consolidated because they both consider the impact of industrial activities associated with the continued operations of a nuclear power plant (not directly related to cooling system effects) on groundwater use and quality. Consolidating these issues also

conforms to the resource-based approach used in the revised GEIS and serves to facilitate the license renewal environmental review process.

The finding column of Table B-1 for “Impacts of refurbishment on groundwater use and quality” prior to the final rule, as analyzed in the 1996 GEIS, indicated that impacts of continued operations and refurbishment on groundwater use and quality would be small, as extensive dewatering is not anticipated, and the application of best management practices for handling any materials produced or used during activities would reduce impacts. These findings were re-evaluated in the revised GEIS and are retained in the finding column of Table B-1 for the consolidated issue.

This new consolidated issue also considers the impacts on groundwater, soil, and subsoil from the industrial use of solvents, hydrocarbons, heavy metals, or other chemicals at nuclear power plant sites during the license renewal term, including the impacts resulting from the use of wastewater disposal ponds or lagoons (both lined or unlined). Industrial practices at all nuclear power plants have the potential to contaminate groundwater and soil, especially on sites with unlined wastewater and storm water lagoons. Contaminants have been found in groundwater and soil samples at some nuclear power plants during previous license renewal environmental reviews.

Any groundwater and soil contamination at operating nuclear power plants is subject to characterization and clean-up under EPA- and State-regulated remediation and monitoring programs. In addition, wastewater disposal ponds and lagoons are subject to discharge authorizations under the National Pollutant Discharge Elimination System (NPDES) and related State wastewater discharge permit programs. Each operating nuclear power plant must comply with these EPA and State regulatory requirements. As such, each site has an established program for handling chemicals, waste, and other hazardous materials. Moreover, nuclear power plant licensees are expected to employ best management practices, both in minimizing

effluents and in remediation. Thus, this new consolidated issue, as set forth in the final revised GEIS and the final rule, is listed as a Category 1 issue.

C. Summary of Other Comments

Radionuclides in groundwater. Several commenters expressed opposition to the inclusion of a new Category 2 issue, “Radionuclides released to groundwater,” with an impact estimate of small to moderate in the proposed rule. Some commenters indicated that the issue category should be changed to Category 1; others suggested that the levels of significance should range to large. The argument for changing the issue to Category 1 was based on the voluntary industry-wide initiative, Nuclear Energy Institute (NEI) 07–07, “Industry Ground Water Protection Initiative—Final Guidance Document” (ADAMS Accession No. ML072610036), designed to protect groundwater.

NRC Response. This new, Category 2 issue evaluates the potential contamination and degradation of groundwater resources resulting from inadvertent discharges of radionuclides into groundwater from nuclear power plants. Within the past several years, there have been numerous events at power reactor sites which involved unknown, uncontrolled, and unmonitored releases of radionuclides into the groundwater. The number of these events and the high level of public controversy have made this an issue that the NRC believes needs a “hard look,” as required by NEPA.

As a voluntary action, NEI 07–07 cannot be enforced by the NRC. As such, no violations can be issued against a licensee who fails to comply with the guidance in NEI 07–07. Furthermore, the NRC cannot rely on a voluntary initiative as a basis to ensure that the nuclear power industry will monitor and have adequate information available for the NRC to determine whether the issue does or does not have an adverse impact on groundwater resources.

Regarding the magnitude of impact, the NRC bases its determination of small to moderate impact on a review of existing plants that have had inadvertent releases of radioactive liquids. Even though the NRC expects impacts for all plants to be within this range, a conclusion of large impact would not be precluded for a future license renewal review based on new and significant information, if the data supports such a conclusion. As reflected in the revised final GEIS and the final rule, "Radionuclides released to groundwater," remains a Category 2 issue.

Radiation exposures to the public. Several commenters identified recent studies that claim an association between cancer risk and proximity to nuclear power facilities.

NRC Response. The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects (i.e., cancer and other biological impacts) of radiation to humans. The limits are based on the recommendations of scientific standards-setting organizations. These radiation standards reflect extensive scientific study by national and international organizations. The NRC actively participates in and monitors the work of these organizations to remain current on the latest trends in radiation protection. If the NRC determines that there is a need to revise its radiation protection regulations, it will initiate a separate rulemaking. The models recognized by the NRC for use by licensees to calculate dose incorporate conservative assumptions to ensure that workers and members of the public are adequately protected from radiation.

On April 7, 2010, the NRC announced that it asked the National Academy of Sciences (NAS) to perform a state-of-the-art study on cancer risk for populations surrounding nuclear power facilities (ADAMS Accession No. ML100970142). The NAS has a broad range of medical and scientific experts who can provide the best available analysis of the complex issues involved in discussing cancer risk and commercial nuclear power plants. The NAS is a nongovernmental organization chartered by the U.S. Congress to advise the nation on issues of

science, technology, and medicine. Through the National Research Council and Institute of Medicine, it carries out studies independently of the Government, using processes designed to promote transparency, objectivity, and technical rigor. More information on its methods for performing studies is available at <http://www.nationalacademies.org/studycommitteprocess.pdf>.

The NAS study will update the 1990 U.S. National Institutes of Health National Cancer Institute (NCI) report, "Cancer in Populations Living Near Nuclear Facilities" (NCI 1990), which concluded there was no evidence that nuclear facilities may be linked causally with excess death from leukemia or from other cancers in populations living nearby. The study's objectives are to: 1) evaluate whether cancer risk is different for populations living near nuclear power facilities, 2) include cancer occurrence, 3) develop an approach to assess cancer risk in geographic areas that are smaller than the county level, and 4) evaluate the study results in the context of offsite doses from normal reactor operations. The study began in the summer of 2010 and is expected to be completed within 3 years. The final revised GEIS has added a discussion on the NRC's sponsorship of this follow-up to the 1990 NCI study.

Onsite storage of spent nuclear fuel, waste disposal, and Yucca Mountain. Several commenters expressed concern about the increasing volume of spent nuclear fuel at existing power plant sites and the availability of a geological repository at Yucca Mountain for future waste disposal.

NRC Response. The Commission is aware that geologic disposal, at Yucca Mountain or elsewhere, may not be available in the timeframe that was originally envisioned. As an alternative, the Commission has considered the storage of spent nuclear fuel on reactor sites where it is generated. The impacts associated with onsite storage of spent nuclear fuel at nuclear power plant sites during the license renewal term are discussed in Section 4.11.1.2 of the revised GEIS. The final rule retains the 1996 GEIS Category 1 classification, with an impact level of small, for onsite spent fuel storage. Two Petitions for Rulemaking (PRMs), PRM-51-10

and PRM-51-12, submitted by the Attorney General of the Commonwealth of Massachusetts in 2006 and the Attorney General of California in 2007 (the petitioners), respectively, challenged the 1996 GEIS classification for this issue.⁴ The petitioners requested that the NRC initiate a rulemaking concerning the environmental impacts of the high-density storage of spent nuclear fuel in spent fuel pools (SFPs). The petitioners asserted that “new and significant information” shows that the NRC incorrectly characterized the environmental impacts of high-density spent fuel storage as “insignificant” in the 1996 GEIS for the renewal of nuclear power plant licenses. Specifically, the petitioners asserted that spent fuel stored in high-density SFPs is more vulnerable to a zirconium fire than the NRC concluded in its NEPA analysis.

In August 2008, the Commission denied the petitions, stating,

Based upon its review of the petitions, the NRC has determined that the studies upon which the Petitioners rely do not constitute new and significant information. The NRC has further determined that its findings related to the storage of spent nuclear fuel in pools, as set forth in NUREG-1437 and in Table B-1, of Appendix B to Subpart A of 10 CFR Part 51, remain valid. Thus, the NRC has met and continues to meet its obligations under NEPA. For the reasons discussed previously, the Commission denies PRM-51-10 and PRM-51-12.⁵

Based on the continued validity of conclusions from the 1996 GEIS, and as affirmed by the Commission in its denial of PRM-51-10 and PRM-51-12, the NRC concludes that the onsite storage of spent fuel is properly classified as Category 1.

In addition, the safety and environmental effects of long-term storage of spent fuel onsite beyond the licensed life for operation of a given reactor (including any license renewal terms) have been assessed by the NRC. As set forth in its Waste Confidence Decision (promulgated

⁴ The details of the petitions and the NRC’s evaluations of the petitions are available to the public in ADAMS under Accession No. ML073310115 and at the Federal Rulemaking Web site, <http://www.regulations.gov>, by searching on Docket IDs NRC-2006-0022 and NRC-2007-0019 for PRM-51-10 and PRM-51-12, respectively.

⁵ 73 FR 46204, 46212; August 8, 2008. The NRC’s decision to deny the two petitions was upheld by the United States Court of Appeals for the Second Circuit. *New York v. the Nuclear Regulatory Commission*, 589 F.3d 551 (2nd Cir. 2009).

as NRC regulation 10 CFR Part 51.23), the Commission generically determined that such storage could be accomplished without significant environmental impact for at least 60 years beyond the licensed life of any reactor.⁶ The Commission's Waste Confidence Decision also found reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent fuel generated in any reactor when necessary.⁷ Accordingly, the Commission's Waste Confidence Decision, as reflected in 10 CFR 51.23, addresses the environmental impacts of spent fuel storage and disposal following operations outside of the context of this final rule.

Postulated accidents. Numerous comments were received on the NRC's evaluation and classification of postulated accidents in the draft revised GEIS. One commenter disagreed with the GEIS's conclusion that environmental impact from design basis accidents (DBAs) is small. Also, several commenters disagreed with the GEIS conclusion that the environmental impact from severe accidents is small, and further, that the evaluation is not adequate because of its use of probability-weighted risk assessments. Their position is that for severe accidents, the revised GEIS should also evaluate the consequences of reactor accidents and expand the evaluation to include spent fuel pool accidents and accidents due to age-related plant component degradation. In addition, some of the commenters stated that the NRC has gained enough information from the many plant licenses it has renewed to make a determination, on a generic basis, that the "severe accidents" issue should be reclassified as Category 1.

⁶ The NRC updated its Waste Confidence Decision in December 2010, extending the period of time that spent fuel could be stored onsite safely without significant environmental impacts after the expiration of the operating license from 30 years to 60 years. (75 FR 81037, 81069-74; December 23, 2010).

⁷ 75 FR at 81060-67; December 23, 2010.

NRC Response.

Design Basis Accidents. The NRC does not agree that the GEIS's evaluation of DBAs is incorrect. The NRC evaluates and presents the potential consequences of DBAs in nuclear power plant licensing documents and considers them in the GEIS for license renewal.

In order to receive NRC approval for an initial operating license, an applicant must submit a final safety analysis report (FSAR) as part of its application. The FSAR presents the applicable design criteria and design information for the proposed reactor, as well as comprehensive data on the proposed site. The FSAR also discusses hypothetical reactor accident situations and addresses the safety features that prevent and mitigate those accidents. During the initial licensing process for a power reactor, the NRC reviews the FSAR to determine whether or not the plant design meets the NRC's regulations.

At initial licensing, the NRC also considered the environmental impact of DBAs at each operating nuclear power plant. The DBAs are those events that both the applicant and the NRC evaluate to ensure that the plant can withstand normal and abnormal transients (e.g., rapid changes in reactor power) without undue risk to the health and safety of the public. Although the NRC does not expect that all of these postulated events will occur during the life of the plant, the NRC evaluates them to establish the basis for the preventive and mitigative safety systems of the facility. The acceptance criteria for DBAs are described in 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," and 10 CFR Part 100, "Reactor Site Criteria." Compliance with these regulations provides reasonable assurance of adequate protection of public health and safety.

During operations, the NRC requires each power plant licensee to maintain acceptable design and performance criteria in accordance with the NRC regulations, including during any license renewal period. Therefore, the calculated releases from DBAs will remain within the NRC regulatory limits.

The 1996 GEIS, in Section 5.2, discusses the impacts of potential accidents. It contains a discussion of plant accidents and consequences. This discussion addresses general characteristics of design basis (and severe) accidents, characteristics of fission products, meteorological considerations, possible exposure pathways, potential adverse health effects, avoiding adverse health effects, accident experience and observed impacts, and emergency preparedness. The revised GEIS reexamined the information from the 1996 GEIS and concluded that it is still valid. Because the information on DBAs is valid and has not changed, the revised GEIS does not repeat the information from the 1996 GEIS.

Severe Accidents. The NRC does not agree with the comments that the revised GEIS evaluation is inadequate regarding the impacts from severe accidents because it uses probability-weighted risk assessments. Severe accidents (i.e., beyond design basis accidents) are those that could result in substantial damage to the reactor core, whether or not there are serious off-site consequences. The 1996 GEIS estimated and considered the potential impacts on human health and economic factors from full-power severe reactor accidents initiated by internal events at different types of nuclear facilities located in different types of settings. That evaluation included modeling the release of radioactive materials into the environment and modeling the pathways (i.e., exposure to the radioactive plume, inhalation of radioactivity, consumption of contaminated food) through which members of the public could potentially be exposed to doses of radiation. Based on the calculated doses, the GEIS reported the consequences (i.e., potential early and latent fatalities) from such accidents. In developing a potential impact level, however, the NRC took into account the very low probability of such events, as well as their potential consequences, and concluded that the likely impact from individual nuclear power plants is small.

In the revised GEIS, the NRC expanded the scope of the severe accident evaluations and used more recent technical information that included both internal and external event core-

damage frequency, as well as improved severe accident source terms, spent fuel pool accidents, low power and reactor shutdown events, new radiation risk-coefficients from the NAS, "Health Risks from Exposure to Low Levels of Ionizing Radiation: Biological Effects of Ionizing Radiation (BEIR) VII Report," and risk impacts of reactor power uprates and higher fuel burn-up levels. As a result, the revised GEIS considers updated information in determining the potential consequences of a reactor accident. Considering this updated information and that severe reactor accidents remain unlikely, the revised GEIS concludes that the environmental impacts of a severe accident remain small.

The NRC notes, however, that the GEIS is not the primary vehicle the NRC uses to address and regulate risks from severe accidents. The NRC's regulations and regulatory practices employ safety standards in the design, construction, and operation of nuclear power plants as well as risk models to ensure the public is adequately protected on an on-going basis. The NRC's ongoing oversight addresses the public's risk from nuclear power plant accidents, accounts for the effects of proposed changes that may be made as part of power plant operations, and considers new information about the facility or its environment when necessary.

Although the NRC has determined that impacts from severe accidents are small for all facilities, the NRC continues to maintain that severe accidents cannot be a Category 1 issue because plant-specific mitigation measures vary greatly based on plant designs, safety systems, fuel type, operating procedures, local environment, population, and siting characteristics. Thus, severe accidents remain a Category 2 issue. Accordingly, the NRC has not changed the requirements in 10 CFR 51.53(c)(3)(ii)(L) that an applicant's environmental report must contain a discussion that considers alternatives to mitigate severe accidents if the NRC has not previously considered this issue in an environmental impact statement or environmental assessment for the facility.

Spent Fuel Pool Accidents. The 1996 GEIS included a quantitative analysis of a severe accident involving a reactor operating at full power. A qualitative evaluation of SFP accidents is presented in Appendix E of the revised GEIS. Based on this evaluation, the revised GEIS concludes that the environmental impacts from accidents involving SFPs are comparable to those from the reactor accidents at full power that were evaluated in the 1996 GEIS, and as such, SFP accidents do not warrant separate evaluation. Based on the continued validity of conclusions from the 1996 GEIS, as affirmed by the Commission (see following paragraph), the revised GEIS does not contain a quantitative evaluation of SFP accidents.

The issue of an accident involving the spent fuel pool was specifically addressed by the NRC in its denial of two PRMs: PRM-51-10 and PRM-51-12, submitted by the Attorney General of the Commonwealth of Massachusetts in 2006 and the Attorney General of California in 2007, respectively. The petitioners requested that the NRC initiate a rulemaking concerning the environmental impacts of the high density storage of spent nuclear fuel in SFPs. The petitioners asserted that “new and significant information” shows that the NRC incorrectly characterized the environmental impacts of high-density spent fuel storage as “insignificant” in the 1996 GEIS for the renewal of nuclear power plant licenses. Specifically, the petitioners asserted that spent fuel stored in high-density SFPs is more vulnerable to a zirconium fire than the NRC concluded in its NEPA analysis. As described in the NRC’s response to the “Onsite storage of spent nuclear fuel, waste disposal, and Yucca Mountain” issues previously discussed, the NRC denied the two petitions, and the NRC denial was upheld by the United States Court of Appeals.

Aging-related Degradation. Issues related to age-related plant component degradation are addressed in the NRC’s safety evaluation of the plant’s license renewal application. The regulations covering the safety review for license renewal are in 10 CFR Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants.”

The 1996 GEIS discusses the potential effects of age on the physical plant and notes that such deterioration could result in an increased likelihood of component or structure failure that could increase the rate of plant accidents. The GEIS notes that the NRC requires an applicant for license renewal to address the issue of age-related degradation by identifying, in an integrated plant assessment process, those passive, long-lived structures and components that are susceptible to age-related degradation and whose functions are necessary to ensure that the facility's current licensing basis is maintained. The GEIS found that the safety evaluation performed by the NRC as part of the license renewal process provides reasonable assurance that age-related degradation is managed and adequate protection of the health and safety of the public is maintained during the license renewal period. Therefore, the 1996 GEIS concluded, "...the probability of any radioactive releases from accidents will not increase over the license renewal period." Based on nuclear power plants' continued compliance with 10 CFR Part 54 to manage age-related degradation, the revised GEIS did not alter or revise this conclusion from the 1996 GEIS.

Greenhouse gas emissions and climate change. Several commenters discussed the need to include a discussion of the effects of climate change on plant operations and the effect of continued operations during the license renewal period on environmental resources affected by climate change.

NRC Response. The NRC acknowledges these concerns. The NRC has begun to evaluate the effects of greenhouse gas (GHG) emissions and its implications for global climate change in its environmental reviews for both new reactor and license renewal applications. Changes in climate have the potential to affect air and water resources, ecological resources, and human health, and should be taken into account when evaluating cumulative impacts over the license renewal term.

Subsequent to the publication of the proposed rule and during the public comment period, the Commission issued a memorandum and order concerning two combined operating license applications for new reactor units at the Tennessee Valley Authority Bellefonte site in Alabama and the Duke Energy Carolinas Lee site in South Carolina (CLI-09-21). The memorandum and order stated:

because the Staff is currently addressing the emerging issues surrounding greenhouse gas emissions in environmental reviews required for the licensing of nuclear facilities, we believe it is prudent to provide the following guidance to the Staff. We expect the Staff to include consideration of carbon dioxide and other greenhouse gas emissions in its environmental reviews for major licensing actions under the National Environmental Policy Act. The Staff's analysis for reactor applications should encompass emissions from the uranium fuel cycle as well as from construction and operation of the facility to be licensed. The Staff should ensure that these issues are addressed consistently in agency NEPA evaluations and, as appropriate, update Staff guidance documents to address greenhouse gas emissions.⁸

Presently, insufficient data exists to support an impact level on a generic basis. The NRC only has direct emission data for a handful of facilities. Although some states have varying reporting requirements, GHG emissions reporting nationwide is in its infancy. The EPA promulgated its GHG emissions reporting rule on October 30, 2009 (74 FR 56260). In accordance with this rule, the first industry reporting date was March 31, 2011.⁹ Moreover, the 25,000 annual metric ton reporting threshold EPA established in the final rule of October 30, 2009, is not an indication of what EPA considers to be a significant (or insignificant)

⁸ In the matter of Duke Energy Carolinas, LLC (Combined License Application for William States Lee III Nuclear Station, Units 1 and 2); In the matter of Tennessee Valley Authority (Bellefonte Nuclear Power Plant, Units 3 and 4), CLI-09-21 (NRC November 3, 2009).

⁹ 74 FR at 56267: October 30, 2009, codified at 40 CFR 98.3(b) ("The annual GHG report must be submitted no later than March 31 of each calendar year for GHG emissions in the previous calendar year").

level of GHG emissions on a scientific basis, but a threshold chosen by EPA for policy evaluation purposes.¹⁰

In order to comply with the Commission's direction in CLI-09-21 and in response to the comments received, a new section, "Greenhouse Gas Emissions and Climate Change" (Chapter 4, Section 4.12.3), summarizing the potential cumulative impacts of GHG emissions and global climate change, has been added to the final revised GEIS. The NRC will also include within each SEIS a plant-specific analysis of any impacts caused by GHG emissions over the course of the license renewal term as well as any impacts caused by potential climate change upon the affected resources during the license renewal term. The final rule was not revised to include any reference to GHG emissions or climate change.

Recent advances in alternative energy technologies. Several commenters asserted that much of the information describing alternative energy technologies did not reflect the state-of-the-science. In some cases, commenters noted facts and events that occurred after the publication date of the draft revised GEIS.

NRC Response. The NRC has updated the final revised GEIS to incorporate the latest information on replacement power alternatives, but it is inevitable that rapidly evolving technologies will outpace the information presented in the final revised GEIS. Incorporation of this information is more appropriately made in the context of plant-specific license renewal reviews, rather than in the evaluations contained in the revised GEIS. As with renewable energy technologies, energy policies are evolving rapidly. While the NRC acknowledges that legislation, technological advancements, and public policy can underlie a fundamental paradigm shift in energy portfolios, the NRC cannot make decisions based on anticipated or speculative changes. Instead, the NRC considers the status of replacement power alternatives and energy

¹⁰ The EPA concluded for policy evaluation purposes, that the 25,000 metric ton threshold more effectively targets large industrial emitters and suppliers, covers approximately 85 percent of the U.S. emissions, and minimizes the burden on smaller facilities (74 FR 56264, October 30, 2009).

policies when conducting plant-specific reviews. The final revised GEIS has been updated to clarify NRC's approach to conducting replacement power alternative evaluations.

Emergency preparedness and security. Several commenters expressed concern with emergency preparedness, evacuation, and safety and security at nuclear power plants. Commenters stated that these topics were not addressed in the proposed rule and not adequately covered in the revised GEIS and should be included in the scope of the plant-specific SEISs.

NRC Response. Emergency preparedness and planning are part of the current licensing basis for each holder of a 10 CFR Part 50 operating license and are outside the regulatory scope of license renewal. Before a plant is licensed to operate, the NRC must have "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency" (10 CFR 50.47). The Commission's regulatory scheme provides continuing assurance that emergency planning for every operating nuclear power plant is adequate. The Commission has determined that there is no need for a special review of emergency planning issues in the context of an environmental review for license renewal because the ongoing decisions and findings concerning emergency preparedness at nuclear power plants address safety concerns as they arise.

The Commission considered the need for a review of emergency planning issues in the context of license renewal during its rulemaking proceedings on 10 CFR Part 54 which included public notice and comment. As discussed in the Statement of Considerations for rulemaking (56 FR 64966; December 13, 1991), the programs for emergency preparedness at nuclear power facilities apply to all nuclear power facility licensees and require the specified levels of protection from each licensee regardless of plant design, construction, or license date. The NRC requirements related to emergency planning are in the regulations at 10 CFR 50.47 and Appendix E to 10 CFR Part 50, "Emergency Planning and Preparedness for Production and

Utilization Facilities.” These requirements apply to all holders of operating licenses and will continue to apply to facilities with renewed licenses. Through its standards and required exercises, the Commission reviews existing emergency preparedness plans throughout the life of any facility, keeping up with changing demographics and other site-related factors.

Further, the NRC actively reviews its regulatory framework to ensure that the regulations are current and effective. The agency began a major review of its emergency preparedness framework in 2005, including a comprehensive review of the emergency preparedness regulations and guidance, the issuance of generic communications regarding the integration of emergency preparedness and security, and outreach efforts to interested persons to discuss emergency preparedness issues. These activities informed a rulemaking effort to enhance the NRC’s emergency preparedness regulations and guidance. This effort culminated in a final rule, which was published in the *Federal Register* on November 23, 2011 (76 FR 72560).

Security issues are not tied to a license renewal action but are treated on an ongoing basis as a part of the current (and renewed) operating license. If issues related to security are discovered at a nuclear power plant, they are addressed immediately, and any necessary changes are reviewed and incorporated under the current operating license. For example, after the terrorist attacks of September 11, 2001, the NRC issued security-related orders and guidance to nuclear power plant licensees. These orders and guidance included interim measures for emergency planning. Nuclear industry groups and Federal, State, and local government agencies assisted in the prompt implementation of these measures and participated in drills and exercises to test these new planning elements. The NRC reviewed licensees’ commitments to address these requirements and verified their implementation through inspections to ensure public health and safety.

In summary, the issue of security is not unique to nuclear power plants requesting license renewal. The NRC routinely assesses threats and other information provided by other

Federal agencies and sources. The NRC also ensures that licensees meet their security requirements through its ongoing regulatory process (routine inspections) as a current and generic regulatory issue that affects all nuclear power plants. Therefore, as discussed in the Statement of Considerations for 10 CFR Part 54 rulemaking (56 FR 64966), the Commission determined that there is no need for an evaluation of security issues in the context of a license renewal review.

V. Related Issues of Importance

This section addresses three issues of related importance to the final rule:

1) consideration of the recent events at the Fukushima Dai-ichi Nuclear Power Plant, 2) clarification of the term “best management practices,” and 3) deletion of the proposed definition of the term “historic properties.”

A. Fukushima Events

On March 11, 2011, a massive earthquake off the east coast of Honshu, Japan produced a devastating tsunami that struck the coastal town of Fukushima. The six-unit Fukushima Dai-ichi Nuclear Power Plant was directly impacted by these events. The resulting damage caused the failure of several of the units’ safety systems needed to maintain cooling water flow to the reactors. As a result of the loss of cooling, the fuel overheated, and there was a partial meltdown of the fuel contained in several of the reactors. Damage to the systems and structures containing reactor fuel resulted in the release of radioactive material to the surrounding environment.

In response to the earthquake, tsunami, and resulting reactor accidents at the Fukushima Dai-ichi Nuclear Power Plant (hereafter referred to as the “Fukushima events”), the Commission directed the NRC staff to convene an agency task force of senior leaders and

experts to conduct a methodical and systematic review of the relevant NRC regulatory requirements, programs, and processes, including their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. As part of the short-term review, the task force concluded that, while improvements are expected to be made as a result of the lessons learned from the Fukushima events, the continued operation of nuclear power plants and licensing activities for new plants do not pose an imminent risk to public health and safety.¹¹

During the time that the task force was conducting its review, groups of individuals and non-governmental organizations petitioned the Commission to suspend all licensing decisions in order to conduct a separate, generic NEPA analysis to determine whether the Fukushima events constituted “new and significant information” under NEPA that must be analyzed as part of environmental reviews. The Commission found the request premature and noted, “In short, we do not know today the full implications of the [Fukushima] events for U.S. facilities.”¹² However, the Commission found that if “new and significant information comes to light that requires consideration as part of the ongoing preparation of application-specific NEPA documents, the agency will assess the significance of that information, as appropriate.”¹³ The Federal courts of appeal and the Commission have interpreted NEPA such that an EIS must be updated to include new information only when that new information provides “a seriously different picture of the environmental impact of the proposed project from what was previously envisioned.”¹⁴

¹¹ Recommendations for Enhancing Reactor Safety in the 21st Century, The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident” (July 12, 2011) (ADAMS Accession No. ML111861807).

¹² *Union Electric Co. d/b/a Ameren Missouri* (Callaway Plant, Unit 2), CLI-11-05, ___ NRC ___, ___ (slip op. at 30) (Sept. 9, 2011).

¹³ *Id.* at 30-31.

¹⁴ *Id.* at 31 (quoting *Hydro Resources, Inc.* (2929 Coors Road, Suite 101, Albuquerque, NM 87120), CLI-99-22, 50 NRC 3, 14 (1999) (citing *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 373 (1989))). The Commission also noted that it can modify a facility’s operating license outside of a renewal

In the context of the revised GEIS and this rulemaking, the Fukushima events are considered a severe accident (i.e., a type of accident that may challenge a plant's safety systems at a level much higher than expected) and more specifically, a severe accident initiated by an event external to the plant. The 1996 GEIS concluded that risks from severe accidents initiated by external events (such as an earthquake) could have potentially high consequences but found that external events are adequately addressed through a consideration of a severe accident initiated by an internal event (such as a loss of cooling water). Therefore, an applicant for license renewal need only analyze the environmental impacts from an internal event in order to adequately characterize the environmental impacts from either type of event. Prior to the Fukushima events, the revised GEIS examined more recent and up-to-date information regarding external events and concluded that the analysis in the 1996 GEIS remains valid.

The NRC's evaluation of the consequences of the Fukushima events is ongoing. As such, the NRC will continue to evaluate the need to make improvements to existing regulatory requirements based on the task force report and additional studies and analyses of the Fukushima events as more information is learned. To the extent that any revisions are made to NRC regulatory requirements, they would be made applicable to nuclear power reactors regardless of whether or not they have a renewed license. Therefore, no additional analyses have been performed in the revised GEIS as a result of the Fukushima events. In the event that the NRC identifies information from the Fukushima events that constitutes new and significant information with respect to the environmental impacts of license renewal, the NRC will discuss that information in its site-specific SEISs to the GEIS, as it does with all such new and significant information.

proceeding and made clear that "it will use the information from these activities to impose any requirement it deems necessary, irrespective of whether a plant is applying for or has been granted a renewed operating license." *Id.* at 26-27.

B. Best Management Practices

“Best management practices” is a term used to describe a type, method, or treatment technique for preventing pollution or reducing the quantities of pollutants released to the environment. The term, as used herein, includes the physical components used to control or minimize pollution (e.g., filters, barriers, mechanical devices, and retention ponds), as well as operational or procedural practices (e.g., minimizing use of a pollutant, spill control, and operator training). Best management practices are used in a variety of industrial sectors. In the nuclear power reactor sector, as in other industrial sectors, best management practices offer flexibility to achieve a balance between protecting the environment and the efficiency and economic limitations associated with the operations of a given plant. Both in the 1996 GEIS and in the revised GEIS, several issues have been determined to be Category 1 issues with a small impact level based upon the assumption that the license renewal applicant employs and will continue to employ best management practices during the license renewal term. The NRC’s regulatory experience has shown that licensees employ such best management practices.

The NRC’s jurisdiction is limited to radiological health and safety and common defense and security. Therefore, the NRC does not generally impose a requirement that its licensees adopt those best management practices that concern non-radiological pollutants. The NRC nuclear power plant licensees, however, are subject to a host of regulatory requirements that are monitored and enforced by other Federal agencies (e.g., the EPA), or State or local regulatory agencies. The NRC-licensed nuclear power plants must obtain a variety of permits from these other agencies before they can operate (e.g., under the CWA, a licensee must obtain a NPDES permit from the EPA or, if the EPA has delegated its CWA authority to a particular State, from the appropriate agency of that State). These permits typically require that the licensee adopt and adhere to best management practices.

Therefore, an assumption underlying the revised GEIS is that NRC licensees will use

best management practices to comply with other Federal, State, and local government requirements to prevent or reduce the quantities of non-radiological pollutants released to the environment. This description of best management practices is not a regulatory or policy change by the NRC because the use of best management practices by nuclear power plant licensees was also an underlying assumption of the 1996 GEIS. Rather, the NRC seeks to make transparent its basis for determining that certain issues are Category 1 issues with a small level of impact.

C. Definition of “Historic Properties”

The proposed rule would have amended 10 CFR Part 51 by adding a definition of the term “historic properties” to 10 CFR 51.14(a). Upon further consideration, the NRC determined that adding the definition was unnecessary. The NRC’s license renewal determination to renew or not renew a nuclear power plant operating license is considered an undertaking as defined by Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations in 36 CFR Part 800. The regulations define the term “historic property” in 36 CFR 800.16(l)(1). The NRC uses the term “historic property” or “historic properties” in the same context as set forth in 36 CFR 800.16(l)(1).

VI. Revisions to 10 CFR 51.53

The final rule revises 10 CFR 51.53 to conform to those changes made by the final rule to Table B-1. Because some Category 2 issues have been reclassified as Category 1 issues, license renewal applicants no longer need to assess these issues and, therefore, the final rule removes the requirements for applicants to provide information on these issues in their environmental reports. The final rule also adds new requirements to 10 CFR 51.53 for the new

Category 2 issues for which applicants are now required to provide information in their environmental reports. The following describes each revision.

A. Reclassifying Category 2 Issues as Category 1 Issues

Section 51.53(c)(3)(ii)(F). The final rule removes and reserves 10 CFR 51.53(c)(3)(ii)(F) because the final rule reclassifies the Category 2 issue, “Air quality during refurbishment (nonattainment and maintenance areas),” to Category 1 and renames the issue, “Air quality impacts (all plants).” The removed regulatory language required the applicant to assess anticipated vehicle exhaust emissions at the time of refurbishment for plants located in or near a nonattainment or maintenance area, as those terms are defined under the Clean Air Act.

The final rule reclassifies this issue as Category 1 based upon public comments received on the proposed rule¹⁵ and a subsequent re-evaluation of the data in the draft revised GEIS, which showed that air quality impacts from refurbishment have not resulted in exceedances in the *de minimis* thresholds for criteria pollutants in nonattainment and maintenance areas due to construction vehicle, equipment, and fugitive dust emissions. Significant air quality impacts are no longer anticipated from future license renewals. Therefore, applicants no longer need to assess the impacts on air quality of continued operations and refurbishment associated with license renewal in their environmental reports.

Section IV, “Response to Public Comments,” of this document provides a summary of the comments received on this issue, and Section VIII, “Final Actions and Basis for Changes to Table B-1,” of this document discusses this issue in more detail under Issue 5, “Air quality impacts (all plants).”

¹⁵ The proposed rule renamed the “Air quality during refurbishment (nonattainment and maintenance areas)” issue as “Air quality (nonattainment and maintenance areas)” and retained the Category 2 classification.

Section 51.53(c)(3)(ii)(I). The final rule removes and reserves 10 CFR 51.53(c)(3)(ii)(I) because several Category 2 socioeconomic issues are reclassified as Category 1. The removed regulatory language required the applicant to assess the impacts of the proposed license renewal on housing availability, land use, and public schools (impacts from refurbishment activities only) within the vicinity of the plant. Additionally, the removed regulatory language required the applicant to assess the impact of population increases attributable to the proposed project on the public water supply. Specifically, the final rule reclassifies the following 1996 GEIS Category 2 socioeconomic issues: “Housing impacts”;¹⁶ “Public services: public utilities”;¹⁷ “Public services, education (refurbishment)”;¹⁸ “Offsite land use (refurbishment)”; and “Offsite land use (license renewal term)”.¹⁹

The final rule reclassifies these issues as Category 1 because significant changes in housing availability, land use, and increased population demand attributable to the proposed refurbishment project on the public water supply have not occurred at relicensed nuclear power plants. Therefore, impacts to these resources are no longer anticipated for future license renewals. In addition, refurbishment activities (such as steam generator and reactor vessel head replacement) have not required the large numbers of workers and the months of time that were conservatively analyzed in the 1996 GEIS. As such, significant impacts on housing availability, land use, public schools, and the public water supply are no longer anticipated from continued operations during the license renewal term and refurbishment associated with license renewal.

¹⁶ The final rule renames this issue as “Population and housing” (see Issue (55) under Section VIII, “Final Actions and Basis for Changes to Table B–1,” of this document).

¹⁷ The final rule merges this issue into the consolidated issue, “Community services and education” (see Issue (54) under Section VIII of this document).

¹⁸ The final rule merges this issue into the consolidated issue, “Community services and education” (see Issue (54) under Section VIII of this document).

¹⁹ The final rule merges “Offsite land use (refurbishment)” and “Offsite land use (license renewal term)” into the consolidated issue, “Offsite land use” (see Issue (2) under Section VIII of this document).

Section 51.53(c)(3)(ii)(J). The final rule removes and reserves 10 CFR 51.53(c)(3)(ii)(J) because the Category 2 issue, “Public services, transportation,” is reclassified as Category 1 (the final rule also renames the issue, “Transportation”). The removed regulatory language required the applicant to assess the impact of highway traffic generated by the proposed project on the level of service of local highways during periods of license renewal refurbishment activities and during the term of the renewed license. Therefore, applicants no longer need to assess the impacts on local traffic volumes of continued operations and refurbishment associated with license renewal in their environmental reports.

The issue was reclassified to Category 1 because refurbishment activities (such as steam generator and reactor vessel head replacement) have not required the large numbers of workers and the months of time that was conservatively analyzed in the 1996 GEIS. As such, significant transportation impacts are not anticipated from future refurbishment activities. Section VIII, “Final Actions and Basis for Changes to Table B-1,” of this document discusses this issue in more detail under Issue 56, “Transportation.”

Section 51.53(c)(3)(ii)(O). The proposed rule added new paragraph 10 CFR 51.53(c)(3)(ii)(O) to 10 CFR Part 51 to address “Groundwater and soil contamination” as a Category 2 issue. However, based upon public comments received on the proposed rule²⁰ and further evaluation by the NRC, it was determined that this issue is properly classified as Category 1. Therefore, the proposed paragraph was not adopted by the final rule.²¹

²⁰ Section IV, “Response to Public Comments,” of this document provides a summary of the comments received on this issue.

²¹ The final rule merges this issue into the consolidated issue, “Groundwater contamination and use (non-cooling system impacts)” (see Issue (20) under Section VIII of this document).

B. Adding New Category 2 Issues

Section 51.53(c)(3)(ii)(N). The final rule adds a new paragraph 10 CFR 51.53(c)(3)(ii)(N)²² in 10 CFR 51.53 to address “Minority and low-income populations” as a Category 2 issue. This new Category 2 issue is listed under the resource area “Environmental Justice” in the revised Table B-1. It addresses the effects of nuclear power plant operations and refurbishment associated with license renewal on minority populations and low-income populations living in the vicinity of the plant. This issue was listed in the original Table B-1 but was not evaluated in the 1996 GEIS. The finding in the original Table B-1 stated that “[t]he need for and the content of an analysis of environmental justice will be addressed in plant specific reviews.” This issue was not classified as either a Category 1 or 2 issue in the 1996 GEIS because guidance for implementing Executive Order (E.O.) 12898, dated February 16, 1994 (59 FR 7629), which initiated the Federal government’s environmental justice program, was not available before the completion of the 1996 GEIS.

In August 2004, the Commission issued a policy statement on implementation of E.O. 12898: “NRC’s Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions” (69 FR 52040). As stated therein, “the NRC is committed to the general goals of E.O. 12898, [and] it will strive to meet those goals through its normal and traditional NEPA review process.” By making this a Category 2 issue, the final rule requires license renewal applicants to identify, in their environmental reports, minority and low-income populations and communities residing in the vicinity of the nuclear power plant. The NRC will then assess the information provided by the applicant in the NRC’s plant-specific environmental review.

²² The final rule adopts the proposed rule language.

Section 51.53(c)(3)(ii)(O). The final rule adds a new paragraph 10 CFR 51.53(c)(3)(ii)(O)²³ in 10 CFR 51.53 to address “Cumulative impacts” as a Category 2 issue. This new Category 2 issue was added to Table B-1 to evaluate the potential cumulative impacts of continued operations during the license renewal term and refurbishment associated with license renewal at nuclear power plants. The NRC did not address cumulative impacts in the 1996 GEIS but has been evaluating these impacts in plant-specific supplements to the GEIS. The Council on Environmental Quality (CEQ) in 40 CFR 1508.7 defines cumulative impacts as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”²⁴ The NRC considers potential cumulative impacts on the environment resulting from the incremental impact of license renewal when added to other past, present, and reasonably foreseeable future actions.

The final rule change requires license renewal applicants to provide information about other past, present, and reasonably foreseeable future actions occurring in the vicinity of the nuclear power plant that may result in a cumulative impact. An example of the type of information to be provided includes data on the construction and operation of other power plants and other industrial commercial facilities in the vicinity of the nuclear power plant. Section VIII, “Final Actions and Basis for Changes to Table B-1,” of this document discusses this issue in more detail under Issue 73, “Cumulative impacts.”

²³ The proposed rule added this paragraph as 10 CFR 51.53(c)(3)(ii)(P). The final rule redesignates it as 10 CFR 51.53(c)(3)(ii)(O) because paragraph 10 CFR 51.53(c)(3)(ii)(O) of the proposed rule, which concerned “Groundwater and soil contamination” (see discussion in Section VI, “A. Reclassifying Category 2 Issues as Category 1 Issues,” of this document) was not adopted by the final rule.

²⁴ The NRC’s regulations in 10 CFR Part 51 incorporate the CEQ definition of cumulative impacts (10 CFR 51.14(b)).

Section 51.53(c)(3)(ii)(P). The final rule adds a new paragraph 10 CFR 51.53(c)(3)(ii)(P)²⁵ in 10 CFR 51.53 to address “Radionuclides released to groundwater” as a Category 2 issue. This new Category 2 issue has been added to Table B-1 to evaluate the potential combined impact of inadvertent discharges of radioactive liquids from all plant systems into groundwater. The issue is relevant to license renewal because all commercial nuclear power plants have spent fuel pools, liquid storage tanks, and piping that contain and transport radioactive liquids. Over time, these systems and piping have a potential to degrade and release radioactive liquids that could migrate into the groundwater. The NRC has investigated several cases where radioactive liquids have been inadvertently released into the groundwater in an uncontrolled manner. In accordance with NRC requirements, residual activity from these inadvertent releases is subject to characterization and evaluation of the potential hazard. For this new Category 2 issue, the license renewal applicant is required to provide information on radioactive liquids released to groundwater.

In the final rule, the NRC modified the language of the proposed rule to specify that only “documented” releases need to be included in the applicant’s environmental report. The NRC provides specific guidance on what constitutes a documented release in the Regulatory Guide 4.2, Supplement 1, Revision 1, “Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications.”

Section IV, “Response to Public Comments,” of this document provides a summary of the comments received on this issue, and Section VIII, “Final Actions and Basis for Changes to Table B-1,” discusses this issue in more detail under Issue 27, “Radionuclides released to groundwater.”

²⁵ The proposed rule added this paragraph as 10 CFR 51.53(c)(3)(ii)(Q). The final rule redesignates it as paragraph 10 CFR 51.53(c)(3)(ii)(P) because the paragraph added as 10 CFR 51.53(c)(3)(ii)(O) by the proposed rule, which concerned groundwater and soil contamination caused by non-radionuclide, industrial contaminants, was not adopted by the final rule (see discussion in Section VI, “A. Reclassifying Category 2 Issues as Category 1 Issues,” of this document).

VII. Response to Specific Request for Voluntary Information

In Section VII of the Statement of Considerations for the July 31, 2009 (74 FR 38129–38130), proposed rule, the NRC requested voluntary information from industry about refurbishment activities and employment trends at nuclear power plants. Information on refurbishment would have been used to evaluate the significance of impacts from this type of activity. Information on employment trends would have been used to assess the significance of socioeconomic effects of ongoing plant operations on local economies.

The NRC received no response to these requests. The NRC interprets this lack of response on these issues to mean that information on major refurbishment and replacement activities and employment trends is either unavailable or insufficient to assist the NRC in re-evaluating the significance of refurbishment-related environmental impacts and socioeconomic effects of ongoing plant operations on local economies. Although no information was received regarding refurbishment activities and employment trends at nuclear power plants, the NRC believes that it has sufficient information based on lessons learned and knowledge gained from completed license renewal environmental reviews to substantiate the conclusions made in the final rule and GEIS.

VIII. Final Actions and Basis for Changes to Table B-1

The final rule revises Table B-1 to reflect the changes made in the revised GEIS. The revised GEIS is being made available with the final rule and provides a summary change table (in Appendix B) comparing the 92 environmental issues in the 1996 GEIS with the 78 environmental issues in the revised GEIS.

Land Use

1) Onsite Land Use: “Onsite land use” remains a Category 1 issue. The final rule amends Table B-1 by making minor clarifying changes to the finding column entry for this issue. Specifically, the final rule replaces the sentence “Projected onsite land use changes required during refurbishment and the renewal period would be a small fraction of any nuclear power plant site and would involve land that is controlled by the applicant,” with “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.”

2) Offsite Land Use: The final rule amends Table B-1 by consolidating two Category 2 issues, “Offsite land use (refurbishment),” with an impact level range small to moderate, and “Offsite land use (license renewal term),” with an impact level range small to large, and reclassifying the consolidated issue as a Category 1 issue, with an impact level of small, and naming the consolidated issue, “Offsite land use.” The final rule also creates a new Category 1 issue, “Tax revenues” (Issue 53), which concerns the impact of license renewal on State and local tax revenues, thereby removing tax revenues from the 1996 GEIS “Offsite land use (license renewal term)” issue. The final rule amends Table B-1 by removing the entries for “Offsite land use (refurbishment)” and “Offsite land use (license renewal term),” and by adding an entry for “Offsite land use.” The finding column entry of “Offsite land use” states “[o]ffsite land use would not be affected by continued operations and refurbishment associated with license renewal.”

The Table B-1 finding column entry for the “Offsite land use (refurbishment)” issue indicated that impacts may be of moderate significance at plants in low population areas. Similarly, the finding column entry for the “Offsite land use (license renewal term)” issue indicates that significant changes (moderate to large) in land use may be associated with

population and tax revenue changes resulting from license renewal. As described in the 1996 GEIS, environmental impacts are considered to be small if refurbishment activities were to occur at plants located in high population areas and if population and tax revenues would not change.

As reflected in the revised GEIS, significant impacts on offsite land use are not anticipated. Previous plant-specific license renewal reviews conducted by the NRC have shown no substantial increases in the number of workers during the license renewal term and that refurbishment activities (such as steam generator and vessel head replacement) have not required the large numbers of workers and the months of time that was conservatively estimated in the 1996 GEIS. These reviews support a finding that offsite land use impacts during the license renewal term would be small for all nuclear power plants.

3) *Offsite Land Use in Transmission Line Right-of-Ways (ROWs)*: The final rule amends Table B-1 by renaming the “Power line right of way” issue as “Offsite land use in transmission line right-of-ways (ROWs).” It remains a Category 1 issue with an impact level of small. The final rule amends the Table B-1 finding column entry for this issue by replacing the statement,

Ongoing use of power line right of ways would continue with no change in restrictions. The effects of these restrictions are of small significance.

with the following:

Use of transmission line ROWs from continued operations and refurbishment associated with license renewal would continue with no change in land use restrictions.

The final rule further amends Table B-1 by appending a footnote to the issue column entry for “Offsite land use in transmission line right-of-ways (ROWs),” concerning the extent to which transmission lines and their associated ROWs have been analyzed under the revised GEIS. The footnote states,

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.

As stated in the revised GEIS, the final environmental statements (essentially, the equivalent of environmental impact statements) prepared for the original construction of the various nuclear power plants (the construction permits) and for the initial operating licenses evaluated the impacts of those transmission lines built to connect the nuclear power plant to the regional electrical grid. Since the original construction of those lines, regional expansion of the electrical distribution grid has resulted in incorporation of those lines originating at the power plant substations. In most cases, the transmission lines originating at the power plant substations are no longer owned or managed by the nuclear power plant licensees. These lines would remain in place and be energized regardless of whether the subject nuclear power plant license was renewed or not. For this reason, those transmission lines that would not be impacted by a license renewal decision (i.e., those lines that would not be dismantled or otherwise decommissioned as a result of a plant terminating operations because its operating license had not been renewed) are considered beyond the scope of, and as such are not analyzed in, the revised GEIS.

Visual Resources

4) Aesthetic Impacts: The final rule amends Table B-1 by consolidating three Category 1 issues, “Aesthetic impacts (refurbishment),” “Aesthetic impacts (license renewal term),” and “Aesthetic impacts of transmission lines (license renewal term),” each with an impact level of small, into one new Category 1 issue, “Aesthetic impacts.” The new consolidated issue also has an impact level of small. The 1996 GEIS concluded that renewal of operating licenses and the refurbishment activities would have no significant aesthetic impact during the license

renewal term. Impacts are considered to be small if the visual appearance of plant and transmission line structures would not change. Previous license renewal reviews conducted by the NRC show that the appearance of nuclear power plants and transmission line structures do not change significantly over time or because of refurbishment activities. Therefore, because aesthetic impacts are not anticipated and the three issues are similar, they have been consolidated to facilitate the environmental review process. The final rule amends Table B-1 by removing the entries for “Aesthetic impacts (refurbishment),” “Aesthetic impacts (license renewal term),” and “Aesthetic impacts of transmission lines (license renewal term),” and adding an entry for “Aesthetic impacts.” The finding column entry for the new combined entry states “[n]o 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

5) Air Quality Impacts (All Plants): The final rule amends Table B-1 by renaming the “Air quality during refurbishment (nonattainment and maintenance areas)” issue as “Air quality impacts (all plants).” The final rule reflects the revised GEIS’s expansion of the issue to include air emission impacts from emergency diesel generators, boilers, and particulate emissions from cooling towers. Based on public comments received on the proposed rule and the re-evaluation of information as described in the revised GEIS, the final rule further amends Table B-1 by revising this Category 2 issue, with an impact level range small to large, to a Category 1 issue with an impact level of small.²⁶ The final rule further amends Table B-1 by revising the finding column entry for this issue to state,

²⁶ Under the proposed rule, the issue had been proposed to be renamed “Air quality (nonattainment and maintenance areas)”; it would have remained a Category 2 issue with an impact level range of small to large (74 FR 38121, 38134; July 31, 2009).

Air quality impacts from continued operations and refurbishment associated with license renewal are expected to be small at all plants. 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 refurbishment 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.

Emissions from emergency diesel generators and fire pumps and routine operations of boilers used for space heating would not be a concern, even for plants located in or adjacent to nonattainment areas. Impacts from cooling tower particulate emissions even under the worst-case situations have been small.

Operating experience has shown that air quality impacts from these emission sources (including particulate emissions from cooling towers at operating plants) have been small at all nuclear power plants, including those plants located in or adjacent to nonattainment areas.

In addition, air quality impacts during refurbishment have also been small. These types of emissions could be a cause for concern if they occur at plants located in or near air quality nonattainment or maintenance areas. However, these impacts have been temporary and would cease once these activities were completed. Operating experience has also shown that refurbishment activities have not required the large numbers of workers and the months of time that was conservatively predicted and analyzed in the 1996 GEIS, nor have such activities resulted in exceedances in the *de minimis* thresholds for criteria pollutants in nonattainment and maintenance areas.

Implementation of best management practices, including fugitive dust controls as required by the imposition of conditions in State and local air emissions permits, would ensure conformance with applicable State or Tribal Implementation Plans, in accordance with EPA's revised General Conformity Regulations (75 FR 17254; April 5, 2010). On the basis of these

considerations, the NRC has concluded that the air quality impact of continued nuclear power plant operations and refurbishment associated with license renewal would be small for all plants.

6) Air Quality Effects of Transmission Lines: The final rule amends Table B-1 by appending a footnote to the issue column entry for “Air quality effects of transmission lines,” concerning the extent to which transmission lines and their associated right of ways have been analyzed under the revised GEIS. This footnote is the same one that was added to Issue 3, “Offsite land use in transmission line right-of-ways (ROWs).” See the description of the changes made by the final rule to Issue 3 for further explanation of this amendment.

Noise

7) Noise Impacts: The final rule amends Table B-1 by renaming the issue “Noise” as “Noise impacts.” The issue remains a Category 1 issue with an impact level of small. The final rule further amends Table B-1 by making minor clarifying changes to the finding column entry for this issue. Specifically, the final rule replaces the sentence “Noise has not been found to be a problem at operating plants and is not expected to be a problem at any plant during the license renewal term,” with “Noise levels would remain below regulatory guidelines for offsite receptors during continued operations and refurbishment associated with license renewal.”

Geologic Environment

8) Geology and Soils: The final rule amends Table B-1 by adding a new Category 1 issue, “Geology and soils.” This issue has an impact level of small. The finding column entry for this issue states,

The effect of geologic and soil conditions on plant operations and 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.

This issue was not evaluated in the 1996 GEIS, as described in the proposed rule.²⁷ This new Category 1 issue considers geology and soils from the perspective of those resource conditions or attributes that can be affected by continued operations during the renewal term. The final rule does not require the license renewal applicant to assess this issue in its environmental report unless the applicant is aware of new and significant information about geologic and soil conditions and associated impacts at or near the nuclear power plant site that could change the conclusion in the GEIS.

An understanding of geologic and soil conditions has been well established at all nuclear power plants and associated transmission lines during the current licensing term, and these conditions are expected to remain unchanged during the 20-year license renewal term for each plant. The impact of these conditions on plant operations and the impact of continued power plant operations and refurbishment activities on geology and soils are small for all nuclear power plants and not expected to change appreciably during the license renewal term. Operating experience shows that any impacts to geologic and soil strata would be limited to soil disturbance from construction activities associated with routine infrastructure renovation and maintenance projects during continued plant operations. Implementing best management practices would reduce soil erosion and subsequent impacts on surface water quality. Information in plant-specific SEISs prepared to date and reference documents have not identified these impacts as being significant.

²⁷ The proposed rule named the issue “Impacts of nuclear plants on geology and soils.” Under the proposed rule, the issue was also a Category 1 issue, with an impact level of small (74 FR 38121, 38134; July 31, 2009).

Surface Water Resources

9) Surface Water Use and Quality (Non-Cooling System Impacts): The final rule amends Table B-1 by consolidating two Category 1 issues, “Impacts of refurbishment on surface water quality” and “Impacts of refurbishment on surface water use,” both with an impact level of small, and names the consolidated issue, “Surface water use and quality (non-cooling system impacts).” These two issues were consolidated because the impacts of refurbishment on both surface water use and quality are negligible, and the effects are closely related. The consolidated issue has also been expanded to include the impacts of continued operations. The consolidated issue is a Category 1 issue with an impact level of small.

The final rule amends Table B-1 by removing the entries for “Impacts of refurbishment on surface water quality” and “Impacts of refurbishment on surface water use,” and adding an entry for “Surface water use and quality (non-cooling system impacts).” The finding column entry for the new consolidated issue states,

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.

The NRC expects licensees to use best management practices during the license renewal term for both continuing operations and refurbishment activities. Use of best management practices will minimize soil erosion. In addition, implementation of spill prevention and control plans will reduce the likelihood of any liquid chemical spills. If refurbishment activities take place during a plant outage, with the reactor shutdown, the overall water use by the facility will be reduced. Based on this conclusion, the impact on surface water use and quality during the license renewal term will continue to be small for all plants.

10) Altered Current Patterns at Intake and Discharge Structures, 11) Altered Salinity Gradients, 12) Altered Thermal Stratification of Lakes, and 13) Scouring Caused

by Discharged Cooling Water: These four issues remain Category 1 issues, each with an impact level of small. The final rule amends Table B-1 by making minor clarifying changes to the finding column entries for each of these issues.

The final rule amends the “Altered current patterns at intake and discharge structures” finding column entry by replacing the statement,

Altered current patterns 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.

with the following:

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.

The final rule amends the “Altered salinity gradients” finding column entry by replacing the statement,

Salinity gradients 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.

with the following:

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.

The final rule amends the “Altered thermal stratification of lakes” finding column entry by replacing the statement,

Generally, lake stratification has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

with the following:

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.

The final rule amends the “Scouring caused by discharged cooling water” finding column entry by replacing the statement,

Scouring has not been found to be a problem at most operating nuclear power plants and has caused only localized effects at a few plants. It is not expected to be a problem during the license renewal term.

with the following:

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.

These changes reflect the findings of environmental reviews conducted since the publication of the 1996 GEIS, which show that the effects of these four issues are localized in the vicinity of the plant’s intake and discharge structures.

14) Discharge of Metals in Cooling System Effluent: The final rule amends Table B-1 by renaming “Discharge of other metals in waste water” as “Discharge of metals in cooling system effluent.” It remains a Category 1 issue with an impact level of small. The final rule also makes minor clarifying changes to the finding column entry for this issue. Specifically, the final rule amends the finding column entry by replacing the statement,

These discharges 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. They are not expected to be a problem during the license renewal term.

with the following:

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.

15) Discharge of Biocides, Sanitary Wastes, and Minor Chemical Spills: The final rule amends Table B-1 by consolidating two Category 1 issues, “Discharge of chlorine or other

biocides” and “Discharge of sanitary wastes and minor chemical spills,” both with an impact level of small, and naming the consolidated issue “Discharge of biocides, sanitary wastes, and minor chemical spills.” The consolidated issue is a Category 1 issue with an impact level of small. Specifically, the final rule amends Table B-1 by removing the entries for “Discharge of chlorine or other biocides” and “Discharge of sanitary wastes and minor chemical spills” and adding an entry for “Discharge of biocides, sanitary wastes, and minor chemical spills.” The finding column entry for the new consolidated issue states,

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.

16) Surface Water Use Conflicts (Plants with Once-Through Cooling Systems):

“Water use conflicts (plants with once-through cooling systems)” remains a Category 1 issue with an impact level of small. The final rule amends Table B-1 by adding the word “Surface” to the title of this issue.

17) Surface Water Use Conflicts (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a River): The final rule amends Table B-1 by adding the term “surface” and removing the terms “small” and “low flow” from the title and the associated numerical definition contained in 10 CFR 51.53(c)(3)(ii)(A) for low flow rivers from this and other related river flow issues. This issue remains a Category 2 issue with an impact range of small to moderate. The final rule also amends the finding column entry by replacing the statement,

The issue has been a concern at nuclear power plants with cooling ponds and at plants with cooling towers. Impacts on instream and riparian communities near these plants could be of moderate significance in some situations. See § 51.53(c)(3)(ii)(A).

with the following:

Impacts could be of small or moderate significance, depending on makeup water requirements, water availability, and competing water demands.

The 1996 GEIS distinguished between surface water use impacts during low flow conditions on “small” versus “large” rivers. Any river, regardless of size, can experience low flow conditions of varying severity during periods of drought and changing conditions in the affected watersheds such as upstream diversions and use of river water. Similarly, the NRC has determined that the use of the term “low flow” in categorizing river flow is of little value considering that plants that withdraw makeup water from a river can experience low flow conditions and would be required to conduct a plant-specific assessment of water use conflicts.

18) *Effects of Dredging on Surface Water Quality*: The final rule amends Table B-1 by adding a new Category 1 issue, “Effects of dredging on surface water quality,” that evaluates the impacts of dredging to maintain intake and discharge structures at nuclear power plant facilities. This issue has an impact level of small. The finding column entry for this issue states,

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.

The impact of dredging on surface water quality was not considered in the 1996 GEIS and was not listed in Table B-1 prior to this final rule. Most plants have intake and discharge structures that must be maintained by periodic dredging of sediment accumulated in or on the structures. The NRC has found that dredging, while temporarily increasing turbidity in the source water body, generally has little long-term effect on water quality. In addition to maintaining intake and discharge structures, dredging is often done to keep barge slips and channels open to service the plant. Dredged material is most often disposed on property owned by the applicant and usually contains no hazardous materials. Dredging must be performed under a permit issued by the U.S. Army Corps of Engineers (the Corps) and consequently, each dredging action would be subject to a site-specific environmental review conducted by the

Corps. Temporary impacts of dredging are measurable in general water quality terms, but the impacts have been shown to be small.

19) *Temperature Effects on Sediment Transport Capacity*: There are no changes to this issue, and it remains a Category 1 issue with an impact level of small.

Groundwater Resources

20) *Groundwater Contamination and Use (Non-Cooling System Impacts)*: The final rule amends Table B-1 by expanding the scope of “Impacts of refurbishment on groundwater use and quality” issue to include the effects of continued nuclear power plant operations during the license renewal term. This Category 1 issue, with an impact level of small, was renamed “Groundwater use and quality” in the proposed rule.

The final rule also amends Table B-1 by changing the proposed rule’s new Category 2 issue “Groundwater and soil contamination,” with an impact range of small to moderate (see 74 FR 38122, 38135), to Category 1, with an impact level of small. This issue was then consolidated with the “Groundwater use and quality” issue and renamed “Groundwater contamination and use (non-cooling system impacts).” These issues were consolidated because they consider the impact of industrial activities associated with the continued operations of a nuclear power plant (not directly related to cooling system effects) and refurbishment on groundwater use and quality. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Extensive dewatering during the original construction on some sites will not be repeated during refurbishment on any sites. Any plant wastes produced during refurbishment will be handled in the same manner as in current operating practices and are not expected to be a problem during the license renewal term.

with the following:

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 Environmental Protection Agency regulated cleanup and monitoring programs. The application of best management practices for handling any materials produced or used during these activities would reduce impacts.

The consolidated Category 1 issue considers the impacts from groundwater use and the impacts on groundwater, soil, and subsoil from the industrial use of solvents, hydrocarbons, heavy metals, or other chemicals at nuclear power plant sites from continued operation during the license renewal term and refurbishment. The consolidated issue also includes the use of wastewater disposal ponds or lagoons and non-radionuclide, industrial contaminants released inadvertently or as effluents into the environment. Industrial practices at all nuclear power plants have the potential to contaminate groundwater and soil, especially on sites with unlined wastewater and storm water ponds or lagoons. Any contamination of this type is subject to characterization and clean-up under EPA or State regulated remediation and monitoring programs.

Non-radionuclide contaminants have been found in groundwater and soil samples at some nuclear power plants during previous license renewal environmental reviews. Release of these contaminants into groundwater and soil degrades the quality of these resources, even if applicable groundwater quality standards are not exceeded. However, each site has its own program for handling chemicals, waste, and other hazardous materials in accordance with Federal and State regulations and is expected to employ best management practices. The use of wastewater disposal ponds or lagoons, whether lined or unlined, may increase the potential for groundwater and soil contamination. However, they are subject to discharge authorizations under NPDES and related State wastewater discharge permit programs.

The finding column of Table B-1 for “Groundwater use and quality” prior to this final rule, as analyzed in the 1996 GEIS, indicated that impacts of continued operations and refurbishment on groundwater use and quality would be small, as extensive dewatering is not anticipated. This finding was re-evaluated in the revised GEIS and is retained in Table B-1.

While the proposed rule’s “Groundwater and soil contamination” issue was identified as a Category 2 issue, further consideration of the “Groundwater and soil contamination” issue and public comments revealed that the potential impacts on groundwater and soil quality from common industrial practices can be addressed generically, as these practices are common to all industrial facilities and are not unique to nuclear power plants. Moreover, as supported by the analysis in the revised GEIS, the NRC concludes that the overall impact of industrial practices on groundwater use and quality from past and current operations is small for all nuclear power plants and not expected to change appreciably during the license renewal term.

21) Groundwater Use Conflicts (Plants that Withdraw Less Than 100 Gallons per Minute [gpm]): The final rule amends Table B-1 by renaming the “Ground-water use conflicts (potable and service water; plants that use <100 gpm)” issue as “Groundwater use conflicts (plants that withdraw less than 100 gallons per minute [gpm]).” It remains a Category 1 issue with an impact level of small. The final rule further amends Table B-1 by making minor clarifying changes to the finding column entry for this issue. Specifically, the final rule replaces the entry statement “Plants using less than 100 gpm are not expected to cause any ground-water conflicts,” with “Plants that withdraw less than 100 gpm are not expected to cause any groundwater use conflicts.”

22) Groundwater Use Conflicts (Plants that Withdraw More Than 100 Gallons per Minute [gpm]): The final rule amends Table B-1 by consolidating two Category 2 issues, “Groundwater use conflicts (potable and service water, and dewatering; plants that use >100 gpm)” and “Ground-water use conflicts (Ranney wells),” each with an impact level range of

small to large, and names the consolidated issue, “Groundwater use conflicts (plants that withdraw more than 100 gallons per minute [gpm]).” Because Ranney wells produce significantly more than 100 gpm, the Ranney wells issue was consolidated with the general issue of groundwater use conflicts for plants using more than 100 gpm of groundwater. The consolidated issue is a Category 2 issue, with an impact level range of small to large. The final rule further amends Table B-1 by removing the entries for “Groundwater use conflicts (potable and service water, and dewatering; plants that use >100 gpm)” and “Ground-water use conflicts (Ranney wells),” and adding an entry for “Groundwater use conflicts (plants that withdraw more than 100 gallons per minute [gpm]).” The finding column entry for the new consolidated issue states “Plants that withdraw more than 100 gpm could cause groundwater use conflicts with nearby groundwater users.”

23) Groundwater Use Conflicts (Plants with Closed-Cycle Cooling Systems that Withdraw Makeup Water from a River): The final rule amends Table B-1 by renaming “Ground-water use conflicts (plants using cooling towers withdrawing makeup water from a small river)” as “Groundwater use conflicts (plants with closed-cycle cooling systems that withdraw makeup water from a river).” It remains a Category 2 issue, with an impact level range of small to large. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Water use conflicts may result from surface water withdrawals from small water bodies during low flow conditions which may affect aquifer recharge, especially if other ground-water or upstream surface water users come on line before the time of license renewal. See § 51.53(c)(3)(ii)(A).

with the following:

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.

The 1996 GEIS distinguished between surface water use impacts during low flow conditions on “small” versus “large” rivers. Any river, regardless of size, can experience low flow conditions of varying severity during periods of drought and changing conditions in the affected watersheds such as upstream diversions and use of river water. The NRC has thus determined that the use of the term “small river” or “small water bodies” is of little value considering that plants that withdraw makeup water from a river can experience low-flow conditions and would be required to conduct a plant-specific assessment of water use conflicts.

24) Groundwater Quality Degradation Resulting from Water Withdrawals: The final rule amends Table B-1 by consolidating two Category 1 issues, “Ground-water quality degradation (Ranney wells)” and “Ground-water quality degradation (saltwater intrusion),” each with an impact level of small, and names the consolidated issue, “Groundwater quality degradation resulting from water withdrawals.” The consolidated issue remains a Category 1 issue, with an impact level of small. The final rule further amends Table B-1 by removing the entries for “Ground-water quality degradation (Ranney wells)” and “Ground-water quality degradation (saltwater intrusion)” and, by adding an entry for “Groundwater quality degradation resulting from water withdrawals.” The finding column entry for the consolidated issue states “Groundwater withdrawals at operating nuclear power plants would not contribute significantly to groundwater quality degradation.” The two issues were consolidated as they both consider the possibility of groundwater quality becoming degraded as a result of plant operations drawing water of potentially lower quality into the aquifer.

25) Groundwater Quality Degradation (Plants with Cooling Ponds in Salt Marshes): The final rule amends Table B-1 by revising the title of the issue “Ground-water quality degradation (cooling ponds in salt marshes)” to “Groundwater quality degradation (plants with cooling ponds in salt marshes).” The issue remains a Category 1 issue, with an impact level of

small. The final rule further amends Table B-1 by replacing the finding column entry which states,

Sites with closed-cycle ponds may degrade ground-water quality. Because water in salt marshes is brackish, this is not a concern for plants located in salt marshes.

with the following:

Sites with closed-cycle cooling ponds could degrade groundwater quality. However, groundwater in salt marshes is naturally brackish and thus, not potable. Consequently, the human use of such groundwater is limited to industrial purposes.

The final rule change to the finding column entry reflects the NRC's response to a public comment on the proposed rule by: 1) deleting the term "plants" to eliminate any misunderstanding that the NRC meant "nuclear power plant" and not marsh "plants" and 2) clarifying that the focus of this issue is on the degradation of groundwater quality for human use. Brackish groundwater has limited human use, thus, any impacts on groundwater quality caused by continued operations and refurbishment associated with license renewal are not significant.

26) Groundwater Quality Degradation (Plants with Cooling Ponds at Inland Sites):

The final rule amends Table B-1 by revising the title of the issue "Ground-water quality degradation (cooling ponds at inland sites)" to "Groundwater quality degradation (plants with cooling ponds at inland sites)." The issue remains a Category 2 issue, with an impact level range of small to large. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Sites with closed-cycle cooling ponds may degrade ground-water quality. For plants located inland, the quality of the ground water in the vicinity of the ponds must be shown to be adequate to allow continuation of current uses. See § 51.53(c)(3)(ii)(D).

with the following:

Inland sites with closed-cycle cooling ponds could degrade groundwater quality. The significance of the impact would depend on 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.

27) Radionuclides Released to Groundwater: The final rule amends Table B-1 by adding a new Category 2 issue, “Radionuclides released to groundwater,” with an impact level range of small to moderate, to evaluate the potential impact of discharges of radionuclides from plant systems into groundwater. The finding column entry for this issue states,

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.

This new Category 2 issue has been added to evaluate the potential impact to groundwater quality from the discharge of radionuclides from plant systems, piping, and tanks. This issue was added because within the past several years there have been events at nuclear power reactor sites which involved unknown, uncontrolled, and unmonitored releases of radioactive liquids into the groundwater. The issue is relevant to license renewal because this experience has shown that components and piping at nuclear power plants have the potential to leak radioactive material into the groundwater and degrade its quality. While the NRC regulations in 10 CFR Part 20 and in 10 CFR Part 50 limit the amount of radioactive material released (i.e., from routine and inadvertent sources) from a nuclear power plant into the environment, the regulations are focused on protecting the public, not the quality of the groundwater. Therefore, as required by NEPA, the NRC must consider the potential impacts to the groundwater from radioactive liquids released into groundwater.

The majority of the inadvertent radioactive liquid release events involved tritium, which is a radioactive isotope of hydrogen. However, in some of the events, radioactive isotopes of

cesium and strontium have also been released. Non-routine releases of radioactive liquids into the groundwater have occurred from plant systems and buried piping.

In 2006, the NRC's Executive Director for Operations chartered a task force to conduct a lessons-learned review of these incidents. On September 1, 2006, the Task Force issued its report: "Liquid Radioactive Release Lessons Learned Task Force Report" (ADAMS Accession No. ML062650312). A significant conclusion of the report dealt with the potential health impacts to the public from the inadvertent releases. Although there were numerous events where radioactive liquids were released to the groundwater in an unplanned, uncontrolled, and unmonitored fashion, based on the data available, the task force did not identify any instances where public health and safety was adversely impacted. However, the task force did not evaluate the impact of the releases to groundwater quality. The task force also identified that under the existing regulatory requirements, the potential exists for radioactive liquid releases from leaking systems to not be detected for a period of time and, therefore, the contaminants could migrate into groundwater.

In response to these groundwater events, NEI, which represents the nuclear industry, in 2007 committed to the NRC to develop a voluntary initiative for each nuclear power plant to have a site-specific groundwater protection program. NEI provided guidance to the nuclear industry (NEI 07-07, ADAMS Accession No. ML072610036) on the development and implementation of a groundwater protection program. The program covers the assessment of plant systems and components, site hydrogeology, and methods to detect leaks to determine the needs for each site-specific program. To monitor the actions of the nuclear industry, the NRC routinely inspects nuclear power plant licensees to verify continued implementation of the Groundwater Protection Initiative programs, to review records of identified leakage and spill events, to assess whether the source of the leak or spill was identified and mitigated, and to review any remediation actions taken for effectiveness.

On the basis of the information and experience with these groundwater events and the evaluation in the revised GEIS, the NRC concludes that the impact to groundwater quality from the release of radionuclides is dependent on site-specific variables and could be small or moderate, depending on the magnitude of the leak, radionuclides involved, and the response time of plant personnel to identify and stop the leak in a timely fashion. Therefore, “Radionuclides released to groundwater” is a Category 2 issue and, as such, a site-specific evaluation in the environmental report is needed for each application for license renewal. Similarly, the NRC will analyze this issue in the SEIS for each license renewal action.

Terrestrial Resources

28) Effects on Terrestrial Resources (Non-Cooling System Impacts): The final rule amends Table B-1 by renaming the “Refurbishment impacts” issue as “Effects on terrestrial resources (non-cooling system impacts).” It remains a Category 2 issue, with an impact level range of small to large.²⁸ The issue, as set forth in the 1996 GEIS, addressed only the impacts upon terrestrial resources resulting from any refurbishment activities during the license renewal term. The analysis in the revised GEIS builds on the analysis in the 1996 GEIS to include the environmental impacts resulting from continued plant operations during the license renewal term. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Refurbishment impacts are insignificant if no loss of important plant and animal habitat occurs. However, it cannot be known whether important plant and animal communities may be affected until the specific proposal is presented with the license renewal application. See § 51.53(c)(3)(ii)(E).

with the following:

²⁸ The proposed rule named the issue, “Impacts of continued plant operations on terrestrial ecosystems” (74 FR 38123, 38136; July 31, 2009).

Impacts resulting from continued operations and refurbishment associated with license renewal may affect terrestrial communities. Application of best management practices would reduce the potential for impacts. The magnitude of impacts would depend on the nature of the activity, the status of the resources that could be affected, and the effectiveness of mitigation.

29) Exposure of Terrestrial Organisms to Radionuclides: The final rule amends Table B-1 by adding a new Category 1 issue, “Exposure of terrestrial organisms to radionuclides.” The new issue has been determined to have an impact level of small. The finding column entry for this issue states,

Doses to terrestrial organisms from continued operations and refurbishment associated with license renewal are expected to be well below exposure guidelines developed to protect these organisms.

This new issue evaluates the potential impact of radionuclides on terrestrial organisms resulting from continued operations of a nuclear power plant during the license renewal term and refurbishment associated with license renewal. This issue was not evaluated in the 1996 GEIS. Subsequent to the publication of the 1996 GEIS, however, members of the public and various Federal and State agencies commented on the need to evaluate the potential impact of radionuclides on terrestrial organisms during plant-specific license renewal reviews.

The revised GEIS evaluates the potential impact of radionuclides on terrestrial biota at nuclear power plants from continued operations during the license renewal term. For the evaluation, site-specific radionuclide concentrations in environmental media (e.g., water, air, milk, crops, food products, sediment, and fish and other aquatic biota) were obtained from publicly available Radiological Environmental Monitoring Program (REMP) annual reports from 15 nuclear power plants. The REMP is conducted at every NRC licensed nuclear power plant to assess the environmental impacts from plant operations. This is done by collecting samples of environmental media from areas surrounding the plant for analysis to measure the amount of radioactivity, if any, in the samples. The media samples reflect the radiation exposure pathways

to the public from radioactive effluents released by the nuclear power plant and from background radiation (i.e., cosmic sources, naturally-occurring radioactive material, including radon and global fallout). These 15 plants were selected to represent sites that reported a range of radionuclide concentrations in the sample media and included both boiling water reactors and pressurized water reactors. Site-specific radionuclide concentrations in water and sediments, as reported in the plant's REMP reports, were used in the calculations. The calculated radiation dose rates to terrestrial biota, based on exposure to radioactivity in the environmental media, were compared against radiation-safety guidelines issued by the U.S. Department of Energy (DOE), the International Atomic Energy Agency (IAEA), the National Council of Radiation Protection and Measurements (NCRP), and the International Commission on Radiological Protection (ICRP). The NRC concluded that the impacts of radionuclides on terrestrial biota from past and current normal operations are small for all nuclear power plants and should not change appreciably during the license renewal term.

30) Cooling System Impacts on Terrestrial Resources (Plants with Once-Through Cooling Systems or Cooling Ponds): The final rule amends Table B-1 by renaming the "Cooling pond impacts on terrestrial resources" issue as "Cooling system impacts on terrestrial resources (plants with once-through cooling systems or cooling ponds)." It remains a Category 1 issue, with an impact level of small. The analysis in the revised GEIS expands the scope of this issue to include plants with once-through cooling systems. This analysis concludes that the impacts on terrestrial resources from once-through cooling systems, as well as from cooling ponds, is of small significance at all plants. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Impacts of cooling ponds on terrestrial ecological resources are considered to be of small significance at all sites.

with the following:

No adverse effects to terrestrial plants or animals have been reported as a result of increased water temperatures, fogging, humidity, or reduced habitat quality. Due to the low concentrations of contaminants in cooling system effluents, uptake and accumulation of contaminants in the tissues of wildlife exposed to the contaminated water or aquatic food sources are not expected to be significant issues.

31) Cooling Tower Impacts on Vegetation (Plants with Cooling Towers): The final rule amends Table B-1 by consolidating two Category 1 issues, “Cooling tower impacts on crops and ornamental vegetation” and “Cooling tower impacts on native plants,” both issues having an impact level of small, and names the consolidated issue, “Cooling tower impacts on vegetation (plants with cooling towers).” The consolidated issue is a Category 1 issue with an impact level of small. The two issues were consolidated to conform to the resource-based approach used in the revised GEIS. With the recent trend of replacing lawns with native vegetation, some ornamental plants and crops are native plants, and the original separation into two issues is unnecessary and cumbersome. The final rule further amends Table B-1 by removing the entries for “Cooling tower impacts on crops and ornamental vegetation” and “Cooling tower impacts on native plants,” and by adding an entry for “Cooling tower impacts on vegetation (plants with cooling towers).” The finding column entry for the new consolidated issue states,

Impacts from salt drift, icing, fogging, or increased humidity associated with cooling tower operation have the potential to affect adjacent vegetation, but these impacts have been small at operating nuclear power plants and are not expected to change over the license renewal term.

32) Bird Collisions with Plant Structures and Transmission Lines: The final rule amends Table B-1 by consolidating two Category 1 issues, “Bird collisions with cooling towers” and “Bird collision with power lines,” both issues having an impact level of small. The final rule also expands the scope of the consolidated issue to address collisions with all plant structures and names the issue, “Bird collisions with plant structures and transmission lines.” The consolidated issue is a Category 1 issue with an impact level of small. The two issues were

consolidated to conform to the resource-based approach used in the revised GEIS. The final rule further amends Table B-1 by removing the entries for “Bird collisions with cooling towers” and “Bird collision with power lines,” and by adding an entry for “Bird collisions with plant structures and transmission lines.” The finding column entry for the new consolidated issue states,

Bird collisions with cooling towers and other plant structures and transmission lines occur at rates that are unlikely to affect local or migratory populations and the rates are not expected to change.

The final rule further amends Table B-1 by appending a footnote to the issue column entry for “Bird collisions with plant structures and transmission lines,” concerning the extent to which transmission lines and their associated right of ways have been analyzed under the revised GEIS. This footnote is the same one that was added to Issue 3, “Offsite land use in transmission line right-of-ways (ROWs).” See the description of the changes made by the final rule to Issue 3 for further explanation of this amendment.

33) *Water Use Conflicts with Terrestrial Resources (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a River)*: The final rule amends Table B-1 by adding a new Category 2 issue, “Water use conflicts with terrestrial resources (plants with cooling ponds or cooling towers using makeup water from a river),” to evaluate water use conflict impacts with terrestrial resources in riparian communities. The new issue has an impact level range of small to moderate. The finding column entry for this issue states,

Impacts on terrestrial resources in riparian communities affected by water use conflicts could be of moderate significance.

As described in the revised GEIS, such impacts could occur if water that supports these resources is diminished because of decreased availability due to droughts; increased water demand for agricultural, municipal, or industrial usage; or a combination of these factors. The potential range of impact levels at plants, subject to license renewal, with cooling ponds or

cooling towers using makeup water from a river cannot be generically determined. The NRC has also removed the term “low flow” from the title of this issue, as set forth in the proposed rule, and other related river flow issues in the final rule as previously discussed in this section (see Issue 17, “Surface Water Use Conflicts (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a River)”).

34) *Transmission Line Right-of-Way (ROW) Management Impacts on Terrestrial*

Resources: The final rule amends Table B-1 by consolidating two Category 1 issues, “Power line right-of-way management (cutting and herbicide application)” and “Floodplains and wetland on power line right-of-way,” each with an impact level of small, and names the consolidated issue, “Transmission line right-of-way (ROW) management impacts on terrestrial resources.” The consolidated issue is a Category 1 issue, with an impact level of small. The two issues were consolidated to conform to the resource-based approach used in the revised GEIS. The final rule further amends Table B-1 by removing the entries for “Power line right-of-way management (cutting and herbicide application)” and “Floodplains and wetland on power line right-of-way,” and, by adding an entry for “Transmission line right-of-way (ROW) management impacts on terrestrial resources.” The finding column entry for the consolidated issue states,

Continued ROW management during the license renewal term is expected to keep terrestrial communities in their current condition. Application of best management practices would reduce the potential for impacts.

The final rule further amends Table B-1 by appending a footnote to the issue column entry for “Transmission line right-of-way (ROW) management impacts on terrestrial resources,” concerning the extent to which transmission lines and their associated rights of way have been analyzed under the revised GEIS. This footnote is the same one that was added to Issue 3, “Offsite land use in transmission line right-of-ways (ROWs).” See the description of the changes made by the final rule to Issue 3 for further explanation of this amendment.

35) Electromagnetic Fields on Flora and Fauna (Plants, Agricultural Crops, Honeybees, Wildlife, Livestock): There are no changes to this issue, and it remains a Category 1 issue with a small level of impact. The final rule amends Table B-1 by appending a footnote to the issue column entry for “Electromagnetic Fields on Flora and Fauna (Plants, Agricultural Crops, Honeybees, Wildlife, Livestock),” concerning the extent to which transmission lines and their associated rights of way have been analyzed under the revised GEIS. This footnote is the same one that was added to Issue 3, “Offsite land use in transmission line right-of-ways (ROWs).” See the description of the changes made by the final rule to Issue 3 for further explanation of this amendment.

Aquatic Resources

36) Impingement and Entrainment of Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds): The final rule amends Table B-1 by consolidating two Category 2 issues, “Entrainment of fish and shellfish in early life stages (for plants with once-through cooling and cooling pond heat dissipation systems)” and “Impingement of fish and shellfish (for plants with once-through cooling and cooling pond heat dissipation systems),” both with impact level ranges of small to large, and names the consolidated issue, “Impingement and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds).” The consolidated issue is a Category 2 issue with an impact level range of small to large. The final rule further amends Table B-1 by removing the entries for “Entrainment of fish and shellfish in early life stages (for plants with once-through cooling and cooling pond heat dissipation systems)” and “Impingement of fish and shellfish (for plants with once-through cooling and cooling pond heat dissipation systems),” and, by adding an entry for “Impingement and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds).” The finding column entry for the consolidated issue states,

The impacts of impingement and entrainment are small at many plants, but may be moderate or even large at a few plants with once-through and cooling-pond cooling systems, depending on cooling system withdrawal rates and volumes and the aquatic resources at the site.

For the revised GEIS, these issues were consolidated to facilitate the review process in keeping with the resource-based approach and to allow for a more complete analysis of the environmental impact. Nuclear power plants typically conduct separate sampling programs to estimate the numbers of organisms entrained and impinged, which explains the original separation of these issues. However, it is the consolidated effects of entrainment and impingement that reflect the total impact of the cooling system intake on the resource. Environmental conditions are different at each nuclear power plant site, and impacts cannot be determined generically.

37) *Impingement and Entrainment of Aquatic Organisms (Plants with Cooling Towers)*: The final rule amends Table B-1 by consolidating two Category 1 issues, “Entrainment of fish and shellfish in early life stages (for plants with cooling tower-based heat dissipation systems)” and “Impingement of fish and shellfish (for plants with cooling tower-based heat dissipation systems),” both with impact levels of small, and names the consolidated issue, “Impingement and entrainment of aquatic organisms (plants with cooling towers).” The consolidated issue is a Category 1 issue with an impact level of small. The final rule further amends Table B-1 by removing the entries for “Entrainment of fish and shellfish in early life stages (for plants with cooling tower-based heat dissipation systems)” and “Impingement of fish and shellfish (for plants with cooling tower-based heat dissipation systems),” and, by adding an entry for “Impingement and entrainment of aquatic organisms (plants with cooling towers).” The finding column entry for the consolidated issue states,

Impingement and entrainment rates are lower at plants that use closed-cycle cooling with cooling towers because the rates and volumes of water withdrawal needed for makeup are minimized.

The two issues have been consolidated given their similar nature and to facilitate the environmental review process consistent with the resource-based approach in the revised GEIS.

38) *Entrainment of phytoplankton and zooplankton (all plants)*: There are no changes to this issue, and it remains a Category 1 issue with an impact level of small. The proposed rule had consolidated two Category 2 issues, “Entrainment of fish and shellfish in early life stages (for plants with once-through cooling and cooling pond heat dissipation systems)” and “Impingement of fish and shellfish (for plants with once-through cooling and cooling pond heat dissipation systems)” with the Category 1 issue, “Entrainment of phytoplankton and zooplankton (for all plants)” (74 FR 38124, 38136; July 31, 2009). Under the proposed rule, the consolidated issue would have been a Category 2 issue, with an impact range of small to large. Subsequent to the publication of the proposed rule, the NRC determined that such consolidation would have the effect of making “Entrainment of phytoplankton and zooplankton (all plants),” which is an issue generic to all plants (Category 1), a site-specific issue (Category 2). As there is no basis to support making the “Entrainment of phytoplankton and zooplankton (all plants)” a site-specific issue, the NRC determined not to adopt the proposed rule change. Instead, only the two Category 2 issues were consolidated (see Issue 36), and this issue remains separate.

39) *Thermal Impacts on Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds)*: The final rule amends Table B-1 by renaming the issue, “Heat shock (for plants with once-through and cooling pond heat dissipation systems)” as “Thermal impacts on aquatic organisms (plants with once-through cooling systems or cooling ponds).” It remains a Category 2 issue with an impact level range of small to large. The final rule further amends Table B-1 by replacing the finding column entry for this issue, which states,

Because of continuing concerns about heat shock and the possible need to modify thermal discharges in response to changing environmental conditions, the impacts may be of moderate or large significance at some plants. See § 51.53(c)(3)(ii)(B).

with the following:

Most of the effects associated with thermal discharges are localized and are not expected to affect overall stability of populations or resources. The magnitude of impacts, however, would depend on site-specific thermal plume characteristics and the nature of aquatic resources in the area.

Environmental conditions are different at each nuclear power plant site, and thermal impacts associated with once-through and cooling pond heat dissipation systems cannot be determined generically. The proposed rule had consolidated the Category 2 issue, “Heat shock (for plants with once-through and cooling pond heat dissipation systems)” with four Category 1 issues, “Cold shock (for all plants),” “Thermal plume barrier to migrating fish (for all plants),” “Distribution of aquatic organisms (for all plants),” and “Premature emergence of aquatic insects (for all plants)” (74 FR 38124, 38136; July 31, 2009). These issues were proposed for consolidation to facilitate the environmental review process because they are all caused by thermal effects. The final rule consolidates these four Category 1 issues with another Category 1 issue, “Stimulation of nuisance organisms (e.g., shipworms),” as Issue 41, “Infrequently reported thermal impacts (all plants),” as described later in this section.

40) *Thermal Impacts on Aquatic Organisms (Plants with Cooling Towers):* The final rule amends Table B-1 by renaming the issue “Heat shock (for plants with cooling-tower-based heat dissipation systems)” as “Thermal impacts on aquatic organisms (plants with cooling towers).” It remains a Category 1 issue with an impact level of small. The final rule further amends Table B-1 by replacing the finding column entry for this issue, which states, “Heat shock has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term,” with the

following, “Thermal effects associated with plants that use cooling towers are expected to be small because of the reduced amount of heated discharge.”

The proposed rule had consolidated the Category 1 issue, “Heat shock (for plants with cooling-tower-based heat dissipation systems)” with four other Category 1 issues, “Cold shock (for all plants),” “Thermal plume barrier to migrating fish (for all plants),” “Distribution of aquatic organisms (for all plants),” and “Premature emergence of aquatic insects (for all plants)” (74 FR 38124, 38136). These issues were proposed for consolidation to facilitate the environmental review process because they are all caused by thermal effects. The final rule consolidates these four Category 1 issues with another Category 1 issue, “Stimulation of nuisance organisms (e.g., shipworms),” as Issue 41, “Infrequently reported thermal impacts (all plants),” as described in the following paragraphs.

41) *Infrequently Reported Thermal Impacts (All Plants)*: The final rule amends Table B-1 by consolidating five Category 1 issues, “Cold shock (for all plants),” “Thermal plume barrier to migrating fish (for all plants),” “Distribution of aquatic organisms (for all plants),” “Premature emergence of aquatic insects (for all plants),” and “Stimulation of nuisance organisms (e.g., shipworms),” each with an impact level of small, and names the consolidated issue, “Infrequently reported thermal impacts (all plants).” The consolidated issue is a Category 1 issue, with an impact level of small. The final rule further amends Table B-1 by removing the entries for “Cold shock (for all plants),” “Thermal plume barrier to migrating fish (for all plants),” “Distribution of aquatic organisms (for all plants),” “Premature emergence of aquatic insects (for all plants),” and “Stimulation of nuisance organisms (e.g., shipworms),” and, by adding an entry for “Infrequently reported thermal impacts (all plants).” The finding column entry for the new consolidated issue states,

Continued operations during the license renewal term are expected to have small thermal impacts with respect to the following:

Cold shock has been satisfactorily mitigated at operating nuclear plants with once-through cooling systems, has not endangered fish populations or been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds, and is not expected to be a problem.

Thermal plumes have not been found to be a problem at operating nuclear power plants and are not expected to be a problem.

Thermal discharge may have localized effects but is not expected to affect the larger geographical distribution of aquatic organisms.

Premature emergence has been found to be a localized effect at some operating nuclear power plants but has not been a problem and is not expected to be a problem.

Stimulation of nuisance organisms has been satisfactorily mitigated at the single nuclear power plant with a once-through cooling system where previously it was a problem. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem.

The five issues are consolidated to facilitate the environmental review process because they are all caused by thermal effects resulting from operation of a plant's cooling system.

Previous license renewal reviews conducted by the NRC have shown that the previously described thermal issues have not been a problem at operating nuclear power plants and would not change during the license renewal term, and so no future impacts are anticipated.

42) Effects of Cooling Water Discharge on Dissolved Oxygen, Gas

Supersaturation, and Eutrophication: The final rule amends Table B-1 by consolidating three Category 1 issues, "Eutrophication," "Gas supersaturation (gas bubble disease)," and "Low dissolved oxygen in the discharge," each with an impact level of small, and names the consolidated issue, "Effects of cooling water discharge on dissolved oxygen, gas supersaturation, and eutrophication." The consolidated issue is a Category 1 issue, with an impact level of small. The three issues are consolidated given their similar nature and to facilitate the environmental review process. The final rule further amends Table B-1 by

removing the entries for “Eutrophication,” “Gas supersaturation (gas bubble disease),” and “Low dissolved oxygen in the discharge,” and, by adding an entry for “Effects of cooling water discharge on dissolved oxygen, gas supersaturation, and eutrophication.” The finding column entry for the new consolidated issue states,

Gas supersaturation was a concern at a small number of operating nuclear power plants with once-through cooling systems but has been mitigated. Low dissolved oxygen was a concern at one nuclear power plant with a once-through cooling system but has been mitigated. Eutrophication (nutrient loading) and resulting effects on chemical and biological oxygen demands have not been found to be a problem at operating nuclear power plants.

43) *Effects of Non-Radiological Contaminants on Aquatic Organisms:* The final rule amends Table B-1 by renaming the issue “Accumulation of contaminants in sediments or biota” as “Effects of non-radiological contaminants on aquatic organisms.” The renamed issue remains a Category 1 issue with an impact level of small. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Accumulation of contaminants has been a concern at a few nuclear power plants but has been satisfactorily mitigated by replacing copper alloy condenser tubes with those of another metal. It is not expected to be a problem during the license renewal term.

with the following:

Best management practices and discharge limitations of NPDES permits are expected to minimize the potential for impacts to aquatic resources during continued operations and refurbishment associated with license renewal. Accumulation of metal contaminants has been a concern at a few nuclear power plants, but has been satisfactorily mitigated by replacing copper alloy condenser tubes with those of another metal.

44) *Exposure of Aquatic Organisms to Radionuclides:* The final rule amends Table B-1 by adding a new Category 1 issue, “Exposure of aquatic organisms to radionuclides,” with an impact level of small. The finding column entry for this issue states,

Doses to aquatic organisms are expected to be well below exposure guidelines developed to protect these aquatic organisms.

The issue has been added to evaluate the potential impact of radionuclide discharges upon aquatic organisms, based on comments from members of the public and Federal and State agencies raised during the license renewal process for various plants.

The revised GEIS evaluates the potential impact of radionuclides on aquatic organisms at nuclear power plants from continued operations during the license renewal term. For the evaluation, site-specific radionuclide concentrations in environmental media (e.g., water, air, milk, crops, food products, sediment, and fish and other aquatic biota) were obtained from publicly available REMP annual reports from 15 nuclear power plants. The REMP is conducted at every NRC licensed nuclear power plant to assess the environmental impacts from plant operations. This is done by collecting samples of environmental media from areas surrounding the plant for analysis to measure the amount of radioactivity, if any, in the samples. The media samples reflect the radiation exposure pathways to the public from radioactive effluents released by the nuclear power plant and from background radiation (i.e., cosmic sources, naturally-occurring radioactive material, including radon and global fallout). These 15 plants were selected to represent sites that reported a range of radionuclide concentrations in the sample media and included both boiling water reactors and pressurized water reactors. Site-specific radionuclide concentrations in water and sediments, as reported in the plant's REMP reports, were used in the calculations. The calculated radiation dose rates to aquatic organisms, based on exposure to radioactivity in the environmental media, were compared against radiation-safety guidelines issued by DOE, IAEA, NCRP, and ICRP. The NRC concluded that the impacts of radionuclides on aquatic organisms from past and current normal operations are small for all nuclear power plants and should not change appreciably during the license renewal term.

45) Effects of Dredging on Aquatic Organisms: The final rule amends Table B-1 by adding a new Category 1 issue, “Effects of dredging on aquatic organisms,” with an impact level of small, to evaluate the impacts of dredging on aquatic organisms. The finding column entry for this issue states,

Dredging at nuclear power plants is expected to occur infrequently, would be of relatively short duration, and would affect relatively small areas. Dredging is performed under permit from the U.S. Army Corps of Engineers, and possibly, from other State or local agencies.

Licensees conduct dredging to maintain intake and discharge structures at nuclear power plant facilities and in some cases, to maintain barge slips. Dredging may disturb or remove benthic communities. In general, maintenance dredging for nuclear power plant operations occur infrequently, is of relatively short duration, and affects relatively small areas. Dredging is performed under a permit issued by the U.S. Army Corps of Engineers and consequently, each dredging action is subject to a site-specific environmental review conducted by the Corps. Dredging activities may also require permits from various State or local agencies.

46) Water Use Conflicts with Aquatic Resources (Plants with Cooling Ponds or Cooling Towers using Makeup Water from a River): The final rule amends Table B-1 by adding a new Category 2 issue, “Water use conflicts with aquatic resources (plants with cooling ponds or cooling towers using makeup water from a river),” with an impact level range of small to moderate, to evaluate water use conflicts with aquatic resources in stream communities. The finding column entry for this issue states,

Impacts on aquatic resources in stream communities affected by water use conflicts could be of moderate significance in some situations.

Such impacts could occur if water that supports these resources is diminished because of decreased availability due to droughts; increased water demand for agricultural, municipal, or industrial usage; or a combination of these factors. The potential range of impact levels at

plants, subject to license renewal, with cooling ponds or cooling towers using makeup water from a river cannot be generically determined. The NRC has also removed the term “low flow” from the title of this issue, as set forth in the proposed rule, and other related river flow issues in the final rule as previously discussed in this section (see Issue 17, “Surface water use conflicts (plants with cooling ponds or cooling towers using makeup water from a river)”).

47) Effects on Aquatic Resources (Non-Cooling System Impacts): The final rule amends Table B-1 by renaming the “Refurbishment” issue as “Effects on aquatic resources (non-cooling system impacts).”²⁹ It remains a Category 1 issue with an impact level of small. The final rule further amends Table B-1 by replacing the finding column entry, which states,

During plant shutdown and refurbishment there will be negligible effects on aquatic biota because of a reduction of entrainment and impingement of organisms or a reduced release of chemicals.

with the following:

Licensee application of appropriate mitigation measures is expected to result in no more than small changes to aquatic communities from their current condition.

48) Impacts of Transmission Line Right-of-Way (ROW) Management on Aquatic Resources: The final rule amends Table B-1 by adding a new Category 1 issue, “Impacts of transmission line right-of-way (ROW) management on aquatic resources,” with an impact level of small, to evaluate the impact of transmission line ROW management on aquatic resources during the license renewal term. The finding column entry for this issue states,

Licensee application of best management practices to ROW maintenance is expected to result in no more than small impacts to aquatic resources.

Impacts on aquatic resources from transmission line ROW maintenance could occur as a result of the direct disturbance of aquatic habitats, soil erosion, changes in water quality (from

²⁹ The proposed rule had renamed this issue “Refurbishment impacts on aquatic resources.” (74 FR 38125, 38136; July 31, 2009).

sedimentation and thermal effects), or inadvertent releases of chemical contaminants from herbicide use. As described in the revised GEIS, the NRC expects any impact on aquatic resources resulting from transmission line ROW maintenance to be small, short term, and localized for all plants because of licensee application of best management practices.

The final rule further amends Table B-1 by appending a footnote to the issue column entry for “Impacts of transmission line right-of-way (ROW) management on aquatic resources,” concerning the extent to which transmission lines and their associated ROW have been analyzed under the revised GEIS. This footnote is the same one that was added to Issue 3, “Offsite land use in transmission line right-of-ways (ROWs).” See the description of the changes made by the final rule to Issue 3 for further explanation of this amendment.

49) Losses from Predation, Parasitism, and Disease Among Organisms Exposed to Sublethal Stresses: There are no changes to this issue, and it remains a Category 1 issue, with an impact level of small.

Special Status Species and Habitats

50) Threatened, Endangered, and Protected Species and Essential Fish Habitat:

The final rule amends Table B-1 by renaming the issue “Threatened or endangered species” as “Threatened, endangered, and protected species and essential fish habitat.” The final rule expands the scope of the issue to include essential fish habitats protected under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The renamed and expanded issue is a Category 2 issue. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Generally, plant refurbishment and continued operations are not expected to adversely affect threatened or endangered species. However, consultation with appropriate agencies would be needed at the time of license renewal to determine whether threatened or

endangered species are present and whether they would be adversely affected. See § 51.53(c)(3)(ii)(E).

with the following:

The magnitude of impacts on threatened, endangered, and protected species, critical habitat, and essential fish habitat would depend on the occurrence of listed species and habitats and the effects of power plant systems on them. Consultation with appropriate agencies would be needed to determine whether special status species or habitats are present and whether they would be adversely affected by continued operations and refurbishment associated with license renewal.

The final rule also amends Table B-1 by removing the words “SMALL, MODERATE, or LARGE” from the finding column entry because the Endangered Species Act (ESA) requires other findings.³⁰ In complying with the ESA, the NRC determines whether the effects of continued nuclear power plant operations and refurbishment 1) would have no effect, 2) are not likely to adversely affect, 3) are likely to adversely affect, or 4) are likely to jeopardize the listed species or adversely modify the designated critical habitat of Federally listed species populations or their critical habitat during the license renewal term. For listed species where the NRC has found that its action is “likely to adversely affect” the species or habitat, the NRC may further characterize the effects as “is [or is not] likely to jeopardize listed species or adversely modify designated critical habitat.”

Similarly, the MSA also requires other findings. In complying with the MSA, the NRC determines whether the effects of continued nuclear power plant operations and refurbishment associated with license renewal would have: 1) no adverse impact, 2) minimal adverse impact, or 3) substantial adverse impact to the essential habitat of federally managed fish populations during the license renewal term. Therefore, the NRC believes that reporting its ESA and MSA findings instead of the “SMALL, MODERATE, or LARGE” significance levels of impact will clarify the results.

³⁰ The proposed rule did not reflect this change (74 FR 38125, 38137; July 31, 2009).

Historic and Cultural Resources

51) *Historic and Cultural Resources*: The final rule amends Table B-1 by renaming the issue “Historic and archaeological resources” as “Historic and cultural resources.” It remains a Category 2 issue. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Generally, plant refurbishment and continued operations are expected to have no more than small adverse impacts on historic and archaeological resources. However, the National Historic Preservation Act requires the Federal agency to consult with the State Historic Preservation Officer to determine whether there are properties present that require protection. See § 51.53(c)(3)(ii)(K).

with the following:

Continued operations and refurbishment associated with license renewal are expected to have no more than small impacts on historic and cultural resources located onsite and in the transmission line ROW because most impacts could be mitigated by avoiding those resources. The National Historic Preservation Act (NHPA) requires the Federal agency to consult with the State Historic Preservation Officer (SHPO) and appropriate Native American Tribes to determine the potential effects on historic properties and mitigation, if necessary.

The final rule further amends Table B-1 by removing the words “SMALL, MODERATE, or LARGE” from the finding column entry³¹ because the NHPA requires the NRC to determine whether historic properties are present on or near the project site, and if so, whether the license renewal decision would result in any adverse effect upon such properties. Thus, the NRC in its plant-specific environmental review makes the following determinations: no historic properties present; historic properties are present, but not adversely affected; or there is an adverse effect.

If continued operations and refurbishment associated with license renewal result in any adverse effects, the NHPA Section 106 process requires consultation with the requisite State

³¹ The proposed rule did not reflect this change (74 FR 38125, 38137; July 31, 2009).

Historic Preservation Officer and if appropriate, the requisite Tribal Historic Preservation Officer. The license renewal applicant is typically an active participant in such consultation, and the applicant may agree to commit to carrying out the appropriate mitigation measures. If an agreement is reached, the parties will execute a Memorandum of Agreement. Therefore, the NRC believes that reporting its NHPA findings in the plant-specific SEIS, instead of the “SMALL, MODERATE, or LARGE” significance levels of impact will clarify the results.

Socioeconomics

52) *Employment and Income, Recreation and Tourism*: The final rule amends Table B-1 by adding a new Category 1 issue, “Employment and income, recreation and tourism,” which includes the “tourism and recreation” portion of a current Table B-1 Category 1 issue, “Public services: public safety, social services, and tourism and recreation.” The issue has an impact level of small. The final rule consolidates the tourism and recreation portion with the new generic analysis to cover employment and income given the similar nature of these issues and to facilitate the environmental review process. The revised GEIS provides an analysis of this consolidated issue and concludes that the impacts are generic to all plants undergoing license renewal. The finding column entry for this issue states,

Impacts to employment, income, recreation, and tourism from continued operations and refurbishment associated with license renewal are expected to be small.

53) *Tax Revenues*: The impact of changes to tax revenues was discussed in the 1996 GEIS, but was not listed in Table B-1. The final rule amends Table B-1 by adding a new Category 1 issue, “Tax revenues,” to evaluate the impacts of license renewal on tax revenues. The issue has an impact level of small. The finding column entry for this issue states,

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.

Refurbishment activities, such as steam generator and reactor vessel head replacement, have not had a noticeable effect on the value of nuclear power plants, thus changes in tax revenues are not anticipated from future refurbishment activities. Refurbishment activities involve the one-for-one replacement of existing components and are generally not considered a taxable improvement. Also, new property tax assessments; proprietary payments in lieu of tax stipulations, settlements, and agreements; and State tax laws are continually changing the amounts paid to taxing jurisdictions by nuclear power plant owners, and these occur independent of license renewal and refurbishment activities.

54) *Community Services and Education*: The final rule amends Table B-1 by reclassifying two Category 2 issues, “Public services: public utilities,” with an impact level range of small to moderate, and “Public services, education (refurbishment),” with an impact level range of small to large, as Category 1 issues. The final rule consolidates these two issues with the Category 1 issue, “Public services, education (license renewal term),” which has an impact level of small, and the “Public safety and social service” portion of the Category 1 issue, “Public services: public safety, social services, and tourism and recreation,” which also has an impact level of small.³² The final rule names the consolidated issue, “Community services and education,” and classifies it as a Category 1 issue with an impact level of small. The final rule further amends Table B-1 by removing the entries for “Public services: public utilities,” “Public services, education (refurbishment),” “Public services, education (license renewal term),” and “Public services: public safety, social services, and tourism and recreation,” and by adding the

³² The “tourism and recreation” portion of the “Public services: public safety, social services, and tourism and recreation” issue was consolidated with the new generic analysis concerning employment and income to form the consolidated Category 1 issue, “Employment and income, recreation and tourism” (see Issue 52).

entry for “Community services and education.” The finding column entry for the “Community services and education” issue states,

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.

The four issues are consolidated because all public services are equally affected by changes in plant operations and refurbishment associated with license renewal. Any changes in the number of workers at a nuclear power plant will affect demand for public services from local communities. Nevertheless, past environmental reviews conducted by the NRC since the issuance of the 1996 GEIS have shown that the number of workers at relicensed nuclear power plants has not changed significantly because of license renewal. Thus, no significant impacts on community services are anticipated from future license renewals. In addition, refurbishment activities, such as steam generator and reactor vessel head replacement, have not required the large numbers of workers and the months of time that was conservatively analyzed in the 1996 GEIS, and as such, significant impacts on community services are no longer anticipated. Combining the four issues also facilitates the environmental review process.

55) *Population and Housing*: The final rule amends Table B-1 by renaming the Category 2 issue, “Housing impacts,” with an impact level range of small to large, to “Population and housing.” The final rule reclassifies this issue as a Category 1 issue with an impact level of small. As described in the revised GEIS, the availability and value of housing are directly affected by changes in population. The final rule further amends Table B-1 by removing the entry for “Housing impacts,” and, by adding an entry for “Population and housing.” The finding column entry for this issue states,

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.

As described in the revised GEIS, the NRC has determined that the impacts of continued operations and refurbishment activities on population and housing during the license renewal term would be small. Moreover, any impacts are not dependent on the socioeconomic setting of the nuclear power plant and are generic to all plants.

56) *Transportation*: The final rule amends Table B-1 by reclassifying the Category 2 issue, "Public services, Transportation," with an impact level range of small to large, as a Category 1 issue with an impact level of small, and renaming it "Transportation." The final rule further amends Table B-1 by replacing the finding column entry, which states,

Transportation impacts (level of service) of highway traffic generated during plant refurbishment and during the term of the renewed license are generally expected to be of small significance. However, the increase in traffic associated with additional workers and the local road and traffic control conditions may lead to impacts of moderate or large significance at some sites. See § 51.53(c)(3)(ii)(J).

with the following:

Changes resulting from continued operations and refurbishment associated with license renewal to traffic volumes would be small.

As described in the revised GEIS, the NRC has determined that the numbers of workers have not changed significantly due to license renewal, so transportation impacts from continued operations and refurbishment associated with license renewal are no longer expected to be significant.

Human Health

57) Radiation Exposures to the Public: The final rule amends Table B-1 by consolidating two Category 1 issues, “Radiation exposures to the public during refurbishment” and “Radiation exposure to public (license renewal term)” and names the consolidated issue, “Radiation exposures to the public.” The consolidated issue is a Category 1 issue with an impact level of small. These issues are consolidated given their similar nature and to facilitate the environmental review process. The final rule amends Table B-1 by removing the entries for “Radiation exposures to the public during refurbishment” and “Radiation exposure to public (license renewal term)” and by adding an entry for “Radiation exposures to the public.” The finding column entry for this consolidated issue states,

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.

58) Radiation Exposures to Plant Workers: The final rule amends Table B-1 by consolidating two Category 1 issues, “Occupational radiation exposures during refurbishment” and “Occupational radiation exposures (license renewal term)” and names the consolidated issue, “Radiation exposures to plant workers.” The consolidated issue is a Category 1 issue with an impact level of small. These issues are consolidated given their similar nature and to facilitate the environmental review process. The final rule amends Table B-1 by removing the entries “Occupational radiation exposures during refurbishment” and “Occupational radiation exposures (license renewal term)” and by adding an entry for “Radiation exposures to plant workers.” The finding column entry for the combined issue states,

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.

59) Human Health Impact from Chemicals: The final rule amends Table B-1 by adding a new Category 1 issue, “Human health impact from chemicals,” to evaluate the potential impacts to plant workers and members of the public from exposure to chemicals. The new issue has an impact level of small. The finding column entry for this issue states,

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.

The evaluation addresses the potential impact of chemicals on human health resulting from normal operations of a nuclear power plant during the license renewal term. Impacts of chemical exposure to human health are considered to be small if the use of chemicals within the plant is in accordance with industrial safety guides and discharges of chemicals to water bodies are within effluent limitations designed to ensure protection of water quality and aquatic life.

The disposal of hazardous chemicals used at nuclear power plants by licensees is subject to the RCRA and the CWA (which requires licensees to hold an NPDES permit). Adherence by the licensee to these statutory requirements should minimize adverse impacts to the environment, workers, and the public. It is anticipated that all plants would continue to operate in compliance with all applicable permits and that no mitigation measures beyond those implemented during the current license term would be warranted as a result of license renewal.

A review of the documents, as referenced in the revised GEIS, operating monitoring reports, and consultations with utilities and regulatory agencies that were performed for the 1996 GEIS, indicated that the effects of the discharge of chlorine and other biocides on water quality have been of small significance for all power plants. Small quantities of biocides are readily dissipated and/or are chemically altered in the body of water receiving them, so

significant cumulative impacts to water quality would not be expected. The NRC expects no major changes in the operation of plant cooling systems during the license renewal term, so no changes are anticipated in the effects of biocide discharges on the quality of the receiving waters. The EPA and the States regulate discharges of sanitary wastes and heavy metals through NPDES permits. The NRC considers discharges that do not violate the permit limits to be of small significance. The effects of minor chemical discharges and spills on water quality are also expected to be of small significance during the license renewal term, and the appropriate regulating agencies would require the licensee to mitigate these discharges and spills as needed.

60) Microbiological Hazards to the Public (Plants with Cooling Ponds or Canals or Cooling Towers that Discharge to a River): The final rule amends Table B-1 by renaming the “Microbiological organisms (public health) (plants using lakes or canals, or cooling towers or cooling ponds that discharge to a small river)” issue as “Microbiological hazards to the public (plants with cooling ponds or canals or cooling towers that discharge to a river).” The issue remains a Category 2 issue, with an impact level range of small to large. The final rule further amends Table B-1 by replacing the finding column entry, which states,

These organisms are not expected to be a problem at most operating plants except possibly at plants using cooling ponds, lakes, or canals that discharge to small rivers. Without site-specific data, it is not possible to predict the effects generically. See § 51.53(c)(3)(ii)(G).

with the following:

These organisms are not expected to be a problem at most operating plants except possibly at plants using cooling ponds, lakes, or canals, or that discharge into rivers. Impacts would depend on site-specific characteristics.

61) Microbiological Hazards to Plant Workers: The final rule amends Table B-1 by renaming the “Microbiological organisms (occupational health)” issue as “Microbiological

hazards to plant workers.” It remains a Category 1 issue with an impact level of small. The final rule amends Table B-1 by adding the phrase “as required by permits and Federal and State regulations” to the end of the finding column entry.

62) Chronic Effects of Electromagnetic Fields (EMFs): The final rule amends Table B-1 by renaming the “Electromagnetic fields, chronic effects” issue as “Chronic effects of electromagnetic fields (EMFs).” It remains an uncategorized issue with respect to impact level because there is no national scientific consensus on the potential impacts from chronic exposure to EMFs. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Biological and physical studies of 60-Hz electromagnetic fields have not found consistent evidence linking harmful effects with field exposures. However, research is continuing in this area and a consensus scientific view has not been reached.

with the following:

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.

Although there is no conclusion as to the impact level, and this issue is not considered to be a Category 1 issue in the sense that a generic conclusion on the impact level has not been reached, this issue will be treated uniformly in plant-specific SEISs by essentially providing the discussion appearing in this issue’s finding column entry in Table B-1 until a national scientific consensus has been reached.

The final rule further amends Table B-1 by appending a footnote to the issue column entry for “Chronic effects of electromagnetic fields (EMFs),” concerning the extent to which transmission lines and their associated right of ways have been analyzed under the revised

GEIS. This footnote is the same one that was added to Issue 3, “Offsite land use in transmission line right-of-ways (ROWS).” See the description of the changes made by the final rule to Issue 3 for further explanation of this amendment. In addition, the final rule retains the footnote that was appended to issue column entry but renumbers that footnote from “5” to “6” and retains the footnote that was appended to category column entry but renumbers that footnote from “4” to “5.”

63) *Physical Occupational Hazards:* The final rule amends Table B-1 by adding a new Category 1 issue, “Physical occupational hazards,” to evaluate the potential impact of physical occupational hazards on human health resulting from normal nuclear power plant operations during the license renewal term. The issue has an impact level of small. The finding column entry for this issue states,

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.

Through a Memorandum of Understanding (53 FR 43950; October 31, 1988) between the NRC and the Occupational Safety and Health Administration (OSHA), plant conditions which result in an occupational risk, but do not affect the safety of licensed radioactive materials, are under the statutory authority of OSHA rather than the NRC. Nevertheless, the impact of physical occupational hazards on human health has been raised by the public, as well as Federal and State agencies during the license renewal process. As such, this issue has been added to allow for a more complete analysis of the human health impact of continued power plant operation, during the license renewal term. Occupational hazards can be minimized by licensees when workers adhere to safety standards and use appropriate protective equipment, although fatalities and injuries from accidents can still occur. Data for occupational injuries in 2005 obtained from the U.S. Bureau of Labor Statistics indicate that the rate of fatal injuries in

the utility sector is less than the rate for many sectors (e.g., construction, transportation and warehousing, agriculture, forestry, fishing and hunting, wholesale trade, and mining) and that the incidence rate for nonfatal occupational injuries and illnesses is the least for electric power generation, followed by electric power transmission control and distribution. It is expected that over the license renewal term, licensees would ensure that their workers continue to adhere to safety standards and use protective equipment, so adverse occupational impacts would be of small significance at all sites.

64) *Electric Shock Hazards*: The final rule amends Table B-1 by renaming the “Electromagnetic fields, acute effects (electric shock)” issue as “Electric shock hazards.” It remains a Category 2 issue with an impact level range of small to large. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Electrical shock resulting from direct access to energized conductors or from induced charges in metallic structures have not been found to be a problem at most operating plants and generally are not expected to be a problem during the license renewal term. However, site-specific review is required to determine the significance of the electric shock potential at the site. See § 51.53(c)(3)(ii)(H).

with the following:

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 generically determine the significance of the electrical shock potential.

The final rule’s change to the finding column entry reflects the analysis in the revised GEIS concerning the potential of electrical shock from transmission lines. The final rule further amends Table B-1 by appending a footnote to the issue column entry for “Electric shock hazards,” concerning the extent to which transmission lines and their associated right of ways have been analyzed under the revised GEIS. This footnote is the same one that was added to

Issue 3, “Offsite land use in transmission line right-of-ways (ROWs).” See the description of the changes made by the final rule to Issue 3 for further explanation of this amendment.

Postulated Accidents

65) Design-Basis Accidents and 66) Severe Accidents: “Design-basis accidents,” and “Severe accidents,” with impact levels of small, remain Category 1 and 2 issues, respectively. The final rule amends Table B-1 by making minor clarifying changes to the finding column entries for both of these issues.

Environmental Justice

67) Minority and Low-Income Populations: The final rule amends Table B-1 by adding a new Category 2 issue, “Minority and low-income populations,” to evaluate the impacts of continued operations and any refurbishment activities during the license renewal term on minority and low-income populations living in the vicinity of the plant. This issue was listed in Table B-1, prior to this final rule, but was not evaluated in the 1996 GEIS. In that table the finding column entry for this issue states, “[t]he need for and the content of an analysis of environmental justice will be addressed in plant-specific reviews.”

Executive Order 12898 (59 FR 7629; February 16, 1994) initiated the Federal government’s environmental justice program. The NRC’s “Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions” (69 FR 52040; August 24, 2004) states, “the NRC is committed to the general goals of E.O. 12898, [and] it will strive to meet those goals through its normal and traditional NEPA review process.” Guidance for implementing E.O. 12898 was not available prior to the completion of the 1996 GEIS. By making this a Category 2 issue, the final rule requires license renewal applicants to identify, in

their environmental reports, minority and low-income populations and communities residing in the vicinity of the nuclear power plant.

The final rule amends Table B-1 by replacing the finding column entry, which states,

The need for and the content of an analysis of environmental justice will be addressed in plant-specific reviews.

with the following:

Impacts to minority and low-income populations and subsistence consumption resulting from continued operations and refurbishment associated with license renewal will be addressed in plant-specific reviews. See NRC Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (69 FR 52040; August 24, 2004).

The final rule does not adopt the proposed rule's impact range of small to moderate for this issue as E.O. 12898 requires a determination of whether human health and environmental effects of continued operations during the license renewal term and refurbishment associated with license renewal on minority and low-income populations would be disproportionately high and adverse. This determination will be made by the NRC in each plant-specific SEIS.

The final rule removes the footnote from the category column entry for this issue and removes footnote "6" from Table B-1, as footnote "6" is no longer necessary.

Waste Management

68) Low-Level Waste Storage and Disposal: This issue remains a Category 1 issue with an impact level of small. The final rule amends Table B-1 by replacing the finding column entry, which states,

The comprehensive regulatory controls that are in place and the low public doses being achieved at reactors ensure that the radiological impacts to the environment will remain small during the term of a renewed license. The maximum additional on-site land that may be required for low-level waste storage during the term of a renewed license and associated impacts will be small. Nonradiological impacts on air and water will be negligible. The

radiological and nonradiological environmental impacts of long-term disposal of low-level waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient low-level waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with NRC decommissioning requirements.

with the following:

The comprehensive regulatory controls that are in place and the low public doses being achieved at reactors ensure that the radiological impacts to the environment would remain small during the license renewal term.

69) Onsite Storage of Spent Nuclear Fuel: The final rule amends Table B-1 by renaming the “Onsite spent fuel” issue as “Onsite storage of spent nuclear fuel.” It remains a Category 1 issue with an impact level of small. The final rule does not change the finding column entry for this issue.

70) Offsite Radiological Impacts of Spent Nuclear Fuel and High-Level Waste Disposal: The final rule amends Table B-1 by renaming the “Offsite radiological impacts (spent fuel and high level waste disposal)” issue as “Offsite radiological impacts of spent nuclear fuel and high-level waste disposal.” It remains a Category 1 issue with no impact level assigned. The final rule amends Table B-1 by replacing the finding column entry for this issue with a more concise and updated entry, including reference to updated radiation protection standards. The finding column entry revised by the final rule states,

For the high-level waste and spent-fuel disposal component of the fuel cycle, the EPA established a dose limit of 15 millirem (0.15 mSv) per year for the first 10,000 years and 100 millirem (1.0 mSv) 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.

71) *Mixed-Waste Storage and Disposal:* This issue remains a Category 1 issue with an impact level of small. The final rule amends Table B-1 by replacing the finding column entry for this issue, which states,

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 will 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. In addition, the Commission concludes that there is reasonable assurance that sufficient mixed waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with NRC decommissioning requirements.

with the following:

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.

72) *Nonradioactive Waste Storage and Disposal:* The final rule amends Table B-1 by renaming the issue “Nonradiological waste” as “Nonradiological waste storage and disposal.” It remains a Category 1 issue, with an impact level of small. The final rule further amends Table B-1 by replacing the finding column entry, which states,

No changes to generating systems are anticipated for license renewal. Facilities and procedures are in place to ensure continued proper handling and disposal at all sites.

with the following:

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.

Cumulative Impacts

73) Cumulative Impacts: The final rule amends Table B-1 by adding a new Category 2 issue, “Cumulative impacts,” to evaluate the potential cumulative impacts of license renewal. The term “cumulative impacts” is defined in 10 CFR 51.14(b) by reference to the CEQ regulations, 40 CFR 1508.7, as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”

For the purposes of analysis, past actions are considered to be when the nuclear power plant was licensed and constructed, present actions are related to current plant operations, and future actions are those that are reasonably foreseeable through the end of plant operations including the license renewal term. The geographic area over which past, present, and future actions are assessed depends on the affected resource.

The final rule requires license renewal applicants to identify other past, present, and reasonably foreseeable future actions, such as the construction and operation of other power plants and other industrial and commercial facilities in the vicinity of the nuclear power plant.

The finding column entry for this issue states,

Cumulative impacts of continued operations and refurbishment associated with license renewal must be considered on a plant-specific basis. Impacts would depend on regional resource characteristics, the resource-specific impacts of license renewal, and the cumulative significance of other factors affecting the resource.

Uranium Fuel Cycle

74) Offsite Radiological Impacts—Individual Impacts from Other than the Disposal of Spent Fuel and High-Level Waste: The final rule amends Table B-1 by renaming the “Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high level waste)” issue as “Offsite radiological impacts—individual impacts from other than the disposal of spent fuel and high-level waste.” This issue remains a Category 1 issue with an impact level of small. The final rule further amends Table B-1 by replacing the finding column entry, which states,

Off-site impacts of the uranium fuel cycle have been considered by the Commission in Table S-3 of this part. Based on information in the GEIS, impacts on individuals from radioactive gaseous and liquid releases including radon-222 and technetium-99 are small.

with the following:

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.

75) Offsite Radiological Impacts—Collective Impacts from Other than the Disposal of Spent Fuel and High-Level Waste: The final rule amends Table B-1 by renaming the “Offsite radiological impacts (collective effects)” issue as “Offsite radiological impacts—collective impacts from other than the disposal of spent fuel and high-level waste.” It remains a Category 1 issue with no impact level assigned. The final rule further amends Table B-1 by replacing the finding column entry, which states,

The 100 year environmental dose commitment to the U.S. population from the fuel cycle, high level waste and spent fuel disposal excepted, is calculated to be about 14,800 person rem, or 12 cancer fatalities, for each additional 20-year power reactor operating term. Much of this, especially the contribution of radon releases from mines and tailing piles, consists of tiny doses

summed over large populations. This same dose calculation can theoretically be extended to include many tiny doses over additional thousands of years as well as doses outside the U.S. The result of such a calculation would be thousands of cancer fatalities from the fuel cycle, but this result assumes that even tiny doses have some statistical adverse health effect which will not ever be mitigated (for example no cancer cure in the next thousand years), and that these doses projected over thousands of years are meaningful. However, these assumptions are questionable. In particular, science cannot rule out the possibility that there will be no cancer fatalities from these tiny doses. For perspective, the doses are very small fractions of regulatory limits, and even smaller fractions of natural background exposure to the same populations.

Nevertheless, despite all the uncertainty, some judgment as to the regulatory NEPA implications of these matters should be made and it makes no sense to repeat the same judgment in every case. Even taking the uncertainties into account, the Commission concludes that these impacts are acceptable in that these 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 effects of the fuel cycle, this issue is considered Category 1.

with the following:

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.

76) Nonradiological Impacts of the Uranium Fuel Cycle: The final rule amends Table B-1 by making minor clarifying changes to the finding column entry for this issue. This issue remains a Category 1 issue with an impact level of small.

77) Transportation: This issue remains a Category 1 issue with an impact level of small. The final rule amends Table B-1 by replacing the finding column entry for this issue, which states,

The impacts of transporting spent fuel enriched up to 5 percent uranium-235 with average burnup for the peak rod to current levels approved by NRC up to 62,000 MWd/MTU and the cumulative impacts of transporting high-level waste to a single repository, such as Yucca Mountain, Nevada are found to be consistent with the impact values contained in 10 CFR 51.52(c), Summary Table S-4—Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor. If fuel enrichment or burnup conditions are not met, the applicant must submit an assessment of the implications for the environmental impact values reported in § 51.52.

with the following:

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

78) Termination of Plant Operations and Decommissioning: The final rule amends Table B-1 by consolidating a new Category 1 issue, “Termination of nuclear power plant operations” with six other Category 1 issues related to the decommissioning of a nuclear power plant: “Radiation doses,” “Waste management,” “Air quality,” “Water quality,” “Ecological resources,” and “Socioeconomic impacts,” each with an impact level of small. The final rule names the consolidated issue, “Termination of plant operations and decommissioning.” The consolidated issue is a Category 1 issue with an impact level of small.

The final rule further amends Table B-1 by removing the entries for “Radiation doses,” “Waste management,” “Air quality,” “Water quality,” “Ecological resources,” and “Socioeconomic impacts,” and, by adding an entry for “Termination of plant operations and decommissioning.” The finding column entry for the consolidated issue states,

License renewal is expected to have a negligible effect on the impacts of terminating operations and decommissioning on all resources.

The 1996 GEIS analysis indicates that the six decommissioning issues are expected to be small at all nuclear power plant sites. The new issue addresses the impacts from terminating nuclear power plant operations and plant decommissioning. Termination of nuclear power plant operations results in the cessation of many routine plant operations as well as a significant reduction in the plant's workforce. It is assumed that termination of plant operations would not lead to the immediate decommissioning and dismantlement of the reactor or other power plant infrastructure.

The final rule consolidates the six decommissioning issues and the termination of nuclear power plant operations issue into one Category 1 issue to facilitate the environmental review process. For further information about the environmental effects of decommissioning, see the "2002 Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Regarding the Decommissioning of Nuclear Power Reactors," NUREG-0586.

IX. Section-by-Section Analysis

The following section-by-section analysis discusses the sections in 10 CFR Part 51 that are being amended as a result of the final rule.

Section 51.53(c)(2)

The NRC is clarifying the required contents of the license renewal environmental report which applicants must submit in accordance with 10 CFR 54.23, "Contents of application—environmental information," by revising the second sentence in this subparagraph to read, "This report must describe in detail the affected environment around the plant, the

modifications directly affecting the environment or any plant effluents, and any planned refurbishment activities.”

Sections 51.53(c)(3)(ii)(A), (B), (C), and (E)

For those applicants seeking an initial license renewal and holding either an operating license, construction permit, or combined license as of June 30, 1995, the environmental report shall include the information required in 10 CFR 51.53(c)(2) but is not required to contain assessments of the environmental impacts of certain license renewal issues identified as Category 1 (generically analyzed) issues in Appendix B to Subpart A of 10 CFR Part 51. The environmental report must contain 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 (plant-specific analysis required) issues in Appendix B to Subpart A of 10 CFR Part 51 and must include consideration of alternatives for reducing adverse impacts of Category 2 issues. In addition, the environmental report must contain any new and significant information regarding the environmental impacts of license renewal of which the applicant is aware. The required analyses are listed in 10 CFR 51.53(c)(3)(ii)(A)–(P).

The final rule language for 10 CFR 51.53(c)(3)(ii)(A), (B), (C), (E), (F), (G), (I), (J), (K), and (N) consists of changes to conform to the final changes in Table B-1, which in turn, reflects the revised GEIS. The modified paragraphs more accurately reflect the specific information needed in the environmental report that will help the NRC conduct the environmental review of the proposed action.

Section 51.53(c)(3)(ii)(A) is revised to incorporate the findings of the revised GEIS and to require applicants to provide information in their environmental reports regarding water use conflicts encompassing water availability and competing water demands, and related impacts

on stream (aquatic) and riparian (terrestrial) communities. The numerical definition for a low flow river has also been deleted requiring that applicants withdrawing makeup water for cooling towers or cooling ponds from any river provide a plant-specific assessment of water use conflicts in their environmental reports.

Section 51.53(c)(3)(ii)(B) is revised to replace “heat shock” with “thermal changes” to reflect the final changes in Table B-1 as described earlier in this document under “Aquatic Resources” environmental impact Issue 39, “Thermal impacts on aquatic organisms (plants with once-through cooling systems or cooling ponds).”

Section 51.53(c)(3)(ii)(C) is revised to delete the reference to “Ranney wells” to conform to the final changes made in the revised Table B-1.

Section 51.53(c)(3)(ii)(E) is revised to expressly include nuclear power plant continued operations within the scope of the impacts to be assessed by license renewal applicants. The paragraph is further revised to expand the scope of the provision to include all Federal wildlife protection laws and essential fish habitat under the MSA.

Section 51.53(c)(3)(ii)(F)

The final rule removes and reserves 10 CFR 51.53(c)(3)(ii)(F) because the final rule changes the Category 2 issue, “Air quality during refurbishment (nonattainment and maintenance areas),” to Category 1, “Air quality impacts (all plants).”

Section 51.53(c)(3)(ii)(G)

The final rule language for 10 CFR 51.53(c)(3)(ii)(G) is revised to delete the numerical definition for a low flow river to conform to the final changes made in the revised Table B-1.

Section 51.53(c)(3)(ii)(I)

The final rule removes and reserves 10 CFR 51.53(c)(3)(ii)(I) because several Category 2 socioeconomic issues are reclassified as Category 1.

Section 51.53(c)(3)(ii)(J)

The final rule removes and reserves 10 CFR 51.53(c)(3)(ii)(J) because the final rule changes the Category 2 issue, “Public services, Transportation,” to Category 1, “Transportation.”

Section 51.53(c)(3)(ii)(K)

The final rule language for 10 CFR 51.53(c)(3)(ii)(K) is revised to more accurately reflect the specific information needed in the environmental report that will help the NRC conduct the environmental review of the proposed action.

Section 51.53(c)(3)(ii)(N)

The final rule adds a new paragraph (c)(3)(ii)(N) in 10 CFR 51.53 to require license renewal applicants to provide information on the general demographic composition of minority and low-income populations and communities (by race and ethnicity) residing in the immediate vicinity of the plant that could be affected by the renewal of the plant’s operating license, including any planned refurbishment activities, and ongoing and future plant operations.

Section 51.53(c)(3)(ii)(O)

The final rule adds a new paragraph (c)(3)(ii)(O) in 10 CFR 51.53 to require license renewal applicants to provide information about other past, present, and reasonably foreseeable

future actions occurring in the vicinity of the nuclear power plant that may result in a cumulative effect.

Section 51.53(c)(3)(ii)(P)

The final rule adds a new paragraph (c)(3)(ii)(P) in 10 CFR 51.53 to require the license renewal applicant to assess the impact of any documented inadvertent releases of radionuclides to groundwater. The assessment must include a description of any groundwater protection program used for the surveillance of piping and components containing radioactive liquids for which a pathway to groundwater may exist. The assessment must also include a description of any past inadvertent releases, including the projected impact to the environment (e.g., aquifers, rivers, lakes, ponds) during the license renewal term.

Section 51.71(d)

The final rule language for 10 CFR 51.71(d) is revised to make minor conforming changes to clarify the readability and to include the analysis of cumulative impacts. Cumulative impacts were not addressed in the 1996 GEIS, but are currently being evaluated by the NRC in plant-specific supplements to the GEIS. The NRC is modifying this paragraph to more accurately reflect the cumulative impacts analysis conducted for environmental reviews of the proposed action.

Section 51.95(c)

The final rule language revisions to the preamble paragraph of 10 CFR 51.95(c) are administrative in nature and replace the reference to the 1996 GEIS for license renewal of nuclear power plants with a reference to the revised GEIS.

Section 51.95(c)(4)

The final rule removes the terms “resolved Category 2 issues” and “open Category 2 issues” from the second sentence of 10 CFR 51.95(c)(4), makes other clarifying changes to enhance the readability of the sentence, corrects a typographical error, and removes otherwise ambiguous or unnecessary language. The terms “resolved Category 2 issues” and “open Category 2 issues” are not defined nor used in 10 CFR Part 51. In addition, the revised GEIS does not contain these terms nor does the NRC use these terms in SEISs. The only instance in past NRC practice in which an “open” or “resolved” Category 2 issue arises is for the Category 2 “Severe accidents” issue. The “Severe accidents” issue requires the preparation of a severe accident mitigation alternatives (SAMA) analysis as a prerequisite to license renewal. If a license renewal applicant had not yet performed a SAMA analysis for a given plant, then the issue would remain “open” pending the completion of a SAMA analysis. Some licensees, however, have already performed a SAMA analysis at some point. Thus, if a license renewal applicant had performed a SAMA analysis for a particular plant, then the issue would be considered “resolved,” and there would be no need to repeat a SAMA analysis as part of a license renewal application. As the finding column entry for “Severe accidents” already provides for a previously prepared SAMA analysis, and the “open” or “resolved” terminology is not used in connection with any other GEIS issue, there is no need to retain this language in the second sentence of 10 CFR 51.95(c)(4).

Table B-1

The final rule revises Table B-1 to follow the organizational format of the revised GEIS. Environmental issues in Table B-1 are arranged by resource area. The environmental impacts of license renewal activities, including plant operations and refurbishment along with replacement power alternatives, are addressed in each resource area. Table B-1 organizes

environmental impact issues under the following resource areas: 1) land use, 2) visual resources, 3) air quality, 4) noise, 5) geologic environment, 6) surface water resources, 7) groundwater resources, 8) terrestrial resources, 9) aquatic resources, 10) special status species and habitats, 11) historic and cultural resources, 12) socioeconomics, 13) human health, 14) postulated accidents, 15) environmental justice, 16) waste management, 17) cumulative impacts, 18) uranium fuel cycle, and 19) termination of nuclear power plant operations and decommissioning. Discussions of the environmental impact issues in each resource area and classification of issues into Category 1 or Category 2 are provided in Section VIII, “Final Actions and Basis for Changes to Table B-1” of this document. Additional changes to Table B-1 in the final rule were discussed previously in applicable resource areas in Section VIII. Footnote 1 was updated to reference the revised GEIS. A minor edit was made to footnote 2, clause (3), to improve clarity. Footnote 4 was added to define the in-scope electric transmission lines. Consequently, the previous footnotes 4 and 5 were renumbered as footnotes 5 and 6, respectively. The previous footnote 6 was deleted, as it is no longer needed.

X. Guidance Documents

The NRC is also issuing: a revised GEIS, NUREG–1437, Volumes 1 and 2, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants” (ML12111A266); a revised Regulatory Guide 4.2, Supplement 1, Revision 1, “Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications” (ML12111A236); and a revised Environmental Standard Review Plan (ESRP), NUREG–1555, Supplement 1, Revision 1, “Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal” (ML12111A165).

The revised GEIS is intended to improve the efficiency of the license renewal process by 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 (the same or similar) at all nuclear power plants (or plants with specific plant or site characteristics), and 3) defining the number and scope of environmental impact issues that need to be addressed in plant-specific supplemental EISs. The content of the revised GEIS is discussed further in Section III, “Discussion,” of this document.

Revision 1 of Regulatory Guide 4.2, Supplement 1, provides general procedures for the preparation of environmental reports, which are submitted as part of the license renewal application for a nuclear power plant in accordance with 10 CFR Part 54. More specifically, this revised regulatory guide explains the criteria for addressing Category 2 issues in the environmental report as required by the revisions to 10 CFR Part 51 under the final rule.

The revised ESRP provides guidance to the NRC staff on how to conduct a license renewal environmental review. The ESRP parallels the format in Regulatory Guide 4.2. The primary purpose of the ESRP is to ensure that these reviews focus on those environmental concerns associated with license renewal as described in 10 CFR Part 51.

XI. Agreement State Compatibility

Under the “Policy Statement on Adequacy and Compatibility of Agreement States Programs,” approved by the Commission on June 20, 1997, and published in the *Federal Register* (62 FR 46517), this rule is classified as compatibility category “NRC.” Agreement State Compatibility is not required for Category “NRC” regulations. The NRC program elements in this category are those that relate directly to areas of regulation reserved to the NRC by the Atomic Energy Act of 1954, as amended, or the provisions of Title 10 of the CFR. Although an Agreement State may not adopt program elements reserved to the NRC, it may wish to inform its licensees of certain requirements via a mechanism that is consistent with

the particular State’s administrative procedure laws. Category “NRC” regulations do not confer regulatory authority on the State.

XII. Availability of Documents

The NRC is making the documents identified in the following table available to interested persons through one or more of the methods provided in the ADDRESSES section of this document.

Document	PDR	Web	ADAMS Accession No.
NUREG–1437, Vols. 1 and 2, Revision 1—“Generic Environmental Impact Statement for License Renewal of Nuclear Plants”	X	X	ML12111A266
Regulatory Guide 4.2, Supplement 1, Revision 1—“Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications”	X	X	ML12111A236
NUREG–1555, Supplement 1, Revision 1—“Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal”	X	X	ML12111A165
Regulatory Analysis for RIN 3150–AI42, Final Rulemaking Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses	X	X	ML110760321
OMB Supporting Statement for RIN 3150–AI42, Final Rulemaking Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses	X	X	ML110760342
SECY–12–XXXX, Final Rule: Revisions to Environmental Protection Regulations for the Renewal of Nuclear Power Plant Operating Licenses (10 CFR Part 50; RIN 3150–AI42) (May XX, 2012)	X	X	ML110760033
Staff Requirements Memorandum for SECY-12-XXXX (May XX, 2012)	X	X	TBD

Meeting Between the U.S. Nuclear Regulatory Commission and Public Stakeholders Concerning Implementation of Final Rule for Revisions to the Environmental Protection Regulations for the Renewal of Nuclear Power Plant Operating Licenses and Other License Renewal Environmental Review Issues (TAC No. ME2308) (July 21, 2011)	X	X	ML11182B535
Recommendations for Enhancing Reactor Safety in the 21 st Century, The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident” (July 12, 2011)	X	X	ML111861807
NRC Press Release No. 10-060, “NRC Asks National Academy of Sciences to Study Cancer Risk in Populations Living Near Nuclear Power Facilities” (April 7, 2010)	X	X	ML100970142
Summary of Public Meetings to Discuss Proposed Rule Regarding Title 10, Part 51 of the <i>Code of Federal Regulations</i> and the Draft Revision to the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG–1437, Revision 1 (November 3, 2009)	X	X	ML093070141
Official Transcript of Public Meeting to Discuss the Draft Generic Environmental Impact Statement, Dana Point, CA (October 22, 2009)	X	X	ML093100505
Official Transcript of Public Meeting to Discuss the Draft Generic Environmental Impact Statement, Pismo Beach, CA (October 20, 2009)	X	X	ML093070174
Official Transcript of Public Meeting to Discuss the Draft Generic Environmental Impact Statement, Rockville, MD (October 1, 2009)	X	X	ML092931678
Official Transcript of Public Meeting to Discuss the Draft Generic Environmental Impact Statement, Oak Brook, IL (September 24, 2009)	X	X	ML092931545
Official Transcript of Public Meeting to Discuss the Draft Generic Environmental Impact Statement, Newton, MA (September 17, 2009)	X	X	ML092931681
Official Transcript of Public Meeting to Discuss the Draft Generic Environmental Impact Statement, Atlanta, GA (September 17, 2009)	X	X	ML092810007
NRC Response to Public Comments Received on Proposed 10 CFR Part 51 Rule, “Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses” (RIN 3150–AI42)	X	X	ML111450013
NRC Response to Public Comments Related to Draft Regulatory Guide, DG-4015 (Proposed Revision 1 of Regulatory Guide 4.2, Supplement 1)—“Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications” (RIN 3150–AI42)	X	X	ML111450010

Regulatory History for Proposed Rule, “Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses” (RIN 3150–AI42)	X	X	ML093160539
Draft NUREG–1437, Vols. 1 and 2, Revision 1—“Generic Environmental Impact Statement for License Renewal of Nuclear Plants”	X	X	ML090220654
Draft Regulatory Guide, DG-4015 (Proposed Revision 1 of RG 4.2, Supplement 1), “Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications”	X	X	ML091620409
Draft NUREG–1555, Supplement 1, Revision 1—“Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal”	X	X	ML090230497
NEI 07–07, “Industry Ground Water Protection Initiative—Final Guidance Document”	X	X	ML072610036
Liquid Radioactive Release Lessons Learned Task Force Final Report (September 1, 2006)	X	X	ML062650312
NUREG–1437, Vol. 1, Addendum 1, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants,” Main Report, Section 6.3—Transportation, Table 9.1, Summary of NEPA Issues for License Renewal of Nuclear Power Plants	X	X	ML040690720
NUREG–1437, Vol. 1, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants,” Main Report	X	X	ML040690705
NUREG–1437, Vol. 2, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants,” Appendices	X	X	ML040690738

XIII. Voluntary Consensus Standards

The National Technology Transfer and Advancement Act of 1995, Public Law 104–113, requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies unless using such a standard is inconsistent with applicable law or is otherwise impractical. This final rulemaking, which amends various provisions of 10 CFR Part 51, does not constitute the establishment of a standard that contains generally applicable requirements.

XIV. Environmental Impact—Categorical Exclusion

The NRC has determined that the promulgation of this final rule is a type of procedural action that meets the criteria of the categorical exclusion set forth in 10 CFR 51.22(c)(3)(i) and (iii). Therefore, neither an environmental impact statement nor an environmental assessment has been prepared for this final rule.

XV. Paperwork Reduction Act Statement

This final rule contains new or amended information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501, *et seq.*). These requirements were approved by the Office of Management and Budget (OMB), control number 3150–0021.

The burden to the public for these information collections is estimated to average **-1782.9 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. Send comments on any aspect of these information collections, including suggestions for reducing the burden, to the Information Services Branch (T–5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001, or by Internet electronic mail to INFOCOLLECTS.Resource@nrc.gov; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB–10202, (3150–0021), Office of Management and Budget, Washington, DC 20503, or by Internet electronic mail to [Chad S. Whiteman@omb.eop.gov](mailto:Chad_S_Whiteman@omb.eop.gov).

Public Protection Notification

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

XVI. Plain Writing

The Plain Writing Act of 2010 (Pub. L. 111-274) requires Federal agencies to write documents in a clear, concise, well-organized manner that also follows other best practices appropriate to the subject or field and the intended audience. The NRC has attempted to use plain language in promulgating this rule consistent with the Federal Plain Writing Act guidelines.

XVII. Regulatory Analysis

The NRC has prepared a regulatory analysis of this regulation. The analysis examines the costs and benefits of the alternatives considered by the NRC. Availability of the regulatory analysis is provided in Section XII, "Availability of Documents," of this document.

XVIII. Regulatory Flexibility Act Certification

In accordance with the Regulatory Flexibility Act (5 U.S.C. 605(b)), the NRC certifies that this rule does not have a significant economic impact on a substantial number of small entities. The final rule affects only nuclear power plant licensees filing 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).

XIX. Backfit Analysis

The NRC has determined that the backfit rule does not apply to the final rule; therefore, a backfit analysis is not required for the final rule because these amendments do not involve any provisions that would impose backfits as defined in 10 CFR Chapter 1.

XX. Congressional Review Act

In accordance with the Congressional Review Act of 1996, the NRC has determined that this action is not a major rule and has verified this determination with the Office of Information and Regulatory Affairs of the OMB.

List of Subjects in 10 CFR Part 51

Administrative practice and procedure, Environmental impact statement, 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 amends 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 is revised to read as follows:

Authority: Atomic Energy Act sec. 161, 1701 (42 U.S.C. 2201, 2297f); Energy Reorganization Act secs. 201, 202, 211 (42 U.S.C. 5841, 5842, 5851); Government Paperwork Elimination Act sec. 1704 (44 U.S.C. 3504 note). Subpart A also issued under National Environmental Policy Act secs. 102, 104, 105 (42 U.S.C. 4332, 4334, 4335); Pub. L. 95 604, Title II, 92 Stat. 3033 3041; Atomic Energy Act sec. 193 (42 U.S.C. 2243). 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. Revising the second sentence of paragraph (c)(2);
 - b. Revising the first sentence of paragraph (c)(3)(ii)(A);
 - c. Revising the second sentence of paragraph (c)(3)(ii)(B);
 - d. Revising paragraph (c)(3)(ii)(C);
 - e. Revising paragraph (c)(3)(ii)(E);
 - f. Removing and reserving paragraph (c)(3)(ii)(F);
 - g. Revising paragraph (c)(3)(ii)(G);
 - h. Removing and reserving paragraphs (c)(3)(ii)(I) and (J);

- i. Revising paragraph (c)(3)(ii)(K); and
- j. Adding paragraphs (c)(3)(ii)(N), (O), and (P).

The amendments read as follows:

§ 51.53 Postconstruction environmental reports.

* * * * *

(c) * * *

(2) * * * This report must describe in detail the affected environment around the plant, the modifications directly affecting the environment or any plant effluents, and any planned refurbishment activities. * * *

(3) * * *

(ii) * * *

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

(B) * * * If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from thermal changes and impingement and entrainment.

(C) If the applicant's plant pumps more than 100 gallons (total onsite) of groundwater per minute, an assessment of the impact of the proposed action on groundwater must be provided.

* * * * *

(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 threatened or endangered species in accordance with Federal laws protecting wildlife, including but not limited to, the Endangered Species Act, and essential fish habitat in accordance with the Magnuson-Stevens Fishery Conservation and Management Act.

(F) [Reserved]

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

* * * * *

(I) [Reserved]

(J) [Reserved]

(K) All applicants shall identify any potentially affected historic or archaeological properties and assess whether any of these properties will be affected by future plant operations and any planned refurbishment activities in accordance with the National Historic Preservation Act.

* * * * *

(N) Applicants shall provide information on the general demographic composition of minority and low-income populations and communities (by race and ethnicity) residing in the immediate vicinity of the plant that could be affected by the renewal of the plant's operating license, including any planned refurbishment activities, and ongoing and future plant operations.

(O) Applicants shall provide information about other past, present, and reasonably foreseeable future actions occurring in the vicinity of the nuclear plant that may result in a cumulative effect.

(P) An applicant shall assess the impact of any documented inadvertent releases of radionuclides into groundwater. The applicant shall include in its assessment a description of any groundwater protection program used for the surveillance of piping and components containing radioactive liquids for which a pathway to groundwater may exist. The assessment must also include a description of any past inadvertent releases and the projected impact to the environment (e.g., aquifers, rivers, lakes, ponds, ocean) during the license renewal term.

3. Amend § 51.71 to revise the first sentence of paragraph (d) to read as follows:

§ 51.71 Draft environmental impact statement—contents.

* * * * *

(d) *Analysis.* Unless excepted in this paragraph or § 51.75, the draft environmental impact statement will include a preliminary analysis that considers and weighs the environmental effects, including any cumulative effects, of the proposed action; the environmental impacts of alternatives to the proposed action; and alternatives available for reducing or avoiding adverse environmental effects. Additionally, the draft environmental impact statement will include a consideration of the economic, technical, and other benefits and costs of the proposed action and alternatives. The draft environmental impact statement will indicate what other interests and considerations of Federal policy, including factors not related to environmental quality, if applicable, are relevant to the consideration of environmental effects of the proposed action identified under paragraph (a) of this section. * * *

* * * * *

4. Amend § 51.95 to revise the introductory text of paragraph (c), and the second sentence of paragraph (c)(4) to read as follows:

§ 51.95 Postconstruction environmental impact statements.

* * * * *

(c) *Operating license renewal stage.* In connection with the renewal of an operating license or combined license for a nuclear power plant under parts 52 or 54 of this chapter, the Commission shall prepare an environmental impact statement, which is a supplement to the Commission's NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" [(Month 20XX)], which is available in the NRC Public Document Room, 11555 Rockville Pike, Rockville, Maryland 20852.

* * * * *

(4) * * * In order to make recommendations and reach a final decision on the proposed action, the NRC staff, adjudicatory officers, and Commission shall integrate the conclusions in the generic environmental impact statement for issues designated Category 1 with information developed for those Category 2 issues applicable to the plant under § 51.53(c)(3)(ii) and any new and significant information. * * *

* * * * *

5. In appendix B to subpart A of part 51, Table B-1 is revised to read as follows:

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

* * * * *

Table B-1—Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants¹

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 (all plants)	1	<p>SMALL. Air quality impacts from continued operations and refurbishment associated with license renewal are expected to be small at all plants. 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 refurbishment activities are completed. Operating experience has shown that the scale of refurbishment activities has not resulted in exceedance of the <i>de minimis</i> 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.</p> <p>Emissions from emergency diesel generators and fire pumps and routine operations of boilers used for space heating would not be a concern, even for plants located in or adjacent to nonattainment areas. Impacts from cooling tower particulate emissions even under the worst-case situations have been small.</p>
Air quality effects of transmission lines ⁴	1	SMALL. Production of ozone and oxides of nitrogen 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 effect of geologic and soil conditions on plant operations and 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.
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 Environmental Protection Agency 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 in salt marshes)	1	SMALL. Sites with closed-cycle cooling ponds could degrade groundwater quality. However, groundwater in salt marshes is naturally brackish and thus, not potable. Consequently, the human use of such groundwater is limited to industrial purposes.
Groundwater quality degradation (plants with cooling ponds at inland sites)	2	SMALL, MODERATE, or LARGE. Inland sites with closed-cycle cooling ponds could degrade groundwater quality. The significance of the impact would depend on 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		
Effects on terrestrial resources (non-cooling system impacts)	2	SMALL, MODERATE, or LARGE. Impacts resulting from continued operations and refurbishment associated with license renewal may affect terrestrial communities. Application of best management practices would reduce the potential for impacts. The magnitude of impacts would depend on the nature of the activity, the status of the resources that could be affected, and the effectiveness of mitigation.
Exposure of terrestrial organisms to radionuclides	1	SMALL. Doses to terrestrial organisms from continued operations and refurbishment associated with license renewal are expected to be well below exposure guidelines developed to protect these organisms.

Cooling system impacts on terrestrial resources (plants with once-through cooling systems or cooling ponds)	1	SMALL. No adverse effects to terrestrial plants or animals have been reported as a result of increased water temperatures, fogging, humidity, or reduced habitat quality. Due to the low concentrations of contaminants in cooling system effluents, uptake and accumulation of contaminants in the tissues of wildlife exposed to the contaminated water or aquatic food sources are not expected to be significant issues.
Cooling tower impacts on vegetation (plants with cooling towers)	1	SMALL. Impacts from salt drift, icing, fogging, or increased humidity associated with cooling tower operation have the potential to affect adjacent vegetation, but these impacts have been small at operating nuclear power plants and are not expected to change over the license renewal term.
Bird collisions with plant structures and transmission lines ⁴	1	SMALL. Bird collisions with cooling towers and other plant structures and transmission lines occur at rates that are unlikely to affect local or migratory populations and the rates are not expected to change.
Water use conflicts with terrestrial resources (plants with cooling ponds or cooling towers using makeup water from a river)	2	SMALL or MODERATE. Impacts on terrestrial resources in riparian communities affected by water use conflicts could be of moderate significance.
Transmission line right-of-way (ROW) management impacts on terrestrial resources ⁴	1	SMALL. Continued ROW management during the license renewal term is expected to keep terrestrial communities in their current condition. Application of best management practices would reduce the potential for impacts.
Electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock) ⁴	1	SMALL. No significant impacts of electromagnetic fields on terrestrial flora and fauna have been identified. Such effects are not expected to be a problem during the license renewal term.
Aquatic Resources		
Impingement and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds)	2	SMALL, MODERATE, or LARGE. The impacts of impingement and entrainment are small at many plants but may be moderate or even large at a few plants with once-through and cooling-pond cooling systems, depending on cooling system withdrawal rates and volumes and the aquatic resources at the site.

Impingement and entrainment of aquatic organisms (plants with cooling towers)	1	SMALL. Impingement and entrainment rates are lower at plants that use closed-cycle cooling with cooling towers because the rates and volumes of water withdrawal needed for makeup are minimized.
Entrainment of phytoplankton and zooplankton (all plants)	1	SMALL. Entrainment of phytoplankton and zooplankton has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Thermal impacts on aquatic organisms (plants with once-through cooling systems or cooling ponds)	2	SMALL, MODERATE, or LARGE. Most of the effects associated with thermal discharges are localized and are not expected to affect overall stability of populations or resources. The magnitude of impacts, however, would depend on site-specific thermal plume characteristics and the nature of aquatic resources in the area.
Thermal impacts on aquatic organisms (plants with cooling towers)	1	SMALL. Thermal effects associated with plants that use cooling towers are expected to be small because of the reduced amount of heated discharge.

<p>Infrequently reported thermal impacts (all plants)</p>	<p>1</p>	<p>SMALL. Continued operations during the license renewal term are expected to have small thermal impacts with respect to the following:</p> <p>Cold shock has been satisfactorily mitigated at operating nuclear plants with once-through cooling systems, has not endangered fish populations or been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds, and is not expected to be a problem.</p> <p>Thermal plumes have not been found to be a problem at operating nuclear power plants and are not expected to be a problem.</p> <p>Thermal discharge may have localized effects but is not expected to affect the larger geographical distribution of aquatic organisms.</p> <p>Premature emergence has been found to be a localized effect at some operating nuclear power plants but has not been a problem and is not expected to be a problem.</p> <p>Stimulation of nuisance organisms has been satisfactorily mitigated at the single nuclear power plant with a once-through cooling system where previously it was a problem. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem.</p>
<p>Effects of cooling water discharge on dissolved oxygen, gas supersaturation, and eutrophication</p>	<p>1</p>	<p>SMALL. Gas supersaturation was a concern at a small number of operating nuclear power plants with once-through cooling systems but has been mitigated. Low dissolved oxygen was a concern at one nuclear power plant with a once-through cooling system but has been mitigated. Eutrophication (nutrient loading) and resulting effects on chemical and biological oxygen demands have not been found to be a problem at operating nuclear power plants.</p>
<p>Effects of non-radiological contaminants on aquatic organisms</p>	<p>1</p>	<p>SMALL. Best management practices and discharge limitations of NPDES permits are expected to minimize the potential for impacts to aquatic resources during continued operations and refurbishment associated with license renewal. Accumulation of metal contaminants has been a concern at a few nuclear power plants but has been satisfactorily mitigated by replacing copper alloy condenser tubes with those of another metal.</p>
<p>Exposure of aquatic organisms to radionuclides</p>	<p>1</p>	<p>SMALL. Doses to aquatic organisms are expected to be well below exposure guidelines developed to protect these aquatic organisms.</p>

Effects of dredging on aquatic organisms	1	SMALL. Dredging at nuclear power plants is expected to occur infrequently, would be of relatively short duration, and would affect relatively small areas. Dredging is performed under permit from the U.S. Army Corps of Engineers, and possibly, from other State or local agencies.
Water use conflicts with aquatic resources (plants with cooling ponds or cooling towers using makeup water from a river)	2	SMALL or MODERATE. Impacts on aquatic resources in stream communities affected by water use conflicts could be of moderate significance in some situations.
Effects on aquatic resources (non-cooling system impacts)	1	SMALL. Licensee application of appropriate mitigation measures is expected to result in no more than small changes to aquatic communities from their current condition.
Impacts of transmission line right-of-way (ROW) management on aquatic resources ⁴	1	SMALL. Licensee application of best management practices to ROW maintenance is expected to result in no more than small impacts to aquatic resources.
Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses	1	SMALL. These types of losses 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.
Special Status Species and Habitats		
Threatened, endangered, and protected species and essential fish habitat	2	The magnitude of impacts on threatened, endangered, and protected species, critical habitat, and essential fish habitat would depend on the occurrence of listed species and habitats and the effects of power plant systems on them. Consultation with appropriate agencies would be needed to determine whether special status species or habitats are present and whether they would be adversely affected by continued operations and refurbishment associated with license renewal.
Historic and Cultural Resources		

Historic and cultural resources ⁴	2	Continued operations and refurbishment associated with license renewal are expected to have no more than small impacts on historic and cultural resources located onsite and in the transmission line ROW because most impacts could be mitigated by avoiding those resources. The National Historic Preservation Act (NHPA) requires the Federal agency to consult with the State Historic Preservation Officer (SHPO) and appropriate Native American Tribes to determine the potential effects on historic properties and mitigation, if necessary.
Socioeconomics		
Employment and income, recreation and tourism	1	SMALL. Impacts to employment, income, recreation, and tourism from continued operations and refurbishment associated with license renewal are expected to be small.
Tax revenues	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 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.

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.
Human health impact from chemicals	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 the public (plants with cooling ponds or canals or cooling towers that discharge to a river)	2	SMALL, MODERATE, or LARGE. These organisms are not expected to be a problem at most operating plants except possibly at plants using cooling ponds, lakes, or canals, or that discharge into rivers. Impacts would depend on site-specific characteristics.
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.
Chronic effects of 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	2	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. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives.
Environmental Justice		
Minority and low-income populations	2	Impacts to minority and low-income populations and subsistence consumption resulting from continued operations and refurbishment associated with license renewal will be addressed in plant-specific reviews. See NRC Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (69 FR 52040; August 24, 2004).
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 to the environment would remain small during the license renewal term.
Onsite storage of spent nuclear fuel	1	SMALL. The expected increase in the volume of spent fuel from an additional 20 years of operation can be safely accommodated onsite with small environmental effects through dry or pool storage at all plants, if a permanent repository or monitored retrievable storage is not available.
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 15 millirem (0.15 mSv) per year for the first 10,000 years and 100 millirem (1.0 mSv) 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.
Cumulative Impacts		
Cumulative impacts	2	Cumulative impacts of continued operations and refurbishment associated with license renewal must be considered on a plant-specific basis. Impacts would depend on regional resource characteristics, the resource-specific impacts of license renewal, and the cumulative significance of other factors affecting the 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	<p>There are no regulatory limits applicable to collective doses to the general public from fuel-cycle facilities. The practice of estimating health effects on the basis of collective doses may not be meaningful. All fuel-cycle facilities are designed and operated to meet the applicable regulatory limits and standards. The Commission concludes that the collective impacts are acceptable.</p> <p>The Commission concludes that the impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the collective impacts of the uranium fuel cycle, this issue is considered Category 1.</p>

Nonradiological impacts of the uranium fuel cycle	1	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 1, "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 collective offsite radiological impacts from the fuel cycle and from high level waste and spent fuel disposal); 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.

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.

Dated at Rockville, Maryland, this ___day of XXXX 2012.

For the Nuclear Regulatory Commission.

Annette L. Vietti-Cook,
Secretary of the Commission.

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

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.

Dated at Rockville, Maryland, this ___ day of XXXX 2012.

For the Nuclear Regulatory Commission.

Annette L. Vietti-Cook,
Secretary of the Commission.

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NAME	SSchneider	JRikhoff	SHelton	TMcGinty (SBahadur for)	JSusco	MGalloway (JSusco for)
DATE	03/13/12	03/13/12	03/20/12	03/20/12	03/20/12	03/20/12
OFFICE	ADM*	OIS*	RES:D*	NMSS:D*	FSME:D*	OE:D*
NAME	CBladey (LTerry for)	TDonnell	BSheron (RCorreia for)	CHaney (JRubenstone for)	MSatorius (KHsueh for)	RZimmerman (NColeman for)
DATE	03/27/12	03/29/12	03/26/12	03/29/12	03/27/12	03/26/12
OFFICE	NRO:D	OGC:NLO*	NRR:DRA	NRR:D	EDO	
NAME	MJohnson (SFlanders for)	BJones	JGitter	ELeeds (BBoger for)	RBorchardt	
DATE	03/27/12	03/20/12	03/27/12	04/17/12	04/ /12	

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