

Regulatory Analysis

Final Rule Revisions to 10 CFR Part 51, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation

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TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 Statement of the Problem and Objective of the Rulemaking	1
1.2 Background	1
2. IDENTIFICATION AND PRELIMINARY ANALYSIS OF ALTERNATIVE APPROACHES	5
2.1 Option 1: No Action	5
2.2 Option 2: Update and Amend 10 CFR Part 51	5
3. EVALUATION OF BENEFITS AND COSTS	23
3.1 Identification of Affected Attributes	23
3.2 Analytical Methodology	24
3.2.1 Baseline for the Analysis	25
3.2.2 Affected Licensees	25
3.2.3 Analysis of the Incremental Requirements, Option 2	26
4. RESULTS.....	65
4.1 Benefits and Costs	65
4.2 Backfit Analysis	67
4.3 Disaggregation	67
5. DECISION RATIONALE	68
6. IMPLEMENTATION	69
6.1 Schedule	69
6.2 Impact on Other Requirements	69

1. INTRODUCTION

This document presents the regulatory analysis of the final revisions to Nuclear Regulatory Commission (NRC or the Commission) environmental protection regulations for the renewal of nuclear power plant operating licenses including Table B-1, "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants," in Appendix B to Subpart A, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," of Title 10, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the *Code of Federal Regulations* (10 CFR Part 51). (Hereafter, this table will only be referred to as "Table B-1" in this document.) The NRC 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 which 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.

This introduction is divided into two sections. Section 1.1 states the problem and the objective of the rulemaking, and Section 1.2 provides background information on the pertinent regulatory requirements in 10 CFR Part 51.

1.1 Statement of the Problem and Objective of the Rulemaking

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. On June 5, 1996, the NRC published the final rule, "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses" (61 FR 28467), 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 rulemaking was based upon the analyses and findings of a May 1996 NRC environmental impact statement, the "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437 (the "1996 GEIS").

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

The objective of this rulemaking is to update Table B-1 and the environmental protection regulations in 10 CFR Part 51 for renewal of nuclear power plant operating licenses, based on the technical findings in the revision to the 1996 GEIS.

1.2 Background

As mandated by the Atomic Energy Act of 1954, as amended (AEA), the NRC is responsible for protecting public health and safety in the civilian use of nuclear power. The NRC Office of Nuclear Reactor Regulation (NRR) is responsible for ensuring the public health and safety through the licensing and inspection of activities at all commercial nuclear power reactor facilities in the United States (U.S.). The AEA allows the NRC to issue licenses for commercial power reactors to operate for up to 40 years. NRC regulations allow for the renewal of these

licenses, the renewal term to include any remaining number of years on the operating license or combined license currently in effect plus an additional 20 years. The decision whether to renew the operating license of a nuclear power plant is based on an NRC determination as to whether it can continue to operate safely during the 20-year period of extended operation. The term of any renewed license may not exceed 40 years. No specific limitations exist in the AEA or in NRC's regulations on the number of times a power reactor operating license may be renewed.

Under the NRC's environmental protection regulations in 10 CFR Part 51, which implement Section 102(2) of the National Environmental Policy Act of 1969 (NEPA), renewal of a nuclear power plant operating license requires the preparation of an environmental impact statement (EIS). To help in the preparation of license renewal EISs, the NRC prepared the 1996 GEIS, which summarizes the findings of a systematic inquiry into the environmental impacts of continued operations and refurbishment activities associated with license renewal.

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 the 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 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 supplemental environmental impact statements (SEISs) to the 1996 GEIS. As a result, the NRC identified 92 environmental impact issues. Of these, 69 impact issues were addressed generically in the 1996 GEIS and 23 impact issues needed to be assessed in separate plant-specific EISs.

Table B-1 summarizes the findings of the environmental impact analyses conducted for the 1996 GEIS. Issues common to all nuclear power plants having generic (i.e., the same or similar) environmental impacts are addressed in the GEIS and are considered Category 1 issues. Category 2 issues are those issues that cannot be generically dispositioned in the GEIS and require a separate plant-specific analysis to determine the level of impact.

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.

For Category 1 issues, the generic impact analysis conducted for the 1996 GEIS and impact level determination may be re-evaluated if new and significant information is discovered during a plant-specific license renewal environmental review.

As part of the license renewal environmental review process, an applicant submits an environmental report (ER) as part of its license renewal application to the NRC. After accepting the license renewal application and ER, the NRC prepares a draft SEIS to the 1996 GEIS that evaluates the environmental impact of plant-specific (Category 2) issues along with the consideration of any new and significant information for Category 1 and/or any other newly identified issues. The draft SEIS is made available for public comment. After considering public comments, the NRC prepares and issues a final SEIS in accordance with 10 CFR 51.91 and 51.93. Together, the final SEIS and the GEIS (NUREG-1437) serve as the requisite NEPA analysis for license renewal environmental reviews.

The Table B-1 and associated GEIS update effort began in June 2003.¹ During the first public comment period (June to September 2003) the NRC received approximately 400 comments. No additional comments were received during a second comment period (September to December 2005).

After a delay, the Table B-1 and GEIS update effort recommenced in October 2005. On July 31, 2009, the NRC published the proposed rule for public comment in the *Federal Register* (74 FR 38117). The NRC also prepared a revision to the 1996 GEIS, referred to as the "revised GEIS," which updates 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.

In conjunction with the Table B-1 update and GEIS revision, the NRC revised two guidance documents including NUREG-1555, Supplement 1, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," and Regulatory Guide 4.2, Supplement 1, "Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses." The first document guides NRC staff in conducting plant-specific license renewal environmental reviews; the second document guides applicants in the preparation of ERs for license renewal applications.

The proposed rule was published with a 75-day public comment period, closing 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 request, 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.

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. Public meetings were held in Atlanta, Georgia (September 15, 2009); Newton, Massachusetts

¹ A notice of intent to revise the 1996 GEIS was published on June 3, 2003 (68 FR 33209).

(September 17, 2009); Oak Brook, Illinois (September 24, 2009); Rockville, Maryland (October 1, 2009); Pismo Beach, California (October 20, 2009); and Dana Point, California (October 22, 2009). On June 21, 2011, the NRC conducted another public meeting to discuss final rule implementation at NRC headquarters in Rockville, Maryland. No public comments were solicited at this meeting because the public comment period for the proposed rule had closed 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. Responses to all public comments submitted on the proposed rule, draft revised GEIS, and proposed guidance are contained in separate documents as follows:

- 1) 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). This document is publicly available through the NRC's Agencywide Documents Access and Management System (ADAMS) at Accession No. ML111450013.
- 2) NUREG-1437, Volume 2, Revision 1, Appendix A—"Generic Environmental Impact Statement for License Renewal of Nuclear Plants; Comments Received on the Environmental Review" (ADAMS Accession No. **ML12XXXXXXX**).
- 3) Response to Public Comments on Regulatory Guide 4.2, Supplement 1, Revision 1—"Preparation of Environmental Reports for Nuclear Power License Renewal Applications" (issued as DG-4015) (RIN 3150-AI42) (ADAMS Accession No. ML111450010).

2. IDENTIFICATION AND PRELIMINARY ANALYSIS OF ALTERNATIVE APPROACHES

The analysis considers two options. The following subsections describe each option.

2.1 Option 1: No Action

Under Option 1, the No-Action alternative, the NRC would not amend certain provisions of 10 CFR Part 51 relating to the renewal of nuclear power plant licenses, including Table B-1. The NRC would continue to rely on the findings set forth in the current Table B-1 when evaluating the scope and magnitude of environmental impacts of renewing the operating license for a nuclear power plant. Licensees seeking to renew operating licenses would continue to comply with the existing provisions of 10 CFR Part 51. Requests for additional information (RAIs) from license renewal applicants currently needed to assist the NRC staff in conducting license renewal environmental reviews would continue.

2.3 Option 2: Update and Amend 10 CFR Part 51

Under Option 2, the NRC would update and amend certain provisions of 10 CFR Part 51 relating to the renewal of nuclear power plant licenses, including Table B-1.² Some of the changes consist of minor text edits to improve the clarity of Table B-1. These changes result in no quantifiable impacts or benefits.

Exhibit 2-1 of this regulatory analysis presents the changes to the issues and findings in Table B-1 that would result in quantifiable impacts and/or benefits. These changes are based upon the findings described in the revised GEIS. Many of these changes would require information and assessments currently requested of license renewal applicants, which are needed by the NRC staff in conducting current license renewal environmental reviews. The first and second columns in Exhibit 2-1 present the revised issues and findings, the third and fourth columns present the current issues and findings (if applicable), and the fifth column highlights the rule changes (e.g., new Category 1 issue). The changes to Table B-1 consist of four types:

- **Consolidated Issues.** A number of changes include consolidating certain issues in the current Table B-1 to improve the organization and clarity of Table B-1, which on net reduces the overall number of environmental issues. For example, one change would consolidate 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.” Issue consolidation will result in quantifiable impacts or benefits insofar as the overall number of Category 1 and 2 issues are reduced.

² The final rule revises 10 CFR 51.53 to conform with changes to the final rule in Table B-1. Costs incurred by the applicant to comply with these requirements (as well as NRC costs) are included with the estimates provided in Section 3.2.3, “Analysis of the Incremental Requirements, Option 2 ,” of this document.

- **New Category 1 Issues.** New Category 1 issues are issues not previously evaluated in the 1996 GEIS and not listed in Table B–1 of the current rule.³ The license renewal applicant 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 required to provide in the environmental report any “new and significant information” of which the applicant is aware. The NRC then considers and evaluates this information during its plant-specific environmental review. The NRC has addressed the environmental impacts of these Category 1 issues generically for all plants in the revised GEIS.
- **New Category 2 Issues.** New Category 2 issues are issues not previously evaluated in the 1996 GEIS and not listed in Table B–1 of the current rule.⁴ For each new Category 2 issue, the applicant will incur an increase in cost because the applicant must conduct a plant-specific assessment of the potential environmental impacts related to that issue and include it in its ER. In addition, for each new Category 2 issue, the applicant must include in its ER a discussion of possible actions to mitigate any adverse impacts associated with license renewal and environmental impacts of alternatives to license renewal. Similarly, the NRC will incur an increase in cost to evaluate and assess the environmental impacts of each new Category 2 issue during its plant-specific environmental review. Some of the changes to Table B–1 require information and assessments currently requested of applicants. This generally results in no additional cost impact beyond what is currently being incurred by each applicant and the NRC. However, as it was not previously required by the regulation, these costs are included in the regulatory analysis of the final rule.
- **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. This type of change results in a cost reduction because: 1) each applicant will no longer be required to conduct a plant-specific assessment of the potential environmental impacts related to that issue and 2) 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 ER any “new and significant information” of which it is aware. The NRC would then consider and evaluate this information during its plant-specific environmental review.

³ New Category 1 issues also resulted from consolidation of multiple Category 1 issues from the 1996 GEIS and Table B–1 of the current rule. These new Category 1 issues are evaluated in this regulatory analysis because issue consolidation reduces the time required for rule compliance by eliminating duplicative data collection and reporting efforts.

⁴ New Category 2 issues also resulted from consolidation of multiple Category 2 issues from the 1996 GEIS and Table B–1 of the current rule. These new consolidated Category 2 issues are evaluated in this regulatory analysis because issue consolidation reduces the time required for rule compliance by eliminating duplicative data collection and reporting efforts.

Exhibit 2–1—Presentation of Final Rule Revisions to Table B–1 in 10 CFR Part 51

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
Land Use					
2	Offsite land use	SMALL (Category 1). Offsite land use would not be affected by continued operations and refurbishment associated with license renewal.	Offsite land use (refurbishment)	SMALL or MODERATE (Category 2). Impacts may be of moderate significance at plants in low population areas.	Change issue from Category 2 to Category 1 Issue consolidation (Category 1) Remove tax revenue and address as a new Category 1 issue
			Offsite land use (license renewal term)	SMALL, MODERATE, or LARGE (Category 2). Significant changes in land use may be associated with population and tax revenue changes resulting from license renewal.	
Visual Resources					
4	Aesthetic impacts	SMALL (Category 1). No important changes to the visual appearance of plant structures or transmission lines are expected from continued operations and refurbishment associated with license renewal.	Aesthetic impacts (refurbishment)	SMALL (Category 1). No significant impacts are expected during refurbishment.	Issue consolidation (Category 1)
			Aesthetic impacts (license renewal term)	SMALL (Category 1). No significant impacts are expected during the license renewal term.	
			Aesthetic impacts of transmission lines (license renewal term)	SMALL (Category 1). No significant impacts are expected during the license renewal term.	

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
Air Quality					
5	Air quality impacts (all plants)	<p>SMALL (Category 1). 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 exceedances 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.</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 during refurbishment (nonattainment and maintenance areas)	<p>SMALL, MODERATE, or LARGE (Category 2). Air quality impacts from plant refurbishment associated with license renewal are expected to be small. However, vehicle exhaust emissions could be cause for concern at locations in or near nonattainment or maintenance areas. The significance of the potential impact cannot be determined without considering the compliance status of each site and the numbers of workers expected to be employed during the outage.</p>	Change issue from Category 2 to Category 1
Geologic Environment					
8	Geology and soils	SMALL (Category 1). The effect of geologic and soil conditions on plant 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.	Not addressed	Not addressed	New Category 1 issue

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
Surface Water Resources					
9	Surface water use and quality (non-cooling system impacts)	SMALL (Category 1). 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.	Impacts of refurbishment on surface water quality	SMALL (Category 1). Impacts are expected to be negligible during refurbishment because best management practices are expected to be employed to control soil erosion and spills.	Issue consolidation (Category 1) Issue expanded to include impacts of continued operations
			Impacts of refurbishment on surface water use	SMALL (Category 1). Water use during refurbishment will not increase appreciably or will be reduced during plant outage.	
15	Discharge of biocides, sanitary wastes, and minor chemical spills	SMALL (Category 1). 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.	Discharge of chlorine or other biocides	SMALL (Category 1). Effects are not a concern among regulatory and resource agencies, and are not expected to be a problem during the license renewal term.	Issue consolidation (Category 1)
			Discharge of sanitary wastes and minor chemical spills	SMALL (Category 1). Effects are readily controlled through NPDES permit and periodic modifications, if needed, and are not expected to be a problem during the license renewal term.	
18	Effects of dredging on surface water quality	SMALL (Category 1). 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.	Not addressed	Not addressed	New Category 1 issue

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
Groundwater Resources					
20	Groundwater contamination and use (non-cooling system impacts)	SMALL (Category 1). 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.	Impacts of refurbishment on ground-water use and quality	SMALL (Category 1). 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.	Issue expanded to include impacts of continued operations Issue expanded to include impacts to groundwater and soil contamination
27	Radionuclides released to groundwater	SMALL or MODERATE (Category 2). 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.	Not addressed	Not addressed	New Category 2 Issue
Terrestrial Resources					
29	Exposure of terrestrial organisms to radionuclides	SMALL (Category 1). 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.	Not addressed	Not addressed	New Category 1 Issue

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
31	Cooling tower impacts on vegetation (plants with cooling towers)	SMALL (Category 1). 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.	Cooling tower impacts on crops and ornamental vegetation	SMALL (Category 1). Impacts from salt drift, icing, fogging, or increased humidity associated with cooling tower operation 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.	Issue consolidation (Category 1)
			Cooling tower impacts on native plants	SMALL (Category 1). Impacts from salt drift, icing, fogging, or increased humidity associated with cooling tower operation 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.	
32	Bird collisions with plant structures and transmission lines	SMALL (Category 1). 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. Footnote: 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.	Bird collisions with cooling towers	SMALL (Category 1). These collisions 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.	Issue consolidation (Category 1) Issue expanded to address collisions with all plant structures
			Bird collision with power lines	SMALL (Category 1). Impacts are expected to be of small significance at all sites.	
33	Water use conflicts with terrestrial resources (plants with cooling ponds or cooling towers using makeup water from a river)	SMALL or MODERATE (Category 2). Impacts on terrestrial resources in riparian communities affected by water use conflicts could be of moderate significance.	Not addressed	Not addressed	New Category 2 issue

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
34	Transmission line right-of-way (ROW) management impacts on terrestrial resources	SMALL (Category 1). 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.	Power line right-of-way management (cutting and herbicide application)	SMALL (Category 1). The impacts of right-of-way maintenance on wildlife are expected to be of small significance at all sites.	Issue consolidation (Category 1)
		Footnote: 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.	Floodplains and wetland on power line right of way	SMALL (Category 1). Periodic vegetation control is necessary in forested wetlands underneath power lines and can be achieved with minimal damage to the wetland. No significant impact is expected at any nuclear power plant during the license renewal term.	
Aquatic Resources					
36	Impingement and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds)	SMALL, MODERATE, or LARGE (Category 2). 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.	Entrainment of fish and shellfish in early life stages (for plants with once-through cooling and cooling pond heat dissipation systems)	SMALL, MODERATE, or LARGE (Category 2). The impacts of 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. Further, ongoing efforts in the vicinity of these plants to restore fish populations may increase the numbers of fish susceptible to intake effects during the license renewal period, such that entrainment studies conducted in support of the original license may no longer be valid. See § 51.53(c)(3)(ii)(B).	Issue consolidation (Category 2)
			Impingement of fish and shellfish (for plants with once-through cooling and cooling pond heat dissipation systems)	SMALL, MODERATE, or LARGE (Category 2). The impacts of impingement are small at many plants but may be moderate or even large at a few plants with once-through and cooling-pond cooling systems. See § 51.53(c)(3)(ii)(B).	

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
37	Impingement and entrainment of aquatic organisms (plants with cooling towers)	SMALL (Category 1). 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 fish and shellfish in early life stages (for plants with cooling tower-based heat dissipation systems)	SMALL (Category 1). Entrainment of fish 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.	Issue consolidation (Category 1)
			Impingement of fish and shellfish (for plants with cooling tower-based heat dissipation systems)	SMALL (Category 1). The impingement 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.	

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
41	Infrequently reported thermal impacts (all plants)	<p>SMALL (Category 1). 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>Cold shock (for all plants)</p> <p>Thermal plume barrier to migrating fish (for all plants)</p> <p>Distribution of aquatic organisms (for all plants)</p> <p>Premature emergence of aquatic insects (for all plants)</p> <p>Stimulation of Nuisance Organisms (e.g.,Shipworms)</p>	<p>SMALL (Category 1). 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 during the license renewal term.</p> <p>SMALL (Category 1). Thermal plumes 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.</p> <p>SMALL (Category 1). Thermal discharge may have localized effects but is not expected to affect the larger geographical distribution of aquatic organisms.</p> <p>SMALL (Category 1). 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 during the license renewal term.</p> <p>SMALL (Category 1). 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 during the license renewal term.</p>	Issue consolidation (Category 1)

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
42	Effects of cooling water discharge on dissolved oxygen, gas supersaturation, and eutrophication	SMALL (Category 1). 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.	Eutrophication	SMALL (Category 1). Eutrophication 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.	Issue consolidation (Category 1)
			Gas supersaturation (gas bubble disease)	SMALL (Category 1). Gas supersaturation was a concern at a small number of operating nuclear power plants with once-through cooling systems but has been satisfactorily mitigated. 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 during the license renewal term.	
			Low dissolved oxygen in the discharge	SMALL (Category 1). Low dissolved oxygen has been a concern at one nuclear power plant with a once-through cooling system but has been effectively mitigated. 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 during the license renewal term.	
44	Exposure of aquatic organisms to radionuclides	SMALL (Category 1). Doses to aquatic organisms are expected to be well below exposure guidelines developed to protect these organisms.	Not addressed	Not addressed	New Category 1 issue
45	Effects of dredging on aquatic organisms	SMALL (Category 1). 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.	Not addressed	Not addressed	New Category 1 issue

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
46	Water use conflicts with aquatic resources (plants with cooling ponds or cooling towers using makeup water from a river)	SMALL or MODERATE (Category 2). Impacts on aquatic resources in stream communities affected by water use conflicts could be of moderate significance in some situations.	Not addressed	Not addressed	New Category 2 issue
48	Impacts of transmission line right-of-way (ROW) management on aquatic resources	SMALL (Category 1). Licensee application of best management practices to ROW maintenance is expected to result in no more than small impacts to aquatic resources. Footnote: 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.	Not addressed	Not addressed	New Category 1 issue
Special Status Species and Habitats					
50	Threatened, endangered, and protected species and essential fish habitat	(Category 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.	Threatened or endangered species	SMALL, MODERATE, or LARGE (Category 2). 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).	Issue expanded to include essential fish habitats protected under the Magnuson Stevens Fishery Conservation & Management Act (MSA)

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
Socioeconomics					
52	Employment and income, recreation and tourism	SMALL (Category 1). Impacts from continued operations and refurbishment associated with license renewal are expected to be small.	Public services: public safety, social services, and tourism and recreation	Small (Category 1). Impacts to public safety, social services, and tourism and recreation are expected to be of small significance at all sites.	Issue expanded to address employment and income The "Public safety, social services" portion of this issue was consolidated into the Category 1 issue, "Community services and education"
53	Tax revenues	SMALL (Category 1). 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.	Considered in the 1996 GEIS but not identified as an issue	Not addressed	New Category 1 issue

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
54	Community services and education	SMALL (Category 1). 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.	Public services: public safety, social services, and tourism and recreation	SMALL (Category 1). Impacts to public safety, social services, and tourism and recreation are expected to be of small significance at all sites	The "tourism and recreation" portion of this issue was consolidated into the Category 1 issue, "Employment and income, recreation and tourism"
			Public services: public utilities	SMALL or MODERATE (Category 2). An increased problem with water shortages at some sites may lead to impacts of moderate significance on public water supply availability.	Change issue from Category 2 to Category 1
			Public services, education (license renewal term)	SMALL (Category 1). Only impacts of small significance are expected.	No change
			Public services, education (refurbishment)	SMALL, MODERATE, or LARGE (Category 2). Most sites would experience impacts of small significance, but larger impacts are possible depending on site- and project-specific factors.	Change issue from Category 2 to Category 1
55	Population and housing	SMALL (Category 1). 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.	Housing impacts	SMALL, MODERATE, or LARGE (Category 2). Housing impacts are expected to be of small significance at plants located in a medium or high population area and not in an area where growth control measures that limit housing development are in effect. Moderate or large housing impacts of the workforce associated with refurbishment may be associated with plants located in sparsely populated areas or in areas with growth control measures that limit housing development.	Change issue from Category 2 to Category 1

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
56	Transportation	SMALL (Category 1). Changes resulting from continued operations and refurbishment associated with license renewal to traffic volumes would be small.	Public services, Transportation	SMALL, MODERATE, or LARGE (Category 2). 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.	Change issue from Category 2 to Category 1
Human Health					
57	Radiation exposures to the public	SMALL (Category 1). 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 the public during refurbishment	SMALL (Category 1). During refurbishment, the gaseous effluents would result in doses that are similar to those from current operation. Applicable regulatory dose limits to the public are not expected to be exceeded.	Issue Consolidation (Category 1)
			Radiation exposure to public (license renewal term)	SMALL (Category 1). Radiation doses to the public will continue at current levels associated with normal operations.	
58	Radiation exposures to plant workers	SMALL (Category 1). 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.	Occupational radiation exposures during refurbishment	SMALL (Category 1). Occupational doses from refurbishment are expected to be within the range of annual average collective doses experienced for pressurized-water reactors and boiling-water reactors. Occupational mortality risk from all causes including radiation is in the mid-range for industrial settings.	Issue Consolidation (Category 1)
			Occupational radiation exposures (license renewal term)	SMALL (Category 1). Projected maximum occupational doses during the license renewal term are within the range of doses experienced during normal operations and normal maintenance outages, and would be well below regulatory limits.	

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
59	Human health impact from chemicals	SMALL (Category 1). 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.	Not addressed	Not addressed	New Category 1 issue
63	Physical occupational hazards	SMALL (Category 1). 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.	Not addressed	Not addressed	New Category 1 issue
Environmental Justice					
67	Minority and low-income populations	(Category 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).	Environmental justice	None. The need for and the content of an analysis of environmental justice will be addressed in plant-specific reviews.	New Category 2 issue
Cumulative impacts					
73	Cumulative impacts	(Category 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.	Not addressed	Not addressed	New Category 2 issue

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
Termination of Nuclear Power Plant Operations and Decommissioning					
78	Termination of plant operations and decommissioning	SMALL (Category 1). License renewal is expected to have a negligible effect on the impacts of terminating operations and decommissioning on all resources.	Radiation doses	SMALL (Category 1). Doses to the public will be well below applicable regulatory standards regardless of which decommissioning method is used. Occupational doses would increase no more than 1 man-rem caused by buildup of long-lived radionuclides during the license renewal term.	Issue consolidation (Category 1)
			Waste management	SMALL (Category 1). Decommissioning at the end of a 20-year license renewal period would generate no more solid wastes than at the end of the current license term. No increase in the quantities of Class C or greater than Class C wastes would be expected.	
			Air quality	SMALL (Category 1). Air quality impacts of decommissioning are expected to be negligible either at the end of the current operating term or at the end of the license renewal term.	
			Water quality	SMALL (Category 1). The potential for significant water quality impacts from erosion or spills is no greater whether decommissioning occurs after a 20-year license renewal period or after the original 40-year operation period, and measures are readily available to avoid such impacts.	
			Ecological resources	SMALL (Category 1). Decommissioning after either the initial operating period or after a 20-year license renewal period is not expected to have any direct ecological impacts.	

Final Rule Revisions			Current Rule		Final Rule Change Summary
Issue #	Issue	Finding	Issue	Finding	
		Socioeconomic impacts		SMALL (Category 1). Decommissioning would have some short-term socioeconomic impacts. The impacts would not be increased by delaying decommissioning until the end of a 20-year relicense period, but they might be decreased by population and economic growth.	

3. EVALUATION OF BENEFITS AND COSTS

This section describes the analysis conducted to identify and evaluate the benefits (values/savings) and costs (impacts) of the final revisions to Appendix B to Subpart A of 10 CFR Part 51. Section 3.1 identifies the attributes that Option 2 is expected to affect. Section 3.2 describes the methodology used to analyze the benefits and costs associated with expected changes to the affected attributes.

3.1 Identification of Affected Attributes

This section identifies the factors within the public and private sectors that the final revisions are expected to affect. These factors are classified as "attributes" using the list of potential attributes provided in Chapter 5 of the NRC's "Regulatory Analysis Technical Evaluation Handbook."⁵ Affected attributes include the following:

- *Industry Implementation.* As a result of consolidation of environmental issues, licensees will recognize an associated savings to prepare the ER. Licensees also will likely recognize savings associated with those Category 2 issues that have been reclassified as Category 1 issues, as the licensee will no longer be required to assess the impacts of such issues in its ER. Conversely, licensees will incur additional costs associated with new Category 2 issues to complete site-specific analyses and present the information in the ER. In addition, licensees will incur additional costs associated with new Category 1 issues to research for new and significant information and present the information, if found, in the ER. License renewal applicants are currently providing data on the new Category 1 and 2 issues to the NRC in their ERs or in response to RAIs. However, as it was not previously required by the regulation, these costs are included in the regulatory analysis of the final rule.
- *NRC Implementation.* As a result of consolidation of environmental issues, the NRC will recognize an associated savings to review the licensee's ER. The NRC will likely recognize resource savings associated with those Category 2 issues that have been reclassified as Category 1 issues, as the NRC will no longer be required to evaluate the impact of such issues in the SEIS. Conversely, the NRC will likely incur additional costs associated with new Category 2 issues (thus, expanding the scope of the SEIS). The NRC may also incur additional costs for new Category 1 issues in the event the NRC becomes aware of any new and significant information, which then must be included in the SEIS. However, some costs are being incurred during current license renewal environmental reviews.

⁵ NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook: Final Report," U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, January 1997.

- *Improvements in Knowledge.* Category 1 and 2 issues have been added to Table B–1, which will improve the quality of the information provided to the NRC and facilitate license renewal environmental reviews. This information is necessary for the NRC to ensure compliance with Federal environmental statutes and regulations and to evaluate the potential environmental effects of continued nuclear power plant operations. Additionally, licensee research for new and significant information pertaining to Category 1 issues will improve the knowledge base for these issues.
- *Improvements in Clarity and Efficiency.* The text revisions and organizational changes to the issues and findings in Table B–1 will improve the clarity and intent of the requirements. Increasing the number of Category 1 issues that can be adequately addressed generically is based on lessons learned and knowledge gained by the NRC in completing more than 40 license renewal environmental reviews. Improving the clarity and intent of the regulatory provisions reduces the cost to industry to prepare environmental reports for license renewal applications and permits the NRC to focus resources on plant-specific issues of importance (i.e., site-specific analyses), which also reduces the cost to the NRC.

The final revisions to Appendix B to Subpart A of 10 CFR Part 51 are *not* expected to affect the following attributes:

- Public Health (Routine)
- Public Health (Accident)
- Occupational Health (Routine)
- Occupational Health (Accident)
- Offsite Property
- Onsite Property
- Industry Operation
- NRC Operation
- Other Government
- General Public
- Antitrust Considerations
- Safeguards and Security Considerations
- Environmental Considerations
- Other Considerations

3.2 Analytical Methodology

This section describes the methodology used to analyze the benefits and costs associated with Option 2. The benefits of Option 2 include any desirable changes in affected attributes (e.g., monetary savings) while the costs include any adverse changes in affected attributes (e.g., monetary costs).

The analysis evaluates the following two attributes affected by Option 2 on a quantitative basis:

- Industry Implementation
- NRC Implementation

The analysis evaluates the following two attributes affected by Option 2 on a qualitative basis:

- Improvements in Clarity and Efficiency

- Improvements in Knowledge

A qualitative evaluation was performed for Improvements in Clarity and Efficiency, and Improvements in Knowledge due to the difficulty and uncertainty involved in quantifying the benefits and impacts to these attributes. One aspect of the Industry Implementation and NRC Implementation attributes pertaining to issues associated with transmission line right-of-ways also was evaluated on a qualitative basis.

3.2.1 Baseline for the Analysis

The analysis measures the incremental impacts of Option 2 relative to a baseline (Option 1, the No Action alternative).

3.2.2 Affected Licensees

The license holders for all 104 operating nuclear power plants (i.e., reactor units) can apply for license renewals. In fact, the license holders for 71 nuclear reactor units have already received 20-year operating license extensions from the NRC. Another 15 reactor units are currently undergoing license renewal environmental and safety reviews (as of January 20, 2012).

The analysis estimates the number of license renewal applications as follows:

- Based on letters of intent received from licensees, the NRC anticipates receiving 3 license renewal applications per year through 2015.
- Some plants will become eligible for a second 20-year license extension after FY 2013. While the NRC understands that the possibility exists for license holders to submit a second license renewal application, no letters of intent have been received as of the issuance date of this document. The NRC estimates receiving 3 applications per year from FY 2015 through FY 2022.
- The NRC estimates that a total of 30 license renewal applications (including applications for a second license renewal) will be received in the 10-year cycle following the effective date of the rule. At this time, sufficient data do not exist to support estimates on license renewal applications beyond 2022.

Calendar Year	Applications
2013	3
2014	3
2015	3
2016	3
2017	3
2018	3
2019	3
2020	3
2021	3
2022	3
Total	30

3.2.3 Analysis of the Incremental Requirements, Option 2

The NRC evaluated each provision contained in Option 2 relative to the applicable baseline (Option 1, the No Action alternative). Based on this analysis, the NRC developed equations to estimate the benefits (values/savings) and costs (impacts) using available data, augmented by assumptions when necessary, and guidance contained in NUREG/BR-0184. It is important to note that some costs are being incurred during current license renewal environmental reviews.

General Assumptions:

- Effective year of final rule = 2013
- Industry wage rate = \$119.00/hour
- NRC wage rate = \$119.00/hour
- The analysis presents all benefits and costs in current dollars. For net present value calculations, the analysis discounts to the first year of incurred costs and/or savings (i.e., 2013).

The analysis evaluates two affected attributes on a quantitative basis, Industry Implementation in Section 3.2.3.1 and NRC Implementation in Section 3.2.3.2.

3.2.3.1 Industry Implementation

Option 2 updates and amends issues in Table B-1 that each licensee must assess and include in the ER portion of its license renewal application to the NRC. The analysis specifies each Table B-1 issue that is evaluated quantitatively. For each Table B-1 issue, the regulatory analysis lists the assumption(s) and equation(s) used to estimate the benefits and/or costs to industry.

General Assumptions:

- Each Table B-1 benefit and cost described below applies to all licensees except where noted.
 - Licensees will incur the costs or recognize the savings resulting from the final rule change(s) in the 18 months prior to submitting a license renewal application to the NRC. However, any licensee submitting a license renewal application in the effective year of the final rule will incur the costs or recognize the savings in the same year as the application submittal. An anticipated 12-month implementation period is expected from final rule publication to provide adequate notice to licensees considering the submission of a licensee renewal application in 2013. Because the savings to an applicant will be significant and because the NRC has been actively informing the public of anticipated final rule changes, it is expected that licensees that submit an application in 2013 will prefer to comply with the revised rule.
 -

- Each cost and saving assumption included in the regulatory analysis is based on extensive NRC staff experience in the review of license renewal applications.
 - **Category 1 issue.** A typical Category 1 issue is assumed to require, on average, 78 hours of licensee staff labor to research for new and significant information and, as applicable, include information in the ER.
 -
 - **Category 2 issue.** A typical Category 2 issue is assumed to require, on average, 312 hours of licensee staff labor to complete a site-specific analysis and to present the analysis in the ER.
 - **Category Change.** The net savings per change from Category 2 to Category 1 is 312 hours – 78 hours = 234 hours.
 -
 - **Issue Consolidation.** Combining similar issues from the 1996 GEIS into a single Category 1 or Category 2 issue in the final rule will result in savings in licensee staff labor. Savings will be recognized by eliminating duplicative research and/or ER reporting requirements. However, some of the original effort associated with an issue must still be performed. Therefore, on average, the regulatory analysis assumes that issue consolidation will result in a 70-percent savings in labor time for each issue removed by consolidation.
 -
 - **Issue Consolidation (Category 1).** For example, removing one Category 1 issue by consolidation is assumed to save 55 hours (78 hours x 70 percent) in licensee staff labor, per application.
 -
 - **Issue Consolidation (Category 2).** For example, removing one Category 2 issue by consolidation is assumed to save 218 hours (312 hours x 70 percent) in licensee staff labor, per application.
 -
 - **The Summary of Industry Implementation Cost and Saving Assumptions** table reflects the aforementioned assumptions that will be used, as applicable, in the issue-specific cost/saving calculations in Section 3.2.3.1. For each issue, the revision type (e.g., New Category 1) is identified and the hours estimate included.
 -
 -
 - **Summary of Industry Implementation Cost and Saving Assumptions**

Revision Type	Hours	Saving/Cost
New Category 1	78	Cost
New Category 2	312	Cost
Category Change (2 to 1)	234	Saving
Issue Consolidation (Category 1)	55	Saving
Issue Consolidation (Category 2)	218	Saving

- **Offsite Land Use**—The final rule reclassifies two Category 2 issues, “Offsite land use (refurbishment),” and “Offsite land use (license renewal term),” as Category 1 issues, consolidates the issues into a new Category 1 issue, and names the consolidated issue, “Offsite land use.” The final rule changes the finding based on lessons learned and knowledge gained from previous renewal reviews for the existing Category 2 issues (requiring a site-specific analysis). Changes to the tax revenue portion of the “Offsite land use (license renewal term)” issue are addressed in the final rule as a separate new Category 1 issue, “Tax revenues.” Addressing the “Offsite land use” issues generically and consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Category Change): Average reduction in licensee staff time, per application, because two Category 2 issues are reclassified as Category 1 issues:
 - (234 hours per Category Change) x (2 Category Changes) = 468 hours.
- ▪ SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 55 hours.
- ○ Net result: One-time savings per application
 - (468 hours + 55 hours) = (523 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Aesthetic Impacts**—The final rule consolidates three Category 1 issues, “Aesthetic impacts (refurbishment),” “Aesthetic impacts (license renewal term),” and “Aesthetic impacts of transmission lines (license renewal term),” into one new Category 1 issue, “Aesthetic impacts.” The 1996 GEIS concluded that renewal of operating licenses and the refurbishment activities would have no significant aesthetic impact during the license renewal term. Previous license renewal reviews conducted by the NRC show that the appearance of nuclear plants and transmission line structures do not change significantly over time or because of refurbishment activities. Therefore, because aesthetic impacts are not anticipated and these three issues are similar, they have been consolidated to facilitate the environmental review process. Consolidating the three issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because two Category 1 issues are removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (2 Category 1 Issue Consolidations) = 110 hours.

- Net result: One-time savings per application
(110 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Air Quality Impacts (All Plants)**—The final rule renames the issue “Air quality during refurbishment (nonattainment and maintenance areas)” as “Air quality (all plants).” The final rule reflects the revised GEIS’ 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 reclassifies this Category 2 issue in the 1996 GEIS as a Category 1 issue.⁶ Addressing this issue generically reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Category Change): Average reduction in licensee staff time, per application, because one Category 2 issue is reclassified as a Category 1 issue:
 - $(234 \text{ hours per Category Change}) \times (1 \text{ Category Change}) = 234 \text{ hours.}$
 - Net result: One-time savings per application
(234 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Geology and Soils**—The final rule creates a new Category 1 issue, “Geology and soils.”⁷ 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 applicant is required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue, and as needed, include information in the ER.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
 - $(78 \text{ hours per Category 1 Issue}) \times (1 \text{ Category 1 Issue}) = 78 \text{ hours.}$

⁶ The proposed rule renamed the issue “Air quality (nonattainment and maintenance areas)” and retained the issue as Category 2 issue (74 FR 38121, 38134).

⁷ The proposed rule created a new Category 1 issue named “Impacts of nuclear plants on geology and soils” (74 FR 38121, 38134).

- Net result: One-time cost per application
 - $(78 \text{ hours}) \times (\text{industry wage rate})$
 - *Outcome:* Cost to the applicant.
- **Surface Water Use and Quality (Non-Cooling System Impacts)**—The final rule consolidates two Category 1 issues, “Impacts of refurbishment on surface water quality” and “Impacts of refurbishment on surface water use,” and names the new consolidated Category 1 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. Consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - $(55 \text{ hours per Category 1 Issue Consolidation}) \times (1 \text{ Category 1 Issue Consolidation}) = 55 \text{ hours}$.
 - Net result: One-time savings per application
 $(55 \text{ hours}) \times (\text{industry wage rate})$

Outcome: Savings to the applicant.

- **Discharge of Biocides, Sanitary Wastes, and Minor Chemical Spills**—The final rule consolidates two Category 1 issues, “Discharge of chlorine or other biocides” and “Discharge of sanitary wastes and minor chemical spills,” and names the new consolidated Category 1 issue, “Discharge of biocides, sanitary wastes, and minor chemical spills.” Consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - $(55 \text{ hours per Category 1 Issue Consolidation}) \times (1 \text{ Category 1 Issue Consolidation}) = 55 \text{ hours}$.
 - Net result: One-time savings per application
 $(55 \text{ hours}) \times (\text{industry wage rate})$

Outcome: Savings to the applicant.

- **Effects of Dredging on Surface Water Quality**—The final rule creates 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. The applicant is required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue, and as needed, include information in the ER.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
 - (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
 - Net result: One-time cost per application
 - (78 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Groundwater Contamination and Use (Non-Cooling System Impacts)**—The final rule expands the scope of “Impacts of refurbishment on groundwater use and quality” issue to include the effects on continued nuclear plant operations during the license renewal term. The expanded issue is then consolidated with a new Category 1 issue, “Groundwater and soil contamination,” which was first presented in the proposed rule. The resulting consolidated Category 1 issue is named, “Groundwater contamination and use (non-cooling system impacts).” These issues were consolidated because both 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. As supported by the analysis in the final 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. Expanding the scope of the existing Category 1 issue, “Impacts of refurbishment on groundwater use and quality,” provides clarification on relevant industry activities covered by this issue, but will not result in an increase in cost. Introduction of a new Category 1 issue, “Groundwater and soil contamination,” requires the applicant to include in the ER any new and significant information about environmental impacts of license renewal, related to this new Category 1 issue, of which the licensee is aware. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue and, as needed, include information in the ER. However, consolidating these two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
 - (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
- ▪ SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 55 hours.
- ○ Net result: One-time cost per application
 - (78 hours - 55 hours) = (23 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Radionuclides Released to Groundwater**—The final rule creates a new Category 2 issue, “Radionuclides released to groundwater,” to evaluate the potential impact of discharges of radionuclides from plant systems into groundwater. Addressing this new issue in an ER will result in a one-time industry cost per application.

Assumptions:

- COST (Category 2 Issue): Average increase in licensee staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the ER:
 - (312 hours per Category 2 Issue) x (1 Category 2 Issue) = 312 hours.
- ○ Net result: One-time cost per application
 - (312 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Exposure of Terrestrial Organisms to Radionuclides**—The final rule creates a new Category 1 issue, “Exposure of terrestrial organisms to radionuclides.” 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. The applicant is required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue and, as needed, to include information in the ER.

Assumptions:

- o COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
 - o (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
 - o Net result: One-time cost per application
 - o (78 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Cooling Tower Impacts on Vegetation (Plants with Cooling Towers)**—The final rule consolidates two Category 1 issues, “Cooling tower impacts on crops and ornamental vegetation” and “Cooling tower impacts on native plants,” and names the consolidated Category 1 issue, “Cooling tower impacts on vegetation (plants with cooling towers).” 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. Consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - o (55 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 55 hours.
 - o NOTE: Approximately 50 percent of nuclear power plants have cooling towers. Therefore, this savings only will be recognized by those licensees with plants with cooling towers.
 - o Net result: One-time savings per application
(55 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Bird Collisions with Plant Structures and Transmission Lines**—The final rule consolidates two Category 1 issues, “Bird collisions with cooling towers” and “Bird collision with power lines,” and names the consolidated Category 1 issue, “Bird collisions with plant structures and transmission lines.” The final rule also expands the scope of the consolidated Category 1 issue to address collisions with all plant structures. Expanding the scope of this issue will not result in an increase in cost. The two issues were consolidated to conform to the resource-based approach used in the revised GEIS. Consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 55 hours.
 - Net result: One-time savings per application
(55 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Water Use Conflicts with Terrestrial Resources (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a River)**—The final rule creates 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. Completing a site-specific analysis on this new issue and presenting the results in the ER will result in a one-time industry cost per application.

Assumptions:

- COST (Category 2 Issue): Average increase in licensee staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the ER:
 - (312 hours per Category 2 Issue) x (1 Category 2 Issue) = 312 hours.
 - NOTE: Approximately 50 percent of nuclear power plants use makeup water from a river. Therefore, this cost only will be incurred by those licensees that use makeup water from a river.
 - Net result: One-time cost per application
○ (312 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Transmission Line Right-of-Way (ROW) Management Impacts on Terrestrial Resources**—The final rule consolidates two Category 1 issues, “Power line right-of-way management (cutting and herbicide application)” and “Floodplains and wetland on power line right-of-way,” and names the consolidated Category 1 issue, “Transmission line right-of-way (ROW) management impacts on terrestrial resources.” The two issues were consolidated to conform to the resource-based approach used in the revised GEIS. Consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 55 hours.
 - Net result: One-time savings per application
(55 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Impingement and Entrainment of Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds)**—The final rule consolidates 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),” and names the consolidated Category 2 issue, “Impingement and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds).” 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. It is the consolidated effects of entrainment and impingement that reflect the total impact of the cooling system intake on the resource. Consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 2 issue is removed by consolidation:
 - (218 hours per Category 2 Issue Consolidation) x (1 Category 2 Issue Consolidation) = 218 hours.
 - NOTE: Approximately 50 percent of nuclear power plants use once-through cooling systems or cooling ponds. Therefore, this savings only will be recognized by those licensees with plants that use once-through cooling systems or cooling ponds.
 - Net result: One-time savings per application
(218 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Impingement and Entrainment of Aquatic Organisms (Plants with Cooling Towers)**—The final rule consolidates 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),” and names the consolidated Category 1 issue, “Impingement and entrainment of aquatic organisms (plants with cooling towers).” These 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. Consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 55 hours.
 - NOTE: Approximately 50 percent of nuclear power plants have cooling towers. Therefore, this savings only will be recognized by those licensees with plants with cooling towers.
 - Net result: One-time savings per application
(55 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Infrequently Reported Thermal Impacts (All Plants)**— The final rule consolidates 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),” and names the consolidated Category 1 issue, “Infrequently reported thermal impacts (all plants).” These five issues are consolidated to facilitate the environmental review process because all issues are caused by thermal effects resulting from operation of a plant’s cooling system. Previous license renewal reviews conducted by the NRC have shown that these thermal issues have not been a problem at operating nuclear power plants and would not change during the license renewal term. Therefore, no future impacts are anticipated. Consolidating the five issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because four Category 1 issues are removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (4 Category 1 Issue Consolidations) = 220 hours.

- Net result: One-time savings per application
(220 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Effects of Cooling Water Discharge on Dissolved Oxygen, Gas Supersaturation, and Eutrophication**—The final rule consolidates three Category 1 issues, “Eutrophication,” “Gas supersaturation (gas bubble disease),” and “Low dissolved oxygen in the discharge,” and names the consolidated Category 1 issue, “Effects of cooling water discharge on dissolved oxygen, gas supersaturation, and eutrophication.” These three issues are consolidated given their similar nature and to facilitate the environmental review process. Consolidating these three issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because two Category 1 issues are removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (2 Category 1 Issue Consolidations) = 110 hours.
 - Net result: One-time savings per application
(110 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Exposure of Aquatic Organisms to Radionuclides**—The final rule creates a new Category 1 issue, “Exposure of aquatic organisms to radionuclides.” This issue has been added to evaluate the potential impact of radionuclide discharges on aquatic organisms at nuclear power plants from continued operations during the license renewal term. The applicant is required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue and, as needed, include information in the ER.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
 - (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
 - Net result: One-time cost per application
(78 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Effects of Dredging on Aquatic Organisms**—The final rule creates a new Category 1 issue, “Effects of dredging on aquatic organisms,” to evaluate the impacts of dredging on aquatic organisms. The applicant is required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue and, as needed, include information in the ER.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
 - (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
- - Net result: One-time cost per application
 - (78 hours) x (industry wage rate)
- *Outcome:* Cost to the applicant.

- **Water Use Conflicts with Aquatic Resources (Plants with Cooling Ponds or Cooling Towers using Makeup Water from a River)**—The final rule creates a new Category 2 issue, “Water use conflicts with aquatic resources (plants with cooling ponds or cooling towers using makeup water from a river),” to evaluate water use conflicts with aquatic resources in stream communities. Addressing this new issue in an ER will result in a one-time industry cost per application.

Assumptions:

- COST (Category 2 Issue): Average increase in licensee staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the ER:
 - (312 hours per Category 2 Issue) x (1 Category 2 Issue) = 312 hours.
- - NOTE: Approximately 50 percent of nuclear power plants use makeup water from a river. Therefore, this cost only will be incurred by those licensees that use makeup water from a river.
- - Net result: One-time cost per application
 - (312 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Impacts of Transmission Line Right-of-Way (ROW) Management on Aquatic Resources**—The final rule creates a new Category 1 issue, “Impacts of transmission line right-of-way (ROW) management on aquatic resources,” to evaluate the impact of transmission line ROW management on aquatic resources during the license renewal term. The applicant is required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue and, as needed, include information in the ER.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
 - (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
 - Net result: One-time cost per application
 - (78 hours) x (industry wage rate)
- *Outcome:* Cost to the applicant.

- **Threatened, Endangered, and Protected Species and Essential Fish Habitat**—The final rule renames 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. Expanding the scope of this issue will result in a one-time industry cost per application for those licensees subject to the MSA.

Assumptions:

- COST (Category 2 Issue): Average increase in licensee staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the ER:
 - (312 hours per Category 2 Issue) x (1 Category 2 Issue) = 312 hours.
- NOTE: Approximately 10 percent of nuclear power plants are located in areas in close proximity to a commercial fisheries. Therefore, this cost only will be incurred by licensees with plants located near commercial fisheries.
 - Net result: One-time cost per application
 - (312 hours) x (industry wage rate)
- *Outcome:* Cost to the applicant.

- **Employment and Income, Recreation and Tourism**—The final rule creates 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 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 “tourism and recreation” portion of this issue is not addressed in this analysis because it is transferred from another existing issue, and will not result in any quantifiable savings or costs. However, the addition of the new generic analysis will result in a one-time industry cost per application to research for new and significant information on this issue and, as needed, include information in the ER.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
- ○ (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
- ○ Net result: One-time cost per application
- ○ (78 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **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 creates a new Category 1 issue, “Tax revenues,” to evaluate the impacts of license renewal on tax revenues. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue and, as needed, include information in the ER.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
- ○ (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
- ○ Net result: One-time cost per application
- ○ (78 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Community Services and Education**—The final rule reclassifies two Category 2 issues, “Public services: public utilities,” and “Public services, education (refurbishment)” as Category 1 issues, and consolidates them with the Category 1 issue, “Public services, education (license renewal term),” and the “Public safety and social service” portion of the Category 1 issue, “Public services: Public safety, social services, and tourism and recreation.”⁸ This consolidation is based on lessons learned and knowledge gained from previous license renewal reviews which show that all public services are equally affected by changes in plant operations and refurbishment associated with license renewal. The consolidated issue, “Community services and education,” is a Category 1 issue. By changing two Category 2 issues to Category 1 issues and consolidating four issues, the final rule reduces the labor to prepare the ER and will result in a one-time industry savings per application. The applicant is still required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware.

Assumptions:

- SAVINGS (Category Change): Average reduction in licensee staff time, per application, because two Category 2 issues are reclassified as Category 1 issues:
 - $(234 \text{ hours per Category Change}) \times (2 \text{ Category Changes}) = 468 \text{ hours.}$
- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because three Category 1 issues are removed by consolidation:
 - $(55 \text{ hours per Category 1 Issue Consolidation}) \times (3 \text{ Category 1 Issue Consolidations}) = 165 \text{ hours.}$
 - Net result: One-time savings per application
 $(468 + 165 \text{ hours}) = (633 \text{ hours}) \times (\text{industry wage rate})$

Outcome: Savings to the applicant.

- **Population and Housing**—The final rule renames the existing Category 2 issue, “Housing impacts” (requiring a site-specific analysis), to “Population and housing” and reclassifies this issue as a Category 1 issue. Based on lessons learned and knowledge gained from previous license renewal reviews, addressing this issue generically reduces the labor to prepare the ER and will result in a one-time industry savings per application. The applicant is still required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware.

⁸ The “tourism and recreation” portion of the “Public services: Public safety, social services, and tourism and recreation” issue was consolidated into the Category 1 issue, “Employment and income, recreation and tourism.”

Assumptions:

- SAVINGS (Category Change): Average reduction in licensee staff time, per application, because one Category 2 issue is reclassified as a Category 1 issue:
 - (234 hours per Category Change) x (1 Category Change) = 234 hours.
- ○ Net result: One-time savings per application
 - (234 hours) x (industry wage rate)
- *Outcome:* Savings to the applicant.

- **Transportation**—The final rule renames the existing Category 2 issue, “Public services, Transportation” (requiring a site-specific analysis), to “Transportation” and reclassifies this issue as a Category 1 issue. Based on lessons learned and knowledge gained from previous license renewal reviews, addressing this issue generically reduces the labor to prepare the ER and will result in a one-time industry savings per application. The applicant is still required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware.

Assumptions:

- SAVINGS (Category Change): Average reduction in licensee staff time, per application, because one Category 2 issue is reclassified as a Category 1 issue:
 - (234 hours per Category Change) x (1 Category Change) = 234 hours.
- ○ Net result: One-time savings per application
 - (234 hours) x (industry wage rate)
- *Outcome:* Savings to the applicant.

- **Radiation Exposures to the Public**—The final rule consolidates two Category 1 issues, “Radiation exposures to the public during refurbishment” and “Radiation exposure to public (license renewal term)” and names the consolidated Category 1 issue, “Radiation exposures to the public.” These issues are consolidated given their similar nature and to facilitate the environmental review process. Consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 55 hours.
- ○ Net result: One-time savings per application
 - (55 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Radiation Exposures to Plant Workers**—The final rule consolidates two Category 1 issues, “Occupational radiation exposures during refurbishment” and “Occupational radiation exposures (license renewal term)” and names the consolidated Category 1 issue, “Radiation exposures to plant workers.” These issues are consolidated given their similar nature and to facilitate the environmental review process. Consolidating the two issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because one Category 1 issue is removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 55 hours.
 - Net result: One-time savings per application
(55 hours) x (industry wage rate)

Outcome: Savings to the applicant.

- **Human Health Impact from Chemicals**—The final rule creates 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 resulting from normal operations of a nuclear power plant during the license renewal term. The applicant is required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue and, as needed, include information in the ER.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and, as needed, include information in the ER:
 - (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
 - Net result: One-time cost per application
(78 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Physical Occupational Hazards**—The final rule creates 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 applicant is required to include in the ER any new and significant information, related to this new Category 1 issue, regarding the environmental impacts of license renewal of which the applicant is aware. Addressing this new issue in a license renewal application will result in a one-time industry cost per application to research for new and significant information on this issue, and, as needed, include information in the ER.

Assumptions:

- COST (Category 1 Issue): Average increase in licensee staff time, per application, to research for new and significant information related to this new Category 1 issue and present the information in the ER (as needed):
 - (78 hours per Category 1 Issue) x (1 Category 1 Issue) = 78 hours.
 - Net result: One-time cost per application
 - (78 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Minority and Low-Income Populations**—The final rule creates 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. By making this a Category 2 issue, the final rule will require 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. Completing a site-specific analysis on this new issue and presenting the results in the ER will result in a one-time industry cost per application.

Assumptions:

- COST (Category 2 Issue): Average increase in licensee staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the ER:
 - (312 hours per Category 2 Issue) x (1 Category 2 Issue) = 312 hours.
 - Net result: One-time cost per application
 - (312 hours) x (industry wage rate)

Outcome: Cost to the applicant.

- **Cumulative Impacts**—The final rule creates a new Category 2 issue, “Cumulative impacts,” to evaluate the potential cumulative impacts of license renewal. Completing a site-specific analysis on this new issue and presenting the results in the ER will result in a one-time industry cost per application.

Assumptions:

- COST (Category 2 Issue): Average increase in licensee staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the ER:
 - (312 hours per Category 2 Issue) x (1 Category 2 Issue) = 312 hours.
 - ○ Net result: One-time cost per application
 - (312 hours) x (industry wage rate)
- **Outcome:** Cost to the applicant.

- **Termination of Plant Operations and Decommissioning**—The final rule consolidates six 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.” The final rule names the new consolidated Category 1 issue, “Termination of plant operations and decommissioning.” The final rule consolidates these six decommissioning issues into one Category 1 issue to facilitate the environmental review process. Consolidating the six issues reduces the labor to prepare the ER portion of each license renewal application and will result in a one-time industry savings per application.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in licensee staff time, per application, because five Category 1 issues are removed by consolidation:
 - (55 hours per Category 1 Issue Consolidation) x (5 Category 1 Issue Consolidations) = 275 hours.
 - Net result: One-time savings per application
(275 hours) x (industry wage rate)

Outcome: Savings to the applicant.

3.2.3.2 NRC Implementation

Option 2 activities affect the environmental review time per license renewal application. The analysis specifies each Table B–1 issue that is evaluated quantitatively. For each Table B–1 issue, the analysis lists the assumption(s) and equation(s) used to estimate the value (benefit/saving) and/or impact (cost) to the NRC. It is important to note that some costs are being incurred during current license renewal environmental reviews.

General Assumptions:

- Each Table B–1 cost or savings described below applies to all license renewal applications except where noted.
 - The NRC will incur the costs or recognize the savings resulting from the final rule changes in the 22 months after the NRC receives each license renewal application. The NRC is assumed to recognize half of the costs and savings in the same year as the application submittal and half of the costs and savings in the year following the application submittal.
 - Each cost and saving assumption associated with the final rule changes is based on extensive NRC staff experience in the review of license renewal applications.
 - **Category 1 issue.** A typical Category 1 issue is assumed to require, on average, 26 hours of NRC staff labor to research for new and significant information and, as applicable, include information in the SEIS.
 - **Category 2 issue.** A typical Category 2 issue is assumed to require, on average, 104 hours of NRC staff labor to complete a site-specific analysis and present the information in the SEIS.
 - **Category Change.** Redefining a Category 2 issue as a Category 1 issue will result in a net savings. The NRC will no longer be required to evaluate the impact of such issues in the SEIS (saving 104 hours), but research for new and significant information and including information in the SEIS (as applicable) now must be performed (cost of 26 hours).
 - The net savings per Category Change is 104 hours – 26 hours = 78 hours.
 - **Issue Consolidation.** Combining similar issues from the 1996 GEIS into a single Category 1 or Category 2 issue in the final rule will result in savings of NRC staff time. Savings will be recognized by eliminating duplicative research and/or SEIS reporting requirements. However, some of the original effort associated with an issue must still be performed. Therefore, on average, the regulatory analysis assumes that issue consolidation will result in a 70 percent savings in labor time for each issue removed by consolidation.

- **Issue Consolidation (Category 1).** For example, removing one Category 1 issue by consolidation is assumed to save 18 hours (26 hours x 70 percent) in NRC staff time, per application.
 -
- **Issue Consolidation (Category 2).** For example, removing one Category 2 issue by consolidation is assumed to save 73 hours (104 hours x 70 percent) in NRC staff time, per application.
 -
- The **Summary of NRC Implementation Cost and Saving Assumptions** table reflects the aforementioned assumptions that will be used, as applicable, in the issue-specific cost/saving calculations in Section 3.2.3.2. For each issue, the revision type (e.g., New Category 1) is identified and the hours estimate included.
 -
 -
 - **Summary of NRC Implementation Cost and Saving Assumptions**
 - | Revision Type | Hours | Saving/Cost |
|----------------------------------|-------|-------------|
| New Category 1 | 26 | Cost |
| New Category 2 | 104 | Cost |
| Category Change (2 to 1) | 78 | Saving |
| Issue Consolidation (Category 1) | 18 | Saving |
| Issue Consolidation (Category 2) | 73 | Saving |

- **Offsite Land Use**—The final rule reclassifies two Category 2 issues, “Offsite land use (refurbishment),” and “Offsite land use (license renewal term),” as Category 1 issues, consolidates the issues into a new Category 1 issue, and names the consolidated issue, “Offsite land use.” The final rule changes the finding based on lessons learned and knowledge gained from previous renewal reviews for the existing Category 2 issues (requiring a site-specific analysis). The tax revenue changes portion of the “Offsite land use (license renewal term)” issue is addressed in the final rule as a separate new Category 1 issue, “Tax revenues.” Addressing the “Offsite land use” issues generically and consolidating the two issues reduces the amount of time NRC staff needs to review this issue.

Assumptions:

- SAVINGS (Category Change): Average decrease in NRC staff time, per application, because two Category 2 issues are reclassified as Category 1 issues:
 - (78 hours per Category Change) x (2 Category Changes) = 156 hours.
 -
 - SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
 -
 - Net result: One-time savings per application
 - (156 hours + 18 hours) = (174 hours) x (industry wage rate)

Outcome: Savings to the NRC.

- **Aesthetic Impacts**—The final rule consolidates three Category 1 issues, “Aesthetic impacts (refurbishment),” “Aesthetic impacts (license renewal term),” and “Aesthetic impacts of transmission lines (license renewal term),” into one new Category 1 issue, “Aesthetic impacts.” The 1996 GEIS concluded that renewal of operating licenses and the refurbishment activities would have no significant aesthetic impact during the license renewal term. Previous license renewal reviews conducted by the NRC show that the appearance of nuclear 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. Consolidating the three issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because two Category 1 issues are removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (2 Category 1 Issue Consolidations) = 36 hours.

- Net result: One-time savings per application
(36 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Air Quality Impacts (All Plants)**—The final rule renames “Air quality during refurbishment (nonattainment and maintenance areas)” issue as “Air quality (all plants).” The final rule reflects the revised GEIS’ 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 revises this Category 2 issue in the 1996 GEIS as a Category 1 issue.⁹ Addressing this issue generically reduces the NRC staff time, per application, to prepare the SEIS.

Assumptions:

- SAVINGS (Category Change): Average reduction in NRC staff time, per application, because one Category 2 issue is reclassified as a Category 1 issue:
 - (78 hours per Category Change) x (1 Category Change) = 78 hours.
- - Net result: One-time savings per application
 - (78 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Geology and Soils**—The final rule creates a new Category 1 issue, “Geology and soils.”¹⁰ 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 NRC will incur an additional cost in preparing the SEIS for an application if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 - (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
- - Net result: One-time cost per application
 - (26 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

⁹ The proposed rule renamed the issue “Air quality (nonattainment and maintenance areas)” and retained the issue as Category 2 (74 FR 38121, 38134).

¹⁰ The proposed rule named the issue “Impacts of nuclear plants on geology and soils” and proposed the issue as Category 1(74 FR 38121, 38134).

- **Surface Water Use and Quality (Non-Cooling System Impacts)**—The final rule consolidates two Category 1 issues, “Impacts of refurbishment on surface water quality” and “Impacts of refurbishment on surface water use,” and names the new consolidated Category 1 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. Consolidating the two issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
 - Net result: One-time savings per application
(18 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Discharge of Biocides, Sanitary Wastes, and Minor Chemical Spills**—The final rule consolidates two Category 1 issues, “Discharge of chlorine or other biocides” and “Discharge of sanitary wastes and minor chemical spills,” and names the new consolidated Category 1 issue, “Discharge of biocides, sanitary wastes, and minor chemical spills.” Consolidating the two issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
 - Net result: One-time savings per application
(18 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Effects of Dredging on Surface Water Quality**—The final rule creates 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. The NRC will incur an additional cost in preparing the SEIS for an application if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- o COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 - o (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
 - o
 - o Net result: One-time cost per application
 - o (26 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **Groundwater Contamination and Use (Non-Cooling System Impacts)**—The final rule expands the scope of “Impacts of refurbishment on groundwater use and quality” issue to include the effects on continued nuclear plant operations during the license renewal term. The expanded issue is then consolidated with a new Category 1 issue, “Groundwater and soil contamination,” which was first presented in the proposed rule. The resulting consolidated Category 1 issue is named, “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) and refurbishment on groundwater use and quality. As supported by the analysis in the final 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. Expanding the scope of the existing Category 1 issue, “Impacts of refurbishment on groundwater use and quality,” provides clarification on the relevant industry activities but does not result in significant cost or saving. Introduction of a new Category 1 issue, “Groundwater and soil contamination,” requires that the NRC incur an additional cost in preparing the SEIS for an application if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff. However, consolidating the two issues also reduces the amount of time NRC staff needs to review the information.

Assumptions:

- o COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 - o (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
 - o
 - SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - o (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
 - o
 - o Net result: One-time cost per application
 - o (26 hours - 18 hours) = (8 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **Radionuclides Released to Groundwater**—The final rule creates a new Category 2 issue, “Radionuclides released to groundwater” to evaluate the potential impact of discharges of radionuclides from plant systems into groundwater. The NRC will incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new Category 2 issue.

Assumptions:

- COST (Category 2 Issue): Average increase in NRC staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the SEIS:
 -
 - (104 hours per Category 2 Issue) x (1 Category 2 Issue) = 104 hours.
 - - Net result: One-time cost per application
 - (104 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **Exposure of Terrestrial Organisms to Radionuclides**—The final rule creates a new Category 1 issue, “Exposure of terrestrial organisms to radionuclides.” 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. The NRC will incur an additional cost in preparing the SEIS for an application if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 -
 - (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
 - - Net result: One-time cost per application
 - (26 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **Cooling Tower Impacts on Vegetation (Plants with Cooling Towers)**—The final rule consolidates 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 Category 1 issue, “Cooling tower impacts on vegetation (plants with cooling towers).” 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. Consolidating the two issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
 - NOTE: Approximately 50 percent of nuclear power plants have cooling towers. Therefore, this savings only will be recognized by NRC during the reviews of license renewal applications for plants with cooling towers.
 - Net result: One-time savings per application
(18 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Bird Collisions with Plant Structures and Transmission Lines**—The final rule consolidates two Category 1 issues, “Bird collisions with cooling towers” and “Bird collision with power lines,” and names the consolidated Category 1 issue, “Bird collisions with plant structures and transmission lines.” The final rule also expands the scope of the consolidated Category 1 issue to address collisions with all plant structures. The two issues were consolidated to conform to the resource-based approach used in the revised GEIS. Consolidating the two issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
 - Net result: One-time savings per application
(18 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Water Use Conflicts with Terrestrial Resources (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a River)**—The final rule creates 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 NRC will incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new Category 2 issue.

Assumptions:

- o COST (Category 2 Issue): Average increase in NRC staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the SEIS:
 - o (104 hours per Category 2 Issue) x (1 Category 2 Issue) = 104 hours.
- o NOTE: Approximately 50 percent of nuclear power plants use makeup water from a river. Therefore, this cost only will be incurred by NRC during the reviews of license renewal applications for plants that use makeup water from a river.
 - o Net result: One-time cost per application
(104 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **Transmission Line Right-of-Way (ROW) Management Impacts on Terrestrial Resources**—The final rule consolidates two Category 1 issues, “Power line right-of-way management (cutting and herbicide application)” and “Floodplains and wetland on power line right-of-way,” and names the consolidated Category 1 issue, “Transmission line right-of-way (ROW) management impacts on terrestrial resources.” The two issues were consolidated to conform to the resource-based approach used in the revised GEIS. Consolidating the two issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - o (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
- o Net result: One-time savings per application
(18 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Impingement and Entrainment of Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds)**—The final rule consolidates 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),” and names the consolidated Category 2 issue, “Impingement and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds).” These two 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. It is the consolidated effects of entrainment and impingement that reflect the total impact of the cooling system intake on the resource. Consolidating the two issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 2 issue is removed by consolidation:
 - (73 hours per Category 2 Issue Consolidation) x (1 Category 2 Issue Consolidation) = 73 hours.
 - NOTE: Approximately 50 percent of nuclear power plants use once-through cooling systems or cooling ponds. Therefore, this savings only will be recognized by NRC during the reviews of license renewal applications for plants that have once-through cooling systems or cooling ponds.
 - Net result: One-time savings per application
(73 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Impingement and Entrainment of Aquatic Organisms (Plants with Cooling Towers)**—The final rule consolidates 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),” and names the consolidated Category 1 issue, “Impingement and entrainment of aquatic organisms (plants with cooling towers).” 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. Consolidating the two issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
 - NOTE: Approximately 50 percent of nuclear power plants have cooling towers. Therefore, this savings only will be recognized by NRC during the reviews of license renewal applications for plants with cooling towers.
 - Net result: One-time savings per application
(18 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Infrequently Reported Thermal Impacts (All Plants)**— The final rule consolidates 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),” and names the consolidated Category 1 issue, “Infrequently reported thermal impacts (all plants).” 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 these thermal issues have not been a problem at operating nuclear power plants and would not change during the license renewal term. Therefore, no future impacts are anticipated. Consolidating the five issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because four Category 1 issues are removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (4 Category 1 Issue Consolidations) = 72 hours.
 - Net result: One-time savings per application
(72 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Effects of Cooling Water Discharge on Dissolved Oxygen, Gas Supersaturation, and Eutrophication**—The final rule consolidates three Category 1 issues, “Eutrophication,” “Gas supersaturation (gas bubble disease),” and “Low dissolved oxygen in the discharge,” and names the consolidated Category 1 issue, “Effects of cooling water discharge on dissolved oxygen, gas supersaturation, and eutrophication.” The three issues are consolidated given their similar nature and to facilitate the environmental review process. Consolidating these three issues reduces the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because two Category 1 issues are removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (2 Category 1 Issue Consolidations) = 36 hours.
 - Net result: One-time savings per application
(36 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Exposure of Aquatic Organisms to Radionuclides**—The final rule creates a new Category 1 issue, “Exposure of aquatic organisms to radionuclides.” This issue has been added to evaluate the potential impact of radionuclide discharges on aquatic organisms at nuclear power plants from continued operations during the license renewal term. The NRC will incur an additional cost in preparing the SEIS, per application, if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 - (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
 - - Net result: One-time cost per application
 - (26 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **Effects of Dredging on Aquatic Organisms**—The final rule creates a new Category 1 issue, “Effects of dredging on aquatic organisms,” to evaluate the impacts of dredging on aquatic organisms. The NRC will incur an additional cost in preparing the SEIS for an application if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 - (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
 - - Net result: One-time cost per application
 - (26 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **Water Use Conflicts with Aquatic Resources (Plants with Cooling Ponds or Cooling Towers using Makeup Water from a River)**—The final rule creates a new Category 2 issue, “Water use conflicts with aquatic resources (plants with cooling ponds or cooling towers using makeup water from a river),” to evaluate water use conflicts with aquatic resources in stream communities. The NRC will incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new Category 2 issue.

Assumptions:

- COST (Category 2 Issue): Average increase in NRC staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the SEIS:
 - (104 hours per Category 2 Issue) x (1 Category 2 Issue) = 104 hours.
 - NOTE: Approximately 50 percent of nuclear power plants use makeup water from a river. Therefore, this cost only will be incurred by NRC during the reviews of license renewal applications for plants that use makeup water from a river.
 - ○ Net result: One-time cost per application
 - (104 hours) x (NRC wage rate)
- **Outcome:** Cost to the NRC.

- **Impacts of Transmission Line Right-of-Way (ROW) Management on Aquatic Resources**—The final rule creates a new Category 1 issue, “Impacts of transmission line right-of-way (ROW) management on aquatic resources,” to evaluate the impact of transmission line ROW management on aquatic resources during the license renewal term. The NRC will incur an additional cost in preparing the SEIS for an application if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 - (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.

- Net result: One-time cost per application
 - $(26 \text{ hours}) \times (\text{NRC wage rate})$
 - *Outcome:* Cost to the NRC.
- **Threatened, Endangered, and Protected Species and Essential Fish Habitat**—The final rule renames 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. Expanding the scope of this issue will result in a one-time cost to NRC to review additional information for a limited set of applications.

Assumptions:

- COST (Category 2 Issue): Average increase in NRC staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the SEIS:
 - $(104 \text{ hours per Category 2 Issue}) \times (1 \text{ Category 2 Issue}) = 104 \text{ hours.}$
 - *Outcome:* Cost to the NRC.
- NOTE: Approximately 10 percent of nuclear power plants are located in areas in close proximity to a commercial fisheries. Therefore, this cost only will be incurred by NRC when reviewing license renewal applications for plants located near commercial fisheries.
 - - Net result: One-time cost per application
 - $(104 \text{ hours}) \times (\text{NRC wage rate})$
 - *Outcome:* Cost to the NRC.
- **Employment and Income, Recreation and Tourism**—The final rule creates 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 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 “tourism and recreation” portion of this issue is not addressed in this analysis because it is transferred from another existing issue, which would not result in quantifiable savings or costs. However, the addition of the new generic analysis requires that the NRC incur an additional cost in preparing the SEIS for an application if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 -
 - (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
 -
 - Net result: One-time cost per application
 - (26 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **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 creates a new Category 1 issue, “Tax revenues,” to evaluate the impacts of license renewal on tax revenues. The NRC will incur an additional cost in preparing the SEIS for an application if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and present the information in the ER (as needed):
 -
 - (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
 -
 - Net result: One-time cost per application
 - (26 hours) x (NRC wage rate)
-

Outcome: Cost to the NRC.

- **Community Services and Education**—The final rule reclassifies two Category 2 issues, “Public services: public utilities,” and “Public services, education (refurbishment)” as Category 1 issues, and consolidates them with the Category 1 issue, “Public services, education (license renewal term),” and the “Public safety and social service” portion of the Category 1 issue, “Public services: Public safety, social services, and tourism and recreation.”¹¹ This consolidation is based on lessons learned and knowledge gained from previous license renewal reviews which show that all public services are equally affected by changes in plant operations and refurbishment associated with license renewal. The consolidated issue, “Community services and education,” is a Category 1 issue. Addressing these issues generically and consolidating the four issues reduces the NRC staff time, per application, to prepare the SEIS.

Assumptions:

¹¹ The “tourism and recreation” portion of the “Public services: Public safety, social services, and tourism and recreation” issue was consolidated into the Category 1 issue, “Employment and income, recreation and tourism.”

- SAVINGS (Category Change): Average reduction in NRC staff time, per application, because two Category 2 issues are reclassified as Category 1 issues:
 - $(78 \text{ hours per Category Change}) \times (2 \text{ Category Changes}) = 156 \text{ hours.}$
- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because three Category 1 issues are removed by consolidation:
 - $(18 \text{ hours per Category 1 Issue Consolidation}) \times (3 \text{ Category 1 Issue Consolidations}) = 54 \text{ hours.}$
 - Net result: One-time savings per application
 $(156 + 54 \text{ hours}) = (210 \text{ hours}) \times (\text{NRC wage rate})$

Outcome: Savings to the NRC.

- **Population and Housing**—The final rule renames the existing Category 2 issue, “Housing impacts” (requiring a site-specific analysis), to “Population and housing” and reclassifies this issue as a Category 1 issue. Based on lessons learned and knowledge gained from previous license renewal reviews, addressing this issue generically will reduce the NRC staff time, per application, to prepare the SEIS.

Assumptions:

- SAVINGS (Category Change): Average reduction in NRC staff time, per application, because one Category 2 issue is reclassified as a Category 1 issue:
 - $(78 \text{ hours per Category Change}) \times (1 \text{ Category Change}) = 78 \text{ hours.}$
 - Net result: One-time savings per application
 $(78 \text{ hours}) \times (\text{NRC wage rate})$
- *Outcome:* Savings to the NRC.

- **Transportation**—The final rule renames the existing Category 2 issue, “Public services, Transportation” (requiring a site-specific analysis), to “Transportation” and reclassifies this issue as a Category 1 issue. Based on lessons learned and knowledge gained from previous license renewal reviews, addressing this issue generically will reduce the NRC staff time in preparing the SEIS.

Assumptions:

- SAVINGS (Category Change): Average reduction in NRC staff time, per application, because one Category 2 issue is reclassified as a Category 1 issue:
 - $(78 \text{ hours per Category Change}) \times (1 \text{ Category Change}) = 78 \text{ hours.}$
 - Net result: One-time savings per application
 $(78 \text{ hours}) \times (\text{NRC wage rate})$
- *Outcome:* Savings to the NRC.

- **Radiation Exposures to the Public**—The final rule consolidates two Category 1 issues, “Radiation exposures to the public during refurbishment” and “Radiation exposure to public (license renewal term)” and names the consolidated Category 1 issue, “Radiation exposures to the public.” These issues are consolidated given their similar nature and to facilitate the environmental review process. Consolidating the two issues will reduce the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
 - Net result: One-time savings per application
(18 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Radiation Exposures to Plant Workers**—The final rule consolidates two Category 1 issues, “Occupational radiation exposures during refurbishment” and “Occupational radiation exposures (license renewal term)” and names the consolidated Category 1 issue, “Radiation exposures to plant workers.” These issues are consolidated given their similar nature and to facilitate the environmental review process. Consolidating the two issues will reduce the amount of time NRC staff needs to review the information.

Assumptions:

- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because one Category 1 issue is removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (1 Category 1 Issue Consolidation) = 18 hours.
 - Net result: One-time savings per application
(18 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

- **Human Health Impact from Chemicals**—The final rule creates 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 resulting from normal operations of a nuclear power plant during the license renewal term. The NRC will incur an additional cost in preparing the SEIS, per application, if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 - (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
 - - Net result: One-time cost per application
 - (26 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **Physical Occupational Hazards**—The final rule creates 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 NRC will incur an additional cost in preparing the SEIS, per application, if any new and significant information related to this new Category 1 issue is identified, either by the applicant, through the public comment process on the draft SEIS, or by the NRC staff.

Assumptions:

- COST (Category 1 Issue): Average increase in NRC staff time, per application, to research for new and significant information related to this new Category 1 issue and, as applicable, include the information in the SEIS:
 - (26 hours per Category 1 Issue) x (1 Category 1 Issue) = 26 hours.
 - - Net result: One-time cost per application
 - (26 hours) x (NRC wage rate)

Outcome: Cost to the NRC.

- **Minority and Low-Income Populations**—The final rule creates 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. By making this a Category 2 issue, the final rule will require 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 incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new Category 2 issue.

Assumptions:

- COST (Category 2 Issue): Average increase in NRC staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the SEIS:
 -
 - (104 hours per Category 2 Issue) x (1 Category 2 Issue) = 104 hours.
 - - Net result: One-time cost per application
 - (104 hours) x (NRC wage rate)
- - **Outcome:** Cost to the NRC.

- **Cumulative Impacts**—The final rule creates a new Category 2 issue, “Cumulative impacts,” to evaluate the potential cumulative impacts of license renewal. The NRC currently analyzes these effects in plant-specific license renewal environmental reviews.

Assumptions:

- COST (Category 2 Issue): Average increase in NRC staff time, per application, to complete a site-specific analysis for this new Category 2 issue and present the information in the SEIS:
 -
 - (104 hours per Category 2 Issue) x (1 Category 2 Issue) = 104 hours.
 - Net result: One-time cost per application
 - (104 hours) x (NRC wage rate)
 -
- **Outcome:** Cost to the NRC.

- **Termination of Plant Operations and Decommissioning**—The final rule consolidates six 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.” The final rule names the new consolidated Category 1 issue, “Termination of plant operations and decommissioning.” The final rule consolidates these six decommissioning issues into one Category 1 issue to facilitate the environmental review process. Consolidating the six issues will reduce the amount of time NRC staff needs to review the information.

Assumptions:

-
- SAVINGS (Issue Consolidation): Average decrease in NRC staff time, per application, because five Category 1 issues are removed by consolidation:
 - (18 hours per Category 1 Issue Consolidation) x (5 Category 1 Issue Consolidations) = 90 hours.
 - Net result: One-time savings per application
(90 hours) x (NRC wage rate)

Outcome: Savings to the NRC.

4. RESULTS

This section presents the analytical results and is organized into three sections. Section 4.1 presents findings on the benefits and costs of the regulatory analysis. Section 4.2 discusses the backfit analysis, and Section 4.3 discusses disaggregation of the analytical results.

4.1 Benefits and Costs

Quantitative Results

For Option 2, two attributes have been analyzed quantitatively (Industry Implementation; NRC Implementation). The net benefits and costs calculated for Options 1 and 2 are presented below. Relative to the Option 1 (No Action alternative), Option 2 would result in estimated net one-time quantitative benefits to:

- Industry of \$2.72 million (total present value), assuming a 7-percent discount rate, or \$3.13 million assuming a 3-percent discount rate.
 -
- NRC of \$1.07 million (total present value), assuming a 7-percent discount rate, or \$1.28 million assuming a 3-percent discount rate.
 -
 - Exhibits 4-1 and 4-2 present the quantitative results for Options 1 and 2 using a 7-percent discount rate and a 3-percent discount rates respectively.
 -

Exhibit 4-1: Quantitative Results (7-percent discount rate)
Benefit (+) or Cost (-)

Attribute	Option 1 No Action	Option 2 Amend and Revise 10 CFR Part 51
Industry Implementation	\$ 0	\$ 2,722,328
NRC Implementation	\$ 0	\$ 1,073,625
Net Result	\$ 0	\$ 3,795,953

Exhibit 4-2: Quantitative Results (3-percent discount rate)
Benefit (+) or Cost (-)

Attribute	Option 1 No Action	Option 2 Amend and Revise 10 CFR Part 51
Industry Implementation	\$ 0	\$ 3,130,025
NRC Implementation	\$ 0	\$ 1,278,731
Net Result	\$ 0	\$ 4,408,756

Qualitative Results

For Option 2, two attributes have been analyzed on a qualitative basis (Improvements in Knowledge; Improvements in Clarity and Efficiency). In addition, one aspect of the Industry Implementation and NRC Implementation attributes pertaining to issues associated with transmission line right-of-ways also was evaluated on a qualitative basis. Exhibit 4-3 presents a summary of both the qualitative and quantitative benefits and costs for Option 2.

Exhibit 4-3: Summary of Quantitative and Qualitative Results

Net Monetary Benefits (+) or Costs (-)	Non-Monetary Benefits/Costs
Option 2: Update and Amend 10 CFR Part 51	
<u>Quantitative Benefits:</u>	<u>Qualitative Benefits:</u>
Industry: Average savings of 556 hours per application \$2.72 million (7% discount rate) \$3.13 million (3% discount rate)	<i>Improvements in Knowledge.</i> Revised and reorganized Category 1 and 2 issues will improve the quality of the information provided to the NRC and facilitate license renewal environmental reviews. This information is necessary for the NRC to comply with Federal environmental statutes and regulations by evaluating the potential environmental effects of continued nuclear power plant operations. Additionally, licensee research for new and significant information pertaining to Category 1 issues will improve the knowledge base for these issues.
NRC: Average savings of 177 hours per application \$1.07 million (7% discount rate) \$1.28 million (3% discount rate)	<i>Improvements in Clarity and Efficiency.</i> The text revisions and organizational changes to the issues and findings in Table B-1 will improve the clarity and intent of the requirements. Improving the clarity and intent of the regulatory provisions will reduce the cost to industry to prepare the environmental reports for license renewal applications and will permit the NRC to focus resources on important plant-specific issues (i.e., site-specific analyses). Other actions, such as focusing the scope of transmission lines, improve regulatory efficiency.
<u>Quantitative Costs:</u> None.	<i>Transmission Line Right-of-Ways (ROWS).</i> The scope of analysis that a licensee must perform for all issues pertaining to transmission lines and transmission line ROWs has been reduced. Specifically, a licensee only will be required to evaluate the impacts of the 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. Previously, the licensee was required to evaluate the impacts of those transmission lines built to connect the nuclear power plant to the regional electrical grid during construction of the site. Developing a reasonable estimate of the savings resulting from this GEIS change is not possible given the variability in distances of transmission lines from power plants to the regional power distribution system. However, this change will result in qualitative benefits to licensees and the NRC due to the reduced (and more appropriate) scope of review.
<u>Qualitative Costs:</u> None.	<u>Qualitative Costs:</u> None.

4.2 Backfit Analysis

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

4.3 Disaggregation

In order to comply with guidance provided in Section 4.3.2 (“Criteria for the Treatment of Individual Requirements”) of the Regulatory Analysis Guidelines (NUREG/BR-0058, Rev. 4), the NRC conducted a screening review to ensure that the aggregate analysis did not mask the inclusion of individual rule provisions that would not be cost-beneficial when considered individually and are not necessary to meet the goals of the rule revisions.

Consistent with the Regulatory Guidelines, the NRC evaluated, on a disaggregated basis, each new regulatory provision expected to result in an incremental cost. Appendix 1 to this regulatory analysis presents the cost or savings estimated to result from each final rule change. Each change is necessary to comply with Federal environmental regulations and is not considered a voluntary alternative.

5. DECISION RATIONALE

Relative to the “no-action” alternative, Option 2 results in a net benefit of approximately \$2.84 million (total present value), assuming a 7-percent discount rate, or \$3.40 million assuming a 3-percent discount rate. The NRC has concluded that proceeding with Option 2 is justified for the following reasons:

1. In Appendix B to Subpart A of 10 CFR Part 51, the Commission stated that it intended to review the findings in Appendix B to Subpart A on a 10-year cycle and to update the requirements if necessary. The GEIS review identified additional issues that need to be addressed in Appendix B.
2. Option 2 incorporates revisions to 10 CFR Part 51, including Table B–1, that reflect the updated findings described in the revised GEIS.
3. Option 2 addresses revised Table B–1 issues generically (Category 1) based on information obtained and lessons learned during numerous license renewal reviews conducted since 2001, and identifies new Category 1 and Category 2 issues to improve the quality of information provided to the NRC in license renewal applications.
4. Option 2 incorporates text revisions and organizational changes to improve the clarity and intent of the issues and findings in Table B–1. Improving the clarity and intent of the requirements will reduce the cost to industry in preparing environmental reports for license renewal applications and focuses resources on site-specific analyses. The NRC also will recognize similar reductions in cost and be better able to focus its resources on the important site-specific issues during license renewal environmental reviews.

6. IMPLEMENTATION

This section identifies how and when the final action will be implemented, the required NRC actions to ensure implementation, and the impact on NRC resources.

6.1 Schedule

The action (Option 2) was enacted through a Proposed Rule, resolution of public comments, and a Final Rule. The staff has not identified any impediments to implementing the recommended alternative.

Actual Schedule:

- Publish Proposed Rule: July 2009
- End of Public Comment Period: January 2010
- Publish Final Rule: **January 2013**

6.2 Impact on Other Requirements

None.

APPENDIX

Summary of Results - Option 2

Issue #	Table B-1 Issues	Per Application				Total - Rule	
		Wage Rate	Hours per Application	Saving/Cost	Total per Application	NPV (7%)	NPV (3%)
INDUSTRY IMPLEMENTATION							
2	Offsite land use	\$119.00/hr	523.0	saving	\$ 62,237	\$ 1,445,753	\$ 1,662,269
4	Aesthetic impacts	\$119.00/hr	110.0	saving	\$ 13,090	\$ 304,078	\$ 349,617
5	Air quality impacts (all plants)	\$119.00/hr	234.0	saving	\$ 27,846	\$ 646,857	\$ 743,731
8	Geology and soils	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
9	Surface water use and quality (non-cooling system impacts)	\$119.00/hr	55.0	saving	\$ 6,545	\$ 152,039	\$ 174,808
15	Discharge of biocides, sanitary wastes, and minor chemical spills	\$119.00/hr	55.0	saving	\$ 6,545	\$ 152,039	\$ 174,808
18	Effects of dredging on surface water quality	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
20	Groundwater contamination and use (non-cooling system impacts)	\$119.00/hr	23.0	cost	\$ (2,737)	\$ (63,580)	\$ (73,102)
27	Radionuclides released to groundwater	\$119.00/hr	312.0	cost	\$ (37,128)	\$ (862,476)	\$ (991,641)
29	Exposure of terrestrial organisms to radionuclides	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
	Cooling tower impacts on vegetation (plants with cooling towers)**	\$119.00/hr	55.0	saving	\$ 6,545	\$ 76,020	\$ 87,404
31	Bird collisions with plant structures and transmission lines	\$119.00/hr	55.0	saving	\$ 6,545	\$ 152,039	\$ 174,808
33	Water use conflicts with terrestrial resources (plants with cooling ponds or cooling towers using makeup water from a river)**	\$119.00/hr	312.0	cost	\$ (37,128)	\$ (431,238)	\$ (495,820)
34	Transmission line right-of-way (ROW) management impacts on terrestrial resources	\$119.00/hr	55.0	saving	\$ 6,545	\$ 152,039	\$ 174,808
36	Impingement and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds)**	\$119.00/hr	218.0	saving	\$ 25,942	\$ 301,314	\$ 346,439
37	Impingement and entrainment of aquatic organisms (plants with cooling towers)**	\$119.00/hr	55.0	saving	\$ 6,545	\$ 76,020	\$ 87,404
41	Infrequently reported thermal impacts (all plants)	\$119.00/hr	220.0	saving	\$ 26,180	\$ 608,156	\$ 699,234
42	Effects of cooling water discharge on dissolved oxygen, gas supersaturation, and eutrophication	\$119.00/hr	110.0	saving	\$ 13,090	\$ 304,078	\$ 349,617
44	Exposure of aquatic organisms to radionuclides	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
45	Effects of dredging on aquatic organisms	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
46	Water use conflicts with aquatic resources (plants with cooling ponds or cooling towers using makeup water from a river)**	\$119.00/hr	312.0	cost	\$ (37,128)	\$ (431,238)	\$ (495,820)
48	Impacts of transmission line right-of-way (ROW) management on aquatic resources	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
50	Threatened, endangered, and protected species and essential fish habitat*	\$119.00/hr	312.0	cost	\$ (37,128)	\$ (86,248)	\$ (99,164)
52	Employment and income, recreation and tourism	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
53	Tax revenues	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
54	Community services and education	\$119.00/hr	633.0	saving	\$ 75,327	\$ 1,749,831	\$ 2,011,886
55	Population and housing	\$119.00/hr	234.0	saving	\$ 27,846	\$ 646,857	\$ 743,731
56	Transportation	\$119.00/hr	234.0	saving	\$ 27,846	\$ 646,857	\$ 743,731
57	Radiation exposures to the public	\$119.00/hr	55.0	saving	\$ 6,545	\$ 152,039	\$ 174,808
58	Radiation exposures to plant workers	\$119.00/hr	55.0	saving	\$ 6,545	\$ 152,039	\$ 174,808
59	Human health impact from chemicals	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
63	Physical occupational hazards	\$119.00/hr	78.0	cost	\$ (9,282)	\$ (215,619)	\$ (247,910)
67	Minority and low-income populations	\$119.00/hr	312.0	cost	\$ (37,128)	\$ (862,476)	\$ (991,641)
73	Cumulative impacts	\$119.00/hr	312.0	cost	\$ (37,128)	\$ (862,476)	\$ (991,641)
78	Termination of plant operations and decommissioning	\$119.00/hr	275.0	saving	\$ 32,725	\$ 760,195	\$ 874,042

Industry Implementation - Total \$ 2,722,328 \$ 3,130,025

* Cost or saving only applies to 10% of reactors

** Cost or saving only applies to 50% of reactors

Issue #	Table B-1 Issues	Per Application				Total - Rule	
		Wage Rate	Hours per Application	Saving/Cost	Total per Application	NPV (7%)	NPV (3%)
NRC IMPLEMENTATION							
2	Offsite land use	\$119.00/hr	174.0	saving	\$ 20,706	\$ 451,561	\$ 537,827
4	Aesthetic impacts	\$119.00/hr	36.0	saving	\$ 4,284	\$ 93,426	\$ 111,275
5	Air quality impacts (all plants)	\$119.00/hr	78.0	saving	\$ 9,282	\$ 202,424	\$ 241,095
8	Geology and soils	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
9	Surface water use and quality (non-cooling system impacts)	\$119.00/hr	18.0	saving	\$ 2,142	\$ 46,713	\$ 55,637
15	Discharge of biocides, sanitary wastes, and minor chemical spills	\$119.00/hr	18.0	saving	\$ 2,142	\$ 46,713	\$ 55,637
18	Effects of dredging on surface water quality	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
20	Groundwater contamination and use (non-cooling system impacts)	\$119.00/hr	8.0	cost	\$ (952)	\$ (20,761)	\$ (24,728)
27	Radionuclides released to groundwater	\$119.00/hr	104.0	cost	\$ (1,238)	\$ (26,990)	\$ (32,146)
29	Exposure of terrestrial organisms to radionuclides	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
31	Cooling tower impacts on vegetation (plants with cooling towers)**	\$119.00/hr	18.0	saving	\$ 2,142	\$ 23,357	\$ 27,819
32	Bird collisions with plant structures and transmission lines	\$119.00/hr	18.0	saving	\$ 2,142	\$ 46,713	\$ 55,637
33	Water use conflicts with terrestrial resources (plants with cooling ponds or cooling towers using makeup water from a river)**	\$119.00/hr	104.0	cost	\$ (12,376)	\$ (134,949)	\$ (160,730)
34	Transmission line right-of-way (ROW) management impacts on terrestrial resources	\$119.00/hr	18.0	saving	\$ 2,142	\$ 46,713	\$ 55,637
36	Impingement and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds)**	\$119.00/hr	73.0	saving	\$ 8,687	\$ 94,724	\$ 112,820
37	Impingement and entrainment of aquatic organisms (plants with cooling towers)**	\$119.00/hr	18.0	saving	\$ 2,142	\$ 23,357	\$ 27,819
41	Infrequently reported thermal impacts (all plants)	\$119.00/hr	72.0	saving	\$ 8,568	\$ 186,853	\$ 222,549
42	Effects of cooling water discharge on dissolved oxygen, gas supersaturation, and eutrophication	\$119.00/hr	36.0	saving	\$ 4,284	\$ 93,426	\$ 111,275
44	Exposure of aquatic organisms to radionuclides	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
45	Effects of dredging on aquatic organisms	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
46	Water use conflicts with aquatic resources (plants with cooling ponds or cooling towers using makeup water from a river)**	\$119.00/hr	104.0	cost	\$ (12,376)	\$ (134,949)	\$ (160,730)
48	Impacts of transmission line right-of-way (ROW) management on aquatic resources	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
50	Threatened, endangered, and protected species and essential fish habitat*	\$119.00/hr	104.0	cost	\$ (12,376)	\$ (26,990)	\$ (32,146)
52	Employment and income, recreation and tourism	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
53	Tax revenues	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
54	Community services and education	\$119.00/hr	210.0	saving	\$ 24,990	\$ 544,987	\$ 649,102
55	Population and housing	\$119.00/hr	78.0	saving	\$ 9,282	\$ 202,424	\$ 241,095
56	Transportation	\$119.00/hr	78.0	saving	\$ 9,282	\$ 202,424	\$ 241,095
57	Radiation exposures to the public	\$119.00/hr	18.0	saving	\$ 2,142	\$ 46,713	\$ 55,637
58	Radiation exposures to plant workers	\$119.00/hr	18.0	saving	\$ 2,142	\$ 46,713	\$ 55,637
59	Human health impact from chemicals	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
63	Physical occupational hazards	\$119.00/hr	26.0	cost	\$ (3,094)	\$ (67,475)	\$ (80,365)
67	Minority and low-income populations	\$119.00/hr	104.0	cost	\$ (12,376)	\$ (269,899)	\$ (321,460)
73	Cumulative impacts	\$119.00/hr	104.0	cost	\$ (12,376)	\$ (269,899)	\$ (321,460)
78	Termination of plant operations and decommissioning	\$119.00/hr	90.0	saving	\$ 10,710	\$ 233,566	\$ 278,187

NRC Implementation - Total \$ 1,073,625 \$ 1,278,731
 Option 2 Total \$ 3,795,953 \$ 4,408,756

* Cost or saving only applies to 10% of reactors

** Cost or saving only applies to 50% of reactors