Regulatory Analysis

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

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

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1. INTRODUCTION

This document presents the regulatory analysis of the proposed revisions to Table B-1 in Appendix B to Subpart A – Environmental Effect of Renewing the Operating License of a Nuclear Power Plant, 10 CFR Part 51.

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

As part of the operating license renewal process, the NRC prepared in 1996 the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, to assist staff in preparing supplemental environmental impact statements (SEISs) in accordance with 10 CFR Part 51, which implements Section 102(2) of the National Environmental Policy Act of 1969 (NEPA). The GEIS was published as a Final Rule on December 18, 1996 (61 FR 66537). In Appendix B to Subpart A of 10 CFR Part 51, the Commission stated its intent to review the findings in Appendix B on a 10-year cycle and to update the requirements if necessary.

The objective of this rulemaking is to update Appendix B to Subpart A of 10 CFR Part 51 based on changes in the 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 U.S. The AEA allows the U.S. Nuclear Regulatory Commission (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 approval or disapproval of the license renewal application turns upon an NRC determination as to whether the nuclear facility 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 Atomic Energy Act or in NRC's regulations on the number of times a power reactor operating license may be renewed.

As a federal agency, the NRC is subject to the National Environmental Policy Act (NEPA). The NRC's environmental protection regulations in 10 CFR Part 51 identify renewal of a nuclear power plant operating license as a major federal action significantly affecting the quality of the human environment. As such, an EIS is required for a plant license renewal review in accordance with NEPA. The GEIS generically assesses the significance of various environmental impacts associated with the renewal of nuclear power plant licenses. The GEIS summarizes the findings of a systematic inquiry into the potential environmental consequences of operating individual nuclear power plants for an additional 20 years. The findings of the GEIS are codified in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51.

The GEIS analysis identifies the attributes of the nuclear power plants, such as major features and plant systems, and the ways in which the plants can affect the environment. The analysis also identifies the possible refurbishment activities and modifications to maintenance and operating procedures that might be undertaken given the requirements of the safety review as provided for in the NRC's nuclear power plant license renewal regulations at 10 CFR Part 54.

The GEIS assigns one of three impact levels (small, moderate, or large) to a given environmental resource (*e.g.*, air, water, or soil). A small impact means that the environmental effects are not detectable, or are so minor that they will 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 to destabilize, important attributes of the resource. A large impact means that the environmental effects are clearly noticeable, and are sufficient to destabilize important attributes of the resource.

In addition to determining the significance of environmental impacts associated with license renewal, the NRC determined whether the analysis in the GEIS for a given resource can be applied to all plants. Under the GEIS analysis, impacts will be considered either Category 1 or Category 2. A Category 1 determination means that the environmental impacts associated with that resource are generic (*i.e.*, the same) for all plants. A Category 2 determination means that the environmental impacts associated with that resource cannot be generically assessed, and must be assessed on a plant-specific basis.

For Category 1 issues, the generic analysis may be adopted in each plant-specific license renewal review. A Category 2 classification means that the GEIS analysis does not meet the criteria of Category 1. For Category 2 issues, additional plant-specific review is required and must be analyzed by the license renewal applicant in its environmental report (ER), which is submitted with its license renewal application.

After evaluating the license renewal application and ER, the NRC will prepare a draft supplemental EIS (SEIS) to analyze those plant-specific (Category 2) issues. Neither the SEIS nor the ER is required to cover Category 1 issues. However, both are required to consider any new and significant information for Category 1 or unidentified issues. The draft SEIS is made available for public comment. After considering public comments, the NRC will prepare and issue the final SEIS in accordance with 10 CFR 51.91 and 51.93. The final SEIS and NUREG-1437, together, serve as the requisite NEPA analysis for any given license renewal application.

The GEIS update effort began in June 2003. 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 GEIS update effort recommenced in October 2005. The NRC staff has prepared a draft revision to the 1996 GEIS, referred to as the "revised GEIS," which updates the 1996 GEIS based upon consideration of the public comments received, lessons learned, and knowledge gained from the preparation of individual SEISs.

Two guidance documents also are being revised in addition to the GEIS, which include 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." These guidance documents are used by the NRC staff to evaluate license renewal applications,

to conduct site environmental reviews, and to assist applicants in the preparation of ERs as part of their license renewal applications.

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 in Appendix B to Subpart A of 10 CFR Part 51. The NRC would continue to rely upon the findings set forth in the current Table B-1 when determining 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.

2.2 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. Some of the proposed changes consist of minor text edits to improve the clarity of Table B-1. These changes would result in no quantifiable impacts or benefits.

Other proposed changes include consolidating certain issues in the current Table B-1 to improve the organization and clarity of Table B-1. For example, one proposed change would consolidate the issues: Aesthetic Impacts (refurbishment); Aesthetic Impacts (license renewal term); Aesthetic Impacts of Transmission Lines (license renewal term) into a single issue "Aesthetic Impacts." This type of issue consolidation will result in no quantifiable impacts or benefits.

Exhibit 2-1 of this regulatory analysis presents the proposed changes to the issues and findings in Table B-1 that would result in quantifiable impacts and/or benefits. The proposed changes are based upon the findings described in the revised GEIS. The first and second columns in Exhibit 2-1 present the proposed rule changes, the third and fourth columns present the current issues and findings (if applicable), and the fifth column highlights the proposed rule change (e.g. new Category 1 issue). The changes to Table B-1 consist of four types:

- **New Table B-1 Issue (Category 1).** The NRC has addressed the environmental impacts of these new Category 1 issues generically for all plants in the revised GEIS. For each new Category 1 issue, the license renewal applicant must include within its ER any new and significant information regarding the environmental impacts of license renewal of which the applicant is aware (see 10 CFR 51.53(c)(iv)). The NRC would then evaluate and consider any such information in its site-specific supplemental environmental impact statement (SEIS) for that plant. If the applicant determines that no new and significant information exists that would change the conclusion in the GEIS, the applicant would provide a statement of this determination in the ER.

- **New or Expanded Table B-1 Issue (Category 2).** A license renewal applicant will incur an increase in cost for each new or expanded Category 2 impact issue listed in Table B-1. For each new or expanded Category 2 issue, the applicant must include in its ER a site specific assessment of the environmental impacts related to that issue. In addition, for each new or expanded 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 as it must analyze the environmental impacts related to each new or expanded Category 2 issue in its SEIS.

- **Existing Table B-1 Issue – Category Change (Category 2 to Category 1)**. A license renewal applicant would no longer be required to conduct a site specific analysis on the environmental impacts associated with a Table B-1 issue that has been changed from Category 2 to Category 1. This type of change would result in a cost reduction because each applicant would no longer be required to conduct a site-specific analysis of the potential environmental impacts related to that issue.

- **Existing Table B-1 Issue – Category Change (Category 1 to Category 2).** An applicant will incur an increase in cost for each Category 1 issue that is changed to a Category 2 issue in the proposed rule revisions. An applicant that previously did not have to provide a site-specific analysis on the environmental impacts associated with this issue now would be required to do so. The results of the applicant's assessment would be included in its ER. The assessment also must include a discussion of possible actions to mitigate any adverse impacts associated with license renewal and environmental impacts of alternatives to license renewal in the ER. The NRC will incur an increase in cost as it must analyze the environmental impacts related to each new Category 2 issue in its SEIS.

Exhibit 2-1 - Presentation of Proposed Rule Changes

Table B-1 - Proposed Revisions		Table B-1 (10 CFR Part 51) - Current Rule		Proposed Rule Change Summary
Issue	**Finding**	**Issue**	**Finding**	
Land Use				
Offsite land use	Small impact (Category 1). Offsite land use would not be affected from continued operations and refurbishment associated with the license renewal term.	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
		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.	Change Issue from Category 2 to Category 1
Geology and Soils				
Impacts of nuclear plants on geology and soils	Small impact (Category 1). Impacts on geology and soils would be small at all plants if best management practices were employed to reduce erosion associated with continued operations and refurbishment.	Not addressed	Not addressed	New Category 1 Issue
Surface Water				
Effects of dredging on water quality	Small impact (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.	Not addressed	Not addressed	New Category 1 Issue
Groundwater				
Groundwater and soil contamination	Small or moderate impact (Category 2). Industrial practices involving the use of solvents, hydrocarbons, heavy metals, or other chemicals and unlined waste-water lagoons have the potential to contaminate site groundwater, soil, and subsoil. Contamination is subject to State- and Environmental Protection Agency-regulated	Not addressed	Not addressed	New Category 2 Issue

Table B-1 - Proposed Revisions		Table B-1 (10 CFR Part 51) - Current Rule		Proposed Rule Change Summary
Issue	**Finding**	**Issue**	**Finding**	
	cleanup and monitoring programs.			
Radionuclides released to groundwater	Small or moderate impact (Category 2). Underground system leaks of process water have been discovered in recent years at several plants. Groundwater protection programs to have been established at all operating nuclear power plants.	Not addressed	Not addressed	New Category 2 Issue
Terrestrial Resources				
Exposure of terrestrial organisms to radionuclides	Small impact (Category 1). Doses to terrestrial organisms are expected to be well below exposure guidelines developed to protect these organisms.	Not addressed	Not addressed	New Category 1 Issue
Aquatic Resources				
Exposure of aquatic organisms to radionuclides	Small impact (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
Effects of dredging on aquatic resources	Small impact (Category 1). Effects of dredging on aquatic resources tend to be of short duration (years or less) and localized. Dredging requires permits from the U.S. Army Corps of Engineers, state environmental agencies, and other regulatory agencies.	Not addressed	Not addressed	New Category 1 Issue
Thermal impacts on aquatic organisms (plants with once-through cooling systems or cooling ponds)	Small, moderate, or large impact (Category 2). Most of the effects associated with thermal discharges are localized and are not expected to affect overall stability of populations or resources. The magnitude of impacts, however, would depend on site-specific thermal plume characteristics and the nature of aquatic resources in the area.	Cold shock (all plants)	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.	Change Issue from Category 1 to Category 2

Table B-1 - Proposed Revisions		Table B-1 (10 CFR Part 51) - Current Rule		Proposed Rule Change Summary
Issue	**Finding**	**Issue**	**Finding**	
		Thermal plume barrier to migrating fish (all plants)	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.	Change Issue from Category 1 to Category 2
		Heat shock (plants with once-through and cooling-pond heat dissipation systems)	Small, moderate, or large (Category 2). Because of continuing concerns about heat shock and the possible need to modify thermal discharges in response to changing environmental conditions, the impacts may be of moderate or large significance at some plants. See § 51.53(c)(3)(ii)(B).	No Change
		Distribution of aquatic organisms (all plants)	Small (Category 1). Thermal discharge may have localized effects but is not expected to affect the larger geographical distribution of aquatic organisms.	Change Issue from Category 1 to Category 2
		Premature emergence of aquatic insects (all plants)	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.	Change Issue from Category 1 to Category 2

Table B-1 - Proposed Revisions		Table B-1 (10 CFR Part 51) - Current Rule		Proposed Rule Change Summary
Issue	**Finding**	**Issue**	**Finding**	
Impacts of transmission line ROW management on aquatic resources	Small impact (Category 1). Application of best management practices to ROW near aquatic systems would reduce the potential for impacts.	Not addressed	Not addressed	New Category 1 Issue
Threatened, Endangered, and Protected Species and Essential Fish Habitat				
Threatened, endangered, and protected species and essential fish habitat	Small, moderate, or large impact (Category 2). The magnitude of impacts on threatened, endangered, and protected species 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 activities associated with license renewal.	Threatened or endangered species (all plants)	Small, moderate, or large (Category 2). Generally, plant refurbishment and continued operation 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.	Additional provisions added to this Category 2 issue to address the Magnuson-Stevens Fishery Conservation and Management Act as amended (10/11/96).
Socioeconomics				
Employment and income, recreation and tourism	Small impact (Category 1). Although most nuclear plants have large numbers of employees with higher than average wages and salaries, employment and income impacts from continued operations and refurbishment are expected to be small. Nuclear plant operations, employee spending, power plant expenditures, and tax payments have an affect on local economies. Changes in plant operations, employment and expenditures would have a greater effect on rural economies than on semi-urban economies.	Public services: public safety, social services, and tourism and recreation	Small (Category1). Impacts to public safety, social services, and tourism and recreation are expected to be of small significance at all sites.	Additional provisions added to this Category 1 issue to address employment and income.
Tax revenues	Small impact (Category 1). Nuclear plants provide tax revenue to local jurisdictions in	Not addressed	Not addressed	New Category 1 Issue

Table B-1 - Proposed Revisions		Table B-1 (10 CFR Part 51) - Current Rule		Proposed Rule Change Summary
Issue	**Finding**	**Issue**	**Finding**	
	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 from continued operations and refurbishment is not expected to change, since the assessed value of the power plant, payments on energy production and PILOT payments are also not expected to change.		Considered in the 1996 GEIS, but not identified as an issue.	
Community services and education	Small impact (Category 1). Changes to local community and educational services would be small from continued operations and refurbishment associated with the license renewal term. With no increase in employment, value of the power plant, payments on energy production, and PILOT payments expected during the renewal term, community and educational services would not be affected by continued power plant operations. Changes in employment and tax payments would have a greater effect on jurisdictions receiving a large portion of annual revenues from the power plant than on jurisdictions receiving the majority of their revenues from other sources.	Public services: public safety, and social services	Small (Category 1). Impacts on public safety, social services are expected to be of small significance at all sites.	No change
		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

Table B-1 - Proposed Revisions		Table B-1 (10 CFR Part 51) - Current Rule		Proposed Rule Change Summary
Issue	**Finding**	**Issue**	**Finding**	
Population and Housing	Small impact (Category 1). Changes to regional population and housing availability and value would be small from continued operations and refurbishment associated with the license renewal term. With no increase in employment expected during the license renewal term, population and housing availability and values would not be affected by continued power plant operations. Changes in housing availability and value would have a greater effect on sparsely populated areas than areas with higher density populations.	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
Transportation	Small impact (Category 1). Changes to traffic volumes would be small from continued operations and refurbishment activities associated with the license renewal term. Changes in employment would have a greater effect on rural areas, with less developed local and regional networks. Impacts would be less noticeable in semi-urban areas depending on the quality and extent of local access roads and the timing of plant shift changes when compared to typical local usage.	Public services, transportation	Small, moderate, or large (Category 2). Transportation impacts are generally expected to be of small significance. However, the increase in traffic associated with the 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
Human Health				
Human health impact from chemicals	Small impact (Category 1). Chemical hazards to workers would be minimized by observing good industrial hygiene practices. Chemical releases to the environment and the potential for impacts to the public are minimized by adherence to discharge limitations of NPDES permits.	Not addressed	Not addressed	New Category 1 Issue
Physical occupational hazards	Small impact (Category 1). The occupational safety and health hazards are generic to all types of electrical generating stations, including nuclear power plants,	Not addressed	Not addressed	New Category 1 Issue

Table B-1 - Proposed Revisions		Table B-1 (10 CFR Part 51) - Current Rule		Proposed Rule Change Summary
Issue	**Finding**	**Issue**	**Finding**	
	and is of small significance if the workers adhere to safety standards and use protective equipment.			
Environmental Justice				
Minority and low-income populations	Small or moderate impact (Category 2). Impacts to minority and low-income populations and subsistence consumption 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).	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				
Cumulative impacts	(Category 2). Cumulative impacts of license renewal must be considered on a plant-specific basis. Impacts will 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

3. EVALUATION OF BENEFITS AND COSTS

This section describes the analysis conducted to identify and evaluate the benefits (values) and costs (impacts) of the proposed revisions to Appendix B to Subpart A – Environmental Effect of Renewing the Operating License of a Nuclear Power Plant (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 proposed 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."[1] Affected attributes include the following:

- *Industry Implementation*. Licensees will likely recognize savings associated with those Category 2 (plant specific) issues that have been redefined to be Category 1 (generic) issues, as the licensee will no longer be required to analyze such issues in its ER. Conversely, licensees will incur additional costs associated with new Category 2 issues, and those Category 1 issues that have been redefined to be Category 2 issues (thus, expanding the scope of the ER). In addition, licensees will incur additional costs associated with new Category 1 issues to evaluate if any new and significant information existed on these issues which must be included in the ER (see 10 CFR 51.53(c)(iv)).

- *NRC Implementation*. The NRC will likely recognize resource savings associated with those Category 2 issues that have been redefined to be Category 1 issues, as the NRC will no longer be required to analyze such issues in the SEIS. Conversely, the NRC will likely incur additional costs associated new Category 2 issues and those Category 1 issues that have been redefined to be 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 or the licensee becomes aware of any new and significant information, which then must be included in the ER. NRC also will expend additional staff resources to prepare the Final Rule.

- *Improvements in Knowledge*. Additional Category 1 and 2 issues have been added to Table B-1 which will increase the information provided to the NRC in operating license renewal applications. 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.

- *Regulatory 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 extensive information obtained by the NRC during the reviews of operating license renewal applications for 48 power plants (i.e., reactor units). Improving the clarity and intent of the regulatory provisions reduces the cost to industry to prepare renewal

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

applications and permits the NRC to focus resources on other application issues (i.e., site specific analyses).

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

- Public Health (Routine)
- Public Health (Accident)
- Occupational Health (Routine)
- Occupational Health (Accident)
- Off-Site Property
- On-Site 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 Options 2 include any desirable changes in affected attributes (e.g., improved safety, monetary savings) while the costs include any adverse changes in affected attributes (e.g., increased 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:

- Regulatory Efficiency
- Improvements in Knowledge.

A qualitative evaluation was performed for Regulatory Efficiency and Improvements in Knowledge due to the difficulty and uncertainty involved in quantifying the benefits and impacts to these attributes.

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 Universe

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 48 reactor units already have received 20-year operating license extensions from the NRC.

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

- Based on letters of intent received from license holders, the NRC anticipates receiving 6 initial license renewal applications per fiscal year (October 1 through September 30) from FY 2011 through FY 2013.

- 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 20-year license renewal application, no letters of intent have been received as of the issuance date of this document. The NRC conservatively estimates receiving 4 applications per year from FY 2014 through FY 2020.

- The NRC estimates that a total of 46 license renewal applications 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 2020.

Calendar Year	Applications Received
2011	6
2012	6
2013	6
2014	4
2015	4
2016	4
2017	4
2018	4
2019	4
2020	4
Total	**46**

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 costs (impacts) and savings (values) using available data, augmented by assumptions when necessary, and guidance contained in NUREG/BR-0184.

General assumptions:

- Effective date of Final Rule = 2011
- Industry Wage Rate = $110.00/hour
- NRC Wage Rate = $99.00/hour
- The analysis presents all costs and savings in current dollars. For net present value calculations the analysis discounts to the first year of incurred costs and/or savings (i.e., 2009).

The analysis evaluates two affected attributes on a quantitative basis, Industry Implementation in Section 3.1.3.1 and NRC Implementation in Section 3.1.3.2.

3.2.3.1 Industry Implementation

Option 2 updates and amends issues in Table B-1 that each licensee must assess and include in 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 analysis lists the assumption(s) and equation(s) used to estimate the value (saving) and/or impact (cost) to industry.

General Assumptions

- Each Table B-1 impact or benefit described below applies to all licensees except where noted.
- Licensees will incur the costs or recognize the savings resulting from the proposed rule change(s) in the year prior to submitting a license renewal application to the NRC. However, any licensee submitting a license renewal application in the effective year of the revised rule will incur the costs or recognize the savings in the same year as the application submittal.
- Each cost and saving assumption associated with the proposed rule changes is based on extensive NRC staff experience in the review of license renewal applications.

- **Offsite Land Use** – The proposed rule would change the finding based on lessons learned and information gained from previous license renewal reviews for this existing issue from Category 2 (requiring a site specific analysis) to Category 1 issue. Addressing this issue generically would reduce the labor to prepare each license renewal application and result in a one-time industry savings per application.

Assumptions:
- Reduction in licensee staff time per application to research and prepare this application section: 32 hours.

One-time savings per application:
(32 hours) x (industry wage rate)

- **Impacts of Nuclear Plants on Geology and Soils** – The proposed rule would create a new Category 1 issue to evaluate seismicity and the impacts of continued power plant operations on geology and soils (prime farmland). The applicant would be 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. If the applicant is aware of any such significant and new information, the applicant may incur an additional cost in the preparation of the ER (see 10 CFR 51.53(c)(iv)).

Assumptions:
- Average increase in licensee staff time, per application to research and address this issue: 32 hours.

One-time cost per application:
(32 hours) x (industry wage rate)

- **Effects of Dredging on Water Quality** – The proposed rule would create a new Category 1 issue to evaluate the impacts of dredging to maintain intake and discharge structures. The applicant would be 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 would result in a one-time industry cost per application to research for new and significant information on this issue.

Assumptions:
- Average increase in licensee staff time, per application, to research and address this issue: 16 hours.

One-time cost per application:
(16 hours) x (industry wage rate)

- **Groundwater and Soil Contamination** – The proposed rule would create a new Category 2 issue to evaluate the impacts of the industrial use of solvents, hydrocarbons, heavy metals, or other chemicals on site groundwater, soil, and subsoil. Addressing this new issue in an ER would result in one-time industry cost per application.

Assumptions:
- Average increase in licensee staff time, per application, to research and prepare this application section: 32 hours.

One-time cost per application:
(32 hours) x (industry wage rate)

- **Radionuclides Released to Groundwater** – The proposed rule would create a new Category 2 issue to evaluate the potential impact of underground system leaks of process water. Addressing this new issue in an ER would result in a one-time industry cost per application.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and prepare this application section: 32 hours.

  One-time cost per application:
  (32 hours) x (industry wage rate)

- **Exposure of Terrestrial Organisms to Radionuclides** – The proposed rule would create a new Category 1 issue to evaluate the impacts of exposure of terrestrial organisms to radionuclides. The applicant would be 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 would result in a one-time industry cost per application to research for new and significant information on this issue.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and address this issue: 24 hours.

  One-time cost per application:
  (24 hours) x (industry wage rate)

- **Exposure of Aquatic Organisms to Radionuclides** – The proposed rule would create a new Category 1 issue to evaluate the impacts for exposure of aquatic organisms to radionuclides. The applicant would be 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 would result in a one-time industry cost per application to research for new and significant information on this issue.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and address this issue: 24 hours.

  One-time cost per application:
  (24 hours) x (industry wage rate)

- **Effects of Dredging on Aquatic Resources** – The proposed rule would create a new Category 1 issue to evaluate the effects of dredging on aquatic resources. The applicant would be 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 would result in a one-time industry cost per application to research for new and significant information on this issue.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and address this issue: 16 hours.

  One-time cost per application:
  (16 hours) x (industry wage rate)

- **Thermal Impacts on Aquatic Organisms (plants with once-through cooling systems or cooling ponds)** – The proposed rule would consolidate four Category 1 issues (Cold Shock; Thermal Plume Barrier to Migrating Fish; Distribution of Aquatic Organisms; Premature Emergence of Aquatic Insects) and one Category 2 issue (Heat Shock [Plants With Once-Through Cooling-Pond and Heat Dissipation Systems]) in the current Table B-1 that address the impacts of thermal discharges on aquatic resources into one Category 2 issue. Addressing this consolidated issue in an ER would result in an increased industry cost per application.

  Assumptions:
  - Increase in licensee staff time, per application, to research and prepare this application section: 24 hours.

  One-time cost per application:
  (24 hours) x (industry wage rate)

- **Impacts of Transmission Line ROW Management on Aquatic Resources** – The proposed rule would create a new Category 1 issue to evaluate the potential impacts of transmission line ROW management on aquatic resources. The applicant would be 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 would result in a one-time industry cost per application to research for new and significant information on this issue.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and address this issue: 8 hours.

  One-time cost per application:
  (8 hours) x (industry wage rate)

- **Threatened, Endangered, and Protected Species and Essential Fish Habitat** – The proposed rule would include new requirements for this existing Category 2 issue to comply with the Magnuson-Stevens Fishery Conservation and Management Act, as amended October 11, 1996. Nuclear power plants located near commercial fisheries would be affected by this proposed change. Addressing this expanded Category 2 issue in an ER would result in an increased industry cost per application.

  Assumptions:
  - Increase in licensee staff time, per application, to research and prepare additional site specific analyses for this issue: 40 hours.
  - Ten percent (10%) of license renewal applications will be affected by the proposed rule change based on plant proximity to commercial fisheries.

  One-time cost per application:
  (40 hours) x (industry wage rate)

- **Employment and Income, Recreation and Tourism** – The proposed rule would create a new Category 1 issue that combines a one new issue (employment and income) with a portion of an existing Category 1 issue (Public services: public safety, social services, and tourism and recreation). The applicant would be 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 would result in a one-time industry cost per application to research for new and significant information on this issue.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and address this issue: 24 hours.

  One-time cost per application:
  (24 hours) x (industry wage rate)

- **Tax revenues** – The proposed rule would create a new Category 1 issue to evaluate the impacts of license renewal on tax revenues. The applicant would be 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 would result in a one-time industry cost per application to research for new and significant information on this issue.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and address this issue: 24 hours.

  One-time cost per application:
  (24 hours) x (industry wage rate)

- **Community Services and Education** – The proposed rule would consolidate two Category 1 issues (Public Services: Public Safety and Social Services; Public Services, Education [License Renewal Term]) and two Category 2 issues (Public Services: Public Utilities; and Public Services, Education [Refurbishment]) in the current Table B-1 into one Category 1 issue. The proposed consolidation, which is based on lessons learned and information gained from previous license renewal reviews, would change the findings of two Category 2 issues to Category 1 issues which would reduce the labor to prepare the ER and result in a one-time industry savings per application.

  Assumptions:
  - Reduction in licensee staff time per application to research and prepare this ER section: 24 hours.

  One-time savings per application:
  (24 hours) x (industry wage rate)

- **Population and Housing** – The proposed rule would change the finding for this existing issue from a Category 2 to Category 1 issue. Based on lessons learned and information gained from previous license renewal reviews, addressing this issue generically would reduce the labor to prepare the ER and result in a one-time industry savings per application.

  Assumptions:
  - Average reduction in licensee staff time per application to research and prepare this ER section: 24 hours.

  One-time savings per application:
  (24 hours) x (industry wage rate)

- **Transportation** – The proposed rule would change the finding for this existing issue from a Category 2 to a Category 1 issue. Based on lessons learned and information gained from previous license renewal reviews, addressing this issue generically would reduce the labor to prepare the ER and result in a one-time industry savings per application.

  Assumptions:
  - Reduction in licensee staff time per application to research and prepare this ER section: 24 hours.

  One-time savings per application:
  (24 hours) x (industry wage rate)

- **Human Health Impact from Chemicals** – The proposed rule would create a new Category 1 issue to evaluating the potential impacts of chemical hazards to workers and chemical releases to the environment. The applicant would be 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 would result in a one-time industry cost per application to research for new and significant information on this issue.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and address this issue: 32 hours.

  One-time cost per application:
  (32 hours) x (industry wage rate)

- **Physical Occupational Hazards** – The proposed rule would create a new Category 1 issue evaluating occupational health and safety hazards. The applicant would be 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 would result in a one-time industry cost per application to research for new and significant information on this issue.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and address this issue: 24 hours.

  One-time cost per application:
  (24 hours) x (industry wage rate)

- **Minority and Low-Income Populations** – The proposed rule would create a new Category 2 issue evaluating the impacts of license renewal on minority and low-income populations. Addressing this new issue in an ER would result in an increased industry cost per application.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and prepare this ER section: 40 hours.

  One-time cost per application:
  (40 hours) x (industry wage rate)

- **Cumulative Impacts** – The proposed rule would create a new Category 2 issue to evaluate the cumulative impacts of license renewal. Addressing this new issue in an ER would result in an increased industry cost per application.

  Assumptions:
  - Average increase in licensee staff time, per application, to research and prepare this ER section: 80 hours.

  One-time cost per application:
  (80 hours) x (industry wage rate)

3.2.3.2 NRC Implementation

Option 2 activities affect NRC staff 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 (saving) and/or impact (cost) to the NRC.

General Assumptions:
- Each Table B-1 impact or benefit described below applies to all license renewal applications except where noted.
- The NRC will incur the costs or recognize the savings resulting from the proposed rule changes in the year that the NRC receives each license renewal application.
- Each cost and saving assumption associated with the proposed rule changes is based on extensive NRC staff experience in the review of license renewal applications.

- **Offsite Land Use** – The proposed rule would change the finding based on lessons learned and information gained from previous license renewal reviews for this existing issue from a Category 2 (requiring a site specific analysis) to a Category 1 issue. Addressing this issue generically would reduce the NRC staff to review this issue in a renewal application.

  Assumptions:
  - Average reduction in NRC staff time per application to review this issue: 16 hours.

  One-time savings per application:
  (16 hours) x (NRC wage rate)

- **Impacts of Nuclear Plants on Geology and Soils** – The proposed rule would create a new Category 1 issue to evaluate seismicity and the impacts of continued power plant operations on geology and soils (prime farmland). 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:
- Average increase in NRC staff time, per application, to review information and prepare this application section: 16 hours.

One-time cost per application:
(16 hours) x (NRC wage rate)

- **Effects of Dredging on Water Quality** – The proposed rule would create a new Category 1 issue to evaluate the impacts of dredging to maintain intake and discharge structures. 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:
- Average increase in NRC staff time, per application, to review information and prepare this application section: 16 hours.

One-time cost per application:
(16 hours) x (NRC wage rate)

- **Groundwater and Soil Contamination** – The proposed rule would create a new Category 2 issue to evaluate the impacts of the industrial use of solvents, hydrocarbons, heavy metals, or other chemicals on site groundwater, soil, and subsoil. The NRC will incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new or expanded Category 2 issue.

Assumptions:
- Average increase in NRC staff time, per application, to review the site specific analysis provided and to prepare the SEIS section for this issue: 24 hours.

One-time cost per application:
(24 hours) x (NRC wage rate)

- **Radionuclides Released to Groundwater** – The proposed rule would create a new Category 2 issue to evaluate the potential impact of underground system leaks of process water. The NRC will incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new or expanded Category 2 issue.

Assumptions:
- Average increase in NRC staff time, per application, to review the site specific analysis provided and to prepare the SEIS section for this issue: 16 hours.

One-time cost per application:
(16 hours) x (NRC wage rate)

- **Exposure of Terrestrial Organisms to Radionuclides** – The proposed rule would create a new Category 1 issue to evaluate the impacts of exposure of terrestrial organisms to radionuclides. 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:
  - Average increase in NRC staff time, per application, to review information and prepare this application section: 8 hours.

  One-time cost per application:
  (8 hours) x (NRC wage rate)

- **Exposure of Aquatic Organisms to Radionuclides** – The proposed rule would create a new Category 1 issue to evaluate the impacts of exposure of aquatic organisms to radionuclides. 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:
  - Average increase in NRC staff time, per application, to review information and prepare the SEIS section for this issue: 8 hours.

  One-time cost per application:
  (8 hours) x (NRC wage rate)

- **Effects of Dredging on Aquatic Resources** – The proposed rule would create a new Category 1 issue to evaluate the effects of dredging on aquatic resources. 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:
  - Average increase in NRC staff time, per application, to review information and prepare the SEIS section for this issue: 8 hours.

  One-time cost per application:
  (8 hours) x (NRC wage rate)

- **Thermal Impacts on Aquatic Organisms (plants with once-through cooling systems or cooling ponds)** – The proposed rule would consolidate four Category 1 issues (Cold Shock; Thermal Plume Barrier to Migrating Fish; Distribution of Aquatic Organisms; and Premature Emergence of Aquatic Insects) and one Category 2 issue (Heat Shock [Plants With Once-Through Cooling-Pond and Heat Dissipation Systems]) in the current Table B-1 that address the impacts of thermal discharges on aquatic resources into one Category 2 issue. The NRC will incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new or expanded Category 2 issue.

  Assumptions:
  - Average increase in NRC staff time, per application, to review the additional site specific analysis provided and to prepare the SEIS section for this issue: 8 hours.

  Cost per application:
  (8 hours) x (NRC wage rate)

- **Impacts of Transmission Line ROW Management on Aquatic Resources** – The proposed rule would create a new Category 1 issue to evaluate the potential impacts of transmission line ROW management on aquatic resources. 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:
  - Average increase in NRC staff time, per application, to review information and prepare the SEIS section for this issue: 8 hours.

  One-time cost per application:
  (8 hours) x (NRC wage rate)

- **Threatened, Endangered, and Protected Species and Essential Fish Habitat** – The proposed rule would include new requirements for this existing Category 2 issue to comply with the Magnuson-Stevens Fishery Conservation and Management Act, as amended October 11, 1996. Nuclear power plants located near commercial fisheries would be affected by this proposed change. The NRC will incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new or expanded Category 2 issue.

  Assumptions:
  - Average increase in NRC staff time, per application, to review additional site specific analyses and prepare the SEIS section for this issue: 24 hours.
  - Ten percent (10%) of license renewal applications will be affected by the proposed rule change based on plant proximity to commercial fisheries.

  One-time cost per application:
  (24 hours) x (NRC wage rate)

- **Employment and Income, Recreation and Tourism** – The proposed rule would consolidate one new issue employment and income with tourism and recreation from an existing Category 1 issue (Public services: public safety, social services, and tourism and recreation) in the current Table B-1 that address the impacts of license renewal on Public services: public safety, social services, and tourism and recreation into one Category 1 issue. The NRC will incur an additional cost in preparing the SEIS 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:
  - Average increase in NRC staff time, per application, to review information and prepare the SEIS section for this issue: 8 hours.

  One-time cost per application:
  (8 hours) x (NRC wage rate)

- **Tax revenues** – The proposed rule would create a new Category 1 issue to evaluate the impacts of license renewal on tax revenues. The NRC will incur an additional cost in preparing the SEIS 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:
  - Average increase in NRC staff time, per application, to review information and prepare the SEIS section for this issue: 8 hours.

  One-time cost per application:
  (8 hours) x (NRC wage rate)

- **Community Services and Education** – The proposed rule would consolidate two Category 1 issues (Public Services: Public Safety and Social Services; and Public Services, Education [License Renewal Term]) and two Category 2 issues (Public Services: Public Utilities; and Public Services, Education [Refurbishment]) in the current Table B-1 that address the impacts of license renewal on public services, public safety, public utilities, and education into one Category 1 issue. The proposed consolidation, which is based on lessons learned and information gained from previous license renewal reviews, would change the findings of two Category 2 issues to a Category 1 finding in the new issue. Addressing these issues generically (i.e., Category 1) would reduce the staff time, per application, to prepare the SEIS.

  Assumptions:
  - Average reduction in NRC staff time, per application, to prepare the SEIS section for this issue: 8 hours.

  One-time savings per application:
  (8 hours) x (NRC wage rate)

- **Population and Housing** – The proposed rule would change the finding for this existing issue from a Category 2 to a Category 1 issue. Based on lessons learned and information gained from previous license renewal reviews, addressing this issue generically would reduce the NRC staff time, per application, to prepare the SEIS.

  Assumptions:
  - Average reduction in NRC staff time, per application, to prepare the SEIS section for this issue: 8 hours.

  One-time savings per application:
  (8 hours) x (NRC wage rate)

- **Transportation** – The proposed rule would change the finding for this existing issue from a Category 2 to a Category 1 issue. Based on lessons learned and information gained from previous license renewal reviews, addressing this issue generically would reduce the NRC staff time in preparing the SEIS.

  Assumptions:
  - Average reduction in NRC staff time, per application, to prepare the SEIS section for this issue: 8 hours.

  One-time savings per application:
  (8 hours) x (NRC wage rate)

- **Human Health Impact from Chemicals** – The proposed rule would create a new Category 1 issue to evaluating the potential impacts of chemical hazards to workers and chemical releases to the environment. 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:
  - Average increase in NRC staff time, per application, to review information and prepare the SEIS section for this issue: 8 hours.

  One-time cost per application:
  (8 hours) x (NRC wage rate)

- **Physical Occupational Hazards** – The proposed rule would create a new Category 1 issue evaluating occupational health and safety hazards. 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:
  - Average increase in NRC staff time, per application, to review information and prepare the SEIS section for this issue: 8 hours.

  One-time cost per application:
  (8 hours) x (NRC wage rate)

- **Minority and Low-Income Populations** – The proposed rule would create a new Category 2 issue evaluating the impacts of license renewal on minority and low-income populations. The NRC will incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new or expanded Category 2 issue.

  Assumptions:
  - Average increase in NRC staff time, per application, to review the site specific analysis provided and to prepare the SEIS section for this issue: 16 hours.

  One-time cost per application:
  (16 hours) x (NRC wage rate)

- **Cumulative Impacts** – The proposed rule would create a new Category 2 issue to comply with a NEPA requirement and to evaluate the cumulative impacts of license renewal. The NRC will incur an increase in its SEIS preparation costs, per application, as it must analyze the environmental impacts related to each new or expanded Category 2 issue.

  Assumptions:
  - Average increase in NRC staff time, per application, to review the site specific analysis provided and to prepare the SEIS section for this issue: 56 hours.

  One-time cost per application:
  (56 hours) x (NRC wage rate)

- **Preparation of Final Rule** – NRC staff will prepare the Final Rule in calendar years 2009 through 2011.

  Assumptions:
  - 1 FTE of NRC staff labor: 1,600 hours.
  - NRC staff labor hours to prepare the Final Rule in calendar year 2009: 2.1 FTE.

    One-time cost:
    (1,600 hours/FTE) x (2.1 FTE) x (NRC wage rate)
  - NRC staff labor hours to prepare the Final Rule in calendar year 2010: 1.0 FTE.

    One-time cost:
    (1,600 hours/FTE) x (1.0 FTE) x NRC wage rate)
  - NRC staff labor hours to prepare the Final Rule in calendar year 2011: 0.6 FTE.

    One-time cost:
    (1,600 hours/FTE) x (0.6 FTE) x NRC wage rate)

4. RESULTS

This section presents the analytical results and is organized into five sections. Section 4.1 presents findings on the overall benefits and costs of Option 2. Section 4.2 presents the quantitative results for each affected attribute, and Section 4.3 presents the qualitative results for each affected attribute. Section 4.4 discusses the backfit and Section 4.5 discusses disaggregation of the analytical results.

4.1 Benefits and Costs

This section summarizes the benefits (values) and costs (impacts) estimate for Option 2. For Option 2, two attributes have been analyzed quantitatively and two attributes have been analyzed qualitatively. The net benefits and costs calculated for each option are presented below.

Option 2 (Update and Amend 10 CFR Part 51)

Relative to the no-action alternative, Option 2 would result in estimated net one-time quantitative costs to:

- Industry of $1.18 million (total present value), assuming a 7-percent discount rate, or $1.41 million assuming a 3-percent discount rate.

- NRC of $1.11 million (total present value), assuming a 7-percent discount rate, or $1.23 million assuming a 3-percent discount rate.

Exhibit 4-1 presents a summary of the qualitative and quantitative benefits and costs for Option 2.

Exhibit 4-1: Summary of Results
Value (+) or Impact (-)

Net Monetary Savings (+) or Costs (-)	**Non-Monetary Benefits/Costs**
Option 2: Update and Amend 10 CFR Part 51	
***Quantitative Benefits*:** None. ***Quantitative Costs*:** **Industry:** ($ 1.18 million) 7% discount rate ($ 1.41 million) 3% discount rate **NRC**: ($ 1.11 million) 7% discount rate ($ 1.23 million) 3% discount rate	***Qualitative Benefits***: *Improvements in Knowledge*. Additional Category 1 and 2 issues would increase the information provided to the NRC in evaluating license renewal applications. 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. *Regulatory Efficiency*. The text revisions and organizational changes to the issues and findings in Table B-1 would improve the clarity and intent of the requirements. Improving the clarity and intent of the regulatory provisions reduces the cost to industry to prepare renewal applications and permits the NRC to focus resources on other application issues (i.e., site specific analyses). ***Qualitative Costs*:** *None.*

4.2 Qualitative Benefits and Costs

Exhibit 4-2 and 4-3 present the breakdown of total benefit and cost for each affected attribute.

Exhibit 4-2: Quantitative Results (7-percent discount rate)
Value (+) or Impact (-)

Attribute	**Option 1 No Action**	**Option 2 Amend and Revise 10 CFR Part 51**
Industry Implementation	$ 0	($1,175,269)
NRC Implementation	$ 0	($1,114,053)
Net Result	**$ 0**	**($2,289,322)**

Exhibit 4-3: Quantitative Results (3-percent discount rate)
Value (+) or Impact (-)

Attribute	**Option 1 No Action**	**Option 2 Amend and Revise 10 CFR Part 51**
Industry Implementation	$ 0	($1,411,642)
NRC Implementation	$ 0	($1,225,580)
Net Result	**$ 0**	**($2,637,222)**

4.3 Backfit Analysis

The NRC has determined that the proposed rule amendments do not involve any provisions that would impose a backfit as defined in 10 CFR 50.109(a)(1). Therefore, no backfit analysis was prepared.

4.4 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 proposed change. Each

proposed 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 would result in a net cost of approximately $2.29 million (total present value), assuming a 7-percent discount rate, or $2.64 million assuming a 3-percent discount rate. Even though Option 2 results in a net cost, 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 additional 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 issues to improve the 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 reduces the cost to industry in preparing license renewal applications and focuses resources on site specific analyses.

6. IMPLEMENTATION

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

6.1 Schedule

The action (Option 2) would be 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.

Tentative Schedule:

- Publish Proposed Rule: July 2009
- End of Public Comment Period: October 2009
- Publish Final Rule: April 2011

6.2 Impact on Other Requirements

None.

APPENDIX 1

Summary of Results - Option 2

Table B-1 Issues	Per Application				Total - Rule	
	Wage Rate	Hours per Application	Saving/ Cost	Total per Application	NPV (7%)	NPV (3%)
INDUSTRY IMPLEMENTATION (by Table B-1 Issue)						
Offsite land use	$110.00/hr	32.0	saving	$ 3,520	$ 116,076	$ 139,421
Impacts of nuclear plants on geology and soils	$110.00/hr	32.0	cost	$ (3,520)	$ (116,076)	$ (139,421)
Effects of dredging on water quality	$110.00/hr	16.0	cost	$ (1,760)	$ (58,038)	$ (69,711)
Groundwater and soil contamination	$110.00/hr	32.0	cost	$ (3,520)	$ (116,076)	$ (139,421)
Radionuclides released to groundwater	$110.00/hr	32.0	cost	$ (3,520)	$ (116,076)	$ (139,421)
Exposure of terrestrial organisms to radionuclides	$110.00/hr	24.0	cost	$ (2,640)	$ (87,057)	$ (104,566)
Exposure of aquatic organisms to radionuclides	$110.00/hr	24.0	cost	$ (2,640)	$ (87,057)	$ (104,566)
Effects of dredging on aquatic resources	$110.00/hr	16.0	cost	$ (1,760)	$ (58,038)	$ (69,711)
Thermal impacts on aquatic organisms (plants with once-through cooling systems or cooling ponds)	$110.00/hr	24.0	cost	$ (2,640)	$ (87,057)	$ (104,566)
Impacts of transmission line ROW management on aquatic resources	$110.00/hr	8.0	cost	$ (880)	$ (29,019)	$ (34,855)
Threatened, endangered, and protected species and essential fish habitat.	$110.00/hr	40.0	cost	$ (440)	$ (14,509)	$ (17,428)
Employment and income, recreation and tourism	$110.00/hr	24.0	cost	$ (2,640)	$ (87,057)	$ (104,566)
Tax revenues	$110.00/hr	24.0	cost	$ (2,640)	$ (87,057)	$ (104,566)
Community services and education	$110.00/hr	24.0	saving	$ 2,640	$ 87,057	$ 104,566
Population and Housing	$110.00/hr	24.0	saving	$ 2,640	$ 87,057	$ 104,566
Transportation	$110.00/hr	24.0	saving	$ 2,640	$ 87,057	$ 104,566
Human health impact from chemicals	$110.00/hr	24.0	cost	$ (2,640)	$ (87,057)	$ (104,566)
Physical occupational hazards	$110.00/hr	24.0	cost	$ (2,640)	$ (87,057)	$ (104,566)
Minority and low-income populations	$110.00/hr	40.0	cost	$ (4,400)	$ (145,095)	$ (174,277)
Cumulative impacts	$110.00/hr	80.0	cost	$ (8,800)	$ (290,190)	$ (348,554)
NRC IMPLEMENTATION (by Table B-1 Issue)						
Offsite land use	$99.00/hr	16.0	saving	$ 1,584	$ 49,360	$ 61,173
Impacts of nuclear plants on geology and soils	$99.00/hr	16.0	cost	$ (1,584)	$ (49,360)	$ (61,173)
Effects of dredging on water quality	$99.00/hr	16.0	cost	$ (1,584)	$ (49,360)	$ (61,173)
Groundwater and soil contamination	$99.00/hr	24.0	cost	$ (2,376)	$ (74,040)	$ (91,760)
Radionuclides released to groundwater	$99.00/hr	16.0	cost	$ (1,584)	$ (49,360)	$ (61,173)
Exposure of terrestrial organisms to radionuclides	$99.00/hr	8.0	cost	$ (792)	$ (24,680)	$ (30,587)
Exposure of aquatic organisms to radionuclides	$99.00/hr	8.0	cost	$ (792)	$ (24,680)	$ (30,587)
Effects of dredging on aquatic resources	$99.00/hr	8.0	cost	$ (792)	$ (24,680)	$ (30,587)
Thermal impacts on aquatic organisms (plants with once-through cooling systems or cooling ponds)	$99.00/hr	8.0	cost	$ (792)	$ (24,680)	$ (30,587)
Impacts of transmission line ROW management on aquatic resources	$99.00/hr	8.0	cost	$ (792)	$ (24,680)	$ (30,587)
Threatened, endangered, and protected species and essential fish habitat.	$99.00/hr	24.0	cost	$ (238)	$ (7,404)	$ (9,176)
Employment and income, recreation and tourism	$99.00/hr	8.0	cost	$ (792)	$ (24,680)	$ (30,587)
Tax revenues	$99.00/hr	8.0	cost	$ (792)	$ (24,680)	$ (30,587)
Community services and education	$99.00/hr	8.0	saving	$ 792	$ 24,680	$ 30,587
Population and Housing	$99.00/hr	8.0	saving	$ 792	$ 24,680	$ 30,587
Transportation	$99.00/hr	8.0	saving	$ 792	$ 24,680	$ 30,587
Human health impact from chemicals	$99.00/hr	8.0	cost	$ (792)	$ (24,680)	$ (30,587)
Physical occupational hazards	$99.00/hr	8.0	cost	$ (792)	$ (24,680)	$ (30,587)
Minority and low-income populations	$99.00/hr	16.0	cost	$ (1,584)	$ (49,360)	$ (61,173)
Cumulative impacts	$99.00/hr	56.0	cost	$ (5,544)	$ (172,760)	$ (214,106)
NRC IMPLEMENTATION (Other Values/Impacts)						
Activity	**Wage Rate**	**Hours**	**Saving/ Cost**	**Total**	**NPV (7%)**	**NPV (3%)**
NRC Staff Labor - Developing Final Rule (CY 2009)	$99.00/hr	3,360	cost	$ (332,640)	$ (332,640)	$ (332,640)
NRC Staff Labor - Developing Final Rule (CY 2010)	$99.00/hr	1,600	cost	$ (158,400)	$ (148,037)	$ (138,353)
NRC Staff Labor - Developing Final Rule (CY 2011)	$99.00/hr	960	cost	$ (95,040)	$ (83,012)	$ (72,506)
				Industry Implementation - Total	**$ (1,175,269)**	**$ (1,411,642)**
				NRC Implementation - Total	**$ (1,114,053)**	**$ (1,225,580)**
				Option 2 Total	**$ (2,289,322)**	**$ (2,637,222)**

Note: *Italicized* issues only apply to 10% of reactors