Regulatory Analysis for the 10 CFR Part 51, Generic Environmental Impact Statement for Licensing of New Nuclear Reactors

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U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
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ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC or the Commission) is amending the requirements in Part 51 of Title 10 of the *Code of Federal Regulations* (10 CFR), “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions,” to include the results of the Generic Environmental Impact Statement for Licensing of New Nuclear Reactors (NR GEIS). This document presents a draft regulatory analysis of the benefits and costs of the final rule requirements; the NR GEIS; Regulatory Guide 4.2, “Preparation of Environmental Reports for Nuclear Power Stations;” and COL-ISG-030, “Environmental Considerations for Advanced Nuclear Reactor Applications that Reference the Generic Environmental Impact Statement” relative to the baseline case (i.e., the No-Action Alternative).

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ABBREVIATIONS

ac	acre(s)
BLS	Bureau of Labor Statistics
CFR	*Code of Federal Regulations*
COL	combined license
CP	construction permits
CRGR	Committee to Review Generic Requirements
EIS	environmental impact statement
ER	Environmental Report
ESP	early site permit
FRN	*Federal Register* notice
GEIS	generic environmental impact statement
LWR	light-water reactor
N/A	not applicable
NAICS	North American Industry Classification System
NEIMA	Nuclear Energy Innovation and Modernization Act of 2019
NEPA	National Environmental Policy Act of 1969, as amended
NPV	net present value
NR GEIS	Generic Environmental Impact Statement for Licensing of New Nuclear Reactors
NRC	U.S. Nuclear Regulatory Commission
OFR	Office of the Federal Register
OL	operating license
OMB	Office of Management and Budget
PERT	program evaluation and review technique
PPE	plant parameter envelope
RG	regulatory guide
ROW	right-of-way
SEIS	supplemental environmental impact statement
SME	subject matter expert
SPE	site parameter envelope
SRM	staff requirements memorandum

EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) is amending its regulations that govern the NRC's National Environmental Policy Act (NEPA) reviews. The rulemaking codifies the generic findings of the Generic Environmental Impact Statement for Licensing of New Nuclear Reactors (NR GEIS). The NR GEIS uses a technology-neutral regulatory framework and performance-based assumptions to determine generic environmental impacts of new nuclear reactors. The NR GEIS streamlines the NEPA reviews for future new nuclear reactor applicants. The final rule codifies these generic findings into the NRC's regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," thus making the NRC's licensing process more efficient. Specifically, these findings are being codified into Subpart A of 10 CFR Part 51, which sets forth the NRC's regulations to implement its obligations under NEPA. Major provisions of this final rule and guidance would include:

- Addition of a new Appendix C to Subpart A of 10 CFR Part 51 to codify the generic findings in the NR GEIS and state that, on a 10-year cycle, the Commission intends to review the material in this appendix and update if necessary.
- Changes to the regulations for the preparation of environmental reports for new nuclear reactors (e.g., 10 CFR 51.49, "Environmental report—limited work authorization," and 10 CFR 51.50, "Environmental report—construction permit, early site permit, or combined license stage") to provide the applicant with the option to use the NR GEIS.
- Changes to the regulations for the preparation of draft environmental impact statements (EISs) for new nuclear reactors (e.g., 10 CFR 51.75, "Draft environmental impact statement —construction permit, early site permit, or combined license" and 10 CFR 51.76, "Draft environmental impact statement—limited work authorization") to require the NRC staff to use the NR GEIS in preparing its draft EIS if an applicant for a new nuclear reactor referenced the NR GEIS in its application.
- Addition of a new section (10 CFR 51.96, "Final supplemental environmental impact statement relying on a generic environmental impact statement for licensing new nuclear reactors") to provide the NRC staff with directions on the preparation of a final supplemental EIS (SEIS) for a new nuclear reactor application that relied on the NR GEIS.
- Revisions to Regulatory Guide (RG) 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," to provide guidance to applicants regarding the use of the NR GEIS. In addition, the NRC staff has prepared a draft interim staff guidance document, COL-ISG-030, "Environmental Considerations for New Nuclear Reactor Applications that Reference the Generic Environmental Impact Statement for Licensing of New Nuclear Reactors (NUREG-2249)," to provide guidance to the staff regarding the use of the NR GEIS.

This regulatory analysis discusses two alternatives—Alternative 1, the No-Action or Status Quo Alternative, and Alternative 2, issuing the final rule. For Alternative 2, the regulatory analysis evaluates the costs and benefits of the final rule requirements and development of the NR GEIS and associated guidance documents. It derives from the key findings summarized in Table ES-1.

Table ES-1 Total Costs and Benefits of Alternative 2

Description	Undiscounted	7% Net Present Value (NPV)	3% NPV
Industry Benefits	$25,830,000	$17,610,000	$21,710,000
NRC Benefits	$32,260,000	$20,940,000	$26,550,000
Total Benefits	**$58,090,000**	**$38,550,000**	**$48,260,000**
Industry Cost	($800,000)	($550,000)	($680,000)
NRC Cost	($710,000)	($350,000)	($520,000)
Total Cost	**($1,510,000)**	**($870,000)**	**($1,180,000)**
Industry Net Benefits	*$25,030,000*	*$17,060,000*	*$21,030,000*
NRC Net Benefits	*$31,550,000*	*$20,590,000*	*$26,030,000*
Total Net Benefits	***$56,580,000***	***$37,650,000***	***$47,060,000***

* Totals may differ between tables due to rounding and modeling.

1. IDENTIFICATION AND PRELIMINARY ANALYSIS OF ALTERNATIVE APPROACHES

The analysis considers two alternatives. The following sections describe each alternative.

1.1. Alternative 1: No-Action

Under Alternative 1, the No-Action Alternative, the U.S. Nuclear Regulatory Commission (NRC) would not issue a Generic Environmental Impact Statement for Licensing of New Nuclear Reactors (NR GEIS) and codify its results in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." The NRC would evaluate all environmental impacts in a project-specific environmental impact statement (EIS). Applicants for a new reactor license would continue to comply with the existing provisions of 10 CFR Part 51 and submit environmental reports (ERs) that evaluated all environmental impacts on a case-by-case basis.

1.2. Alternative 2: Issue NR GEIS and Codify Findings in 10 CFR Part 51

Under Alternative 2, the NRC would issue the NR GEIS and would amend certain provisions of 10 CFR Part 51 related to the environmental review for new nuclear power plant licenses and add Table C-1. The NRC would also issue two revised guidance documents on applying the NR GEIS findings for both applicants and the NRC staff, a revision to RG 4.2, and a draft interim staff guidance document, COL-ISG-030.

This ability to rely on these generically determined Category 1 issues will result in time and cost savings for both the applicant and the NRC as the EIS for an application is developed. An evaluation of the estimated benefit of reliance on Category 1 issues in the GEIS is discussed in Section 3.

Table C-1 of Appendix C to Subpart A of 10 CFR Part 51 would summarize the findings of the NR GEIS, for which 119 environmental issues were analyzed. The table would identify issues as Category 1, Category 2, or Uncategorized issues, most of which would be considered Category 1 issues. This means they are issues for which a generic analysis of environmental impacts is possible, provided that relevant values and assumptions in the plant parameter envelope (PPE) and site parameter envelope (SPE) are met. The table would also identify mitigation measures, parameters, and values that apply to each issue.

2. EVALUATION OF BENEFITS AND COSTS

This section describes the analysis conducted to identify and evaluate the benefits and costs expected from utilization of the results of the NR GEIS, which will be codified in the final revisions of Appendix C to Subpart A of 10 CFR Part 51. Section 2.1 identifies the attributes that Alternative 2 is expected to affect. Section 2.2 describes the methodology used to analyze the benefits and costs associated with expected changes to the affected attributes. Section 3.3 analyzes the implementation of Alternative 2, which will involve implementation and operational costs for industry and the NRC.

2.1. Attributes Affected by the Rulemaking

This section identifies the factors within the public and private sectors that the rulemaking is 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" (NRC, 2020). Affected attributes include the following:

- *Industry Implementation*. This attribute accounts for the projected net economic effect on the industry of activities directly resulting from implementing the regulatory action for all affected licensees. Potential industry applicants will incur costs as they evaluate how to implement the generic environmental impact statement (GEIS) when generating a new nuclear reactor application using the provisions of the final rule. Such internal procedures include prescribing how determinations for Category 1 versus Category 2 designations will be made and how the assessment process will be documented in the application.
- *Industry Operation*. This attribute accounts for the projected net economic effect caused by routine and recurring activities required by the alternative on all affected entities. As a result of the generic analysis of environmental issues, applicants will recognize a savings to prepare the ER by relying on the analysis in the NR GEIS for Category 1 issues and the ability to incorporate by reference the findings in the GEIS, rather than analyzing the impacts in their ER. Applicants will incur costs for Category 1 issues associated with demonstrating that their project is bounded by the analysis in the GEIS. However, these costs are assumed to be required as part of the characterization of the affected environment under existing National Environmental Policy Act of 1969, as amended (NEPA) guidance and approaches for combined license (COL) and early site permit (ESP) reviews. No incremental costs would be incurred by addressing Category 2 issues in project-specific analyses and presenting the information in the ER because these costs would be incurred if an applicant submitted an ER with or without relying on the GEIS.
- *NRC Implementation.* This attribute accounts for the projected net economic effect on the NRC to place the alternative into operation. The NRC has incurred costs related to implementing the provisions of the rule, but these costs have already occurred (sunk costs) and do not factor into this regulatory analysis. Future costs of implementation include consolidation of the new GEIS-related Staff Guidance, COL-ISG-030, into more durable guidance in NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," and then a 10-year review of the GEIS issues, internal communications with the Commission, and a scoping *Federal Register* notice (FRN) (beginning in 2034).
- *NRC Operations*. This attribute accounts for the projected net economic effect on the NRC caused by routine and recurring activities required by the alternative after implementation of the final rule. Similar to the industry operation, the NRC will recognize cost savings by relying on the generic analysis of Category 1 issues. As part of the characterization of the affected environment, the NRC will need to verify that the project is bounded by the NR GEIS. Category 2 issues will need to be analyzed in the supplemental EIS (SEIS). However, the project-specific analysis of Category 1 issues for the SEIS referencing the GEIS will cost less than the analysis for an EIS that does not reference the GEIS.
- *Improvements in Knowledge*. Category 1 and 2 issues have been added to Table C-1 of 10 CFR Part 51, which will improve the quality of the information provided to the NRC by focusing on issues most relevant to specific applications and facilitate new nuclear reactor 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, the applicant's research for new and significant information pertaining to Category 1 issues will improve the knowledge base for these issues.
- *Improvements in Regulatory Efficiency for the Applicant and the NRC.* The NR GEIS and the issues and findings in Table C-1 will improve the efficiency of the environmental review.

Improving the clarity and efficiency of the regulatory provisions reduces the cost to industry to prepare ERs for new nuclear reactor applications and permits the NRC to focus resources on project-specific issues of importance (i.e., project-specific analyses), which also reduces the cost to the NRC.

2.2. Analytical Methodology

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

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

- industry implementation
- industry operation
- NRC implementation
- NRC operation

The analysis evaluates improvements in process and improvements in efficiency affected by Alternative 2 on a qualitative basis due to the difficulty and uncertainty involved in quantifying the benefits and impacts to this attribute.

2.3. Baseline for the Analysis

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

2.4. Affected Applicants

New nuclear reactor applicants for an NRC license can refer to Table C-1 in 10 CFR Part 51 and the NR GEIS to streamline the preparation of their ER. The NRC estimates that approximately 45 new nuclear reactor applications will be received over the 10-year period before the NR GEIS will be updated. This estimate is based on letters of intent received from potential applicants. Consideration of the potential new nuclear reactor applications under the final rule is discussed in Sections 3.2 and.3.4.

The analysis period for this regulatory analysis covers that period between 2026 and 2036 for the benefits and costs of implementation. The costs and benefits are analyzed for that period based on the guidance provided in NUREG/BR-0058, Revision 5, *“Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission”* (NRC, 2020). Results are presented in undiscounted terms and using financial discounting with discount rates of 3 and 7 percent to reflect the time value of money.

2.5. Base Year

All monetized costs are expressed in 2024 dollars, the year of the currently available Bureau of Labor Statistics (BLS) labor rate data. This regulatory analysis assumes that the final rule will be published in the 10 CFR in 2026 and will become effective 30 days later. Implementation costs

and ongoing costs of operation under are assumed to begin in 2026 and are modeled on an annual cost basis.

2.6. Discount Rates

In accordance with guidance in Office of Management and Budget (OMB) Circular A-4 and NUREG/BR-0058, the analysis employs net present value (NPV) calculations to determine how much society would need to invest today to ensure that the designated dollar amount is available in a given year in the future. By using NPVs, the NRC can translate costs and benefits to a reference year for comparison, regardless of when they are incurred. The choice of a discount rate and its conceptual basis is a topic of ongoing discussion within the Federal government. Based on OMB Circular A-4 and consistent with the NRC's past practice and guidance, present-worth calculations in this analysis use 3 percent and 7 percent real discount rates. A 3 percent discount rate approximates the real rate of return on long-term Government debt, which serves as a proxy for the real rate of return on savings; this reflects the concept of discounting based on the social rate of time preference.[1] A 7 percent discount rate approximates the marginal pretax real rate of return on an average investment in the private sector; it is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector. A 7 percent rate is consistent with the concept of the opportunity cost[2] of capital; it reflects the time value of resources directed to meet regulatory requirements.

2.7. Labor Rates

For the purposes of this regulatory analysis, the NRC applied strict incremental cost principles to develop labor rates that include only labor and material costs directly related to the implementation, operation, and maintenance of the rule requirements. This approach is consistent with the guidance in NUREG/CR-3568, "A Handbook for Value-Impact Assessment," issued December 1983 (NRC, 1983), and with general cost-benefit methodology. The NRC's incremental labor rate for fiscal year 2024 is $144 per hour.[3]

This regulatory analysis uses the 2024 BLS Occupational Employment and Wages data (BLS, 2024), which provide labor categories and the mean hourly wage rate by job type. The labor rates used in the analysis reflect total hourly compensation, which includes wages and nonwage benefits (using a burden factor of 2.4, which is applicable for contract labor and conservative for regular utility employees). The staff used the BLS data tables to select appropriate hourly labor rates for the estimated procedural, licensing, and utility-related work necessary during and after implementation of the proposed alternative. These labor rates include both the wages paid to the individuals performing the work and the associated fringe benefits. This also accounts for incremental labor costs, such as time spent by plant management beyond what is directly expensed. Appendix A summarizes the BLS labor categories used to estimate industry labor

[1] The "social rate of time preference" refers to the rate at which society is willing to postpone a marginal unit of current consumption in exchange for more future consumption.

[2] "Opportunity cost" is what is forgone by undertaking a given action. If licensee personnel were not revising procedures, they would be performing other work activities. Throughout this analysis, the NRC estimates the opportunity cost of performing these incremental tasks as the industry personnel's pay for the designated amount of time.

[3] The NRC labor rates presented here differ from those developed under the NRC's license fee recovery program (10 CFR Part 170, "Fees for Facilities, Materials, Import and Export Licenses, and Other Regulatory Services under the Atomic Energy Act of 1954, as Amended"). NRC labor rates for fee recovery purposes are designed for full-cost recovery of the services rendered and thus include nonincremental costs (e.g., overhead, administrative, and logistical support costs).

costs to implement this final rule and lists the industry labor rates used in the analysis. The regulatory analysis also includes an uncertainty analysis, which is discussed in Section 3.11.

2.8. Sign Conventions

The sign conventions used in this analysis are that all favorable consequences are positive and all adverse consequences are negative. Negative values are shown using parentheses (e.g., negative $500 is displayed as ($500)).

2.9. Analysis Horizon

This regulatory analysis uses an analysis horizon from 2026 to 2036, which encompasses both the period of time from issuance of the final rule to the application year of the last application of which the NRC is currently aware, and a few more years extrapolated based on comments from industry and other proprietary discussions.

2.10. Cost Estimation

To estimate the costs of each alternative evaluated, the staff used a work breakdown approach to deconstruct each requirement into its mandated activities. For each mandated activity, the analysis further subdivides the work across labor categories (i.e., executives, managers, technical staff, administrative staff, and licensing staff). The staff estimated the level of effort needed for each required activity and used a blended labor rate to develop bottom-up cost estimates.

The analysis uses data from subject matter experts (SMEs), knowledge gained from past rulemakings, and the NRC budget for this rulemaking to estimate the costs and benefits associated with this final rule. NRC staff members provided quantitative and qualitative information on attributes affected by the rule language. The NRC considered the potential differences between the finalized and existing requirements and incorporated these incremental changes into the regulatory analysis. The staff gathered data from several sources, consulted working group members to develop level of effort and unit cost estimates, and applied several cost estimation methods to use collective professional knowledge and judgment to estimate many of the costs and benefits. The analysis also uses available information from licensees and extrapolation techniques to estimate costs and benefits.

The staff extrapolated some costs by relying on actual past or current costs to estimate the future costs of similar activities. For example, to calculate the costs of licensing activities and the costs of preparing rules accompanying regulatory guidance, the staff used data from past projects to determine the labor categories of the personnel who would perform the work and to estimate the amount of time required under each category. If data were not available, the analysis estimated the level of effort based on similar steps in the process for which data were available.

To evaluate the effect of uncertainty in the model, the staff employed Monte Carlo simulation, which is an approach to uncertainty analysis in which input variables are expressed as probability distributions. The simulation was run 10,000 times, and values were chosen at random from the probability distributions of the input variables provided in Table A-11. The result was a distribution of values for the output variable of interest. Monte Carlo simulation also enables users to determine which input variables most strongly affect the value of the output variable. Section 3.11 describes the Monte Carlo simulation methods in detail and presents the results.

3. RESULTS

The NRC evaluated each provision contained in Alternative 2 relative to the applicable baseline (Alternative 1, the No-Action Alternative). Based on this analysis, the NRC developed equations to estimate the benefits and costs using available data, augmented by assumptions when necessary, and guidance contained in NUREG/BR-0058.

The NRC labor rate is the weighted average of the NRC staff labor rate and the NRC contractor labor rate. NRC contractors may perform a significant portion of the analyses addressed by the proposed rule. For the regulatory analysis, data about the relative effort expended on previous COL and ESP reviews by NRC staff and NRC contractors were collected and summarized in terms of costs and hours. The NRC staff labor rate was given as $144 per hour per internal agency guidance. The NRC contractor labor rate was estimated based on recent review costs billed to NRC divided by the hours billed and equates to approximately $225 per hour inclusive of all labor costs. The weighted average of these two rates was estimated based on the relative number of hours per most typical review experience. This rate equates to $191 per hour and represents the NRC average labor rate used in the analysis.

General Assumptions

- Effective year of proposed rule = 2026
- NRC composite rate (weighted) = $191.00
  - NRC staff rate = $144.00/hour
  - NRC contractor staff rate = $225.00/hour
- Industry staff rate = $134.18/hour
- The analysis presents all benefits and costs in constant 2024 dollars. For net present value calculations, the analysis discounts to the base year of the labor rates from BLS used in the analysis (i.e., 2024).

The industry rate is a blended and weighted labor rate of multiple occupational series taken from 2024 BLS labor data.

The following sections address the implementation and operational costs to industry and the NRC associated with issuing the NR GEIS and codifying the findings in 10 CFR Part 51 to accelerate and streamline the process of conducting environmental reviews related to the licensing of new nuclear reactors.

3.1. Industry Implementation

Under Alternative 2, industry applicants would be expected to take actions to implement the provisions of the rule for environmental reviews triggered by the expected applications under this rule. The NRC staff assumed that these implementation activities would apply to the 45 applications expected to be submitted under this rule during the first 10 years after the rule is issued, 2026–2036 period, which is used as the operational period of the rule in this regulatory analysis. Further, the staff assumed each ESP, construction permit (CP) and COL applicant (a total of 32, considered to be unique applicants in this analysis) would devote $25,000 to these preparatory activities implementing the provisions of the eventual final rule.[4] The annual costs are summarized in Table 1. As shown in the table, it is assumed that preparatory activities for the 32 applications occur in the year of the anticipated applications.

[4]The NRC staff assumed that each operating license application would not incur this cost because the licensee had incurred the cost during the preparation of the associated CP application.

Table 1 Annual Industry Implementation Costs (2024 Constant Dollars)

Year	Undiscounted	7% NPV	3% NPV
2026	$ (275,000)	$ (240,196)	$ (259,214)
2027	$ (75,000)	$ (61,222)	$ (68,636)
2028	$ (50,000)	$ (38,145)	$ (44,424)
2029			
2030			
2031	$ (100,000)	$ (62,275)	$ (81,309)
2032	$ (25,000)	$ (14,550)	$ (19,735)
2033	$ (75,000)	$ (40,795)	$ (57,481)
2034	$ (50,000)	$ (25,417)	$ (37,205)
2035	$ (100,000)	$ (47,509)	$ (72,242)
2036	$ (50,000)	$ (22,201)	$ (35,069)
Total Costs	$ (800,000)	$ (552,310)	$ (675,315)

* Totals may differ between tables due to rounding and modeling.

3.2. Industry Operations

Alternative 2 quantitatively evaluates the issues that each applicant must assess and include in their application to the NRC, which will be documented in Table C-1. For each Table C-1 issue, this regulatory analysis lists the assumption(s) and equation(s) used to estimate the benefits and/or costs to industry.

General assumptions are listed below (each Table C-1 benefit (averted cost), and the cost described below applies to all applicants except where noted):

- Any applicant submitting a new nuclear reactor application before the final rule is implemented is not affected by the rule and therefore not included in this regulatory analysis.
- The list of expected applications submitted in the 10 years following the issuance of the rule (through 2036) is based on the updated, proprietary information of expected applicants provided to the NRC. Table A-11 in Appendix A shows the expected number of applications per year.
- Applicant labor savings are assumed to scale based on the recent COL and ESP review experience of NRC staff and contractors, and equate to 1.75 times the labor hours required by NRC contractor staff who are reviewing and confirming the original analysis done by the applicant. The 1.75 factor is assumed to represent the additional effort on the part of the applicant to prepare the application from scratch. This factor is assumed to apply regardless of the complexity of the application.
- Savings enabled by the final rule occur when a generic impact analysis is determined to be an adequate analysis approach compared to standard impact analysis practices that are required by current guidance for new nuclear reactor reviews. The reduced labor effort required with generic analysis compared to previous (baseline) approaches constitutes the savings.
- Savings estimates are analyzed for environmental reviews that would be considering new nuclear reactor applications focused on facilities incorporating designs where multiple nuclear units would be installed in a single facility. These types of facilities most closely align

with the previous review experience of the NRC and reflect the most recent review experience associated with the Clinch River ESP review. Thus, the savings reported for the most likely review experience are likely to be upper bound estimates for the potential range of applications that may be expected.

- Many potential new nuclear reactor applications may use innovative technology, a smaller reactor size, or a single small unit. In these cases, several environmental resources may not be affected, and the resulting savings would not be realized because unaffected resources would not be part of the savings baseline.
- A Category 1 issue is assumed to be analyzed based on the generic analysis provided in the NR GEIS and would not require analytical effort apart from making the determination that generic analysis applies. It is assumed that the applicant will assess new and significant information for the determination of Category 1 applicability as part of the typical characterization of the affected environment in the ER; therefore, no additional costs are incurred to make this determination.
- A Category 2 issue is assumed to require a level of effort similar to that required without a GEIS, and thus, would not result in savings or added costs for applicant staff.

Table 2 presents the issue-by-issue cost savings impacts attributable to the rule, which are enabled by using the NR GEIS to provide the generic impact conclusions for the Category 1 issues, thereby avoiding the cost to industry of in-depth assessment for those issues. The tables in Appendix A show the input variables used to calculate these estimates.

Table 2 Industry Operations Averted Costs under the Final Rule by Issue, 2026–2036 (2024 Constant Dollars)

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
1	Category 1 Construction - Onsite Land Use	$134	48	$6,413	$153,910	$104,935	$129,339
2	Category 1 Construction - Offsite Land NRC Construction	$134	206	$27,573	$661,757	$451,183	$556,111
3	Category 1 Construction - Impacts on Prime and Unique Farmland	$134	29	$3,866	$92,775	$63,253	$77,964
4	Category 1 Construction - Coastal Zone and Compliance with the Coastal Zone Management Act for Facilities Located with a Designated Coastal Zone	$134	16	$2,190	$52,554	$35,831	$44,164
5	Category 1 Operations - Onsite Land Use	$134	4	$514	$12,334	$8,409	$10,365
6	Category 1 Operations - Offsite Land Use NRC	$134	30	$4,022	$96,529	$65,813	$81,118
7	Category 1 Construction - Visual Impacts in Site and Vicinity	$134	11	$1,452	$34,858	$23,766	$29,293
8	Category 1 Construction - Visual Impacts from Transmission Lines	$134	11	$1,452	$34,858	$23,766	$29,293
9	Category 1 Operations - Visual Impacts in Site and Vicinity	$134	11	$1,452	$34,858	$23,766	$29,293
10	Category 1 Construction - Emissions of Criteria Pollutants and Dust During Construction	$134	35	$4,692	$112,617	$76,782	$94,638
11	Category 1 Construction - Greenhouse Gas Emissions During Construction	$134	94	$12,625	$302,993	$206,579	$254,621
12	Category 1 Operations - Emissions of Criteria Pollutants During Operation	$134	51	$6,793	$163,026	$111,150	$137,000
13	Category 1 Operations - Greenhouse Gas Emissions During Operation	$134	63	$8,424	$202,174	$137,841	$169,898
14	Category 1 Operations - Cooling	$134	13	$1,765	$42,365	$28,884	$35,602

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
	System Emissions						
15	Category 1 Operations - Emissions of Ozone and NO_X During Transmission Line Operation	$134	7	$916	$21,987	$14,991	$18,477
16	Category 1 Construction - Surface Water Use Conflicts During Construction	$134	21	$2,838	$68,106	$46,435	$57,233
17	Category 1 Construction - Groundwater Use Conflicts Due to Excavation Dewatering	$134	172	$22,993	$551,822	$376,230	$463,726
18	Category 1 Construction - Groundwater Use Conflicts Due to Construction-Related Groundwater Withdrawals	$134	143	$19,127	$459,047	$312,976	$385,763
19	Category 1 Construction - Water Quality Degradation Due to Construction-Related Discharges	$134	21	$2,838	$68,106	$46,435	$57,233
20	Category 1 Construction - Water Quality Degradation Due to Inadvertent Spills During Construction	$134	21	$2,838	$68,106	$46,435	$57,233
21	Category 1 Construction - Water Quality Degradation Due to Groundwater Withdrawal	$134	58	$7,776	$186,622	$127,238	$156,829
22	Category 1 Construction - Water Quality Degradation Due to Offshore or In-Water Construction Activities	$134	85	$11,329	$271,889	$185,373	$228,483
23	Category 1 Construction - Water Use Conflict Due to Plant Municipal Water Demand	$134	85	$11,329	$271,889	$185,373	$228,483
24	Category 1 Construction - Degradation of Water Quality from Plant Effluent Discharges to Municipal Systems	$134	187	$25,115	$602,768	$410,964	$506,539
25	Category 1 Operations - Surface	$134	145	$19,417	$466,019	$317,729	$391,621

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
	Water Use Conflicts During Operation Due to Water Withdrawal from Flowing Waterbodies						
26	Category 1 Operations - Surface Water Use Conflicts During Operation Due to Water Withdrawal from Non-flowing Waterbodies	$134	65	$8,670	$208,073	$141,863	$174,855
27	Category 1 Operations - Groundwater Use Conflicts Due to Building Foundation Dewatering	$134	59	$7,955	$190,912	$130,163	$160,434
28	Category 1 Operations - Groundwater Use Conflicts Due to Groundwater Withdrawals for Plant Uses	$134	116	$15,597	$374,317	$255,207	$314,559
29	Category 1 Operations - Surface Water Quality Degradation Due to Physical Effects from Operation of Intake and Discharge Structures	$134	185	$24,802	$595,260	$405,845	$500,230
30	Category 1 Operations - Surface Water Quality Degradation Due to Changes in Salinity Gradients Resulting from Withdrawals	$134	342	$45,896	$1,101,499	$750,997	$925,650
31	Category 1 Operations - Groundwater Quality Degradation Due to Plant Discharges	$134	119	$15,954	$382,897	$261,057	$321,769
32	Category 1 Operations - Water Quality Degradation Due to Inadvertent Spills and Leaks During Operation	$134	26	$3,530	$84,731	$57,769	$71,204
33	Category 1 Operations - Water Quality Degradation Due to Groundwater Withdrawals	$134	107	$14,345	$344,285	$234,732	$289,322
34	Category 1 Operations - Water Use Conflict from Plant Municipal Water Demand	$134	20	$2,614	$62,744	$42,778	$52,727
35	Category 1 Operations -	$134	26	$3,530	$84,731	$57,769	$71,204

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
	Degradation of Water Quality from Plant Effluent Discharges to Municipal Systems						
36	Category 1 Construction - Permanent and Temporary Loss, Conversion, Fragmentation, and Degradation of Habitats	$134	163	$21,808	$523,400	$356,851	$439,842
37	Category 1 Construction - Permanent and Temporary Loss and Degradation of Wetlands	$134	159	$21,317	$511,602	$348,808	$429,927
38	Category 1 Construction - Effects of Construction Noise on Wildlife	$134	56	$7,441	$178,578	$121,754	$150,069
39	Category 1 Construction - Effects of Vehicular Collisions on Wildlife	$134	48	$6,413	$153,910	$104,935	$129,339
40	Category 1 Construction - Bird Collisions and Injury from Structures and Transmission Lines	$134	56	$7,441	$178,578	$121,754	$150,069
41	Category 1 Construction - Important Species and Habitats – Other Important Species and Habitats	$134	78	$10,413	$249,902	$170,382	$210,006
42	Category 1 Operations - Permanent and Temporary Loss or Disturbance of Habitats	$134	34	$4,514	$108,327	$73,857	$91,033
43	Category 1 Operations - Effects of Operational Noise on Wildlife	$134	17	$2,212	$53,091	$36,197	$44,615
44	Category 1 Operations - Effects of Vehicular Collisions on Wildlife	$134	11	$1,452	$34,858	$23,766	$29,293
45	Category 1 Construction - Exposure of Terrestrial Organisms to Radionuclides	$134	38	$5,095	$122,270	$83,363	$102,750
46	Category 1 Operations - Cooling Tower Operational Impacts on Vegetation	$134	48	$6,480	$155,518	$106,032	$130,691
47	Category 1 Operations - Bird Collisions and Injury from Structures and Transmission Lines	$134	23	$3,084	$74,005	$50,456	$62,191

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
48	Category 1 Operations - Bird Electrocutions from Transmission Lines	$134	23	$3,084	$74,005	$50,456	$62,191
49	Category 1 Operations - Water Use Conflicts with Terrestrial Resources	$134	195	$26,121	$626,900	$427,417	$526,818
50	Category 1 Operations - Effects of Transmission Line ROW Management on Terrestrial Resources	$134	26	$3,530	$84,731	$57,769	$71,204
51	Category 1 Operations - Effects of Electromagnetic Fields on Flora and Fauna	$134	7	$938	$22,523	$15,356	$18,928
52	Category 1 Operations - Important Species and Habitats – Other Important Species and Habitats	$134	67	$8,915	$213,972	$145,885	$179,812
53	Category 1 Construction - Runoff and Sedimentation from Construction Areas	$134	122	$16,312	$391,477	$266,907	$328,980
54	Category 1 Construction - Dredging and Filling Aquatic Habitats to Build Intake and Discharge Structures	$134	133	$17,786	*$426,871*	*$291,039*	*$358,723*
55	Category 1 Construction - Building Transmission Lines, Pipelines, and Access Roads Across Surface Waterbodies	$134	122	$16,312	$391,477	$266,907	$328,980
56	Category 1 Operations - Important Species and Habitats – Other Important Species and Habitats	$134	126	$16,825	$403,811	$275,317	$339,345
57	Category 1 Operations - Stormwater Runoff	$134	21	$2,838	$68,106	$46,435	$57,233
58	Category 1 Operations - Exposure of Aquatic Organisms to Radionuclides	$134	38	$5,095	$122,270	$83,363	$102,750
59	Category 1 Operations - Effects of Refurbishment on Aquatic Biota	$134	25	$3,285	$78,832	$53,747	$66,247
60	Category 1 Operations - Effects of	$134	104	$13,876	$333,024	$227,054	$279,858

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
	Maintenance Dredging on Aquatic Biota						
61	Category 1 Operations - Impacts of Transmission Line ROW Management on Aquatic Resources	$134	52	$6,904	$165,707	$112,979	$139,253
62	Category 1 Operations - Impingement and Entrainment of Aquatic Organisms	$134	155	$20,780	$498,731	$340,033	$419,111
63	Category 1 Operations - Water Use Conflicts with Aquatic Resources	$134	52	$6,904	$165,707	$112,979	$139,253
64	Category 1 Operations - Important Species and Habitats – Other Important Species and Habitats	$134	139	$18,568	$445,641	$303,836	$374,496
65	Category 1 Construction - Radiological Dose to Construction Workers	$134	117	$15,664	$375,925	$256,304	$315,911
66	Category 1 Operations - Occupational Doses to Workers	$134	38	$5,095	$122,270	$83,363	$102,750
67	Category 1 Operations - Maximally Exposed Individual Annual Doses	$134	38	$5,095	$122,270	$83,363	$102,750
68	Category 1 Operations - Total Population Annual Doses	$134	42	$5,631	$135,140	$92,138	$113,566
69	Category 1 Operations - Nonhuman Biota Doses	$134	42	$5,631	$135,140	$92,138	$113,566
70	Category 1 Construction - Building Impacts of Chemical, Biological, and Physical Nonradiological Hazards	$134	65	$8,692	$208,609	$142,229	$175,306
71	Category 1 Operations - Operation Impacts of Chemical, Biological, and Physical Nonradiological Hazards	$134	51	$6,815	$163,562	$111,516	$137,450
72	Category 1 Construction - Construction-Related Noise	$134	31	$4,089	$98,137	$66,910	$82,470
73	Category 1 Operations - Operation-Related Noise	$134	24	$3,151	$75,614	$51,553	$63,543

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
74	Category 1 Operations - Low-Level Radioactive Waste	$134	233	$31,238	$749,706	$511,146	$630,019
75	Category 1 Operations - Onsite Spent Nuclear Fuel Management	$134	233	$31,238	$749,706	$511,146	$630,019
76	Category 1 Operations - Mixed Waste	$134	233	$31,238	$749,706	$511,146	$630,019
77	Category 1 Construction - Construction Nonradiological Waste	$134	39	$5,251	$126,023	$85,922	$105,904
78	Category 1 Operations - Operation Nonradiological Waste	$134	28	$3,732	$89,557	$61,060	$75,260
79	Category 1 Operations - Design Basis Accidents Involving Radiological Releases	$134	172	$23,082	$553,967	$377,692	$465,529
80	Category 1 Operations - Accidents Involving Releases of Hazardous Chemicals	$134	104	$13,943	$334,633	$228,151	$281,210
81	Category 1 Operations - Severe Accidents and Severe Accident Mitigation Alternatives	$134	405	$54,297	$1,303,137	$888,472	$1,095,097
82	Category 1 Operations - Acts of Terrorism	$134	69	$9,273	$222,552	$151,735	$187,023
83	Category 1 Construction - Community Services and Infrastructure	$134	91	$12,155	$291,731	$198,901	$245,158
84	Category 1 Construction - Transportation Systems and Traffic	$134	140	$18,769	$450,467	$307,126	$378,552
85	Category 1 Construction - Economic Impacts	$134	91	$12,155	$291,731	$198,901	$245,158
86	Category 1 Construction - Tax Revenue Impacts	$134	48	$6,458	$154,982	$105,666	$130,240
87	Category 1 Operations - Community Services and Infrastructure	$134	64	$8,603	$206,464	$140,766	$173,503
88	Category 1 Operations - Transportation Systems and Traffic	$134	32	$4,335	$104,036	$70,932	$87,428
89	Category 1 Operations - Economic	$134	64	$8,603	$206,464	$140,766	$173,503

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
	Impacts						
90	Category 1 Operations - Tax Revenue Impacts	$134	128	$17,094	$410,247	$279,704	$344,753
91	Category 1 Operations - Uranium Recovery	$134	40	$5,340	$128,169	$87,385	$107,707
92	Category 1 Operations - Uranium Conversion	$134	40	$5,340	$128,169	$87,385	$107,707
93	Category 1 Operations - Uranium Enrichment	$134	40	$5,340	$128,169	$87,385	$107,707
94	Category 1 Operations - Fuel Fabrication[(a)]	$134	40	$5,340	$128,169	$87,385	$107,707
95	Category 1 Operations - Reprocessing	$134	40	$5,340	$128,169	$87,385	$107,707
96	Category 1 Operations - Storage and Disposal of Radiological Wastes	$134	40	$5,340	$128,169	$87,385	$107,707
97	Category 1 Operations - Transportation of Unirradiated NR Fuel	$134	74	$9,966	$239,177	$163,069	$200,993
98	Category 1 Operations - Transportation of Radioactive Waste from NRs	$134	92	$12,267	$294,412	$200,729	$247,411
99	Category 1 Operations - Transportation of Spent Nuclear Fuel from NRs	$134	159	$21,339	$512,138	$349,173	$430,378
100	Decommissioning	$134	82	$10,994	$263,845	$179,888	$221,723
	Totals		**8,028**	**$1,076,317**	**$25,831,599**	**$17,611,860**	**$21,707,714**

(a) Fuel fabrication impacts for metal fuel and liquid fueled molten salt are not included in the staff's generic analysis.
(b) Totals may differ between tables due to rounding and modeling.

3.3. NRC Implementation

The NRC will incur costs after issuance of the final rule (development costs are sunk and not part of this regulatory analysis), including the cost of the following:

- consolidation of the new GEIS-related Staff Guidance, COL-ISG-030, into more durable guidance in NUREG-1555
- a 10-year review of the GEIS issues, internal communications with the Commission, and scoping FRN (beginning in 2034)

Table 3 lists the NRC costs of rule implementation.

Table 3 NRC Implementation Costs (2024 Constant Dollars)

Year	Undiscounted	7% NPV	3% NPV
2026			
2027			
2028			
2029	$ (44,080)	$ (31,428)	$ (38,024)
2030			
2031			
2032			
2033			
2034	$ (220,400)	$ (112,040)	$ (163,998)
2035	$ (220,400)	$ (104,710)	$ (159,222)
2036	$ (220,400)	$ (97,860)	$ (154,584)
Total	$ (705,280)	$ (346,039)	$ (515,828)

*Totals may differ between tables due to rounding and modeling.

3.4. NRC Operations

Alternative 2 activities affect the environmental review time for each new nuclear reactor licensing application. The Alternative 2 analysis included each environmental issue presented in Table C-1 of Appendix C to Subpart A of 10 CFR Part 51. For each of these environmental issues, the analysis lists the assumption(s) and equation(s) used to estimate the value (benefit/savings) and/or impact (cost) to the NRC. Each of these issues was evaluated quantitatively, and results are presented in Table 4 below. General assumptions are as follows:

- The NRC will recognize the savings resulting from the final rule changes in the 12 months after the NRC receives each application. The NRC is assumed to recognize the savings in the year following the application submittal.
- Each cost and savings assumption associated with the final rule changes is based on extensive NRC staff experience in the review of COL and ESP applications.
- Savings estimates are analyzed for environmental reviews that would be considering new nuclear reactor applications focused on facilities incorporating designs where multiple nuclear units would be installed in a single facility. Thus, the savings reported are upper bound estimates. For many potential new nuclear reactor applications, the reactor size may be somewhat smaller or may use only a single small unit. In these cases, several

environmental resources may not be affected, and the resulting savings would not be realized, because unaffected resources would not be part of the savings baseline.

- A Category 1 issue is assumed to be analyzed based on the generic analysis provided in the NR GEIS and would not require analytical effort apart from making the determination that generic analysis applies. It is assumed that NRC staff will assess new and significant information for the determination of Category 1 applicability as part of the typical characterization of the affected environment of the EIS.
- A typical Category 2 issue is assumed to require a level of effort similar to the level of effort required without the NR GEIS, and thus, would not result in savings or added costs for applicant staff.

Table 4 presents the issue-by-issue cost savings impacts attributable to the rule, which are enabled by using the NR GEIS to provide the generic impact conclusions for the Category 1 issues, thereby avoiding the cost to the NRC of in-depth review for those issues. The tables in Appendix A show the input variables used to calculate these estimates.

Table 4 NRC Operations Averted Costs under the Final Rule by Issue, 2026–2036 (2024 Constant Dollars)

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
1	Category 1 Construction - Onsite Land Use	$191	141	$26,963	$614,753	$398,906	$505,929
2	Category 1 Construction - Offsite Land NRC Construction	$191	144	$27,536	$627,817	$407,383	$516,681
3	Category 1 Construction - Impacts on Prime and Unique Farmland	$191	25	$4,680	$106,693	$69,232	$87,806
4	Category 1 Construction - Coastal Zone and Compliance with the Coastal Zone Management Act for Facilities Located with a Designated Coastal Zone	$191	10	$1,974	$45,000	$29,200	$37,034
5	Category 1 Operations - Onsite Land Use	$191	28	$5,348	$121,934	$79,122	$100,350
6	Category 1 Operations - Offsite Land Use NRC	$191	32	$6,048	$137,902	$89,483	$113,491
7	Category 1 Construction - Visual Impacts in Site and Vicinity	$191	27	$5,157	$117,580	$76,296	$96,766
8	Category 1 Construction - Visual Impacts from Transmission Lines	$191	9	$1,719	$39,193	$25,432	$32,255
9	Category 1 Operations - Visual Impacts in Site and Vicinity	$191	13	$2,483	$56,612	$36,735	$46,591
10	Category 1 Construction - Emissions of Criteria Pollutants and Dust During Construction	$191	162	$30,974	$706,203	$458,247	$581,191
11	Category 1 Construction - Greenhouse Gas Emissions During Construction	$191	161	$30,815	$702,574	$455,892	$578,205
12	Category 1 Operations - Emissions of Criteria Pollutants During Operation	$191	166	$31,674	$722,171	$468,608	$594,332
13	Category 1 Operations - Greenhouse Gas Emissions During Operation	$191	109	$20,883	$476,125	$308,952	$391,841

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
14	Category 1 Operations - Cooling System Emissions	$191	22	$4,107	$93,628	$60,754	$77,054
15	Category 1 Operations - Emissions of Ozone and NO_X During Transmission Line Operation	$191	18	$3,343	$76,209	$49,451	$62,718
16	Category 1 Construction - Surface Water Use Conflicts During Construction	$191	62	$11,747	$267,820	$173,785	$220,411
17	Category 1 Construction - Groundwater Use Conflicts Due to Excavation Dewatering	$191	173	$33,075	$754,106	$489,330	$620,614
18	Category 1 Construction - Groundwater Use Conflicts Due to Construction-Related Groundwater Withdrawals	$191	162	$30,847	$703,300	$456,363	$578,802
19	Category 1 Construction - Water Quality Degradation Due to Construction-Related Discharges	$191	62	$11,874	$270,723	$175,669	$222,800
20	Category 1 Construction - Water Quality Degradation Due to Inadvertent Spills During Construction	$191	25	$4,839	$110,322	$71,586	$90,792
21	Category 1 Construction - Water Quality Degradation Due to Groundwater Withdrawal	$191	103	$19,673	$448,544	$291,055	$369,143
22	Category 1 Construction - Water Quality Degradation Due to Offshore or In-Water Construction Activities	$191	63	$11,938	$272,175	$176,611	$223,995
23	Category 1 Construction - Water Use Conflict Due to Plant Municipal Water Demand	$191	56	$10,696	$243,869	$158,244	$200,699
24	Category 1 Construction - Degradation of Water Quality from Plant Effluent Discharges to Municipal Systems	$191	113	$21,615	$492,818	$319,784	$405,580
25	Category 1 Operations - Surface	$191	158	$30,114	$686,607	$445,531	$565,064

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
	Water Use Conflicts During Operation Due to Water Withdrawal from Flowing Waterbodies						
26	Category 1 Operations - Surface Water Use Conflicts During Operation Due to Water Withdrawal from Non-flowing Waterbodies	$191	150	$28,555	$651,043	$422,454	$535,795
27	Category 1 Operations - Groundwater Use Conflicts Due to Building Foundation Dewatering	$191	77	$14,643	$333,868	$216,643	$274,767
28	Category 1 Operations - Groundwater Use Conflicts Due to Groundwater Withdrawals for Plant Uses	$191	145	$27,663	$630,720	$409,267	$519,070
29	Category 1 Operations - Surface Water Quality Degradation Due to Physical Effects from Operation of Intake and Discharge Structures	$191	124	$23,748	$541,447	$351,338	$445,600
30	Category 1 Operations - Surface Water Quality Degradation Due to Changes in Salinity Gradients Resulting from Withdrawals	$191	227	$43,262	$986,362	$640,039	$811,756
31	Category 1 Operations - Groundwater Quality Degradation Due to Plant Discharges	$191	150	$28,650	$653,220	$423,867	$537,587
32	Category 1 Operations - Water Quality Degradation Due to Inadvertent Spills and Leaks During Operation	$191	32	$6,176	$140,805	$91,367	$115,880
33	Category 1 Operations - Water Quality Degradation Due to Groundwater Withdrawals	$191	154	$29,478	$672,091	$436,112	$553,117
34	Category 1 Operations - Water Use Conflict from Plant Municipal Water Demand	$191	29	$5,571	$127,015	$82,418	$104,531
35	Category 1 Operations -	$191	38	$7,226	$164,757	$106,909	$135,591

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
	Degradation of Water Quality from Plant Effluent Discharges to Municipal Systems						
36	Category 1 Construction - Permanent and Temporary Loss, Conversion, Fragmentation, and Degradation of Habitats	$191	124	$23,589	$537,818	$348,983	$442,613
37	Category 1 Construction - Permanent and Temporary Loss and Degradation of Wetlands	$191	121	$23,079	$526,205	$341,448	$433,056
38	Category 1 Construction - Effects of Construction Noise on Wildlife	$191	38	$7,194	$164,031	$106,438	$134,994
39	Category 1 Construction - Effects of Vehicular Collisions on Wildlife	$191	34	$6,399	$145,886	$94,664	$120,061
40	Category 1 Construction - Bird Collisions and Injury from Structures and Transmission Lines	$191	37	$7,003	$159,676	$103,612	$131,410
41	Category 1 Construction - Important Species and Habitats – Other Important Species and Habitats	$191	63	$12,033	$274,352	$178,024	$225,787
42	Category 1 Operations - Permanent and Temporary Loss or Disturbance of Habitats	$191	21	$3,916	$89,273	$57,928	$73,470
43	Category 1 Operations - Effects of Operational Noise on Wildlife	$191	12	$2,260	$51,532	$33,438	$42,410
44	Category 1 Operations - Effects of Vehicular Collisions on Wildlife	$191	8	$1,464	$33,387	$21,664	$27,477
45	Category 1 Construction - Exposure of Terrestrial Organisms to Radionuclides	$191	28	$5,348	$121,934	$79,122	$100,350
46	Category 1 Operations - Cooling Tower Operational Impacts on Vegetation	$191	37	$7,099	$161,853	$105,025	$133,202
47	Category 1 Operations - Bird Collisions and Injury from Structures and Transmission Lines	$191	15	$2,897	$66,048	$42,858	$54,356

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
48	Category 1 Operations - Bird Electrocutions from Transmission Lines	$191	15	$2,897	$66,048	$42,858	$54,356
49	Category 1 Operations - Water Use Conflicts with Terrestrial Resources	$191	105	$20,119	$458,706	$297,649	$377,506
50	Category 1 Operations - Effects of Transmission Line ROW Management on Terrestrial Resources	$191	20	$3,884	$88,548	$57,457	$72,873
51	Category 1 Operations - Effects of Electromagnetic Fields on Flora and Fauna	$191	6	$1,210	$27,580	$17,897	$22,698
52	Category 1 Operations - Important Species and Habitats – Other Important Species and Habitats	$191	47	$8,977	$204,676	$132,812	$168,444
53	Category 1 Construction - Runoff and Sedimentation from Construction Areas	$191	118	$22,602	$515,318	$334,384	$424,096
54	Category 1 Construction - Dredging and Filling Aquatic Habitats to Build Intake and Discharge Structures	$191	122	$23,302	$531,286	$344,745	$437,237
55	Category 1 Construction - Building Transmission Lines, Pipelines, and Access Roads Across Surface Waterbodies	$191	101	$19,196	$437,657	$283,991	$360,183
56	Category 1 Operations - Important Species and Habitats – Other Important Species and Habitats	$191	165	$31,579	$719,994	$467,195	$592,540
57	Category 1 Operations - Stormwater Runoff	$191	28	$5,253	$119,757	$77,709	$98,558
58	Category 1 Operations - Exposure of Aquatic Organisms to Radionuclides	$191	28	$5,348	$121,934	$79,122	$100,350
59	Category 1 Operations - Effects of Refurbishment on Aquatic Biota	$191	29	$5,603	$127,741	$82,889	$105,128
60	Category 1 Operations - Effects of	$191	73	$13,943	$317,900	$206,282	$261,626

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
	Maintenance Dredging on Aquatic Biota						
61	Category 1 Operations - Impacts of Transmission Line ROW Management on Aquatic Resources	$191	44	$8,468	$193,063	$125,276	$158,887
62	Category 1 Operations - Impingement and Entrainment of Aquatic Organisms	$191	116	$22,124	$504,431	$327,319	$415,137
63	Category 1 Operations - Water Use Conflicts with Aquatic Resources	$191	56	$10,728	$244,595	$158,714	$201,296
64	Category 1 Operations - Important Species and Habitats – Other Important Species and Habitats	$191	131	$25,021	$570,479	$370,177	$469,493
65	Category 1 Construction - Radiological Dose to Construction Workers	$191	97	$18,527	$422,416	$274,100	$347,640
66	Category 1 Operations - Occupational Doses to Workers	$191	62	$11,842	$269,998	$175,198	$222,203
67	Category 1 Operations - Maximally Exposed Individual Annual Doses	$191	53	$10,123	$230,804	$149,766	$189,947
68	Category 1 Operations - Total Population Annual Doses	$191	64	$12,224	$278,707	$180,850	$229,370
69	Category 1 Operations - Nonhuman Biota Doses	$191	36	$6,876	$156,773	$101,728	$129,021
70	Category 1 Construction - Building Impacts of Chemical, Biological, and Physical Nonradiological Hazards	$191	51	$9,646	$219,917	$142,702	$180,988
71	Category 1 Operations - Operation Impacts of Chemical, Biological, and Physical Nonradiological Hazards	$191	30	$5,794	$132,096	$85,715	$108,712
72	Category 1 Construction - Construction-Related Noise	$191	22	$4,202	$95,806	$62,167	$78,846
73	Category 1 Operations - Operation-Related Noise	$191	15	$2,770	$63,145	$40,974	$51,967
74	Category 1 Operations - Low-Level Radioactive Waste	$191	145	$27,695	$631,446	$409,738	$519,667

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
75	Category 1 Operations - Onsite Spent Nuclear Fuel Management	$191	176	$33,616	$766,445	$497,337	$630,769
76	Category 1 Operations - Mixed Waste	$191	136	$25,976	$592,253	$384,306	$487,412
77	Category 1 Construction - Construction Nonradiological Waste	$191	34	$6,494	$148,063	$96,076	$121,853
78	Category 1 Operations - Operation Nonradiological Waste	$191	19	$3,629	$82,741	$53,690	$68,094
79	Category 1 Operations - Design Basis Accidents Involving Radiological Releases	$191	121	$23,111	$526,931	$341,919	$433,654
80	Category 1 Operations - Accidents Involving Releases of Hazardous Chemicals	$191	78	$14,898	$339,674	$220,411	$279,545
81	Category 1 Operations - Severe Accidents and Severe Accident Mitigation Alternatives	$191	357	$68,123	$1,553,212	$1,007,861	$1,278,263
82	Category 1 Operations - Acts of Terrorism	$191	58	$11,078	$252,578	$163,895	$207,867
83	Category 1 Construction - Community Services and Infrastructure	$191	52	$9,964	$227,175	$147,411	$186,961
84	Category 1 Construction - Transportation Systems and Traffic	$191	83	$15,789	$359,997	$233,598	$296,270
85	Category 1 Construction - Economic Impacts	$191	52	$9,837	$224,272	$145,528	$184,572
86	Category 1 Construction - Tax Revenue Impacts	$191	28	$5,412	$123,386	$80,064	$101,544
87	Category 1 Operations - Community Services and Infrastructure	$191	36	$6,908	$157,499	$102,199	$129,618
88	Category 1 Operations - Transportation Systems and Traffic	$191	19	$3,629	$82,741	$53,690	$68,094
89	Category 1 Operations - Economic Impacts	$191	36	$6,908	$157,499	$102,199	$129,618
90	Category 1 Operations - Tax	$191	70	$13,434	$306,288	$198,746	$252,069

Issue Number	Table C-1 Issue Description	Labor Rate	Hours per Application	Averted Costs per Application	Net Averted Costs Undiscounted	Net Averted Costs 7% NPV	Net Averted Costs 3% NPV
	Revenue Impacts						
91	Category 1 Operations - Uranium Recovery	$191	26	$4,966	$113,225	$73,470	$93,182
92	Category 1 Operations - Uranium Conversion	$191	26	$4,966	$113,225	$73,470	$93,182
93	Category 1 Operations - Uranium Enrichment	$191	32	$6,112	$139,354	$90,425	$114,685
94	Category 1 Operations - Fuel Fabrication(a)	$191	37	$7,067	$161,128	$104,554	$132,605
95	Category 1 Operations - Reprocessing	$191	27	$5,157	$117,580	$76,296	$96,766
96	Category 1 Operations - Storage and Disposal of Radiological Wastes	$191	37	$7,067	$161,128	$104,554	$132,605
97	Category 1 Operations - Transportation of Unirradiated NR Fuel	$191	54	$10,282	$234,433	$152,121	$192,934
98	Category 1 Operations - Transportation of Radioactive Waste from NRs	$191	63	$12,065	$275,078	$178,495	$226,384
99	Category 1 Operations - Transportation of Spent Nuclear Fuel from NRs	$191	174	$33,139	$755,558	$490,272	$621,809
100	Decommissioning	$191	95	$18,145	$413,706	$268,449	$340,472
-	**Totals**	-	**7,409**	**$1,415,087**	**$32,263,987**	**$20,935,712**	**$26,552,619**

(a) Fuel fabrication impacts for metal fuel and liquid fueled molten salt are not included in the NRC staff's generic analysis.
(b) Totals may differ between tables due to rounding and modeling.

3.5. Totals

The analytical results are organized into four sections. This section presents findings related to the benefits and costs of the regulatory analysis. Section 3.8 discusses the backfitting and issue finality analysis, Section 3.9 discusses disaggregation of the analytical results, and Section 3.11 examines uncertainties associated with the analytical assumptions and input data.

3.6. Quantitative Results

For Alternative 2, four attributes have been analyzed quantitatively (Industry Implementation, Industry Operations, NRC Implementation, and NRC Operations). The net benefits (averted costs) and costs calculated for Alternatives 1 and 2 are presented below. Relative to Alternative 1 (No-Action alternative), Alternative 2 would result in estimated net quantitative benefits:

- industry averted costs of $17.61 million NPV, assuming a 7 percent discount rate, or $21.71 million assuming a 3 percent discount rate
- industry costs of ($0.55 million) NPV, assuming a 7 percent discount rate, or ($0.68 million) assuming a 3 percent discount rate
- NRC averted costs of $20.94 million NPV, assuming a 7 percent discount rate, or $26.55 million assuming a 3 percent discount rate
- NRC costs of ($0.35 million) NPV, assuming a 7 percent discount rate, or ($0.52 million) assuming a 3 percent discount rate

Table 5 presents the quantitative results for Alternative 2 using 7 and 3 percent discount rates. Several cases were developed to reflect situations where only some Category 1 issues would be identified and used as part of an application. These cases were used as part of the uncertainty and sensitivity analyses in Section 3.11.

Table 5 Net Benefits (Costs) of Alternative 2

Attribute	Total Averted Costs (Costs)		
	Undiscounted	**7% NPV**	**3% NPV**
Industry Implementation:	($800,000)	($552,000)	($675,000)
Industry Operation:	$25,830,000	$17,610,000	$21,710,000
Industry Totals:	*$25,030,000*	*$17,060,000*	*$21,030,000*
NRC Implementation:	($705,000)	($346,000)	($516,000)
NRC Operation:	$32,260,000	$20,940,000	$26,550,000
NRC Totals:	*$31,560,000*	*$20,590,000*	*$26,040,000*
Net:	***$56,590,000***	***$37,650,000***	***$47,070,000***

*Totals may differ between tables due to rounding and modeling.

3.7. Qualitative Results

For Alternative 2, two attributes have been analyzed on a qualitative basis (Improvements in Knowledge and Improvements in Regulatory Efficiency). Regarding Improvements in Knowledge, Category 1 and 2 issues have been added to Table C-1 of 10 CFR Part 51, which will improve the quality of the information provided to the NRC by focusing on issues most relevant to specific applications and facilitating new nuclear reactor 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, the applicant's research for new and significant information pertaining to Category 1 issues will improve the knowledge base for these issues.

Regarding Improvements in Regulatory Efficiency, the NR GEIS and the issues and findings in Table C-1 will improve the efficiency of the environmental review. Improving the clarity and efficiency of the regulatory provisions reduces the cost to industry to prepare environmental reports for new nuclear reactor applications and permits the NRC to focus resources on project-specific issues of importance (i.e., project-specific analyses), which also reduces the cost to the NRC.

3.8. Safety Goal Evaluation

The NRC's safety goal evaluation applies only to regulatory initiatives considered to be generic safety enhancement backfits subject to the substantial additional protection standard at 10 CFR 50.109(a)(3). The final rule codifies in 10 CFR Part 51 certain environmental issues identified in the NR GEIS. The final rule also revises 10 CFR Part 51 to permit an applicant for a new nuclear reactor CP or operating license (OL) under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," or a new nuclear reactor ESP or COL under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," to use the NR GEIS in preparing its ER. The final rule requires the NRC staff to prepare a site-specific draft SEIS and final SEIS for each application that references the NR GEIS. The NRC has determined that the backfitting rule in § 50.109 and the issue finality provisions in 10 CFR Part 52 do not apply to this final rule because this amendment does not involve any provision that would either constitute backfitting as that term is defined in 10 CFR Chapter I or affect the issue finality of any approval issued under 10 CFR Part 52.

The final rule does not constitute backfitting for applicants for CPs or OLs under 10 CFR Part 50 and does not affect the issue finality of applicants for ESPs or COLs under 10 CFR Part 52. These applicants are not, with certain exceptions not applicable here, within the scope of the backfitting or issue finality provisions. The backfitting and issue finality regulations include language delineating when the backfitting and issue finality provisions begin; in general, they begin after the issuance of a license, permit, or other approval (e.g., 10 CFR 50.109(a)(1)(iii) and 52.98(a)). Furthermore, neither the backfitting provisions nor the issue finality provisions, with certain exceptions not applicable here, are intended to apply to NRC actions that substantially change the expectations of current and future applicants. Applicants cannot reasonably expect that future requirements will not change.

The exceptions to the general principle are applicable when an applicant references a 10 CFR Part 52 approval (e.g., an ESP or design certification rule) with specified issue finality provisions or a CP under 10 CFR Part 50. However, this rule would have no effect on a CP held by an applicant for a 10 CFR Part 50 OL or an ESP referenced by an applicant for a 10 CFR Part 52 COL. Therefore, for purposes of this final rule, the exceptions to the general principle do not apply.

3.9. Disaggregation

To comply with guidance provided in Section 4.3.2 ("Criteria for the Treatment of Individual Requirements") of the Regulatory Analysis Guidelines (NRC, 2020), 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 Analysis Guidelines, the NRC evaluated, on a disaggregated basis, each new regulatory provision expected to result in an incremental cost. The costs to the NRC associated with this final rule result from consolidation of the GEIS-related staff guidance into NUREG-1555, withdrawing the GEIS ISG and canceling the GEIS NUREG, and a statutorily mandated scoping review of the GEIS to be completed 10 years after the issuance of this final rule. These activities are related to the issuance of the NR GEIS itself and enable the averted costs (benefits) of the generic treatment of Category 1 issues in the NR GEIS to both NRC and Industry, which far exceed the minor costs of these activities. The costs to Industry (applicants/licensees) associated with this final rule result from administrative activities for each entity to prepare for using the NR GEIS process as opposed to the current process. These costs are also far exceeded by the averted costs (benefits) to applicants/licensees of the NR GEIS. Table 6 below shows the costs of these items compared to the averted costs (at a 7% NPV) to the NRC and just one applicant, showing the net benefit that results from this effort when even one applicant is considered. Given that the NRC expects many applicants to use the NR GEIS, the costs of finalizing the GEIS are clearly justified by the averted costs (benefits). The location in the regulatory analysis where the source information for Table 6 is located is in the final column of the table.

Table 6 Disaggregation

Entity	Activity	Cost (7% NPV)	Benefit (7% NPV)	Location in RA
Industry	Preparatory activities to use NR GEIS	($21,800)	$0	Table 1
Industry	Reduced level of effort using NR GEIS	$0	$940,000	Table 2
NRC	Consolidate new guidance, withdraw ISG/NUREG	($31,400)	$0	Table 3
NRC	10-year scoping review of NR GEIS	($315,000)	$0	Table 3
NRC	Reduced level of effort using NR GEIS	$0	$1,155,000	Table 4

3.10. Results for the Committee to Review Generic Requirements

This section addresses regulatory analysis information requirements for rulemaking actions or staff positions subject to review by the Committee to Review Generic Requirements (CRGR). All information called for by the CRGR procedures (NRC, 2018) appears in this regulatory analysis or in the FRN for the final rule. Table 7 provides a cross-reference between the relevant information and its location in this document or the FRN.

Table 7 Specific CRGR Information Requirements for Regulatory Analysis

Citation in CRGR Procedures (NRC, 2018)	Information Item to Include in a Regulatory Analysis Prepared for CRGR Review	Where Item Is Discussed
Appendix B, (i)	The new or revised generic requirement or staff position in the final rule	Final rule text in *Federal Register* notice
Appendix B, (ii)	Draft papers or other documents supporting the requirements or staff positions	*Federal Register* notice for the final rule
Appendix B, (iii)	The sponsoring office's position on whether each requirement or staff position would modify, implement, relax, or reduce existing requirements or staff positions	Regulatory Analysis, Section 3, and Section VIII, "Backfitting and Issue Finality," of *Federal Register* notice for the final rule
Appendix B, (iv)	The method of implementation	Regulatory Analysis, Section 5
Appendix B, (vi)	The category of power reactors, new reactors, or nuclear materials facilities or activities to which the generic requirement or staff position applies	Regulatory Analysis, Section 2.4
Appendix B, (vii)–(viii)	The items required at 10 CFR 50.109(c) and the required rationale at 10 CFR 50.109(a)(3) if the action involves a power reactor backfit and the exceptions at 10 CFR 50.109(a)(4) are not applicable	Section VIII, "Backfitting and Issue Finality," of *Federal Register* notice for the final rule
Appendix B, (xvi)	An assessment of how the action relates to the Commission's Safety Goal Policy Statement	Regulatory Analysis, Section 3.8

3.11.Uncertainty and Sensitivity Analyses

The NRC is including a Monte Carlo uncertainty analysis in this regulatory analysis using the specialty software @Risk.[5] The Monte Carlo approach answers the question, "What distribution of net benefits and costs results from multiple draws of the probability distribution assigned to key variables?"

3.12.Uncertainty and Sensitivity Analyses Assumptions

Because this regulatory analysis is based on estimates of values that are sensitive to licensee-specific cost drivers and plant dissimilarities, the NRC provides the following Monte Carlo analysis of the variables that have the greatest amount of uncertainty.

Monte Carlo simulations involve introducing uncertainty into the analysis by replacing the point estimates of the variables used to estimate base-case costs and benefits with probability distributions. By defining input variables as probability distributions instead of point estimates, the influence of uncertainty on the results of the analysis (i.e., the net benefits) can be modeled effectively.

The probability distributions chosen to represent the different variables in the analysis were bounded by the range-referenced input and the staff's professional judgment. When defining the probability distributions for use in a Monte Carlo simulation, summary statistics are needed to characterize the distributions. These summary statistics include (1) the minimum, most likely,

[5] Information about the @Risk software is available at https://www.palisade.com.

and maximum values of a program evaluation and review technique (PERT) distribution, [6] (2) the minimum and maximum values of a uniform distribution, and (3) the specified integer values of a discrete population. The regulatory analysis uses PERT distributions to reflect the relative spread and skewness of the distribution defined by the three estimates.

In this analysis, the NRC assigned probability distributions to uncertain variables including the number of Category 1 issues that might be triggered by a new nuclear reactor application, the relative complexity of any one application, the mix of applications expected during the analysis period, and the NRC assigned triangular probability distributions to these inputs.

As an example of the variables and distributions used in the Monte Carlo simulations, a variety of potential scenarios were evaluated based on combinations of resource areas for which the Category 1 issues might or might not apply, based on the type of site and design that is selected. These combinations reflect the input of NRC SMEs interviewed during the proposed rule stage about the potential mix of issues that may apply to applications, used in the same way in the regulatory analysis of the final rule, and include the following potential application cases:

- Case 1: All Category 1 issues applicable.
- Case 2: Brownfield site without terrestrial ecology concerns nor transmission lines.
- Case 3: Brownfield site without groundwater use, transmission lines, or terrestrial ecology resources.
- Case 4: Small brownfield site without water use.
- Case 5: Small brownfield site without ecological concerns, transmission lines, or surface water use.
- Case 6: Large greenfield site with transmission lines.
- Case 7: Greenfield site without groundwater resources.
- Case 8: Greenfield site with no water use, aquatic ecology resources, or transmission lines.
- Case 9: Greenfield site with no surface water or aquatic ecology resources, with transmission lines.

For each of these cases, the NRC determined which set of Category 1 issues likely would apply and estimated the net savings that would be attributable to each case. The number of applicable Category 1 issues for any review is linked to the SME-determined effort (hours) per issue used to derive the per-issue savings from conducting generic analysis. Also, NRC modeled the effort of the “least complex” review scenario in addition to the “most typical” review experience. The sensitivity of the results to variations in the scope of the ER are presented in Table 8. In the case of lower review complexity, many Category 1 issues may not be of any concern, or the affected resource areas may not be present at the anticipated application site. In these cases, no savings would result if the Category 1 issue identified in the NR GEIS is not present for a

[6] A PERT distribution is a special form of the beta distribution with specified minimum and maximum values. The shape parameter is calculated from the defined “most likely” value. The PERT distribution is similar to a triangular distribution in that it has the same set of three parameters. Technically, it is a special case of a scaled beta (or beta general) distribution. The PERT distribution is generally considered superior to the triangular distribution when the parameters result in a skewed distribution because the smooth shape of the curve places less emphasis in the direction of skew. Similar to the triangular distribution, the PERT distribution is bounded on both sides and, therefore, may not be adequate for some modeling purposes if the capture of tail or extreme events is desired.

given application. Thus, Table 8 presents what reduced savings would be available in such cases.

Table 8 Relative Expected Effort of Alternative NRC New Nuclear Reactor National Environmental Policy Act Review Cases

Metric	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Category 1 issues in play	100	80	73	51	59	100	93	66	78
Fraction of "most typical" effort	100%	89%	78%	48%	60%	100%	89%	58%	71%
Fraction of "most typical" effort (Least complex review effort)	67%	62%	55%	41%	48%	67%	60%	45%	53%

These results suggest that on average a typical review would involve 75 percent of the Category 1 issues. As a result, these percentages of Category 1 resource utilization were used to understand how cost might reasonably vary based on the utilization of Category 1 issues in the applications that are received. The NRC acknowledges that some anticipated applications may be for relatively small projects, compared to the COL and ESP projects upon which these estimates are based. The least complex review effort may be more indicative of the expected effort for such applications. However, the NRC assumes that the most typical application will be for larger projects, similar to the Clinch River ESP application, in which an array design was proposed as part of a relatively large facility and site development involving all or most Category 1 issues.

The uncertainty analysis uses a detailed approach to evaluating issues based on review complexity. Review complexity was derived by collecting data about recent NRC environmental reviews of new nuclear reactor applications, including an ESP application for a facility at the Clinch River site in Tennessee, in addition to two large LWR applications. NRC environmental reviews range in complexity based on several factors that vary from site to site and application to application. Experienced environmental SMEs were asked to indicate which reviews reflected the most typical, least complex, and most complex for their specific resource area (ecology, human health, socioeconomics, water resources, etc.). The Category 1 issues analyzed in this proposed rule are each assigned to a specific resource area for impact analysis for each application (COL, ESP licensing actions). For each Category 1 issue, the relevant SME made a determination of which application represented the most typical review experience, the least complex, and the most complex for their resource area. This information was used to allocate NRC cost data for each issue for each classification (least complex, most typical, most complex).

Finally, the mix of reviews undertaken during the analysis period of the proposed rule is also subject to some level of uncertainty. This is reflected in the total number of Category 1 issues that would arise from the applications expected in the 2026–2036 period. ESP and COL

applications were estimated to address approximately 75 percent of the Category 1 issues, based on the discussion above. CP applications were estimated to address all construction issues, and OL applications were estimated to address all operations issues with some rework of construction issues (6 out of 36 as an average assumption). Table A-14 lists all Category 1 issues along with the per-issue effort that would be saved by using the NR GEIS, and the remaining uncertainty analysis variables that are in the other tables of Appendix A.

3.13.Uncertainty and Sensitivity Analyses Results

The staff performed the Monte Carlo simulation by calculating the results for 10,000 realizations (samples) of the input parameters. For each iteration, this analytical tool chooses the values identified in the table randomly from the probability distributions that define the input variables. The analysis records the values of the output variables for each iteration and used these resulting output variable values to define the resultant probability distribution. Figures 1–3 show the net results to Industry, the NRC, and for the rule overall, at a 7%NPV.

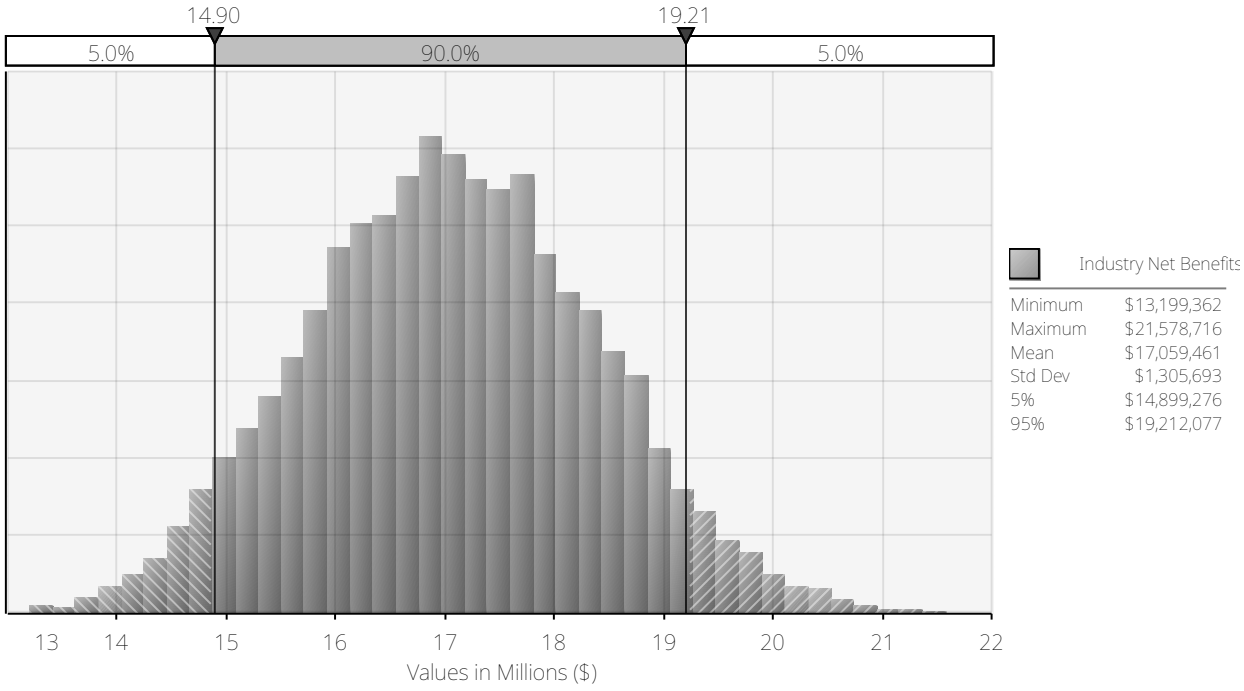

Figure 1 Industry Net Benefits (7% NPV)

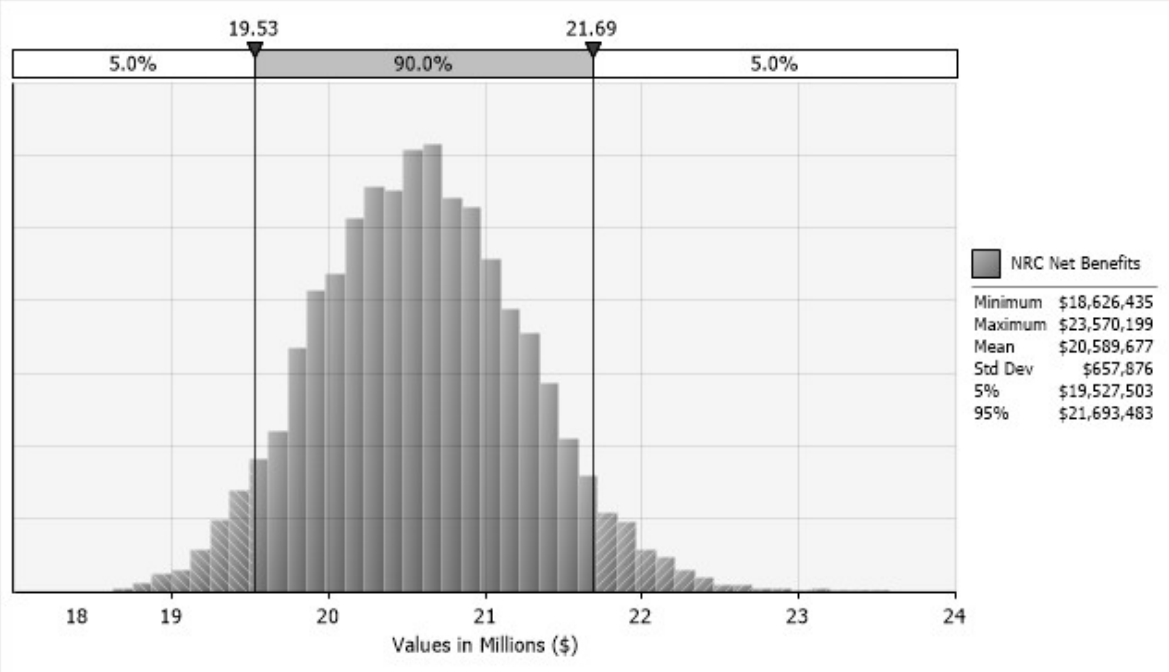

Figure 2 **NRC Net Benefits (7% NPV)**

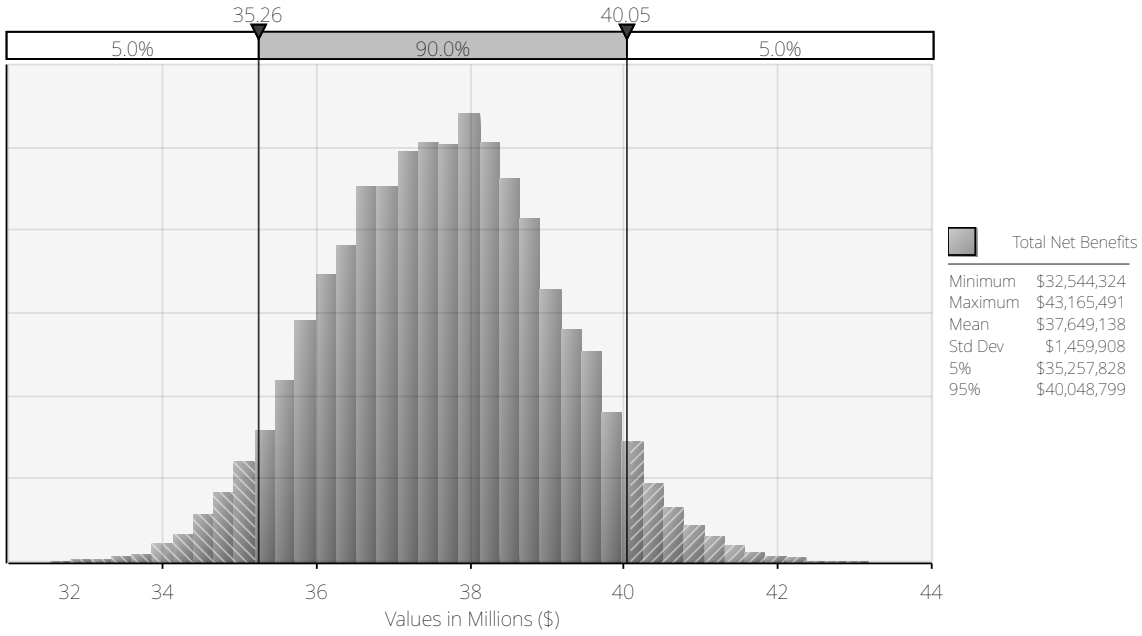

Figure 3 **Total Net Benefits (7% NPV)**

Table 9 presents descriptive statistics for the uncertainty analysis. In particular, the table shows the ranges of the output distributions, which give a clearer picture of the potential incremental costs and benefits (averted costs) of the final rule. The 5 percent and 95 percent values also appear as numerical values in Error: Reference source not found, Figure 2, and Figure 3, above the vertical lines marking the endpoints of the 90 percent confidence intervals.

Table 9 Descriptive Statistics for Uncertainty Results (7 Percent NPV)

Uncertainty results	Incremental cost-benefit (2024 dollars, millions)					
	Min	Mean	Std. dev.	Max	5%	95%
Total industry benefit	$13.2	$17.1	$1.31	$21.6	$14.9	$19.2
Total NRC benefit	$18.6	$20.6	$0.66	$23.6	$19.5	$21.7
Total benefit	$32.5	$37.6	$1.46	$43.2	$35.3	$40.0

In addition to estimating the probability distributions for the net benefits of the final rule, Monte Carlo simulation was used to conduct a sensitivity analysis to determine the variables that have greatest impact on the resulting net benefits. Variables shown to have a large effect on the resulting net benefits may deserve more attention and scrutiny than variables shown to have a small or minimal effect.

Figure 4 is a sensitivity analysis that identifies the key input variables whose uncertainty drives the largest impact on total costs for Alternative 2. These figures rank the variables based on their contribution to cost uncertainty using regression mapped values. This means that the dollar value on the bar for each variable represents the amount the output changes from the mean value (from the net results of the analysis) for each unit change of one standard deviation in the input variable. For example, if the mean value of the first variable, which represents the weighted industry labor rate for performing activities related to the NR GEIS, increased by one standard deviation, the net averted cost (7% NPV) would increase by approximately $1.05 million.

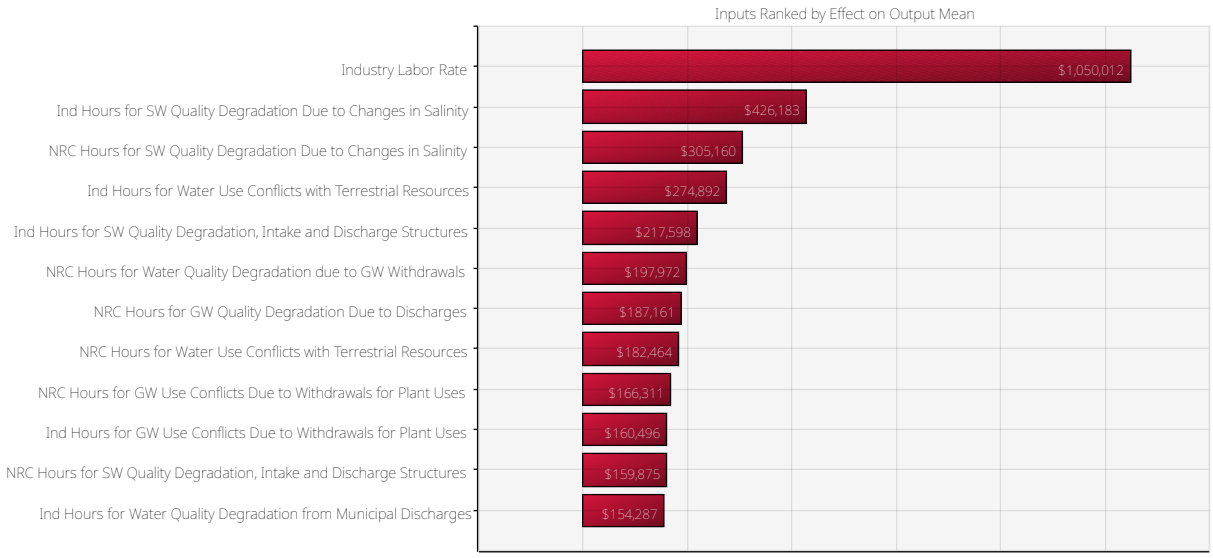

Figure 4 **Key Variables Whose Uncertainty Drives the Largest Cost Impact (7% NPV)**

Figure 4 shows that the input variables having the greatest cost impact on Alternative 3 are:

1. The weighted industry labor rate for performing activities related to the NR GEIS
2. The number of hours a licensee would spend analyzing surface water quality degradation due to changes in salinity
3. The number of hours the NRC would spend reviewing that analysis, and
4. The number of hours a licensee would spend analyzing water use conflicts the facility site may cause related to terrestrial resources

The other input variables shown have less impact on the results.

The estimated number of applications received during the analysis period has the greatest impact on the net results of this regulatory analysis, but due to the complexity of the model combined with analyzing applications on an annual basis, the @Risk software was not able to provide a sensitivity analysis output for total number of applications. The model was run separately, such that the sensitivity figure above showed expected applications in each year where there were a significant number of applications, but this added less useful information to the sensitivity figure by supplanting the most impactful Category 1 issues. However, running the model to include applications in each year as described above showed that variability in the number of applications has the largest effect on the net benefits when considered as a single input variable.

4. DECISION RATIONALE

Table 10 provides the quantified and qualified costs and benefits for Alternative 2 compared to Alternative 1. The quantitative analysis used best estimate values. The regulatory analysis attempted to use a realistic, perhaps even conservative, estimate of future applications. If there are more applications than assumed in the regulatory analysis, the averted costs (benefits) of the final rule will be higher than shown here.

Table 10 Summary of Analysis Results

Net Monetary Savings or (Costs) - Total Present Value	Nonquantified Benefits or (Costs)
Alternative 1: No-action **$0**	None
Alternative 2: Issue the NR GEIS, amend provisions of 10 CFR Part 51 related to the environmental review for new nuclear power plant licenses, and add Table C-1. Issue a revision to RG 4.2, and a draft interim staff guidance document, COL-ISG-030. In future years, consolidate guidance into NUREG-1555 and conduct the 10-year scoping review of the GEIS. **Industry (all provisions):** $17.06 million using 7% NPV $21.03 million using 3% NPV **NRC (all provisions):** $20.59 million using 7% NPV $26.04 million using 3% NPV **Net benefit (cost) (all provisions):** $37.65 million using 7% NPV $47.07 million using 3% NPV	Benefits: • **Improvements in Knowledge:** Incorporates revisions to 10 CFR Part 51, including Table C-1, which reflect the findings described in the NR GEIS. This will improve the quality of the information provided to the NRC by focusing on issues most relevant to specific applications and facilitating new nuclear reactor environmental reviews. • **Improvements in Regulatory Efficiency:** The NR GEIS and the issues and findings in Table C-1 will improve the clarity and efficiency of the regulatory provisions by reducing the cost to industry to prepare environmental reports for new nuclear reactor applications, and will permit the NRC to focus resources on project-specific issues of importance (i.e., project-specific analyses), which also reduces the cost to the NRC.

5. IMPLEMENTATION

This section identifies how and when the final action will be implemented and the impact on other requirements.

5.1. Schedule

The NRC assumes that the final rule would become effective 30 days after its publication in the *Federal Register* in 2026.

5.2. Impact on Other Requirements

None.

6. REFERENCES

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." TN250.

84 FR 62559. November 15, 2019. "Agency Action Regarding the Exploratory Process for the Development of an Advanced Nuclear Reactor Generic Environmental Impact Statement." *Federal Register*, Nuclear Regulatory Commission. TN6470.

85 FR 24040. April 30, 2020. "Notice To Conduct Scoping and Prepare an Advanced Nuclear Reactor Generic Environmental Impact Statement." *Federal Register*, Nuclear Regulatory Commission. TN6458.

Barrasso, J. and M. Braun. 2019. Letter to NRC, dated June 25, 2019, regarding "Request you Initiate a Process to Develop a Generic Environmental Impact Statement (GEIS) for the Construction and Operation of Advanced Nuclear Reactors." U.S. Senate, Washington, D.C. ADAMS Accession No. ML19176A444. TN6465.

BLS, 2024. "May 2024 National Industry Specific Occupational Employment and Wage Estimates;" NAICS 221100—Electric Power Generation, Transmission, and Distribution' and 221113—Nuclear Electric Power Generation, U.S. Department of Labor, April 2024, http://www.bls.gov/soc/home.htm, https://www.bls.gov/oes/tables.htm.

Endangered Species Act of 1973. 16 U.S.C. § 1531 et seq. TN1010.

National Environmental Policy Act of 1969 (NEPA), as amended. 42 U.S.C. § 4321 et seq. TN661.

National Historic Preservation Act. 54 U.S.C. § 300101 et seq. TN4157.

U.S. Nuclear Regulatory Commission (NRC). 2013. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* [GEIS]. NUREG-1437, Revision 1, Washington, D.C. ADAMS Package Accession No. ML13107A023. TN2654.

NRC, "Committee to Review Generic Requirements Procedures and Internal Administrative Process," June 2018 (ML17355A533).

NRC. 2018. *Preparation of Environmental Reports for Nuclear Power Stations*. Regulatory Guide 4.2, Revision 3, Washington, D.C. ADAMS Accession No. ML18071A400. TN6006.

NRC. 2019. Letter from K.L. Svinicki to Senator J.A. Barrasso, dated July 29, 2019, regarding "Response to Request that NRC Initiate a Process to Develop a Generic Environmental Impact Statement for the Construction and Operation of Advanced Nuclear Reactors." Washington, D.C. ADAMS Accession No. ML19192A267. TN6467.

NRC. 2020. Memorandum from A.L. Vietti-Cook to M.M. Doane, dated September 21, 2020, regarding Staff Requirements - SECY-20-0020 - Results of Exploratory Process for Developing a Generic Environmental Impact Statement for the Construction and Operation of Advanced Nuclear Reactors." SRM-SECY-20-0020, Washington, D.C. ADAMS Accession No. ML20265A112. TN6492.

NRC. 2020. *Policy Issue: Draft Final NUREG/BR-0058, Revision 5, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission*." SECY-20-0008, Washington, D.C. ADAMS Pkg. Accession No. ML19261A277. TN6806.

NRC. 2020. *Policy Issue: Results of Exploratory Process for Developing a Generic Environmental Impact Statement for the Construction and Operation of Advanced Nuclear Reactors*. SECY-20-0020, Washington, D.C. ADAMS Accession No. ML20052D175. TN6493.

NRC. 2020. *Summary of Public Scoping Meeting Conducted for the Advanced Reactor Generic Environmental Impact Statement, May 28, 2020*. Washington, D.C. ADAMS Package Accession No. ML20161A339. TN6459.

NRC. 2021. *Rulemaking Issue Notation Vote: Proposed Rule: Advanced Nuclear Reactor Generic Environmental Impact Statement (RIN 3150-AK55; NRC-2020-0101)*. SECY-21-0098, Washington, D.C. ADAMS Accession No. ML21222A044. TN10127.

NRC. 2024. Memorandum from C.M. Safford, Secretary, to R.V. Furstenau, Acting Director for Operations, dated April 17, 2024, regarding "Staff Requirements – SECY-21-0098 – Proposed Rule: Advanced Nuclear Reactor Generic Environmental Impact Statement (RIN 3150-AK55; NRC 2020 0101)." Washington, D.C. ADAMS Accession No. ML24108A199. TN10164.

NRC. 2026. COL-ISG-030, Environmental Considerations for New Nuclear Reactor Applications that Reference the Generic Environmental Impact Statement for Licensing of New Nuclear Reactors (NUREG-2249). Washington, D.C. ADAMS Accession No. ML25043A341. TN11922.

NRC. 2026. *Generic Environmental Impact Statement for Licensing of New Nuclear Reactors*. NUREG-2249, Washington, D.C. ADAMS Accession No. ML25324A130. TN12155.

NRC. 2026. Regulatory Guide 4.2, Revision 4, Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications. Washington, D.C. ADAMS Accession No. ML25043A345. TN11915.

National Reactor Innovation Center. 2021. *Advanced Nuclear Reactor Plant Parameter Envelope and Guidance*. NRIC-21-ENG-0001, Washington, D.C. ADAMS Accession No. ML21145A416. TN6940.

Nuclear Energy Innovation Capabilities Act of 2017. Public Law 115–248. 132 Stat. 3160. TN6468.

Nuclear Energy Innovation and Modernization Act. Public Law 115-439. 132 Stat. 5565. TN6469.

APPENDIX A
REGULATORY ANALYSIS INPUT VARIABLES

This appendix presents all of the input variables and input data used in the regulatory analysis, including the uncertainty and sensitivity analyses that rely upon the three-point estimates generated for each input variable, where practical. The substantial majority of impacts attributable to the final rule derive from the reduction in industry and U.S. Nuclear Regulatory Commission (NRC) environmental review effort required to satisfy National Environmental Policy Act (NEPA) reporting requirements for new nuclear reactor licensing actions. This reduction in effort enabled by the use of the Generic Environmental Impact Statement (GEIS) to provide generic impact estimates across 100 Category 1 issues leads to substantial savings over current practice and represents a quantifiable benefit.

The analysis of savings relies upon several assumptions about how the final rule will be utilized by industry, including the number and timing of applications expected to be submitted to the NRC under the rule during the first 10 years after the rule is finalized (i.e., the operational period of the regulatory analysis, 2026–2036). The NRC assumes that 45 applications will be submitted for new nuclear reactor projects with multiple applications submitted soon after the implementation of the final rule. These assumptions are judged to form the most likely evolution of impacts of the final rule and the detailed results presented in this appendix reflect that assumption. The sooner in the operational period of the rule that industry utilizes its provisions and submits a new nuclear reactor licensing application, the larger the financial effects (net benefits) would be. Table A-11 below shows the expected number of applications in each year of the analysis period, along with several other fundamental input variables such as blended labor rates, discount rates, future GEIS implementation costs, and important years referenced in the analysis. Table A-12 shows the aggregate labor rate categories used in the analysis, and Table A-13 shows the individual labor categories and rates from Bureau of Labor Statistics (BLS) that constitute the aggregate labor rate categories.

The final rule creates 100 Category 1 issues for which generic impact analysis can be utilized by industry and NRC staff. As the size and complexity of the expected new nuclear reactor applications are not known at the time of this analysis, the NRC staff assumes that the most likely case would be for applications taking full advantage of the final rule and invoking a generic analysis for all Category 1 issues that apply to the particular characteristics of the reactor and site. Section 3.9 illustrates potential results if a distribution of applications using various numbers of Category 1 issues might occur, along with variations in the other input variables such as the hours saved on each issue. Table A-14 lists all Category 1 issues, along with the three-point estimates and mean estimates for reductions in NRC/Contractor and Industry labor hours achieved by the issuance of the GEIS. These reductions in labor hours for the Category 1 issues generate the vast majority of the averted costs of the final rule, shown in the Industry Operation and NRC Operation sections of this regulatory analysis. The cost model calculated averted costs for each issue separately, across all the years of the analysis period, and then rolled up those costs into the tables in the aforementioned sections.

The input variables below were based on the following assumptions (Section 3.3 provides more detailed discussion):

- Labor Rates: The NRC labor rate was assumed to be the average between the NRC labor rate of $144 per hour and the NRC contractor labor rate of $225 per hour, which equates to $191 per hour. The industry labor rate is a blended rate of several weighted occupational series labor rates from 2024 U.S. BLS data.

- Hours per Application: For each Category 1 issue, the NRC staff estimated the hours saved by utilizing the generic impact analysis findings in the new reactor generic environmental impact statement (NR GEIS). These impacts are a one-time realization of submission and review effort savings per application received when the application is generated by an applicant/licensee and accepted by NRC, and when the application review is completed by NRC staff and NRC contractor staff and the licensing decision is rendered by the Commission.
- Applications per Year: As discussed above and in Section 2.4, this represents the NRC's assumed number of new nuclear reactor applications utilizing the provisions of the proposed rule, where an application represents an analysis of all 100 Category 1 issues. Therefore, as previously discussed, the total number of applications in Table A-11 do not sum to 45 because of the different numbers of issues that would actually be addressed in the different types of applications for different reactor site characteristics. Thus, each of the numbers in Table A-1 represent a weighted average for all of the application types that takes into account the percentage of Category 1 issues that pertain to each type of application and an average of the amount of time in each of the different cases discussed in Section 3.9.1 that are devoted to the resolution of Category 1 issues. For the same reason, the amount of applications per year are not whole numbers in this table.[7]

Table A-11 Key Input Variables

Description	Mean/ Value	Distribution	Low	Best	High
NR Applications in 2026	5.9				
NR Applications in 2027	2.6				
NR Applications in 2028	2.3				
NR Applications in 2029	1.2				
NR Applications in 2030	0				
NR Applications in 2031	4				
NR Applications in 2032	0.3				
NR Applications in 2033	1.9				
NR Applications in 2034	1.8				
NR Applications in 2035	2.8				
NR Applications in 2036	1.2				
Per-Applicant Cost to Implement GEIS	$25,000				
NRC Cost to Update NUREG-1555	$44,080				
10 Year GEIS Review Cost	$705,280				
Base Year	2024				
Rule Issuance Year	2026				

[7]In Section 3.1, the NRC staff documents the number of applications that it expects will incur implementation costs. Two-part applications (i.e., CPs and OLs) were counted as single entities and costs were only incurred at the CP phase, which captures how the NRC expects those costs to be incurred. For this calculation, CPs and OLs are separate entities because the estimates are used to calculate the content of the applications devoted to Category 1 issues. Because OLs typically trail CPs, this creates the appearance of a mismatch between the number of applications shown in this table and the number in Section 3.1 (i.e., OL applications will be captured in separate years than their respective CP applications, with some being submitted after 2036 and thus falling outside the bounds of this analysis).

Description	Mean/ Value	Distribution	Low	Best	High
Principal Discount Rate	7%				
Alternative Discount Rate	3%				
NRC Hourly Rate	$144				
PNNL Hourly Rate	$225				
Industry Hourly Rate	$134.07	PERT	$110.74	$135.09	$153.31

Table A-12 Aggregate Labor Categories

Labor Category*	Labor Multiplier	2024 Dollars		
		BLS Burdened Hourly Mean Wage	BLS Burdened Hourly 25th Percentile Wage	BLS Burdened Hourly 75th Percentile Wage
Executive	2.4	$292.45	$198.19	$368.46
Managers	2.4	$198.44	$164.83	$215.98
Technical Staff	2.4	$128.70	$106.30	$144.80
Administrative Staff	2.4	$108.62	$87.76	$124.57
Licensing Staff	2.4	$177.79	$139.93	$214.58
Physicist	2.4	$139.27	$120.24	$150.82
Nuclear Engineers	2.4	$158.69	$130.32	$183.79
Nuclear Technicians	2.4	$125.90	$118.63	$137.66

*These labor categories consist of combinations of the individual occupations below, which were taken from BLS data.

Table A-13 BLS Labor Rates

Occupation (Standard Occupational Classification Code)	Hourly Mean Wage	Hourly 25th Percentile Wage	Hourly 75th Percentile Wage
Nuclear Electric Power Generation (NAICS code 221113)			
Top Executives (11-1000)	$90.98	$66.92	$99.83
General and Operations Managers (11-1021)	$88.92	$66.79	$99.63
Industrial Production Managers (11-3051)	$94.41	$80.65	$104.61
Nuclear Engineers (17-2161)	$66.12	$54.30	$76.58
Life, Physical, and Social Science Occupations (19-0000)	$53.13	$49.43	$58.04
Physical Scientists (19-2000)	$58.03	$50.10	$62.84
Environmental Scientists and Geoscientists (19-2040)	$58.73	$48.65	$65.24
Nuclear Technicians (19-4051)	$52.46	$49.43	$57.36
Office and Administrative Support Occupations (43-0000)	$39.20	$29.46	$47.49
First-Line Supervisors of Office and Administrative Support Workers (43-1011)	$62.77	$51.55	$71.49
Office Clerks, General (43-9061)	$33.81	$28.69	$36.73
First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)	$68.13	$60.07	$73.28
Industrial Machinery Mechanics (49-9041)	$55.17	$51.48	$61.10
First-Line Supervisors of Production and Operating Workers (51-1011)	$79.28	$67.21	$82.45
Nuclear Power Reactor Operators (51-8011)	$59.37	$51.52	$62.91
Electric Power Generation, Transmission and Distribution (NAICS code 221100)			
Chief Executives (11-1011)	$152.73	$98.24	$207.22
Lawyers (23-1011)	$104.75	$80.44	$129.06
Paralegals and Legal Assistants (23-2011)	$43.41	$36.17	$49.76
Architectural, Engineering, and Related Services (NAICS code 541300)			
Biological Scientists (19-1020)	$36.52	$24.79	$41.47

*Source: BLS, 2024.

Table A-14 GEIS Category 1 Issues and Averted Hours

Category/Entity	Mean Value	Low	Best	High
Cat1 Construction – Onsite land use during construction				
NRC and NRC Contractor	141.2	82	82	437
Industry	47.7	23	26	159
Cat1 Construction – Offsite land use during construction				
NRC and NRC Contractor	144	96	135	228
Industry	204.7	112	184	380
Cat1 Construction - Impacts on prime and unique farmland				
NRC and NRC Contractor	23.8	10	23	41
Industry	28.8	9	25	64
Cat1 Construction - Coastal zone and compliance with the Coastal Zone Management Act for facilities located with a designated coastal zone				
NRC and NRC Contractor	10.3	7	9	19
Industry	16.3	9	14	33
Cat1 Operations – Onsite land use during operation				
NRC and NRC Contractor	28	24	24	48
Industry	3.8	3	3	8
Cat1 Operations – Offsite land use during operation				
NRC and NRC Contractor	31.8	22	28	57
Industry	30	16	25	64
Cat1 Construction - Visual impacts in site and vicinity				
NRC and NRC Contractor	27	27	27	27
Industry	10.8	9	11	12
Cat1 Construction - Visual impacts from transmission lines				
NRC and NRC Contractor	9	9	9	9
Industry	10.8	9	11	12
Cat1 Operations - Visual impacts in site and vicinity				
NRC and NRC Contractor	19.7	18	20	20
Industry	22.5	18	23	25
Cat1 Construction - Emissions of criteria pollutants and dust during construction				
NRC and NRC Contractor	162.2	154	154	203
Industry	34.8	28	33	49

Category/Entity	Mean Value	Low	Best	High
Cat1 Construction - Greenhouse gas emissions during construction				
NRC and NRC Contractor	160.8	134	134	295
Industry	94	66	76	194
Cat1 Operations - Emissions of criteria pollutants during operation				
NRC and NRC Contractor	165.8	163	163	180
Industry	50.5	42	50	61
Cat1 Operations - Greenhouse gas emissions during operation				
NRC and NRC Contractor	107.5	79	88	214
Industry	62.7	38	48	146
Cat1 Operations - Cooling system emissions				
NRC and NRC Contractor	21.5	18	18	39
Industry	13	9	11	25
Cat1 Operations - Emissions of ozone and NOx during transmission line operation				
NRC and NRC Contractor	17.5	15	15	30
Industry	6.8	5	6	12
Cat1 Construction - Surface water use conflicts during construction				
NRC and NRC Contractor	60.2	30	60	91
Industry	21.2	7	17	52
Cat1 Construction - Water quality degradation due to construction-related discharges				
NRC and NRC Contractor	62.2	31	62	94
Industry	21.2	7	17	52
Cat1 Construction - Water quality degradation due to inadvertent spills during construction				
NRC and NRC Contractor	25.3	12	24	44
Industry	21.2	7	17	52
Cat1 Construction - Groundwater use conflicts due to excavation dewatering				
NRC and NRC Contractor	172.8	123	123	422
Industry	171.2	100	117	459
Cat1 Construction - Groundwater use conflicts due to construction-related groundwater withdrawals				
NRC and NRC Contractor	161.5	115	115	394
Industry	142.5	84	97	383

Category/Entity	Mean Value	Low	Best	High
Cat1 Construction - Water quality degradation due to groundwater withdrawals				
NRC and NRC Contractor	101.5	73	73	244
Industry	57.2	34	39	153
Cat1 Construction - Water quality degradation due to offshore or in-water construction activities				
NRC and NRC Contractor	62.5	27	56	124
Industry	83.5	28	67	205
Cat1 Construction - Water use conflict due to plant municipal water demand				
NRC and NRC Contractor	56	24	49	116
Industry	83.5	28	67	205
Cat1 Construction - Degradation of water quality from plant effluent discharges to municipal systems				
NRC and NRC Contractor	113.2	47	97	244
Industry	187.2	62	150	461
Cat1 Operations - Surface water use conflicts during operation due to water withdrawal from flowing waterbodies				
NRC and NRC Contractor	156.2	34	152	295
Industry	144.5	22	109	409
Cat1 Operations - Surface water use conflicts during operation due to water withdrawal from non-flowing waterbodies				
NRC and NRC Contractor	145	69	113	349
Industry	63.8	22	39	205
Cat1 Operations - Groundwater use conflicts due to building foundation dewatering				
NRC and NRC Contractor	76.3	20	57	210
Industry	59.2	9	29	230
Cat1 Operations - Groundwater use conflicts due to groundwater withdrawals for plant uses				
NRC and NRC Contractor	144.5	23	124	348
Industry	116	9	57	459
Cat1 Operations - Surface water quality degradation due to physical effects from operation of intake and discharge structures				
NRC and NRC Contractor	122.5	20	95	335
Industry	183.8	22	117	613
Cat1 Operations - Surface water quality degradation due to changes in salinity gradients resulting from withdrawals				
NRC and NRC Contractor	225.2	40	158	679
Industry	340.7	42	194	1,226

Category/Entity	Mean Value	Low	Best	High
Cat1 Operations - Groundwater quality degradation due to plant discharges				
NRC and NRC Contractor	149.7	50	97	460
Industry	118.7	25	57	459
Cat1 Operations - Water quality degradation due to inadvertent spills and leaks during operation				
NRC and NRC Contractor	32.3	17	22	89
Industry	26.3	11	16	83
Cat1 Operations - Degradation of water quality from plant effluent discharges to municipal systems				
NRC and NRC Contractor	37.8	20	26	103
Industry	26.3	11	16	83
Cat1 Operations - Water quality degradation due to groundwater withdrawals				
NRC and NRC Contractor	154	28	116	432
Industry	106.7	9	43	459
Cat1 Operations - Water use conflict from plant municipal water demand				
NRC and NRC Contractor	29.2	20	26	51
Industry	19.5	11	16	42
Cat1 Construction - Permanent and temporary loss, conversion, fragmentation, and degradation of habitats				
NRC and NRC Contractor	123.3	46	133	162
Industry	161.8	49	168	250
Cat1 Construction - Permanent and temporary loss and degradation of wetlands				
NRC and NRC Contractor	120.7	35	133	157
Industry	158.2	37	168	240
Cat1 Construction - Effects of construction noise on wildlife				
NRC and NRC Contractor	37.7	21	41	41
Industry	55.5	25	60	68
Cat1 Construction - Bird collisions and injury from structures and transmission lines				
NRC and NRC Contractor	36.7	20	40	40
Industry	55.5	25	60	68
cat1 construction - effects of vehicular collisions on wildlife				
NRC and NRC Contractor	33.5	21	36	36
Industry	47.2	25	50	58

Category/Entity	Mean Value	Low	Best	High
Cat1 Construction - Important species and habitats – Other important species and habitats				
NRC and NRC Contractor	62.8	25	70	72
Industry	76.8	25	84	100
Cat1 Operations - Permanent and temporary loss or disturbance of habitats				
NRC and NRC Contractor	20.5	7	13	64
Industry	33.7	9	19	117
Cat1 Operations - Effects of operational noise on wildlife				
NRC and NRC Contractor	11.8	7	8	32
Industry	16.5	7	11	48
Cat1 Operations - Effects of vehicular collisions on wildlife				
NRC and NRC Contractor	7.7	4	7	14
Industry	10.8	5	9	24
Cat1 Construction - Exposure of terrestrial organisms to radionuclides				
Cat1 Operations - Exposure of aquatic organisms to radionuclides				
NRC and NRC Contractor	28	28	28	28
Industry	38	33	38	43
Cat1 Operations - Occupational doses to workers				
NRC and NRC Contractor	62	62	62	62
Industry	38	33	38	43
Cat1 Operations - Maximally exposed individual annual doses				
NRC and NRC Contractor	53	53	53	53
Industry	38	33	38	43
Cat1 Operations - Cooling tower operational impacts on vegetation				
NRC and NRC Contractor	37.2	24	30	79
Industry	48.3	25	37	117
Cat1 Operations - Bird collisions and injury from structures and transmission lines				
Cat1 Operations - Bird electrocutions from transmission lines				
NRC and NRC Contractor	15.2	11	13	28
Industry	23	14	19	48

Category/Entity	Mean Value	Low	Best	High
Cat1 Operations -Water use conflicts with terrestrial resources				
NRC and NRC Contractor	105	13	50	417
Industry	194.2	17	83	816
Cat1 Operations - Effects of transmission line ROW management on terrestrial resources				
NRC and NRC Contractor	20.3	17	18	33
Industry	26.3	18	23	48
Cat1 Operations -Effects of electromagnetic fields on flora and fauna				
NRC and NRC Contractor	6.3	2	5	16
Industry	7	2	4	24
Cat1 Operations - Important species and habitats – Other important species and habitats				
NRC and NRC Contractor	47	17	30	145
Industry	66.3	17	37	233
Cat1 Construction - Runoff and sedimentation from construction areas				
NRC and NRC Contractor	116.7	80	124	124
Industry	121.3	70	128	146
Cat1 Construction - Building transmission lines, pipelines, and access roads across surface waterbodies				
NRC and NRC Contractor	98.8	68	105	105
Industry	121.3	70	128	146
Cat1 Construction - Dredging and filling aquatic habitats to build intake and discharge structures				
NRC and NRC Contractor	121.2	79	123	156
Industry	132.3	70	128	212
Cat1 Operations - Important species and habitats – Other important species and habitats				
NRC and NRC Contractor	163.8	111	172	184
Industry	125.3	70	128	170
Cat1 Operations - Stormwater runoff				
NRC and NRC Contractor	26.7	12	28	36
Industry	21.2	7	20	40
Cat1 Operations - Effects of refurbishment on aquatic biota				
NRC and NRC Contractor	28.7	12	28	48
Industry	24.3	7	20	59

Category/Entity	Mean Value	Low	Best	High
Cat1 Operations - Effects of maintenance dredging on aquatic biota				
NRC and NRC Contractor	72.2	30	72	115
Industry	103.3	35	97	197
Cat1 Operations - Impacts of transmission line ROW management on aquatic resources				
NRC and NRC Contractor	43.5	19	44	66
Industry	51.5	18	48	99
Cat1 Operations - Water use conflicts with aquatic resources				
NRC and NRC Contractor	56.2	25	58	80
Industry	51.5	18	48	99
Cat1 Operations - Impingement and entrainment of aquatic organisms				
NRC and NRC Contractor	114.7	48	115	180
Industry	154.8	53	145	296
Cat1 Operations - Important species and habitats – Other Important Species and Habitats				
NRC and NRC Contractor	131	60	142	158
Industry	138.3	53	145	197
Cat1 Construction - Radiological dose to construction workers				
NRC and NRC Contractor	97	97	97	97
Industry	116.8	100	117	133
Cat1 Operations - Total population annual doses				
NRC and NRC Contractor	64	64	64	64
Industry	42	36	42	48
Cat1 Operations - Nonhuman biota doses				
NRC and NRC Contractor	36	36	36	36
Industry	42	36	42	48
Cat1 Construction - Building impacts of chemical, biological, and physical nonradiological hazards				
NRC and NRC Contractor	50.5	28	44	99
Industry	64.7	28	52	152
Cat1 Operations - Operation impacts of chemical, biological, and physical nonradiological hazards				
NRC and NRC Contractor	30.3	10	23	80
Industry	50.8	13	35	152

Category/Entity	Mean Value	Low	Best	High
Cat1 Construction - Construction-related noise				
NRC and NRC Contractor	22	16	17	48
Industry	30.5	17	23	74
Cat1 Operations - Operation-related noise				
NRC and NRC Contractor	14.5	6	10	41
Industry	22.8	7	14	74
Cat1 Operations - Low-level radioactive waste				
NRC and PNNL	145	145	145	145
Industry	232	199	232	265
Cat1 Operations - Onsite spent nuclear fuel management				
NRC and NRC Contractor	176	176	176	176
Industry	232	199	232	265
Cat1 Operations - Mixed waste				
NRC and NRC Contractor	136	136	136	136
Industry	232	199	232	265
Cat1 Construction - Construction nonradiological waste				
NRC and NRC Contractor	34	29	34	39
Industry	38.8	28	38	53
Cat1 Operations - Operation nonradiological waste				
NRC and NRC Contractor	18.3	11	17	31
Industry	27.7	13	25	53
Cat1 Operations – Design basis accidents involving radiological releases				
NRC and NRC Contractor	120	120	120	120
Industry	171.8	147	172	196
Cat1 Operations - Accidents involving releases of hazardous chemicals				
NRC and NRC Contractor	77	77	77	77
Industry	103.2	89	103	118
Cat1 Operations - Severe accidents and severe accident mitigation alternatives				
NRC and NRC Contractor	356.7	305	367	367
Industry	405	297	415	473

Category/Entity	Mean Value	Low	Best	High
Cat1 Operations - Acts of terrorism				
NRC and NRC Contractor	57	57	57	57
Industry	68.8	59	69	78
Cat1 Construction - Community services and infrastructure				
NRC and NRC Contractor	51.7	25	44	109
Industry	90.5	36	74	211
Cat1 Construction - Economic Impacts				
NRC and NRC Contractor	51	25	43	109
Industry	90.5	36	74	211
Cat1 Construction - Transportation Systems and Traffic				
NRC and NRC Contractor	82	25	89	111
Industry	139.2	36	147	211
Cat1 Construction - Tax Revenue Impacts				
NRC and NRC Contractor	28.2	25	25	44
Industry	48	36	42	84
Cat1 Operations - Community Services and Infrastructure				
Cat1 Operations - Economic Impacts				
NRC and NRC Contractor	35.3	11	29	85
Industry	64	16	50	168
Cat1 Operations - Transportation Systems and Traffic				
NRC and NRC Contractor	18.2	6	15	43
Industry	32.2	9	25	84
Cat1 Operations - Tax Revenue Impacts				
NRC and NRC Contractor	69.7	20	57	170
Industry	126.7	31	98	337
Cat1 Operations - Uranium Recovery				
Cat1 Operations - Uranium Conversion				
NRC and NRC Contractor	26	26	26	26
Industry	39.2	34	39	45

Category/Entity	Mean Value	Low	Best	High
Cat1 Operations - Uranium Enrichment				
NRC and NRC Contractor	32	32	32	32
Industry	39.2	34	39	45
Cat1 Operations - Reprocessing				
NRC and NRC Contractor	27	27	27	27
Industry	39.2	34	39	45
Cat1 Operations - Fuel fabrication(a)				
Cat1 Operations - Storage and Disposal of Radiological Wastes				
NRC and NRC Contractor	37	37	37	37
Industry	39.2	34	39	45
Cat1 Operations - Transportation of unirradiated NR fuel				
NRC and NRC Contractor	53.8	38	57	57
Industry	74.3	45	78	89
Cat1 Operations - Transportation of radioactive waste from NRs				
NRC and NRC Contractor	63.2	38	57	113
Industry	91.5	45	78	192
Cat1 Operations - Transportation of spent nuclear fuel from NRs				
NRC and NRC Contractor	172	79	181	229
Industry	158.8	59	155	274
Decommissioning (Construction)				
NRC and NRC Contractor	95	95	95	95
Industry	81.2	70	81	93