

Draft Regulatory Analysis for Decommissioning Financial Assurance for Sealed and Unsealed Radioactive Materials Proposed Rule

NRC Docket ID NRC-2017-0031 / RIN Number 3150-AK52

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Division of Rulemaking, Environmental, and Financial Support

Enter date when ready to issue, 2023



[Page intentionally left blank.]

ABSTRACT

This document presents a regulatory analysis of the proposed rule, “Decommissioning Financial Assurance for Sealed and Unsealed Radioactive Materials.” The rulemaking would amend the table in Appendix B to Part 30, which is used by the U.S. Nuclear Regulatory Commission (NRC) when assessing decommissioning funding requirements for radioactive material, based on the relative risk to public health and safety. The potentially affected licensees are those authorized to possess byproduct and special nuclear material.

[Page intentionally left blank.]

Contents

ABSTRACT	iii
LIST OF FIGURES	vii
LIST OF TABLES	vii
EXECUTIVE SUMMARY	ix
1.0 INTRODUCTION	1
2.0 BACKGROUND, STATEMENT OF THE PROBLEM, AND OBJECTIVE	1
2.1 Background	1
2.2 Statement of the Problem	4
2.3 Objectives	5
3 IDENTIFICATION AND ANALYSIS OF ALTERNATIVES	5
4 EVALUATION OF BENEFITS AND COSTS	7
4.1 Identification of Affected Attributes.....	7
4.2 Analytical Methodology	8
4.2.1 Regulatory Baseline.....	8
4.2.2 Affected Entities.....	8
4.2.3 Base Year.....	9
4.2.4 Discount Rates	9
4.2.5 Cost/Benefit Inflaters	10
4.2.6 Labor Rates	10
4.2.7 Sign Conventions.....	11
4.2.8 Analysis Horizon	11
4.2.9 Cost Estimation.....	11
4.3 Data.....	12
5 RESULTS	13
5.1 Cost Impact Considerations	13
5.2 NRC Implementation.....	13
5.3 NRC Operation.....	13
5.4 Industry Operations.....	13
5.5 Agreement State Operation	15
5.6 Totals	15
5.7 Uncertainty Analysis.....	16
5.7.1 Uncertainty Analysis Assumptions.....	16
5.7.2 Uncertainty Analysis Results	16
5.7.3 Sensitivity Analysis	17
5.8 Safety Goal Evaluation.....	19
5.9 Disaggregation	19

5.10	Summary.....	19
	5.10.1 Quantified Net Benefit.....	20
	5.10.2 Unquantified Benefits.....	20
	5.10.3 Regulatory Efficiency.....	20
	5.10.4 Increased Public Confidence.....	20
6	DECISION RATIONALE.....	21
7	INITIAL REGULATORY FLEXIBILITY ANALYSIS.....	22
7.1	Defining “Small Entities” Affected by the Rule.....	23
7.2	Measuring “Significant Impacts”.....	24
7.3	Steps Taken to Mitigate Economic Impacts on Small Entities.....	24
8	CUMULATIVE EFFECTS OF REGULATION.....	24
9	IMPLEMENTATION.....	24
10	REFERENCES.....	24
Appendix A	Summary and Tables of Costs for Each Alternative by NRC, Agreement States, and Industry.....	1
Appendix B	Analysis Input Variables.....	1
Appendix C	Quantities of Licensed Material Used to Assess Financial Assurance for Decommissioning (Proposed Updated Table).....	1
Appendix D	Position Titles and Occupations.....	1
Appendix E	Labor Categories Rates Converted to 2023 Dollars.....	1

LIST OF FIGURES

Figure 1	Total Net Benefit (7-Percent NPV).....	17
Figure 2	Key Variables Whose Uncertainty Drives the Largest Impact on Costs (7-Percent Net Present Value)	18

LIST OF TABLES

Table ES-1	Total Benefits (Costs) of Proposed Rule.....	x
Table 1	Advantages and Disadvantages of Alternative 2	6
Table 3	Impacted Licensees	14
Table 4	Total Net Costs and Benefits	15
Table 5	Uncertainty Results Descriptive Statistics—7-Percent NPV	17
Table 6	Disaggregation.....	19
Table 7	Summary of Totals.....	21
Table A-1	NRC Implementation Costs	A-1
Table A-2	NRC Costs (Review of Licensees’ Submittal of Modified DFP/DFA).....	A-1
Table A-3	NRC Averted Costs (Reviewing Licensee Submittal)	A-2
Table A-4	Industry Averted Costs (Licensees No Longer Required to Submit Exemption Requests)	A-3
Table A-5	Licensees Required to Revise Decommissioning Funding Plans or Financial Assurance Funding—Industry	A-4
Table A-6	Licensees Decreasing Decommissioning Funding Plans or Financial Assurance Funding—Industry	A-4
Table A-7	Financial Assurance Mechanism: (Annual Cost of Bank Servicing the Instrument—Surety Bond) Savings—Industry	A-4
Table A-8	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument—Surety Bond)—Industry.....	A-5
Table A-9	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings—Industry	A-6
Table A-10	Financial Assurance Mechanism: (Annual Servicing the Letter of Credit) Cost—Industry	A-7
Table A-11	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings—Industry.....	A-8
Table A-12	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost—Industry	A-9
Table A-13	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost—Industry	A-10
Table A-14	Agreement States Implementation Cost to Complete Rulemakings to Incorporate Compatible Regulations	A-10
Table A-15	Agreement States Averted Costs (Reviewing Exemption Requests Submittal).....	A-11
Table A-16	Agreement States Review of Licensees New or Revised Decommissioning Funding Plans or Financial Assurance Funding	A-11

ABBREVIATIONS AND ACRONYMS

AEA	Atomic Energy Act of 1954, as amended
ALI	annual limit on intake
BLS	Bureau of Labor Statistics
CFR	<i>Code of Federal Regulations</i>
CPI-U	Consumer price index for all urban consumers
DAC	derived air concentration
DFA	decommissioning financial assurance
DFF	decommissioning funding plan
EPAct	Energy Policy Act of 2005
FA	financial assurance
FR	<i>Federal Register</i>
ICRP	International Commission on Radiological Protection
μCi	microcurie
mCi	millicurie
NARM	naturally occurring and accelerator-produced radioactive material
NPV	net present value
NRC	U.S. Nuclear Regulatory Commission
OEWS	Occupational Employment and Wage Statistics
OMB	U.S. Office of Management and Budget
PERT	program evaluation and review technique
RFA	Regulatory Flexibility Act
SECY	Office of the Secretary of the Commission
SOC	Standard Occupational Classification
SRM	staff requirements memorandum
WBL	Web-based licensing

EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) is amending its regulations for decommissioning financial assurance (DFA) for sealed and unsealed radioactive materials. The NRC would revise the current table in Appendix B to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 30, “Rules of General Applicability to Domestic Licensing of Byproduct Material,” using the radionuclides and quantities from Appendix C to 10 CFR Part 20, “Standards of Protection Against Radiation.” The changes would add radionuclides not currently named in Appendix B to 10 CFR Part 30. These include radionuclides associated with industrial technologies and current and emerging medical uses. In addition, the NRC would remove all radionuclides with a half-life of 120 days or less from the appendix since these radionuclides are not considered when developing DFA. The default values would be set to equal the lowest values of the listed radionuclides: 0.001 μCi (microcurie) for alpha-emitting radionuclides (e.g., U-235) and 0.01 μCi for the most restricted non-alpha-emitting radionuclides (e.g., Pb-210). These changes provide an updated table for use when calculating DFA in accordance with 10 CFR 30.35(d) and 70.25(d) of 10 CFR Part 70, “Domestic Licensing of Special Nuclear Material.” In addition, the title of the table in Appendix B to 10 CFR Part 30 would be changed to “Quantities of Licensed Material Used to Assess Financial Assurance for Decommissioning” to reflect its current use for DFA as opposed to labeling. These changes would result in an up-to-date table with more risk-informed values for use by licensees, the NRC, and the Agreement States when assessing DFA.

This rulemaking would revise NRC’s decommissioning funding requirements for radioactive material based on the relative risk to public health and safety from different radioisotopes, including naturally occurring and accelerator-produced radioactive material (NARM). The potentially affected licensees are those authorized to possess byproduct and special nuclear material. The NRC’s goals in amending these regulations are to support the principles of good regulation, including openness, clarity, and reliability.

Costs and Benefits

This regulatory analysis measures the incremental costs of the proposed rule relative to a “baseline” that reflects anticipated behavior if the NRC undertakes no additional regulatory action (Alternative 1, the “no action” alternative). The analysis quantifies the costs and benefits to the NRC, industry, and Agreement States for implementation and operations, as summarized in Table ES-1. The implementation cost captures the industry startup cost and the NRC rulemaking cost. The Agreement States are required to adopt NRC’s regulations in order to remain compatible with the NRC’s program. The operations cost captures the reporting and recordkeeping costs incurred during the first reporting period after rule promulgation. The analysis quantifies benefits and costs associated with the requirements for financial reporting and recordkeeping accrued to those licensees that relied on bond ratings issued by credit rating agencies for their financial guarantee.

The analysis resulted in the following key findings:

- **Costs and Benefits to the NRC.** The rule would result in estimated incremental NRC implementation costs of (\$236,000). The rule would also result in NRC one-time costs of (\$63,000) for review of licensees new or revised decommissioning funding plans or financial assurance funding. Also present are NRC averted costs for not performing

eliminated reviews of \$97,000. This results in net costs to the NRC of approximately (\$202,000) using a 7-percent net present value (NPV).

- Costs and Benefits to the Industry.** The rule would result in estimated incremental industry implementation and operations net averted costs of approximately \$993,000 using a 7-percent net present value (NPV). This is comprised of industry costs of (\$1,388,000), industry averted costs of \$406,000, and industry benefits from the ability to select different financial assurance mechanisms of \$1,975,000.
- Costs and Benefits to the Agreement States.** The rule would result in estimated incremental implementation and operations net averted costs to the Agreement States of approximately \$22,000. This is comprised of Agreement States implementation costs to complete rulemaking to incorporate compatible regulations of (\$134,000) using a 7-percent NPV. Also present is a net averted cost of \$484,000 using a 7-percent NPV for not having to review exemption request submittals. In addition, there is a cost of (\$596,000) using a 7-percent NPV for review of new or revised decommissioning funding plans or financial assurance funding.
- Total Costs and Benefits.** The rule would result in total net averted costs of approximately \$813,000 using a 7-percent NPV, making the overall proposed rule cost beneficial.

Table ES-1 Total Benefits (Costs) of Proposed Rule

DESCRIPTION	Net Benefits (Costs) in 2023 Dollars		
	Undiscounted	7% NPV	3% NPV
Alternative 1 – Status Quo (No Action Taken)	\$0	\$0	\$0
Alternative 2 – Update the List of Radionuclides and the Values in Appendix B to Part 30 Table (NRC Selected)			
NRC Implementation	(\$250,000)	(\$236,000)	(\$244,000)
Alternative 2 NRC Cost	(\$114,000)	(\$63,000)	(\$87,000)
Alternative 2 NRC Averted Cost	\$176,000	\$97,000	\$133,000
<i>NRC Total</i>	<i>(\$188,000)</i>	<i>(\$202,000)</i>	<i>(\$198,000)</i>
Alternative 2 Industry Cost	(\$1,698,000)	(\$1,388,000)	(\$1,554,000)
Alternative 2 Industry Averted Cost	\$568,000	\$406,000	\$485,000
Alternative 2 – Industry Financial Assurty Mechanisms Averted Costs	\$3,580,000	\$1,975,000	\$2,729,000
<i>Industry Total</i>	<i>\$2,450,000</i>	<i>\$993,000</i>	<i>\$1,660,000</i>
Alternative 2 Agreement States Cost	(\$729,000)	(\$596,000)	(\$667,000)
Alternative 2 Agreement States Averted Cost	\$1,038,000	\$618,000	\$816,000
<i>Agreement States Total</i>	<i>\$309,000</i>	<i>\$22,000</i>	<i>\$149,000</i>
Alternative 2 Total Net Benefits (Cost)	\$2,571,000	\$813,000	\$1,611,000

1.0 INTRODUCTION

The NRC is proposing to amend its regulations for decommissioning financial assurance for sealed and unsealed radioactive materials. The rulemaking would revise NRC's decommissioning funding requirements for radioactive material based on the relative risk to public health and safety from different radioisotopes, including naturally occurring and accelerator-produced radioactive material (NARM). The potentially affected licensees are those authorized to possess byproduct and special nuclear material.

2.0 BACKGROUND, STATEMENT OF THE PROBLEM, AND OBJECTIVE

2.1 Background

Decommissioning financial assurance (DFA) is a guarantee or other financial arrangement provided by a licensee to ensure that funds are available for decommissioning when needed (see NUREG-1757, Volume 3, Revision 1, "Consolidated Decommissioning Guidance: Financial Assurance, Recordkeeping, and Timeliness, Final Report," issued February 2012). DFA requirements ensure that adequate funds are available to complete the decommissioning of licensed nuclear facilities in a safe and timely manner. The NRC's overall objective with respect to decommissioning is to protect public health and safety and the environment from the use of radioactive materials under its regulatory authority.

On June 27, 1988, the NRC published in the *Federal Register* (FR) its first comprehensive set of regulations addressing the decommissioning of nuclear facilities, "Final Rule: General Requirements for Decommissioning Nuclear Facilities" (53 FR 24018). These regulations were the result of a thorough review over multiple years of issues associated with the decommissioning of nuclear facilities as described in numerous Office of the Secretary of the Commission (SECY) papers and staff requirements memoranda (SRM), contractor reports, *Federal Register* notices, a generic environmental impact statement, public meetings, and comment analysis. The purpose of the rule was to assure that, at the time operations were terminated (including premature closure of nuclear facilities), adequate funds would be available to complete decommissioning in a safe and timely manner. The regulations addressed decommissioning planning needs, timing, funding methods, and environmental review requirements. Regarding DFA for sealed and unsealed radioactive material, the new 10 CFR 30.35 required licensees that possessed and used byproduct material with a half-life greater than 120 days to use the quantities in Appendix C to 10 CFR Part 20 to determine whether a decommissioning funding plan (DFP) was needed. The regulation in 10 CFR 70.25 required licensees that possessed and used unsealed special nuclear material to refer to the quantities in Appendix C to determine whether a DFP was needed.

The statements of consideration for the proposed rule did not provide a specific rationale for the 120-day threshold. Rather, the section entitled "Mechanisms for Requiring Financial Assurance," stated, "[t]he amounts (of financial assurance) for materials licensees were chosen based primarily on data in NUREG/CR-1754 and on licensing experience." The data in NUREG/CR1754, "Technology, Safety and Costs of Decommissioning Reference Non-Fuel-Cycle Nuclear Facilities," issued February 1981 in the Agencywide Documents Access and Management System Accession No. ML20008E869, indicated that if a licensee is

limited to the use of very short-lived radionuclides, then its facilities do not require a major decommissioning effort.

The greater than 120-day half-life criterion is consistent with the agency's regulation of low-level waste disposal through onsite decay-in-storage. The NRC previously had two decay-in-storage license conditions: one was for medical licensees and the other for nonmedical licensees. Both license conditions authorized decay-in-storage for waste containing radioactive material with half-lives less than or equal to 120 days, provided that the radioactive material was held for a minimum of 10 half-lives and additional conditions were met.

Thus, the statements of consideration for the proposed rule, the data in NUREG/CR-1754, and the NRC's licensing experience with decay-in-storage support the 120-day half-life criterion for DFA for byproduct material. The data in NUREG/CR-1754 and the NRC's licensing experience indicate that (1) radioactive materials with very short half-lives do not require a major decommissioning effort, and (2) radioactive materials with half-lives less than or equal to 120 days will decay away in a few years.

The amount of DFA for a given radionuclide with a half-life greater than 120 days is determined by comparing the licensee's authorized radionuclide quantities against the criteria provided in the table in 10 CFR 30.35(d) for byproduct material and 10 CFR 70.25(d) for special nuclear material. These tables, which are identical, require specific amounts of funding for a specified range of the quantities of radionuclides possessed. In cases where the quantities exceed 1×10^5 times the applicable quantities set forth in Appendix B to 10 CFR Part 30 for unsealed radioactive material and 1×10^{12} times the applicable quantities set forth in Appendix B to 10 CFR Part 30 for sealed radioactive material the regulations in 10 CFR 30.35(a) and 10 CFR 70.25(a), the licensee is required to submit a license-specific DFP.

On May 21, 1991, the NRC published the "Final Rule: Standards for Protection Against Radiation" (56 FR 23360, May 1991). The purpose of the rule was to modify the NRC's primary radiation protection regulations in 10 CFR Part 20 to reflect scientific developments since their issuance in 1957 (22 FR 548; January 29, 1957) by the Atomic Energy Commission (the NRC's predecessor agency) and subsequent amendments in the 1960s and 1970s (25 FR 8595, September 7, 1960; 25 FR 10914, November 17, 1960; and 35 FR 6425, April 22, 1970). These earlier versions of 10 CFR Part 20 were based upon the recommendations of the National Committee on Radiation Protection and Measurements in National Bureau of Standards Handbook 52, "Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water," dated March 20, 1953, and Handbook 59, "Permissible Dose from External Sources of Ionizing Radiation," dated January 8, 1957, that were incorporated into International Commission on Radiological Protection (ICRP) Publication 2, "Report of Committee II on Permissible Dose for Internal Radiation (1959)," issued 1960. After years of research into the biological effects of ionizing radiation, it was determined that some of the early concepts of radiation protection created unnecessary conservatisms in the regulation of radioactive material. The 1991 amendments to 10 CFR Part 20 adopted the updated and more risk-informed basic tenets of radiation protection in ICRP Publication 26, "Recommendations of the International Commission on Radiological Protection," adopted January 17, 1977, and ICRP Publication 30, "Limits for Intakes of Radionuclides by Workers," issued 1979–1988.

On December 22, 1993 (58 FR 67659), the NRC published a final rule, “Standards for Protection Against Radiation; Removal of Expired Material.” The rule made several minor conforming amendments to the NRC’s standards for protection against radiation that were published on May 21, 1991 (56 FR 23360). It removed the text of the superseded standards and conformed references in the new 10 CFR Part 20. Regarding DFA, the NRC redesignated Appendix C to 10 CFR 20.1–20.601 as Appendix B to 10 CFR Part 30. In turn, it revised 10 CFR 30.35 and 10 CFR 70.25 to eliminate references to “Appendix C to 10 CFR Part 20” and to insert references to “Appendix B to 10 CFR Part 30.”

As a result, the Appendix B to 10 CFR Part 30 values continued to be based upon ICRP Publication 2. The NRC decided not to conform the Appendix B values to ICRP Publications 26 and 30 during the 1991 revision of 10 CFR Part 20. The NRC determined that its experience with the values in Appendix C to 10 CFR Part 20 over 30 years had shown that the values were generally adequate to determine the level of funding assurance required for decommissioning and, therefore, retained them.

On August 8, 2005, the President signed into law the Energy Policy Act of 2005 (EPAAct). Section 651(e) of the EPAAct expanded the definition of byproduct material given in Section 11e of the Atomic Energy Act of 1954 (AEA). The expanded definition placed additional byproduct material under the NRC’s jurisdiction and required the Commission to provide a regulatory framework for licensing and regulating this additional byproduct material. Specifically, Section 651(e) of the EPAAct expanded the definition of byproduct material to include any discrete source of radium-226 that is produced for a commercial, medical, or research activity, and any naturally radioactive material other than source material that the NRC determines would pose a threat similar to the threat posed by radium-226 to the public health and safety or common defense and security; and is extracted or converted after extraction before, on, or after August 8, 2005 and accelerator-produced radioactive material. This new category of byproduct material is referred to as naturally occurring and accelerator-produced radioactive material.

On October 1, 2007, the NRC published in the *Federal Register* the “Final Rule: Requirements for Expanded Definition of Byproduct Material” (72 FR 55863; October 2007), which is commonly referred to as the NARM Rule. The purpose of the final rule was to implement the authority that the NRC obtained over NARM through the EPAAct. Before enactment of that law, the NRC did not regulate NARM. However, the NRC’s definition of occupational dose in 10 CFR Part 20 did include dose contributions from both licensed and nonlicensed radioactive material such as NARM. In addition, the NRC required licensees to consider nondiscrete sources, including radium, during decommissioning activities at sites such as rare-earth processing facilities that were contaminated with source material.

Before the EPAAct, Agreement States and some non-Agreement States had regulatory programs for NARM. The law mandated that the NRC use model State standards to the maximum extent practicable. Thus, the NRC considered the suggested State regulations for control of radiation published by Conference of Radiation Control Program Directors, Inc., as the model State standard in developing the rule and ensured that all of the NARM radionuclide specific values were listed in Appendix B to 10 CFR Part 20, “Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage,” and Appendix C to 10 CFR Part 20. However, the NRC did not amend Appendix B to 10 CFR Part 30, which is used in DFA determinations, to include NARM radionuclides.

As previously stated, the NRC's regulations in 10 CFR 30.35 and Appendix B to 10 CFR Part 30 are used together to determine the amount of DFA required for unsealed and sealed byproduct material. The regulations in 10 CFR 70.25 and Appendix B to 10 CFR Part 30 are used together to determine the amount of DFA required for unsealed special nuclear material. As noted in 10 CFR 30.35(a)(1) and 10 CFR 70.25(a)(2), DFPs must be submitted when the amount of unsealed radionuclide exceeds 1×10^5 times the applicable quantities listed in the table in Appendix B to 10 CFR Part 30. Individuals with licenses authorizing the possession and use of sealed sources or plated foils at quantities 1×10^{12} times the values in the table in Appendix B to 10 CFR Part 30 must also submit DFPs. The NRC gives additional details about these criteria in 10 CFR 30.35(d) and 10 CFR 70.25(d).

The table in Appendix B to 10 CFR Part 30 includes default possession values for radionuclides not specifically listed. The default possession values are equal to the lowest values listed in Appendix B for specific alpha-emitting and gamma- and beta-emitting radionuclides.

The Regulatory Basis for this rulemaking was published in April 2022 (ML21235A480) and contains more background information pertinent to the proposed rule (NRC, 2022).

2.2 Statement of the Problem

This section examines the regulatory concerns that are to be addressed as a part of this rulemaking to provide specific possession values for existing NARM radionuclides and other radionuclides that are not currently listed in Appendix B to 10 CFR Part 30 for DFA requirements for sealed and unsealed byproduct material.

The NRC is taking this action in response to a petition for rulemaking (PRM-30-66) submitted by the Organization of Agreement States on April 14, 2017, requesting that the NRC provide specific possession values for NARM radionuclides not currently listed in Appendix B to 10 CFR Part 30. See the Commission disposition on the PRM on November 27, 2020 (85 FR 75959). The current values in Appendix B to 10 CFR Part 30 are not aligned with the NRC's primary radiation protection regulations in 10 CFR Part 20 and the Energy Policy Act of 2005 (EPAAct), which amended the definition of byproduct material to include NARM radionuclides and granted NRC authority over this new category of byproduct material. The current table does not include the additional NARM radionuclides and their possession values. In addition, the current list of radionuclides and quantities in Appendix B to 10 CFR Part 30 were not developed to determine decommissioning funding costs. Rather, the values were initially derived from exceptions to labeling requirements such that certain small quantities of byproduct material could be released into the sanitary sewerage or buried in soil for disposal. In addition, the default values are based upon the radiation protection principles in ICRP Publication 2 (1959). The values in Appendix C to 10 CFR Part 20 are based upon these more risk-informed principles found in ICRP recommendations (ICRP Publication 26) and methodologies (ICRP Publication 30).

The current NRC regulations in 10 CFR 30.35 and 10 CFR 70.25 document the criteria for determining the amount of DFA required by licensees. DFA considerations only apply for radionuclides with a half-life greater than 120 days. However, the table in Appendix B to 10 CFR Part 30, which is used for calculating DFA costs, includes radionuclides with a half-life of 120 days or less. The disconnect between the criteria in 10 CFR 30.35 and the list of radionuclides in the table in Appendix B to 10 CFR Part 30 can lead to confusion about which radionuclides need to be considered when determining DFA requirements.

2.3 Objectives

The objectives of this rulemaking are to:

- improve the regulatory framework by adding radionuclides not currently listed in Appendix B to 10 CFR Part 30, including radionuclides associated with industrial technologies and current and emerging medical uses, to avoid the overly restrictive use of default values;
- base the NRC's decommissioning funding requirements for radioactive material on the cost of disposal and relative risk to public health and safety from different radioisotopes by replacing the current radionuclide values in Appendix B to 10 CFR Part 30, which are based on ICRP Publication 2, with more risk-informed values established in ICRP Publications 26 and 30;
- provide specific possession values for radionuclides not currently listed in Appendix B to 10 CFR Part 30, so that licensees using those radionuclides would not have to apply the default values to calculate decommissioning funding requirements,
- clarify that only radioactive materials with half-lives greater than 120 days are subject to DFA, and
- clarify the purpose of Appendix B by changing its title to reflect its current use for DFA.

Rulemaking would provide a regulatory solution to address issues currently regulated using case-by-case exemptions, a temporary process approved in advance of pending rulemaking to generically solve the issue. If the NRC does not complete the rulemaking process, many licensees, especially medical licensees, would require case-by-case reviews. The potentially affected licensees are those authorized to possess radioactive material licenses. In addition, since many of these unlisted radionuclides used in the medical field would remain unlisted if the NRC does not pursue this rulemaking, many users of these unlisted isotopes are likely to submit numerous requests for exemptions to the DFA requirements or submit site-specific DFPs.

3 IDENTIFICATION AND ANALYSIS OF ALTERNATIVES

The NRC considered the following two approaches to address the regulatory problem identified in Section 2.2¹:

- Alternative 1: Take No Action

The status quo considers no changes to the current process for assessing a licensee's DFA requirements. The status quo is the baseline from which the staff evaluated the four other alternatives.

¹ In the regulatory basis, the NRC analyzed five alternatives of which three are not included in this regulatory analysis as the costs involved in those alternatives were prohibitive.

- Alternative 2: Rulemaking—Update the List of Radionuclides and the Values in Appendix B to 10 CFR Part 30 Table (NRC Selected)

The NRC would revise the current table in Appendix B to 10 CFR Part 30 using the radionuclides and quantities from Appendix C to 10 CFR Part 20, including additional radionuclides not currently named in Appendix B to 10 CFR Part 30. These include radionuclides associated with industrial technologies and current and emerging medical uses. In addition, the NRC would remove all radionuclides with a half-life of 120 days or less from the appendix since these radionuclides are not considered when developing DFA. Finally, the default values would be set to equal the lowest values of the listed radionuclides: 0.001 μCi for alpha emitting radionuclides like U-235, and 0.01 μCi for the most restricted nonalpha emitting radionuclides (e.g., Pb-210). By making these changes, licensees, the NRC staff, and the Agreement States would have an up-to-date table with more risk informed values for use when assessing DFA. Appendix C to this document contains an updated version of the table.

Actions associated with this alternative do not affect the current decommissioning funding costs outlined in 10 CFR 30.35(d) but do change the funding thresholds for some radionuclides. Based on the current cost criteria, changes to the table would decrease costs associated with 18 radionuclides but would increase costs for others, especially alpha emitters.

Table 1 lists the advantages and disadvantages considered by the NRC for this alternative.

Table 1 Advantages and Disadvantages of Alternative 2

Advantages
<ul style="list-style-type: none"> • satisfies the petitioner’s request and Commission direction through a simple approach • provides a more up-to-date and risk-informed table (ICRP 26/30 vs. ICRP 2) • adds to the table specific radionuclides associated with industrial technologies and current and emerging medical uses (e.g., germanium-68, sodium-22, silicon-32, titanium-44, cobalt-57, and lutetium-177 (metastable)) • removes over 130 radionuclides with a half-life ≤ 120 days, as these short-lived radionuclides do not necessitate decommissioning costs • increases the Appendix B values for about 18 radionuclides, thus potentially decreasing the amount of financial assurance for decommissioning, thus lowering the expected costs
Disadvantages
<ul style="list-style-type: none"> • is not site specific or scenario specific • decreases the Appendix B values for several alpha-emitting isotopes and Cd-109, thus potentially increasing the amount of financial assurance for decommissioning (see Table 3) • includes the cost of rulemaking for NRC and Agreement States

4 EVALUATION OF BENEFITS AND COSTS

This section examines the benefits and costs estimated to result from this rulemaking when compared to Alternative 1 (No Action alternative). Section 4.1 identifies attributes expected to be affected by the rulemaking. Section 4.2 describes how the NRC staff analyzed benefits and costs.

4.1 Identification of Affected Attributes

This section identifies the factors within the public and private sectors that the regulatory alternatives discussed in Section 2 are expected to affect. These factors are classified as attributes using the list of potential attributes provided in Chapter 5 of NUREG/BR-0058. Each of the following attributes is quantified when possible and an uncertainty analysis is performed to report benefit and cost estimate confidence levels and to identify those variables that most affect the variation in the results distribution:

NRC Implementation. This attribute accounts for the projected net economic effect on the NRC if the rule is implemented. This attribute accounts for the projected net economic effect on the NRC to prepare and publish the final rule. It includes NRC implementation costs.

NRC Operation. This attribute measures the projected net economic effect on the NRC after the proposed action is implemented. DFP and DFA activities would be examples of such costs. Costs in this category generally fall over time (the licensing term). These costs are particularly sensitive to the discount factor used. For example, costs related to the NRC's review of licensee exemption requests would no longer be considered.

Industry Operation. This attribute accounts for the projected net economic effect on industry entities caused by routine and recurring activities required by the proposed regulation changes. Activities currently performed but would no longer be required if the alternative is implemented are treated as averted costs. For example, licensees would no longer submit exemption requests for medical licensees that use Ge-68/Ga-68 generators under certain conditions.

Other Government (Agreement States) Operation. This attribute accounts for the projected net economic effect on Agreement States entities caused by routine and recurring activities required by the proposed guidance or regulation changes. This includes the development of corresponding regulations. Activities currently performed but would no longer be required if the alternative is implemented are treated as averted costs. For example, Agreement States completing rulemakings to incorporate compatible regulations.

Regulatory Efficiency. This attribute attempts to measure regulatory and compliance improvements resulting from the proposed action (e.g., removing decommissioning barriers to licensing current and emerging medical and industrial technologies that use radionuclides not listed in Appendix B to 10 CFR Part 30). Efficiency actions are quantifiable and addressed under other attributes. For example, the results in the updated table of values for radioisotopes include naturally occurring and accelerator-produced radioactive material, which are based on more up-to-date and risk-informed principles.

Increased Public Confidence. This attribute attempts to measure the change in public confidence in the NRC's ability to improve its regulations, adapt to regulatory needs identified by stakeholders, and maintain the NRC's role as an effective industry regulator. This attribute is qualitative.

Attributes that are not expected to be affected under either of the alternatives include public health (accident), public health (routine), occupational health (accident), occupational health (routine), offsite property, onsite property, industry implementation, other government, general public, improvements in knowledge, safeguards and security considerations, and environmental considerations. By choosing rulemaking, the NRC would promote openness and transparency to the public, licensees, Agreement States (included under other government) and other stakeholders; provide for the opportunity for public comment on the proposed rule; and avoid the risk of unintended impacts to important and safe medical, academic, and industrial uses of these materials.

4.2 Analytical Methodology

This section describes the process used to evaluate benefits and costs associated with the recommended alternative. The benefits include any desirable changes in affected attributes (e.g., monetary savings) while the costs include any undesirable changes in affected attributes (e.g., monetary costs, increased reviews).

Of the affected attributes discussed in Section 5, the following attributes could be evaluated on a quantitative basis—industry operation, NRC implementation, and NRC and Agreement States operations. Quantitative analysis requires a baseline characterization of the affected universe including the characterization of factors such as the number of affected entities, the nature of the activities being conducted, and procedures that licensees implement or no longer implement for the alternative being considered. The NRC used the program evaluation and review technique (PERT), triangular distributions, and uniform distributions to evaluate the uncertainty around the variables. PERT and triangular distributions involve assigning a Low Estimate, a High Estimate, and a Most Likely Estimate to each variable. Other costs were estimated using a uniform distribution which involves assigning a Low Estimate and a High Estimate. Appendix A includes the detailed cost tables that the NRC used in this regulatory analysis. The NRC evaluated the remaining attributes on a qualitative basis because the benefits are not quantifiable and the data necessary to quantify and monetize the impacts are not available.

4.2.1 Regulatory Baseline

This regulatory analysis measures the incremental impacts of the rulemaking alternative relative to a baseline that reflects the anticipated behavior if the NRC undertakes no other regulatory action (Alternative 1: No Action alternative). As part of the regulatory baseline used in this analysis, the NRC staff assumes licensee compliance with existing NRC regulations. Section 5 presents the estimated incremental costs and benefits of the rule relative to the regulatory baseline. Licensees required to increase or decrease their financial assurance mechanism values (number of licensees) are counted to ensure that incremental costs and benefits are estimated. Section 5 of this regulatory analysis also presents the estimated costs and benefits of the alternatives relative to this baseline.

4.2.2 Affected Entities

Licensees could be impacted by overly conservative DFA requirements during the development of the rule. As a result, the NRC developed interim guidance for staff to disposition potential exemption requests for DFA requirements for Ge-68/Ga-68 generators under specific conditions

for each licensee. Several NRC licensees requested and were granted these exemptions using this temporary process. While the exemptions that were granted by the NRC did not specify an end date for the exemptions, it did impose certain requirements for the exemptions to be effective. Should the rulemaking be completed, the NRC expects that exemptions similar to ones previously granted would not be necessary and licensees with exemptions may cease to rely on the exemptions as granted.

To simplify the cost model while still fully analyzing the new Part 30 proposed rule language, this regulatory analysis considers increasing or decreasing DFA values and increasing or decreasing financial assurance instruments. This rulemaking assumes that Part 70 licensees are not impacted because their authorized possession limits already exceed the table values and therefore, they are already required to submit a site-specific financial assurance plan. This review assumes that the number of NRC and Agreement States licensees authorized for use or possession of byproduct source or special nuclear material subject to DFA requirements is 440 (400 Agreement State licensees and 40 NRC licensees). Agreement States will also be required to modify their corresponding Appendix B to 10 CFR Part 30 regulations in accordance with the compatibility category designation assigned to each NRC regulation, as discussed in NRC Management Directive 5.9, "Adequacy and Compatibility of Program Elements for Agreement State Programs," dated April 26, 2018. The table in Appendix B to 10 CFR Part 30 is designated Compatibility Category B, which means that the Agreement States must adopt regulations that are essentially identical to those in the NRC's regulations, including the requirements for DFA for sealed and unsealed radioactive material. The NRC has designated 10 CFR 70.25(a)(2) and (b) as Category H&S, which means that the Agreement States need to adopt these program elements because of health and safety considerations. In addition to completing rulemakings to incorporate compatible regulations, Agreement States must also review licensees' new or revised DFPs or financial assurance funding. In this way, the costs and benefits can be analyzed and compared.

4.2.3 Base Year

All monetized costs are expressed in 2023 dollars to agree with the NRC current annual labor rates for all rulemaking activities. The NRC staff assumes publication of the final rule in calendar year 2024. The analysis assumes that ongoing costs of operation for the alternative for NRC licensees would begin no earlier than 30 days after publication of the final rule in the NRC's regulations unless otherwise stated. The Agreement States can take up to 3 years to implement the rule. The NRC assumes that the final rule would become effective 30 days after its publication in the *Federal Register* in 2025.

4.2.4 Discount Rates

In accordance with NUREG/BR-0058, net present value (NPV) calculations are used to determine how much society will need to invest today to ensure that the designated dollar amount is available in a given year in the future. By using NPVs, costs and benefits are valued to a reference year for comparison, regardless of when the cost or benefit is incurred in time. Based on U.S. Office of Management and Budget (OMB) Circular A-4, "Regulatory Analysis," dated September 17, 2003 (OMB, 2003), and consistent with NRC 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 to reflect reliance on a social rate

of time preference concept.² A 7-percent discount rate approximates the marginal pretax real rate of return on an average investment in the private sector and 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 an opportunity cost³ of capital concept to reflect the time value of resources directed to meet regulatory requirements.

4.2.5 Cost/Benefit Inflaters

The NRC estimated the analysis inputs from sources as referenced in Appendix B, which are provided in 2023 dollars.

The NRC estimated the analysis inputs using the consumer price index for all urban consumers (CPI-U) and labor rates reported by the Bureau of Labor Statistics (BLS). To evaluate the costs and benefits consistently, the NRC converted these inputs into base year (2021) dollars using the CPI-U, where appropriate. Using the CPI-U, the NRC converted prior year dollars to 2023 dollars using the following formula:

$$\frac{CPI - U_{2023}}{CPI - U_{Prior Year}} \times Value_{Prior Year} = Value_{2023}$$

Table 2 summarizes the values of CPI-U used in this regulatory analysis.

Table 2 CPI-U Inflater

Year	CPI-U Annual Average	Index
2021	270.97	
2023*	300.11	1.10754

^a Source: Statista, 2022, <https://www.statista.com/statistics/244993/projected-consumer-price-index-in-the-united-states/>

4.2.6 Labor Rates

For the purposes of this regulatory analysis, the staff applied strict incremental cost principles to develop labor rates that include only labor and material costs directly related to the implementation and operation of the proposed 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 is \$143 per hour.⁴

² The “social rate of time preference discounting concept” refers to the rate at which society is willing to postpone a marginal unit of current consumption in exchange for more future consumption.

³ “Opportunity cost” represents what is foregone by undertaking a given action. If the applicant or licensee personnel were not engaged in producing exemption requests, they would be engaged in other work activities. Throughout the analysis, the NRC estimates the opportunity cost of performing these incremental tasks as the industry personnel’s pay for the designated unit of time.

⁴ 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

The staff used the 2021 BLS Occupational Employment and Wages data (www.bls.gov), 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. The table in Appendix D summarizes the BLS labor categories the staff used to estimate industry labor costs to implement this proposed rule and lists the industry labor rates used in the analysis.

4.2.7 Sign Conventions

In this analysis, all favorable consequences for the alternative are positive, and all adverse consequences for the alternative are negative. Negative values are shown using parentheses (e.g., negative \$500 is displayed as (\$500)).

4.2.8 Analysis Horizon

The NRC used an analysis horizon extending from issuing the proposed rule for public comment in 2023 through 2040 for most items (18 years). The Agreement States can take up to 3 years to implement the rule e.g., 2023 through 2025. The time horizon after the rule is active is from 2025 through 2040 (15 years). The 15-year period is the standard licensing period for Part 30 licensees.

4.2.9 Cost Estimation

To estimate the costs associated with the evaluated alternatives, the NRC used the program evaluation and review technique (PERT), triangular distributions, and uniform distributions. This involved assigning a Low Estimate, a High Estimate, and a Most Likely Estimate to each variable. Other costs were estimated using a uniform distribution, which involves assigning a Low Estimate and a High Estimate. For each required activity, the NRC further subdivided the work across labor categories (i.e., managers, technical staff, administrative staff, and licensing staff). The NRC estimated the required level of effort for each required activity and used a blended labor rate to develop bottom-up cost estimates.

The NRC gathered data from several sources and consulted working group members to develop level of effort and unit cost estimates. The NRC applied several cost estimation methods in this analysis. Additionally, the agency used its collective professional knowledge and judgment to estimate many of the costs and benefits. For example, to calculate the estimated averted costs of exemption requests, the NRC used analogous data from previous exemption request submittals to determine the labor categories for the staff who would perform the work and to estimate the amount of time required under each category to complete the work. If data were not available, the NRC used the level of effort method to estimate future costs based on similar steps in the process for which data were available. Additionally, the NRC used the expert

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 no incremental costs (e.g., overhead, administrative, and logistical support costs).

opinion method to fill data gaps when one or more experts were the only available sources of information.

To evaluate the effect of uncertainty in the model, the NRC used a Monte Carlo simulation, which is an approach to uncertainty analysis that expresses input variables as distributions. 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 effectively modeled. The probability distributions chosen to represent the different variables in the analysis were bounded (i.e., BLS data used represented 25- and 75-percentile values and other values used the NRC'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, and maximum values of a PERT and triangular distribution;⁵ and (2) the minimum and maximum values of a uniform distribution. The NRC used the PERT distribution to reflect the relative spread and skewness of the distribution defined by the three estimates.

4.3 Data

Cost estimates for the alternative include several actions related to rulemaking, implementation of the rule, and actions performed under the new rule, which would be done by the NRC, Agreement States, and affected licensees. The assumptions used in developing the cost estimates are based on a search of the NRC's web-based licensing (WBL) system for an approximate number of licensees and labor and licensing action estimates provided by NRC regional licensing and inspection staff. For calculating future costs, the cost estimate assumes 39 Agreement States.⁶

NRC staff developed hourly labor estimates for license registration and verification activities under the new rule. For example, a verification activity under the rule is the review of licensees' submittal of modified DFP or DFA. The NRC relied on experience of NRC staff to develop the hourly labor estimates associated with licensee activities. The staff combined the hourly labor estimates with information from the WBL system on numbers of affected licensees to develop estimated costs and averted costs. These NRC-based estimates were also applied to the Agreement States, though the NRC acknowledges that there is variability among the NRC and Agreement States in the hourly labor resources required for licensing actions. The NRC considered the potential differences between the new requirements and the current requirements and incorporated the incremental changes into this regulatory analysis.

⁵ 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.

⁶ The analysis assumes the current number of 39 Agreement States. If the number of Agreement States increases based on current application reviews, there will be a transfer of costs from the NRC to the Agreement States, but the overall costs will be the same or less.

5 RESULTS

This section discusses cost and other impacts related to the rulemaking for DFA requirements for sealed and unsealed radioactive material on the three groups: (1) the NRC, (2) the Agreement States, and (3) licensees. This section contains the NRC's evaluation of the estimated costs and benefits associated with the regulatory alternative recommended.

5.1 Cost Impact Considerations

The proposed rule would result in quantitative costs and benefits for the attributes of NRC Implementation, NRC Operations, Industry Operations, and Agreement States Operation. All cost information provided in these attribute sections are calculated in tables within Appendix A.

5.2 NRC Implementation

The NRC's development and publication of the final rule would result in incremental costs to the agency. These include the costs of reviewing and addressing public comments on the proposed rule and developing the final rule. The staff estimates that approximately 1,745 hours are required to develop the final rule across the 2 years (2023 and 2024), with estimated costs of (\$236,000) using a 7-percent NPV and (\$244,000) using a 3-percent NPV.

The NRC will incur minor costs compared to the regulatory baseline for verifying the initial reviews by licensees are accurate. The staff did not quantify these costs due to the expectation that the costs are minor relative to the net benefits and difficult to quantify.

5.3 NRC Operation

This attribute accounts for the projected net economic effect of routine and recurring activities required by the proposed alternative for the NRC. The NRC will incur costs from reviewing new and revised DFPs or other financial assurance funding mechanisms for decommissioning that licensees will submit as a result of this rulemaking. NRC staff estimates that they will need to review 40 decommissioning financial assurance mechanisms when the rule goes into effect due to the updates made to the appendix B table.

These activities result in estimated costs of (\$63,000) using a 7-percent NPV and (\$87,000) using a 3-percent NPV. The NRC will also have averted costs due to a reduction in the number of exemption requests for DFPs or financial assurance funding, estimated at \$97,000 (7-percent NPV) and \$133,000 (3-percent NPV). Based on the number of exemptions previously granted, NRC staff estimate that 32 exemption requests (2 per year during the analysis period) would be eliminated as a result of this rulemaking.

Therefore, the net costs (implementation and operation) to the NRC, as noted in Table 4, are estimated to be (\$202,000) at 7-percent NPV and (\$198,000) using a 3-percent NPV.

5.4 Industry Operations

Licensees are currently required to provide an up-to-date DFA or DFP every 3 years and at the time of license renewal. The proposed rulemaking would not change this requirement. Licensees will need to review the changes made to the radionuclide-specific values in the

updated appendix B table and determine if these changes impact their current DFA or DFP. In addition, some licensees may choose to submit a new DFP as a result of these changes.

As a result, some licensees will incur costs from having to update their DFPs and DFAs to the amount of (\$1,388,000) at 7-percent NPV. Licensees will experience averted costs due to not having to revise decommissioning financial assurance mechanism values of approximately \$252,000 (7-percent NPV) and \$272,000 (3-percent NPV). However, licensees will also experience averted costs due to the proposed rule reducing the number of revisions of DFPs or financial assurance funding of approximately \$154,000 at 7-percent NPV. Some licensees will not be impacted by the changes to the values in the updated appendix B table and therefore will not require any changes to their DFA or DFP.

Other financial surety mechanisms, such as banks servicing the surety bond, letter of credit, and trust agreement will also be affected. These changes result in net averted costs of approximately \$1,975,000 (7-percent NPV) and \$2,729,000 (3-percent NPV).

The costs of revising DFPs and financial assurance mechanisms add up to an estimated net averted cost of \$993,000 at a 7-percent NPV and \$1,660,000 at a 3-percent NPV.

Licensees will incur minor costs compared to the regulatory baseline for conducting an initial review of their DFP/DFA to identify whether any changes to DFA are needed. The staff did not quantify these costs due to the expectation that the costs are minor relative to the net benefits and difficult to quantify.

Due to the changes to the values in the revised table for the isotopes in the appendix B, there may be increased costs and averted costs to future applicants (estimated at 17 over the analysis period) from the rulemaking alternative compared to the regulatory baseline, that the staff did not quantify. In some cases, the value has become more restrictive (i.e., lowered) or a new isotope has been added, and in other cases the value has become less restrictive (i.e., increased), leading to a different required DFA requirement or a DFA requirement where none was previously required. The net effect of these increases and decreases in cost will be highly variable from licensee to licensee, and difficult to quantify due to a lack of information needed to evaluate which isotopes would be applicable to future licensees. Therefore, the staff chose not to quantify these costs and averted costs, which may tend to balance out for future licensees due to the fact that there are both lowered and increased limits in the revised table.

The table below shows the breakdown of the impacted licensees that were used in estimating the costs and benefits associated with this rulemaking.

Table 3 Impacted Licensees⁷

	Number of Licensees	Benefits/(Cost) 7% NPV
How many current licensees will need to review their DFA/DFP?	400 (Agreement State) + 40 (NRC) = 440	N/A
How many current licensees will need to modify their DFA mechanism based on new thresholds?	275	(\$1,388,000)

⁷ Costs and benefits associated with this rulemaking that could not be quantified are discussed in section 5.

How many current licensees will need to modify their DFA mechanism and have their DFA/DFP increase or decrease?	165	N/A
How many current licensees will have a reduction to their modified DFA/DFP?	102	\$3,264,000
How many current licensees will have an increase to their modified DFA/DFP?	63	(\$1,289,000)

5.5 Agreement State Operation

This attribute accounts for the projected net economic effect of routine and recurring Agreement State activities if the proposed rule is issued. Once corresponding rulemakings have been completed and incorporated in their regulations, Agreement States will incur costs from reviewing licensees' new or revised DFAs or financial assurance funding. These activities are estimated to result in costs to Agreement States of approximately (\$596,000) using a 7-percent NPV and (\$667,000) using a 3-percent NPV. The proposed rule would avert the need for Agreement States to review exemption requests from licensees for their DFPs, resulting in averted costs of approximately \$618,000 (7-percent NPV) and \$816,000 (3-percent NPV). Therefore, the total net averted costs to Agreement States are approximately \$22,000 (7-percent NPV) and \$149,000 (3-percent NPV).

The Agreement States will incur minor costs compared to the regulatory baseline for verifying the initial reviews by Agreement State licensees are accurate. The staff did not quantify these costs due to the expectation that the costs are minor relative to the net benefits and difficult to quantify.

5.6 Totals

The NRC's recommended alternatives in this regulatory analysis result in net averted costs of approximately \$813,000 using a 7-percent discount rate and \$1,611,000 using a 3-percent discount rate, as shown in Table 4. Therefore, the staff's recommended alternative to proceed with the proposed rule is cost justified. Table 4 shows that this rulemaking would result in net costs to the NRC of (\$202,000), net averted costs to industry of \$993,000 and net averted costs to the Agreement States of \$22,000 using a 7-percent discount rate.

Appendix A contains the detailed cost tables supporting the totals in Table 4.

Table 4 Total Net Costs and Benefits

DESCRIPTION	Net Benefits (Costs) in 2023 Dollars		
	Undiscounted	7% NPV	3% NPV
Alternative 1 – Status Quo (No Action Taken)	\$0	\$0	\$0
Alternative 2 – Update the List of Radionuclides and the Values in appendix B to Part 30 Table (NRC Selected)			
NRC Implementation	(\$250,000)	(\$236,000)	(\$244,000)

Alternative 2 NRC Cost	(\$114,000)	(\$63,000)	(\$87,000)
Alternative 2 NRC Averted Cost	\$176,000	\$97,000	\$133,000
<i>NRC Total</i>	<i>(\$188,000)</i>	<i>(\$202,000)</i>	<i>(\$198,000)</i>
Alternative 2 Industry Cost	(\$1,698,000)	(\$1,388,000)	(\$1,554,000)
Alternative 2 Industry Averted Cost	\$568,000	\$406,000	\$485,000
Alternative 2 – Industry Financial Assurity Mechanisms Averted Costs	\$3,580,000	\$1,975,000	\$2,729,000
<i>Industry Total</i>	<i>\$2,450,000</i>	<i>\$993,000</i>	<i>\$1,660,000</i>
Alternative 2 Agreement States Cost	(\$729,000)	(\$596,000)	(\$667,000)
Alternative 2 Agreement States Averted Cost	\$1,038,000	\$618,000	\$816,000
<i>Agreement States Total</i>	<i>\$309,000</i>	<i>\$22,000</i>	<i>\$149,000</i>
Alternative 2 Total Net Benefits (Cost)	\$2,571,000	\$813,000	\$1,611,000

5.7 Uncertainty Analysis

The NRC completed a Monte Carlo sensitivity analysis for this regulatory analysis using the specialty software @Risk.⁸ The Monte Carlo approach answers the question, “What distribution of net benefits results from multiple draws of the probability distribution assigned to key variables?”

5.7.1 Uncertainty Analysis Assumptions

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 NRC’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, and maximum values of a PERT and triangular distribution and (2) the minimum and maximum values of a uniform distribution.

Appendix A identifies those data elements that are modeled with distributions and the mean value of the distribution that were used in the uncertainty analysis. Appendix B identifies the data elements, the distribution and summary statistics, and the mean value of the distribution that the staff used in the uncertainty analysis. Table 5 contains descriptive statistics containing the minimum and maximum values, the standard deviation, and the 5th and 95th percentile values.

5.7.2 Uncertainty Analysis Results

The NRC performed the Monte Carlo simulation by repeatedly recalculating the results 10,000 times. For each iteration, the cost model chose the values in the cost model randomly from the

probability distributions that define the input variables. The model recorded the values of the output variables for each iteration and used these resulting output variable values to define the resultant probability distribution, in terms of costs and benefits.

Figure 1 depicts the staff’s proposed rule would result in mean net averted costs to industry, the NRC, and the Agreement States of approximately \$813,000 using a 7-percent discount rate. The uncertainty analysis indicates that there is a positive net benefit to industry, the NRC, and the Agreement States.

The uncertainty analysis graph shows that the Alternative 2 mean net averted cost is \$813,000 in 2023 dollars with a 90-percent confidence level that the averted costs are between (\$1,010,000) and \$2,740,000 using a 7-percent discount rate. Both Figure 1 and Figure 2 display the histograms of the net incremental costs and benefits from the regulatory baseline of the rule’s alternatives.

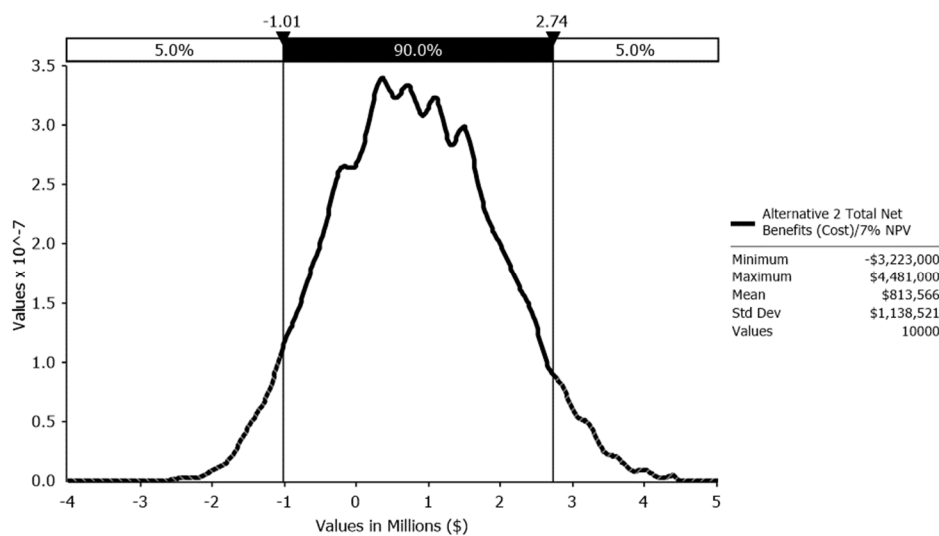


Figure 1 Total Net Benefit (7-Percent NPV)

Table 5 presents descriptive statistics on the uncertainty analysis. Table 5 reflects the 5th and 95th percentile values and minimum, maximum, and standard deviation. that appear as numerical values on the top of the vertical lines in Figure 1.

Table 5 Uncertainty Results Descriptive Statistics—7-Percent NPV

Uncertainty Result	Incremental Cost-Benefit (2023 million dollars)					
	Minimum	Mean	Std. Dev	Maximum	5 th Percentile	95 th Percentile
Total NRC Cost	(\$0.21)	(\$0.20)	\$0.01	(\$0.19)	(\$0.21)	(\$0.19)
Total Industry Cost	(\$3.05)	\$0.99	\$1.14	\$4.70	\$0.82	\$2.92
Total Agreement States Cost	(\$0.25)	(\$0.02)	(\$0.08)	(\$0.32)	(\$0.12)	(\$0.16)
Total Cost	(\$1.01)	\$0.81	\$1.14	\$4.48	(\$1.01)	\$2.74

5.7.3 Sensitivity Analysis

In addition to estimating the probability distributions for the net benefits of the proposed 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. The results are compiled into a “tornado diagram,” which presents in vertical order the variables that have the greatest influence on net benefits.

Figure 2 presents the tornado diagram for the benefits of the proposed rule and ranks the variables based on their contribution to cost uncertainty. The estimate that has the greatest variation in the overall results are the savings resulting from the number of Surety Bond decreases. The uncertainty in this variable would result in a change to the mean of \$3.2 million, the difference in averted costs that ranges between (\$0.4 million) to \$2.1 million with a 90 percent confidence level.

The estimate that has the second greatest variation in the Alternative 2 overall results is the banks servicing the reduced amount of Letter of Credit resulting in savings. The uncertainty variable would result in a change to the mean of \$1.4 million, a difference in averted costs that ranges from \$0.1 million to \$1.5 million with a 90 -percent confidence level.

The estimate that has the third greatest variation in the Alternative 2 overall results is the Number of surety bond decreases resulting in savings. The uncertainty in this variable would result in a change to the mean of \$1.1 million, the difference in averted costs that ranges between \$0.3 million to \$1.4 million with a 90 percent confidence level.

The estimate that has the fourth greatest variation in the overall results is the savings resulting from the annual trust agreements. The uncertainty variable would result in a change to the mean of \$1.0 million, a difference in averted costs that ranges from \$0.3 million to \$1.3 million with a 90-percent confidence level.

The remainder of the variables result in smaller differences.

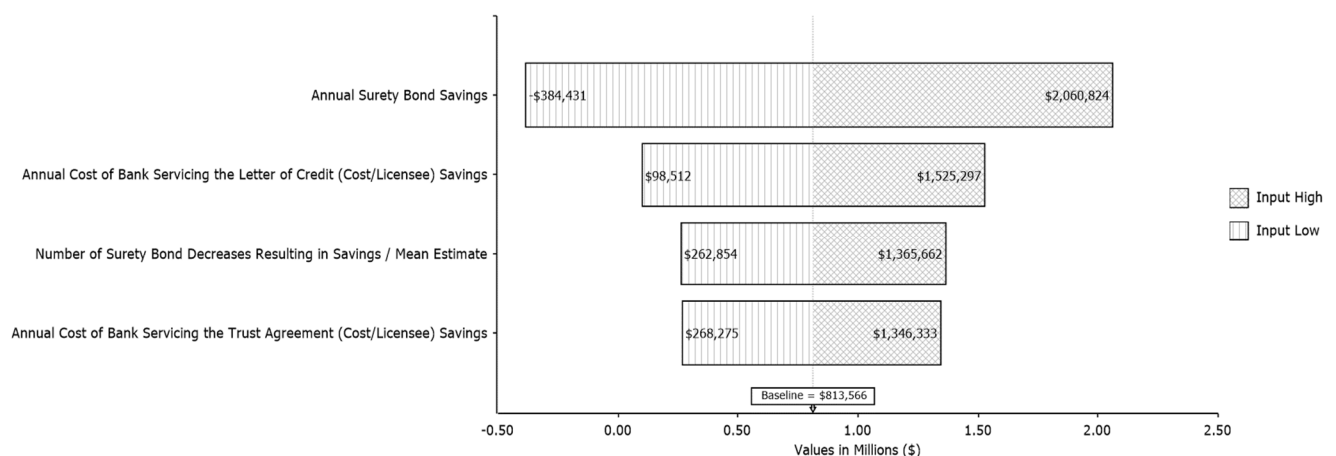


Figure 2 Key Variables Whose Uncertainty Drives the Largest Impact on Costs (7-Percent Net Present Value)

5.8 Safety Goal Evaluation

Safety goal evaluations are applicable to regulatory initiatives considered to be generic safety enhancement backfits subject to the substantial additional protection standard in paragraph 50.109(a)(3). This regulatory analysis does not contain any new regulatory impositions of this type.

5.9 Disaggregation

The NRC performed a screening review to determine whether any of the individual requirements (or set of integrated requirements) of the rule are unnecessary to achieve the objectives of the rulemaking. The NRC staff concludes that each of the rule changes are necessary to achieve one or more of the objectives of the rulemaking, as described in Section 2 and summarized in Table 6. The objectives of this regulatory action are to amend the regulations for decommissioning financial assurance for sealed and unsealed radioactive materials. The NRC staff concludes that each of the rule changes are necessary to achieve one or more of the objectives of the rulemaking.

Table 6 Disaggregation

Revised 10 CFR Requirement ^a	Aligning Values with Part 20	Improve Regulatory Framework	Incorporating Lessons Learned from DFA Licensing Reviews	Administrative and Organizational Changes
Update Appendix B to 10 CFR Part 30 using the list of radionuclides and possession values from Appendix C, "Quantities of Licensed Material Requiring Labeling," to 10 CFR Part 20, "Standards for Protection Against Radiation."	X	X		X
Revise Appendix B to 10 CFR Part 30 to clarify that only radioactive materials with half-lives greater than 120 days are subject to DFA.	X	X	X	X
Change the title of Appendix B to 10 CFR Part 30 to reflect its use in determining DFA requirements to "Quantities of Licensed Material Used to Assess Financial Assurance for Decommissioning."				X

The rulemaking would revise NRC's decommissioning funding requirements for radioactive material based on the relative risk to public health and safety from different radioisotopes, including naturally occurring and accelerator-produced radioactive material. The potentially affected licensees are those authorized to possess radioactive material licenses.

5.10 Summary

This regulatory analysis identified quantifiable and nonquantifiable costs and benefits that will result from conducting the rulemaking to address risk-informed, technology-inclusive requirements for decommissioning financial assurance for sealed and unsealed radioactive materials. Although quantifiable costs and benefits appear more tangible, the staff urges decision-makers not to discount costs and benefits that cannot be quantified or monetized, as the latter may be of equal or greater importance. Based on this regulatory analysis, Alternative 2 is cost beneficial to industry and the Agreement States.

5.10.1 Quantified Net Benefit

As shown in ES-1, the estimated incremental averted costs for Alternative 2 over the 18-year analysis horizon, relative to the regulatory baseline (Alternative 1), range from approximately \$813,000 (7-percent NPV) to \$1,611,000 (3-percent NPV). Alternative 2 is cost beneficial. The 18-year analysis horizon is due to the 3 years for Agreement States implementation and 15-year timespan of the license renewal.

5.10.2 Unquantified Benefits

In addition to the quantified costs discussed in this regulatory analysis, the proposed rule would lead to several unquantified benefits for the general public, industry, the Agreement States, and the NRC, in relation to the regulatory efficiency and increased public confidence. These costs and benefits are summarized below. Therefore, while it is important to acknowledge these averted costs, it is not necessary to quantify them, especially in view of the high levels of uncertainty in the data.

5.10.3 Regulatory Efficiency

The NRC is pursuing rulemaking to update DFA. The regulations would accomplish the following:

1. Improve alignment between the DFA licensing processes in Parts 30 and 20. The alternative analyzed in this document would help ensure consistent safety standards for DFA of byproduct materials are applied. This alignment would result in a licensing process that has enhanced regulatory stability, predictability, and clarity.
2. Update Part 30 and supporting regulations based on the relative risk to public health and safety.

Addressing these changes in a single rulemaking effort would be more efficient than addressing them in separate rulemakings and would help ensure continuity and consistency between DFA byproduct licensing regulations. A single rulemaking effort also would make it easier for stakeholders to understand all the changes and provide meaningful input.

The rule would result in a licensing process that has enhanced regulatory stability, predictability, and clarity. The rule would result in a reduction in the need for the development and review of case-by-case exemption requests for new DFA byproduct license applicants. In addition, the NRC attempts to avoid regulation by exemption when it can address an issue through generic actions such as rulemaking. This rulemaking will not provide flexibility for incorporating additional radionuclides in the future and additional rulemaking actions would be required if the NRC wishes to add radionuclides to the table in the future. This is out of scope for this rulemaking.

5.10.4 Increased Public Confidence

The rule would align Parts 30 and 20 by updating the table values in Appendix B to 10 CFR Part 30 using more up-to-date and risk-informed values currently incorporated Appendix C to Part 20 and address lessons learned from DFA for byproduct reviews. In addition, results of this rulemaking would increase public confidence in the NRC's ability to improve its regulations, adapt to regulatory needs identified by stakeholders, address emerging

technologies, provide opportunities for stakeholder to provide input to the changes to the DFA licensing process, and maintain the NRC's role as an effective industry regulator. In addition, the rulemaking process provides the greatest opportunity for Commission and public engagement on the issues related to the DFA process. Public comments during rulemaking provided a wide range of viewpoints for Commission consideration prior to preparation of the final rule. This attribute is qualitative in nature.

6 DECISION RATIONALE

Table 7 provides the quantified and qualified costs and benefits for Alternatives 1 and 2. The quantitative analysis used mean values.

Table 7 Summary of Totals

Net Monetary Savings or (Costs)—Total Present Value	Unquantified Benefits or (Costs)
Alternative 1: Status Quo - No Action \$0	None
<p>Alternative 2: Update the List of Radionuclides and the Values in Appendix B to Part 30 Table (NRC Selected).</p> <p>Industry: \$993,000 using 7% NPV. \$1,660,000 using 3% NPV.</p> <p>NRC: (\$202,000) using 7% NPV. (\$198,000) using 3% NPV.</p> <p>Agreement States: \$22,000 using 7% NPV. \$149,000 using 3% NPV.</p> <p>Net benefit (cost): \$813,000 using 7% NPV. \$1,611,000 using 3% NPV.</p>	<p>Benefits: Satisfies the petitioner's request and Commission direction through a simple approach.</p> <p>Provides a more up-to-date and risk-informed table (ICRP 26/30 vs. ICRP 2)</p> <p>Adds to the table specific radionuclides associated with industrial technologies and current and emerging medical uses (e.g., Ge-68, sodium-22, silicon-32, titanium-44, cobalt-57, thulium-170, and lutetium-177 (metastable)).</p> <p>Removes over 130 radionuclides with a half-life <120 days.</p> <p>Increases the Appendix B values for about 18 radionuclides thus potentially decreasing the amount of financial assurance for decommissioning.</p> <p>Regulatory Efficiency: Enhances the effectiveness and efficiency of licensing and certification activities to maintain both quality and timeliness of licensing and certification reviews," by developing a regulatory framework that facilitates the ability of industry to manufacture and market useful medical and industrial products to support various applications, while providing reasonable assurance of adequate protection of public health and safety, promoting the common defense and security, and protecting the environment.</p>

Net Monetary Savings or (Costs)—Total Present Value	Unquantified Benefits or (Costs)
	<p>Public Confidence: The rule would align Parts 30 and 20 and address lessons learned from DFA for byproduct reviews, which would increase public confidence in the NRC’s ability to improve its regulations, adapt to regulatory needs identified by stakeholders, afford opportunities for stakeholders to provide input to the changes to the DFA licensing process, and maintain the NRC’s role as an effective industry regulator. In addition, the rulemaking process provides the greatest opportunity for Commission and public engagement on the issues related to the DFA process. Public notice and comment during rulemaking would provide the widest range of viewpoints for Commission consideration prior to preparation of the final rule. This attribute is qualitative in nature.</p>

Pursuing this alternative would result in a more up-to-date and risk-informed Appendix B to 10 CFR Part 30 for use in the development of DFA without requiring significant time and resources.

Based solely on quantified costs and benefits, the regulatory analysis shows that the rulemaking is justified because the total net quantified benefits of the proposed regulatory action would exceed the costs for discount rates up to 7 percent. The identified qualitative benefits further justify proceeding with the proposed rule. The uncertainty analysis shows a net benefit (averted cost) for simulations with a range of costs from (\$1.01 million) to averted costs of \$2.74 million (at a 7-percent NPV).

Therefore, after integrating both quantified and qualitative costs and benefits, the benefits of the proposed rule outweigh the costs to implement the rule.

Relative to the No Action alternative, rulemaking results in a net benefit of approximately \$813,000 million assuming a 7-percent discount rate or \$1,611,000 million assuming a 3-percent discount rate.

The NRC supports updating Appendix B to 10 CFR Part 30 to include more risk-informed values for the existing radionuclides and to add the unlisted NARM radionuclides using the values in Appendix C to 10 CFR Part 20. This rulemaking satisfies the petitioner’s request and the Commission’s direction to provide a simple approach for addressing concerns associated with the values in the current Appendix B to 10 CFR Part 30, it would also result in a table with more up-to-date and risk-informed values. These changes, which include the addition of radionuclides associated with emerging medical and industrial technologies that the table currently excludes, could enable more efficient reviews of diagnostic and therapeutic products, thus increasing the availability of new medical and industrial applications to the general public and potentially reducing the number and severity of patient health and safety concerns. Implementing this rulemaking would avert some costs to the licensees, NRC, and the Agreement States.

7 INITIAL REGULATORY FLEXIBILITY ANALYSIS

The NRC is required by the Regulatory Flexibility Act (RFA) (5 U.S.C. 601 et seq.) as amended by the Small Business Regulatory Enforcement Fairness Act, to consider the impact of its rulemakings on small entities and evaluate alternatives that will accomplish regulatory objectives without unduly burdening small entities or erecting barriers to competition. This section describes the assessment of the small entity impacts expected to be incurred by 10 CFR Parts 30, 32, and 35 licensees because of the rule. This analysis describes (1) the NRC's definition of "small entities," including "small businesses," "small governmental jurisdictions," "small educational institutions," and "small organizations;" (2) what number constitutes a "substantial number" of these entities; (3) whether "significant impacts" will be incurred by licensees under the rule; and (4) the measures that NRC has adopted in the rule to mitigate impacts on small entities.

7.1 Defining "Small Entities" Affected by the Rule

The NRC established its size standards for small entities on December 9, 1985 (50 FR 50241). On November 6, 1991 (56 FR 56671), the NRC conformed its format for size standards to mirror the definitions of small entities in the Regulatory Flexibility Act of 1980, as amended. In a direct final rule published in the *Federal Register* on August 10, 2007 (72 FR 44951), the NRC adjusted its receipts-based small business size standard to conform to the Small Business Act (SBA) size standard for nonmanufacturing industries. This size standard reflects the most used SBA size standard for nonmanufacturing industries. On February 17, 2022 (87 FR 89432), the NRC increased its receipts-based, small business size standard (§ 2.810 NRC size standards) from \$7 million to \$8 million to conform to the standard set by the SBA.

The NRC estimates that 27 small entities (6 percent of 440) licensees will be impacted by this proposed rule. The NRC based this estimate on a total of 1,100 small entity licensees out of 18,226 total licensees, which equates to 6 percent. The total number of licensees was taken from the 2021-2022 Information Digest (ML21300A290). The revenues will result in averted costs to the licensees. Therefore, as a conservative assumption the NRC has assumed that all affected small entities would benefit.

The NRC uses the size standards contained in 10 CFR 2.810 to determine whether a licensee qualifies as a small entity in its regulatory programs.

The size standards pertinent to Part 30 licensees impacted by this rule under 10 CFR 2.810 are:

- A small business is a for-profit concern and is a:
 - (1) Concern that provides a service or a concern not engaged in manufacturing with average gross receipts of \$8 million or less over its last 5 completed fiscal years; or
 - (2) Manufacturing concern with an average number of 500 or fewer employees based upon employment during each pay period for the preceding 12 calendar months.
- A small organization is a not-for-profit organization which is independently owned and operated and has annual gross receipts of \$8 million or less.
- A small governmental jurisdiction is a government of a city, county, town, township, village, school district, or special district with a population of less than 50,000.

- A small educational institution is one that is supported by a qualifying small governmental jurisdiction or is not State or publicly supported and has 500 or fewer employees.

Ultimately, the rule will affect approximately 40 NRC and 400 Agreement States licensees. Since the total number of NRC and Agreement States material licensees is 18,226, 440 licensees would not be considered substantial. These licensees are principally private entities, including medical institutions and individual private medical practitioners, which currently have something other than sealed sources or plated foils (i.e., are not exclusively broad scope licensees).

7.2 Measuring “Significant Impacts”

The NRC has not established a quantitative cutoff for “significant impact.” For the purpose of this rulemaking, the NRC assumes “significant” impact when the revenues or costs of any class of affected entities change by more than 3 to 5 percent in 5 years. The NRC does not expect any of the small entities will be affected to the extent set by these criteria. In fact, the proposed rule would have an estimated \$2,300 (\$993,000 industry total net averted cost/440 impacted licensees) averted cost per impacted licensee.

7.3 Steps Taken to Mitigate Economic Impacts on Small Entities

The NRC has taken several actions in this rule to ensure that the selected alternative reduces decommissioning financial assurance requirements. The rulemaking will have a positive economic impact on a significant number of small entities. For the vast number of small entities, the NRC expects that business will continue as usual. Based on that very small number of licensees, the limited scope of the rule, and the nature of decommissioning financial assurance requirements, the NRC took no steps to mitigate the impact to small entities since the rulemaking results in averted costs as described in Section 7.2.

8 CUMULATIVE EFFECTS OF REGULATION

The NRC has implemented a program to address the possible cumulative effects of regulation in the development of regulatory bases for rulemakings. The cumulative effects of regulation are an organizational effectiveness challenge that results from a licensee or other affected entity implementing several complex positions, programs, or requirements within a prescribed implementation period and with limited available resources. The NRC is requesting feedback from the public on the cumulative effects that may result from this NRC rulemaking.

9 IMPLEMENTATION

The NRC assumes that the final rule would become effective 30 days after its publication in the *Federal Register* in 2025. Agreement States may issue license conditions under appropriate authorities to expedite compliance with these rule changes followed by issuing their amended regulations within 3 years of the final rule effective date.

10 REFERENCES

Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.).

Energy Policy Act of 2005, Pub. L. 109-58.

International Commission on Radiological Protection, Publication 2, "Report of Committee II on Permissible Dose for Internal Radiation (1959)," Pergamon Press, London, 1960.

International Commission on Radiological Protection, ICRP Publication 26, "Recommendations of the International Commission on Radiological Protection," Annals of the ICRP, Pergamon Press, London, January 17, 1977.

International Commission on Radiological Protection, ICRP Publication 30, "Limits for Intakes of Radionuclides by Workers," Annals of the ICRP, Pergamon Press, London, 1979–1988.

National Bureau of Standards, Handbook 52, "Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water," U.S. Department of Commerce, Washington, DC, March 20, 1953.

National Bureau of Standards, Handbook 59, "Permissible Dose from External Sources of Ionizing Radiation," U.S. Department of Commerce, Washington, DC, January 8, 1957.

Office of the Federal Register, "Agreement State Program Policy Statement," 82 FR 48535, October 18, 2017.

Office of the Federal Register, *Federal Register*, Final Rule to Part 20, Standards for Protection Against Radiation, 22 FR 548, January 29, 1957.

Office of the Federal Register, *Federal Register*, Final Rule to Part 20, Standards for Protection Against Radiation; Miscellaneous Amendments, 25 FR 8595, September 7, 1960.

Office of the Federal Register, *Federal Register*, Final Rule to Part 20, Standards for Protection Against Radiation, 25 FR 10914, November 17, 1960.

Office of the Federal Register, *Federal Register*, Final Rule to Appendix C to Part 20, Standards for Protection Against Radiation, 35 FR 6425, April 22, 1970.

Office of the Federal Register, *Federal Register*, Receipts-Based NRC Size Standards, 50 FR 50241, December 9, 1985.

Office of the Federal Register, *Federal Register*, Final Rule: General Requirements for Decommissioning Nuclear Facilities, 53 FR 24018, June 27, 1988.

Office of the Federal Register, *Federal Register*, Final Rule: Standards for Protection Against Radiation, 56 FR 23360, May 21, 1991.

Office of the Federal Register, *Federal Register*, Final Rule: Standards for Protection Against Radiation; Removal of Expired Material, 58 FR 67657, December 22, 1993.

Office of the Federal Register, *Federal Register*, Final Rule: Requirements for Expanded Definition of Byproduct Material (NARM Rule), 72 FR 55863, October 1, 2007.

Office of the Federal Register, *Federal Register*, Receipts-Based NRC Size Standards, 87 FR 89432, February 17, 2022.

Office of the Federal Register, *Federal Register*, Final Rule: NRC Size Standards, Revision, 56 FR 56671, November 6, 1991.

Office of the Federal Register, *Federal Register*, Final Rule: NRC Size Standards, Revision, 72 FR 44951, August 10, 2007.

Office of Management and Budget, OMB Circular No. A-4, September 17, 2003.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.).

Statista, "Projected Consumer Price Index in the United States from 2010 to 2026," 2022. Available at <https://www.statista.com/statistics/244993/projected-consumer-price-index-in-the-united-states/>.

U.S. Nuclear Regulatory Commission, NUREG-1757, Volume 1, Revision 2, "Consolidated NMSS Decommissioning Guidance: Decommissioning Process for Materials Licensees," September 2006 (ML063000243).

U.S. Nuclear Regulatory Commission, NUREG-1757, Volume 3, Revision 1, "Consolidated NMSS Decommissioning Guidance: Financial Assurance, Recordkeeping, and Timeliness, Final Report," February 2012 (ML12048A683).

U.S. Nuclear Regulatory Commission, NUREG/BR-0058, Draft Final Revision 5, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," January 2020, ML19261A277.

U.S. Nuclear Regulatory Commission, NUREG/CR-1754, "Technology, Safety and Costs of Decommissioning Reference Non-Fuel-Cycle Nuclear Facilities," February 1981 (ML20008E869).

U.S. Nuclear Regulatory Commission, NUREG/CR-3568, "A Handbook for Value-Impact Assessment," December 1983 (ML062830096).

U.S. Nuclear Regulatory Commission, Authorization for Granting Specific Exemption from Decommissioning Funding Plan Requirement for Germanium-68/Gallium-68 Generators, July 29, 2016 (ML16082A415).

U.S. Nuclear Regulatory Commission, Revision of Technical Basis for Granting Specific Exemption from Decommissioning Funding Plan Requirement for Germanium-68/Gallium-68 Generators, July 13, 2017 (ML17075A487).

U.S. Nuclear Regulatory Commission, Regulatory Basis, "Decommissioning Financial Assurance Requirements for Sealed and Unsealed Radioactive Materials," April 2022 (ML21235A480).

U.S. Nuclear Regulatory Commission, NUREG-1350, Volume 33, "2021-2022 Information Digest" (ML21300A290).

[Page intentionally left blank.]

Appendix A Summary and Tables of Costs for Each Alternative by NRC, Agreement States, and Industry

The Appendix A tables show the calculations for the net costs associated with Alternative 2 by the NRC, Agreement States, and industry. Note that Alternative 1 is not included here, because it has no additional benefits (costs). See Appendix B, “Analysis Input Variables,” for more information.

Table A-1 NRC Implementation Costs

Year	Activity	Hours	NRC hourly rate	Total Cost		
				Undiscounted	7% NPV	3% NPV
2023	Develop/issue Comment Resolution for final rule	291	\$143	(\$41,599)	(\$41,599)	(\$41,599)
2024	Develop/issue final rule	727	\$143	(\$103,997)	(\$97,194)	(\$100,968)
2024	Complete final rule	727	\$143	(\$103,997)	(\$97,194)	(\$100,968)
Total Benefit (Cost)		1,745		(\$249,594)	(\$235,987)	(\$243,536)

Table A-2 NRC Costs (Review of Licensees’ Submittal of Modified DFP/DFA)

Year	Activity	Number of Plans	Staff Labor Hours / Plan	Weighted Hourly Rate	Undiscounted	7% NPV	3% NPV
2025	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$6,245)	(\$6,740)
2026	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$5,837)	(\$6,543)
2027	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$5,455)	(\$6,353)
2028	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$5,098)	(\$6,168)
2029	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$4,764)	(\$5,988)
2030	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$4,453)	(\$5,814)
2031	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$4,161)	(\$5,644)
2032	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$3,889)	(\$5,480)
2033	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$3,635)	(\$5,320)
2034	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$3,397)	(\$5,165)
2035	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$3,175)	(\$5,015)
2036	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$2,967)	(\$4,869)
2037	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$2,773)	(\$4,727)
2038	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$2,591)	(\$4,589)
2039	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$2,422)	(\$4,456)
2040	NRC review of licensees’ submittal of modified DFP/DFA	2.5	(20)	\$143	(\$7,150)	(\$2,264)	(\$4,326)
Total NRC Benefit (Cost)		40			(\$114,400)	(\$63,125)	(\$87,196)

Table A-3 NRC Averted Costs (Reviewing Licensee Submittal)

Year	Activity	Staff Hours	# Occurrences	Weighted Hourly Rate	Undiscounted	7% NPV	3% NPV
2025	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$10,000	\$10,000
2026	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$8,979	\$10,067
2027	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$8,392	\$9,773
2028	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$7,843	\$9,489
2029	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$7,330	\$9,212
2030	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$6,850	\$8,944
2031	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$6,402	\$8,684
2032	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$5,983	\$8,431
2033	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$5,592	\$8,185
2034	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$5,226	\$7,947
2035	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$4,884	\$7,715
2036	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$4,565	\$7,490
2037	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$4,266	\$7,272
2038	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$3,987	\$7,060
2039	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$3,726	\$6,855
2040	NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance. #Hours/Review	40	2	\$143	\$11,000	\$3,482	\$6,655
Total NRC Benefit (Cost)		640	32		\$176,000	\$97,000	\$133,000

Table A-4 Industry Averted Costs (Licensees No Longer Required to Submit Exemption Requests)

Year	Activity	Number of Plans	# Occurrences	Weighted Hourly Rate	Undiscounted	7% NPV	3% NPV
2025	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$15,276	\$16,486
2026	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$14,277	\$16,006
2027	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$13,343	\$15,539
2028	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$12,470	\$15,087
2029	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$11,654	\$14,647
2030	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$10,892	\$14,221
2031	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$10,179	\$13,807
2032	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$9,513	\$13,404
2033	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$8,891	\$13,014
2034	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$8,309	\$12,635
2035	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$7,766	\$12,267
2036	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$7,258	\$11,910
2037	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$6,783	\$11,563
2038	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$6,339	\$11,226
2039	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$5,924	\$10,899
2040	Licensees no longer submit exemption requests for decommissioning funding levels	40	4	\$103	\$69,959	\$5,537	\$10,582
Total Industry Benefit (Cost)			68		\$279,835	\$154,410	\$213,291

Table A-5 Licensees Required to Revise Decommissioning Funding Plans or Financial Assurance Funding—Industry

Year	Activity	Number of Plans	Staff Labor Hours / Plan	Weighted Hourly Rate	Undiscounted	7% NPV	3% NPV
2025	Licensees required to revise DFA plans or FA funding	92	(60)	\$103	(\$565,843)	(\$494,229)	(\$533,361)
2026	Licensees required to revise DFA plans or FA funding	92	(60)	\$103	(\$565,843)	(\$461,896)	(\$517,827)
2027	Licensees required to revise DFA plans or FA funding	92	(60)	\$103	(\$565,843)	(\$431,679)	(\$502,744)
	Total Industry Benefit (Cost)	275			(\$1,697,529)	(\$1,387,805)	(\$1,553,932)

Table A-6 Licensees Decreasing Decommissioning Funding Plans or Financial Assurance Funding—Industry

Year	Activity	Number of Items	Staff Labor Hours / Plan	Weighted Hourly Rate	Undiscounted	7% NPV	3% NPV
2025	Licensees required to decrease their financial assurance mechanism values (number of items)	165	17	\$103	\$288,580	\$252,057	\$272,014
	Total Industry Benefit (Cost)				\$288,580	\$252,057	\$272,014

Table A-7 Financial Assurance Mechanism: (Annual Cost of Bank Servicing the Instrument—Surety Bond) Savings—Industry

Year	Activity	Number of Items	Cost / Licensee	Undiscounted	7% NPV	3% NPV
2025	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$158,311	\$170,846
2026	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$147,954	\$165,869
2027	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$138,275	\$161,038
2028	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$129,229	\$156,348
2029	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$120,775	\$151,794
2030	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$112,873	\$147,373
2031	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$105,489	\$143,080
2032	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$98,588	\$138,913
2033	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$92,138	\$134,867
2034	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$86,111	\$130,939
2035	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$80,477	\$127,125
2036	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$75,212	\$123,422
2037	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$70,292	\$119,828
2038	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$65,693	\$116,337
2039	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$61,396	\$112,949
2040	Number of Surety Bond Decreases Resulting in Savings	50	\$3,625	\$181,250	\$57,379	\$109,659
	Total Industry Benefit (Cost)			\$2,900,000	\$1,600,192	\$2,210,388

Table A-8 Financial Assurance Mechanism: (Annual Bank Servicing the Instrument—Surety Bond)—Industry

Year	Activity	Number of Items	Cost / Licensee	Undiscounted	7% NPV	3% NPV	
2025	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$31,662)	(\$34,169)	
2026	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$29,591)	(\$33,174)	
2027	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$27,655)	(\$32,208)	
2028	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$25,846)	(\$31,270)	
2029	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$24,155)	(\$30,359)	
2030	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$22,575)	(\$29,475)	
2031	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$21,098)	(\$28,616)	
2032	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$19,718)	(\$27,783)	
2033	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$18,428)	(\$26,973)	
2034	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$17,222)	(\$26,188)	
2035	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$16,095)	(\$25,425)	
2036	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$15,042)	(\$24,684)	
2037	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$14,058)	(\$23,966)	
2038	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$13,139)	(\$23,267)	
2039	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$12,279)	(\$22,590)	
2040	Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	(\$3,625)	(\$36,250)	(\$11,476)	(\$21,932)	
Total Industry Benefit (Cost)					(\$580,000)	(\$320,038)	(\$442,078)

Table A-9 Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings—Industry

Year	Activity	Number of Items	Cost / Licensee	Undiscounted	7% NPV	3% NPV
2025	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$94,986	\$102,507
2026	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$88,772	\$99,522
2027	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$82,965	\$96,623
2028	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$77,537	\$93,809
2029	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$72,465	\$91,076
2030	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$67,724	\$88,424
2031	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$63,293	\$85,848
2032	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$59,153	\$83,348
2033	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$55,283	\$80,920
2034	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$51,666	\$78,563
2035	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$48,286	\$76,275
2036	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$45,127	\$74,053
2037	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$42,175	\$71,897
2038	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$39,416	\$69,802
2039	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$36,837	\$67,769
2040	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	\$3,625	\$108,750	\$34,427	\$65,796
	Total Industry Benefit (Cost)			\$1,740,000	\$960,115	\$1,326,233

Table A-10 Financial Assurance Mechanism: (Annual Servicing the Letter of Credit) Cost—Industry

Year	Activity	Number of Items	Cost / Licensee	Undiscounted	7% NPV	3% NPV
2025	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$31,662)	(\$34,169)
2026	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$29,591)	(\$33,174)
2027	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$27,655)	(\$32,208)
2028	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$25,846)	(\$31,270)
2029	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$24,155)	(\$30,359)
2030	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$22,575)	(\$29,475)
2031	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$21,098)	(\$28,616)
2032	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$19,718)	(\$27,783)
2033	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$18,428)	(\$26,973)
2034	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$17,222)	(\$26,188)
2035	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$16,095)	(\$25,425)
2036	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$15,042)	(\$24,684)
2037	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$14,058)	(\$23,966)
2038	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$13,139)	(\$23,267)
2039	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$12,279)	(\$22,590)
2040	Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	(\$3,625)	(\$36,250)	(\$11,476)	(\$21,932)
	Total Industry Benefit (Cost)			(\$580,000)	(\$320,038)	(\$442,078)

Table A-11 Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings—Industry

Year	Activity	Number of Items	Cost / Licensee	Undiscounted	7% NPV	3% NPV
2025	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$69,657	\$75,172
2026	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$65,100	\$72,983
2027	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$60,841	\$70,857
2028	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$56,861	\$68,793
2029	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$53,141	\$66,789
2030	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$49,664	\$64,844
2031	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$46,415	\$62,955
2032	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$43,379	\$61,122
2033	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$40,541	\$59,341
2034	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$37,889	\$57,613
2035	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$35,410	\$55,935
2036	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$33,093	\$54,306
2037	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$30,928	\$52,724
2038	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$28,905	\$51,188
2039	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$27,014	\$49,698
2040	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings	22	3,625	\$79,750	\$25,247	\$48,250
	Total Industry Benefit (Cost)			\$1,276,000	\$704,084	\$972,571

Table A-12 Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost—Industry

Year	Activity	Number of Items	Cost / Licensee	Undiscounted	7% NPV	3% NPV
2025	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$42,580)	(\$45,952)
2026	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$39,795)	(\$44,613)
2027	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$37,191)	(\$43,314)
2028	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$34,758)	(\$42,052)
2029	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$32,484)	(\$40,827)
2030	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$30,359)	(\$39,638)
2031	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$28,373)	(\$38,484)
2032	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$26,517)	(\$37,363)
2033	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$24,782)	(\$36,275)
2034	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$23,161)	(\$35,218)
2035	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$21,646)	(\$34,192)
2036	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$20,230)	(\$33,196)
2037	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$18,906)	(\$32,229)
2038	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$17,669)	(\$31,291)
2039	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$16,513)	(\$30,379)
2040	Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost	10	(\$4,875)	(\$48,750)	(\$15,433)	(\$29,495)
	Total Industry Benefit (Cost)			(\$780,000)	(\$430,396)	(\$594,518)

Table A-13 Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost—Industry

Year	Activity	Number of Items	Cost / Licensee	Undiscounted	7% NPV	3% NPV
2025	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$21,618)	(\$23,329)
2026	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$20,203)	(\$22,650)
2027	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$18,882)	(\$21,990)
2028	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$17,646)	(\$21,350)
2029	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$16,492)	(\$20,728)
2030	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$15,413)	(\$20,124)
2031	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$14,405)	(\$19,538)
2032	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$13,462)	(\$18,969)
2033	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$12,582)	(\$18,416)
2034	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$11,759)	(\$17,880)
2035	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$10,989)	(\$17,359)
2036	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$10,270)	(\$16,854)
2037	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$9,598)	(\$16,363)
2038	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$8,971)	(\$15,886)
2039	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$8,384)	(\$15,423)
2040	Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	(750)	(\$24,750)	(\$7,835)	(\$14,974)
Total Industry Benefit (Cost)				(\$396,000)	(\$218,509)	(\$301,832)

Table A-14 Agreement States Implementation Cost to Complete Rulemakings to Incorporate Compatible Regulations

Year	Activity	Number of Plans	Agreement States Staff Labor Hours	Weighted Hourly Rate	Undiscounted	7% NPV	3% NPV
2025	Agreement States complete rulemakings to incorporate compatible regulations	5.0	(120)	\$91	(\$54,654)	(\$47,737)	(\$51,517)
2026	Agreement States complete rulemakings to incorporate compatible regulations	5.0	(120)	\$91	(\$54,654)	(\$44,614)	(\$50,016)
2027	Agreement States complete rulemakings to incorporate compatible regulations	5.0	(120)	\$91	(\$54,654)	(\$41,695)	(\$48,560)
Total Agreement States Benefit (Cost)		15			(\$163,962)	(\$134,047)	(\$150,093)

Table A-15 Agreement States Averted Costs (Reviewing Exemption Requests Submittal)

Year	Activity	Hours/ review	# Occurrences	Weighted Hourly Rate	Undiscounted	7% NPV	3% NPV
2025	Agreement States review exemption requests	40	15	\$91	\$54,654	\$48,000	\$52,000
2026	Agreement States review exemption requests	40	15	\$91	\$54,654	\$45,000	\$50,000
2027	Agreement States review exemption requests	40	15	\$91	\$54,654	\$42,000	\$49,000
2028	Agreement States review exemption requests	40	15	\$91	\$54,654	\$39,000	\$47,000
2029	Agreement States review exemption requests	40	15	\$91	\$54,654	\$36,000	\$46,000
2030	Agreement States review exemption requests	40	15	\$91	\$54,654	\$34,000	\$44,000
2031	Agreement States review exemption requests	40	15	\$91	\$54,654	\$32,000	\$43,000
2032	Agreement States review exemption requests	40	15	\$91	\$54,654	\$30,000	\$42,000
2033	Agreement States review exemption requests	40	15	\$91	\$54,654	\$28,000	\$41,000
2034	Agreement States review exemption requests	40	15	\$91	\$54,654	\$26,000	\$39,000
2035	Agreement States review exemption requests	40	15	\$91	\$54,654	\$24,000	\$38,000
2036	Agreement States review exemption requests	40	15	\$91	\$54,654	\$23,000	\$37,000
2037	Agreement States review exemption requests	40	15	\$91	\$54,654	\$21,000	\$36,000
2038	Agreement States review exemption requests	40	15	\$91	\$54,654	\$20,000	\$35,000
2039	Agreement States review exemption requests	40	15	\$91	\$54,654	\$19,000	\$34,000
2040	Agreement States review exemption requests	40	15	\$91	\$54,654	\$17,000	\$33,000
Total Agreement States Benefit (Cost)		640	240		\$874,466	\$484,000	\$666,000

Table A-16 Agreement States Review of Licensees New or Revised Decommissioning Funding Plans or Financial Assurance Funding

Year	Activity	Number of Reviews	Staff Labor Hours / Plan	Weighted Hourly Rate	Undiscounted	7% NPV	3% NPV
2025	Agreement States Review of Licensees New or Revised DFPs or FA Funding	133.3	(20)	\$91	(\$242,907)	(\$212,165)	(\$228,963)
2026	Agreement States Review of Licensees New or Revised DFPs or FA Funding	133.3	(20)	\$91	(\$242,907)	(\$198,285)	(\$222,295)
2027	Agreement States Review of Licensees New or Revised DFPs or FA Funding	133.3	(20)	\$91	(\$242,907)	(\$185,313)	(\$215,820)
Total Agreement States Benefit (Cost)		400			(\$728,722)	(\$595,762)	(\$667,078)

Appendix B Analysis Input Variables

Description	Mean estimate	Distribution	Low Estimate	Best Estimate	High Estimate	Source or Basis of Estimate
General						
Base Year	2023					Staff assumption
Year Rule is Active	2025					Staff assumption
Timespan of Analysis	18					Staff assumption: Timespan [2023 thru 2040]
Discount Rate	7%					NUREG/BR-0058
Supplemental Discount Rate	3%					NUREG/BR-0058
NRC Staff Labor Rate	\$143					Calculated value based on previous NRC actuals. (NRC Labor Rates for Use in FY2023 Regulatory Analyses)
Private Loaded Wage Burden	2.4			2.4		Loaded wage burden for industry based on NRC NUREG-BR-0058, Rev. 5, Section 5.4

Licensee Labor Mix Composite Percent per UNIT Hour with Labor Multiplier						
Description	Mean (2023)	w/Benefits (2.4x)	Unit	%	Wt. Ave	
Technical Staff	\$22.26	\$53.43	\$ / hour	25%	\$13.36	
Administrative Staff	\$17.91	\$42.98	\$ / hour	25%	\$10.75	
Licensing Staff	\$65.93	\$158.23	\$ / hour	50%	\$79.11	
Licensee Labor Rate Composite				100%	\$103.22	

Labor Mix Percent Composite per UNIT Hour with Labor Multiplier w/Risk						
Description	Mean Estimate	Distribution	Low Estimate	Wt. Ave Most Likely	High Estimate	
Technical Staff			\$15.65	\$22.26	\$26.69	
Administrative Staff			\$13.67	\$17.91	\$22.08	
Licensing Staff			\$40.58	\$65.93	\$85.41	
Licensee Average Labor Rate	\$103	Trigen	\$69.89	\$106.10	\$134.18	
Agreement States Average Labor Rate	\$91	Trigen	\$63.77	\$99.44	\$114.09	

Description	Mean Estimate	Distribution	Low Estimate	Wt. Ave Most Likely	High Estimate	Source of Base Estimate
NRC Implementation						
Alternative 2 - [Rulemaking Implementation]						
Staff hours to perform review	1,745	PERT	1,309	1,745	2,182	

Description	Mean Estimate	Distribution	Low Estimate	Best Estimate	High Estimate	
Operation						
Alternative 1 (NOT SELECTED)						
Alternative 1 – Status Quo (No Action Taken)						
Under the status quo, the NRC would rely on the existing regulations, exemptions, orders, and guidance as well as continue to use the current Appendix B to Part 30 table to determine decommissioning financial assurance requirements						-
Description	Mean Estimate	Distribution	Low Estimate	Best Estimate	High Estimate	
Alternative 2 – STAFF RECOMMENDATION						
Alternative 2 – Update the List of Radionuclides and the Values in Appendix B to Part 30 Table (NRC Selected)						
Under Alternative 2, the NRC would update the current table in Appendix B to Part 30 using the radionuclides and values from Appendix C to Part 20. This includes the addition of radionuclides that are not currently in Appendix B. In addition to adding radionuclides and updating values to incorporate ICRP 26/30 methodologies, the NRC would remove all radionuclides with a half-life of 120 days or less from the table since they are not considered when assessing decommissioning financial assurance or developing decommissioning funding plans. By making these changes, licensees, the NRC, and Agreement States would have an up-to-date table with more risk-informed values for use when assessing decommissioning financial assurance and developing decommissioning funding plans. Appendix C of this regulatory analysis contains an updated version of the table.						
Description	Mean Estimate	Distribution	Low Estimate	Best Estimate	High Estimate	
Amend Appendix B to add unlisted isotopes and assign them risk-informed specific possession values that result in decommissioning funding requirements that better reflect expected costs.						
Alternative 2 NRC Cost						
NRC review of licensees' submittal of modified DFP/ decommissioning financial assurance	40			40		NRC Estimate
NRC review of licensees new or revised decommissioning funding plans or financial assurance funding (hours/review)	(20)	PERT	(25)	(20)	(15)	NRC Estimate

NRC Averted Cost (NRC review of licensees' submittal of exemption request Saving)	\$146	PERT	\$139	\$146	\$153	<p>\$278K from Reg Basis Para 10, Pg 29, the current generic bounding estimate for the cost of a license exemption is \$278,000, consisting of an estimated \$188,000 for the licensee's development and submittal of a license exemption request and an estimated \$90,000 for the NRC's review. As of July 2019, the NRC staff had processed seven DFP exemption requests for Ge-68/Ga-68 generators at a cost of approximately \$1.95 million ($\\$278,000 \times 7$ DFP exemption reviews). The Agreement States had ($\\$278,000 \times 47$ DFP exemption reviews) at a cost of approximately \$13.1 million.</p> <p>As of July 2019, the NRC staff had processed seven DFP exemption requests for Ge-68/Ga-68 generators.</p>
NRC Number of Occurrences	2			2		
Alternative 2 Agreement States Cost						
Agreement States Complete Rulemakings to Incorporate Compatible Regulations	15			15		NRC Estimate
Agreement States complete rulemaking to incorporate compatible regulations (hours/review)	(120)	PERT	(150)	(120)	(90)	NRC Estimate
Agreement States Review of Licensees New or Revised DFPs or FA Funding	400			400		NRC Estimate Agreement States DFP Plan Review. 10 to 1 ratio
Agreement States review of licensees new or revised decommissioning funding plans or financial assurance funding hours/ review	(20)	PERT	(25)	(20)	(15)	NRC Estimate
Alternative 2 Industry Cost						
Alternative 2 Industry Cost						Only Licensees that currently have Decom Funding Plans must look at these decommissioning Cost Estimate and Funding Plan every 3 years. Licensees not subject to 10 CFR 30.35 will now have to evaluate additional decommissioning funding if required. Must be related to decommissioning Funding requirements for increased funding levels.

Industry Averted Costs (Licensees no longer submit exemption requests for decommissioning funding levels — Industry)	40	PERT	30	40	50	NRC Estimate Medical Use Licensees and Industrial & (broad scope - Academic) WBL-verified Number. This includes Part 70 licensee. # of Plans/Yr.
NRC number of occurrences	4	PERT	3	4.25	5	NRC Estimate Evaluating only changes minimal.
Licensees required to revise DFA plans or FA funding	275	PERT	138	275	413	NRC Estimate: Also includes alpha emitters. This number includes Licensees who may need to increase or decrease their certification amounts; who need to revise their decommissioning cost estimate for funding plans; and who are newly subject to decommissioning funding plan or certification requirements. We expect the number of Licensees newly subject to decommissioning funding plan requirements to be small (i.e., 300 or fewer).
No. Hours per DFP (hours/Licensee)	(60)	PERT	(75)	(60)	(45)	NRC Estimate. Also includes alpha emitters
Licensees required to increase or decrease their financial assurance mechanism values (number of items)	165	PERT	83	165	248	NRC Estimate, 15 NRC Licensees plus 150 Agreement States Licensees (10 to 1 ratio) Triannual review for cost estimate and funding plan only. Types of Financial Assurance Instruments anticipated were determined based on the most common instruments (Surety Bond, Letter of Credit, Trust Agreement, or Statement of Intent) submitted to the NRC. Number breakouts add up to 165.
Licensees newly required to perform triannual review of DFPs (#/licensees).	17	PERT	9	17	26	NRC Estimate. Also includes alpha emitters. This is based on 10 percent (i.e., 44 or fewer) of the Licensees expected to have to revise the decommissioning funding plans (additional).

Number of Surety Bond Decreases Resulting in Savings	50	PERT	25	50	75	Surety Bond: The cost of getting bonded can vary depending on a few factors such as personal credit and financial strength of an applicant, as well as the risk associated with a type of bond. Part 70 Licensees are NOT impacted by the table. All 60 Licensees (Section 5.4) are Part 30 Licensees. Of the 60 Licensees, only 50 are affected resulting in a savings, a decrease but still require financial assurance.
Annual Surety Bond Savings	\$3,625	Uniform	\$500		\$6,750	NRC Estimate: Surety Bond will be in an amount of ranging from 50K to \$2.25M but typically will be \$50 K to \$225K. Yearly: 1% to 3%. Part 70 Licensees are NOT impacted by the table. All 60 Licensees are Part 30 Licensees. Of the 60 Licensees, only 40 are affected. Of the 40 affected, 30 will go down resulting in a Savings, a decrease but still require financial assurance.
Financial Assurance Mechanism: (Annual Bank Servicing the Instrument - Surety Bond) Cost	10	PERT	5	10	15	Surety Bond: The cost of getting bonded can vary depending on a several factors such as personal credit and financial strength of an applicant, as well as the risk associated with a type of bond. Part 70 Licensees are NOT impacted by the table. All 60 Licensees are Part 30 Licensees. Of the 60 Licensees, only 40 are affected. Of the 40 affected, 10 will go up resulting in a Cost, an increase in financial assurance.
Annual Bank Servicing the Surety Bond (Cost/Licensee) Cost	(\$3,625)	Uniform	(\$6,750)		(\$500)	NRC Estimate: Surety Bond will be in an amount of ranging from \$50K to \$2.5M but typically will be \$50 K to \$225K. Yearly: 1% to 3%. Part 70 Licensees are NOT impacted by the table. All 60 are Part 30 Licensees. Of the 60 Licensees, only 40 are affected. Of the 40 affected 10 will go up resulting in a Cost, an increase in financial assurance.

Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Savings	30	PERT	15	30	45	A letter of credit, or a credit letter, is a letter from a bank guaranteeing that a buyer's payment to a seller will be received on time and for the correct amount. 1st yr. = \$225,000 + 2%; 2nd Yr. to End 2% of \$225K. Part 70 Licensees are NOT impacted by the table. All 60 Licensees are Part 30 Licensees. Of the 60 Licensees, only 40 are affected. Of the 40 affected, 30 will go down resulting in a Savings, a decrease but still require financial assurance.
Annual Bank Servicing the Letter of Credit Savings	\$3,625	Uniform	\$500		\$6,750	NRC Estimate: Letter of Credit will be in an amount typically ranging from \$50 K to \$225K. Yearly: 1% to 3% (~2%). Part 70 Licensees are NOT impacted by the table. All 60 are Part 30 Licensees. Of the 60 Licensees, only 40 are affected. Of the 40 affected, 30 will go down resulting in a Savings, a decrease but still require financial assurance.
Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) Cost	10	PERT	5	10	15	A letter of credit, or a credit letter, is a letter from a bank guaranteeing that a buyer's payment to a seller will be received on time and for the correct amount. 1st yr. = \$225,000 + 2%; 2nd Yr. to End 2% of \$225K. Part 70 Licensees are NOT impacted by the table. Of the 60 Licensees, only 40 are affected. Of the 40 affected, 10 will go up resulting in a Cost, an increase in financial assurance.
Financial Assurance Mechanism: (Annual Bank Servicing the Letter of Credit) (Cost/Licensee) Cost	(\$3,625)	Uniform	(\$6,750)		(\$500)	NRC Estimate: Letter of Credit will be in an amount of ranging from \$50K to \$2.5M but typically will be \$50 K to \$225K. Yearly: 1% to 3% (~2%). Part 70 Licensees are NOT impacted by the table. Of the 60 Licensees, only 40 are affected. Of the 40 affected 10 will go up resulting in a Cost, an increase in financial assurance.

<p>Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Savings</p>	<p>22</p>	<p>PERT</p>	<p>11</p>	<p>22</p>	<p>33</p>	<p>A trust (standby trust agreement) is a complex legal and financial entity that should be established with the help of a qualified attorney. Costs increase depending on the complexity of the trust. The price to establish a trust can range from \$3,000 to more than \$5,000 for irrevocable trusts. Part 70 Licensees are NOT impacted by the table. Of the 60 Licensees, only 40 are affected. Of the 40 affected, 22 will go down resulting in a Savings, a decrease but still require financial assurance.</p>
<p>Annual Trust Agreement Savings</p>	<p>\$3,625</p>	<p>Uniform</p>	<p>\$500</p>		<p>\$6,750</p>	<p>A trust (standby trust agreement) is a complex legal and financial entity that should be established with the help of a qualified attorney. Costs increase depending on the complexity of the trust. The price to establish a trust can range from \$3,000 to more than \$5,000 for irrevocable trusts. Part 70 Licensees are NOT impacted by the table. Of the 60 Licensees, only 40 are affected. Of the 40 affected, 22 will go down resulting in a Savings, a decrease but still require financial assurance.</p>
<p>Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) Cost</p>	<p>10</p>	<p>PERT</p>	<p>5</p>	<p>10</p>	<p>15</p>	<p>A trust (standby trust agreement) is a complex legal and financial entity that should be established with the help of a qualified attorney. Costs increase depending on the complexity of the trust. The price to establish a trust can range from \$3,000 to more than \$5,000 for irrevocable trusts. Part 70 Licensees are NOT impacted by the table. Of the 60 Licensees, only 40 are affected. Of the 40 affected, 10 will go up resulting in a Cost, an increase in financial assurance.</p>

Financial Assurance Mechanism: (Annual Bank Servicing the Trust Agreement) (Cost/Licensee) Cost	(\$4,875)	Uniform	(\$6,750)		(\$3,000)	A trust (standby trust agreement) is a complex legal and financial entity that should be established with the help of a qualified attorney. Costs increase depending on the complexity of the trust. The price to establish a trust can range from \$3,000 to more than \$5,000 for irrevocable trusts. Part 70 Licensees are NOT impacted by the table. Of the 60 Licensees, only 40 are affected. Of the 40 affected 22 will go up resulting in a Cost, an increase in financial assurance.
Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) Cost	33	PERT	17	33	50	Statement of Intent is a formal statement that the author has a serious intention of doing something under specified conditions, and at a specified time. Part 70 Licensees are NOT impacted by the table. Of the 60 Licensees, only 33 are affected and will go up resulting in a Cost, an increase in financial assurance.
Financial Assurance Mechanism: (Annual Maintaining the Statement of Intent) (Cost/Licensee) Cost	(\$750)	Uniform	(\$1,000)		(\$500)	Statement of Intent may result in Savings if Statement of Intent will grant relief of having to go keep Surety Bonds, Letter of Credit, Stand- By Trust Agreement. Part 70 Licensees are NOT impacted by the table. Of the 60 Licensees, only 33 are affected and will go up resulting in a Cost, an increase in financial assurance.

Appendix C Quantities of Licensed Material Used to Assess Financial Assurance for Decommissioning (Proposed Updated Table)

Radionuclide	Microcuries
Actinium-227	0.001
Aluminum-26	10
Americium-241	0.001
Americium-242m	0.001
Americium-243	0.001
Antimony-125	100
Argon-39	1,000
Barium-133	100
Berkelium-247	0.001
Berkelium-249	0.1
Beryllium-10	1
Bismuth-207	10
Bismuth-210m	0.1
Cadmium-109	1
Cadmium-113m	0.1
Cadmium-113	100
Calcium-41	100
Calcium-45	100
Californium-248	0.01
Californium-249	0.001
Californium-250	0.001
Californium-251	0.001
Californium-252	0.001
Carbon-14	100
Cerium-139	100
Cerium-144	1
Cesium-134	10
Cesium-135	100
Cesium-137	10
Chlorine-36	10
Cobalt-57	100
Cobalt-60	1
Curium-242	0.01
Curium-243	0.001
Curium-244	0.001
Curium-245	0.001
Curium-246	0.001
Curium-247	0.001
Curium-248	0.001
Dysprosium-159	100
Einsteinium-254	0.01
Europium-150	1
Europium-152	1
Europium-154	1
Europium-155	10
Gadolinium-148	0.001

Radionuclide	Microcuries
Gadolinium-151	10
Gadolinium-152	100
Gadolinium-153	10
Germanium-68	10
Gold-195	10
Hafnium-172	1
Hafnium-178m	0.1
Hafnium-182	0.1
Holmium-166m	1
Hydrogen-3	1,000
Indium-115	100
Iodine-129	1
Iridium-194m	10
Iron-55	100
Iron-60	1
Krypton-81	1,000
Krypton-85	1,000
Lanthanum-137	10
Lanthanum-138	100
Lead-202	10
Lead-205	100
Lead-210	0.01
Lutetium-173	10
Lutetium-174m	10
Lutetium-174	10
Lutetium-176	100
Lutetium-177m	10
Manganese-53	1,000
Manganese-54	100
Mercury-194	1
Molybdenum-93	10
Neptunium-235	100
Neptunium-236	0.001
Neptunium-237	0.001
Nickel-59	100
Nickel-63	100
Niobium-93m	10
Niobium-94	1
Osmium-194	1
Palladium-107	10
Platinum-193	1,000
Plutonium-236	0.001
Plutonium-238	0.001
Plutonium-239	0.001
Plutonium-240	0.001
Plutonium-241	0.01
Plutonium-242	0.001
Plutonium-244	0.001
Polonium-210	0.1
Potassium-40	100

Radionuclide	Microcuries
Promethium-143	100
Promethium-144	10
Promethium-145	10
Promethium-146	1
Promethium-147	10
Protactinium-231	0.001
Radium-226	0.1
Radium-228	0.1
Rhenium-184m	10
Rhenium-186m	10
Rhenium-187	1,000
Rhodium-101	10
Rhodium-102m	10
Rhodium-102	10
Rubidium-87	100
Ruthenium-106	1
Samarium-145	100
Samarium-146	1
Samarium-147	100
Samarium-151	10
Selenium-79	100
Silicon-32	1
Silver-108m	1
Silver-110m	10
Sodium-22	10
Strontium-90	0.1
Tantalum-179	100
Technetium-97	1,000
Technetium-98	10
Technetium-99	100
Tellurium-121m	10
Tellurium-123	100
Terbium-157	10
Terbium-158	1
Thallium-204	100
Thorium-228	0.001
Thorium-229	0.001
Thorium-230	0.001
Thorium-232	100
Thorium-natural	100
Thulium-170	10
Thulium-171	10
Tin-119m	100
Tin-121m	100
Tin-123	10
Tin-126	10
Titanium-44	1

[Page intentionally left blank.]

Appendix D Position Titles and Occupations

Position Title	Occupation (SOC code)*	Hourly mean wage (\$2021)	Hourly 25 th percentile wage (\$2021)	Hourly 75 th percentile wage (\$2021)	Source
Technical Staff	Industry: State Government, excluding schools and hospitals (OEWS Designation) Healthcare Practitioners and Technical Occupations (29-0000)	\$37.41	\$23.99	\$42.92	https://data.bls.gov/oes/#/indOcc/Multiple%20occupations%20for%20one%20industry
	Industry: State Government, excluding schools and hospitals (OEWS Designation) Diagnostic Related Technologist and Technicians (29-2030)	\$29.59	\$23.11	\$37.41	https://data.bls.gov/oes/#/indOcc/Multiple%20occupations%20for%20one%20industry
	Average	\$33.50	\$23.55	\$40.17	-
Administrative Staff	Industry: State Government, excluding schools and hospitals (OEWS Designation) Clinical Laboratory Technologists and Technicians (29-2010)	\$24.32	\$18.02	\$29.04	https://data.bls.gov/oes/#/indOcc/Multiple%20occupations%20for%20one%20industry
	Industry: State Government, excluding schools and hospitals (OEWS Designation) Radiologic Technologists and Technicians (29-2034)	\$29.58	\$23.11	\$37.41	https://data.bls.gov/oes/#/indOcc/Multiple%20occupations%20for%20one%20industry
	Average	\$26.95	\$20.57	\$33.23	-
Licensing Staff	Paralegals and Legal Assistants (23-2011)	\$28.04	\$21.82	\$34.98	https://www.bls.gov/oes/current/oes232011.htm
	Lawyers (231011)	\$71.17	\$39.24	\$93.55	https://www.bls.gov/oes/current/oes231011.htm
	Average	\$49.61	\$30.53	\$64.27	-
Agreement States Staff	Industry: State Government, excluding schools and hospitals (OEWS Designation) Healthcare Practitioners and Technical Occupations (29-0000)	\$37.41	\$23.99	\$42.92	<u>State Government, excluding schools and hospitals (OEWS Designation)</u>
Footnotes:					
(1) SOC code: Standard Occupational Classification code—see https://www.bls.gov/soc/home.htm					
(2) NAICS code: North American Industry Classification System code—see https://www.bls.gov/bls/naics.htm					
(3) Data extracted on January 10, 2023.					

* Occupational Employment and Wage Statistics (OEWS)

[Page intentionally left blank.]

Appendix E Labor Categories Rates Converted to 2023 Dollars

Labor Category	Mean Hourly wage (2021)	CPI-U Inflation (2021 to 2023)	Labor Burden Multiplier	Labor Mix Percentage	2023 Dollars		
					BLS Burdened Hourly mean wage	BLS Burdened Hourly 25th percentile wage	BLS Burdened Hourly 75th percentile wage
Technical Staff	\$33.50	1.108	2.4	25%	\$22.26	\$15.65	\$26.69
Administrative Staff	\$26.95	1.108	2.4	25%	\$17.91	\$13.67	\$22.08
Licensing Staff	\$49.61	1.108	2.4	50%	\$65.93	\$40.58	\$85.41
<i>Total Licensee</i>					<i>\$106.10</i>		
Agreement States Staff	\$37.41	1.108	2.4		\$99.44	\$63.77	\$114.09
NRC (2023)	\$143				\$143.00		