
**Draft Regulatory Analysis for Proposed Rule:
Low-Level Radioactive Waste Disposal (10 CFR
Part 61)**

U.S. Nuclear Regulatory Commission

**Office of Federal and State Materials and Environmental
Management Programs**

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Executive Summary

The U.S. Nuclear Regulatory Commission (NRC) is proposing to amend its regulations that govern low-level radioactive waste (LLRW) disposal facilities to require new and revised site-specific technical analyses and to permit the development of criteria for LLRW acceptance based on the results of these analyses. These amendments would ensure that LLRW streams that are significantly different from those considered during the development of the current regulations (i.e., depleted uranium and other unanalyzed waste streams) can be disposed of safely and meet the performance objectives for land disposal of LLRW. These amendments would also increase the use of site-specific information to ensure performance objectives are met that are designed to provide protection of public health and safety. These amendments would revise the existing technical analysis for protection of the general population (i.e., performance assessment) to include a 10,000-year compliance period; add a new site-specific technical analysis for the protection of inadvertent intruders (i.e., intruder assessment) that would include a 10,000-year compliance period and a dose limit; add a new analysis for certain long-lived LLRW (i.e., performance period analysis) that would include a post-10,000-year performance period; and a requirement to update the technical analyses at closure. The NRC would also be adding a new requirement to develop criteria for the acceptance of LLRW for disposal, based on either the results of these technical analyses or the existing LLRW classification requirements. Additionally, the NRC is also proposing amendments to facilitate implementation and better align the requirements with current health and safety standards. This rule would affect LLRW disposal licensees or license applicants that are regulated by the NRC or the Agreement States.

This regulatory analysis examines the benefits and costs of the proposed requirements. The key findings of the analysis are as follows:

- **Cost to the Industry.** The proposed rule would result in additional costs to the industry with the majority of the costs resulting from implementation. On average, each licensee would incur an estimated implementation cost of \$837,000, followed by an estimated annual cost of \$4,000. Overall, the industry will incur an estimated implementation cost of \$3.3 million, followed by an estimated annual cost of \$16,000.
- **Cost to the Agreement States.** The proposed rule would result in additional costs to the Agreement States with all costs resulting from implementation. On average, each Agreement State would incur an estimated implementation cost of \$428,515. Overall, the Agreement States will incur an estimated implementation cost of \$1.7 million.
- **Cost to the NRC.** The NRC would incur an implementation cost for drafting and implementing a final rulemaking based on the proposed rule. This cost is estimated to be \$260,000. Because the NRC does not have any LLRW disposal licensee, no annual NRC cost is expected. The NRC would also incur an estimated implementation cost of \$225,225, for drafting a final guidance document based on the final rule.

Decision Rationale. Although the NRC did not quantify the benefits of this rule, the agency did examine its benefits qualitatively. These include both the direct benefits that would accrue and the indirect benefits from risks that could be avoided if the NRC adopted the rule. The principal qualitative benefits of the proposed action would include: 1) ensuring that LLRW streams that are significantly different from those considered during the development of the current regulations can be disposed of safely and meet the performance objectives for land disposal of

LLRW; 2) facilitating the use of site-specific information and up-to-date dosimetry methodology in site-specific technical analyses to ensure public health and safety is protected; and 3) promoting a risk-informed regulatory framework that specifies what requirements need to be met and provides flexibility to a licensee or applicant with regard to what information or approach they use to satisfy those requirements. The NRC concluded that the rule is cost-justified because the proposed regulatory initiatives would ensure the safe disposal of LLRW that was not analyzed in the original 10 CFR Part 61 regulatory basis (e.g., large quantities of depleted uranium).

Acronyms

ADAMS	Agencywide Documents Access and Management System
CFR	Code of Federal Regulations
BLS	Bureau of Labor Statistics
FTE	Full-time equivalent
LLRW	Low-level radioactive waste
NRC	U.S. Nuclear Regulatory Commission
OMB	Office of Management and Budget

1. Introduction

The NRC adopted licensing requirements for the disposal of commercial LLRW in land disposal facilities in 1982 (47 FR 57446). The proposed amendments would revise Title 10 of the *Code of Federal Regulations* (10 CFR) Part 61 to require LLRW disposal licensees and license applicants to conduct site-specific analyses and permit the development of criteria for LLRW acceptance based on the results of these analyses. These amendments would ensure that LLRW streams that are significantly different from those considered during the development of the current regulations can be disposed of safely and meet the performance objectives for land disposal of LLRW. These amendments would also increase the use of site-specific information to ensure that public health and safety is protected.

This regulatory analysis evaluates the costs and benefits associated with the proposed rule, "Proposed Rule: Low-Level Radioactive Waste Disposal (10 CFR Part 61)." This document presents background material, rulemaking objectives, alternatives, input assumptions, analysis of the costs and benefits of the proposed rule and a decision rationale.

The remainder of this introduction is divided into two sections. Section 1.1 states the problem and objective of the rulemaking. Section 1.2 provides background information.

1.1 Statement of the Problem and Reasons for Rulemaking

The NRC developed the current 10 CFR Part 61 regulations based on assumptions from a survey of LLRW generators regarding the types of LLRW likely to go into a commercial disposal facility.¹ The results of this survey formed the regulatory basis for the source terms used in the analysis to define the allowable isotopic concentration limits in Tables 1 and 2 of 10 CFR 61.55, "Waste classification," which established three classes of LLRW (Class A, Class B, and Class C) that are suitable for near-surface disposal. Tables 1 and 2 of 10 CFR 61.55 provides limiting concentrations for long-lived radionuclides and limiting concentrations for short-lived radionuclides, respectively.

In addition to determining the acceptability of LLRW for disposal in a near-surface land disposal facility, the LLRW classification system is also integral to determining Federal and State responsibilities for LLRW and requirements for transfers of LLRW intended for disposal. The Low-Level Radioactive Waste Policy Act of 1980 (LLRW Act), as amended in 1985, defines Federal and State responsibilities for the disposal of LLRW based on 10 CFR 61.55, as in effect on January 26, 1983. Specifically, the LLRW Act assigns responsibility for disposal of Class A, Class B, and Class C commercial LLRW to the States and responsibility for disposal of commercial LLRW with concentrations that exceed the limits for Class C LLRW to the Federal Government.

Low-level radioactive waste streams generated by the U.S. Department of Energy, including large quantities of DU, were not considered in the original analysis to determine the

¹ NRC, "Final Environmental Impact Statement on 10 CFR Part 61, 'Licensing Requirements for Land Disposal of Radioactive Waste,'" NUREG-0945, Vols. 1–3, November 1982, ADAMS Accession Nos. ML052590184, ML052920727, and ML052590187.

concentration limits in Tables 1 and 2 of 10 CFR 61.55. LLRW streams from commercial uranium enrichment facilities and blended LLRW, which might result in large quantities of material near the upper bounds of an LLRW class, also were not considered. Further, new technologies might result in the future generation of different LLRW streams not evaluated when the current 10 CFR Part 61 regulations were developed. Thus, if LLRW differs significantly in quantity and concentration from what was considered in the development of the current 10 CFR Part 61, then it might be possible to dispose of LLRW that meets the disposal requirements but results in an intruder dose (if calculated) that exceeds the dose limit used to develop the LLRW classification tables (i.e., 5 milliSieverts per year (mSv/yr) (500 millirem per year (mrem/yr))).

1.2 Background

The NRC adopted the current 10 CFR Part 61 in 1982 (47 FR 57446). The regulations place emphasis on an integrated systems approach to the disposal of commercial LLRW, including site selection, disposal facility design and operation, minimum waste form requirements, and disposal facility closure. To reduce reliance on institutional controls, 10 CFR Part 61 emphasizes passive, rather than active, systems to limit and retard the release of LLRW to the environment.

The regulations at 10 CFR Part 61, Subpart C, contains performance objectives, which set standards for a) 10 CFR 61.41, "Protection of the general population from the releases of radioactivity;" b) 10 CFR 61.42, "Protection of individuals from inadvertent intrusion;" c) 10 CFR 61.43, "Protection of individuals during operations;" and d) 10 CFR 61.44, "Stability of disposal site after closure." License applicants under 10 CFR Part 61 must prepare an assessment of potential dose impacts to the general population to demonstrate that they will meet the 10 CFR Part 61, Subpart C performance objectives. License applicants must also demonstrate adequate protection of potential inadvertent intruders into the LLRW disposal facility, who might occupy the site at any time after institutional controls over the LLRW disposal facility are removed and are unaware of the radiation hazard from the LLRW. Currently, licensees demonstrate protection of inadvertent intruders by complying with the LLRW classification (10 CFR 61.55) and segregation requirements (10 CFR 61.52, "Land disposal facility operation and disposal site closure,") and by providing adequate barriers to inadvertent intrusion.

Explicit dose limits for an inadvertent intruder are not currently provided in 10 CFR Part 61 because an intruder dose assessment is not required, but the LLRW classification concentrations limits for radionuclides, in Tables 1 and 2 of 10 CFR 61.55, were based on a dose of 5 mSv/yr (500 mrem/yr) to an inadvertent intruder. The final LLRW classification tables were developed assuming that only a fraction of the LLRW being disposed would approach the LLRW classification limits and that the dose to an intruder exposed to a large volume of disposed LLRW at the classification limits could exceed 5 mSv/yr (500 mrem/yr). By complying with the LLRW classification and segregation requirements, a licensee can demonstrate that an inadvertent intruder will be protected if the LLRW stream proposed for disposal is sufficiently similar to that considered by the regulatory basis for the current 10 CFR Part 61 regulations and if the underlying assumptions are not compromised.

Currently, 10 CFR Part 61 does not specify a time period² for the protection of the general population from releases of radioactivity. The regulatory basis for 10 CFR Part 61 regulations and the related guidance documents recognize the need to use an analysis timeframe commensurate with the persistence of the hazard. Selection of an analysis timeframe generally considers the characteristics of the LLRW, the analysis framework (assumed scenarios, receptors, and pathways), societal uncertainties, uncertainty in predicting the behavior of natural systems over time, and national and international LLRW disposal practices. The analysis timeframe needs to consider both technical factors (e.g., the characteristics and persistence of the radiological hazard attributed to the LLRW) and socioeconomic factors (e.g., transgenerational equity).³ The purpose of assigning an analysis timeframe to the site-specific technical analyses is to ensure that public health and safety are protected to prescribed limits with an acceptable degree of confidence. Proposing a specific analysis timeframe in the regulations would ensure the safe disposal of LLRW by providing clear direction to licensees, license applicants, and the Agreement States.

The NRC is proposing a 10,000-year compliance period based primarily on the natural cycling of climate, characteristics of the LLRW, radionuclide transport characteristics, national and international programs, and previous recommendations by the Advisory Committee on Nuclear Waste⁴ and the performance assessment working group.⁵ The regulatory basis for the NRC's selection of the compliance period can be found in the NRC's position paper, "Technical Analysis Supporting Definition of Period of Performance for Low-Level Waste Disposal," dated April 28, 2011 (ADAMS Accession No. ML111030586), and "Regulatory Basis for Proposed Revisions to Low-Level Waste Disposal Requirements (10 CFR Part 61)," dated December 19, 2012 (ADAMS Accession No. ML12356A242).

The NRC's existing criteria for LLRW acceptance can be found in Subpart D of 10 CFR Part 61, which specifies technical requirements for land disposal facilities for commercial LLRW. The technical requirements specify the classes and characteristics of LLRW that are acceptable for near-surface disposal, as well as other requirements. Currently, 10 CFR 61.55 provides the primary criteria related to LLRW acceptance and identifies the classes of LLRW acceptable for near-surface disposal (i.e., the LLRW classification system). Section 10 CFR 61.56, "Waste characteristics," identifies minimum characteristics for all classes of LLRW and characteristics to ensure the stability of certain LLRW (i.e., Class B and Class C). Additionally, 10 CFR 61.52, "Land disposal facility operation and disposal site closure," specifies requirements for

² Different terminology has historically been used to refer to the timeframe assessed for regulatory compliance or other analyses including "performance period," "time of compliance," "compliance period," and other variants.

³ ICRP, "Radiation Protection Recommendations as Applied to the Disposal of Long-lived Solid Radioactive Waste," ICRP Publication 81, Annals of the ICRP, Vol. 28, No. 4, ICRP Publication 81, 2000.

⁴ Pomeroy, P.W., Chairman, Advisory Committee on Nuclear Waste, Letter to the Honorable Shirley Ann Jackson, Chairman, U.S. NRC, "Time of Compliance for Low-Level Nuclear Waste Disposal Facilities," Washington, DC, February 11, 1997, ADAMS Accession No. ML091490047.

⁵ NRC, "A Performance Assessment Methodology for Low-Level Radioactive Waste Disposal Facilities: Recommendations of NRC's Performance Assessment Working Group," NUREG-1573, October 2000, ADAMS Accession No. ML003770778.

near-surface LLRW disposal facility operation, including segregation and intruder barrier requirements for various classes of LLRW. Section 10 CFR 61.58, “Alternative requirements for waste classification and characteristics,” currently allows for other provisions for the classification and characteristics of LLRW on a case-by-case basis if, after evaluation, the Commission finds reasonable assurance of compliance with the Subpart C performance objectives.

2. Identification of Alternative Approaches

The following discussion describes the two alternatives being considered in this regulatory analysis, with additional analysis presented in Section 3.

2.1 Alternative 1: No-Action

Alternative 1, the no-action alternative, would maintain the regulations as written. Under this option, the NRC would not modify 10 CFR Part 61. The rules would continue to provide no performance period analyses requirements, no specified compliance period, no new intruder assessment or performance assessment requirements, no dose limit for the inadvertent intruder, no updated compliance and performance period analyses, and no LLRW acceptance plan. Alternative 1 would avoid the costs that the proposed rule revisions would impose, but would not update the existing LLRW disposal requirements to ensure the current level of protection for public health and safety. Alternative 1, the no-action alternative, is the baseline of this regulatory analysis.

2.2 Alternative 2: Rulemaking to Amend 10 CFR Part 61

Under Alternative 2, the NRC would ensure the safe disposal of LLRW by amending 10 CFR Part 61 through the rulemaking process. The amended 10 CFR Part 61 would require LLRW disposal facility licensees and license applicants to prepare new and updated site-specific technical analyses to demonstrate compliance with 10 CFR Part 61, Subpart C performance objectives. The amended rules would apply to LLRW disposal licensees and license applicants regulated by the NRC. Agreement States would be required to develop conforming regulations within 3 years of the publication date of the final amended 10 CFR Part 61.

This rulemaking would require LLRW disposal licensees or license applicants to prepare: 1) an updated performance assessment to demonstrate the protection of the general population from releases of radioactivity (proposed 10 CFR 61.41); 2) a new intruder assessment to demonstrate the protection of inadvertent intruders (proposed 10 CFR 61.42); 3) new performance period analyses to evaluate how the disposal system could mitigate the risk from disposal of long-lived LLRW (proposed 10 CFR 61.13(e)); and 4) a new LLRW acceptance plan for shipments of LLRW (proposed 10 CFR 61.58), to provide greater assurance of compliance with the performance objectives of Subpart C in 10 CFR Part 61, and to ensure safe disposal of LLRW that was not analyzed in the original 10 CFR Part 61 regulatory basis (e.g., large quantities of depleted uranium). Licensees would also be required to provide updated compliance and performance period analyses with the application to amend the license for closure (proposed 10 CFR 61.28).

The regulations at 10 CFR 61.41 require licensees to prepare an analysis to demonstrate protection of the general population from releases of radioactivity—this analysis is currently

called a technical analysis. In the proposed rule, the staff is proposing to update the terminology and specify updated requirements for this analysis. The proposed rule would replace the outdated term “technical analysis” with the more modern term “performance assessment,” in 10 CFR 61.13, “Technical analyses.” The proposed performance assessment would estimate peak dose within the 10,000-years compliance period following closure of the disposal facility. The proposed performance assessment would identify and evaluate the specific characteristics of the disposal site; degradation, deterioration, or alteration processes of the engineered barriers and natural system; and interactions between the site characteristics and engineered barriers that might affect the performance of the disposal system. The proposed 10,000-year timeframe for this assessment is an important additional technical parameter for these analyses over existing requirements and is significant when evaluating LLRW streams that were not considered in the original 10 CFR Part 61 rulemaking. The requirement to prepare a performance assessment is a risk-informed approach that provides flexibility to a licensee or applicant regarding what information or approach they may use to satisfy those requirements. The NRC believes that the proposed approach is warranted because of the site-specific nature of LLRW disposal, which can rely on different facility designs at different sites.

Currently, 10 CFR 61.42 does not require a site-specific technical analysis to demonstrate the protection of an inadvertent intruder. Instead, the safety of an inadvertent intruder is demonstrated by compliance with the LLRW classification system and the disposal requirements imposed for each class of LLRW. The connection between the LLRW classification system and protection of an inadvertent intruder is reflected in the LLRW classification tables in 10 CFR 61.55(a). The proposed revisions to 10 CFR 61.42 would require an intruder assessment that quantitatively estimates the radiological exposure of an inadvertent intruder at a LLRW disposal facility following an assumed loss of institutional controls. The results of the intruder assessment would then be compared to the performance objective in 10 CFR 61.42. The intruder assessment would have to identify the intruder barriers, examine the capability of the barriers, and address the effects of uncertainty on the performance of the barriers. The capabilities of the barriers to inhibit contact with the disposed LLRW or to limit the radiological exposure of an inadvertent intruder and the time period over which the capability persists must be demonstrated with an intruder assessment. Proposed 10 CFR 61.42 would also include a proposed annual dose limit of 5 mSv/yr (500 mrem/yr), which would ensure that the dose limit that provided the basis for the 10 CFR 61.55 LLRW classification tables (i.e., 5 mSv/yr (500-mrem/yr)), is not exceeded. The NRC proposed amendments to 10 CFR 61.42 to ensure protection of any inadvertent intruder who occupies the disposal site or contacts the LLRW at any time after active institutional controls are removed.

The current 10 CFR Part 61 regulations developed a system of analyses, LLRW classification, site-selection, LLRW characteristics, and other requirements to ensure protection of public health and safety. Impacts, regardless of timeframes, were expected to be assessed by licensees or license applicants. The need for a licensee or applicant to perform performance period analyses (e.g., after 10,000 years) was eliminated when NRC developed LLRW classification limits for long-lived radionuclides. The regulatory system was designed to ensure the short- and long-term impacts were limited by regulatory requirements such as the LLRW classification system. The performance period analyses in proposed 10 CFR 61.13(e), “Technical analyses,” would require licensees or license applicants to prepare performance period analyses (i.e., after 10,000 years) that assess how the LLRW disposal facility and site characteristics limit the potential long-term radiological impacts, consistent with available data

and current scientific understanding. The analyses are proposed to only be required for land disposal facilities with long-lived LLRW that contains radionuclides with average concentrations exceeding the values listed in proposed Table A of 10 CFR 61.13(e), "Average Concentrations of Long-lived Radionuclides Requiring Performance Period Analyses," or if necessitated by site-specific conditions. The proposed amendment to 10 CFR 61.13(e) would evaluate any additional measures that are needed at a disposal site to ensure the protection of the general population and the inadvertent intruder from disposal of long-lived LLRW.

The NRC is also proposing to amend 10 CFR 61.58, along with a new title "Waste acceptance," to require LLRW disposal licensees or license applicants to develop criteria for the acceptability of shipments of LLRW for disposal. These amendments maintain the existing LLRW classification system, but permit licensees or license applicants to account for facility design, disposal practices, and site characteristics to determine if LLRW would be acceptable for disposal. Under the proposed 10 CFR 61.58(f), licensees are also required to conduct an annual review of the LLRW acceptance plan to determine if they need to be updated, to ensure that the LLRW disposal facility complies with the Subpart C performance objectives. Because licensees or license applicants are permitted to develop site-specific LLRW acceptance criteria rather than rely on the LLRW classification system for acceptance criteria under the proposed LLRW acceptance amendments, the NRC is also proposing to amend Appendix G of 10 CFR Part 20, "Standards for Protection Against Radiation," to conform to proposed requirements for LLRW acceptance.

Currently, 10 CFR 61.28, "Contents of application for closure," requires LLRW disposal licensees to submit an application to amend their license for closure. This application must include: a) a final revision and specific details of the disposal site closure plan, and b) an environmental report or a supplement to an environmental report. This section currently does not include site-specific technical analyses. The proposed rule would require licensees to include updated site-specific technical analyses in their application to amend their license for closure to provide greater assurance of compliance with the Subpart C performance objectives, and to ensure the safe disposal of LLRW. Under current 10 CFR 61.28(c), which is not being amended by this rulemaking, the NRC can only authorize closure of the facility if there is reasonable assurance that the long-term performance objectives in Subpart C of 10 CFR Part 61 will be met. Therefore, requiring updated compliance period and performance period analyses by licensees may result in the licensee being required to take additional action prior to closure to ensure that the LLRW that has been disposed of will meet the long-term Subpart C performance objectives.

Currently, 10 CFR 61.23, "Condition of licenses," requires LLRW disposal licensees to provide updated technical analyses, as part of an application for amendment of a license, if they are to deviate from the licensing conditions. Actions considered deviations would include, but not be limited to, receiving new LLRW streams or LLRW that are different in volumes and concentrations from those listed in Tables 1 and 2 of 10 CFR 61.55 or the LLRW acceptance plan specified in 10 CFR 61.58. The proposed rule would require licensees to update site-specific technical analyses and the LLRW acceptance plan, as would be required by proposed 10 CFR 61.13(e), 10 CFR 61.41, 10 CFR 61.42, and 10 CFR 61.58, to ensure that the LLRW disposal facility complies with the Subpart C performance objectives.

Section 5 discusses the reasons for choosing Alternative 2.

3. Estimation and Evaluation of Benefits and Costs

This section describes the analysis that the NRC conducted to identify and evaluate the benefits and costs of the two regulatory alternatives. Section 3.1 describes how the benefits and costs have been analyzed. Section 3.2 presents the assumptions of the analysis. Section 3.3 identifies the entities expected to be affected by the proposed rulemaking. Section 3.4 identifies the attributes expected to be affected by the proposed rulemaking.

3.1 Analytical Methodology

This section describes the methodology used to analyze the consequences associated with the proposed rule. The benefits include any desirable changes in the affected attributes. The costs include any undesirable changes in affected attributes.

The NRC collected input assumptions using data and information from NRC staff experience, NRC documents, and other related documents.

The attributes expected to be affected, as described in Section 3.4, are evaluated quantitatively, if possible. Therefore, licensee implementation and operation, Agreement State implementation, and NRC implementation attributes are evaluated quantitatively. Public health (accident) attribute is evaluated qualitatively.

In accordance with guidance from the Office of Management and Budget (OMB), Circular A-4 and NUREG/BR-0058, Revision 4, this regulatory analysis presents the results of the analysis using both 3-percent and 7-percent real discount rates. The real discounted rates or present-worth calculation determines how much society would need to invest today to ensure that the designated dollar amount is available in a given year in the future. By using present-worth calculations, costs and benefits, regardless of time, are valued equally. Based on OMB guidance (OMB Circular No. A-4, dated September 17, 2003), present-worth calculations are presented using both 3-percent and 7-percent real discount rates. The 3-percent rate approximates the real rate of return on long-term government debt which serves as a proxy for the real rate of return on savings. This rate is appropriate when the primary effect of the regulation is on private consumption. Alternatively, the 7-percent 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.

3.2 Assumptions

The NRC assumes the following for the purpose of this regulatory analysis:

3.2.1 General assumptions

1. The proposed rule allows the affected licensees up to 5 years after the final rule goes into effect to conduct the proposed analyses. For this regulatory analysis, the NRC assumes the analyses are completed during the first year after a final rule takes effect in each Agreement State. Therefore, the one-time implementation costs associated with conducting the proposed analyses would be incurred in calendar year 2018. This is based on the NRC publishing the final rule in 2014 and the

Agreement States should adopt the final rule and develop conforming regulations within 3 years of the effective date of the rule.⁶

2. The NRC calculates benefits and costs over a 10-year period, discounted at a 7-percent and 3-percent discount rate and expressed in 2013 dollars.
3. Currently, three of the four existing LLRW disposal facilities are subject to a 5-year license renewal period. One of the four existing LLRW disposal facilities just initiated its 15-year initial licensing period. Thus, the NRC assumes an average license renewal period for the four licensees is 10 years. This 10-year period is also assumed for the period analyzed in the regulatory analysis.
4. For the purpose of this analysis, two of the four LLRW disposal facilities are assumed to accept only LLRW streams with short-lived radionuclides, and the remaining two facilities are assumed to accept, in addition to the short-lived LLRW streams, LLRW streams with long-lived radionuclides. These assumptions are based on information received from the Agreement States and NRC documents indicating two of the four existing LLRW disposal facilities have expressed an interest in accepting large quantities of long-lived LLRW, one existing LLRW disposal facility indicated that it would not accept more long-lived LLRW, and one existing LLRW disposal facility has not made its intentions known.
5. Currently, only one of the four existing LLRW disposal facilities plans to close its facility by 2044. To capture the facility closure costs, the NRC assumes that all four LLRW disposal facilities will close upon the next license renewal, assumed above to be after 10 years. This also coincides with the tenth year of the regulatory analysis period. The costs associated with LLRW disposal facility closures are included in the implementation cost.

3.2.2 Site-specific technical analysis assumptions

1. The NRC assumes that all four licensees would develop an LLRW acceptance plan as required by the proposed 10 CFR 61.58. This analysis also assumes site-specific technical analyses include compliance period analyses and performance period analyses. Compliance period analyses are performance assessments and intruder assessments that estimate peak annual doses that occur within the first 10,000 years, after facility closure, as would be required by proposed 10 CFR 61.41 and 10 CFR 61.42, respectively. Performance period analyses are analyses that assess how the LLRW disposal facility and site characteristics limit the potential long-term radiological impacts after the initial 10,000 years, as would be required by proposed 10 CFR 61.13(e).
2. The NRC assumes that the Agreement States will adopt compatible regulations 3 years after the final rule and that the licensees' initial analyses will be performed at next license renewal or within 5 years of the effective date. The costs for these initial

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NRC, "Adequacy and Compatibility of Agreement States Program," Directive 5.9, February 1998, ADAMS Accession No. ML041770094.

analyses and LLRW acceptance plan would be incurred as one-time implementation costs. All four affected licensees are assumed to be Agreement States' licensees, the NRC assumes that licensees' initial analyses would be conducted after the Agreement States' adoption of the compatible regulations, or at a time determined by the Agreement States.

3. The NRC assumes that all LLRW disposal facilities would update site-specific technical analysis and LLRW acceptance plans once during the 10-year regulatory analysis period.

3.2.3 Labor rate and full-time equivalent (FTE) assumptions

1. The NRC's labor rates are determined using the methodology in Abstract 5.2, "NRC Labor Rates," of NUREG/CR-4627, "Generic Cost Estimates, Abstracts from Generic Studies for Use in Preparing Regulatory Impact Analyses." This methodology considers only variable costs (including salary and benefits) that are directly related to the development, implementation, and continuing support of the proposed amendments. Currently, the NRC hourly labor rate is \$126, including all benefits. The estimation of costs for rulemaking is based on professional NRC FTE, without administrative staff support. Based on data from the NRC's time and labor system, the number of hours in 1 year that directly relate to a professional staff's implementation of assigned duties is 1,375; excluding hours such as leave, training, and completing administrative tasks. Therefore, an NRC professional staff FTE hourly rate is based on 1,375 hours. The NRC labor rate for one FTE is \$173,250.
2. As described in the Office of Management and Budget (OMB) Circular A-76, "Performance of Commercial Activities," the number of productive hours in 1 year is 1,776. As this actual value is likely to vary from State to State and no specific data are available, the FTE costs for the States and licensees are based on the number of hours estimated in OMB Circular A-76.
3. The NRC staff determined Agreement State labor rates using National Wage Data available on the Bureau of Labor Statistics (BLS) web site (www.bls.gov). Because exact hourly rates for each state vary from State to State, nationwide mean hourly rates are used. Also, the exact rulemaking burden varies from State to State depending, among other things on the mix of different professional skills and administrative support required. For review of licensee documents, the NRC estimates \$31.54/hour, using the BLS Employer Costs for Employee Compensation data set for "Environmental Scientist." These rates are multiplied by 1.5 to account for items such as pension, insurance, overhead, and other legally-required benefits. For the development and review of site-specific technical analyses and LLRW acceptance plans associated with this proposed rulemaking, the NRC uses a labor rate of \$47.31/hour, 1.5 times the \$31.54 hourly rate from the BLS's employer cost data set for a state government "Environmental Scientist."
4. Licensee labor rates were also obtained from Bureau of Labor Statistics National Wage Data available on the BLS web site. The NRC selected an appropriate mean hourly labor rate depending on the listed industry and the occupation (e.g., manufacturing, health and safety, etc.) and multiplying by 1.5 to account for

pension, insurance, and other legally-required benefits. Because exact licensee hourly rates can vary significantly, the NRC used nationwide mean hourly rates. For the development of site-specific technical analyses and LLRW acceptance plans associated with this proposed rulemaking, \$49.62/hour is used (\$33.08*1.5), which is from the BLS employer cost data set for an “Environmental Scientist” in the private sector.

3.2.4 Agreement State and licensee effort assumptions:

1. This analysis assumes two cost scenarios for these licensees.
In scenario 1, the licensee accepts only LLRW streams with short-lived radionuclides, and, therefore, is required to conduct only compliance period analyses. These analyses include: 1) an initial performance assessment required by the proposed 10 CFR 61.41; 2) an initial intruder assessment required by the proposed 10 CFR 61.42; and 3) an initial LLRW acceptance plan required by proposed 10 CFR 61.58. The licensee or license applicant would also be required to conduct updated compliance period analyses with the application to amend the license for closure as required by proposed 10 CFR 61.28. In addition, the licensee is required to update its compliance period analyses and LLRW acceptance plan, as part of an operating license amendment. The NRC assumes that two licensees follow this scenario.

In scenario 2, the licensee or license applicant would accept, in addition to the LLRW streams with short-lived radionuclides, LLRW with long-lived radionuclides. Therefore, in addition to the required compliance period analyses and LLRW acceptance plan, this licensee would also have to conduct: 1) the initial performance period analyses required by the proposed 10 CFR 61.13(e) and 2) the updated performance period analyses with the application to amend the license for closure as required by proposed 10 CFR 61.28. The NRC assumes that in addition to their initial performance period analyses, these licensees would also be required to conduct the updated performance period analyses and LLRW acceptance plan as part of an operating license amendment. The NRC also assumes that two licensees follow this scenario.

2. The analysis also assumes two cost scenarios for the Agreement States.
An Agreement State regulating a licensee that falls under cost scenario 1 incurs costs to review its licensee’s compliance period analyses and LLRW acceptance plan. These reviews would include: 1) an initial performance assessment required by the proposed 10 CFR 61.41; 2) an initial intruder assessment required by the proposed 10 CFR 61.42; and 3) an initial LLRW acceptance plan required by proposed 10 CFR 61.58. An Agreement State would also review updated compliance period analyses with the application to amend the license for closure. In addition, the Agreement State also incurs costs to review its licensee’s updated compliance period analyses and LLRW acceptance plan, as part of an operating license amendment. The NRC assumes that two Agreement States follow this scenario.

An Agreement State regulating a licensee that falls under cost scenario 2 also incurs costs to review, in addition to its licensee’s compliance period analyses and LLRW

acceptance plan: 1) the initial performance period analyses as required by the proposed 10 CFR 61.13(e) and 2) the updated performance period analyses as required by proposed 10 CFR 61.28 to be included with the application to amend the license for closure. In addition, the Agreement State also incurs costs to review its licensee's updated performance period analyses and LLRW acceptance plan, as part of an operating license amendment. The NRC assumes that two Agreement States follow this scenario.

3. In FY2011, the NRC performed a review of a site-specific technical analysis (compliance period analyses and performance period analyses) conducted by the U.S. Department of Energy (DOE), for its Savannah River Site F-Area Tank Farm Waste Determination. The DOE proposed to perform a Waste Determination to assign the residual high-level radioactive waste remaining in the liquid high-level radioactive waste tanks after cleaning, as LLRW. To do so, the DOE must demonstrate that the 10 CFR Part 61 performance objectives will be met. Therefore, the DOE's site-specific technical analyses are of a scope similar (though not identical) to a 10 CFR Part 61 LLRW disposal licensee's analysis. The NRC spent approximately 3,700 staff hours (three FTE) on the review, which includes multiple public and non-public efforts to develop and resolve "requests for additional information," review of DOE's modeling, and to develop a technical evaluation report. The NRC used this information and NRC staff experience derived from its review of the DOE Waste Determination to assume the following estimated costs for a licensee to conduct and an Agreement State to review the proposed site-specific technical analyses and LLRW acceptance plan:
 - a) The NRC assumes that an Agreement State requires the same effort to review a licensee's initial site-specific technical analyses as the NRC required to review DOE's site-specific technical analyses. Therefore, the NRC assumes that an Agreement State devotes 5,328 hours (three FTE) to review the licensee's initial site-specific technical analyses.
 - b) Based on NRC technical expertise, the NRC assumes that the estimated effort for an Agreement State to review a licensee's compliance period analyses is 1,776 hours (one FTE) and the estimated effort for an Agreement State to review the licensee's performance period analyses is 3,552 hours (two FTE).
 - c) Based on NRC technical expertise, the NRC assumes that the estimated effort for an Agreement State to review a licensee's updated compliance period analyses is 888 hours (0.5 FTE) and the estimated effort for an Agreement State to review the licensee's updated performance period analyses is 1,776 hours (one FTE).
 - d) Based on NRC technical expertise, the NRC assumes that the estimated effort for an Agreement State to review a licensee's LLRW acceptance plan is 888 hours (0.5 FTE) and the estimated effort for an Agreement State to review a licensee's updated LLRW acceptance plan is 177.6 hours (0.1 FTE).
 - e) Based on NRC technical expertise, the NRC assumes that a licensee expends twice the estimated effort developing all analyses provided below than the Agreement State expends reviewing the licensee's analyses.

- f) Based on the NRC assumption provided in e) of this section, the NRC assumes that a licensee expends 10,656 hours (six FTE) developing the initial site-specific technical analyses.
- g) Based on the NRC assumption provided in e) of this section, the NRC assumes that a licensee incurs 3,552 hours (two FTE) developing the compliance period analyses and 7,104 hours (four FTE) developing the performance period analyses.
- h) Based on the NRC assumption provided in e) of this section, the NRC assumes that a licensee expends 1,776 hours (one FTE) developing the updated compliance period analyses and 3,552 hours (two FTE) developing the updated performance period analyses.
- i) Based on the NRC assumption provided in e) of this section, the NRC assumes that a licensee expends 1,776 hours (one FTE) developing the initial LLRW acceptance plan.
- j) Based on the NRC assumption provided in e) of this section, the NRC assumes that a licensee incurs 888 hours (0.5 FTE) developing the updated LLRW acceptance plan.

3.3 Affected Entities

The affected entities are those entities that could be impacted from any of the alternatives. Currently, no new LLRW disposal facility is expected to be built during the regulatory analysis period. The affected entities are four licensees located in four separate Agreement States. The affected entities (Agreement State licensees and Agreement States) are the following:

- a) The four existing LLRW disposal licensees are:
 - 1. EnergySolutions at Clive, UT
 - 2. US Ecology, Inc., at Richmond, WA
 - 3. Waste Control Specialists LLC at Andrews, TX
 - 4. EnergySolutions at Barnwell, SC
- b) The four existing Agreement States are:
 - 1. Utah
 - 2. Washington
 - 3. Texas
 - 4. South Carolina

3.4 Identification of Affected Attributes

This section identifies the factors within the public and private sectors that the proposed rule is expected to affect, using the list of potential attributes provided in Chapter 5 of NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook," issued January

1997⁷, and in Chapter 4 of NUREG/BR-0058, Revision 4, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," issued September 2004.⁸ The evaluation considered each attribute listed in Chapter 5 of NUREG/BR-0184. The basis for selecting those attributes is presented below.

Affected attributes include the following:

- *Licensee Implementation*--The proposed changes require a licensee to develop: 1) initial compliance period analyses, which include a performance assessment (proposed 10 CFR 61.41); 2) a compliance period intruder assessment (proposed 10 CFR 61.42); 3) the initial performance period analyses (proposed 10 CFR 61.13(e)); and 4) initial LLRW acceptance plan (proposed 10 CFR 61.58). The licensee is also required to provide updated compliance and performance period analyses with the application to amend the license for closure (proposed 10 CFR 61.28). In addition, the proposed changes also require a licensee to conduct updated compliance period analyses, performance period analyses, and LLRW acceptance plan, as part of a license amendment.
- *Licensee Operation*--The proposed changes require a licensee to conduct an annual review of the LLRW acceptance plan as required under the proposed 10 CFR 61.58(f). In addition, licensees are also required to keep records under proposed 61.80(m).
- *Agreement State Implementation*--An Agreement State incurs costs to develop its conforming regulations to the 10 CFR Part 61 final rules. The proposed changes would also require an Agreement State to review its licensee's: 1) initial compliance period analyses, which include a performance assessment (proposed 10 CFR 61.41); 2) and a compliance period intruder assessment (proposed 10 CFR 61.42); 3) initial performance period analyses required (proposed 10 CFR 61.13(e)); and 4) initial LLRW acceptance plan (proposed 10 CFR 61.58). The Agreement State is also required to review its licensee's updated compliance and performance period analyses with the application to amend its license for closure (proposed 10 CFR 61.28). In addition, this proposed rule requires an Agreement State's licensee to conduct an update to its compliance period analyses, performance period analyses, and LLRW acceptance plan, as part of a license amendment; this would also require that an Agreement State incur the cost of reviewing these amendments.
- *NRC Implementation*--Under the proposed action, the NRC develops the proposed and final rule packages to be published in the *Federal Register*.

⁷ NRC, "Regulatory Analysis Technical Evaluation Handbook, Final Report," NUREG/BR-0184, January 1997, ADAMS Accession No. ML050190193.

⁸ NRC, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," NUREG/BR 0058, Rev. 4, September 2004, ADAMS Accession No. ML042820192.

The NRC also develops an implementation guidance document to support the requirements that would be added or modified by the rulemaking process.

- *Public Health (Accident)*--The proposed rule requires new site-specific technical analyses to ensure that an inadvertent intruder, who occupies the site and might unknowingly be exposed to radiation from disposed LLRW, will be protected. These analyses must demonstrate there is reasonable assurance that any inadvertent intruder will not be exposed to doses that exceed the performance objectives set forth in proposed 10 CFR 61.42.

Attributes that are not affected include the following: Agreement State operations, NRC operations, public health (routine), general public, regulatory efficiency, occupational health (routine), occupational health (accident), off-site property, on-site property, environmental considerations, antitrust considerations, safeguards and security considerations, and improvement in knowledge.

4. Presentation of Results

This section presents the results of the alternatives. Table 4-1 summarizes the costs of Alternative 2 by entity over the 10-year regulatory analysis period.

4.1 Alternative 1: No action

By definition, the No-Action Alternative, the baseline for the main analysis, does not result in any change of benefits or costs. The baseline assumes full compliance with existing NRC requirements.⁹

4.2 Alternative 2: Rulemaking to amend 10 CFR Part 61

Alternative 2 is divided into four sections: licensee costs, including implementation and operation costs; Agreement State implementation costs; NRC implementation costs; and public health (accident).

4.2.1 Licensee:

This analysis assumes that four separate licensees would incur costs for implementation and operation because of the rulemaking. Unless stated otherwise, each cost is incurred by all four licensees. Licensees could incur costs by the following impacts:

4.2.1.1 Licensee Implementation:

- a) Conducting initial performance period analyses.

⁹ NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," the NRC's staff guidance for regulatory analyses, states that, "in evaluating a new requirement...the staff should assume that all existing NRC requirements have been implemented."

Proposed 10 CFR 61.13(e) requires a licensee to conduct the initial performance period analyses that impacts two of the four affected licensees. The NRC estimates that the costs for each licensee to conduct the initial performance period analyses would be equal to 7,104 hours (four FTE). Therefore, the estimated cost to conduct the initial performance period analyses is to be \$352,502 per licensee and the total estimated cost to industry is \$705,004.

- b) Conducting initial compliance period analyses.

Proposed 10 CFR 61.41 and 10 CFR 61.42 require a licensee to conduct initial compliance period analyses, which include a performance assessment and an intruder assessment. The NRC estimates that the costs for each licensee to conduct its initial compliance period analyses would equal 3,552 hours (two FTE). Thus, the estimated total incremental cost, which is in addition to the cost to conduct the technical analysis currently required, is \$176,250 per licensee and the total estimated cost to the industry is \$705,000.

- c) Conducting initial LLRW acceptance plan.

Proposed 10 CFR 61.58 requires a licensee to develop an initial LLRW acceptance plan that impacts four licensees. The licensee's cost of developing an initial LLRW acceptance plan is estimated to 1,776 hours (one FTE) for a total cost of \$88,125 per licensee and the total estimated cost to the industry is \$352,500.

- d) Conducting updated compliance period analyses with the application to amend the license for closure.

Proposed 10 CFR 61.28 requires a licensee to update its compliance period analyses, which include a performance assessment and an intruder assessment, with the application to amend the license for closure. The NRC assumes that each licensee will conduct the analysis during the tenth year of the regulatory analysis period. The NRC estimates that the costs for each licensee to conduct its updated compliance period analyses would be 1,176 hours (one FTE), or \$88,125 per licensee and the total estimated cost to the industry is \$352,500.

- e) Conducting updated performance period analyses with the application to amend the license for closure.

Proposed 10 CFR 61.28 also requires a licensee to update its performance period analyses, which would include an intruder analysis, with the application to amend the license for closure. This impacts the two licensees that accept long-lived LLRW. The NRC assumes that each licensee will conduct the analysis during the tenth year of the regulatory analysis period. The NRC estimates that these updated performance period analyses would require 3,552 hours (two FTE), or \$176,250 per licensee and the total cost to the industry is \$352,500.

- f) Conducting updated performance period analyses during facility operations.

To ensure compliance with the Subpart C performance objectives, proposed 10 CFR 61.13(e) requires licensees to update their performance period analyses. This impacts the two licensees that accept long-lived LLRW. This analysis assumes that each licensee would conduct this update during the fifth year of the analysis period. The NRC estimates that each licensee's updated performance period analysis would require 3,552 hours (two FTE), or \$176,250 with the total cost to industry of \$352,500.

- g) Conducting updated compliance period analyses during facility operations.

Ensure compliance with the Subpart C performance objectives, proposed 10 CFR 61.41 and 10 CFR 61.42 requires a licensee to update its compliance period analyses, including a performance assessment and an intruder assessment. This would demonstrate that Subpart C would be met during the 10,000-year compliance period. This analysis assumes that each licensee would conduct this update during the fifth year of the regulatory analysis period. The NRC estimates that the costs for completing both updated compliance period analyses would require 1,776 hours (one FTE), or \$88,125 per licensee with the total cost to industry of \$352,500.

- h) Conducting updated LLRW acceptance plan during facility operations.

Proposed 10 CFR 61.58 ensures compliance with the Subpart C performance objectives by requiring licensees to update their LLRW acceptance plans. This analysis assumes that each licensee would conduct this update during the fifth year of the regulatory analysis period. The NRC estimates that each LLRW acceptance plan update would require 888 hours (0.5 FTE), or \$44,063 per licensee with the total cost to industry of \$176,250.

4.2.1.2 Licensee Operation:

- a) Conducting annual reviews of LLRW acceptance plan during facility operations.

Proposed 10 CFR 61.58(f) requires a licensee to review its LLRW acceptance plan annually to determine whether an update would be needed. The NRC estimates that each annual review of a LLRW acceptance plan would require 40 hours (0.02 FTE), or \$1,985 per licensee with a total annual cost to the industry of \$7,940.

- b) Recordkeeping requirements.

Proposed language for 61.80(m) requires licensees to maintain records of their audits and other reviews of program content and implementation. The NRC estimates that each recordkeeping effort would require 40 hours (0.02 FTE), or \$1,985 per licensee with a total annual cost to the industry of \$7,940.

4.2.2 Agreement States:

The NRC assumes that four licensees would locate their LLRW disposal facilities in four different Agreement States and the Agreement State also incurs costs as a result of this rulemaking. Unless stated otherwise, each cost is incurred by all four Agreement States. The impacts on the Agreement States are as follows:

4.2.2.1 Agreement State Implementation:

- a) Reviewing initial performance period analyses.

Proposed 10 CFR 61.13(e) requires an Agreement State to review its licensee's initial performance period analyses and impacts two Agreement States, and estimates that the costs for each Agreement State to review its licensee's initial performance period analyses would be 3,552 hours (two FTE), or \$168,045 per Agreement State with a total cost for the Agreement States of \$336,090.

- b) Reviewing initial compliance period analyses.

Proposed 10 CFR 61.41 and 10 CFR 61.42 requires an Agreement State to review its licensee's initial compliance period analyses and impacts four Agreement States. The NRC estimates that the costs for each Agreement State to review its licensee's initial compliance period analyses would be equal to 1,776 hours (one FTE). This cost is estimated to be \$84,023 per Agreement State with a total cost for the Agreement States of \$336,090.

- c) Reviewing initial LLRW acceptance plan.

Proposed 10 CFR 61.58 requires an Agreement State to review its licensee's initial LLRW acceptance plan and impacts four Agreement States. The Agreement State's cost for reviewing its licensee's initial LLRW acceptance plan is estimated to be 888 hours (0.5 FTE) for a total cost of \$42,011 per Agreement State with a total cost for the Agreement States of \$168,044.

- d) Conducting rulemaking and guidance documents.

The Agreement States' staff develops the rule packages and procedures to accommodate the requirements that would be added or modified by the rulemaking process. The effort to develop the rule package requires 888 hours (0.5 FTE) for each Agreement State. This would result in a total cost of \$42,011 cost per Agreement State with a total cost for the Agreement States of \$168,044.

- e) Reviewing updated compliance period analyses with the application to amend the license for closure.

Proposed 10 CFR 61.28 requires an Agreement State to review its licensees' updated compliance period analyses at facility closure. The NRC estimates that each Agreement State review of its licensee's updated compliance period analyses during the tenth year

of the regulatory analysis period and requires 888 hours (0.5 FTE), or \$42,011 per Agreement State with a total cost for the Agreement States of \$168,045.

- f) Reviewing updated performance period analyses with the application to amend the license for closure.

Under proposed 10 CFR 61.28, an Agreement State is required to review its licensee's updated performance period analyses with the application to amend the license for closure. This requirement affects the two Agreement States assumed to have licensees accepting long-lived LLRW for disposal during the tenth year of the regulatory analysis period. The NRC estimates that each Agreement State review of its licensee's updated performance period analyses would require 1,776 hours (one FTE), or \$84,023 per Agreement State with a total cost for the Agreement States of \$168,045.

- g) Reviewing updated performance period analyses during facility operations.

To ensure each licensee's compliance with the Subpart C performance objectives under proposed 10 CFR 61.13(e), each Agreement State is required to review its licensee's updated performance period analyses. This impacts the two Agreement States that have licensees accepting long-lived LLRW. Each Agreement State reviews the updated performance period analyses during the fifth year of the regulatory analysis period. The NRC estimates that each of these Agreement State reviews would require 1,776 hours (one FTE), or \$84,023 with a total Agreement States cost of \$168,045.

- h) Reviewing updated compliance period analyses during facility operations.

Under proposed 10 CFR 61.41 and 10 CFR 61.42, an Agreement State is required to review its licensee's updated compliance period analyses to ensure compliance with the Subpart C performance objectives. Each Agreement State reviews the updated performance period analyses during the fifth year of the regulatory analysis period. The NRC estimates that each Agreement State's review of its licensee's updated compliance period analyses would require 888 hours (0.5 FTE), or \$42,011 per Agreement State with a total Agreement States cost of \$168,045.

- i) Reviewing updated LLRW acceptance plan.

To ensure compliance with the Subpart C performance objectives under proposed 10 CFR 61.58, an Agreement State is required to review its licensee's updated LLRW acceptance plan. Each Agreement State reviews the updated LLRW acceptance plan during the fifth year of the regulatory analysis period. The NRC estimates that each Agreement State would require 177.6 hours (0.1 FTE), or \$8,402 per Agreement State with a total Agreement States cost of \$33,608.

4.2.3 NRC:

The four currently existing LLRW disposal facilities are located in Agreement States and not regulated by the NRC. The current NRC professional staff FTE hourly rate is based on 1,375 hours. The NRC labor rate for one FTE is \$173,250.

4.2.3.1 NRC Implementation:

a) Conducting rulemaking:

The NRC incurs only the costs of drafting the final rule following publication of the proposed rule for public comment. The estimated NRC effort required is 2,062.5 hours (1.5 FTE) to respond to comments, draft the final rule, and complete the rulemaking, for an estimated total cost of \$260,000.

b) Developing the implementing guidance document:

The NRC incurs only the costs of drafting a final implementing guidance document following its publication for public comment. The NRC estimates the NRC effort is 1,787.5 hours (1.3 FTE), for an estimated total cost of \$225,100.

4.2.4 Public Health (Accident)

Although the NRC did not quantify the benefits of this proposed rule, the agency did qualitatively examine the benefits. These include both the direct and indirect benefits that would accrue from risks that are avoided if the NRC adopted the rule.

4.2.5 Totals

Cost to the Industry. The proposed rule would result in additional costs to the industry with the majority of the costs resulting from implementation. On average, each licensee would incur an estimated implementation cost of \$837,000, followed by an estimated annual cost of \$4,000. Overall, the industry will incur an estimated implementation cost of \$3.3 million, followed by an estimated annual cost of \$16,000.

Cost to the Agreement States. The proposed rule would result in additional costs to the Agreement States with all costs resulting from implementation. On average, each Agreement State would incur an estimated implementation cost of \$428,515. Overall, the Agreement States will incur an estimated implementation cost of \$1.7 million.

Cost to the NRC. The NRC would incur an implementation cost for drafting and implementing a final rulemaking based on the proposed rule. This cost is estimated to be \$260,000. Because the NRC does not have any LLRW disposal licensee, no annual NRC cost is expected. The NRC would also incur an estimated implementation cost of \$225,100 for drafting a final guidance document based on the final rule.

Table 4-1 Quantitative Results: Total Present Value for the Cost

Table 4-1 summarizes the costs by entity, over a 10-year analysis period for Alternative 2.

Description	One-time Implementation Costs	Annual Operating Costs	Total combined Implementation and Annual Cost for 10-year period undiscounted	Total combined Implementation and Annual Cost for 10-year period at 3-percent discount rate	Total combined Implementation and Annual Cost for 10-year period at 7-percent discount rate
Industry Costs	\$3,348,755	\$15,878	\$3,507,539	\$3,484,201	\$3,460,278
Agreement States	\$1,714,060	\$0	\$1,714,060	\$1,714,060	\$1,714,060
NRC Costs	\$485,100	\$0	\$485,100	\$485,100	\$485,100
Total	\$5,547,915	\$15,878	\$5,706,699	\$5,683,361	\$5,659,438

5. Benefits and Costs

This section presents the benefits and costs from the proposed rule. To the extent that the affected attributes can be analyzed quantitatively, the net effect of each alternative is calculated and presented below. However, some benefits and costs could be evaluated only on a qualitative basis.

Although the NRC did not quantify the benefits of this proposed rule, the agency did qualitatively examine the benefits. These include both the direct and indirect benefits that would accrue from risks that are avoided if the NRC adopted the rule. The qualitative benefits of the proposed action includes assurance that public health and safety would be protected from the disposal of LLRW and an improved regulatory structure that facilitates implementation and better aligns 10 CFR Part 61 requirements with current health and safety standards.

The proposed 10,000-year compliance period is an important additional technical parameter for these analyses over existing requirements and is significant when evaluating LLRW streams that were not considered in the original 10 CFR Part 61 rulemaking. Currently, there is ambiguity regarding how a compliance period should be selected by an Agreement State and what timeframes should be applied to the analysis supporting demonstration of compliance with different sections of the regulations. In addition, the proposed site-specific analyses use a risk-informed regulatory framework that specifies requirements that need to be met and provides flexibility to a licensee or applicant with regard to the information or approach used to satisfy those requirements. Also, proposed 10 CFR 61.42 ensures protection of any inadvertent intruder who occupies the disposal site or contacts the LLRW at any time after active institutional controls are removed, proposed 10 CFR 61.13(e) evaluates any additional measures that are needed at a disposal site to ensure the protection of the general population and the inadvertent intruder from disposal of long-lived LLRW, and proposed 10 CFR 61.58,

when combined with the other revisions recommended for this rulemaking, provides reasonable assurance that public health and safety would be protected from the disposal of LLRW.

Table 5-1 summarizes the results of the benefits and costs analysis. The rulemaking alternative results in additional costs when compared to the no-action alternative. The quantitative impact estimated of the rulemaking alternative is estimated to cost between approximately \$5,659,438 and \$5,683,361 (7-percent and 3-percent discount rate, respectively).

Table 5-1 Summary of Benefits and Costs

Net Monetary Costs – Total Present Value in Millions (\$)	Nonmonetary Benefits/Costs
Alternative 1: No Action Licensee: 0 NRC: 0	<u>Qualitative Benefits:</u> None <u>Qualitative Costs:</u> None
Alternative 2: Rulemaking <u>Licensee:</u> \$3.48M using a 3% discount rate \$3.46M using a 7% discount rate <u>Agreement States:</u> \$1.7M using a 3% discount rate \$1.7M using a 7% discount rate <u>NRC:</u> \$0.5M using a 3% discount rate \$0.5M using a 7% discount rate <u>Total:</u> \$5.68M using a 3% discount rate \$5.65M using a 7% discount rate	<u>Qualitative Benefits:</u> These amendments ensure that LLRW streams that are significantly different from those considered during the development of the current regulations can be disposed of safely and meet the performance objectives for land disposal of LLRW. These amendments would facilitate the use of site-specific information and up-to-date dosimetry methodology to ensure public health and safety is protected. <u>Qualitative Costs:</u> None

6. Decision Rationale

This regulatory analysis evaluated two alternatives. Alternative 1, the no-action alternative, would maintain the regulations as currently written. Under this option, the NRC would not modify 10 CFR Part 61. The regulations at 10 CFR Part 61 would continue to provide no performance period analyses requirements, no specified compliance period, no new intruder assessment or performance assessment requirements, no dose limit for the inadvertent intruder, no updated compliance and performance period analyses, and no LLRW acceptance plan. Alternative 1 avoids the costs that the proposed rule would impose, but would not update the existing LLRW disposal requirements to ensure the current level of protection for public health and safety. Accepting the no-action alternative does not provide the assurance that the

disposal of the LLRW streams not considered in the original 10 CFR Part 61 regulatory basis complies with the performance objectives in the regulations.

Alternative 2, the rulemaking alternative, would amend 10 CFR Part 61 by adding requirements for licensees and license applicants to prepare new and revised compliance and performance period analyses. These analyses include: 1) a revised and renamed compliance period performance assessment to demonstrate the protection of the general population from releases of radioactivity, 2) a new compliance period intruder assessment to demonstrate the protection of inadvertent intruders, 3) new performance period analyses to determine whether limitations on the disposal of some LLRW streams at certain sites may be needed to properly manage the disposal of LLRW, and 4) a LLRW acceptance plan to provide assurance of compliance with the Subpart C performance objectives and to ensure the safe disposal of LLRW that was not analyzed in the original 10 CFR Part 61 regulatory basis (e.g., large quantities of depleted uranium). In addition, licensees and license applicants are required to update compliance and performance analyses in applications to amend a license for closure.

Requiring updated and new compliance and performance period analyses to demonstrate compliance with the performance objectives ensures the safe disposal of LLRW and provides assurance that the disposal of LLRW streams not considered in the original 10 CFR Part 61 regulatory basis complies with the Subpart C performance objectives. Further, these analyses may identify additional measures that should be implemented, and these amendments would facilitate implementation and better align the requirements with current health and safety standards. This rulemaking provides assurance that LLRW disposal meet the Subpart C performance objectives in 10 CFR Part 61. Therefore, the NRC staff recommends publishing the proposed rule for public comment.

7. Implementation

Following the publication of the proposed rule and the draft regulatory guide, the staff would revise the proposed rule and draft regulatory guide as appropriate and submit a draft final rule and draft final regulatory guide to the Commission in 2014.

8. References

- NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook, Final Report," U.S. Nuclear Regulatory Commission, Washington, DC, January 1997.
- NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," Revision 4, U.S. Nuclear Regulatory Commission, Washington, DC, September 2004.
- NUREG/CR-4627, "Generic Cost Estimates, Abstracts from Generic Studies for Use in Preparing Regulatory Impact Analyses."
- OMB Circular No. A-4, September, 17, 2003.
- Department of Labor (U.S.), Bureau of Labor Statistics. Occupational Employment Statistics, Occupational Employment and Wages.