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# NRC Responses to Public Comments

## Draft Regulatory Basis: Disposal of Greater-than-Class C and Transuranic Waste NRC-2017-0081; RIN 3150-AK00

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U.S. Nuclear Regulatory Commission

<INSERT: Month Year>



## ABBREVIATIONS AND ACRONYMS

ADAMS	Agencywide Documents Access and Management System
CFR	<i>Code of Federal Regulations</i>
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EIS	environmental impact statement
GEIS	generic environmental impact statement
FR	<i>Federal Register</i>
GTCC	greater-than-Class C
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
LLW	low-level radioactive waste
MD	management directive
NEPA	National Environmental Protection Act
NRC	U.S. Nuclear Regulatory Commission
NYSERDA	New York State Energy Research and Development Authority
TCEQ	Texas Commission on Environmental Quality
TDSHS	Texas Department of State Health Services
TRU	transuranic
WCS	Waste Control Specialists LLC
WIPP	U.S. Department of Energy's Waste Isolation Pilot Plant

**Analysis of Public Comments on Draft Regulatory Basis for  
Greater-than-Class C and Transuranic Waste (NRC-2017-0081; RIN 3150-AK00)**

**Introduction**

This document summarizes comments the U.S. Nuclear Regulatory Commission (NRC) received on the draft regulatory basis for the disposal of greater-than-Class C (GTCC) and transuranic (TRU) waste and provides the staff responses to those comments. The NRC issued the request for comment in the *Federal Register* (FR) on July 22, 2019 (84 FR 35037). The agency extended the public comment period, originally scheduled to end on September 20, 2019, to November 19, 2019 (84 FR 48309; September 13, 2019), as a result of stakeholder requests.

**Overview of Public Comments**

The NRC received 45 unique comment submissions from members of the public, environmental groups, industry stakeholders, a Tribal Nation, various State agencies, and the U.S. Department of Energy (DOE). The NRC also received approximately 7,200 form letters from environmental groups and individuals. Table 1 below lists the public comment submissions and their sequentially assigned identification numbers and identifies which comment submissions are form letters.

Although the NRC does not treat comments differently depending on their authors, for the purposes of this rulemaking the NRC believes readers will have particular interest in the comments from DOE and the Agreement State regulators of LLW disposal sites, and therefore is identifying those commenters by name.

Public comment submissions are available online in the NRC Library at <http://www.nrc.gov/reading-rm/adams.html>. From this page, the public can access the Agencywide Documents Access and Management System (ADAMS), which supplies text and image files of the NRC’s public documents. If you do not have access to ADAMS, or if there are problems in accessing the documents located in ADAMS, contact the NRC’s Public Document Room reference staff at 1-800-397-4209, 301-415-4737, or by email to [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov). In addition, public comments and supporting materials related to this draft regulatory basis rule can be found at <https://www.regulations.gov> by searching for Docket ID NRC-2017-0081.

**Table 1: Comment Submissions**

<b>Comment Submission ID</b>	<b>Commenter</b>	<b>ADAMS Accession Number</b>	<b>Form Letter? (Y/N)</b>
1	Private Citizen, Sonia Santana	ML19255J776	Y
2	Terry Burns, Alamo Group, Sierra Club	ML19261A187	N
3	Private Citizen, Al Braden	ML19261A186	N
4	Private Citizen, Donna Hoffman	ML19274C591	Y
5	Private Citizen, Sharon Bramblett	ML19280A044	Y
6	Private Citizen, Kathleen Cox	ML19296C395	N
7	Multiple commenters (13)	ML19312C239	Y
8	Anonymous	ML19316C831	N
9	Anonymous	ML19316C832	N
10	Private Citizen, Carol Ortiz	ML19317D535	N

<b>Comment Submission ID</b>	<b>Commenter</b>	<b>ADAMS Accession Number</b>	<b>Form Letter? (Y/N)</b>
11	Private Citizen, Katherine Dawes	ML19317D532	N
12	Multiple commenters (5)	ML19317D534	Y
13	Private Citizen, Rosemary Shively	ML19318F441	N
14	Texas Department of State Health Services, Texas Health and Human Services	ML19318F440	N
15	Missouri Department of Natural Resources	ML19322D689	N
16	Idaho Governor, Brad Little	ML19322D686	N
17	Waste Control Specialists LLC	ML19322D685	N
18	Private Citizen, John T. Greeves	ML19322D687	N
19	Ben M. Brigham, Anthem Ventures	ML19325C622	N
20	Marvin Resnikoff, Radioactive Waste Management Associates	ML19325C623	N
21	Oregon Department of Energy	ML19325C624	N
22	Private Citizen, Robert Brescia	ML19325C625	N
23	Health Physics Society	ML19325C626	N
24	BWXT Technical Services Group, Inc.	ML19325C627	N
25	U.S. Department of Energy, Office of Environmental Management, Office of Waste and Materials Management	ML19325C628	N
26	New York State Energy Research and Development Authority	ML19325C630	N
27	Washington State Department of Ecology	ML19325C631	N
28	Sustainable Energy & Economic Development Coalition	ML19325C613	N
29	Council on Intelligent Energy & Conservation Policy and Promoting Health & Sustainable Energy	ML19325C614	N
30	Private Citizen, Raymond C. Vaughan	ML19325C615	N
31	Conference of Radiation Control Program Directors, Inc.	ML19325C616	N
32	Tommy Taylor, Fasken Oil and Ranch, Ltd.	ML19325C617	N
33	Private Citizen, Will Green	ML19325C618	N
34	A. James Mayer, Green Century Exploration & Production, LLC	ML19325C620	N
35	Private Citizens, Alicia Barker and DiAnn Barker	ML19325C844	N
36	Private Citizen, Marc Maddox	ML19325C845	N
37	Private Citizen, Dan Hawkins	ML19325C846	N
38	Private Citizen, Jenny Tibbetts	ML19325C847	N
39	Private Citizen, Patricia Townsend	ML19325C848	N

<b>Comment Submission ID</b>	<b>Commenter</b>	<b>ADAMS Accession Number</b>	<b>Form Letter? (Y/N)</b>
40	Barbara Warren on behalf of multiple parties	ML19325C831	N
41	Anonymous	ML19325C832	N
42	Texas Commission on Environmental Quality	ML19325C834	N
43	Nuclear Energy Institute	ML19325C835	N
44	State of Washington, Department of Health, Office of Radiation Protection	ML19325C836	N
45	Private Citizen, Joan Christensen	ML19325C838	N
46	Low-Level Radioactive Waste Forum, Inc.	ML19325C840	N
47	Utah State Department of Environmental Quality, Division of Waste Management and Radiation Control	ML19325C841	N
48	Nuclear Information and Resource Service	ML19325C842	N
49	Organization of Agreement States	ML19325C843	N
50	Multiple commenters (282)	ML19326C808	Y
51	Multiple commenters (1,000)	ML19326C722	Y
52	Multiple commenters (1,000)	ML19326C723	Y
53	Multiple commenters (1,000)	ML19326C718	Y
54	Multiple commenters (1,000)	ML19326C719	Y
55	Multiple commenters (813)	ML19326C720	Y
56	Multiple commenters (2)	ML19326C807	Y
57	Multiple commenters (76)	ML19326C810	Y
58	Multiple commenters (501)	ML19326D478	Y
59	Multiple commenters (500)	ML19326D479	Y
60	Multiple commenters (474)	ML19326D475	Y
61	Multiple commenters (209)	ML19326D476	Y
62	Multiple commenters (6)	ML19339F823	Y
63	Multiple commenters (239)	ML19339F824	Y
64	Multiple commenters (4)	ML19339F821	Y
65	Multiple commenters (62)	ML19339F822	Y
66	Multiple commenters (14)	ML20013G362	Y
67	Private Citizen, Virginia Madsen	ML20013G364	Y
68	Multiple commenters (17)	ML20035E633	Y
69	Private Citizen, James Snelson	ML20035E632	Y
70	Multiple commenters (3)	ML20097E883	Y
71	Multiple commenters (4)	ML20097E884	Y
72	Private Citizen, Jane Clark	ML20097E885	Y
73	Private Citizen, Bernadette Webster	ML20128J880	Y
74	Multiple commenters (2)	ML20153A463	Y
75	Multiple commenters (4)	ML20190A128	Y
76	Multiple commenters (3)	ML20225A155	Y

Comment Submission ID	Commenter	ADAMS Accession Number	Form Letter? (Y/N)
77	Private Citizen, Diane LaMagdeleine	ML20254A079	Y
78	Private Citizen, Parisa Chamlou	ML20275A031	Y
79	Private Citizen, Janet Roberts	ML21127A206	Y
80	EnergySolutions	ML21236A104	N
81	Private Citizen, William Hewes	ML22298A078	Y

## Comment Organization

The NRC binned the comments into categories and, within each category, further grouped the comments by topic. This document summarizes each group of comments and the NRC's response to each group. The NRC has identified individual commenters in certain instances when it offered potentially useful context for the comment. The categories are as follows:

- A. Opposing and Supporting GTCC Disposal
- B. Regulatory Framework and Approach
- C. Waste Streams and Technical Analysis
- D. Waste Classification
- E. Intruder Protection
- F. Definitions and TRU Waste
- G. Security
- H. Agreement State Authority
- I. Financial Assurance and Cost Analysis
- J. Other

## Comments and Responses

### A. Opposing and Supporting GTCC Disposal

**Comment:** The NRC received a large number of comments expressing concern and general opposition to the disposal of GTCC waste in a near-surface low-level radioactive waste (LLW) disposal facility. Comments were provided both in writing (including a large number of form letters) and during the two public meetings the NRC held as part of the comment period on the draft regulatory basis. Some comments were of a general nature, such as (1) GTCC waste should be disposed in a deep geologic repository, (2) GTCC waste was too hazardous for near-surface disposal and would remain hazardous for thousands of years, and (3) near-surface disposal of GTCC waste would create considerable psychological stress on local communities near the disposal facility. Some commenters provided very specific concerns and opposition to siting a facility in the State of Texas due to potential future health impacts and contamination of land and resources (e.g., water and oil). Some commenters expressed concern for "reclassifying" certain wastes to allow their disposal in a near-surface facility.

**NRC Response:** The NRC acknowledges the significant concern raised with the near-surface disposal of GTCC waste and the recommendation that such waste would be more appropriately disposed in a deep geologic repository. The NRC is proposing revisions to its regulations to ensure that the appropriate evaluations and information are provided to support a regulatory review to determine whether or not certain GTCC wastes should be allowed to be disposed at a particular facility. Determination of acceptability of GTCC wastes for disposal in a near-surface facility will depend on a variety of considerations regarding both operational safety and the

ability of the site characteristics and design to demonstrate the facility will continue to maintain safety far into the future. Waste that could not be shown to meet the regulatory requirements would not be allowed for near-surface disposal. Before the current rulemaking, Title 10 of the *Code of Federal Regulations* (10 CFR) Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," acknowledged, in 10 CFR 61.7(b)(5), "There may be some instances where waste with concentrations greater than permitted for Class C would be acceptable for near-surface disposal with special processing or design. These will be evaluated on a case-by-case basis."

The NRC's rulemaking is not specific to any LLW facility or State. If the NRC's rulemaking finalizes requirements that allow for near-surface disposal of GTCC waste, several things would have to happen before the waste could be disposed of in any particular State.

**Comment:** The NRC received comments from individuals and organizations (both private and State) supporting the near-surface disposal of GTCC waste; however, these commenters differed regarding NRC conducting a rulemaking. Some commenters noted that the current NRC regulations at 10 CFR Part 61 allow for a case-by-case consideration for GTCC waste disposal and felt that this was sufficient and further rulemaking was not necessary. One commenter suggested that the draft regulatory basis provided sufficient guidance such that new guidance or rulemaking would be redundant and inefficient. Other commenters stated that a rulemaking would provide clear and consistent technical and security requirements for resolving the orphan waste problem. Two commenters expressed support for changes to 10 CFR Part 37, "Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material," and 10 CFR Part 150, "Exemptions and Continued Regulatory Authority in Agreement States and in Offshore Waters Under Section 274," to better safeguard fissile materials and provide regulatory flexibility that would facilitate the licensing authority of Agreement States to regulate radioactive materials more efficiently in a risk-informed, performance-based manner. One commenter noticed that the draft regulatory basis document did not provide guidance for the case-by-case option and suggested the NRC should issue such guidelines for public comment before using them to determine whether GTCC waste could be disposed in a near-surface facility. One commenter noted that SECY-15-0094, "Historical and Current Issues Related to Disposal of Greater-than-Class C Low-Level Radioactive Waste," issued July 2015, contains an extensive analysis of GTCC waste and discusses the main issues that should be a focus for the rulemaking.

**NRC Response:** The NRC acknowledges the support for establishing and clarifying requirements for ensuring the safe near-surface disposal of GTCC waste. The NRC disagrees with the comment that the draft regulatory basis alone provides sufficient information for ensuring the safe disposal of GTCC waste such that a rulemaking would be unnecessary and inefficient. The NRC received many substantive comments; conducting a formal rulemaking process for implementing requirements for the near-surface disposal of GTCC waste is appropriate and provides a transparent and clear approach for revising NRC's regulations, including the development of regulatory guidance. The NRC's rulemaking has considered revisions necessary for ensuring the safe disposal of GTCC waste under 10 CFR Part 61, including other necessary revisions, such as requirements for ensuring the security of fissile material (see responses under item G, Security, and item H, Agreement State Authority, for further discussion).

The NRC has revised its "Guidance for Conducting Technical Analyses for 10 CFR Part 61," Revision 1, and included a new appendix G with respect to GTCC waste disposal, which contains a section (section G.6.2) on physical protection during operations. Revision of the regulations is part of the NRC's rulemaking process that includes a public comment period, and

the NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61.

## **B. Regulatory Framework and Approach**

**Comment:** Commenters supporting rulemaking recommended that any rulemaking to address the disposal of GTCC wastes would be best addressed as part of the ongoing revision of 10 CFR Part 61 to allow the Agreement States to perform a single rulemaking instead of two for implementing any new or revised requirements.

**NRC Response:** The NRC agrees with the commenters. The Commission directed the staff to initiate an integrated rulemaking that addresses the ongoing 10 CFR Part 61 rulemaking and those proposed revisions for disposal of GTCC wastes.

**Comment:** Some commenters expressed support for a regulatory framework that dispositions radioactive waste based on the radiological characteristics and the degree of isolation that should be required to protect human health and suggested that the NRC communicate to stakeholders and the public the significant differences in the performance of current disposal facilities in arid environments versus the types of disposal facilities that existed at the time 10 CFR Part 61 was issued in 1982.

**NRC Response:** The NRC agrees in part with the comments. The NRC agrees that the safe disposition of radioactive waste should be determined based on the radiological characteristics of the waste and degree of isolation provided by the facility and site. The NRC's proposed regulatory framework relies on requirements for the depth of information and analyses that would be needed to appropriately evaluate the GTCC waste characteristics and the facility design and site characteristics for demonstrating the safety of a specific near-surface disposal facility. The statement of considerations for the proposed rule and the associated draft guidance document provide significant details for demonstrating the safety of GTCC waste disposal.

The NRC recognizes that four decades have passed since 10 CFR Part 61 was initially issued, during which LLW waste facility designs have changed significantly (e.g., use of concrete vaults) and analyses have become more sophisticated (e.g., detailed uncertainty analyses). The agency has discussed some of the advances of this nature in its regulatory basis and guidance documents; however, the NRC does not consider discussion of potential significant improvements compared with past facilities or the benefits of potential site conditions are appropriate to the rulemaking. Rather, the NRC has focused on those aspects of its requirements that ensure GTCC waste can be safely disposed at a near-surface disposal facility; meeting the regulatory requirements will be based on both the characteristics of the waste and the facility design and site characteristics.

**Comment:** One commenter stated that an EIS would be required to consider the full lifecycle impacts of any potential rule change should the NRC proceed with rulemaking.

**NRC Response:** An EIS (draft and final) were completed for the original development of 10 CFR Part 61 in the early 1980's, found in the NUREG-0782 and NUREG-0945 volumes. An EIS outlines the impact of a proposed project on its surrounding environment.

As a practical matter, most NRC rulemakings are not considered to be major Federal actions that significantly affect the human environment and thus do not require an EIS under NEPA. Most NRC rulemakings do not, by their own operation, license activities, but rather applicants for an NRC license must comply with the relevant NRC regulations before they can receive a license. As a result, generally, it is not the NRC rulemaking that could significantly affect the



human environment, but rather it is the licensing decision (e.g., issuance of a license or license amendment) under the NRC's regulations that could significantly affect the human environment. It is the issuance of the license, for which the NRC typically prepares a more detailed NEPA analysis (either an environmental assessment or EIS). In this case, the current rulemaking would not allow for the issuance of a license—the proposed revisions to 10 CFR Part 61 would not automatically authorize a person to receive, possess, or dispose of LLW at a disposal facility or to construct a LLW disposal facility; to be authorized to conduct those activities, an applicant would need to be issued a license upon a finding of compliance with the relevant regulations, which would require a new, separate NRC NEPA analysis if the NRC (not an Agreement State) were to issue the license. The current rulemaking proposes to amend the NRC's licensing procedures, performance objectives, and technical requirements for the issuance of licenses for LLW disposal—not approve any licensing decisions. Therefore, the rulemaking would not significantly affect the human environment and would not require an EIS.

**Comment:** One commenter stated the draft regulatory basis document does contain influential scientific information, contrary to what the NRC asserts on page 49 of this document, as a “rulemaking to allow for near-surface disposal of GTCC waste on a generic basis, such a change would represent a significant departure from the status quo that would require ample explanation and technical support.” As such, the commenter requested that the draft regulatory basis be subject to adequate peer review.

**NRC Response:** NRC Management Directive (MD) 3.17, “NRC Information Quality Program,” dated June 28, 2016, provides the policy of the NRC to ensure the quality of all information it relies on for making decisions or that it disseminates to the public. The NRC's policies and practices are designed to ensure that the appropriate level of quality commensurate with the nature of the information is established and maintained consistent with Office of Management and Budget Information Quality Guidelines. In determining what constitutes influential scientific, financial, or statistical information, MD 3.17 specifies that it “considers two principal factors”:

- (a) The information must have a clear and substantial impact that has a high probability of occurring.
- (b) The information must impact regulatory decisions affecting a broad class of applicants or licensees. Although information contained in a regulatory decision for an individual applicant or licensee may have substantial impact, it is limited in its breadth, therefore will not be deemed “influential” for the purposes of these guidelines. (MD 3.17, page 6)

Additionally, MD 3.17 states the following:

The correction and appeal process that will address data quality challenges does not apply to information disseminated by NRC through a comprehensive public comment process; for example, proposed rules, regulatory analyses, requests for comments on information collections subject to the Paperwork Reduction Act, environmental impact statements, and other documents for which NRC solicits public comment by publishing a notice in the *Federal Register*. Persons questioning the quality of information disseminated in those documents, or documents referenced or relied upon in those documents, must submit comments as directed in the notice requesting public comment on the given document. NRC will use its existing processes for responding to public comments to address a request for correction and will describe the actions it has taken with regard to the request in the final agency rule, regulatory analysis, or other final action. (MD 3.17, page 5)

The NRC does not consider its information and analyses in the draft regulatory basis to represent influential scientific information that would be subject to a peer review. The NRC used information on GTCC waste inventories estimated in the DOE's generic environmental impact statement (GEIS) for GTCC waste disposal to evaluate the potential for safe disposal in a nearsurface disposal facility and to identify the potential for safety and security concerns associated with such a facility. The NRC conducted these analyses to assist the staff in understanding the need for clarification and enhancements to 10 CFR Part 61 regarding the range of requirements that would be applied to a facility seeking to dispose of GTCC waste streams. The agency conducted these analyses using available public information; these analyses are not the basis for a decision regarding the acceptability of nearsurface disposal of GTCC waste at a specific facility. Any license application for disposal of GTCC waste at a specific site will require site-specific information and analyses to demonstrate compliance with the regulatory requirements. Waste facilities not meeting the regulatory requirements should not be approved. The information and analyses used to support the draft regulatory basis and assist the development of the NRC's revisions to its regulations and regulatory guidance documents do not replace or limit the information and analyses that must be provided in a license application for a specific disposal facility.

**Comment:** One commenter questioned if the NRC would follow the current administration's (now the previous administration's) policy that, for every new rule, two rules need to be removed.

**NRC Response:** The NRC has complied with all applicable laws and executive branch policies in producing this rule. Note that the NRC is not developing a new rule but rather is proposing to modify its existing regulations at 10 CFR Part 61 to improve its effectiveness and clarity regarding the near-surface disposal of LLW, including proposed revisions that address the disposal of GTCC waste.

### **C. Waste Streams and Technical Analysis**

**Comment:** The NRC received a number of comments on the role of the specific waste streams it used in its draft regulatory basis document. The DOE commented that the NRC's regulatory basis appears to focus more on GTCC waste than GTCC-like waste and recommended that the agency either analyze all waste identified in the DOE's 2016 Final GTCC EIS or focus on GTCC waste and delete all GTCC-like waste from the analysis. The DOE also stated that the Final GTCC EIS is at least 3 years old by reference, and it now considers some values as bounding values, as some waste streams were projected waste volumes and characteristics based on

information available in 2016. One commenter stated that additional waste streams currently classified as high-level waste may “qualify” as GTCC and could potentially be considered for near-surface disposal under the draft regulatory basis; however, these wastes are not suitable for near-surface disposal, and the commenter questioned how new waste streams would be considered under the draft regulatory basis. Some commenters expressed concern that the estimates of GTCC waste in the draft regulatory basis were not accurate (e.g., underestimating volume of a waste stream, overestimating activity amounts).

**NRC Response:** The NRC used the information in the DOE’s GEIS regarding radionuclide inventories and volumes for specific GTCC waste streams to assist the identification of regulatory concerns and issues associated with the potential near-surface disposal of this waste. The DOE’s GEIS included waste streams representing a variety of waste forms and inventories that afforded consideration of a broad range of regulatory issues, such as criticality, physical protection, waste handling, operational safety, intruder protection, and long-term safety after closure of a facility. The NRC’s proposed regulation and draft regulatory guidance address these potential issues and concerns based in part on the waste stream characteristics that may be considered for near-surface disposal. However, the NRC has proposed regulations and guidance to address the issues and concerns (e.g., criticality, intruder protection, operational safety, and security) associated with near-surface disposal of GTCC waste and are not directed to, nor dependent on, specific waste stream inventories and volumes provided in the DOE’s GEIS. The NRC’s proposed revisions to regulations and guidance are intended to ensure the requirements for disposal of any GTCC waste stream are both appropriate and thorough for ensuring reasonable assurance of adequate protection of public health and safety and the environment.

Although the waste stream information in the DOE’s GEIS could be revised or updated, the NRC developed its proposed requirements and guidance for applicability to current and future GTCC waste stream inventories and volumes. Any application for disposal of GTCC waste will need to identify the specific inventories and volumes of the waste to be disposed. A disposal facility seeking approval for near-surface disposal of GTCC waste will need to demonstrate compliance with the regulatory requirements, and that demonstration would be influenced by the site characteristics and design, including the waste inventories and volumes. Potential inaccuracies and updates to the GTCC waste inventories and volumes in the DOE’s GEIS do not affect the obligation for any GTCC waste disposal application to include the inventories and volumes of GTCC waste intended for disposal at a specific site.

**Comment:** Some commenters stated that site-specific analyses and not generic evaluations were appropriate to determine the acceptability of disposal of a specific waste stream at a specific site. A few of these commenters expressed concern that specific waste streams were excluded from near-surface disposal by the NRC’s generic evaluations (e.g., identification of a limit of 10,000 nanocuries per gram (nCi/g) was an arbitrary limit for excluding TRU waste from near-surface disposal facilities). One commenter expressed support for the consideration for the disposal of waste with certain TRU radionuclides at concentrations less than 10,000 nCi/g in a near-surface disposal facility, with those above this concentration to be exclusively licensed by the NRC. Some commenters expressed that site-specific characteristics (e.g., proximity to resources, such as aquifers and oil; natural hazards, such as earthquakes and tornados; erosion over long time periods; climate change; terrorist activity) would be important aspects in an analysis to determine the acceptability of a near-surface disposal of GTCC waste at a specific site.

**NRC Response:** The NRC agrees with commenters asserting the importance of site-specific analyses in supporting the determination of the safety of a disposal facility rather than NRC’s

generic analyses. The NRC conducted its generic analyses to help inform its understanding of the potential issues and concerns related to the near-surface disposal of GTCC waste. The NRC considers its technical analyses as illustrative and not definitive. The NRC recognizes that compliance with the regulations will very much depend on the specific site conditions, design, and inventory.

The NRC's generic analyses identified specific GTCC waste stream inventories based on the DOE EIS to provide insights on the issues and concerns based on types of GTCC waste that may be considered for near-surface disposal. The NRC identification or naming of certain waste streams was to specify the range of potential waste inventories evaluated in the generic analysis; however, the NRC did not intend to make a definitive statement on the acceptability of a specific waste stream based on the specific name applied to an individual waste stream. The generic analyses assisted the NRC in determining key aspects of the revised requirements and guidance to ensure GTCC waste can be safely disposed in a near-surface facility. Site-specific analyses will be required, as part of a license application, to demonstrate that GTCC waste can be safely disposed, including safe and secure operations, at a specific facility and site.

The NRC did identify that GTCC waste concentrations greater than 10,000 nCi/g of alpha-emitting TRU nuclides with half-lives greater than 5 years presented significant concerns for both operational and postclosure safety. Waste packages with such waste are *generally* not acceptable for near-surface disposal. However, GTCC waste in packages containing concentrations of material greater than 10,000 nCi/g of alpha-emitting TRU nuclides with half-lives greater than 5 years would need to be considered by the Commission on a case-by-case basis. Although, the draft regulatory basis document did identify two waste streams with inventories that were estimated to exceed 10,000 nCi/g, the NRC did not intend to imply "all" GTCC waste that might fall under the generic name used in NRC's generic analyses (e.g., sealed sources) would thereby be assumed to be greater than or equal to 10,000 nCi/g and would be generally prohibited from disposal in a near-surface disposal facility. Waste packages containing average concentrations of alpha-emitting TRU radionuclides greater than 10,000 nCi/g may be acceptable for near-surface disposal. Disposal would likely require different engineered systems and disposal concepts than are currently applied in the United States. For example, the International Atomic Energy Agency (IAEA) has implemented a borehole disposal concept for the disposal of limited quantities of radioactive waste in narrow-diameter boreholes using stainless steel packages, high-strength grout, and a steel deflector plate to deter future drilling. This concept may be applicable to wastes containing greater than 10,000 nCi/g of alpha-emitting radionuclides and could be presented to the Commission for approval. Because of the unique engineered features, and because only select operators of disposal facilities are likely to want to dispose of such waste, the approach adopted in the regulation is practical and consistent with that previously used for GTCC waste.

**Comment:** A number of commenters offered perspectives on the analyses the NRC and its contractor conducted in support of the draft regulatory basis. Comments addressed both assumptions made in the analyses and the clarity and transparency of the documentation of the analyses. One commenter suggested that a thorough discussion of the assumptions and the uncertainties included in the probabilistic analyses was needed to fully understand the results. Additionally, probability distributions that were used in the contractor analysis add significant uncertainty since they are based on waste cuttings behaving like dust or soil. The distributions ignore the potential that the cuttings would not behave like dust or soil.

**NRC Response:** The NRC used a generic analysis to determine whether or not the GTCC waste was potentially suitable for disposal at a near-surface disposal facility. The NRC considers its technical analyses as illustrative and not definitive. The NRC has revised its

regulations and guidance to clearly describe the site-specific analyses and documentation that would be expected in a license application for the disposal of GTCC waste. The NRC understands that specific sites would involve specific characteristics and assumptions regarding a variety of issues (e.g., groundwater resources, hydrology, waste forms, potential for intrusion). The NRC's regulations in 10 CFR Part 61 and in guidance provide clarifications regarding site-specific analyses that include aspects of the analysis, such as assumptions and scenarios. The NRC did provide a number of the assumptions and details supporting its technical analyses; however, the agency acknowledges it can and will strive for additional clarity and completeness when documenting its analyses.

**Comment:** Commenters expressed a concern regarding the spread of radionuclides in the air, especially for radionuclides that might volatilize, identifying technetium-99 as a radionuclide that can volatilize. One commenter stated the environmental assessment for WCS discusses the volatilization of radionuclides that would be buried at that LLW site. One commenter recommended that the NRC and the DOE investigate and document all the adverse experiences at nuclear waste sites to better inform credible safety and health analyses. The same commenter stated the NRC failed to include any defense-in-depth measures in its analysis. One commenter stated that the NRC's analyses show that natural processes spread the contamination over wider and wider areas after 10,000 years. One commenter asserted the dose limits were based on men and ignored the larger radiation effects for women and children.

**NRC Response:** The NRC agrees there are concerns (e.g., volatile radionuclides, potential spreading of contamination) associated with certain waste streams, waste forms and packaging, radionuclides, facility designs, and site characteristics. The NRC's regulatory requirements and guidance are intended to ensure appropriate and thorough evaluations are provided in an application for disposal of GTCC waste in a near-surface facility. The NRC has updated its guidance document for concerns that may arise with GTCC waste disposal, such as operational hazards (e.g., fires and handling accidents), defense-in-depth considerations for releases from disposed wastes (e.g., waste package, waste form, and site characteristics), and the potential spread of contamination at very long time periods. In particular, appendix G to the NRC's "Guidance for Conducting Technical Analyses for 10 CFR Part 61," Revision 1, includes topics such as timeframes for analyses of GTCC waste disposal (section G.2); GTCC waste classification (section G.3); GTCC waste characteristics, including thermal effects and management, radiolysis during GTCC waste storage, and disposal (section G.4); intruder barriers (section G.5); operational safety and security evaluations, including operational safety assessment for normal conditions and unlikely accidents, physical protection during operations, and criticality controls (section G.6). Additionally, the NRC's guidance document provides information with respect to a variety of topics relevant to LLW, including gaseous release at an LLW disposal facility (section 3.2.6); transport of radionuclides in groundwater (section 3.3); and performance assessment of the disposal facility over long time periods (section 6.0). The NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61.

The NRC disagrees with the comment that the dose limits ignore the larger radiation effects for women and children. The international community and the Federal agencies follow ICRP's guidelines that the overall annual dose to members of the public from all sources should not exceed 1 mSv (100 mrem), in order to be protective of all individuals and the environment. These guidelines also hold that exposures from a single practice (e.g., potential exposures resulting from disposal of radioactive waste) should be limited to a fraction of this overall dose. The purpose of the public dose limit is to limit the lifetime risk from radiation to a member of the general public regardless of the age and gender of the individual at the time of the exposure. The conversion factor used to equate dose into risk is based on data from various populations

exposed to very high doses of radiation such as the atomic bomb survivors, and these populations contained individuals of all ages and genders. Therefore, variation of the sensitivity to radiation with age and gender is built into the standards which are based on a lifetime exposure. A lifetime exposure includes all stages of life, from birth to old age. The NRC's proposed annual dose limit for a LLW disposal facility of 0.25 milliSievert (mSv) (25 mrems) for any member of the public is considered protective of men, women, and children.

#### **D. Waste Classification**

**Comment:** One commenter recommended that the NRC use the waste characteristics to designate different categories to promote safety, avoid accidents, and assure long-term isolation from the public; in addition, the agency should make corrections to the waste classifications in 10 CFR Part 61 by adding missing radionuclides. One commenter suggested that the NRC should consider "other potential updates to 10 CFR Part 61 such as radionuclide concentration limits in Table 1 and 2 for waste classification determinations for special forms of waste such as any remaining waste from Three Mile Island Unit 2 that DOE does not consider high-level or GTCC waste." One commenter requested that the NRC maintain a distinction between commercial GTCC waste and defense-generated GTCC waste. One commenter stated it would be helpful if the NRC named the gap between Class C waste and high-level waste with one or more additional waste classes that would each have distinct criteria. Another commenter suggested site-specific radionuclide concentration limits could be established as a license condition in lieu of the waste classification tables in 10 CFR Part 61.

**NRC Response:** The NRC acknowledges the commenters' request that the updates and revisions to the 10 CFR Part 61 waste classifications could be updated and revised to improve the scope and clarity of the requirements for specific radionuclide inventories. The NRC has considered different methods for clarifying its requirements for different waste streams that were not anticipated when the waste classifications were first specified in 10 CFR Part 61 (e.g., large amounts of depleted uranium, specific GTCC waste streams). The NRC has elected not to revise the current waste classifications (i.e., Classes A, B, and C) and has placed additional requirements in 10 CFR Part 61 that address waste streams that fall outside the waste classifications. The NRC considers this approach to provide the necessary requirements for ensuring safe operations and disposal for a near-surface facility handling, storing, and disposing of waste streams such as GTCC in a very direct and clear manner while clearly designating the requirements for disposal facilities that are only disposing of Class A, B, and C waste. The NRC believes this approach provides for minimal disruption for current facilities that only intend to dispose of Class A, B, and C wastes.

The NRC has revised its "Guidance for Conducting Technical Analyses for 10 CFR Part 61," Revision 1, and included a new appendix G that discusses GTCC waste classification (section G.3). The NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61. The Background section in the Statements of Consideration accompanying the NRC's proposed revisions to 10 CFR Part 61 includes additional discussion regarding the different sources of GTCC waste.

#### **E. Intruder Protection**

**Comment:** Some commenters expressed support for a 500 millirem (mrem) dose limit for the intruder, and other commenters were opposed to the 500 mrem dose limit. For inadvertent intrusion, the DOE recommended that the NRC move toward consistency with international

recommendations for the use of an optimization-based standard and stated that the use of a specific quantitative limit for intrusion is inconsistent with International Commission on Radiological Protection (ICRP) and IAEA recommendations and DOE requirements, where the intruder is addressed as an optimization situation (the ICRP and the IAEA recommend that optimization be applied for intrusion doses up to 1,000 to 2,000 mrem). The DOE establishes performance “measures” as opposed to strict “objectives” for inadvertent intrusion. One commenter stated the annual intruder dose limit should be set through revision to 10 CFR 61.42, “Protection of individuals from inadvertent intrusion,” and this dose limit should be determined as part of the rulemaking process. One commenter stated a dose of 500 mrem/year is far less protective than a 1-in-one-million risk standard and therefore should not be proposed. One commenter questioned the basis for increasing the dose limit to 500 mrem for the intruder scenario as a proxy for the low probability of the intrusion and asked that such a policy decision be formally acknowledged, justified, and opened to public comment, including an explicit discussion of a comparison of the health effects and environmental effects of such an approach to ensure consistency with other disposal facility standards and risk-based environmental laws, such as the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act.

**NRC Response:** The NRC considers the approach used in developing 10 CFR Part 61 (i.e., limiting exposure to 500 mrem) to be an appropriate method for considering both the hazards associated with disposal of radioactive materials in the near surface and the uncertainty associated with scenarios for inadvertent intrusion. The scenarios used to evaluate inadvertent intrusion back in the 1980s strike a reasonable balance between hazards and uncertainty that the NRC continues to consider appropriate today. Consistent with the commenter’s request, proposed revisions to the requirements for near-surface disposal of GTCC waste are being made through a public rulemaking. Revision of the regulations to address intruder protection, including a specific dose or risk limit and the rationale, is a part of this rulemaking process. This process includes a public meeting and an opportunity for the public to provide comments.

Environmental laws such as the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act (CERCLA) are concerned with cleanup of uncontrolled or abandoned waste sites and the management of solid waste. NRC regulations at 10 CFR Part 61 for the near-surface disposal of radioactive waste provide reasonable assurance of protection of public health and safety such that cleanup, as would occur under CERCLA, would not be required in the future.

**Comment:** Commenters raised concerns regarding the NRC’s approach for specifying disposal 5 meters (m) below the surface of the cover and inclusion of 500-year intruder barriers to protect the inadvertent intruder. Commenters recommended that barriers not be determined through a generic analysis or imposed as a requirement, but rather a site-specific analysis could be used to demonstrate that any given waste stream meets the applicable performance objectives for a facility.

**NRC Response:** The NRC recognizes that how licensees comply with the regulations will greatly depend on the specific site conditions, design, and inventory. However, the likelihood of an intrusion is subject to significant uncertainties at distant times such as 500 years in the future. The current regulatory approach specifies certain requirements (i.e., a 500year intruder barrier and disposal 5 m below the surface) to ensure the risks of a potential intrusion are limited if it were to occur. The 500year intruder barrier allows for a significant period of decay before any intrusion and a burial depth of at least 5 m limits the potential for excavation of the waste.

The NRC understands that a site-specific analysis might be used to show alternatives that would demonstrate that certain site conditions or designs would produce the same effect as the depth of burial and a 500-year intruder barrier. If the site specific analysis also considered the uncertainties associated with inadvertent intrusion, including uncertainty in the likelihood of an intrusion event; information from the specific analyses could be considered during NRC's safety review of an applicant's demonstration for meeting the requirements for protection of the inadvertent intruder.

**Comment:** Commenters raised concerns regarding aspects of the intruder scenario especially associated with the durability of a 500-year barrier. While some questioned the feasibility of a 500-year barrier, others supported the regulatory approach for requiring such a 500-year barrier lifetime. One commenter requested that the NRC consider whatever technical basis is available internationally with respect to a robust intruder barrier that is technically and economically feasible.

One commenter expressed concern for the 500-year timeline, given the longevity of the hazard, and suggested that the longevity of the barriers approximates the expected lifetime of the highly radioactive material. One commenter asked for available information supporting concrete lasting 500 years without degradation.

**NRC Response:** The NRC understands the concerns commenters had regarding the potential for intruder barriers persisting for long time periods, such as 500 years. The NRC agrees that the intruder barrier should be technically and economically feasible.

The NRC has revised its "Guidance for Conducting Technical Analyses for 10 CFR Part 61," Revision 1, and included a new appendix G that provides a detailed discussion of regrading intruder barriers for GTCC waste (section G.5). Briefly, intruder barriers are intended to deter, discourage, or inhibit a human or group of humans from continuing to engage in actions such as drilling, trenching, or excavating that would eventually bring them into contact with radioactive waste. Simply put, an intruder barrier is intended to convince the inadvertent intruders to cease their efforts. An intruder barrier is not intended to be impossible to penetrate, break, or remove using normal construction equipment, such as backhoes, front end loaders, compressed air demolition hammers, bulldozers, and domestic water well drilling rigs. To achieve deterrence, a barrier need only be able to convince the intruders that the material they are trying to drill though, trench, or remove is resistant to their efforts to the degree that the best course of action is to stop and investigate or relocate their activity. In many cases, convincing intruders to cease construction activities may be a simple matter of forcing them to significantly exceed the time allocated, their budget, or a well driller's willingness to allow expensive equipment to be heavily damaged. Section G.5 of the guidance document provides guidance to licensees (or applicants) and reviewers on choosing and testing physical barriers for deterring domestic water well drilling at near-surface disposal facilities for GTCC radioactive waste, including the feasibility, longevity, and durability of the intruder barriers.

The NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61.

**Comment:** The DOE noted that direct disturbance scenarios are uncertain and that technology to identify and recover natural resources is continually evolving such that technologies employed today (e.g., laser-guided sonic drilling) were not even imagined 100 years ago. The DOE recommended that the NRC provide additional context to clarify the statement in the technical analysis that it based its direct disturbance scenarios on present-day observations.



One commenter questioned how the NRC can “predict” drilling practices 500 years into the future. One commenter stated there was no discussion regarding intentional intrusion (e.g., terrorists).

**NRC Response:** The NRC understands the concerns with the consideration and evaluation of direct disturbance (intruder) scenarios, given evolving technologies and changing resource demands in the distant future.

The NRC has proposed a requirement for licensees to conduct a site-specific inadvertent intruder assessment at 10 CFR 61.13, “Technical analyses.” Given the uncertainty in predicting human behavior into the distant future and to limit associated speculation, the NRC has specified at 10 CFR 61.13(b)(1) that the inadvertent intruder assessment must assume that an inadvertent intruder occupies the disposal site and engages in agricultural and residential activities and other reasonably foreseeable pursuits that are consistent with the activities occurring in and around the site at the time of development of the inadvertent intruder assessment.

The NRC has revised its “Guidance for Conducting Technical Analyses for 10 CFR Part 61,” Revision 1, for the inadvertent intruder assessment that describes acceptable approaches for determining reasonably foreseeable inadvertent intruder activities that are consistent with activities in and around the land disposal facility. The guidance also describes how licensees can take credit for physical characteristics (e.g., water quality) and societal information (e.g., land use patterns) related to the land disposal facility to limit speculation about the types of activities in which an inadvertent intruder might engage. Consistent with the original approach used in developing the LLW classification tables, the NRC requires the licensee to assume that the institutional controls will cease to be effective after the end of the active institutional control period, but no later than 100 years after site closure. The NRC does not expect that controls will fail but has concluded that the durability of the controls cannot be assured. In addition, the NRC does not assume that contact with the LLW by an inadvertent intruder is certain to occur. A 5 millisievert (mSv) (500 mrem) dose limit for the inadvertent intruder, compared to a 0.25 mSv (25 mrem) annual dose limit for the public during the compliance period in 10 CFR 61.41, “Protection of the general population from releases of radioactivity,” provides a dose limit that considers both the health risk to the inadvertent intruder and the likelihood of the inadvertent intruder receptor scenario. Furthermore, as in the original regulation, engineered barriers and disposal practices, such as greater disposal depth, are allowed to be considered in the inadvertent intruder assessment. For example, if the disposal site implements a protective cover of at least 5 m (16 feet) thickness, it would not be reasonable to consider a receptor scenario in which a dwelling foundation is excavated below 5 m (16 feet) and waste is exhumed from a disposal unit, if it is not normal to construct foundations in the surrounding area to that depth (see Section 4.0, “Inadvertent Intruder Assessment,” and Section G.5, “Intruder Barriers for GTCC Waste,” of the guidance document).

As discussed in the previous response, an intruder barrier is not intended to be impossible to penetrate, break, or remove using normal construction equipment, such as backhoes, front end loaders, compressed air demolition hammers, bulldozers, and domestic water well drilling rigs. However, disturbance of an LLW disposal facility for removal and use of large quantities of LLW by a terrorist group is not considered a reasonable or realistic scenario due in part to considerations such as that the time and use of industrial earth-moving equipment would be very noticeable, and the separation and movement of significant amounts LLW from the large volume of exhumed material also presents a significant logistical challenge. Although the probability of such a terrorist attempt being successful is numerically indeterminable, the NRC

considers that such a scenario is not a reasonable consideration in the safety assessments of LLW disposal.

Revision of the regulations in the area of the inadvertent intruder assessment is part of the NRC's rulemaking process that includes a public comment period, and the NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61.

**Comment:** Commenters stated the draft regulatory basis document should discuss what institutional controls the NRC will require to limit exposure beyond the proposed life of the intruder barrier.

**NRC Response:** Currently, 10 CFR Part 61 has a number of requirements for institutional controls. In particular, 10 CFR 61.23(a) specifies that granting a license requires the applicant's proposal to demonstrate that the "postclosure institutional controls are adequate to protect the public health and safety in that they will provide reasonable assurance that individual inadvertent intruders are protected in accordance with the performance objective in § 62.42, Protection of individuals from inadvertent intrusion"; 10 CFR 61.12(h) requires "[A]n identification of the known natural resources at the disposal site, the exploitation of which could result in inadvertent intrusion into the low-level wastes after removal of active institutional control"; 10 CFR 61.31(c)(2) specifies that "any additional requirements resulting from new information developed during the institutional control period have been met" will be considered at the time of license termination.

The regulations at 10 CFR Part 61 provide for a thorough consideration of the appropriate and necessary institutional controls that would be implemented for a specific site and the disposed radioactive waste. The NRC's regulations require institutional controls to be maintained and do not specify over what length of time the controls are to be maintained. While changes may occur over time to governments or society, hazardous facilities are unlikely to be abandoned or forgotten. As a result, it is a reasonable assumption that any government would, in the interest of its citizenry, ensure that appropriate oversight remains in place, consistent with radiation protection principles and regulatory restrictions, until final disposition of the spent fuel occurs. Additionally, these institutional controls are part of a defense-in-depth approach to disposal; the facility design is not permitted to rely on those institutional controls to meet postclosure safety requirements—10 CFR 61.59, "Institutional requirements," states the "institutional controls may not be relied upon for more than 100 years following transfer of control of the disposal site to the owner."

**Comment:** The DOE noted differences in the NRC's technical analysis for the inadvertent intruder that were different from analyses that supported the initial development of 10 CFR Part 61 in the 1980s. In particular, the intruder analysis for the draft regulatory basis considered: (a) intrusion that could occur as early as 100 years rather than 500 years, (b) an excavation scenario 5 m in depth rather than 3 m, (c) an adjustment factor of 10 that was not applied as was done for the Class C limits in part due to a number of factors (e.g., likelihood, nature of waste forms, effectiveness of barriers, mixing and other factors), and (d) consideration of a mud pit scenario. Additionally, the intruder analysis appears to assume a humid site (shallow well depth) and does not give appropriate consideration to an arid site that would require a greater well depth resulting in further dilution of exhumed waste in the drill cuttings.

The DOE requested that the NRC consider modeling a well depth aligned with the water table depth for a low infiltration, deeper water table site rather than a humid site. The 55 m deep well that was assumed in the NRC generic analysis is representative of a humid site. The DOE recommends that the technical analysis address conditions at a site with lower infiltration and a

deeper water table (e.g., a midpoint of the generic water table depths of 135 to 200 m as discussed on page 74 of the technical analysis). The relatively small, assumed spreading area for cuttings from the 55 m deep well should also be scaled up, consistent with the increased volume of cuttings resulting from a deeper well.

**NRC Response:** The NRC's analysis was intended to explore differences between current practices in commercial LLW disposal and the assumptions used when 10 CFR Part 61 was developed to determine important variables to consider. The 10 CFR Part 61 analysis of the inadvertent intruder was intended to help define the waste classification system. The NRC staff performed the intruder analysis in support of the draft regulatory basis for disposal of GTCC waste and conducted it to determine the potential consequences of intrusion into a near-surface disposal site with such waste. The analyses supported the NRC staff's conclusion that disposal of GTCC waste was potentially acceptable but would depend on site characteristics and the amount of waste disposed. The NRC's generic analysis was used to determine whether or not the GTCC waste was potentially suitable for disposal at a near-surface disposal facility. The NRC considers its technical analyses as illustrative and not definitive. A site-specific analysis is expected to be based on appropriate site conditions that would include such aspects as the water table depth and drilling characteristics of the region that would influence the type of intruder analysis.

The NRC's original analysis for 10 CFR Part 61 considered intrusion of the waste site could occur as early as 100 years after closure. A 500-year intrusion time was only considered when a robust intruder barrier was in place that would delay human disruption of the disposed waste.

The NRC's original analysis evaluated a depth of excavation of 3 m. The requirements developed in the regulation were for a 5 m disposal depth to prevent excavation into the waste.

Use of a mud pit was common with 1980 drilling technology. Today, use of a mud pit still occurs but is not preferred, as all drilling technology and spreading of cuttings result in higher impacts to a potential intruder. The NRC updated its evaluation to reflect modern practices rather than use assumptions that are known to be no longer current.

Water table depths can be highly variable. Humid water table depths can commonly be single digit depths (at the commercial LLW facility in South Carolina, the depth to water is 9 to 15 m; at the facility in Utah (extremely arid), the depth to water is approximately 8 m; at the facility in Texas (extremely arid), the depth to water is about 80 m; at the facility in Washington (arid to semi-arid), the depth to water is also about 80 m). Deeper water table depth exists in the United States but not at the location of existing commercial disposal facilities, and 55 m is not representative of a humid site as stated by the DOE. The cuttings area the NRC used was consistent with the depth to water.

The degradation of an intruder barrier and its effectiveness is highly dependent on the barrier materials and design and the environmental conditions. The NRC considers scientific information can be used to support the effectiveness and longevity of intruder barriers; however, it is important to acknowledge that there is uncertainty in estimating whether or not an intruder event will occur and the nature of the intrusion (such as the type of drilling method and reason). As such, attempting to quantify a likelihood for the persistence of an intruder barrier is not considered a meaningful exercise. The scientific information can be used to provide confidence that the intruder barrier can retain its capabilities in the environment where it is placed and would be expected to deter reasonable drilling types of intrusions. The NRC has developed additional guidance with respect to inadvertent intruder assessments and intruder barriers (refer

to sections 4.0 and G.5 of the guidance document). The NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61.

## F. Definitions and TRU Waste

**Comment:** The DOE recommended the NRC establish a performance objective, such as the dose to the intruder at 500 years, allowing a site-specific analysis to establish the waste acceptance criteria for a TRU waste concentration limit.

**NRC Response:** The NRC does not agree with the recommendation for TRU waste concentration limit based on an intruder dose at a specified time. The NRC considers that the use of a site-specific analysis to identify the waste acceptance criteria is appropriate without the imposition of a specified time. The peak dose to an intruder is not necessarily at 500 years. Site-specific analyses will be used to establish waste acceptance. Waste acceptance criteria for waste containing certain transuranic radionuclides would include considerations for a variety of potential impacts, such as operational risks, criticality, security, and postclosure. The NRC has revised the definition of LLW such that TRU waste is simply considered LLW when it is considered acceptable for near-surface disposal. Waste containing TRU radionuclides is required to meet the 10 CFR Part 61 requirements.

**Comment:** Commenters supported the suggestion that the NRC conduct a rulemaking to revise the definition of GTCC waste to include TRU waste, consistent with Federal law. One commenter suggested the NRC look at what is done internationally in developing a clear definition of TRU waste. One commenter suggested the definition of TRU waste should distinguish between waste destined for disposal at a 10 CFR Part 61 facility and TRU waste that is to be disposed at the DOE's Waste Isolation Pilot Plant (WIPP) facility.

**NRC Response:** The NRC has proposed a revised definition of LLW such that TRU waste is LLW when it is considered acceptable for near-surface disposal. Waste containing TRU radionuclides is required to meet the 10 CFR Part 61 requirements for disposal. A definition for TRU waste is no longer needed under 10 CFR Part 61. Revision of the regulations to change the definition of LLW, and the rationale, is part of the NRC's rulemaking process that includes a public comment period.

The focus in the U.S. regarding radioactive wastes containing TRU radionuclides is with respect to the concentration that may be appropriate for near surface disposal, whereas the international focus is not so much on the specific concentrations but rather more on the types of waste streams that contribute to TRU wastes. The different focus limits the benefit of the international approaches for assisting a specific definition of TRU waste in U.S. regulations. The NRC's proposed approach that does not require a definition of TRU waste but rather requires radioactive wastes, some of which contain TRU radionuclides, meet the 10 CFR Part 61 requirements is the more appropriate regulatory approach.

**Comment:** The DOE recommended that the staff revise the definition of "GTCC-like waste" on page iv of the draft regulatory basis to read as follows: "A term used by DOE to refer to radioactive waste that is owned or generated by DOE (including LLW and non-defense-generated TRU), has no identified path to disposal, and has characteristics similar to those of GTCC LLW such that a common disposal approach may be appropriate. The term, 'GTCC-like waste' is not a classification of radioactive waste."

**NRC Response:** The NRC included a discussion in the Statements of Consideration for the proposed revisions to 10 CFR Part 61 with respect to GTCC-like waste and the applicability of

the 10 CFR Part 61 requirements. The requirements for the safe disposal of GTCC waste streams are not based on the ownership nor the term used for the waste (i.e., GTCC versus GTCC-like) but are rather based on the types and concentrations of radionuclides present in the waste. As GTCC-like waste is similar in characteristics to those of GTCC LLW, as mentioned in the DOE's "Final Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste" (DOE/EIS-0375, page 1-2), the DOE intends to determine a path to disposal that is similarly protective of public health and safety for GTCC-like waste that it owns or generates).

**Comment:** The DOE provided information on the distinction of GTCC-like waste for sealed sources, noting that, on page 3, the draft regulatory basis states: "A distinction is made between GTCC waste generated by NRC licensees and Agreement State licensees, which is referred to as 'commercial' GTCC waste, and DOE GTCC-like waste. However, DOE's definition of GTCC-like waste also includes recovered sealed sources that the agency has taken title to from NRC and Agreement State licensees." Where the DOE acquires material, such as sealed sources recovered for public health and safety or national security reasons, and not for purposes of implementing its disposal responsibility under the Low-Level Radioactive Waste Policy Act, and those sources are determined to be LLW, the DOE may dispose of such material in the same manner as it does other LLW owned or generated by the DOE. Thus, the recovered sealed sources are considered to be GTCC-like waste.

The Texas Department of State Health Services (TDSHS) stated that americium-241 sealed sources in gauging devices and well logging sources appear to have been included under the description of "neutron irradiator" sources in Tables 3-4 and A-1 of the draft regulatory basis. Under this interpretation, americium-241 would not be permitted for the near-surface disposal. The unsealed form of americium-241 does not appear to be included in the Table A-1 "Description of the Waste Streams in NRC's Hazards Evaluation." The TDSHS recommended it would be helpful for the regulatory basis to explicitly address disposal of americium-241.

**NRC Response:** The NRC understands the commenters' request for additional clarity regarding the ownership of sealed sources and the potential disposition of specific americium-241 sealed sources in gauging devices and well logging sources. The NRC has included a discussion in the Statements of Consideration for the proposed revisions to 10 CFR Part 61 with respect to GTCC-like waste and the applicability of the requirements of 10 CFR Part 61. The requirements for the safe disposal of GTCC waste streams are not based on the ownership nor the term used for the waste (i.e., GTCC versus GTCC-like) but rather, based on the types and concentrations of radionuclides present in the waste. As GTCC-like waste is similar in characteristics to those of GTCC LLW, as mentioned in the DOE's "Final Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste" (DOE/EIS-0375, page 1-2), the DOE intends to determine a path to disposal that is similarly protective of public health and safety for GTCC-like waste that it owns or generates.

The NRC used the generic analysis in the draft regulatory basis to determine whether or not the GTCC waste was potentially suitable for disposal at a near-surface disposal facility. The NRC considers its technical analyses as illustrative and not definitive. The agency's current rulemaking proposes requirements and guidance that are applicable to any GTCC waste stream inventory and volume. Any application for disposal of GTCC waste will need to identify the inventories and volumes of the waste to be disposed. A disposal facility seeking approval for near-surface disposal of GTCC waste will need to demonstrate compliance with the regulatory requirements, and the method of compliance will be influenced by the site characteristics and design, including the waste inventories and volumes of waste. The NRC identified that GTCC waste concentrations greater than 10,000 nCi/g of alpha-emitting TRU nuclides with half-lives

greater than 5 years presented significant concerns for both operational and postclosure safety. Should americium-241 sealed sources exceed the 10,000 nCi/g concentration limit, such waste is generally not acceptable for near-surface disposal. GTCC waste in packages containing concentrations of material greater than 10,000 nCi/g of alpha-emitting TRU nuclides with half lives greater than 5 years would need to be considered by the Commission on a case-by-case basis.

## **G. Security**

**Comment:** The New York State Energy Research and Development Authority (NYSERDA) commented that the draft regulatory basis discusses whether physical protection requirements at 10 CFR 150.14, "Commission regulatory authority for physical protection," would be amended to provide an option for Agreement States to address physical security under 10 CFR Part 37, recognizes this as an issue that must be addressed, and encourages the NRC to obtain specific input from Agreement States should the proposal proceed to rulemaking. NYSERDA agrees with the NRC staff conclusion that a "conservative and prudent approach" in any potential rulemaking would be to limit the scope of Agreement State licensing to those near-surface disposal facilities that can accept only those waste streams that do not exceed the mass thresholds of 10 CFR 150.11, "Critical mass."

One commenter stated that the NRC should address issues with respect to Agreement State licensing and control of special nuclear material through rulemaking.

One commenter stated that NRC Enforcement Guidance Memorandum EGM-14-001, "Interim Guidance for Dispositioning 10 CFR Part 37 Violations with Respect to Large Components or Robust Structures Containing Category 1 or Category 2 Quantities of Material at Power Reactor Facilities Licensed Under 10 CFR Parts 50 and 52" (ML14056A151) with respect to 10 CFR Part 37, provides that large items greater than so many kilograms, absent certain waste types or robust structures, may use an alternative set of controls that may be appropriate for GTCC security measures.

**NRC Response:** The NRC acknowledges that certain GTCC waste streams may exceed the mass thresholds specified at 10 CFR 150.11 and 10 CFR 150.14 that could result in additional requirements for physical protection or limit Agreement State authority. The NRC has decided not to revise the thresholds provided at 10 CFR 150.11 and 10 CFR 150.14. These thresholds provide conservative values for any waste that might be considered for disposal at a near-surface facility. Agreement State licensing will be limited to those near-surface disposal facilities that can accept only those GTCC waste streams that do not exceed the mass thresholds of 10 CFR 150.11. The NRC has considered specific characteristics of the waste (e.g., concentration, separability of the waste form, and specific radionuclides) important in implementing physical protection measures under 10 CFR Part 73, "Physical Protection of Plants and Materials." The NRC is proposing to exempt certain LLW from the physical protection requirements of 10 CFR 73.67, "Licensee fixed site and in-transit requirements for the protection of special nuclear material of moderate and low strategic significance," for waste meeting certain requirements (e.g., very low concentration, not readily separable) to ensure the physical protection is appropriate to the waste material. The Statements of Consideration provides further details for the proposed exemption in 10 CFR Part 73. The proposed exemption is intended to provide additional flexibility to Agreement States for physical protection. Revision of the regulations to provide an exemption for certain LLW from physical protection requirements, and the rationale, are part of the NRC's rulemaking process that includes a public comment period.

The exemption from the requirements at 10 CFR 73.67 for radioactive waste to be disposed at a near-surface disposal facility that is of limited attractiveness for theft and diversion does not exempt the licensee from physical protection and security requirements in other parts of NRC's regulations. Any near-surface disposal facility is still required to provide physical protection and security for radioactive material under 10 CFR Part 20, "Standards for Protection Against Radiation," Subpart I, "Storage and Control of Licensed Material," as well as other physical protection requirements under 10 CFR Part 37 for radioactive waste regulated by that part. This revision is intended to provide appropriate flexibility to Agreement States for licensing certain radioactive wastes that meet the requirements for safe disposal at a near-surface disposal facility that would include the physical protection requirements under 10 CFR Part 37, as appropriate. The physical protection requirements under 10 CFR Part 37 protect against obtaining material for a radiological dispersal device when the threshold quantities in Appendix A, "Category 1 and Category 2 Radioactive Materials," to 10 CFR Part 37 are exceeded. This rulemaking does not change the applicability of 10 CFR Part 37 to 10 CFR Part 61 licensees.

#### **H. Agreement State Authority**

**Comment:** Commenters expressed the view that the NRC should acknowledge in regulation and guidance that an Agreement State would retain the authority to regulate disposal of GTCC waste in a facility licensed in the State. The Low-Level Waste Forum stated the final regulatory basis should be consistent with the Forum's mission to promote access for LLW disposal balanced with the need for flexibility for individual compacts and sited States to determine the acceptability of GTCC and TRU waste disposal with respect to State policy, site-specific conditions, and existing waste acceptance criteria, consistent with the 10 CFR Part 61 requirements. One commenter stated that "As part of the rulemaking process, the NRC should also consult with the LLW Compact Commissions throughout the United States to receive feedback on how Compacts implement NRC rulemaking activities in their policies, especially those regarding disposal of GTCC waste within their host state." The Governor of Idaho expressed concern that the draft regulatory basis would provide a pathway to inappropriately dispose of GTCC and TRU waste streams in the State of Idaho.

Some commenters expressed concern for the capability of Agreement States to evaluate complex site-specific analyses and suggested that the NRC may need to assist the reviews or provide technical oversight. One recommended an approach consistent with how the NRC reviews and approves special nuclear material exemption requests, such as the one granted to Energy Solutions' Clive Facility, would be appropriate. Some commenters expressed the view that GTCC waste disposal needs to be under Federal authority due to the magnitude and longevity of the hazards posed by GTCC waste.

The Texas Commission on Environmental Quality (TCEQ) requested clarification on the Agreement State authority to agree or disagree should a prospective applicant that is already an Agreement State licensee apply directly to the NRC to dispose of GTCC waste under the current regulatory process as would be done under the no-action alternative in the draft regulatory basis.

**NRC Response:** The NRC has carefully considered the potential for the agency to relinquish its authority and allow an Agreement State to assume that authority and exercise its regulatory responsibilities in the area of near-surface disposal of GTCC waste. The DOE's GEIS provided inventories for GTCC waste streams that included the inventories that may exceed certain thresholds (e.g., critical mass thresholds at 10 CFR 150.11, thresholds of fissile material requiring Commission regulatory authority for physical protection at 10 CFR 150.14; thresholds for physical protection of Category 1 and Category 2 quantities of radioactive material provided in Table 1 of 10 CFR Part 37; thresholds for physical protection of quantities of special nuclear material provided at 10 CFR 73.2, "Definitions"). The NRC considers the quantities and thresholds provided in its regulations at 10 CFR Parts 37, 73, and 150 are appropriate for application of regulatory requirements for disposal of GTCC in a near-surface facility licensed under 10 CFR Part 61.

The NRC is not revising any of the thresholds in its regulations; however, it recognizes that implementation of the regulatory requirements for limiting the critical mass and establishing and maintaining physical protection measures can involve a variety of considerations (e.g., concentration and volume of the radioactive material, waste form affecting the separation of fissile material). The NRC is proposing revisions to 10 CFR Part 61 and 10 CFR Part 73 that limit the inclusion of certain waste material for criticality safety and physical protection based primarily on low concentrations. The Statements of Consideration provides further details for the proposed exemptions in 10 CFR Part 61 (for criticality safety) and 10 CFR Part 73 (for physical protection of special nuclear material).

The NRC is proposing an additional criticality safety requirement in 10 CFR Part 61 that is applicable after disposal due to the potential for large quantities of fissile material (e.g., tens of kilograms) to be present in a disposal unit. Site-specific conditions, radionuclide inventories, and waste form considerations all can impact the potential for reconcentration of fissile material after disposal. The NRC is proposing a requirement that the applicant identify the disposal unit and facility design features that limit reconcentration of fissile material for waste containing special nuclear material in quantities that would be subject to the requirements of 10 CFR 70.24, "Criticality accident requirements."

Revision of the regulations with respect to physical protection and criticality safety and the rationales are a part of the NRC's rulemaking process that includes a public comment period. The NRC has also revised its "Guidance for Conducting Technical Analyses for 10 CFR Part 61," Revision 1, and included a new appendix G that provides specific guidance for criticality safety (section G.6.3) and for physical protection (section G.6.2). The NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61.

In response to the one commenter that asked for a clarification of Agreement State authority under the no-action alternative in the draft regulatory basis to agree or disagree if an existing Agreement State licensee applies to the NRC for a license to disposal of GTCC, this clarification is no longer relevant since this alternative was not selected by the Commission. Rather, the Staff Requirements – SECY-20-0098 – Path Forward and Recommendations for Certain Low-Level Radioactive Waste Disposal Rulemakings, dated April 5, 2022, provided for Agreement State licensing of those GTCC waste streams that meet the regulatory requirements for near-surface disposal and do not present a hazard such that the NRC should retain disposal authority. In addition, Agreement States are valued regulatory partners to the NRC. The NRC staff frequently interacts with the Texas Department of State Health Services and the Texas Commission on Environmental Quality (TCEQ) on regulatory matters and benefits from those interactions, especially matters related to LLW disposal. The NRC staff held a public meeting on



the GTCC regulatory basis in Texas, and a representative from the State is on the working group for the low-level waste disposal rulemaking. As such, the NRC fully supports Agreement State involvement throughout its regulatory processes of matters of mutual concern.

Finally, NRC retains oversight authority for ensuring that Agreement State programs provide adequate protection of public health and safety and are compatible with the NRC's regulatory program. In fulfilling this statutory responsibility, the NRC will periodically review the program to ensure it continues to be adequate and compatible after an agreement becomes effective. To fulfill this responsibility, the NRC, in cooperation with the Agreement States, established and implemented the Integrated Materials Performance Evaluation Program (IMPEP). IMPEP is a performance evaluation process that provides the NRC and Agreement States with systematic, integrated, and reliable evaluations of the strengths and weaknesses of their respective radiation control programs and identification of areas needing improvement. IMPEP reviews are conducted in accordance with the NRC Agreement State Program Policy Statement, published in the Federal Register on October 18, 2017 (82 FR 48535), and described in NRC Management Directive 5.6, "Integrated Materials Performance Evaluation Program (IMPEP)" and NMSS Procedure SA-100, "Implementation of the Integrated Materials Performance Evaluation Program (IMPEP)."

## I. Financial Assurance and Cost Analysis

**Comment:** The TDSHS raised a concern regarding the financial assurance for facilities that dispose of GTCC waste and requested guidance for determining how to calculate the financial assurance requirements for licensees to ensure storage can continue in a safe and secure manner and to pay for eventual disposal. It also inquired as to what protections were available if licensees went bankrupt while still storing GTCC waste. Additionally, the TDSHS inquired whether or not sealed sources may be exempt from any financial assurance requirements and asked that the financial assurance regulations be amended to include sealed sources that could become GTCC waste on a per-source basis. Other commenters expressed the concern that taxpayers will eventually have to pick up the costs of the contamination.

**NRC Response:** Subpart E, "Financial Assurances," of 10 CFR Part 61 contains requirements for financial assurance, including funds for the period of institutional controls. The NRC considers Subpart E appropriate for any waste that may be disposed in a near-surface facility and provides the requisite information to ensure that financial resources are available.

The NRC is revising its regulations in a separate rulemaking to require financial assurance for the disposition of Category 1 and 2 byproduct material radioactive material sealed sources. That rulemaking would help ensure 1) that licensees are financially prepared for the costs of end-of life disposition of Category 1 and 2 byproduct material radioactive sealed sources, 2) the safe and secure management of these sources by facilitating timely disposition when they are no longer needed or wanted, and 3) that dispositioning costs are borne by those who receive the economic benefits from the use of these sources.

Those GTCC waste streams that are not suitable for near-surface disposal are not covered under the Subpart E financial assurance requirements. The NRC has determined that, on a generic basis, waste streams containing long-lived transuranic radionuclides such as Americium-241 sources (half-life 430 years) in concentrations greater than 10,000 nCi/g represent a long-term hazard are not suitable for near-surface disposal. Because GTCC is a federal responsibility, the DOE has committed to taking possession of these types of sources. Once DOE takes possession of the GTCC sources, they are remanded under its jurisdiction and

become GTCC-like waste and would no longer be subject to NRC's financial assurance requirements.

**Comment:** The TDSHS asked whether the NRC cost considerations for the no-action alternative considered the cost associated with the impact of no disposal solution that would result from continued storage costs. The TCEQ asked whether the NRC's cost analysis for the no-action alternative that identified costs for the Agreement State only for the license hearing and public meetings assumed that an Agreement State would not be involved in the review process or any other coordination with the NRC.

**NRC Response:** The NRC did not attempt to estimate the costs of continued storage of GTCC waste streams, which would be very speculative given that some of the wastes in the DOE GEIS have yet to be generated and some waste is currently buried.

The no-action alternative (i.e., no regulatory changes) assumes, under 10 CFR 61.55(a)(2)(iv), that an applicant would request, and the Commission would approve, the disposal of GTCC waste in a near-surface disposal facility on a case-by-case basis. If the Commission approves the request and after the site-specific application is evaluated and approved by the NRC staff, the Commission can authorize GTCC waste disposal at the facility that can be licensed either by the NRC or an Agreement State. The costs presented in the draft regulatory basis for this alternative (i.e., table 7-2) reflect Agreement State costs for participation in the license hearing; however, the NRC conducts an independent review. State participation in the licensing hearing would follow the NRC's established procedures. The NRC did not provide specific estimates for the situation where an Agreement State would be the licensing authority rather than the NRC. The draft regulatory basis document indicated that additional costs could result for Agreement State licensing under this alternative (pages 38–39).

## **J. Other**

**Comment:** The DOE suggested that the NRC add, as another disadvantage on page 37, table 7-1 of the draft regulatory basis, that the NRC has not licensed a U.S. disposal facility and that previous licensing experience resides with the Agreement States.

**NRC Response:** Agreement States implementing land disposal regulatory authority assumed from the NRC are required to adopt regulations and other programmatic requirements that the agency has determined to be required for a regulatory program to be adequate to protect health and safety and be compatible with the NRC's regulatory program (i.e., legislation, adequately trained and qualified staff, and inspection program). The NRC staff has significant experience with the activities conducted in the Agreement States with LLW near-surface disposal facilities. In particular, the NRC's Agreement State Program conducts periodic Integrated Materials Performance Evaluation Program reviews in accordance with section 274j of the Atomic Energy Act that include implementation of 10 CFR Part 61 in the Agreement State and interacts with the Agreement State's technical and regulatory staff on an as-needed basis with respect to the 10 CFR Part 61 requirements. As appropriate, the NRC will clarify the extent of its experience with implementation of the 10 CFR Part 61 requirements in its regulatory and guidance documents.

**Comment:** Commenters expressed concern regarding the transportation of GTCC waste. One commenter inquired as to how transportation to a disposal facility is considered in approving a site for near-surface disposal (e.g., transportation infrastructure, security, liability during transit, inspections during transit and at the origin and destination points). Commenters expressed concern with the potential for large numbers of shipments for GTCC waste (on the order of 34,000 truck shipments or 12,000 rail shipments).

One commenter stated that the NRC will need to update the Uniform Low-Level Radioactive Waste Manifest to reflect certain information related to the shipments of GTCC waste. One commenter suggested that a separate label should be used to provide additional information for workers, emergency responders, and the public.

**NRC Response:** Regulating the safety of the shipment of nuclear materials is the joint responsibility of the NRC and the U.S. Department of Transportation (DOT). The NRC establishes requirements for the design and manufacture of packages for radioactive materials, and the DOT regulates the shipments while they are in transit and sets standards for labeling and smaller quantity packages.

Transportation of waste materials in this manner ensures material can be safely transported independent of the number of individual trips. Transportation operations are largely outside of the scope of this rulemaking, which is focused on LLW disposal facilities.

With respect to updating the Uniform Low-Level Radioactive Waste Manifest to account for GTCC waste, the NRC is revising certain aspects of the waste acceptance criteria; however, this change does not require a specific change to the manifest. The NRC is revising 10 CFR 61.58, "Alternative requirements for waste classification and characteristics," to require that waste acceptance criteria be either generic waste acceptance criteria, based on the concentration limits in 10 CFR 61.55, "Waste classification," and the waste characteristics in 10 CFR 61.56, "Waste characteristics," or site-specific waste acceptance criteria based on the results of the technical analyses described in 10 CFR 61.13. Because licensees would be required to develop waste acceptance criteria for the acceptability of LLW for disposal, the NRC is also amending Appendix G, "Requirements for Transfers of Low-Level Radioactive Waste Intended for Disposal at Licensed Land Disposal Facilities and Manifests," to 10 CFR Part 20 to conform to the new requirements for LLW acceptance. Waste generators would continue to comply with LLW manifesting requirements in Appendix G of 10 CFR Part 20 and should continue to classify LLW for shipment in accordance with the LLW Classification System (Class A, B, C, or GTCC), such that there are no unintended consequences on current LLW shipment and transportation practices and DOT regulations.

**Comment:** The DOE stated the depth of 30 m as a distinction between near-surface and not near-surface disposal is not significant but is defined in NRC regulations, which suggests the NRC views this as an important distinction. The NRC should clarify the intent of specifying near-surface disposal as being within the upper 30 m of the Earth's surface. In particular, the DOE asked whether or not the NRC considers the WCS low-level waste disposal facility a near-surface facility.

**NRC Response:** The NRC did not intend the 30 m depth to be a rigid definition that provides a sharp distinction for near-surface disposal. The agency proposes to clarify this definition in its rulemaking to revise 10 CFR Part 61 by including the modifying word "generally":

*Near-surface disposal facility* means a land disposal facility in which radioactive waste is disposed generally within the upper 30 meters of the earth's surface.

Additionally, the NRC revised section 1.1.9 of its guidance document to further the intent of the definition of near-surface disposal:

Near-surface disposal is defined to mean a land disposal facility in which radioactive waste is disposed generally within the upper 30 meters of the earth's surface. The purpose for this definition in 10 CFR Part 61 is to provide constraints for the technical requirements provided in the regulation. The requirements for disposal in a deep mine would be different than those for a

shallow trench. At the time 10 CFR Part 61 was originally developed, essentially all LLW disposal was occurring within 30 meters of the land surface and most of disposal designs used simple excavated trenches. The technical requirements that were developed, such as the Table 1 and Table 2 waste classification concentrations, were consistent with the disposal designs. With the modifications to 10 CFR Part 61 to allow for site-specific technical analysis of inadvertent intruders, the constraints around near-surface disposal can be broadened to account for deeper excavated near-surface designs (deeper than 30 m) and specialized designs used for wastes such as sealed sources (e.g., near-surface boreholes).

Revision of the regulations to change the definition of near-surface disposal is part of the NRC's rulemaking process that includes a public comment period, and the NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61.

**Comment:** One commenter noted the draft regulatory basis document did not include any requirements for storage containers that would be acceptable for near-surface storage, and suggested the NRC should describe how such guidelines would be established. Additionally, the commenter requested that the NRC also discuss where and when GTCC and TRU waste would be transferred to approved containers if current containers are not acceptable under a new rule.

**NRC Response:** The NRC acknowledges that certain GTCC waste containers may require specific procedures and design features to ensure the safe and secure handling and storage before disposal. The regulations at 10 CFR Part 61 require analyses that evaluate the expected exposures due to routine operations and likely accidents during handling, storage, and disposal of waste at 10 CFR 61.13(c) and also requires detailed information for the quality assurance program applied to the receipt, handling, and emplacement of waste at 10 CFR 61.13(c). Thus, the regulations require specific containers for the safe handling and disposal of GTCC and TRU waste, including the transfer of waste into containers, to be evaluated and considered as part of the safety evaluation of a near-surface disposal facility.

The NRC has proposed revisions to the 10 CFR Part 61 requirements, including additional guidance to clarify what is expected in the evaluation of operational safety assessments, especially with regards to GTCC waste. In particular, 10 CFR Part 61 has been revised to include a definition of operational safety assessment at 10 CFR 61.2, and it specifies that operational safety assessments involving GTCC waste must also include quantitative analyses of expected exposures due to unlikely accidents (including fire, handling events, and other credible accidents), the identification of safety features to prevent and mitigate accidents, and the identification of defense-in-depth protections to mitigate large uncertainties at 10 CFR 61.13(c). The NRC has revised its "Guidance for Conducting Technical Analyses for 10 CFR Part 61," Revision 1, and included a new appendix G that discusses the additional technical analyses that may be needed to address the radiological hazards that are unique to GTCC waste and that warrant additional attention and consideration by licensees interested in disposing of these materials at a commercial LLW facility (section G.6.1).

Any facility that will be transferring wastes between containers will need to provide the description and analysis of its plans for maintaining safety with the regulatory limits for operations in 10 CFR Part 61. Currently, the NRC has not proposed any requirements that would require the transfer of waste into a new container. Revision of the regulations in the area of operational safety is part of the NRC's rulemaking process that includes a public comment period, and the NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61.

**Comment:** A commenter recommended the NRC revise 10 CFR Part 61 to use the most up-to-date dose methodology and assessment tools to estimate potential dose impacts that are more realistic than those relied upon in the current 10 CFR Part 61.

**NRC Response:** The NRC agrees in part with the commenter. The NRC agrees that it is appropriate to allow for the use of the most up-to-date dose methodology, subject to the conditions described in the quoted text below, in the assessments demonstrating compliance with the performance objectives in 10 CFR Part 61; however, the NRC considers the more effective and efficient approach for accomplishing this goal is to incorporate such a change in its guidance document for implementing 10 CFR Part 61. This approach is considered more efficient because it avoids potential unintended consequences for other licensees regulated under 10 CFR Part 20.

Section 3.4.2 of the NRC guidance document supports the use of current dose methodologies:

As described in 10 CFR 61.7(c)(5), the dose methodology used to demonstrate compliance with the performance objectives of 10 CFR Part 61 shall be consistent with the dose methodology specified in the standards for radiation protection set forth in 10 CFR Part 20, "Standards for Protection against Radiation." The dose methodology is how individual dose factors (e.g., external, ingestion, or inhalation) are calculated for each radionuclide. Licensees may use updated dose factors, which have been issued by consensus scientific organizations and incorporated by the U.S. Environmental Protection Agency (EPA) into Federal radiation guidance. Additionally, licensees may use the most current scientific models and methodologies (e.g., those accepted by the International Commission on Radiological Protection [ICRP]) appropriate for site-specific circumstances to calculate the dose.

Section 3.4.2 further discusses the implementation of newer dose methodologies in 10 CFR Part 61 technical analyses. The NRC made its guidance document available for public comment at the same time as its revisions to 10 CFR Part 61.

**Comment:** Commenters requested specific clarifications in the draft regulatory basis regarding the WCS LLW disposal facility in Texas, such as the NRC coordination of its rulemaking with the DOE's GEIS, WCS seeking approval from Texas for disposal of waste, Texas seeking a decision on GTCC disposal under 10 CFR Part 61, consideration of the cumulative impacts of all the radioactive material (including the spent nuclear fuel storage) in the NEPA process, and whether WCS would need to comply with all the applicable requirements—namely, 10 CFR Part 61 regulations as well as GTCC waste disposal requirements and requirements for spent fuel storage as activities that could occur at the WCS site.

The DOE suggested that the NRC clarify the text on page 48, in the discussion of the Final GTCC EIS, that states that the Final GTCC EIS "suggested two disposal pathways" to instead state that "DOE identified as its preferred alternative(s) disposal of the GTCC LLW and GTCC-like waste inventory in a generic commercial disposal facility and/or WIPP," and that a statement be added to clarify that the DOE's site-specific environmental assessment of the WCS facility in Texas is not a decision document and that the DOE has not yet made a decision on a disposal facility for GTCC LLW and GTCC-like waste.

**NRC Response:** There has been some correspondence between the NRC and the State of Texas Governor's Office<sup>1</sup> and the TCEQ<sup>2</sup> regarding the disposal of GTCC waste in a near-surface facility. Additionally, commenters from the State of Texas have expressed concern for the current LLW disposal facility operated by WCS as a potential candidate for disposing of GTCC waste. The NRC's rulemaking is not specific to WCS. If the NRC's rulemaking finalizes requirements that allow for near-surface disposal of GTCC waste, several things would have to happen after that for disposal of GTCC waste in Texas.

As noted in the NRC correspondence to the Governor of the State of Texas, the rulemaking process provides additional opportunities for participation by the State of Texas and other stakeholders, including a formal comment period, before promulgation of any changes to the existing regulations.

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<sup>1</sup> Correspondence between the Governor's Office and the Commission can be found at ML19121A545.

<sup>2</sup> Correspondence between the TCEQ and the NRC can be found at ML15034A181 and ML15343A291.