U.S. DEPARTMENT OF
ENERGY

Alternatives for the Disposal of Greater-Than-Class C Low- Level Radioactive Waste and Greater-Than-Class C-Like Waste

Report to Congress
November 2017

United States Department of Energy
Washington, DC 20585

Message from the Secretary

The Department of Energy is providing this Report[1] on the alternatives under consideration for the disposal of greater-than-Class C (GTCC) low-level radioactive waste and GTCC-like waste.

This report is being provided to the following Members of Congress:

The Honorable Thad Cochran
Chairman, Senate Appropriations Committee

The Honorable Patrick Leahy
Vice Chairman, Senate Appropriations Committee

The Honorable Lamar Alexander
Chairman, Subcommittee on Energy and Water Development
Senate Appropriations Committee

The Honorable Dianne Feinstein
Ranking Member, Subcommittee on Energy and Water Development
Senate Appropriations Committee

The Honorable Harold Rogers
Chairman, House Appropriations Committee

The Honorable Nita Lowey
Ranking Member, House Appropriations Committee

The Honorable Mike Simpson
Chairman, Subcommittee on Energy and Water Development
House Appropriations Committee

The Honorable Marcy Kaptur
Ranking Member, Subcommittee on Energy and Water Development
House Appropriations Committee

The Honorable John McCain
Chairman, Senate Armed Services Committee

The Honorable Jack Reed
Ranking Member, Senate Armed Services Committee

The Honorable Deb Fischer
Chairman, Subcommittee on Strategic Forces
Senate Armed Services Committee

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[1] In accordance with Section 631(b)(1)(B)(i) of the Energy Policy Act of 2005 (Public Law 109-58)

The Honorable Joe Donnelly
Ranking Member, Subcommittee on Strategic Forces
Senate Armed Services Committee

The Honorable Mac Thornberry
Chairman, House Armed Services Committee

The Honorable Adam Smith
Ranking Member, House Armed Services Committee

The Honorable Mike Rogers
Chairman, Subcommittee on Strategic Forces
House Armed Services Committee

The Honorable Jim Cooper
Ranking Member, Subcommittee on Strategic Forces
House Armed Services Committee

The Honorable Greg Walden
Chairman, House Energy and Commerce Committee

The Honorable Frank Pallone, Jr.
Ranking Member, House Energy and Commerce Committee

The Honorable John Shimkus
Chairman, Subcommittee on Environment and Economy
House Energy and Commerce Committee

The Honorable Paul Tonko
Ranking Member, Subcommittee on Environment and Economy
House Energy and Commerce Committee

The Honorable Lisa Murkowski
Chairman, Senate Energy and Natural Resources Committee

The Honorable Maria Cantwell
Ranking Member, Senate Energy and Natural Resources Committee

If you have any questions, please contact me or Ms. Jennifer Lorraine, Deputy Assistant Secretary for Senate Affairs, at (202) 586-5450, Mr. Marty Dannenfelser, Deputy Assistant Secretary for House Affairs, at (202) 586-5450, or Mr. Joseph Levin, Associate Director for External Coordination, Office of the Chief Financial Officer, at (202) 586-3098.

Sincerely,

Rick Perry

Rick Perry

Executive Summary

The Energy Policy Act of 2005[2] requires that, prior to making a final decision on the disposal alternative or alternatives to be implemented regarding greater-than-Class C (GTCC) low-level radioactive waste (LLRW), the Secretary of Energy shall submit a Report to Congress that describes the alternatives under consideration and await action by Congress. The report must also include all the information required by the Low-Level Radioactive Waste Policy Amendments Act of 1985 for inclusion in a comprehensive report — submitted by the Secretary of Energy to Congress in February 1987 — on ensuring the safe disposal of GTCC LLRW. This Report, *Alternatives for the Disposal of Greater-Than-Class C Low- Level Radioactive Waste and Greater-Than-Class C-Like Waste*, meets this statutory requirement.

In February 2016, the Department of Energy (DOE) issued the *Final Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste (*DOE/EIS-0375) (Final EIS). This document evaluates the potential environmental impacts associated with the proposed development, operation, and long-term management of a disposal facility or facilities for GTCC LLRW and GTCC-like waste in DOE's inventory as shown in the Final EIS. GTCC LLRW has radionuclide concentrations exceeding the limits for Class C LLRW established by the U.S. Nuclear Regulatory Commission (NRC). GTCC LLRW is generated by NRC or Agreement State (i.e., a state that has signed an agreement with NRC to regulate certain uses of radioactive materials within the state) licensees. The Federal Government is responsible for the disposal of GTCC LLRW.[3] At this time, there is no disposal facility for GTCC LLRW.

GTCC-like waste is radioactive waste that is owned or generated by DOE (including LLRW and non-defense-generated transuranic waste), has no identified path to disposal, and has characteristics similar to those of GTCC LLRW waste suggesting that a common disposal approach may be appropriate.

GTCC LLRW and GTCC-like waste include:

- Activated metals from the decommissioning of nuclear utilities;
- Sealed sources used for diagnostics and treatment of cancer and other illnesses and other industrial uses; and
- Other wastes, which include waste from the production of molybdenum-99 (used in medical diagnostics); waste from radioisotope power systems (used in support of space exploration); and waste from environmental cleanup at DOE sites (e.g. West Valley Demonstration Project in New York).

[2] Public Law [P.L.] 109-58

[3] Section 3(b)(1)(D) of the Low Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240)

The total estimated volume of GTCC LLRW and GTCC-like waste that was in storage as of 2008 and projected (anticipated through 2083) is approximately 12,000 cubic meters or 420,000 cubic feet, and contains about 160 million curies of radioactivity. About 75 percent of the total inventory in the Final EIS is made up of GTCC LLRW with the remaining amount made up of GTCC-like waste.

The Final EIS evaluated five alternatives, including a No Action Alternative. Three of the alternatives involve the use of land disposal methods at six federally owned sites (the Hanford Site, Idaho National Laboratory, Los Alamos National Laboratory, Nevada National Security Site, Savannah River Site, and the Waste Isolation Pilot Plant (WIPP) vicinity[4]) and at generic commercial sites in four regions of the United States. The land disposal alternatives consider the use of intermediate-depth borehole, enhanced near-surface trench, and above-grade vault facilities. The remaining alternative is disposal in the WIPP, a geologic repository in New Mexico.

The preferred alternative for the disposal of GTCC LLRW and GTCC-like waste identified in the Final EIS is land disposal at generic commercial facilities and/or disposal in the WIPP geologic repository. Full waste emplacement operations at WIPP are not expected until the 2021 timeframe, and therefore the Department is primarily considering disposal at generic commercial facilities at this time. The preferred alternative does not include disposal at any DOE sites other than WIPP. The analysis in the Final EIS has provided the Department with the information needed to identify a preferred alternative with the potential for disposal of the entire waste inventory analyzed in this Final EIS.

The Department has determined that the preferred alternative would satisfy the needs of the Department for the disposal of GTCC LLRW and GTCC-like waste. As described in Section VIII of this report, legislation would be required for DOE to implement its preferred disposal alternative.

[4] Two WIPP Vicinity locations are evaluated: Section 27, which is within the WIPP Land Withdrawal Boundary managed by DOE, and Section 35 which is located just outside the WIPP Land Withdrawal Boundary to the southeast and is managed by the Bureau of Land Management in the U.S. Department of the Interior.

ALTERNATIVES FOR THE DISPOSAL OF GREATER-THAN-CLASS C LOW-LEVEL RADIOACTIVE WASTE AND GREATER-THAN-CLASS C LIKE WASTE

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I. Legislative Language

In accordance with Section 631(b)(1)(B) of the Energy Policy Act of 2005 (Public Law [P.L.] 109-58):

> *"Before the Secretary makes a final decision on the disposal alternative or alternatives to be implemented, the Secretary shall (i) submit to Congress a report that describes all alternatives under consideration, including all information required in the comprehensive report making recommendations for ensuring the safe disposal of all greater-than-Class C low-level radioactive waste that was submitted by the Secretary to Congress in February 1987; and (ii) await action by Congress."*

The 1987 comprehensive report referenced in the Energy Policy Act of 2005 was a requirement of section 3(b)(3) of the Low Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240) (LLRWPAA) which stated:

> *"Not later than 12 months after the date of enactment of this Act, the Secretary shall submit to the Congress a comprehensive report setting forth the recommendations of the Secretary for ensuring the safe disposal of all radioactive waste designated a Federal responsibility pursuant to subparagraph (b)(1)(D). Such report shall include:*
>
> *(A) an identification of the radioactive waste involved, including the source of such waste, and the volume, concertation, and other relevant characteristic of such waste;*
>
> *(B) an identification of the Federal and non-Federal options for disposal of such radioactive waste;*
>
> *(C) a description of the actions proposed to ensure the safe disposal of such radioactive waste;*
>
> *(D) a description of the projected costs of undertaking such actions;*
>
> *(E) an identification of the options for ensuring that the beneficiaries of the activities resulting in the generation of such radioactive wastes bear all reasonable costs of disposing of such wastes; and*
>
> (F) *an identification of any statutory authority required for disposal of such waste."*

II. Introduction

In February 2016, the Department of Energy (DOE) issued the *Final Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste (*DOE/EIS-0375) (Final EIS). This document evaluates the potential environmental impacts associated with the proposed development, operation, and long-term management of a disposal facility or facilities for GTCC low-level radioactive waste (LLRW) and GTCC-like waste in DOE's inventory as shown in the Final EIS.

GTCC LLRW has radionuclide concentrations exceeding the limits for Class C LLRW established by the U.S. Nuclear Regulatory Commission (NRC). GTCC LLRW is generated by NRC or Agreement State (i.e., a state that has signed an agreement with NRC to regulate certain uses of radioactive materials within the state) licensees. Federal law[5] specifies that the Federal Government is responsible for the disposal of GTCC LLRW.

At this time, there is no disposal facility for GTCC LLRW. GTCC-like waste is radioactive waste that is owned or generated by the Department of Energy (including LLRW and non-defense-generated transuranic [TRU] waste), has no identified path to disposal, and has characteristics similar to those of GTCC LLRW waste suggesting that a common disposal approach may be appropriate.

[5] Section 3(b)(1)(D) of the Low Level Radioactive Waste Policy Amendments Act of 1985.

III. Waste Inventory

The total estimated volume of GTCC LLRW and GTCC-like waste that was in storage as of 2008 and projected (anticipated through 2083) is approximately 12,000 cubic meters (m^3)[6] or 420,000 cubic feet (ft^3), and contains about 160 million curies (MCi) of radioactivity. About 75 percent of the total inventory in the Final EIS is made up of GTCC LLRW with the remaining amount made up of GTCC-like waste.

GTCC LLRW and GTCC-like waste can be grouped into three waste types:

- **Activated Metals:** This waste type is largely generated from the decommissioning of commercial nuclear utilities. Activated metals include portions of the nuclear reactor vessel, but do not include spent nuclear fuel (Figure 1). In the United States, 100 commercial nuclear reactors are currently operating in 30 states. Because most reactors are not scheduled to undergo decommissioning for several decades, the majority of activated metals are not expected to be generated until 2030 or later. In addition, activated metals are generated from maintenance and decommissioning of DOE nuclear reactors. There are about 2,000 m^3 of activated metals estimated in the Final EIS inventory containing nearly 160 MCi.

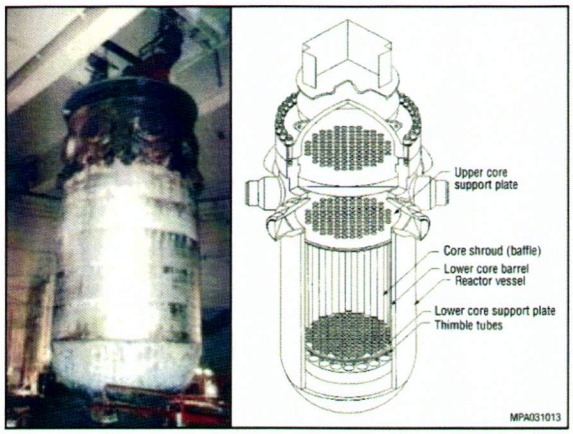

Figure 1: Removal of Reactor Core Produces GTCC LLRW Activated Metal

- **Sealed Sources:** This waste type refers to radioactive sources manufactured, obtained, or retained for the purpose of utilizing the emitted radiation. Sealed sources are used in equipment to diagnose and treat illnesses (particularly cancer), irradiate blood for transplant patients, nondestructively test structures and industrial equipment, and explore geologic formations to find oil and gas. Unsecured or abandoned sealed sources are a national security concern due to potential proliferation risks. Sealed sources commonly consist of concentrated radioactive materials encapsulated in small metal containers (Figure 2, Figure 3). They are located in hospitals, universities, and industries throughout the United States. There are about 2,900 m^3 of sealed sources estimated in the Final EIS inventory containing 2.0 MCi.

Figure 2: Amercium-241 and Cesium-137 Gauges and Shipping Shields

[6] All values have been rounded to two significant figures. Some totals may not equal the sum of individual components because of independent rounding.

Other Waste: This waste type includes contaminated equipment, debris, scrap metal, filters, resins, soil, and solidified sludges. These wastes are primarily associated with the cleanup of radioactively contaminated sites (Figure 4), e.g., the West Valley Demonstration Project in New York, the production of molybdenum-99 (Figure 5) which is used in about 16 million medical procedures each year and the production of radioisotope power systems in support of space exploration. There are about 6,700 m^3 of other waste estimated in the Final EIS inventory containing 1.3 MCi.

Figure 3: A Self-Shielded Cesium-137 Irradiator Used to Irradiate Blood Products and Prevent a Deadly Transfusion Disease (Graft-Versus-Host Disease)

For analysis in the Final EIS, the three waste types (activated metals, sealed sources, and other waste) are divided into two groups on the basis of uncertainties associated with their generation. Group 1 consists of wastes that are either already in storage or are expected to be generated from operating facilities (such as commercial nuclear power plants). All currently operational plants were assumed to have their license renewed for an additional 20 years of operation. All stored GTCC LLRW and GTCC-like wastes are included in Group 1. Of the 12,000 m^3 total inventory in the Final EIS, the waste volume in Group 1 is estimated to be 5,300 m^3 (190,000 ft^3), and this waste contains a total of 110 MCi of activity. The radionuclide activity is mainly from the decommissioning of commercial nuclear power reactors currently in operation.

Group 2 consists of projected wastes from proposed actions or planned facilities not yet in operation. These actions include those proposed by DOE and those to be conducted by commercial entities (including electric utilities) for an assumed number of new (i.e., still to be licensed or constructed) nuclear power plants. Some or all of the Group 2 waste may never be generated, depending on the outcome of the proposed actions that are independent of the Final EIS. No stored GTCC LLRW and GTCC-like wastes are included in Group 2. Of the 12,000 m^3 total Final EIS inventory, Group 2 has an estimated waste volume of 6,400 m^3 (230,000 ft^3) and contains a total activity of 49 MCi. The radionuclide activity in the Group 2 wastes would result mainly from the decommissioning of proposed new commercial nuclear power reactors.

Figure 4: Other Waste Generated as the Result of Site Cleanup and Decontamination of Facilities

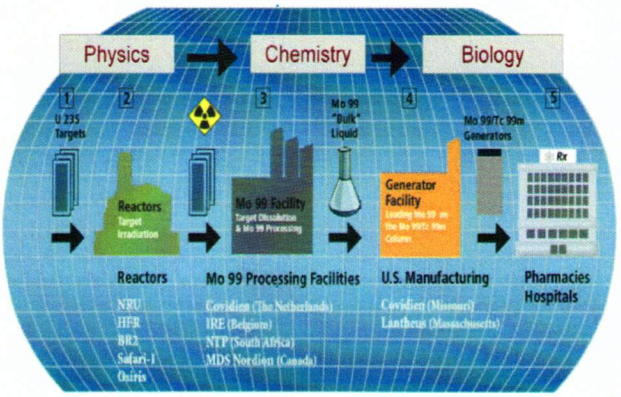

Figure 5: Molybdenum-99 Production

IV. Disposal Alternatives

In the Final EIS, DOE evaluated a range of disposal methods and locations for disposal of GTCC LLRW and GTCC-like waste. The disposal methods evaluated vary in depth of disposal and include: intermediate-depth boreholes, enhanced near-surface trenches, above-grade vaults, and a geologic repository (Figure 6).

The Final EIS evaluated generic commercial disposal sites on the basis of a regional approach that divides the United States into four regions consistent with NRC's designations of Regions I through IV. Region I includes the 11 states in the Northeast; Region II includes the 9 states in the Southeast; Region III comprises the 8 states in the Midwest; and Region IV comprises the remaining 22 states in the West. Generic commercial sites were evaluated because they are considered a reasonable alternative to dispose of GTCC LLRW and GTCC-like waste.

DOE disposal sites that were evaluated include (Figure 7):

- Hanford Site, Washington;
- Idaho National Laboratory (INL), Idaho;
- Los Alamos National Laboratory (LANL), New Mexico;
- Nevada National Security Site (NNSS) (formerly the Nevada Test Site), Nevada;
- Savannah River Site (SRS), South Carolina;
- Waste Isolation Pilot Plant (WIPP), New Mexico; and
- WIPP Vicinity in New Mexico (WIPP Vicinity refers to two sections: Section 27 is within the WIPP Land Withdrawal Boundary and administered by DOE. Section 35 is just outside the WIPP Land Withdrawal Boundary to the southeast and administered by the Bureau of Land Management in the U.S. Department of the Interior).

Among the DOE sites, only WIPP was included in the preferred alternative.

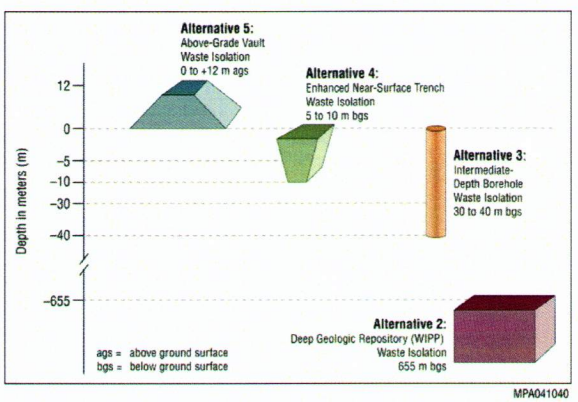

Figure 6: Disposal Methods and Depth Above/Below Ground Level

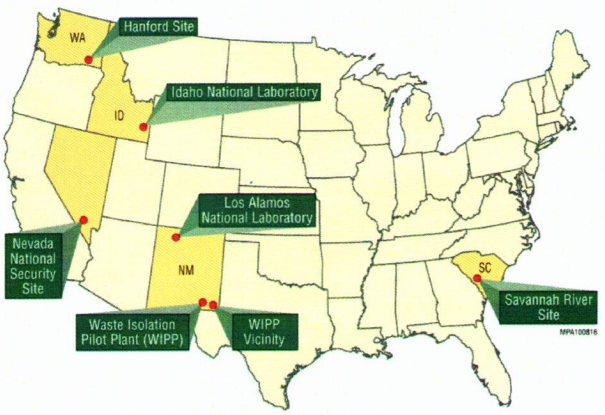

Figure 7: DOE Sites Evaluated for Disposal of GTCC LLRW and GTCC-Like Waste

The Final EIS evaluated five alternatives:

- No Action: Continue current practices for storing and managing GTCC LLRW in accordance with NRC requirements and GTCC-like waste in accordance with DOE and state requirements.

- Disposal in a new[7] intermediate-depth borehole facility: Five sites were evaluated for this alternative: Hanford, INL, LANL, NNSS, and WIPP Vicinity. Because of the shallow depth to groundwater, SRS was not considered for this alternative disposal method. Of the four NRC regions considered for the generic commercial facility, only NRC Region IV was evaluated for this alternative since the depth to groundwater in the other three regions is considered too shallow for application of the borehole method. The disposal of the entire inventory as estimated in the Final EIS, would require 44 hectares (ha) (110 acres (ac)) of land for 930 boreholes. The borehole method entails borehole designs constructed at depths below 30 meters (m) (100 feet), but above 300 m (1,000 ft) below ground surface. Boreholes can vary widely in diameter (from 0.3 to 3.7 m [1 to 12 ft]), and the proximity of one borehole to another can vary depending on the design of the facility. The GTCC LLRW and GTCC-like waste disposal placement is assumed to be about 30 to 40 m (100 to 130 ft) below ground surface.

- Disposal in a new enhanced near-surface trench facility: Six sites were evaluated for this alternative: Hanford, INL, LANL, NNSS, SRS, and WIPP Vicinity. Of the four NRC regions considered for the generic commercial facility, NRC Region II and IV were evaluated to allow for a comparison with the Federal sites in these two regions. To dispose of the entire inventory in the Final EIS, it would require 29 trenches occupying a footprint of about 20 ha (50 ac). Each trench would be approximately 3 m (10 ft) wide, 11 m (36 ft) deep, and 100 m (330 ft) long. GTCC LLRW and GTCC-like waste disposal placement is assumed to be about 5 to 10 m (15 to 30 ft) below ground surface.

- Disposal in a new above-grade vault disposal facility: Six sites were evaluated for this alternative: Hanford, INL, LANL, NNSS, SRS, and WIPP Vicinity. All four NRC regions were evaluated for the generic commercial site. To dispose of the entire inventory in the Final EIS, it would require 12 vaults (each with 11 vault cells) and would occupy a footprint of about 24 ha (60 ac). Each vault would be about 11 m (36 ft) wide, 94 m (310 ft) long, and 7.9 m (26 ft) tall, with the 12 vaults situated in a linear array. GTCC LLRW and GTCC-like waste disposal placement is assumed to be about 4.3 to 5.5 m (14 to 18 ft) below ground surface.

[7] For the purposes of the Final EIS analysis, DOE assumed construction of a new borehole, trench, or vault at all sites analyzed except for WIPP. However, an existing borehole, trench, or above-grade vault that meets the conceptual designs discussed in the Final EIS could also be used.

- Disposal at the WIPP geologic repository: This alternative involves the disposal of GTCC LLRW and GTCC-like waste at WIPP. Construction of up to 26 additional underground rooms would be required if the entire inventory in the Final EIS would be disposed of at WIPP. The exact locations and orientations of these rooms would be determined on the basis of mining engineering, safety, and other factors.

It should be noted that TRU waste disposal operations at WIPP were suspended on February 5, 2014, following a fire involving an underground vehicle. Nine days later, on February 14, 2014, an unrelated radiological event occurred underground at WIPP, contaminating a portion of the mine primarily along the ventilation path from the location of the incident and releasing a small amount of contamination into the environment. DOE resumed safe waste emplacement operations at WIPP on January 4, 2017.

V. Preferred Alternative

In developing the preferred alternative for the disposal of GTCC LLRW and GTCC-like wastes in the Final EIS, DOE considered public comments on the *Draft Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste* (DOE/EIS-0375-D), human health risks, transportation, cultural resources, and tribal concerns. In addition, DOE considered security concerns and the projected timing of waste generation.

Given the diverse characteristics (e.g., different radionuclide inventories, range of physical conditions, and derived from both commercial and DOE sources) of GTCC LLRW and GTCC-like waste analyzed in the Final EIS, the preferred alternative selected is not limited to one disposal method. The preferred alternative for the disposal of GTCC LLRW and GTCC-like waste in the Final EIS is land disposal at generic commercial facilities and/or the WIPP geologic repository.

Full waste emplacement operations at WIPP are not expected until the 2021 timeframe, and therefore the Department is primarily considering disposal at generic commercial facilities. The preferred alternative does not include disposal at any DOE sites other than WIPP. In addition, there is presently no preference among the three land disposal methods that would be implemented at generic commercial sites.

The analysis in the Final EIS has provided DOE with the information needed to identify a preferred alternative with the potential to enable the disposal of the entire waste inventory analyzed in the Final EIS. DOE has determined that the preferred alternative would satisfy the needs of the Department for the disposal of GTCC LLRW and GTCC-like waste.

The preferred alternative identified in the Final EIS does not constitute a decision by DOE. In accordance with the Energy Policy Act of 2005, DOE must await action by Congress before making a decision on which alternative or alternatives to implement.

This Report identifies legislation and regulatory actions in Section VIII, *Statutory and Regulatory Considerations,* that would be required for DOE to implement the preferred alternative. In addition, project-specific National Environmental Policy Act (NEPA) evaluation may be required for DOE to implement the preferred alternative.

VI. Costs for Construction and Operation of the Preferred Alternative

The cost estimates provided in the Final EIS are conceptual in nature; hence the accuracy range, in accordance with DOE Guide 413.3-21 (change 1), *Cost Estimating Guide*, is expected to be -20 percent to +50 percent. As noted in the Final EIS, the total estimated costs (facility construction and operation) for disposal of GTCC LLRW and GTCC-like waste at an intermediate-depth borehole facility, enhanced near-surface trench facility, or above-grade vault facility ranged from $300 million to $620 million in 2016 dollars (Table 1). For the WIPP geologic repository, the estimated cost for GTCC LLRW and GTCC-like waste disposal would be approximately $690 million. The cost to operate the WIPP geologic repository is higher than other alternatives because in general, staffing/labor, waste handling, safety, equipment, infrastructure, maintenance, utilities, oversight, and regulatory requirements for a geologic repository are far more complex than for near-surface land disposal options.

All costs are based on the total Final EIS inventory volume of 12,000 m^3. These cost estimates do not include waste facility permits, licensees, packaging, transportation, and post-closure activities. Once a final decision is made on the disposal alternative, a site-specific estimate of total costs related to disposal of GTCC LLRW and GTCC-like waste will be developed.

The actual start date for operations is uncertain at this time and will depend upon the alternative or alternatives selected, the preparation of additional NEPA analyses, if necessary, characterization studies, and other actions necessary to initiate and complete construction and operation of a GTCC LLRW and GTCC-like waste disposal facility.

Table 1: Costs of GTCC LLRW and GTCC-Like Waste Disposal Alternatives [a]

Disposal Method	Cost to Construct the Facility (in millions of $)[b]	Cost to Operate the Facility (in millions of $)[c]	Total Cost (in millions of $)	Total Cost per m^3 ($)	Total Cost per ft^3 ($)
Intermediate-Depth Borehole	250	140	400	33,330	940
Enhanced Near-Surface Trench	110	190	300	25,000	710
Above-Grade Vault	430	190	620	51,670	1,460
WIPP Geologic Repository [d]	17	670	690	57,500	1,630

[a] The costs provided are in 2016 dollars, which have been escalated from the estimates in the Final EIS which were in 2008 dollars. Some totals may not equal the sum of individual components because of independent rounding.
[b] Construction costs for the borehole, trench, and vault disposal facilities are for 930 boreholes, 29 trenches, and 12 vaults (consisting of 130 total vault cells), respectively, and the supporting infrastructure. Construction costs for the WIPP facility are for 26 new rooms.
[c] Operational costs assume 20 years of facility operations for the borehole, trench, and vault disposal methods. On the basis of the assumed receipt rates, the majority of the wastes would be available for emplacement during the first 15 years of operations.
[d] WIPP repository cost estimate in the Final EIS includes operating costs incurred for ongoing non-GTCC disposal operations.

VII. Disposal Fee Options

Section 3 (b)(3)(E) of the LLRWPAA requires DOE to identify "options for ensuring that the beneficiaries of the activities resulting in the generation of such radioactive wastes bear all reasonable costs of disposing of such wastes."

In the 1987 GTCC Report to Congress, DOE identified two funding options that could be established to allocate costs of waste disposal to the generators. Both funding mechanisms are based upon estimates of waste volumes, types, and costs associated with each waste type. Legislation would be required for either of these funding options to be implemented. The funding options include:

Advanced Fee Assessment and Collection upon Waste Generation Option: This fee, similar to that for the Nuclear Waste Fund under the Nuclear Waste Policy Act (NWPA) (P.L. 97-425), could be established to collect fees to cover the total costs of disposal of some GTCC LLRW. Under this funding option, generators would be required to pay into the fund when the waste is generated.

Under the NWPA, funds for the disposal of spent nuclear fuel from commercial power reactors are collected through the assessment of a fee on electricity generated and sold by a civilian nuclear power reactor as payment in exchange for the Federal Government's contractual commitment to dispose of spent nuclear fuel and high-level waste. From April 7, 1983 - May 16, 2014, consumers of electricity produced at nuclear power plants paid a fee into the fund of one-tenth of one cent for every kilowatt-hour of electricity generated based on the annual Secretarial Determination of the Adequacy of the Nuclear Waste Fund Fee.

Charge Upon Waste Receipt Option: A fee could be assessed to the generator at the time the waste is delivered for disposal. This approach is similar to that used at commercial disposal sites for Class A, B, and C LLRW. The generator would cover the costs for characterization, packaging, transportation, and disposal. DOE recommends this option because it is based on the relatively greater certainty in determining costs and charges for specific waste streams.

For example, it is anticipated that fees for disposal of GTCC LLRW at a commercial disposal site would be based on methodology similar to that used at current commercial LLRW disposal sites. Such fees are based upon: a core charge based on volume of radioactive waste to be disposed plus applicable surcharges. Core charges would be based on a volume fee per cubic meter or cubic foot of the total containerized volume of radioactive waste including:

- Cost to remove radioactive waste from the storage site and ship to a disposal facility, including costs to secure, load, inspect, and decontaminate contents of each shipment (if necessary);
- Cost to return the empty cask from disposal facility to storage site for each shipment;

- Cost to receive, secure, unload, inspect, and decontaminate (if necessary) each shipment; and
- Cost to dispose of radioactive waste.

Surcharges could include:

- An activity charge per Curie;
- A graduated high dose rate charge per container. For example, a high-dose waste container or containers could be defined as a container or containers having a dose rate of 100 millirem/hour at a distance of 30 centimeters and 1 rem/hour at the surface of the container;
    - An overweight charge for heavier waste packages, in dollars per container or kilogram;
    - A special nuclear material charge for wastes containing uranium-235, uranium-233, or plutonium; and
    - Other special handling charges (to be determined).

VIII. Statutory and Regulatory Considerations

Legislation and regulatory actions would be required for DOE to implement the preferred alternative for GTCC LLRW and GTCC-like waste disposal identified in the Final EIS.

Statutory

- Legislation to establish a cost recovery mechanism for GTCC LLRW disposal: Section 3(b)(3)(E) of the LLRWPAA requires DOE to identify options for ensuring that the generators of GTCC LLRW bear all reasonable costs of its disposal. To implement cost recovery for GTCC LLRW disposal, DOE would need authority to set and collect disposal fees from generators of GTCC LLRW.

- Appropriations from the Nuclear Waste Fund to provide for the disposal of GTCC LLW from decommissioning of commercial nuclear reactors, which is considered high-level radioactive waste under the Standard Contract: The Final EIS includes in its inventory activated metals from the decommissioning of commercial nuclear reactors that have been determined to be covered by a *Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste*. For purposes of determining damages in the spent nuclear fuel litigation, GTCC LLRW from the decommissioning of commercial nuclear reactors has been determined to be high-level radioactive waste covered under the terms of DOE's Standard Contract for high-level radioactive waste (*Yankee Atomic Electric Co. v. U.S.*, 536 F. 3d 1268 (Fed. Cir. 2008) and *Pacific Gas & Electric Co. v. U.S.*, 536 F. 3d 1282 (Fed. Cir. 2008)). Since commercial utilities have paid fees under the Standard Contract for disposal of high-level radioactive waste, Congress could appropriate funds from the Nuclear Waste Fund to pay for disposal of activated metals that are covered under the Standard Contract.

- Clarification regarding section 3(b)(2) of the LLRWPAA: Section 3(b)(1)(D) of the LLRWPAA specifies that the Federal Government is responsible for GTCC LLRW disposal. Section 3(b)(2) specifies that GTCC LLRW designated a Federal responsibility under section 3(b)(1)(D) that results from activities licensed by the NRC is to be disposed of in a facility licensed by the NRC that the NRC determines is adequate to protect the public health and safety. However, unless specifically provided by law, NRC does not have authority to license and regulate facilities operated by or on behalf of DOE. If DOE selects the WIPP component of the preferred alternative for disposal of GTCC LLRW for which DOE is responsible under section 3(b)(1)(D), clarification from Congress would be needed to address the requirement that GTCC LLRW be disposed of in a facility licensed by the NRC. In addition, if DOE selects the generic commercial component of the preferred alternative for disposal of GTCC LLRW for which it is responsible under section 3(b)(1)(D), and the commercial disposal facility is licensed by an Agreement State rather

than by NRC, clarification from Congress may be needed to address the requirement that GTCC LLRW be disposed of in a facility licensed by the NRC.[8]

- Legislation to authorize disposal of GTCC LLRW and GTCC-like waste at WIPP: Modifications to the WIPP Land Withdrawal Act (P.L. 102-579 as amended by P.L. 104-201) or new legislation would be required to authorize disposal of waste other than TRU waste generated by atomic energy defense activities at WIPP (GTCC LLRW and GTCC-like waste are not generated by atomic energy defense activities). In addition, a modification to the WIPP Land Withdrawal Act may be required to increase the disposal capacity limit for the remote-handled volume and total curies at WIPP. These changes to the WIPP Land Withdrawal Act would be necessary only if it was determined that GTCC LLRW and GTCC-like waste would be disposed of at WIPP.

Regulatory

- Implementation of the preferred alternative would require development of technical criteria for GTCC LLRW and GTCC-like waste disposal (e.g., technical criteria for GTCC LLRW from NRC would be needed for disposal at generic commercial facilities).

- If it is decided to dispose of the entire inventory of GTCC LLRW and GTCC-like waste considered in the Final EIS inventory at WIPP, limits for remote-handled volume and remote-handled total activity may be exceeded. The majority of the GTCC LLRW and GTCC-like remote-handled *volume* is from the "Other Waste" category (e.g., GTCC-like non-defense TRU waste), while the activated metals waste category comprises most of the remote-handled *activity*. It would be necessary to revise the Agreement for Consultation and Cooperation between DOE and the State of New Mexico for the Waste Isolation Pilot Plant (updated April 18, 1988) to authorize an increase in the total volume of remote-handled TRU waste. In addition, a corresponding modification of the facility's Resource Conservation and Recovery Act permit with the New Mexico Environment Department and a compliance recertification with the Environmental Protection Agency would be required.

[8] On June 20, 2014 Waste Control Specialists, LLC, (WCS), filed (and resubmitted on July 21, 2014) a Petition for Rulemaking with the Texas Commission on Environmental Quality (TCEQ) requesting the State of Texas to revise certain provisions of the Texas Administrative Code to remove prohibitions on disposal of GTCC LLRW, GTCC-like waste, and TRU waste at its TCEQ licensed facilities. On January 30, 2015, TCEQ sent a letter to the NRC requesting guidance on the State of Texas's authority to license disposal of GTCC LLRW, GTCC-like waste, and TRU waste. This matter is under review by NRC.

IX. Conclusion

Implementation of DOE's preferred alternative would result in cost-effective, safe, and secure disposal of GTCC LLRW and GTCC-like waste inventory outlined in the Final EIS. The preferred alternative is land disposal at generic commercial facilities and/or disposal at the WIPP geologic repository. Full waste emplacement operations at WIPP are not expected until the 2021 timeframe, and therefore the Department is primarily considering disposal in generic commercial sites. Congressional action is required before DOE can make a final decision and issue a record of decision on the disposal of GTCC LLRW and GTCC-like waste.

DOE will work with Congress to determine the best path forward for disposal of GTCC LLRW and GTCC-like waste.