



January 2021

# NUCLEAR WASTE

## Congressional Action Needed to Clarify a Disposal Option at West Valley Site in New York

Accessible Version



A Century of Non-Partisan Fact-Based Work

# GAO Highlights

Highlights of [GAO-21-115](#), a report to congressional committees

## Why GAO Did This Study

The West Valley Demonstration Project Act, enacted in 1980, requires DOE to assist with cleanup activities at the site of the nation's only commercial facility for reprocessing spent nuclear fuel. The site contained 600,000 gallons of liquid high-level waste, radioactively contaminated structures and soils, and buried radioactive waste. In 2011, DOE began the first phase of its decommissioning plan, which included demolishing above-ground structures and removing contaminated soils.

The West Valley Reauthorization Act and the Senate Committee Report No. 116-48 included provisions for GAO to review progress on the cleanup at West Valley. GAO's report examines (1) the status of the cleanup and (2) DOE's options for disposing of the remaining radioactive waste.

GAO reviewed DOE's data on cleanup costs and waste volumes and its decommissioning plans, as well as laws, regulations, and policies governing radioactive waste disposal. GAO also interviewed officials from DOE and the state of New York, as well as other stakeholders.

## What GAO Recommends

Congress should consider taking action to provide a legal option for the disposal of West Valley's transuranic waste.

View [GAO-21-115](#). For more information, contact Allison Bawden at (202) 512-3841 or [BawdenA@gao.gov](mailto:BawdenA@gao.gov).

January 2021

## NUCLEAR WASTE

### Congressional Action Needed to Clarify a Disposal Option at West Valley Site in New York

## What GAO Found

The Department of Energy (DOE) has made progress in cleaning up radioactive waste at the site of the West Valley Demonstration Project in New York State. In the 1960s and 1970s, a commercial facility at the site reprocessed spent (used) nuclear fuel into reusable nuclear material—creating various wastes that remained on-site after the facility closed in 1976. Since 2011, DOE has demolished 51 of 55 structures there and disposed of about 1.3 million cubic feet of low-level waste to off-site locations. It has also placed solidified high-level waste into interim on-site storage (see fig.). In addition, DOE has processed for interim on-site storage about 30,000 cubic feet of transuranic waste (which is contaminated with elements that have an atomic number greater than uranium). As of February 2020, DOE reported spending about \$3.1 billion on contracted cleanup activities, but it cannot estimate the cleanup's final cost until it decides how it will address the remaining waste.

#### High-Level Waste from the West Valley Demonstration Project in Interim On-Site Storage, March 2017



Source: West Valley Demonstration Project. | GAO-21-115

DOE has been unable to dispose of the high-level and transuranic wastes stored at West Valley because there are no facilities authorized to accept these wastes. DOE has identified two potential options for disposal of the transuranic waste: the federal Waste Isolation Pilot Plant in New Mexico and a commercial facility in Texas. However, the New Mexico facility is authorized to accept only waste from atomic energy defense activities, and DOE does not consider West Valley waste to be from atomic energy defense activities. Regarding the Texas facility, state regulations preclude disposal of the waste there. In 2017, DOE submitted to Congress a report on all disposal options, as required by the Energy Policy Act of 2005. Pursuant to this act, DOE must await action by Congress before making a final decision, and Congress has not yet acted.

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## Abbreviations

AEC	Atomic Energy Commission
DOE	Department of Energy

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EIS	Environmental Impact Statement
GTCC	greater-than-Class C
Mrem	millirem
NDA	NRC-licensed Disposal Area
NRC	Nuclear Regulatory Commission
NYSERDA	New York State Energy Research and Development Authority
SDA	State-licensed Disposal Area
SEIS	Supplemental Environmental Impact Statement
WCS	Waste Control Specialists
WIPP	Waste Isolation Pilot Plant

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January 13, 2021

### Congressional Committees

Since the 1980s, the Department of Energy (DOE) has been carrying out cleanup efforts at the Western New York Nuclear Service Center, which was built in the 1960s to convert spent (used) nuclear fuel from commercial reactors into reusable nuclear material—an industrial process referred to as reprocessing.<sup>1</sup> In the 1950s, the federal government began to encourage private reprocessing of spent nuclear fuel as part of an effort to commercialize the use of nuclear power by private industry. In response, the state of New York established the center, or West Valley facility, in western New York, about 35 miles south of Buffalo. The West Valley facility was the nation's only commercial facility for reprocessing spent nuclear fuel. In 1976, citing rising costs and uncertain regulatory requirements, Nuclear Fuel Services, Inc., the facility operator, withdrew from the reprocessing business and returned control of the facility to the New York State Energy Research and Development Authority (NYSERDA). At the time that control of the facility was returned to the state of New York, the facility contained more than 600,000 gallons of liquid high-level radioactive waste, contaminated structures and soil, and other radioactive waste in two underground disposal areas.

To facilitate the cleanup, especially the solidification of the liquid high-level waste, the Congress enacted the West Valley Demonstration Project Act in 1980, which brought DOE to West Valley to carry out cleanup activities.<sup>2</sup> Specifically, the act requires the Secretary of Energy to, among other things, solidify the high-level waste, dispose of the solidified high-

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<sup>1</sup>Reprocessing recovers plutonium and uranium from spent nuclear fuel, which can then be recycled for use in new fuel. However, reprocessing spent nuclear fuel also generates liquid high-level radioactive waste as a byproduct. There are no commercial reprocessing facilities currently operating in the United States.

<sup>2</sup>For the purposes of this report, we refer to the entire approximately 3,300-acre area encompassing the Western New York Nuclear Service Center as West Valley, or the West Valley facility, and to the 160-acre federal portion of the cleanup area as the West Valley Demonstration Project site, or project site. The project site premises include the structures that supported reprocessing activities at the West Valley facility, such as the tanks where liquid high-level radioactive waste was stored. Although DOE has exclusive use and possession of the project site and its facilities in order to carry out its cleanup responsibilities, it does not hold title to the premises or any facilities. NYSERDA holds title to the entire West Valley facility, including the project site, in the name of the state of New York, and retains possession and control of the facility outside of the project site.

level waste and any low-level or transuranic waste produced by the solidification, and decontaminate and decommission the tanks and other facilities at West Valley used for solidification or to store solidified waste, in accordance with any requirements prescribed by the Nuclear Regulatory Commission (NRC).<sup>3</sup> DOE maintains a federal site office near West Valley that is co-located with the site office for NYSERDA, which holds title to the West Valley facility. NYSERDA manages the state's responsibilities at West Valley and pays for certain costs of the DOE project.<sup>4</sup>

In 2002, DOE completed the solidification of the high-level waste and, in 2010, DOE and NYSERDA agreed on a phased approach for decommissioning the site. The first phase, which began in 2011, includes demolition and removal of most above-ground structures, the relocation of the canisters of solidified high-level waste to an interim storage pad on the site, and excavation and removal of contaminated soils in certain areas of the site. The agencies have not yet made a decision about the full scope for the second phase, which will include addressing the waste in the underground disposal areas.

The West Valley Reauthorization Act<sup>5</sup> and the Senate Committee report accompanying the National Defense Authorization Act for Fiscal Year 2020<sup>6</sup> include provisions for us to review the status of the West Valley Demonstration Project. Our report describes (1) the status of the project, (2) the progress DOE has made on reaching a decision for the second phase of the project and what issues remain, and (3) the options DOE

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<sup>3</sup>According to NRC, decommissioning means safely removing a nuclear facility or site from service and reducing the residual radioactivity to permit the release of the property and termination of the license. In addition to prescribing the requirements for decommissioning of the tanks and other facilities, NRC is responsible for consulting with DOE regarding, among other things, the solidification of the high-level waste and monitoring DOE's activities at the site to assure the public health and safety. NRC staff carry out this monitoring.

<sup>4</sup>Although the West Valley Demonstration Project Act established a 10-percent cost share by the state of New York for the project, subsequent litigation resulted in a consent decree between the state of New York and the United States that further defined the financial responsibilities of each party for specific actions. For example, the consent decree provides that the state will pay 70 percent and the United States 30 percent of certain costs of specified actions for the state-licensed Disposal Area, one of two disposal areas at the project site.

<sup>5</sup>Pub. L. No. 116-95, § 1(b), 133 Stat. 3249 (2019).

<sup>6</sup>S. Rep. No. 116-48, at 390-391 (2019).

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has identified for disposing of the remaining radioactive waste from the project and the challenges DOE faces.

To describe the status of the project, we toured the project site, reviewed federal and state documents, and interviewed DOE and NYSERDA officials. To determine the amount of waste already disposed of from the project site and the amount that has been processed and packaged for storage at the site (pending disposal), we gathered data that DOE provided us from the site's Integrated Waste Tracking System. We then interviewed DOE officials responsible for managing these data about how the data are processed. Specifically, DOE officials described the standard operating procedures the contractor uses to enter data into the system, which includes checks by multiple parties for verification. Based on our discussions with DOE officials, we determined that the data were sufficiently reliable to describe the volumes of disposed waste.

To determine the amount of DOE spending on contracted services for the project, we analyzed data that DOE provided us from two of the agency's data systems—the Vendor Invoicing Portal Electronic Reporting System and the Strategic Integrated Procurement Enterprise System—through February 2020, the most recent data available. We then interviewed DOE officials responsible for managing these data about how the data are processed. Specifically, DOE officials described how the contractor submits cost data and how the data are checked by the DOE contracting officer and program manager for accuracy before being approved. Based on our discussions with DOE officials, we determined that the data were sufficiently reliable for describing the amount of spending through February 2020. To describe the amount of waste that may be generated under future cleanup activities and the range of possible costs to complete the project, we gathered and reviewed data included in DOE's 2010 final Environmental Impact Statement (EIS) for decommissioning of the project site.<sup>7</sup> We then compared DOE's estimated costs for each decommissioning option with the amount DOE had spent on the cleanup through February 2020.

To describe the progress DOE has made in reaching a Phase 2 decommissioning decision and what issues remain, we reviewed DOE's plans as outlined in the final EIS, the Phase 1 study guidance, and

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<sup>7</sup>DOE and NYSERDA prepared the 2010 final EIS, which analyzes several options—or "decommissioning alternatives"—that the agencies had identified for the West Valley facility. It also identifies the agencies' preferred option in order for DOE to meet its responsibilities under the West Valley Demonstration Project Act.

agreements between DOE and the state of New York. We then reviewed the Phase 1 studies and DOE and NYSERDA's plans to develop Phase 2 decommissioning options. We also interviewed DOE, NRC, and NYSERDA officials, as well as a nongeneralizable sample of stakeholder groups that officials said had been actively engaged with the cleanup effort—the West Valley Citizen Task Force, the Coalition on West Valley Nuclear Wastes, officials from the Town of Ashford, and the Seneca Nation of Indians. We asked them about DOE and NYSERDA's plans to make a Phase 2 decommissioning decision and any issues that remain to be resolved before a decision can be made.

To describe the options DOE has identified for where to dispose of the remaining radioactive waste from the project, and challenges to disposing of this waste, we reviewed DOE documents that identified potential disposal options, including DOE's 2005 decision on waste management for the project and the 2016 EIS for the disposal of greater-than-Class C (GTCC) radioactive waste.<sup>8</sup> We then compared DOE's proposed disposal options with the requirements in relevant laws and regulations governing the disposal of radioactive waste, such as NRC regulations, the West Valley Demonstration Project Act, the Waste Isolation Pilot Plant Land Withdrawal Act, and the Energy Policy Act of 2005. We also interviewed DOE, NRC, and NYSERDA officials about the challenges to each disposal option.

We conducted this performance audit from October 2019 to January 2021 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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<sup>8</sup>Under NRC regulations, GTCC radioactive waste is waste with concentrations of certain radionuclides exceeding the Class C limits as provided in 10 C.F.R. § 61.55(a)(2)(iii). The NRC's waste classification system prescribes physical and administrative controls for low-level waste based on hazards. The NRC's regulations require disposal methods for GTCC waste to be in general more stringent than the disposal methods for Class C waste.



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## Background

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### Nuclear Fuel Reprocessing at the West Valley Facility

The West Valley facility was established as a commercial facility for spent nuclear fuel reprocessing in response to an initiative of the Atomic Energy Commission (AEC)—a predecessor federal agency to DOE and NRC. The AEC encouraged the reprocessing of spent nuclear fuel to increase the supply of uranium to support the expected growth of the nuclear power industry.<sup>9</sup> The AEC guaranteed a supply of spent nuclear fuel from government facilities to keep the West Valley facility operating because a sufficient number of commercial nuclear power reactors were not operating to supply spent fuel for reprocessing. Between 1966 and 1972, the West Valley operator—Nuclear Fuel Services, Inc.—reprocessed 640 metric tons of spent nuclear fuel to recover plutonium and uranium.<sup>10</sup> According to a DOE report from 1999, approximately 60 percent of this fuel, including 33 percent of the plutonium, came from AEC reactors—the majority from the N-Reactor at the Hanford site in Washington.<sup>11</sup> The remaining fuel came from seven commercial nuclear power reactors that were owned and operated by commercial utility companies in seven states.

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<sup>9</sup>After the passage of the Atomic Energy Act of 1954, the AEC encouraged private reprocessing of nuclear fuel in support of the federal government's Atoms for Peace program. Although the stated purpose of the Atoms for Peace program was the development of a commercial nuclear power industry, in 1977 the federal government ceased support for commercial fuel reprocessing due to concerns over the proliferation of weapons-usable material generated through reprocessing.

<sup>10</sup>A metric ton is 1,000 kilograms. Nuclear Fuel Services, Inc., used the Plutonium Uranium Reduction Extraction (Purex) process to recover these radioactive products, a process that included storing spent fuel assemblies, chopping the assembly rods, dissolving the radioactive products in acid, separating and storing the radioactive wastes, and separating uranium nitrate from plutonium nitrate.

<sup>11</sup>The N-Reactor was a dual-purpose plutonium production reactor that, when in operation, produced plutonium for the U.S. defense program and generated electricity. Other AEC sources of spent fuel include the Southwest Experimental Fast Oxide Reactor—a nuclear test reactor constructed in 1968 with funding from the AEC—and the AEC-owned Boiling Nuclear Superheater Reactor—a demonstration boiling reactor located in Rincón, Puerto Rico.

In total, Nuclear Fuel Services, Inc., recovered 1,926 kilograms of plutonium, 79 percent of which (1,530 kilograms) was shipped to the AEC's Hanford site, in the state of Washington, most of which was used in reactor programs.<sup>12</sup> The remaining 396 kilograms of recovered plutonium was sold to commercial entities for use in breeder reactors and for research purposes. Nuclear Fuel Services, Inc., also recovered roughly 620 metric tons of slightly enriched and depleted uranium, all of which was sent to the AEC's Fernald Materials Production Center in Ohio—a former uranium processing facility that supported the U.S. nuclear weapons program.<sup>13</sup> Additionally, Nuclear Fuel Services, Inc., recovered 900 kilograms of highly enriched uranium, which was sent to the Oak Ridge Y-12 Plant in Tennessee.<sup>14</sup>

When Nuclear Fuel Services, Inc., decided to withdraw from the nuclear fuel reprocessing business, a significant amount of radioactive waste remained at the West Valley facility, including:

- 600,000 gallons of liquid high-level radioactive waste in two underground steel storage tanks—part of a series of four tanks known as the Waste Tank Farm;
- the highly contaminated Main Plant Process Building; and
- more than 2 million cubic feet of solid radioactive waste in the site's two disposal areas—one area principally designed for disposal of

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<sup>12</sup>Specifically, most of the plutonium the AEC received from Nuclear Fuel Services, Inc., was used in the breeder reactor and the zero-power reactor programs. A breeder reactor is a nuclear reactor that produces more fuel than it consumes and can be used to generate power and simultaneously produce fuel for other plants. A zero-power reactor is a nuclear reactor that does not generate power but instead is used to assess the performance of various reactor core configurations in the development of a full nuclear reactor.

<sup>13</sup>In order to be used as fuel in a nuclear reactor, uranium needs to have a higher concentration of the U<sup>235</sup> isotope than that which exists in natural uranium ore. Enriched uranium is U<sup>235</sup> in concentrated form and is fissionable in light-water reactors—the most common reactor design in the United States. Depleted uranium is uranium with a lower percentage of U<sup>235</sup> than natural uranium. However, depleted uranium can be blended with highly enriched uranium to make reactor fuel. Workers at the Fernald uranium foundry in Ohio converted uranium gas into uranium metal. Some of this metal was made into reactor fuel at the Hanford and Savannah River sites. Additional uranium metal was converted into alloys for fabrication into weapons components at the Rocky Flats Plant in Colorado and the Y-12 Plant in Tennessee.

<sup>14</sup>The Oak Ridge Y-12 Plant was founded in 1943 to produce enriched uranium for the U.S. weapons program and is now known as the Y-12 National Security Complex.

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wastes from the reprocessing plant known as the NRC-licensed Disposal Area (NDA), and one commercial waste area known as the State-licensed Disposal Area (SDA).<sup>15</sup>

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### Time Line of the West Valley Demonstration Project

In 1982, DOE took possession of the West Valley Demonstration Project site to carry out the project.<sup>16</sup> In 1996, DOE and NYSERDA issued for public comment a draft EIS that analyzed several decommissioning options to complete decontamination and decommissioning activities at the West Valley facility, but the agencies did not ultimately decide on an option (see fig. 1).<sup>17</sup> After receiving almost 1,700 comments, DOE and NYSERDA recognized the need for additional information and analytical methods to support the analysis before making a final decision on which decommissioning option to pursue.

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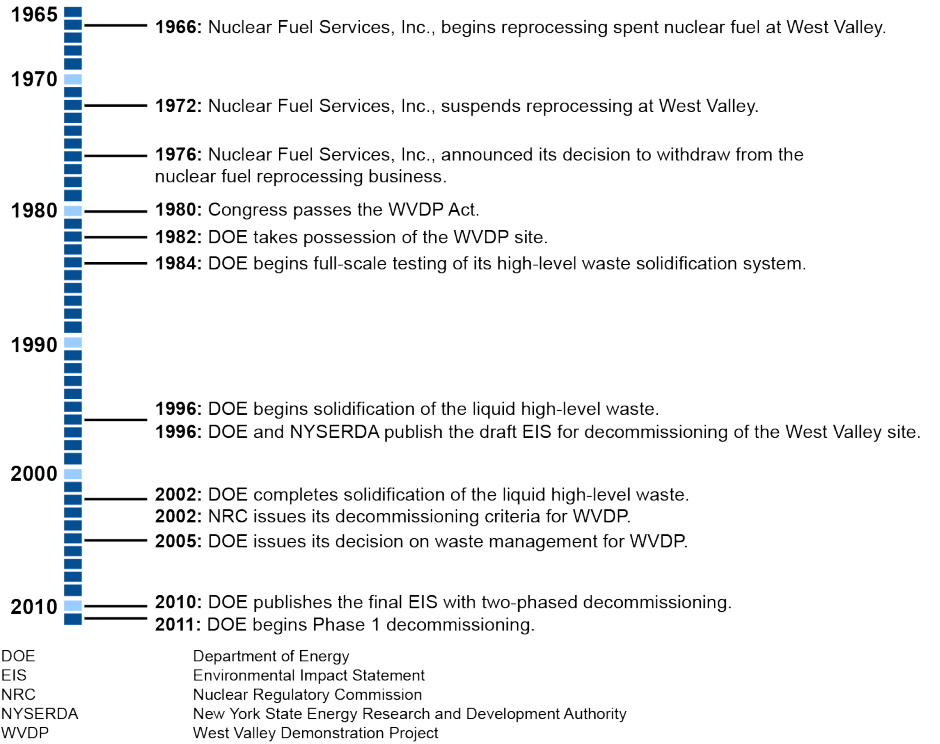
<sup>15</sup>The project site includes the Waste Tank Farm, the Main Plant Process Building, and the NDA, but it does not include the SDA. About 23 percent of the material buried in the SDA originated at the West Valley facility. The remainder came from offsite medical, educational, research, pharmaceutical, and industrial institutions, federal installations, and from nuclear power plants.

<sup>16</sup>The cooperative agreement between DOE and NYSERDA provides for DOE to assume exclusive possession of the West Valley Demonstration Project premises and facilities for use in carrying out the project. Section 3.02(b)(i) of the *Cooperative Agreement between United States Department of Energy and New York State Energy Research and Development Authority on the Western New York Nuclear Service Center at West Valley, New York*.

<sup>17</sup>Department of Energy, *Draft Environmental Impact Statement for Completion of the West Valley Demonstration Project and Closure or Long-Term Management of Facilities at the Western New York Nuclear Service Center* (Washington, D.C.: January 1996). The West Valley Demonstration Project Act required the Secretary of Energy to prepare required environmental impact analyses of the demonstration project.

**Figure 1: Time Line of Key Events at the West Valley Facility in New York before Phased Decommissioning, 1965-2011**

The state of New York owns the site, which was operated by Nuclear Fuel Services, Inc., but DOE is responsible for carrying out the demonstration project at the site.



Source: GAO analysis of DOE and NRC documents. | GAO-21-115

**Text for Figure 1: Time Line of Key Events at the West Valley Facility in New York before Phased Decommissioning, 1965-2011**

Date	Event
1966	Nuclear Fuel Services, Inc., begins reprocessing spent nuclear fuel at West Valley
1972	Nuclear Fuel Services, Inc., suspends reprocessing at West Valley
1976	Nuclear Fuel Services, Inc., announced its decision to withdraw from the nuclear fuel reprocessing business
1980	Congress passes the WVDP Act
1982	DOE takes possession of the WVDP site
1984	DOE begins full-scale testing of its high-level waste solidification system
1996	DOE begins solidification of the liquid high-level waste
1996	DOE and NYSERDA publish the draft EIS for decommissioning of the West Valley site
2002	DOE completes solidification of the liquid high-level waste
2002	NRC issues its decommissioning criteria for WVDP
2005	DOE issues its decision on waste management for WVDP

Date	Event
2010	DOE publishes the final EIS with two-phased decommissioning
2011	DOE begins Phase 1 decommissioning

Although DOE and NYSERDA did not reach a decision on decommissioning the site, by 2002 DOE had completed solidification of the high-level waste, incorporating the 600,000 gallons of liquid high-level waste into glass and placing the glass into 278 steel canisters.<sup>18</sup> Also in 2002, NRC issued a policy statement prescribing decommissioning criteria for the project, as required by the West Valley Demonstration Project Act.<sup>19</sup> NRC prescribed its License Termination Rule as the decommissioning criteria; this rule identifies three scenarios under which DOE could meet its responsibilities for the project site:<sup>20</sup>

1. **Unrestricted release.** According to NRC, unrestricted use means the site will not be subject to institutional controls.<sup>21</sup> To meet the criteria for unrestricted release of the project site, DOE would have to demonstrate that any residual radioactivity that is distinguishable from background radiation results in an individual dose rate that does not

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<sup>18</sup>From 1984 to 1989, DOE conducted full-scale testing of its solidification process and, in 1996, DOE began solidifying the waste.

<sup>19</sup>67 Fed. Reg. 5003 (Feb. 1, 2002).

<sup>20</sup>10 C.F.R. pt. 20, subpt. E. In addition, the NRC's policy statement recognizes that if complying with the rule's restricted release requirements is technically impractical or prohibitively expensive, an exemption from the rule may be appropriate, provided that protection of the public and environment can be maintained. Specifically, the policy statement defines the circumstances under which portions of the project could remain under long-term management or stewardship.

<sup>21</sup>Institutional controls are used to limit intruder access to, or use of, the site to ensure that the exposure from the residual radioactivity does not exceed the established criteria. These controls include administrative mechanisms (e.g., land use restrictions) and may include physical controls (e.g., signs, markers, landscaping, and fences) to control access to the site and minimize disturbances.

exceed 25 millirem (mrem) per year and that residual radioactivity has been reduced to levels that are as low as reasonably achievable.<sup>22</sup>

2. **Restricted release.** According to NRC, restricted release means the site will be subject to institutional controls. Specifically, for restricted release, DOE would have to demonstrate, among other things, that institutional controls at the site would provide reasonable assurance that any residual radioactivity distinguishable from background radiation results in an individual dose that does not exceed 25 mrem per year and that residual radioactivity at the site has been reduced so that if the institutional controls are no longer in effect, there is reasonable assurance that any residual radioactivity distinguishable from background radiation is as low as reasonably achievable and would not exceed 100 mrem per year, or 500 mrem in certain circumstances.<sup>23</sup>
3. **Alternative criteria release.** Under the alternate criteria release scenario, DOE must, among other things, be able to provide assurance that public health and safety will continue to be protected and that it is unlikely that an individual dose from all man-made sources combined would be more than 100 mrem per year.<sup>24</sup> In addition, DOE must be able to reduce doses to levels that are as low as is reasonably achievable.

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<sup>22</sup>10 C.F.R. § 20.1402. A millirem, or one-thousandth of a rem, is a unit used to measure the effective dose of a given type of radiation. The average individual exposure in the United States from background radiation is approximately 360 mrem per year. For the License Termination Rule, residual radioactivity is calculated based on the total effective dose equivalent to an average member of the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances, such as a resident farmer or building occupant.

<sup>23</sup>10 C.F.R. § 20.1403.

<sup>24</sup>10 C.F.R. § 20.1404.

Using the NRC's prescribed decommissioning criteria, DOE and NYSERDA issued the final EIS in January 2010, in which the agencies proposed decommissioning the entire facility in two phases:<sup>25</sup>

- **Phase 1.** This phase, expected to take 8 to 10 years to complete, was to include removal of structures for which there was consensus between DOE and New York State. DOE and NYSERDA also planned for additional information-gathering and studies that could facilitate the Phase 2 decommissioning decision for the remaining structures or areas. Phase 1 decommissioning was divided into two subphases, based on work contracts:
  - Phase 1A covered the demolition and removal of some above-ground structures on the project site and the relocation of the canisters of solidified high-level waste to an interim storage pad on the site.
  - Phase 1B covered the excavation and removal of contaminated soils surrounding the Main Plant Process Building and the Low-Level Waste Treatment Facility Lagoons located on the project site.<sup>26</sup>
- **Phase 2.** DOE and NYSERDA were to, by 2020, decide which actions to pursue to complete decommissioning. Specifically, the agencies were to decide on the remedy for the remaining areas of the site, including the Waste Tank Farm, the NDA, and the SDA, and were to make that decision by 2020.<sup>27</sup> In the final EIS, DOE and NYSERDA analyzed two options that could be selected for Phase 2

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<sup>25</sup>Department of Energy and New York State Energy and Research Development Authority, *Final Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center* (January 2010). DOE and NYSERDA jointly prepared the final EIS in order to meet both federal and state requirements for environmental review. NRC, the U.S. Environmental Protection Agency, and the New York State Department of Environmental Conservation also participated as cooperating agencies in reviewing the options analyzed in the EIS.

<sup>26</sup>There are five lagoons at West Valley that were used by Nuclear Fuel Services, Inc., and then by DOE, to process low-level radioactive wastewater generated on-site. Lagoon 1 is deactivated. Lagoon 2 is currently used to store wastewater from other facilities on-site. Lagoon 3 receives treated water from Lagoons 4 and 5, both of which are radiologically contaminated.

<sup>27</sup>The full list of areas covered by the Phase 2 decision are the Waste Tank Farm, the NDA, the nonsource area of the North Plateau Groundwater Plume, Construction and Demolition Debris Landfill, Cesium Prong, contaminated stream sediments, balance of the site property, and the SDA. Definitions of these areas are included in app. I.

decommissioning: (1) exhuming all buried waste for off-site disposal—called site-wide removal—and (2) leaving buried waste in place and isolating radioactivity using specially designed closure structures—an option called site-wide close-in-place.

DOE also issued a Record of Decision in 2005 for managing radioactive waste from the project that DOE is required to dispose of by the West Valley Demonstration Project Act.<sup>28</sup> In its decision, DOE identified options, or pathways, for where to dispose of the project's waste, defined in the act as follows:<sup>29</sup>

- **High-level waste** is the high-level radioactive waste that was produced by the reprocessing of spent nuclear fuel at West Valley.<sup>30</sup> This waste will continue to be stored in canisters at the project site until transfer to a geologic repository for permanent disposal.<sup>31</sup>
- **Transuranic waste** is material contaminated with elements with an atomic number greater than 92 (the element uranium) and that are in certain concentrations of nanocuries per gram.<sup>32</sup> Such waste would be shipped to the Waste Isolation Pilot Plant (WIPP) in New Mexico, if it were determined that the waste met all the requirements for disposal in this repository. If some or all of the waste did not meet these requirements, DOE would explore other alternatives for disposal of this waste.

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<sup>28</sup>70 Fed. Reg. 35073 (June 16, 2005). The record of decision was for a final environmental impact statement issued in 2003 for West Valley Demonstration Project waste management.

<sup>29</sup>Other laws may contain different definitions of these terms. For example, the Nuclear Waste Policy Act of 1982 defines high-level radioactive waste as highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that NRC, consistent with existing law, determines by rule requires permanent isolation.

<sup>30</sup>Pub. L. No. 96-368, § 6(4), 94 Stat. 1347, 1350 (1980).

<sup>31</sup>According to the 2003 final Environmental Impact Statement, high-level waste includes both liquid wastes and such other material as NRC designates as high-level radioactive waste for purposes of protecting public health and safety.

<sup>32</sup>Pub. L. No. 96-368, § 6(5), 94 Stat. 1347, 1350 (1980). A nanocurie is a unit used to measure the intensity of radioactivity in a sample of material.



- **Low-level waste** is radioactive waste that is not classified as high-level waste, transuranic waste, or certain other material.<sup>33</sup> Such waste would be shipped off-site for disposal at commercial sites, one or both of two DOE sites (the Nevada Test Site or the Hanford site), or a combination of commercial and DOE sites, over the next 10 years.<sup>34</sup>

The low-level radioactive waste at West Valley includes GTCC waste.<sup>35</sup> The Energy Policy Act of 2005 required DOE to submit to Congress a report that describes all options under consideration for the safe disposal of GTCC waste and await action by Congress before making a final decision on disposal.<sup>36</sup>

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## DOE Has Made Progress on Its Cleanup at West Valley, but Full Project Cost and Scope Are Unknown

DOE has demolished a majority of the contaminated structures at the project site and has made progress in disposing of low-level waste off-site and processing transuranic and high-level waste for interim on-site

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<sup>33</sup>Pub. L. No. 96-368, § 6(6), 94 Stat. 1347, 1350 (1980). Specifically, the West Valley Demonstration Project Act defines low-level radioactive waste to mean radioactive waste not classified as high-level radioactive waste, transuranic waste, and tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

<sup>34</sup>The DOE's decision also covered mixed low-level waste, which contains both radioactive and hazardous waste components. The Nevada Test Site is now called the Nevada National Security Site.

<sup>35</sup>NRC identifies four classes of low-level waste in its regulations for disposal purposes on the basis of the concentrations of specific long- and short-lived radionuclides: Class A, B, C, and greater-than-Class C (GTCC). GTCC waste has radionuclide concentrations exceeding the limits for Class C low-level waste, as provided in 10 C.F.R. § 61.55(a)(2)(iii), and requires isolation from the human environment for a longer period of time than do Class A, B, and C wastes, which are disposed of in existing commercial disposal facilities. The NRC's low-level waste classification system does not apply to DOE because DOE is not an NRC licensee. However, DOE often describes West Valley transuranic waste as GTCC or GTCC-like because it has characteristics similar to those of GTCC waste, and there may be no path for disposal of it at the present time. For the purposes of this report, we generally use the term transuranic waste, which is the term used in the West Valley Demonstration Project Act. NYSERDA officials told us that they have objected to DOE's decision to refer to West Valley's transuranic waste as GTCC-like, and that the term "GTCC-like" is not defined in any statute or regulation.

<sup>36</sup>Pub. L. No. 109-58, § 631(b)(1)(B), 119 Stat. 594, 788.

storage, as part of Phase 1 decommissioning of the site. However, DOE was to complete Phase 1 by 2020, and the agency now estimates that this phase will not be completed until 2030 or later. Furthermore, the agencies have not yet made a Phase 2 decision for the remaining buried waste and, as a result, cannot estimate the full scope and cost of the remaining work.

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### DOE Has Demolished Contaminated Structures, Disposed of Low-Level Waste, and Placed Transuranic and High-Level Waste into Interim Storage On-Site

As of September 2020, DOE had made progress on Phase 1 decommissioning of the project. For example, DOE has demolished 51 of the 55 above-ground structures at the project site, according to DOE documents and officials. These structures included the Vitrification Facility, which DOE used to solidify liquid high-level waste; DOE demolished this facility in 2018 (see fig. 2). The most significant structure remaining to be demolished is the Main Plant Process Building—the highly contaminated building in which the main spent fuel reprocessing activities took place. DOE planned to begin open-air demolition of this building in 2018. However, DOE officials said that the agency paused those plans in response to a 2017 contamination incident that occurred during the open-air demolition of the Plutonium Finishing Plant at the Hanford site in Washington. The officials said that DOE has since applied lessons learned from that incident to the open-air demolition for the Main Plant Process Building. DOE officials said the agency plans to complete the demolition by 2023.<sup>37</sup>

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<sup>37</sup>According to DOE officials, DOE is evaluating possible operational impacts due to the Coronavirus Disease 2019 pandemic and, as a result, the completion date for demolition of the Main Plant Process Building may need to be revised outward.

**Figure 2: Demolition of the Vitrification Facility at West Valley**



Before demolition, September 2017



During demolition, June 2018



After demolition, September 2018

Source: West Valley Demonstration Project. | GAO-21-115

DOE has also made progress in disposing of low-level waste from decommissioning activities. According to the 2010 final EIS, Phase 1 decommissioning activities would generate approximately 6.2 million cubic feet of low-level waste.<sup>38</sup> Officials said that from September 2011 to September 2020, DOE disposed of approximately 1.27 million cubic feet of low-level waste—about 20 percent of the estimated total for Phase 1—primarily to the Nevada National Security Site, Energy Solutions in Utah, and Waste Control Specialists in Texas.<sup>39</sup> DOE continues to generate low-level waste as it decommissions and demolishes contaminated structures at the project site. According to DOE officials, DOE intends to dispose of this low-level waste offsite as it is generated (see fig. 3).<sup>40</sup>

<sup>38</sup>The final EIS also noted that there is uncertainty related to the waste volume estimates due to limited availability of site contamination characterization. According to the final EIS, DOE used moderately conservative assumptions to mitigate this uncertainty.

<sup>39</sup>According to officials, 1.27 million cubic feet represents the volume of low-level waste disposed of by the Phase 1 DOE contractor. Since DOE began the project in 1982 to February 2020, it has disposed of 2.3 million cubic feet of low-level waste, including the waste generated through Phase 1 activities and waste generated by the solidification of high-level waste.

<sup>40</sup>According to DOE officials, the current contract for disposal of low-level waste from the project is with Energy Solutions.

**Figure 3: Low-Level Waste from the West Valley Demonstration Project Being Transported for Off-Site Disposal, August 2020**



Source: West Valley Demonstration Project. | GAO-21-115

Although DOE has made progress by disposing of low-level waste at off-site locations and processing transuranic and high-level waste, it continues to store the processed transuranic and high-level waste on-site on an interim basis. Specifically, DOE completed solidification of the 600,000 gallons of high-level waste in 2002 and placed the 278 canisters of solidified waste in interim storage in the Main Plant Process Building. In 2016, DOE transferred all the canisters to 56 storage casks on an outdoor storage pad, which officials said was necessary in order to support the eventual demolition of the Main Plant Process Building (see fig. 4).

**Figure 4: High-Level Waste from the West Valley Demonstration Project in Interim On-Site Storage, March 2017**



Source: West Valley Demonstration Project. | GAO-21-115

As of February 2020, DOE has also processed and packaged approximately 30,000 cubic feet of transuranic waste, including waste generated during solidification of the high-level waste. It is storing the processed and packaged transuranic waste on-site until the agency can identify a suitable disposal location. DOE officials estimated that they may have to reprocess and repackage an additional 3,000 cubic feet of this waste during the remainder of Phase 1 activities.

Although DOE was to complete Phase 1 by 2020, the agency now estimates this phase will not be completed until 2030 or later. According to the final EIS for decommissioning of the West Valley facility, Phase 1 was to be completed within 8 to 10 years, based on a funding profile of \$100 million per year.<sup>41</sup> According to officials, DOE is using one contract for the demolition of above-ground structures—Phase 1A—and is planning another contract for the excavation of contaminated soils—Phase 1B. As of August 2020, DOE was still completing decommissioning activities under the Phase 1A contract, such as the demolition of the Main Plant Process Building, and had not yet awarded the Phase 1B contract or begun the soil excavation work. According to DOE documents and

<sup>41</sup>Average annual project expenditures from fiscal year 2012—the first full fiscal year of Phase 1 decommissioning—to fiscal year 2019 were \$72.4 million.

officials, DOE expects to complete all Phase 1A activities by 2023 but does not expect to complete Phase 1B activities until 2030. Officials said that this delay is largely due to (1) the 2018 pause in demolition of the Main Plant Process Building and (2) a nearly 3-year schedule extension to the Phase 1A contract. This contract was extended because the agency omitted critical activities from the scope of work, among other project management deficiencies that DOE's Office of Inspector General reported in 2017.<sup>42</sup>

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### DOE Cannot Fully Estimate Waste Volumes and Project Cost without a Phase 2 Decommissioning Decision

DOE cannot determine the amount of additional waste that would be disposed of in Phase 2 because it has not yet made a decision on how it will address the remaining waste. For example, DOE officials told us that the amount of additional waste from Phase 2 depends largely on the decommissioning decision for the following areas: the Waste Tank Farm, the NDA, and a portion of groundwater and soil contamination known as the North Plateau Groundwater Plume, among others.<sup>43</sup> According to a technical report accompanying the 2010 final EIS, DOE and NYSERDA estimated that exhuming and removing all the buried waste and contaminated soils from these three areas would require the off-site disposal of approximately 24.7 million cubic feet of low-level waste and

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<sup>42</sup>Department of Energy, Office of Inspector General, *Audit Report: Department of Energy's West Valley Demonstration Project*, DOE-OIG-17-05 (Washington, D.C.: April 2017). In that report, the DOE Inspector General reviewed Phase 1 decommissioning activities and found that the project was not administered using basic project management principles and that DOE had omitted or had not explicitly described critical activities from the Phase 1 contract's scope, which contributed to a nearly 3-year extension to Phase 1. For example, DOE did not include the relocation of 222 containers of remote-handled transuranic waste or unfinished work from a prior contract. In its report, the Inspector General made a total of eight recommendations to DOE to address deficiencies in managing the Phase 1 contract. According to DOE documentation and officials, the agency is in the process of developing and implementing a new program management policy to address some of the concerns raised in that report.

<sup>43</sup>The North Plateau Groundwater Plume is an area of groundwater and subsurface soil contamination resulting from the reprocessing of spent fuel at West Valley that extends through multiple areas of the site. For the purposes of decommissioning, DOE has divided the plume into two areas, called the source and nonsource areas. DOE decided to address the source area during Phase 1 and the nonsource area during Phase 2 of decommissioning. For a description of the areas that are part of the Phase 2 decommissioning decision, see app. I.

87,000 cubic feet of transuranic waste.<sup>44</sup> However, if DOE were to decide to close these areas in place, the amount of waste to be disposed of off-site would be approximately 8,000 cubic feet of low-level waste and 1,000 cubic feet of transuranic waste, based on another EIS technical report.<sup>45</sup>

DOE also cannot determine the total project cost because it has not made a Phase 2 decision. According to DOE officials, by February 2020, DOE had spent a total of \$3.1 billion on all contracted activities for the project since 1984. Of this amount, DOE spent approximately \$572 million on contracted services for Phase 1 decommissioning activities.<sup>46</sup> Officials also told us that as of June 2020, the contract ceiling for Phase 1A was \$836 million, and the agency had not yet developed a contract cost for Phase 1B. Officials said that once DOE has made the Phase 2 decommissioning decision, the agency will revise its estimates for future costs. Based on estimates in the final EIS, we calculated that the additional cost to complete Phase 1 and Phase 2 decommissioning could be between \$1.4 billion and \$10.6 billion, depending on the Phase 2 decommissioning decision.<sup>47</sup>

Federal agencies are required to include in their annual financial reports their assets and liabilities, including environmental liabilities; however, the cost to complete the project at West Valley may be far greater than

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<sup>44</sup>Although the SDA is not part of the project site, the United States has agreed to pay 30 percent of certain costs of specified actions for that disposal area. A technical report accompanying the final EIS estimated that full exhumation of the SDA would require the off-site disposal of approximately 16.8 million cubic feet of low-level waste and 74,000 cubic feet of transuranic waste.

<sup>45</sup>According to the final EIS, the volumes of waste projected to be generated are based on an understanding of the general process and the site's operational history and the conditions that will likely exist during implementation, but the actual volumes to be exhumed could be smaller or greater. Uncertainties in the final EIS analysis were mitigated by using conservative assumptions.

<sup>46</sup>According to DOE officials, from fiscal year 2011, when DOE began Phase 1 decommissioning activities, through February 2020, the agency spent approximately 34 percent, or \$194.2 million, of the Phase 1 decommissioning costs on minimum safety requirements—which include providing facility security and infrastructure maintenance.

<sup>47</sup>We adjusted the estimates in the final EIS for inflation, converting fiscal year 2008 dollars to fiscal year 2019 dollars. The original estimates in the final EIS were \$1.7 billion for phased close-in-place to \$9.4 billion for phased removal. We then adjusted actual Phase 1 expenditures, converting to fiscal year 2019 dollars, and subtracted the inflation-adjusted actual expenditures from those cost estimates to calculate the estimated range in costs to complete the project.

DOE's reported environmental liability.<sup>48</sup> In 2017, we added the federal government's growing environmental liability to our High-Risk List of programs vulnerable to mismanagement or in need of transformation. In fiscal year 2019, DOE reported \$505 billion in environmental liabilities—including approximately \$1 billion for the remaining cleanup of the West Valley Demonstration Project site, according to DOE officials.<sup>49</sup> DOE's estimate assumes that the year of project completion is 2043 and that the annual funding profile remains at \$75 million. In estimating DOE's environmental liability for the site, officials said they selected the lowest-cost cleanup option, which was determined to be the close-in-place option outlined in the final EIS. Basing the estimate on this option would be consistent with federal accounting guidance, which instructs agencies to report the minimum future costs in cases in which there is no better estimate.<sup>50</sup> However, as noted above, completing the project could cost as much as approximately \$10.6 billion, if DOE decides to undertake a more extensive cleanup option in Phase 2. Thus, the federal government's fiscal exposure to complete the project at West Valley may be far greater than DOE's reported environmental liability.

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## DOE Has Taken Steps to Reach a Phase 2 Decommissioning Decision, but Several Issues Remain to Be Resolved

To help the agency decide on options for Phase 2 of the decommissioning of the West Valley facility, DOE and NYSERDA supported several Phase 1 studies that were intended to help address technical uncertainties, such as the potential effects of erosion on buried waste, for Phase 2. DOE also initiated, but has not yet completed, a computer-based model intended to help the agency identify

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<sup>48</sup>Federal accounting standards require agencies responsible for cleaning up contamination to estimate future cleanup and waste disposal costs and to report such costs in their annual financial statements as environmental liabilities.

<sup>49</sup>DOE officials told us that the estimated life cycle cost for completing the project is approximately \$1.8 billion in fiscal year 2020 dollars, the federal portion of which is \$1 billion. The estimate was prepared using conservative estimates based on the closure engineering documents that were prepared for and included in the final EIS. DOE does not include the cost to dispose of transuranic or high-level waste in its project cost estimate at West Valley; however, the cost to dispose of West Valley transuranic waste is currently included in the agency's total environmental liability.

<sup>50</sup>Federal Accounting Standards Advisory Board, *Handbook of Federal Accounting Standards and Other Pronouncements*, as amended, version 18 (June 30, 2019).



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decommissioning options to be analyzed through a Supplemental EIS (SEIS) process. However, according to agency officials, DOE needs to address several issues before it makes a Phase 2 decommissioning decision, including resolving ongoing technical complexities with the performance model. As a result, DOE has delayed the Phase 2 decision from 2020 to 2023.

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### DOE Supported Technical Studies That Addressed Some Uncertainties Needing Resolution to Reach a Phase 2 Decommissioning Decision

DOE and NYSERDA had several areas of disagreement following the 2010 EIS that needed to be resolved in order to reach the Phase 2 decommissioning decision. Specifically, in the final EIS, NYSERDA stated that the technical analyses of soil erosion, groundwater flow and contaminant transport, engineered barriers, and uncertainty were not technically defensible for use in long-term decisions regarding the cleanup.<sup>51</sup> DOE acknowledged that although the agency believed the information in the EIS was adequate to support agency decision-making, there was some incomplete information related to, among other things, the human health impacts resulting from long-term release and transport of radiological material under different decommissioning scenarios.

To facilitate interagency consensus on the Phase 2 decommissioning decision, DOE and NYSERDA supported a series of studies in Phase 1 that were to be completed within 8 years of the Phase 1 decision (i.e., by 2018).<sup>52</sup> DOE and NYSERDA established working groups to address (1) erosion, (2) exhumation, and (3) engineered barriers.

- **Erosion working group.** The purposes of this working group were to improve the forecasts for future erosion at the West Valley site, reduce the associated uncertainty, and assist the agencies in

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<sup>51</sup>Engineered barriers are passive, man-made structures, usually designed to isolate waste from water, limit releases of the waste, or mitigate radioactive doses to intruders.

<sup>52</sup>According to Phase 1 study guidance developed and agreements signed by the agencies, the studies were to be of sufficient scope to address the key issues to be resolved, including (1) those associated with the long-term performance models, (2) the viability and cost of exhuming buried waste and tanks, (3) the availability of waste disposal sites, and (4) technologies for in-place containment. The agencies were also to consider recommendations by identified subject matter experts and an independent scientific advisory panel, as well as input from the regulatory agencies and the public.

reaching consensus on the likely effects of future erosion. The working group found that both the NDA and SDA were similarly vulnerable to erosion from adjacent creeks and from the growth of a gully next to the NDA. According to the working group's report, the working group developed an improved framework for long-term erosion modeling at the site and used that framework to produce projections of future erosion, with uncertainties, up to 10,000 years in the future.<sup>53</sup> The working group concluded that the projections and uncertainty estimates it developed could be used to inform future performance assessments and decommissioning decisions, including any selective exhumation of buried waste.

- **Exhumation working group.** This working group was to evaluate whether there might be viable alternatives for exhuming the wastes buried in the NDA, SDA, and Waste Tank Farm. It evaluated whether any exhumation method or technologies other than those proposed in the final EIS could achieve the project objectives at lower cost without jeopardizing worker and community safety. Overall, the working group found the full exhumation (site-wide removal) option in the final EIS to be the most comprehensive and protective of the exhumation options; however, the working group also found that other options could provide a comparable level of protection at lower cost and could be considered when developing the Phase 2 decommissioning options. The working group also conducted an evaluation of the differences among several historical waste inventories to determine how to best use the inventories and reduce uncertainties related to the waste buried in the NDA, SDA, and Waste Tank Farm. According to DOE officials, the exhumation working group found the most current inventory was generally reliable and that a few uncertainties remained related to the precise location of some of the inventory.
- **Engineered barriers working group.** This working group was to evaluate the performance of engineered barriers for buried waste, among other things. According to DOE officials, this group did not produce any studies of the topic beyond a review of the literature because DOE and NYSERDA had determined that this work would be more appropriate to complete as part of subsequent Phase 2 decision-making efforts.

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<sup>53</sup>West Valley Erosion Working Group Modeling Team, *Modeling Long-Term Erosion at the West Valley Demonstration Project and Western New York Nuclear Service Center* (April 25, 2018). Sources of uncertainty included future climate, future erosion in the Buttermilk Creek valley, model structure and calibration of model parameters, and human modification to contemporary topography, among other things.

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According to DOE officials, a number of the recommendations from the working groups will be considered during the Phase 2 decision-making process.

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## DOE Is Developing Phase 2 Decommissioning Options but Has Delayed Its Decision from 2020 to 2023 Because of Challenges

DOE is developing a model that will help the agency analyze Phase 2 decommissioning options, but it has delayed its decision until 2023 so it can resolve technical challenges with the model. In 2015, DOE and NYSERDA signed an interagency agreement in which they decided to further address uncertainty in the Phase 2 decision by transitioning to a probabilistic modeling approach and to use that model to develop decommissioning options.<sup>54</sup>

Key steps in this agreement include the development of a probabilistic modeling approach to further evaluate uncertainty in the Phase 2 decision. The model is intended to enable the agencies to estimate the potential future consequences for human health and the environment from possible exposure to radioactive material under different cleanup scenarios and compare these scenarios with the NRC's prescribed decommissioning criteria.<sup>55</sup> According to the agreement, the model should allow the agencies to further address uncertainty in the Phase 2 decommissioning decision. Ultimately, according to DOE officials, the agencies intend to use the analysis to develop a number of hybrid options that fall between full exhumation and site-wide close-in-place of the

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<sup>54</sup>The interagency agreement is entitled *Third Supplemental Agreement to the Cooperative Agreement between the United States Department of Energy and the New York Energy Research and Development Authority to Support Phase 2 Decisionmaking for the Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center*. The agreement states that the parties intend that the Phase 2 decision will be based upon relevant data and information from, among other things, (1) the Phase 1 studies, (2) additional studies and data collection by DOE and NYSERDA, (3) the transition of existing analyses to a probabilistic modeling approach, (4) the preparation of a long-term performance assessment, and (5) a joint SEIS. The joint SEIS will be prepared under a jointly managed contract with the agencies sharing the cost. The agencies will also share the cost of the long-term performance assessment.

<sup>55</sup>According to DOE officials, the performance model contractor is using the GoldSim system—a preexisting computer software that has been used for engineering risk analysis at other federal nuclear waste cleanup sites.

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remaining facilities. The officials told us these options would be evaluated through a SEIS process to come to a Phase 2 decision.

Under the 2015 agreement, the model was to provide results in time to allow DOE and NYSERDA to make a Phase 2 decision by spring 2020. However, DOE and NYSERDA officials said that because of challenges with the model, initial results were not available as of summer 2020, although they expected results in late 2020. DOE officials provided a number of reasons for the delays, including the complex geology of the West Valley site and the need to take into account groundwater infiltration and downstream surface water flow. In addition, NRC officials told us that the NDA in particular presents several technical challenges, such as the variety of and significant radioactivity in the buried waste.<sup>56</sup>

DOE officials said they are confident they can resolve these technical challenges. DOE officials also told us the agency has discussed with NRC about holding a series of meetings to have detailed demonstrations and technical discussions of the model with NRC technical staff and that the NRC's technical review of the model would coincide with the public comment period for the draft SEIS. DOE officials said they plan to make the model available for public review when the agency issues the draft SEIS.

In February 2018, DOE and NYSERDA issued a notice of intent to prepare the SEIS, in which the agencies stated they would evaluate several decommissioning options, including, at a minimum, (1) full exhumation of the remaining facilities and waste, (2) site-wide close-in-place of the remaining facilities and waste, and (3) at least two "hybrid" options that would include some amount of removal and some amount of waste being closed in place. These hybrid options are to be developed using preliminary information from the probabilistic performance assessment model. Officials said there are still many unknowns, such as some uncertainty related to the precise location of some buried waste in the NDA, what facilities would need to be built to handle the waste, the availability of future options for waste disposal, and potential impacts

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<sup>56</sup>Radioactive wastes buried in the NDA include, among other things, spent fuel hulls, fuel assembly hardware, and 42 ruptured spent fuel elements from the N-Reactor at the Hanford site in Washington.

when transporting waste off site for disposal.<sup>57</sup> DOE and NYSERDA have delayed the issuance of the Phase 2 decommissioning decision from 2020 to 2023 to give the agencies more time to resolve the complexities with the model, according to DOE officials.

In March 2018, DOE and NYSERDA held three public meetings to solicit comments on the SEIS's scope. DOE officials told us they will consider the comments and provide a general response when preparing the draft SEIS. In scoping comments and in our interviews with them, stakeholders and agency officials identified three main challenges with the Phase 2 decommissioning decision.

- **Estimating the potential for erosion of the waste buried in the NDA and SDA.** Although the Phase 1 study process and the probabilistic performance assessment model are intended to resolve technical uncertainties related to erosion, stakeholders in the West Valley community have a number of concerns regarding the environmental risks to the site posed by erosion. Stakeholders are also concerned about whether the model will appropriately estimate the effect of erosion on the disposal areas. For example, members of the West Valley Citizen Task Force told us that past DOE contractors developed different erosion models, such as the one used in the 1996 draft EIS, which projected severe erosion of the site; however, subsequent erosion models used by DOE, including those used in the final EIS, showed less impact from erosion on the two disposal areas.<sup>58</sup> The Seneca Nation of Indians stated that erosion of the buried wastes presents a direct threat to their way of life because radioactive contamination could enter the Cattaraugus Creek, part of the greater Lake Erie watershed, which flows through the Cattaraugus Indian Territory. This creek is traditionally used by the Seneca Nation as a source of water and food.

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<sup>57</sup>Specifically, in regard to uncertainty associated with waste buried in the NDA, officials told us that there are 15 mapped disposal holes in the NDA that have no associated reported waste or radiological inventory identified in the NDA Integrated Database. The database also has waste disposal records that have no reported associated disposal holes.

<sup>58</sup>The West Valley Citizen Task Force includes members of the West Valley community, local government officials, and the Seneca Nation of Indians. It was formed to advise DOE and NYSERDA on issues regarding the preferred option for "the completion of the West Valley Demonstration Project and cleanup, closure, and/or long-term management of the facilities at the site," according to the group's Ground Rules, as revised and approved on January 29, 1997.

- **Reaching agreement with stakeholders on the Phase 2 decision.** Stakeholders in the West Valley community told us that they strongly oppose any decommissioning option that includes the long-term storage or permanent disposal of waste on-site and that for decades they have advocated for full exhumation of the buried waste.<sup>59</sup> A number of stakeholders, including the West Valley Citizen Task Force, the Coalition on West Valley Nuclear Wastes, and the Seneca Nation of Indians, submitted comments during the initial SEIS scoping period in May 2018. In these comments, stakeholders reiterated their desire for complete and full removal and disposal of the remaining radioactive waste. The Seneca Nation of Indians commented that the West Valley area is unsuitable for long-term storage of radioactive waste and advocated for full cleanup in which all the waste is exhumed, securely contained, monitored, and ultimately removed from the site. Tribal representatives from the Seneca Nation of Indians told us that any option that includes leaving buried radioactive waste would be unacceptable to them.

The task force submitted comments stating that the site-wide removal option should be selected as the preferred option. The task force also stated that there has been no convincing evidence that hybrid options that leave some waste on site could meet the policies and priorities of the task force. In January 2020, several task force members also told us that DOE's decision-making process—in particular DOE's probabilistic performance assessment—has not been sufficiently transparent.

During the Phase 1 period, DOE, NYSERDA, and the DOE contractor have periodically presented information on the model and the Phase 2 decision-making process to the West Valley community. DOE and NYSERDA officials also said that all public comments would be considered during the draft SEIS comment period in 2022, which would be expanded from the required 3 months to 6 months.

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<sup>59</sup>In a 1998 report, the task force stated that (1) the West Valley site is unsuitable for the long-term, permanent storage or disposal of long-lived radionuclides; (2) it does not support any alternative that would make retrieval of buried waste significantly harder, such as creating a permanent monolith; (3) any wastes temporarily stored at the site will be stored so as to be easily monitored and readily retrievable; and (4) all wastes should eventually be transported off-site for permanent disposal. According to the task force ground rules, DOE and NYSERDA are committed to carefully considering the advice of the Citizen Task Force on the preferred option and other aspects of decisions about the future of the site—in addition to the required public comment process on environmental impact statements—and would make an effort to adopt the consensus recommendations of the group.

- **Determining DOE's long-term responsibilities at the site.**

According to DOE, NYSERDA, and NRC officials, DOE has not determined what its long-term responsibilities would be for any waste that remains on-site. DOE officials told us that some of the site may meet the conditions for unrestricted release, and some areas may meet the conditions for release with restrictions—such as institutional controls to prevent inadvertent intrusion to buried waste left on-site. The West Valley Citizen Task Force has stated that it expects a continuing presence by DOE while wastes remain at the site. When we last reported on the West Valley Demonstration Project in May 2001, we found that disagreement between DOE and NYSERDA on their long-term stewardship responsibilities was affecting cleanup planning.<sup>60</sup> We concluded that the agencies might not be able to resolve these issues on their own, and we recommended that Congress consider amending the West Valley Demonstration Project Act to clarify the agencies' respective stewardship responsibilities for historical radioactive contamination left on-site. However, Congress has not taken action to clarify those responsibilities, and the agencies continue to disagree on this issue.

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## DOE's Options for Disposing of High-Level and Transuranic Waste Face Legal and Regulatory Barriers, Among Other Challenges

DOE faces legal and regulatory barriers, among other challenges, to disposing of the high-level and transuranic waste that the West Valley Demonstration Project Act requires it to dispose of. Specifically, DOE cannot dispose of the high-level waste it solidified because a federal repository for high-level waste does not exist. Furthermore, DOE has identified two facilities as potential pathways for disposal of West Valley's transuranic waste, but neither facility is currently authorized to accept this type of waste. DOE is also required to wait for congressional action before making a final decision on where to dispose of its inventory of GTCC waste, which DOE has reported includes West Valley's transuranic

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<sup>60</sup>GAO, *Nuclear Waste: Agreement Among Agencies Responsible for the West Valley Site Is Critically Needed*, [GAO-01-314](#) (Washington, D.C.: May 11, 2001).

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## There Is No Federal Repository for West Valley's High-Level Waste

The West Valley Demonstration Project Act requires DOE to dispose of the solidified high-level waste currently at West Valley, but there is no federal repository for the permanent disposal of high-level waste. Yucca Mountain was envisioned as such a federal repository, but after DOE submitted its March 2010 motion to withdraw its license application to construct the repository, DOE and NRC largely dismantled their capabilities to carry out the licensing process, as we reported in April 2017.<sup>62</sup> We also reported that as of late 2016 and early 2017, DOE and NRC had no formal plans to resume the licensing for Yucca Mountain.

According to DOE's 2005 Record of Decision on waste management activities for the project, DOE plans to store the solidified high-level waste at West Valley until a federal geologic repository becomes available. According to DOE officials, there is very little cost to store the high-level waste at West Valley in its current configuration, and the high-level waste storage pad is designed for up to 50 years of use.

Meanwhile, DOE and the state of New York continue to disagree about which entity is responsible for paying the fee to dispose of the high-level waste once a repository becomes available. Under the Nuclear Waste Policy Act of 1982, entities seeking to dispose of high-level waste from civilian nuclear facilities in a permanent repository must sign a contract for disposal and pay a fee into the nuclear waste fund that was set up to cover the disposal costs. However, the Nuclear Waste Policy Act makes the federal government responsible for paying the costs of permanent disposal of high-level waste from atomic energy defense activities. NYSERDA officials told us that the federal government should be responsible for the disposal fee, because the high-level waste at West

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<sup>61</sup>Specifically, in a 2017 report to Congress, DOE reported that its GTCC and GTCC-like inventory includes waste from environmental cleanup at DOE sites, including West Valley.

<sup>62</sup>GAO, *Commercial Nuclear Waste: Resuming Licensing of the Yucca Mountain Repository Would Require Rebuilding Capacity at DOE and NRC, Among Other Key Steps*, [GAO-17-340](#) (Washington, D.C.: Apr. 26, 2017).



Valley was related to federal atomic energy defense activities.<sup>63</sup> However, DOE officials told us that the state of New York is responsible for the fee because the state owns the high-level waste, and DOE considers the waste to be commercial.

The state of New York has been managing a perpetual care fund that is to be turned over to DOE upon delivery of the high-level waste to a repository for permanent disposal. According to NYSERDA officials, the amount in the perpetual care fund as of June 2020 was \$30.4 million. However, this would not be sufficient to cover the full cost of disposal, which DOE has estimated to be no less than \$272 million, as of 2020. In 2006, New York filed a lawsuit seeking, among other things, a determination as to whether the state or federal government is responsible for paying the disposal fee required by the Nuclear Waste Policy Act of 1982.<sup>64</sup> The litigation resulted in a consent decree in 2010, but this did not resolve the issue of who would pay the cost of high-level waste disposal.<sup>65</sup> In our May 2001 report, we recommended that Congress consider amending the West Valley Demonstration Project Act to clarify the respective responsibilities of DOE and the state of New York for the high-level waste disposal fees. However, Congress has not taken action to clarify those responsibilities.

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### DOE Identified Two Potential Facilities for the Disposal of Transuranic Waste, but Neither Is Currently Authorized to Accept That Waste, and DOE Must Await Congressional Action

In order to respond to a requirement in the Energy Policy Act of 2005, DOE published an EIS in 2016 in which the agency analyzed several options to dispose of its inventory of GTCC and GTCC-like waste, which

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<sup>63</sup>In addition, New York officials have previously said that no disposal contract was required because the West Valley Demonstration Project Act and the agreement between NYSERDA and DOE already addressed responsibility for the costs of permanent disposal.

<sup>64</sup>*State of New York v. United States*, Case No. 06-cv-00810 (W.D.N.Y. Dec. 11, 2006).

<sup>65</sup>The consent decree resolved all of the lawsuit's claims except the claim regarding responsibility for payment of the high-level waste disposal costs. In 2013, a federal judge dismissed this remaining claim as unripe for adjudication because there will not be disposal of high-level waste in a permanent deep underground repository for at least several decades. *State of New York v. United States*, Case No. 06-cv-00810 (W.D.N.Y. Nov. 22, 2013).

includes West Valley's transuranic waste.<sup>66</sup> In 2017, DOE submitted a report to Congress identifying WIPP or a generic commercial repository, or both, as its current preferred option for disposal of these wastes.<sup>67</sup> However, WIPP is not presently authorized to accept this waste, according to DOE, nor is any commercial facility. Although DOE is required by the West Valley Demonstration Project Act to dispose of project-generated waste, including transuranic waste, the agency has not made a final decision on where the waste is to go because the Energy Policy Act of 2005 requires the agency to await congressional action before making a decision on how to dispose of GTCC waste, which includes West Valley transuranic waste.<sup>68</sup>

### WIPP Disposal Option

In the 2016 EIS, DOE identified WIPP—a DOE facility and the only deep underground geologic repository in the United States—as a preferred option for the disposal of GTCC and GTCC-like waste, including West Valley's transuranic waste. However, the Waste Isolation Pilot Plant Land Withdrawal Act (WIPP Land Withdrawal Act) specifies that only radioactive waste generated by atomic energy defense activities is authorized for disposal at WIPP. According to DOE officials, West Valley's transuranic waste was generated as the result of commercial activity by Nuclear Fuel Services, Inc., not by atomic energy defense activities and, therefore, its disposal at WIPP is prohibited. A 1996 DOE legal memo concluded that the legislative history of both the WIPP Land Withdrawal Act and the DOE National Security Act supports the conclusion that Congress did not intend to permit disposal of all of DOE's transuranic waste at WIPP but instead specifically intended WIPP to

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<sup>66</sup>See Department of Energy, *Final Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste*, DOE/EIS-3075 (Washington, D.C.: January 2016). For the purposes of this EIS, DOE referred to non-defense-generated transuranic waste—including West Valley's transuranic waste—as GTCC-like wastes and stated that the agency intended to determine a similar path for disposal for both GTCC and GTCC-like wastes.

<sup>67</sup>See Department of Energy, Report to Congress, *Alternatives for the Disposal of Greater-Than-Class C Low-Level Radioactive Waste and Greater-Than-Class C-Like Waste* (Washington, D.C.: November 2017).

<sup>68</sup>Pub. L. No. 109-58, § 631(b)(1)(B)(ii), 119 Stat. 594, 788. The act required DOE to submit to Congress a report that describes all options under consideration for the safe disposal of GTCC waste and await action by Congress before making a final decision.

handle DOE's defense transuranic waste.<sup>69</sup> Therefore, it is DOE's position that disposal of West Valley's non-defense-generated transuranic waste at WIPP would require, among other things, the enactment of legislation allowing the disposal.

However, NYSERDA disagrees with DOE's determination that West Valley's transuranic waste is not related to atomic energy defense activities. NYSERDA officials have stated that DOE and other public records show that approximately 60 percent of the fuel reprocessed at West Valley came from defense-related activities and that nearly all of the uranium and approximately 80 percent of the plutonium recovered during reprocessing at West Valley was sent to federal facilities that supported, in some form, nuclear weapons production. Therefore, according to NYSERDA, the resulting waste should be considered defense waste under the definition of "atomic energy defense activity" as defined in the Nuclear Waste Policy Act of 1982.

In addition to the prohibition on nondefense waste disposal at WIPP, other considerations may need to be addressed before West Valley waste could be disposed of at WIPP. Specifically, the WIPP Land Withdrawal Act limits the amount of transuranic waste that can be disposed of at WIPP.<sup>70</sup> Furthermore, DOE may not have enough physical space to meet future transuranic waste disposal needs at WIPP if (1) significant volumes of transuranic waste are added to DOE's transuranic waste inventory; or (2) a permit modification authorizing a revision to the method for how waste volumes are counted at WIPP is successfully challenged in court, as we reported in November 2020.<sup>71</sup> If the legal barriers are addressed, DOE officials told us it would be technically feasible to dispose of part or all of the agency's inventory of GTCC and GTCC-like waste, including

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<sup>69</sup>Department of Energy, *Interpretation of the Term "Atomic Energy Defense Activities" As Used in the Waste Isolation Pilot Plant Land Withdrawal Act* (Washington, D.C.: Sept. 9, 1996).

<sup>70</sup>Pub. L. No. 102-579, § 7(a)(3), 106 Stat. 4777, 4785 (1992). The WIPP Land Withdrawal Act limits WIPP's capacity to 6.2 million cubic feet of transuranic waste. In addition, the act limits the total curies of remote-handled transuranic waste received at WIPP.

<sup>71</sup>GAO, *Nuclear Waste Disposal: Better Planning Needed to Avoid Potential Disruptions at the Waste Isolation Pilot Plant*, [GAO-21-48](#) (Washington, DC: Nov. 19, 2020).

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West Valley transuranic waste, at WIPP.<sup>72</sup> However, DOE officials said that, in the absence of any changes to the WIPP Land Withdrawal Act, the agency has not discussed any corresponding permit changes with the New Mexico Environment Department and, therefore, has no indication whether the state of New Mexico would be willing to make the permit changes necessary to allow for the disposal of West Valley's transuranic waste at WIPP.

### Commercial Disposal Option

In the 2016 EIS, DOE's preferred option for West Valley's transuranic waste also includes consideration of commercial disposal options. However, no commercial facility is currently authorized to accept this waste. NRC's regulations require disposal of GTCC waste in a geologic repository, unless proposals for disposal of such waste in a licensed disposal site are approved by NRC. The only commercial facility that DOE has evaluated for the disposal of West Valley's transuranic waste is Waste Control Specialists (WCS)—a near-surface disposal facility for low-level waste in Andrews County, Texas. In a 2018 Environmental Assessment, DOE estimated that WCS has the capability and capacity to accommodate DOE's entire inventory of GTCC and GTCC-like waste, including West Valley's transuranic waste.<sup>73</sup> However, current Texas State regulations preclude disposal of GTCC waste at WCS. In July 2014, WCS filed a petition with the state requesting revisions to the Texas regulations to remove prohibitions on disposal of GTCC waste, GTCC-like waste, and transuranic waste at its state-licensed facilities. In January

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<sup>72</sup>DOE has noted that in order to dispose of nondefense transuranic waste at WIPP, amendments would need to be made to, among other things, the WIPP Land Withdrawal Act, a 1988 agreement between DOE and New Mexico, and the New Mexico hazardous waste permit under which DOE operates WIPP. If DOE decides to dispose of the entire inventory of GTCC and GTCC-like waste, including West Valley transuranic waste, at WIPP, the facility could exceed its disposal capacity limits for remote-handled waste and total curies. Remote-handled waste has a surface dose rate high enough that workers must use remote manipulators to handle the containers. According to DOE officials, the amount of transuranic waste that could be expected to exceed the radiation dose equivalent for WIPP is approximately 30 cubic feet. Officials said that another estimated 200 cubic feet of transuranic waste would not be expected to meet the WIPP acceptance criteria due to the nuclide content; and approximately 8,000 cubic feet of waste is currently packaged in containers that are not WIPP compliant, although these numbers are speculative.

<sup>73</sup>Department of Energy, *Environmental Assessment for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste at Waste Control Specialists, Andrews County, Texas*, DOE/EA-2082 (Washington, D.C.: October 2018).

2015, the Texas Commission on Environmental Quality—the state regulator for radioactive waste disposal—sent a letter to NRC with questions about Texas’s authority to license the disposal of GTCC waste.<sup>74</sup>

In response to the letter from Texas officials, NRC prepared a draft document to evaluate, among other things, whether changes were needed to the NRC’s regulations to permit the disposal of GTCC waste at near-surface facilities. The draft regulatory basis evaluates which GTCC waste streams could be safely disposed of in a near-surface disposal facility and what type of regulatory changes would need to be considered to permit such action. In addition, the draft regulatory basis evaluates whether disposal of GTCC waste presents a hazard such that NRC should retain authority over its disposal rather than allowing states to license disposal.

Based on its analysis of the content and associated hazard for GTCC waste streams, NRC found that approximately 80 percent of DOE’s GTCC waste inventory could be suitable for near-surface disposal. However, NRC found that remote-handled waste from decontamination activities at the West Valley project site was not suitable for near-surface disposal due to challenges in ensuring that future site users do not inadvertently come into contact with contaminated material and the potential for significant exposures due to operational accidents. NRC officials told us that this waste stream may not be feasible for near-surface disposal in part because it would be operationally difficult or cost prohibitive to dispose of it appropriately in a near-surface facility.

According to NRC officials, NRC is in the process of reviewing and analyzing public comments on the draft regulatory basis and has not yet determined whether it will make any changes to its regulations regarding

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<sup>74</sup>Specifically, the Texas Commission on Environmental Quality raised the following questions: (1) Does Texas’s role as an Agreement State under federal law and regulations authorize promulgation of state rules that could license GTCC waste streams for disposal? (2) Considering the fact that DOE currently holds, or is required to take possession of, all GTCC and GTCC-like material, and considering that some of that material exhibits transuranic characteristics and may currently be commingled to include GTCC, GTCC-like, and material exhibiting transuranic characteristics, could the state of Texas authorize the disposal of these materials? If not, is there some pathway to allow for disposal?

near-surface disposal of GTCC waste.<sup>75</sup> In April 2019, in response to the NRC's draft regulatory basis document, the Governor of Texas submitted a letter to NRC stating that states with disposal sites for radioactive waste should have the authority to determine whether GTCC waste can be disposed of in that state. The Governor also stated his opposition to any increase in the amount or concentration of radioactivity authorized for disposal at WCS. DOE officials told us that DOE is forming a working group with the state of Texas, has drafted a Memorandum of Understanding on disposing of radioactive waste in Texas, and will not move forward with any plans to dispose of GTCC and GTCC-like waste at WCS until they receive approval from Texas.<sup>76</sup> Furthermore, in its comments to NRC, WCS recommended that NRC make no regulatory change. According to DOE officials, WCS is the only commercial entity that has expressed interest in potentially being a disposal facility for GTCC and GTCC-like waste.

#### Impacts of the Lack of a Disposal Pathway for Transuranic Waste

According to DOE officials, as of December 2020, Congress had not yet acted on DOE's preferred option for the disposal of the GTCC and GTCC-like waste inventory and, as a result, DOE continues to store West Valley's transuranic waste at the project site. The lack of a disposal pathway for West Valley's transuranic waste creates a number of concerns for the project, including potential impacts to the project schedule and cost, as well as safety concerns related to long-term on-site storage.

- **Project schedule impacts.** DOE officials have said that without a disposal pathway for transuranic waste by 2025, they may not be able to complete Phase 1 decommissioning activities by 2030, as currently planned. When DOE issued its decision for phased decommissioning,

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<sup>75</sup>In October 2020, NRC staff recommended that Commissioners vote to issue a re-proposed rule consolidating and integrating criteria for licensing the disposal of GTCC waste and low-level radioactive waste rulemaking activities, and that provides for Agreement State licensing of those GTCC waste streams that meet the regulatory requirements for near-surface disposal and not presenting a hazard such that NRC should retain disposal authority. As of December 11, 2020, the Commissioners had not voted on this recommendation.

<sup>76</sup>According to DOE officials, the Memorandum of Understanding covers a variety of matters, including waste streams, waste classification, waste acceptance criteria, public safety and environmental stewardship, public outreach and education, and future DOE missions in Texas, and that the draft has been signed by the Secretary of Energy and is awaiting signature from the Governor of Texas.

the agency anticipated it would make progress in identifying and developing disposal facilities for transuranic waste, thereby facilitating any potential removal actions in Phase 2. Planned Phase 1 activities include the demolition of a facility used to package transuranic waste. However, this facility may be needed for repackaging the transuranic waste to meet the final waste acceptance criteria for the facility where the waste will eventually be disposed of, according to NYSERDA officials.

- **Cost.** According to DOE's EIS on waste management for the project, DOE does not consider the storage of transuranic waste at the project site to be practical or reasonable over time because of continuing costs to either maintain existing facilities or build new facilities to store the waste. NYSERDA officials told us that the monitoring, maintenance, and storage of the transuranic waste uses funds that could otherwise be used to advance the decommissioning work at West Valley. According to DOE officials, as of August 2020, the agency had spent approximately \$6.5 million to store transuranic waste at the project site and that as of 2020, the annual cost to store the waste was approximately \$1.2 million. According to DOE and NYSERDA officials, because of the extended period of storage, DOE has already undertaken at least one extensive repackaging campaign of the stored West Valley transuranic waste to consolidate containers and ensure the waste is safely packaged, which cost the agency approximately \$25 million.
- **Safety.** NYSERDA officials expressed concerns about the safety of long-term interim storage of transuranic waste at West Valley. According to an official DOE incident report, in April 2019, one container holding transuranic waste from the 1980s developed a leak when it was being moved by forklift from one outdoor storage area to another, releasing contamination to the forklift, the ground, and the clothing of several personnel who were overseeing the move. According to NYSERDA officials, the degraded container remains outdoors with a "pan" below it to capture any additional contamination and a tarp over the top to protect it from weather. According to DOE's review of the incident, there are five more potentially degraded waste containers. However, NYSERDA officials said that removing and repackaging waste from degraded containers stored outside is not part of the current contractor's scope of work. In addition, NYSERDA officials told us that, once the Main Plant Process Building is demolished and removed from the site, the transuranic waste stored in above-ground buildings represents the largest inventory of above-ground material at risk at the site. Much of West Valley's transuranic waste is housed in two structures constructed in the 1990s that are

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not built to withstand winds over 80 mph, even though tornadoes with winds in excess of 80 mph are known to occur in the West Valley area, according to NYSERDA officials. DOE officials told us they have no concerns about the safety of storing this waste at the site.<sup>77</sup>

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## Conclusions

Since we last reported on the West Valley Demonstration Project in 2001, DOE has made notable progress on the cleanup by solidifying the high-level waste and decommissioning many structures, among other achievements. However, critical decisions regarding the cleanup are still unresolved, such as where the remaining waste is to go and what waste, if any, is to remain on-site. Ongoing challenges with estimating the long-term risks of leaving waste at the site, as well as legal and regulatory barriers to transuranic and high-level waste disposal, continue to impede progress on the cleanup. Specifically, no viable disposal pathway for West Valley's transuranic and high-level wastes currently exists. By creating a legal pathway for West Valley's transuranic waste, Congress could help DOE to complete its responsibilities under the West Valley Demonstration Project Act.

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## Matter for Congressional Consideration

Congress should consider taking action to indicate how DOE should proceed with the disposal of West Valley's transuranic waste and, if necessary, to amend the appropriate federal legislation to create a legal pathway for its disposal. (Matter for Consideration 1)

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## Agency Comments

We provided our draft report to NRC, DOE, and NYSERDA for review and comment. NRC concurred with our findings in its comments, reproduced in appendix II. DOE and NYSERDA provided technical comments, which we incorporated as appropriate.

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<sup>77</sup>According to DOE officials, DOE evaluates the storage of transuranic waste on an annual basis and conducts periodic inspections of transuranic waste containers in interim storage.



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We are sending copies of this report to the appropriate congressional committees, the Secretary of Energy, the Chairman of the Nuclear Regulatory Commission, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff members have any questions about this report, please contact me at (202) 512-3841 or [BawdenA@gao.gov](mailto:BawdenA@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.

A handwritten signature in black ink, appearing to read "Allison Bawden". The signature is fluid and cursive, with the first name "Allison" written in a larger, more prominent script than the last name "Bawden".

Allison Bawden  
Director, Natural Resources and Environment

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Chair  
Ranking Member  
Subcommittee on Energy and Water Development and Related Agencies  
Committee on Appropriations  
House of Representatives

## Appendix I: Contaminated Areas at West Valley to Be Covered by the Phase 2 Decommissioning Decision

For Phase 2 of the decommissioning of the West Valley site, the Department of Energy (DOE) and the New York State Energy Research and Development Authority (NYSERDA) will decide on how to address the remaining waste in the areas with residual contamination that are listed below, according to DOE's Notice of Intent to Prepare a Supplemental EIS [Environmental Impact Statement] for Decommissioning the West Valley site.

- **Waste Tank Farm**—an area that includes four tanks that were used to store liquid high-level waste resulting from commercial reprocessing. The tanks contain some residual radioactive wastes following the solidification of the liquid high-level waste.
- **Nuclear Regulatory Commission (NRC)-Licensed Disposal Area (NDA)**—a below-grade landfill that contains low-level and transuranic waste resulting from the reprocessing activities of Nuclear Fuel Services, Inc., and DOE's cleanup activities at West Valley.
- **North Plateau Groundwater Plume (nonsource area)**—an area of groundwater contamination resulting from spent fuel reprocessing that extends through multiple areas of the site. The North Plateau Groundwater Plume also includes a source area of groundwater contamination located underneath the Main Plant Process Building that is included in planned Phase 1 decommissioning.
- **Construction and Demolition Debris Landfill**—an area that was used by Nuclear Fuel Services, Inc., and DOE to dispose of nonradioactive construction debris and nonradioactive waste. The landfill is in the flow path of the Groundwater Plume; therefore the buried wastes are assumed to require handling as radioactive waste.
- **State-Licensed Disposal Area (SDA)**—a below-grade disposal area that, according to NYSERDA officials, contains low-level and transuranic wastes. New York is responsible for managing the SDA, and the SDA is not part of the project site; however, the United States

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**Appendix I: Contaminated Areas at West Valley  
to Be Covered by the Phase 2  
Decommissioning Decision**

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agreed to pay 30 percent of certain costs of specified actions for the SDA.

- **Cesium Prong**—an area of soil contamination that resulted from uncontrolled releases from the Main Plant Process Building in 1968. New York is responsible for the Cesium Prong; however, this area is included as part of DOE and NYSERDA’s Phase 2 Supplemental Environmental Impact Statement.

# Appendix II: Comments from the Nuclear Regulatory Commission



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

December 21, 2020

Ms. Allison Bawden, Director  
Natural Resources and Environment  
U.S. Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Dear Ms. Bawden:

Thank you for providing the U.S. Nuclear Regulatory Commission (NRC) with the opportunity to review and comment on the U.S. Government Accountability Office's (GAO) draft report GAO-21-115, "Nuclear Waste: Congressional Action Needed to Clarify a Disposal Option at West Valley Site in New York." The NRC has reviewed the draft report, agrees with the findings, and offers the following comment for consideration.

Staff Comment:

Page 36 - The NRC staff recommends clarifying the difference between high-level waste and transuranic waste, either through edits to the text or the addition of a footnote, as the following sentence could give the impression that the challenges regarding high-level waste and transuranic waste disposal are or have been the same: "Specifically, no viable disposal pathway currently for West Valley's transuranic and high-level waste exists. By creating a legal pathway for this waste, Congress could enable Department of Energy (DOE) to complete its responsibilities under the West Valley Demonstration Project Act."

If you have any questions regarding this response, please contact John Jolicoeur. Mr. Jolicoeur can be reached by telephone at (301) 415-1642 or e-mail at [John.Jolicoeur@nrc.gov](mailto:John.Jolicoeur@nrc.gov).

Sincerely,

Margaret M.  
Doane  
Margaret M. Doane  
Executive Director  
for Operations

Digitally signed by Margaret M.  
Doane  
Date: 2020.12.21 17:17:31  
-05'00'

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## Text of Appendix II: Comments from the Nuclear Regulatory Commission

Ms. Allison Bawden, Director Natural Resources and Environment

U.S. Government Accountability Office

441 G Street, NW

Washington, DC 20548

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Sincerely,

Margaret M. Doane

Executive Director for Operations

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## Appendix III: GAO Contact and Staff Acknowledgments

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### GAO Contact

Allison Bawden, (202) 512-3841 or [BawdenA@gao.gov](mailto:BawdenA@gao.gov)

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### Staff Acknowledgments

In addition to the contact named above, Janice Poling (Assistant Director), Daniel Will (Analyst-in-Charge), Mark Braza, Tara Congdon, Rich Johnson, April Gillens, Samuel Moore, Jeanette Soares, Sheryl Stein, Sara Sullivan, and David Trimble made key contributions to this report.

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