EXECUTIVE SUMMARY

PURPOSE OF THIS EXECUTIVE SUMMARY

The purpose of this part of the Decommissioning Plan is to provide readers a synopsis of the plan content.

INFORMATION IN THIS SECTION

The following matters are addressed in the order given:

- The requirements of the West Valley Demonstration Project Act, the decommissioning requirements, and the decommissioning approach;
- The name and address of the licensee and site owner;
- The location and address of the site;
- A brief description of the site and immediate environs;
- A summary of prior licensed activities and other activities involving radioactivity;
- The nature and extent of radioactive contamination at the site;
- The decommissioning objective;
- Decommissioning controls;
- Derived concentration guideline levels and cleanup goals;
- A summary of ALARA (as low as reasonably achievable) evaluations performed and planned;
- Planned initiation and completion dates for the decommissioning; and
- A summary of post-remediation activities.

RELATIONSHIP TO OTHER PLAN SECTIONS

This summary briefly describes the content of key parts of the plan.

The U.S. Department of Energy (DOE) has prepared this plan pursuant to its statutory obligations for decontamination and decommissioning of the West Valley Demonstration Project (WVDP) under the WVDP Act of 1980, Public Law 96-368, and to satisfy commitments made to the U.S. Nuclear Regulatory Commission (NRC) in 1981 and 2003 to prepare a decommissioning plan for the project and submit it to NRC for review.

This plan addresses Phase 1 of the two phases of the WVDP decommissioning. Phase 1 activities are expected to take eight to 10 years to complete. During this eight to 10 year period, a number of activities will be conducted to help determine the best technical approach to complete decommissioning of the remaining facilities. These activities will include further characterization of site contamination and additional scientific studies.

The approach for Phase 2 will be determined later after consideration of the results of the characterization and additional studies. The basis for this approach and the general context for the decommissioning are explained in the sidebar discussion on the next page.

The WVDP Act and the WVDP

This decommissioning project is being conducted under the WVDP Act of 1980. The WVDP Act directed DOE to carry out the following activities: (1) solidify the high-level waste (HLW) at the site, (2) develop containers suitable for permanent disposal of the solidified HLW, (3) transport the waste to a federal repository for permanent disposal, (4) dispose of low-level radioactive waste and transuranic waste produced in the solidification of the HLW, and (5) decontaminate and decommission the tanks, facilities, materials, and hardware used in the project in accordance with requirements prescribed by the NRC. The WVDP was initiated to allow DOE to carry out its responsibilities under the WVDP Act. This plan focuses on the fifth activity – decontamination and decommissioning.

Decommissioning Requirements

The NRC has prescribed the requirements in its License Termination Rule in Code of Federal Regulations 10 CFR Part 20, Subpart E to WVDP facilities and as the decommissioning goal for the entire NRC-licensed site.

The Phased Decision-Making Approach

The environmental impacts of the approach described in this plan are being analyzed in the *Environmental Impact Statement on Decommissioning and/or Long-Term Stewardship of the WVDP and Western New York Nuclear Service Center*, hereafter referred to as the Decommissioning EIS. Decommissioning will not begin until the Record of Decision is issued. The decommissioning is to be accomplished in two phases, with Phase 1 expected to begin in 2011. This phased decision-making approach is the preferred alternative in the Decommissioning EIS. (If changes are made to the Decommissioning EIS during the course of the National Environmental Policy Act process that affect this approach, such as changes to the preferred alternative, the approach will be revised as necessary to reflect those changes.)

Phase 1 of the decommissioning will entail removal of the Main Plant Process Building, the Low-Level Waste Treatment Facility, and certain other facilities within the WVDP area, which is known as the project premises. These activities will clean up much of the project premises to standards that will not prejudice decisions on the approach for Phase 2, which will complete the decommissioning. The Phase 2 decision could be made within 10 years of the Record of Decision and Findings Statement documenting the Phase 1 decisions. Phase 2 actions will complete the decommissioning or long-term management decision-making following the approach determined most appropriate during the additional Phase 1 evaluations for each remaining facility.

The Phase 1 Decommissioning Scope

The scope of this plan is limited to certain facilities on the north plateau area of the project premises and to removal of one major facility on the south plateau, the Radwaste Treatment System Drum Cell, a former radioactive waste storage area. This plan also provides for potential remediation of surface soil in selected areas of the project premises.

This plan does not address decommissioning of the underground waste storage tanks, the region of subsurface environmental contamination known as non-source area of the north plateau groundwater plume, or the two inactive radioactive waste disposal facilities on the south plateau, the NRC-Licensed Disposal Area and the State-Licensed Disposal Area, all of which will be considered in Phase 2 of the decommissioning.

Site Owner and Site Location

Although DOE will accomplish the decommissioning for the portion of the site used by the WVDP, the entire site remains under the ownership of the New York State Energy Research and Development Authority (NYSERDA), who is the licensee. NYSERDA's main office is in Albany at the following address:

NYSERDA
17 Columbia Circle
Albany, New York 12203-6399

NYSERDA also maintains an office near the site with the following mailing address:

10282 Rock Springs Road
West Valley, New York 14171-9799

The site, which is known as the Western New York Nuclear Service Center (the Center), is located at the latter address in a rural area in Cattaraugus and Erie counties approximately 30 miles south of the city of Buffalo as shown in Figure ES-1.

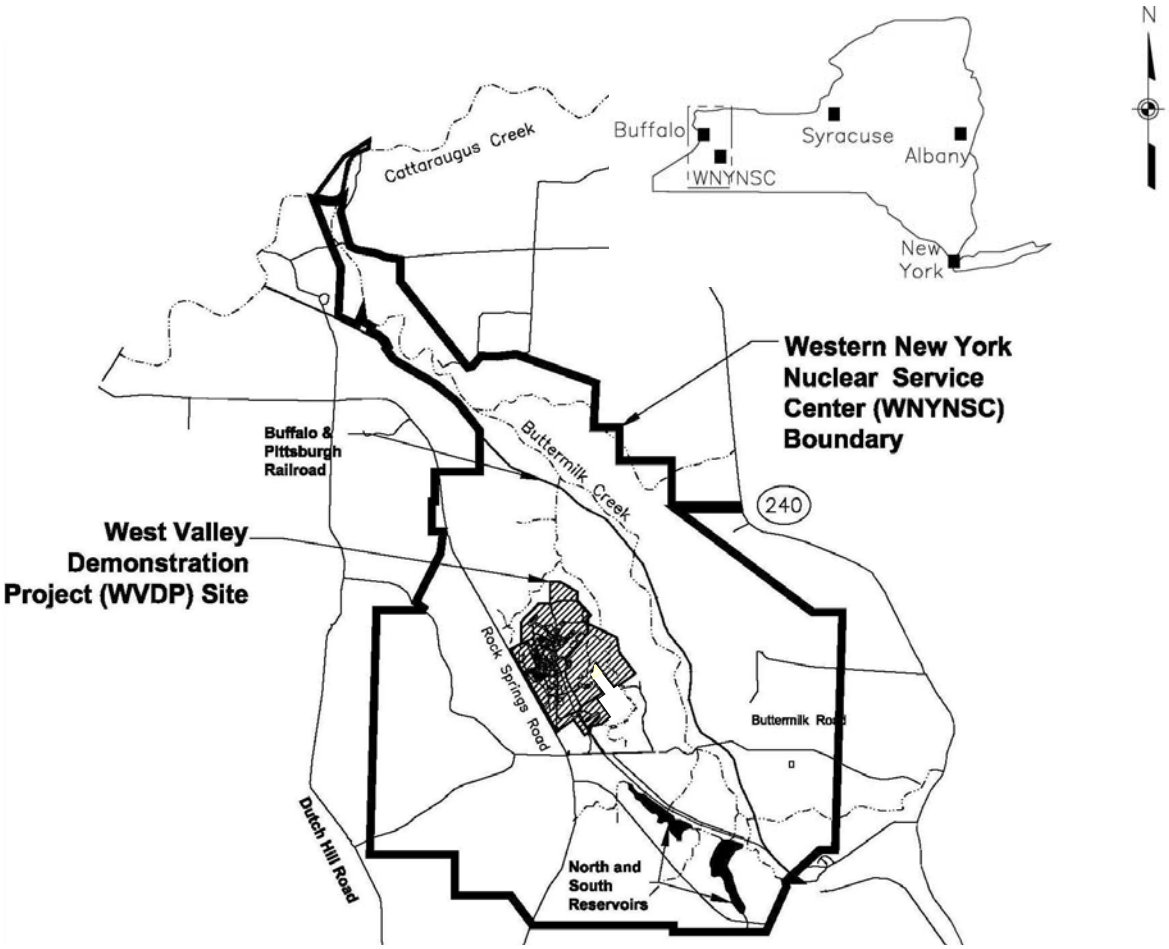

Figure ES-1. Location of the Western New York Nuclear Service Center

Description of the Site and Immediate Environs

The Center property comprises approximately 3,345 acres ranging in elevation from 1,000 to 1,800 feet above mean sea level. The area of the WVDP ranges from 1,300 to 1,445 feet above sea level. The undeveloped part of the Center remains a mixture of forest, wetlands, and abandoned farmland.

The following description of the site and its environs begins with the former irradiated nuclear fuel reprocessing plant and the WVDP facilities and then addresses the remainder of the Center property, known as the retained premises, and the surrounding area. The project premises are shown in Figures ES-1 and ES-2. Note that residual radioactivity associated with the facilities is described later in this summary under the heading "Nature and Extent of Contamination at the Site."

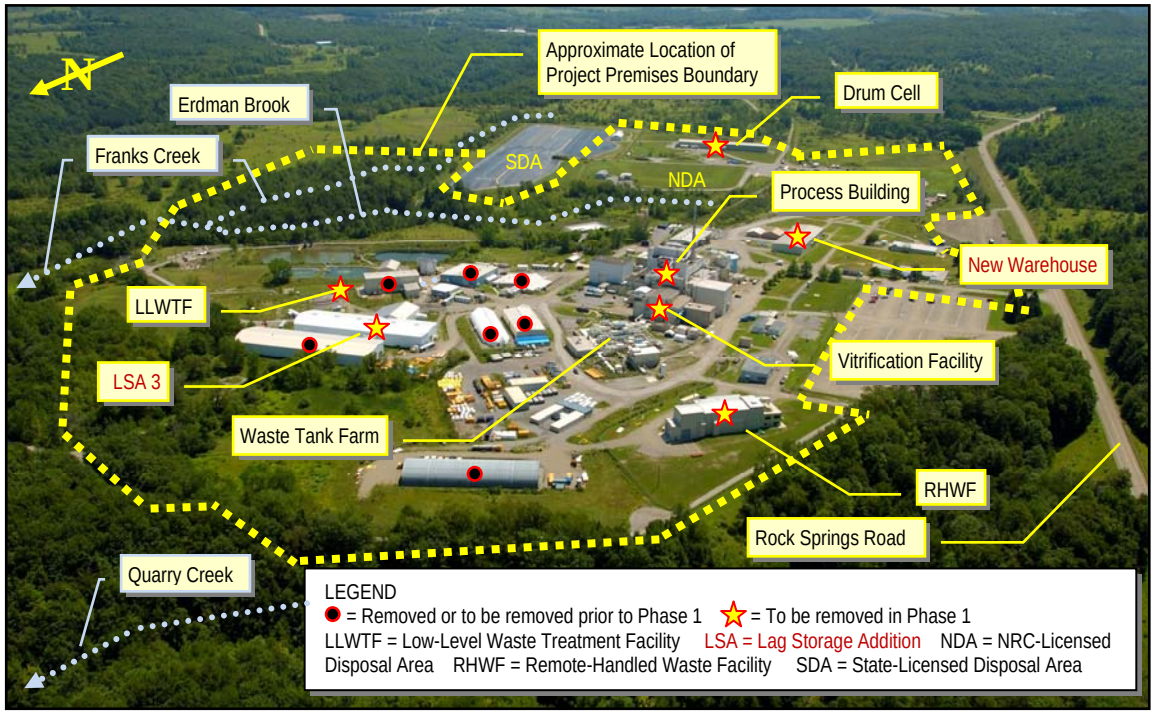

Figure ES-2. The Former Nuclear Fuel Reprocessing Plant and the WVDP in 2006

The Project Premises. At the approximate middle of the Center property lies the former nuclear fuel reprocessing plant operated by Nuclear Fuel Services, Inc. from 1966 through 1972. In 1982, control of a 156.4-acre parcel of land that included this facility and the NRC-Licensed Disposal Area was transferred to DOE for accomplishment of the WVDP[1].

Figure ES-2 shows part of the Center and the project premises as they appeared in 2006. On the right side of the photograph in Figure ES-2, one can see the Vitrification

[1] Control of two additional small parcels of land was transferred to DOE in 1986, bringing the total to approximately 167 acres. One parcel is located in the area of the Radwaste Treatment System Drum Cell. The other is located on the retained premises, which is that portion of the 3,345 acres outside of the initial 156.4 acres for which control but not ownership was transferred to DOE for accomplishment of the WVDP. The parcel on the retained premises is not within the scope of Phase 1 decommissioning activities.

Facility and the Process Building standing just behind the Waste Tank Farm where the underground waste tanks are located. Dotted lines delineate the approximate location of the perimeter of the project premises and the two streams on the project premises.

At the top of Figure ES-2 are the two shallow-land disposal sites for radioactive waste on the Center, the NRC-Licensed Disposal Area and the State-Licensed Disposal Area. The State-Licensed Disposal Area, which is licensed and permitted by the State and controlled by NYSERDA, lies outside of the project premises.

The approximate locations of the courses of the three named streams in the vicinity – Erdman Brook, Franks Creek, and Quarry Creek – are indicated in Figure ES-2. Erdman Brook divides the project premises into two areas known as the north plateau and the south plateau, with the Process Building standing on the north plateau.

When the Phase 1 decommissioning activities begin, the project premises will be in a condition known as the interim end state. The interim end state will be the condition of the project premises at the conclusion of the waste reduction and material removal campaign currently underway. As part of this work, DOE is partially decontaminating certain facilities and removing other unneeded ancillary buildings. Several buildings shown in Figure ES-2 have been removed since the photograph was taken. These and others to be removed in establishing the interim end state are identified in the figure, along with key structures to be removed during Phase 1 of the decommissioning.

Part of the site has been divided into 12 waste management areas for remediation purposes. Nine of the waste management areas are located on the project premises and one (Waste Management Area 12) is partially within the project premises, as shown in Figure ES-3. The facilities of interest are addressed below as they fall within a particular waste management area.

Waste Management Area 1, the Process Building and Vitrification Facility Area. The multi-story Process Building structure is approximately 130 feet by 270 feet in area and rises approximately 79 feet above ground at its highest point (not including the main stack). Most of the structure is reinforced concrete. Parts of the building lie as much as 45 feet below ground.

Within the Process Building are a number of shielded cells where disassembly and chemical reprocessing of nuclear fuel took place. Various rooms housed supporting activities. Aisles provided equipment for remote operations in the shielded cells and access to various plant areas.

On the east side of the building stands the Fuel Receiving and Storage Area. This steel-framed, steel-sheathed structure contains two fuel pools. The floor of the deeper pool lies 45 feet below grade at its lowest point.

The Vitrification Facility, which was constructed by the WVDP, is attached to the north side of the Process Building. The Vitrification Facility is a structural steel frame and sheet metal building housing the reinforced concrete Vitrification Cell, operating aisles, and a control room. It is approximately 91 feet wide and 150 feet long with the peak of the roof standing approximately 50 feet high. The pit in the Vitrification Cell extends 14 feet below grade.

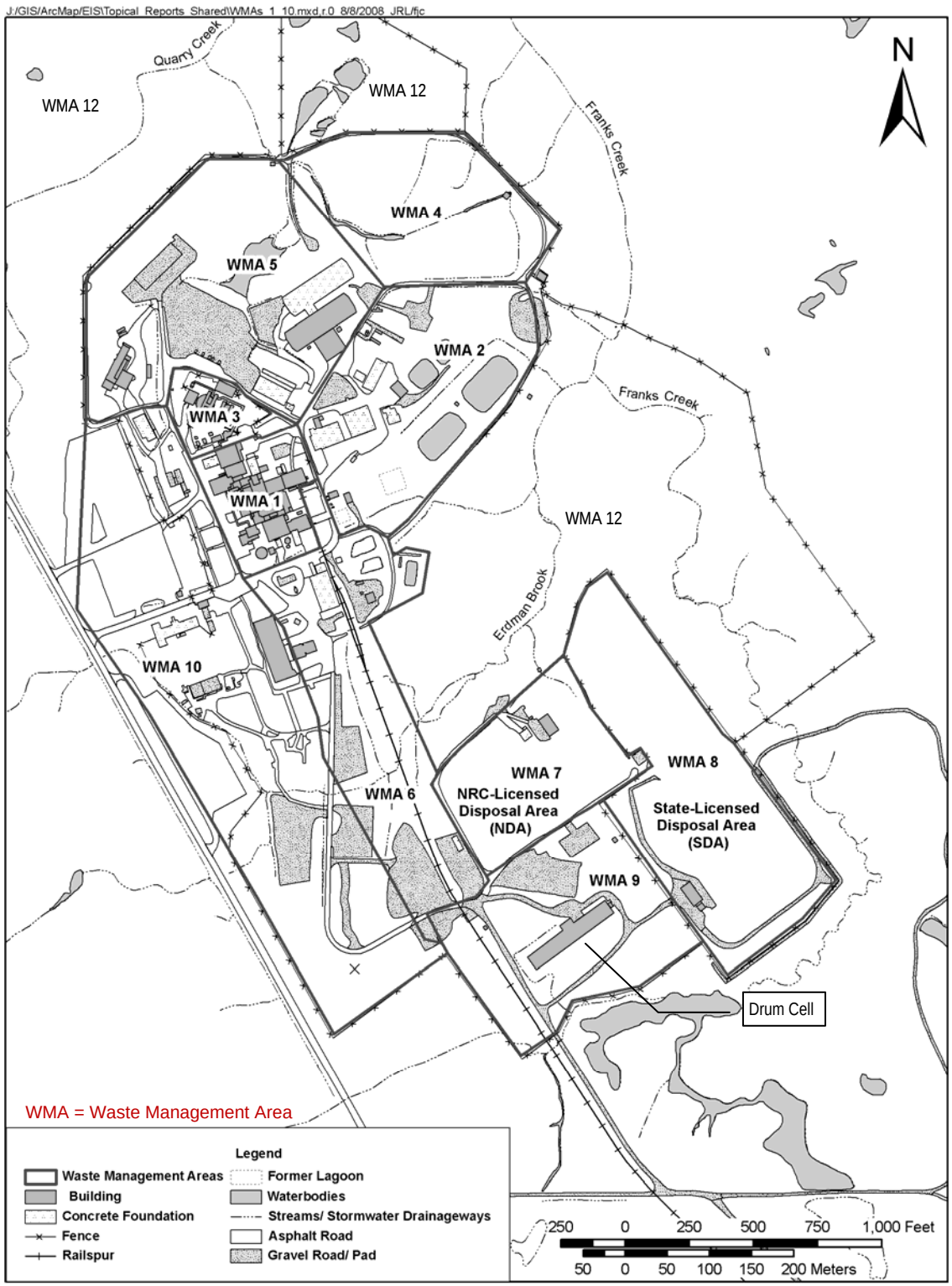

Figure ES-3. Waste Management Areas 1-10. (Part of WMA 12 is also shown. The State-Licensed Disposal Area in WMA 8 is not within the project premises or the scope of this plan. WMA 11 is entirely outside of the project premises.)

The steel-framed, steel-sheathed Load-In/Load-Out Facility connects to the west side of the Process Building as does the concrete block Plant Office Building. The 60-foot tall concrete and steel frame 01-14 Building stands at the southwest corner of the Process Building.

On the south side is the concrete-block Utility Room, with an addition known as the Utility Room Expansion, and the Laundry, which will be removed before decommissioning begins. The Fire Pump House and a large water storage tank stand south of the Process Building and an electrical substation is located on the east side.

All of the Waste Management Area 1 facilities are within the scope of this plan.

Waste Management Area 2, the Low-Level Waste Treatment Facility. This facility, located east of the Process Building, includes five lagoons used to manage radioactive wastewater, including Lagoon 1, which was removed from service in 1984. It also includes the LLW2 Building that contains liquid waste treatment equipment, two in-ground concrete interceptor tanks, the small underground concrete Neutralization Pit, and underground pipelines connecting these facilities. All of these facilities are within the scope of this plan, along with several concrete slabs, the Maintenance Shop leach field, and the inactive Solvent Dike.

Waste Management Area 3, the Waste Tank Farm Area. Located just north of the Vitrification Facility, this area contains two 750,000-gallon carbon steel underground waste tanks, designated Tanks 8D-1 and 8D-2, and two 15,000-gallon stainless steel underground waste tanks, designated 8D-3 and 8D-4. These tanks are housed in concrete vaults, with Tanks 8D-3 and 8D-4 sharing a common vault. Only Tanks 8D-2 and 8D-4 were used to store HLW during reprocessing operations; Tank 8D-1 was subsequently exposed to HLW during the WVDP. A tank and vault drying system will be used to promote evaporation of the remaining liquid in the tanks, all of which are expected to be completely dry by approximately 2015.

Also in this area are the Supernatant Treatment System Support Building and the Permanent Ventilation System Building, both built by the WVDP, several smaller structures, and the HLW transfer trench that contains piping that was used to transfer waste to the Vitrification Facility.

The following facilities in Waste Management Area 3 are within the scope of this plan: the Equipment Shelter and the associated condensers, the Con-Ed Building, the HLW mobilization and transfer pumps in the underground waste tanks, and the piping and equipment within the HLW transfer trench.

Waste Management Area 4, the Construction and Demolition Debris Landfill Area. This 10 acre area contains the 1.5 acre landfill, which was used to dispose of non-radioactive waste, and is located north of the Low-Level Waste Treatment Facility. No facilities in this area are within the scope of Phase 1 of the decommissioning.

Waste Management Area 5, the Waste Storage Area. This area, which is located west of Waste Management Area 4, will contain two structures when the interim end state is reached, both of which are within the scope of this plan. One is Lag Storage Addition 4, a clear span, steel frame, metal sheathed building with an attached steel frame, metal sheathed shipping depot. The other is the Remote-Handled Waste Facility. This steel sided building contains concrete cells and rooms and is currently being used by the WVDP for processing and packaging high-activity radioactive waste. Several concrete floor slabs and gravel pads in this area are also within plan scope.

Waste Management Area 6, the Central Project Premises. This area is located west of the NRC-Licensed Disposal Area and south of the Process Building. Facilities in this area, all of which are within plan scope, are the Sewage Treatment Plant, the south Waste Tank Farm Test Tower, the equalization basin, the concrete equalization tank, and two demineralizer sludge ponds, along with several asphalt and gravel pads and the concrete Cooling Tower basin.

Waste Management Area 7, the NRC-Licensed Disposal Area. In this area lies the 400-foot by 600-foot radioactive waste burial ground, which is no longer used for radioactive waste disposal. Only remaining concrete and gravel pads in this area are within plan scope.

Waste Management Area 8, the State-Licensed Disposal Area. This radioactive waste disposal area covers approximately 15 acres. It is no longer used for radioactive waste disposal and is not within the scope of the Phase 1 decommissioning activities.

Waste Management Area 9, the Radwaste Treatment System Drum Cell Area. This area, which is located on the south plateau, contains one building, the Drum Cell, a former radioactive waste storage area identified in Figure ES-3. The Drum Cell has a concrete block foundation and concrete shield walls and is enclosed by a pre-engineered metal building 375 feet long, 60 feet wide, and 26 feet high. It is within the scope of this plan, as are several asphalt, concrete, and gravel pads.

Waste Management Area 10, the Support and Services Area. The remaining concrete slabs and gravel pads in this area are within the scope of this plan, as is the New Warehouse, which is located south of the Process Building. This area borders Rock Springs Road.

Waste Management Area 11, the Bulk Storage Warehouse and Hydrofracture Test Well Area. This area is located on the retained premises south and east of the project premises. There are no facilities in this area within the scope of this plan.

Waste Management Area 12, the Balance of the Site. Only the small portion of this area within the project premises is within plan scope and that only for characterization of soil and streambed sediment and possible remediation of surface soil.

Underground Piping and Equipment. Fifty-seven lines or portions of lines beneath the Process Building carried radioactive liquid, along with other lines near the Process Building

and at the Low-Level Waste Treatment Facility. Three underground stainless steel wastewater tanks near the Process Building contain radioactivity. The three wastewater tanks are within the scope of this plan, as are the underground lines within Waste Management Area 1 and some of the underground lines within Waste Management Area 2.

Site Geomorphology. Streams in the area are at a relatively young stage of development and are characterized by steep profiles, V-shaped cross sections, and little or no flood plains. Erosion within the drainage basin has been dominated by slump block formation along the stream valley walls. Gullies tend to form along the stream banks during thaws and after heavy rain.

Surface Hydrology. The WVDP watershed is drained by Quarry Creek, Franks Creek, and Erdman Brook. Most surface water runoff from the project premises funnels into a single stream channel at the confluence of Franks Creek and Erdman Brook located just inside the perimeter of the project premises east of the lagoons as shown in Figure ES-3.

These waters flow into Buttermilk Creek, which runs through the retained premises east and north of the project premises. Buttermilk Creek enters Cattaraugus Creek at the north end of the Center; Cattaraugus Creek eventually flows into Lake Erie. Figure ES-1 shows both creeks.

Subsurface Conditions. Underlying the north plateau and the south plateau is more than 500 feet of Pleistocene-age glacial tills. From the surface downward, the following layers are encountered:

- The surficial sand and gravel unit – with an average composition of 55 percent gravel, 20 percent sand, and 25 percent clay – with thickness ranging from 41 feet near the Process Building to a few feet near the northern, eastern, and southern margins of the north plateau. This unit is not present on the south plateau.
- The Lavery till – a silty-clay glacial till that contains lenses of sand, silt, and clay-silt laminations, with an average composition of 50 percent clay, 30 percent silt, 10 percent sand, and 10 percent gravel – with thickness ranging from a few feet at its western margin to more than 130 feet near Buttermilk Creek. On the south plateau, the upper three to 16 feet is weathered, with fractures and root tubes, and is known as the weathered Lavery till. Below the north plateau and the weathered Lavery till on the south plateau, the unit is referred to as the unweathered Lavery till.
- The Lavery till-sand unit – a lenticular-shaped silty, sandy layer – located on the north plateau immediately south of the Process Building. It is up to seven feet thick and lies within the upper 20 feet of the unweathered Lavery till.
- The Kent recessional sequence – with both lacustrine and kame delta deposits – underlies the Lavery till on both the north and south plateaus. It is 30 to 60 feet thick in the WVDP area.

- Shale bedrock underlies the Lavery till and other geological units on both the north and south plateaus.

Groundwater Hydrology. The depth of groundwater in the sand and gravel unit on the north plateau ranges from the surface to 16 feet below the surface. The groundwater flows generally northeastward toward Franks Creek. Near the northwestern margin of the sand and gravel until, flow is toward Quarry Creek and, at the southeastern margin, toward Erdman Brook. Groundwater seeps to the surface in places along stream banks and the edges of the north plateau.

The Surrounding Area. The nearest incorporated village is Springville, 3.5 miles to the north of the WVDP. The hamlet of West Valley lies 3.4 miles to the southeast. The communities of Riceville and Ashford Hollow also lie within a five-mile radius of the site. The closest major highway is U.S. Route 219, located 2.6 miles to the west.

Population Distribution. A 2002 demographic survey showed 1,056 people living within a 3.1-mile radius of the WVDP. The nearest residence was 0.76 miles away. In 2008, the U.S. Census Bureau estimated that 79,699 people lived in Cattaraugus County.

Summary of Licensed Activities

Provisional Operating License Number CSF-1 was issued on April 19, 1966 by the U.S. Atomic Energy Commission to Nuclear Fuel Services and the New York State Atomic and Space Development Authority to operate a spent fuel reprocessing and radioactive waste disposal facility at the Center. This Part 50 license provided possession limits for nuclear fuel of 21,000 kilograms (about 46,000 pounds) of U-235, 3,200 kilograms (about 7,055 pounds) of U-233, and 4,000 kilograms (about 8,800 pounds) of plutonium. Possession limits for unirradiated source material were 50,000 pounds of natural uranium, 100,000 pounds of uranium depleted in U-235, and 50,000 pounds of thorium. The license specified typical limits for radioactivity used for standards, measurements, and calibration purposes.

From 1966 to 1972, Nuclear Fuel Services reprocessed under this license more than 600 metric tons (600,000 kilograms or about 1,320,000 pounds) of spent nuclear fuel and generated approximately 600,000 gallons of liquid HLW as a result. Irradiated nuclear fuel reprocessing operations ended in 1972. In 1976, Nuclear Fuel Services informed New York State that it intended to withdraw from the reprocessing business and not renew the lease for the property when the initial term expired at the end of 1980. In February of 1982, Nuclear Fuel Services transferred possession of the reprocessing facilities to DOE so DOE could carry out its responsibilities under the WVDP Act.[2]

Figure ES-4 shows the plant at the beginning of the WVDP.

[2] While Nuclear Fuel Services transferred physical possession of the reprocessing facilities to DOE, NYSERDA granted exclusive use and possession of the project premises to DOE to carry out the WVDP under the provisions of the WVDP Act.

Figure ES-4. The Plant During the Early Years (The lagoons appear in the foreground. The Process Building can be seen in the background.)

Fuel received for reprocessing came from the N-Reactor at the Atomic Energy Commission's Hanford site and from nine commercial reactors. Reprocessing took place in the Process Building.

The first step in reprocessing entailed disassembling and sectioning the fuel. The pieces of fuel were dissolved in concentrated nitric acid. The resulting aqueous stream underwent a five-stage solvent extraction process. After further purification, the uranium and plutonium product solutions were concentrated, packaged, and eventually shipped off site. The process utilized is known as the PUREX process for plutonium uranium refining by extraction.

Aqueous waste generated was reduced in volume by evaporation, neutralized, and stored in 750,000-gallon Tank 8D-2. The neutralization process caused most fission products (not including cesium) to precipitate out and form sludge on the tank bottom. The remaining radionuclides were retained in the supernatant liquid.

Fuel received included thorium-enriched uranium, which was reprocessed using the THOREX (thorium reduction extraction) process. The resulting 12,000 gallons of liquid HLW, which was not neutralized to avoid precipitating out the thorium, were stored in 15,000-gallon Tank 8D-4.

The amounts of radioactivity in Tanks 8D-2 and 8D-4 at the completion of reprocessing, with fission and activation products decay-corrected to July 1987, were:

- Tank 8D-2 supernatant – approximately 14,000,000 curies, primarily from Cs-137, and Ba-137m;
- Tank 8D-2 sludge – approximately 15,000,000 curies, primarily from Sr-90 and Y-90; and

- Tank 8D-4 – approximately 2,000,000 curies, primarily from Sr-90, Y-90, Cs-137, and Ba-137m.

During initial plant operations, low-level wastewater from the Process Building was piped underground to an interceptor tank and then held in the lagoon system before being discharged into Erdman Brook. In 1971, a new Low-Level Waste Treatment Facility (the O2 Building) entered service. Since that time, wastewater has been treated prior to discharge from the lagoon system, which can be seen in Figure ES-4.

During the 1970s, after the termination of irradiated fuel reprocessing, Nuclear Fuel Services decontaminated many of the Process Building cells and flushed many of the systems. On February 18, 1982, the facility was formally transferred to DOE for performance of the WVDP.

During plant operations, 30 amendments were made to License CSF-1, most related to technical specifications. License amendment 31 was issued in September 1981 to transfer the project premises to DOE in accordance with the WVDP Act. Amendment 32 was issued in February 1982 to terminate the responsibility and authority of Nuclear Fuel Services. No further amendments have been made, with the license technical specifications effectively being held in abeyance until completion of the WVDP.

Summary of WVDP Activities

To solidify the HLW, DOE built the Integrated Radwaste Treatment System and the Vitrification Facility.

The Integrated Radwaste Treatment System included (1) the Supernatant Treatment System that decontaminated HLW tank solutions by ion exchange, (2) the Liquid Waste Treatment System to concentrate Supernatant Treatment System liquid waste by evaporation, (3) the Cement Solidification System to solidify Liquid Waste Treatment System concentrates, and (4) the Drum Cell to store cement solidified waste. By 1995, the Integrated Radwaste Treatment System had produced 19,877 71-gallon drums of solidified waste, which were stored in the Drum Cell. These drums were later shipped offsite for disposal.

Tanks 8D-1 and 8D-2 were modified and used to support the HLW solidification process. Supernatant Treatment System ion exchange columns were installed inside Tank 8D-1.

The Vitrification Facility was used to stabilize HLW sludge, loaded ion exchange resin (zeolite), and acidic THOREX waste from Tank 8D-4 in a borosilicate glass contained in stainless steel canisters. A number of modifications were made to the former reprocessing facilities to accommodate the vitrification system and the related systems. Among these changes were removing equipment from the Chemical Process Cell, decontaminating it, and installing storage racks for the HLW canisters.

Solidification of the HLW was completed in September 2002. A total of 275 canisters of vitrified HLW were produced and placed in interim storage in the former Chemical Process Cell, now known as the HLW Interim Storage Facility. DOE has deactivated portions of the Process Building and several other site facilities. In 2009 deactivation work, which includes removal of

unneeded ancillary facilities, remained underway. Additional deactivation work to be completed before activities under this plan begin will result in conditions known as the interim end state.

Before much of the work to remove the Process Building is undertaken, the 275 vitrified HLW canisters will be relocated to a new Canister Interim Storage Facility to be established on the south plateau. The canisters will remain there until a decision is made and implemented with regard to their final disposal.

Nature and Extent of Contamination at the Site

Due to problems experienced during reprocessing operations, contamination of the site is extensive. Radionuclides include the fission products Sr-90 and Cs-137, along with uranium radionuclides and actinides such as Pu-238, Pu-239, Pu-241, and Am-241. Substantial contamination levels exist in many of the cells and rooms of the Process Building and some contamination is present inside other facilities. Subsurface soil and groundwater contamination is widespread. Figure ES-5 shows key areas of interest that are discussed below. This figure identifies major sources to be removed during Phase 1 of the decommissioning and others to be considered in Phase 2.

Figure ES-5 shows two major areas of environmental contamination at the site: the cesium prong and the north plateau groundwater plume. The cesium prong is a large area northwest of the Process Building where surface soil became contaminated with Cs-137 as a result of two ventilation system filter failures in the Process Building in 1968[3]. The north plateau groundwater plume originated that same year when releases of radioactive acid leaked into soil under the southwest corner of the Process Building. Since that time, mobile radionuclides such as Sr-90 have gradually migrated more than 40 feet under the building and approximately one-quarter mile northeast of the building.

[3] Note that the cesium prong area delineated on the figure provides only an approximation of the region of surface soil impacted by the ventilation system filter failures. Data to determine the extent of the resulting soil contamination on the project premises are not available. Such data would be collected early in Phase 1 of the decommissioning to establish the extent of residual surface and near surface soil contamination in the impacted area within the project premises. Note that other Process Building main stack releases that occurred in 1968 may have contributed to the cesium prong.

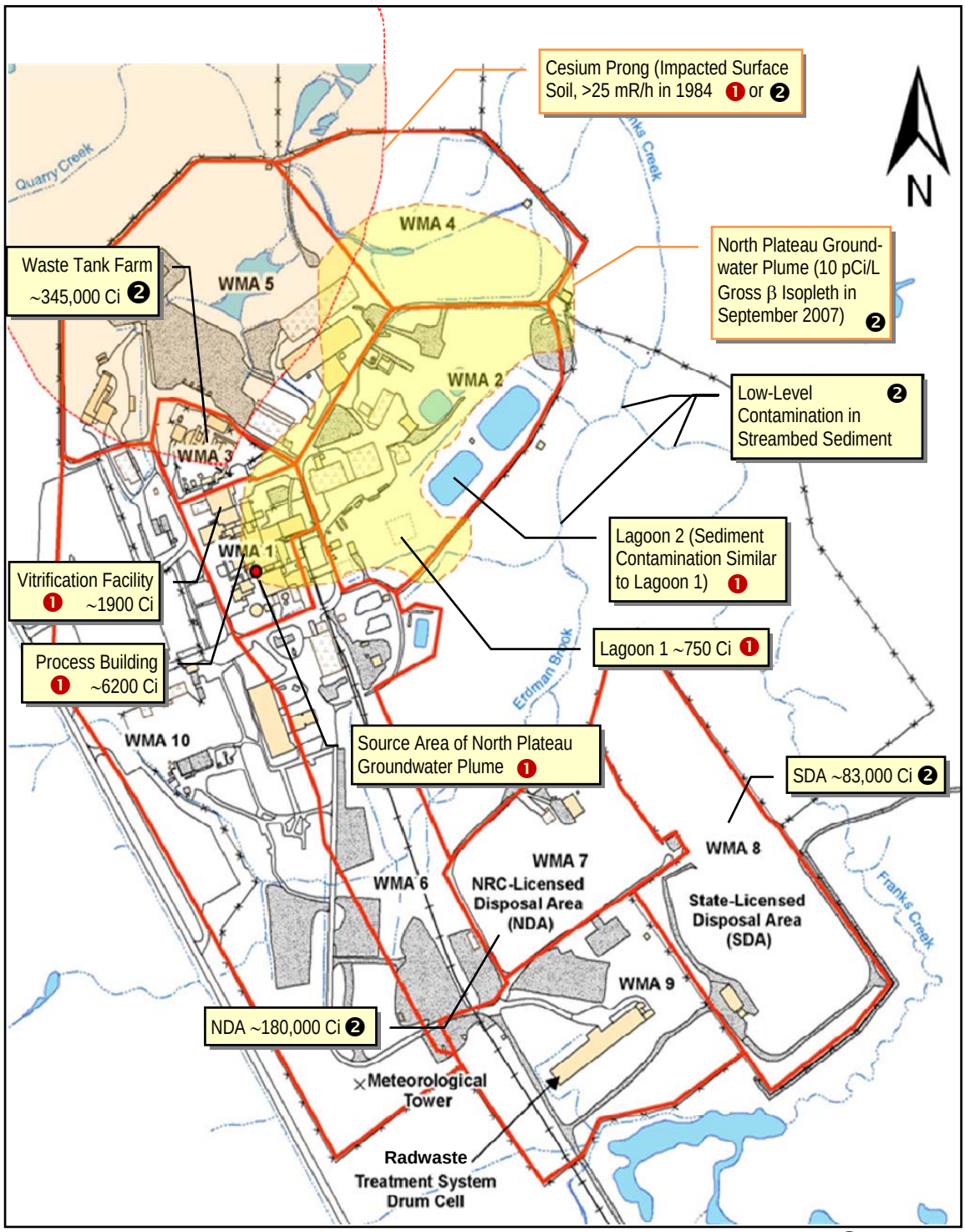

Figure ES-5. Important Sources of Contamination on the Project Premises (The ❶ symbol denotes major sources to be removed during Phase 1 of the decommissioning while the ❷ symbol denotes major sources to be considered in Phase 2. The estimates for total residual radioactivity are for 2011.)

The following summary of radioactive contamination addresses the more significant contaminated facilities and areas and is organized by waste management area. DOE will perform additional characterization before Phase 1 begins or early during Phase 1. The estimates of residual radioactivity are as of 2011, when Phase 1 is anticipated to start.

Waste Management Area 1, Process Building and Vitrification Facility Area.

- The total residual radioactivity in the Process Building is expected to be approximately 6,200 curies, with Cs-137, Sr-90, and Pu-241 being the predominant radionuclides.[4]
- The total residual radioactivity in the Vitrification Facility is expected to be approximately 1,900 curies, with Cs-137 and Sr-90 being the predominant radionuclides.
- The total residual radioactivity inside the vitrification off-gas line that runs within a concrete trench from the Vitrification Facility to the 01-14 Building is expected to be approximately 340 curies.
- Underground wastewater Tank 7D-13 is expected to contain up to 84 curies of residual radioactivity.
- Some of the underground lines in the area are expected to contain significant residual radioactivity, with one HLW transfer line expected to contain approximately 0.4 curies per linear foot.
- The subsurface soil and groundwater under the Process Building is expected to contain significant levels of residual contamination, from one or more releases of radioactivity that occurred during reprocessing that resulted in the impacted area known as the north plateau groundwater plume.

Waste Management Area 2, Low-Level Waste Treatment Facility

- Lagoon 1, which has been deactivated, is expected to contain approximately 750 curies, predominately Cs-137 and Pu-241, with most of this amount associated with sediment.
- The sediment in Lagoon 2, some of which was pumped from Lagoon 1 in 1984, is expected to contain a similar amount of residual radioactivity.
- The other three lagoons are known to contain residual radioactivity in their sediment, with concentrations much lower than concentrations in Lagoons 1 and 2.
- The water in all four active lagoons is expected to contain low levels of radioactivity, with the highest concentrations in Lagoon 2.
- The interceptors and the Neutralization Pit are expected to contain low levels of contamination, with the highest levels in the Old Interceptor.

[4] This estimate does not include radioactivity in the 275 vitrified HLW canisters temporarily stored inside the building, which are estimated to contain an average of approximately 30,000 curies each in 2011.

- Subsurface soil and groundwater in much of this waste management area has been impacted by Sr-90 associated with the north plateau groundwater plume.
- Surface soil near the interceptors contains low levels of contamination, particularly Cs-137.

Waste Management Area 3, the Waste Tank Farm Area

- The four underground waste tanks together are expected to contain approximately 345,000 curies of residual radioactivity.
- The waste mobilization and transfer pumps, which will be removed during Phase 1, are expected to contain significant amounts of residual radioactivity, with gamma radiation levels around 50 R/h.
- Some of the piping and equipment in the HLW transfer trench, which also will be removed during Phase 1, is also expected to be highly radioactive.
- The Con-Ed Building and the Equipment Shelter and condensers, which will be removed during Phase 1, are expected to contain low levels of residual radioactivity, mostly inside equipment.

Waste Management Area 4, Construction and Demolition Debris Landfill Area

- Although the buried waste in the landfill was not radioactive when it was emplaced, some of it is now expected to be contaminated with low levels of Sr-90 from the north plateau groundwater plume.
- Low levels of radioactivity are present in sediment in drainage ditches and in surface soil in this area.

Waste Management Area 5, Waste Storage Area

- The Remote-Handled Waste Facility is expected to have low levels of residual radioactivity.
- The other remaining facility – Lag Storage Addition 4 and the attached Shipping Depot – is expected to have little if any contamination above detection limits.
- Low-level contamination, especially Cs-137 associated with the cesium prong, is expected in surface soil in much of the area.
- Subsurface soil and groundwater in the eastern side of the area is known to have been impacted by the north plateau groundwater plume.

Waste Management Area 6, Central Project Premises. The soil in the two demineralizer sludge ponds is expected to contain low levels of radioactive contamination, as is the Cooling Tower basin, the remaining part of the Cooling Tower, which is being removed in establishing the interim end state.

Waste Management Area 7, the NRC-Licensed Disposal Area. The buried radioactive waste in this inactive waste disposal facility is expected to contain approximately 180,000 curies.

Waste Management Area 8, the State-Licensed Disposal Area. The buried radioactive waste in this inactive waste disposal facility is expected to contain approximately 83,000 curies. The State-Licensed Disposal Area is not within the scope of this plan, as noted previously.

Waste Management Area 9, the Radwaste Treatment System Drum Cell Area. The Drum Cell is expected to have little if any radioactive contamination above detection limits.

Waste Management Area 10, the Support and Services Area. No facilities in this area are expected to have been impacted by radioactivity.

Waste Management Area 12, Balance of the Site. Only the small part of this waste management area within the project premises security fence is within the scope of this plan. The sediment in Erdman Brook and the portion of Franks Creek within the fenced area is expected to contain low levels of contamination, especially Cs-137.

The Decommissioning Objective

The overall objective of Phase 1 of the decommissioning is to remove certain facilities and remediate portions of the project premises to criteria for unrestricted release in the License Termination Rule in 10 CFR 20.1402, thereby fulfilling part of DOE's responsibilities under the WVDP Act for decontaminating and decommissioning the tanks, facilities, materials, and hardware used in the WVDP in accordance with requirements prescribed by the NRC. The Phase 1 decommissioning activities are intended to reduce short-term and long-term health and safety risks in a manner that will support any approach that could be selected for Phase 2 of the decommissioning, which will complete decontamination and decommissioning of the Center.

Consistent with the overall objective of Phase 1, surface soil in certain areas of the project premises may be remediated as necessary to ensure that residual radioactivity concentrations satisfy the cleanup goals discussed below. These areas will be identified after completion of the characterization program. They will undergo Phase 1 final status surveys to ensure that the cleanup goals have been achieved, along with any independent confirmatory surveys to be performed by NRC or its contractor.

The objective of the Phase 1 decommissioning is not license termination of any portion of the Center, which would be beyond DOE's purview since NYSERDA is the NRC licensee. However, the Phase 1 decommissioning activities are designed to support license termination for remediated portions of the project premises if license termination for all or part of the Center were to become an objective for Phase 2 of the decommissioning.

Decommissioning Controls

The decommissioning will be accomplished by a contractor employed by DOE. DOE will provide appropriate oversight. The decommissioning organization will be structured to ensure that certain functions – radiological controls, health and safety, and quality assurance – are independent of the organizational elements performing the work.

The decommissioning will be accomplished in accordance with applicable DOE and NRC requirements, and in accordance with applicable requirements of other federal agencies and the

State of New York. However, given DOE's authority under the WVDP Act and, and considering that the Department is not the NRC licensee for the site, certain aspects of the decommissioning will be controlled in accordance with DOE procedures, i.e., DOE regulations, directives, and technical standards. These aspects are:

- Project management and organization,
- Radiological safety controls and monitoring of workers,
- Environmental monitoring and control, and
- Radioactive waste management.

DCGLs and Cleanup Goals

To support Phase 1 decommissioning activities and later decisions for Phase 2 of the decommissioning, derived concentration guideline levels (DCGLs) were developed for surface soil, subsurface soil in the deep WMA 1 and WMA 2 excavations, and streambed sediment using the RESRAD RESidual RADioactivity computer Code, Version 6.4 and other models. To ensure that the conceptual models initially used in DCGL development were sufficiently conservative, a number of alternative conceptual models were also analyzed. These included evaluation of potential doses to offsite receptors from radioactivity displaced by erosion.

One alternative conceptual model for subsurface soil DCGL development involved consideration of continuing releases of residual radioactivity from the bottom of the remediated deep excavations, as well as radioactivity brought to the surface during installation of a cistern type well. This multi-source conceptual model proved to be more limiting than other conceptual models for most radionuclides of interest.

Sensitivity analyses were performed to identify model input parameters with the most influence on dose. In addition, a probabilistic uncertainty analysis was performed using RESRAD Version 6.4 to help ensure that key model input parameters were sufficiently conservative.

Table ES-1 provides the calculated DCGLs for 18 radionuclides of interest for surface soil, subsurface soil, and streambed sediment. These DCGLs, which take into account the results of the alternate conceptual model analyses and the probabilistic uncertainty analysis, assure that the dose to the average member of the critical group will not exceed 25 millirem per year when considering the dose contribution from each radionuclide individually.[5]

[5] The DCGLs for Sr-90 and Cs-137 apply to the year 2041 and later, that is, they incorporate a 30-year decay period from 2011. The 30-year decay period was selected for these key radionuclides because of their short half-life. As noted previously, the Phase 2 decision could be made within 10 years of issue of the Record of Decision and Findings Statement documenting the Phase 1 decision. If this approach were to involve unrestricted release of the site, achieving this condition would be expected to take more than 20 years due to the large scope of effort to exhume the underground waste tanks and the NDA. It is therefore highly unlikely that conditions for unrestricted release of the project premises could be established before 2041. If Phase 2 were to involve closing radioactive facilities in place, then institutional controls would remain in place after 2041. DOE will be responsible for maintaining institutional control of the project premises and providing for monitoring and maintenance of the project premises until completion of Phase 2 of the decommissioning.

Table ES-1. $DCGL_W$ Values For 25 Millirem per Year (pCi/g)[1]

Nuclide	Surface Soil	Subsurface Soil	Streambed Sediment
Am-241	2.9E+01	6.3E+03	1.0E+04
C-14	1.6E+01	9.9E+02	1.8E+03
Cm-243	3.5E+01	1.1E+03	3.1E+03
Cm-244	6.5E+01	2.2E+04	3.8E+04
Cs-137[2]	1.5E+01	3.0E+02	1.0E+03
I-129	3.3E-01	7.5E+00	7.9E+02
Np-237	2.6E-01	1.0E+00	3.2E+02
Pu-238	4.0E+01	1.3E+04	1.2E+04
Pu-239	2.5E+01	3.1E+03	1.2E+04
Pu-240	2.6E+01	3.4E+03	1.2E+04
Pu-241	1.2E+03	2.4E+05	3.4E+05
Sr-90[2]	4.1E+00	2.8E+02	4.7E+03
Tc-99	2.1E+01	5.9E+02	6.6E+05
U-232	1.5E+00	7.4E+01	2.2E+02
U-233	8.3E+00	1.9E+02	2.2E+04
U-234	8.4E+00	2.0E+02	2.2E+04
U-235	3.5E+00	2.1E+02	2.3E+03
U-238	9.8E+00	2.1E+02	8.2E+03

NOTES: (1) The $DCGL_W$ is the DCGL applicable to the average concentration over a survey unit.
(2) DCGLs for Sr-90 and Cs-137 apply to the year 2041 and later.

Phase 1 decommissioning activities will involve removal of subsurface soil in the bottom and sides of the large excavation for removal of the Waste Management Area 1 facilities and the large excavation in Waste Management Area 2 for removal of Lagoon 1, Lagoon 2, Lagoon 3, the interceptors, and the Neutralization Pit. Phase 1 decommissioning activities may include remediation of surface soil in selected areas, as discussed previously.

The DCGLs in Table ES-1 were developed considering the separate areas of interest and the critical group for exposure to radioactivity in surface soil and subsurface soil is different from the critical group for exposure to radioactivity in streambed sediment. In consideration of this situation, and because only limited portions of the project premises will be remediated during Phase 1 of the decommissioning, two assessments were performed that involved apportioning doses from different portions of the remediated project premises to ensure that DCGLs used for remediation in Phase 1 of the decommissioning will not limit Phase 2 options.

Considering the results of these assessments, and the results of the ALARA analysis discussed below, DOE has established the following cleanup goals, which are lower than the

DCGLs, to ensure that remediation accomplished during Phase 1 of the decommissioning will support any approach that might be used during Phase 2 of the decommissioning.

Table ES-2. Cleanup Goals to be Used in Remediation in pCi/g[1]

Nuclide	Surface Soil[3]	Subsurface Soil[4]	Streambed Sediment
Am-241	2.6E+01	2.8E+03	1.0E+03
C-14	1.5E+01	4.5E+02	1.8E+02
Cm-243	3.1E+01	5.0E+02	3.1E+02
Cm-244	5.8E+01	9.9E+03	3.8E+03
Cs-137[2]	1.4E+01	1.4E+02	1.0E+02
I-129	2.9E-01	3.4E+00	7.9E+01
Np-237	2.3E-01	4.5E-01	3.2E+01
Pu-238	3.6E+01	5.9E+03	1.2E+03
Pu-239	2.3E+01	1.4E+03	1.2E+03
Pu-240	2.4E+01	1.5E+03	1.2E+03
Pu-241	1.0E+03	1.1E+05	3.4E+04
Sr-90[2]	3.7E+00	1.3E+02	4.7E+02
Tc-99	1.9E+01	2.7E+02	6.6E+04
U-232	1.4E+00	3.3E+01	2.2E+01
U-233	7.5E+00	8.6E+01	2.2E+03
U-234	7.6E+00	9.0E+01	2.2E+03
U-235	3.1E+00	9.5E+01	2.3E+02
U-238	8.9E+00	9.5E+01	8.2E+02

NOTES: (1) These cleanup goals, which, like the $DCGL_W$ values in Table ES-1, apply to the average concentration over a survey unit, are to be used as the criteria for the Phase 1 remediation activities.

(2) Cleanup goals for Sr-90 and Cs-137 apply to the year 2041 and later. That is, they incorporate a 30-year decay period from 2011. The 30-year decay period was selected for these key radionuclides because of their short half-life. License termination actions that may take place in Phase 2 of the decommissioning will not likely be fully implemented before 2041.

(3) The surface soil cleanup goals apply to the upper one meter (3.3 feet) of surface soil.

(4) The subsurface soil cleanup goals apply only to the bottoms of the large WMA 1 and WMA 2 excavations and to the sides of these excavations one meter (3.3 feet) or more below the surface.

Since these cleanup goals were developed for individual radionuclides of interest, a sum-of-fractions approach based on radionuclide distributions in different areas will be used to ensure that potential doses from the remediated areas will be no more than the dose from one of the individual radionuclides at the concentration specified in Table ES-2.

Although the subsurface soil cleanup goals in Table ES-2 form the criteria for residual radioactivity in the two large excavations, remediation plans involve excavation at least one foot into the Lavery till and, in Waste Management Area 2, at least one foot below the sediment in the bottoms of Lagoons 2 and 3. This approach is expected to produce residual radioactivity levels

well below the cleanup goals, based on limited existing data on residual radioactive contamination in the Lavery till. A preliminary, order-of-magnitude dose analysis using these data suggests that potential futures doses from these excavated areas will be approximately eight millirem per year for Waste Management Area 1 and approximately 0.2 millirem per year for Waste Management Area 2.

After additional characterization data become available, the DCGLs and the cleanup goals will be reevaluated using these data and refined as appropriate. After the Phase 1 decommissioning activities have been completed, another dose analysis using Phase 1 final status survey data will be performed to estimate the potential doses from the remediated subsurface areas.

Summary of ALARA Evaluations

DOE has performed a preliminary cost-benefit analysis using NRC methodology to determine whether removal of soil or sediment with radioactivity concentrations below the DCGLs will be consistent with the ALARA principal. These analyses compared the cost of disposal of additional soil or sediment with the reduction in radiation exposure associated with removal of additional soil or sediment below the DCGLs valued at $2000 per person-rem as set forth in NRC guidance. They indicate that removal of soil or sediment with radioactivity concentrations below the DCGLs will not be cost-effective.

DOE will perform another similar analysis when the subsurface soil remediation work is in progress (and when surface soil and streambed sediment remediation is in progress, if that work is done in Phase 1) to confirm the results of the preliminary ALARA evaluation. This second, more-detailed analysis will use updated information and consider other factors such as other societal and socioeconomic considerations and costs related to transportation of additional waste. This second analysis will also consider the impacts of using lower discount rates on the estimated cost of remediation so that intergenerational concerns are taken into account.

Initiation and Completion Dates

Subject to the decision in the Record of Decision for the Decommissioning EIS, expected to be issued in early 2010, DOE will begin Phase 1 of the decommissioning in 2011 and it is expected to last approximately eight to 10 years.

Post-Remediation Activities

The post remediation activities fall into two categories: (1) a monitoring and maintenance program and (2) an institutional control program, both of which focus on the project premises.

The monitoring and maintenance program will continue until Phase 2 of the decommissioning starts, when it will be reevaluated. It will include an environmental monitoring program tailored to conditions that will exist at the conclusion of the Phase 1 decommissioning activities. This program will monitor onsite groundwater, storm water, and air, along with onsite and offsite surface water, sediment, and radiation. Groundwater monitoring will be accomplished using approximately 36 monitoring wells.

The monitoring and maintenance program will also ensure that important facilities and systems serve their intended purposes. Facilities and systems within the scope of this program include:

- The subsurface hydraulic barrier wall and French drain to be installed during Phase 1 on the north and east sides of the excavation for removal of the Waste Management Area 1 facilities,
- The subsurface hydraulic barrier wall to be installed during Phase 1 on the northwest and northeast sides of the excavation for removal of key Waste Management Area 2 facilities,
- The tank and vault drying system for the underground waste tanks that is to be installed before Phase 1 of the decommissioning,
- The dewatering well used to minimize in-leakage into the underground waste tank vaults,
- The hydraulic barrier wall and geomembrane cover for the NRC-Licensed Disposal Area, and
- The security features and monitoring systems installed for the new Canister Interim Storage Facility to be established on the south plateau.

Performance of the hydraulic barrier walls will be assessed with hydraulic monitoring piezometers.

Insofar as institutional controls are concerned, DOE will continue control of the project premises and provide for monitoring and maintenance of the project premises until completion of DOE's Phase 2 decommissioning requirements. Institutional controls will include security fences and signs along the perimeter of the project premises, a full-time security force, provisions for controlled access through designated gateways, and appropriate security measures for the new Canister Interim Storage Facility on the south plateau, which will be established during Phase 1 of the decommissioning. DOE will be responsible for institutional controls for the new Canister Interim Storage Facility until the HLW canisters are shipped offsite.