

**APPENDIX L**  
**REGULATORY COMPLIANCE DISCUSSION**

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## APPENDIX L

### REGULATORY COMPLIANCE DISCUSSION

This appendix discusses compliance with three requirements that would apply to site decommissioning actions:

- Regulations promulgated under the Resource Conservation and Recovery Act (RCRA) of 1976 (42 United States Code 6901 *et seq.*) and the New York State Industrial Hazardous Waste Management Act govern the generation, storage, handling, and disposal of hazardous wastes and the closure of treatment, storage, or disposal systems that handle those wastes. The act was created to ensure that hazardous wastes are managed in a way that protects human health, safety, and the environment. Operation and closure of RCRA-regulated units are performed in accordance with 6 New York Code of Rules and Regulations (NYCRR) Part 373. Corrective actions for Solid Waste Management Units (SWMUs) are performed in accordance with the RCRA Section 3008(h) Administrative Order on Consent.
- The West Valley Demonstration Project (WVDP) decommissioning policy statement/License Termination Rule establishes radiological criteria for decommissioning of WVDP facilities and termination of the U.S. Nuclear Regulatory Commission (NRC) licenses (NRC 2002). The policy statement/License Termination Rule provides for flexibility in establishing the final levels of residual contamination, but, in all cases, requires decontamination to the extent technically and economically feasible.
- The new regulations that the New York State Department of Environmental Conservation (NYSDEC) is proposing to adopt for the cleanup of sites contaminated with radioactive materials (NYSDEC 2008) will be compatible with the NRC's License Termination Rule and will be applied as applicable and whenever NYSDEC requires the cleanup of a site contaminated with radioactive material.

RCRA regulations and the License Termination Rule are discussed more fully in Chapter 5 of this *Final Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship of the West Valley Demonstration Project and Western New York Nuclear Service Center*.

Compliance with these key regulations is discussed in the following sections. The discussion draws on information and analytical results presented in this environmental impact statement (EIS). Actual determinations of compliance or noncompliance are made by the regulatory authorities in response to documents submitted by the regulated entities. The information and assessments presented in this appendix do not constrain the judgments that will be made by regulators in evaluating compliance for the alternative finally selected.

Three decommissioning alternatives are described in Chapter 2 of this EIS: Sitewide Removal, Sitewide Close-In-Place, and Phased Decisionmaking. The Sitewide Removal Alternative will, by definition, meet NYSDEC requirements for clean closure of RCRA-regulated units, NRC requirements for license termination without restriction for the NRC-regulated portion of the site, and NYSDEC cleanup requirements for the State-Licensed Disposal Area (SDA). The actual determination of when removal is adequate for the Sitewide Removal Alternative to meet the various decommissioning requirements would be made through the appropriate NYSDEC and NRC regulatory review processes, as noted in Chapter 1, Section 1.5, of this EIS.

While it is conceptually possible that the Sitewide Close-In-Place Alternative could meet NYSDEC, RCRA, and NRC policy statement/License Termination Rule requirements, it is less clear if or under what conditions this alternative would meet these requirements. The balance of this appendix discusses RCRA and policy statement/License Termination Rule requirements that would apply to this alternative and the issues associated with compliance, while drawing (as appropriate) on the information developed as part of this EIS.

The *Phase 1 Decommissioning Plan for the West Valley Demonstration Project (Decommissioning Plan)*, a document that describes the proposed Phase 1 decommissioning actions was submitted to the NRC. (If a different approach is selected in the Record of Decision, this plan will be revised as necessary to reflect the changes.) This document develops allowable residual contamination levels for those areas where facilities would be removed under Phase 1 of the Phased Decisionmaking Alternative. These allowable residual contamination levels are termed Derived Concentration Guideline Levels (DCGLs) and are based on limiting the dose to a potential onsite receptor to a total effective dose equivalent of 25 millirem per year, the dose standard for unrestricted release in the NRC License Termination Rule. The technical basis for the establishment of these West Valley-specific DCGLs is being reviewed by the NRC. Cleanup/closure activities performed during Phase 1 or under the Sitewide Removal Alternative would be performed in accordance with RCRA closure and/or corrective action requirements, as applicable. This appendix does not discuss Phase 2 of the Phased Decisionmaking Alternative because Phase 2 actions have not been defined. If Phase 2 were removal of the remaining Waste Management Areas (WMAs), the overall alternative would be the same as the Sitewide Removal Alternative. If Phase 2 were in-place closure of the remaining WMAs, it would involve the same issues identified for the Sitewide Close-In-Place Alternative, although they would be slightly reduced because the Main Plant Process Building and the Low-Level Waste Treatment Facility would have been removed under Phase 1. This appendix does not address the No Action Alternative because it is not intended to meet decommissioning requirements.

### **L.1 Resource Conservation and Recovery Act**

Site cleanups under RCRA are conducted under its corrective action and permitting programs. The RCRA corrective action program is used to perform corrective actions for SWMUs following the process defined in a facility operating permit or Consent Order, beginning with investigation of potential releases and ending with selection and implementation of a remedy. Corrective Measures Studies (CMSs) would be prepared by the U.S. Department of Energy (DOE) and/or New York State Energy Research and Development Authority (NYSERDA) for SWMUs identified by NYSDEC or the U.S. Environmental Protection Agency (EPA). These reports would propose a preferred corrective measure alternative for the SWMUs, including applicable or appropriate cleanup standards. These CMSs would be reviewed by NYSDEC and EPA, and a corrective measure alternative would be selected by the respective regulatory agency in accordance with the required administrative procedures. This process would also include providing the public with an opportunity to review and comment.

Under any of the alternatives evaluated in this EIS, SWMUs subject to RCRA permitting (referred to as “regulated units”) would be remediated pursuant to respective closure standards and requirements as defined in the regulations. A regulated unit-specific closure plan would be prepared by the owner or operator of a particular regulated unit or the organization that would implement the plan on the owner’s or operator’s behalf. The plan would then be submitted to NYSDEC and/or EPA for review and approval. Upon approval, the closure plan would be implemented for the specific regulated unit. Closure standards may be met through a variety of methods, depending upon the type, design, and performance of the unit and whether any wastes remain in place. Clean closure is the method of closure in which all wastes are removed from the regulated unit and the surrounding media. In-place management is the method of closure in which some or all wastes remain in place, generally subjecting the unit to long-term controls. In-place closure is typically reserved for land disposal units and in the West Valley situation would require both a regulatory variance and a postclosure

permit or Order to document the monitoring and maintenance requirements. Closure requirements usually satisfy the corrective action requirements. However, closed units may be further subject to corrective action requirements, if deemed necessary. Information regarding SWMUs and RCRA interim status units is provided in Chapter 2, Table 2–2, of this EIS.

For the Sitewide Close-In-Place Alternative, the acceptable steps to closure for each regulated unit would be subject to regulatory review through a closure plan for each of the regulated units. Because wastes would be left in place under this option, engineered measures (such as a cover) or long-term controls could be proposed as part of the process. The adequacy of these additional measures would be determined by NYSDEC and/or EPA, as would the need for special administrative provisions, such as a variance to the regulations. It is not clear what the regulators' decisions would be for this alternative, particularly for the units that have the greatest inventory of hazardous constituents (Main Plant Process Building, Waste Tank Farm, NRC-Licensed Disposal Area [NDA], and SDA). If such close-in-place actions were authorized for regulated units, it is expected that it would involve a permit with postclosure monitoring and maintenance requirements that would require a review of performance and options on some recurring interval, such as 5 years.

## **L.2 U.S. Nuclear Regulatory Commission Decommissioning Criteria**

The NRC License Termination Rule (10 *Code of Federal Regulations* [CFR] Part 20, Subpart E) governs the decommissioning of the NRC-licensed portion of the Western New York Nuclear Service Center (WNYNSC). There is flexibility in the License Termination Rule with criteria for unrestricted use (10 CFR 20.1402), criteria for restricted use (10 CFR 20.1403), and alternate criteria (10 CFR 20.1404). In all cases it is necessary to decontaminate to the maximum extent technically and economically feasible. The License Termination Rule is discussed more in Chapter 5 of this EIS.

The NRC established decommissioning criteria for WVDP through issuance of a policy statement (NRC 2002) under its authority in the WVDP Act, prescribing the License Termination Rule as the decommissioning criteria for WVDP. In this policy statement, the NRC recognized that decommissioning of the West Valley Site would present unique challenges and acknowledged that the final end state may involve a long-term, or even a perpetual, license or other innovative approach for some parts of the site where cleanup to License Termination Rule requirements would be prohibitively expensive or technically impractical. DOE submitted its *Decommissioning Plan*, which identifies proposed removal actions and proposed cleanup levels to the NRC on December 3, 2008 for its review and evaluation should the Phased Decisionmaking Alternative be selected. The NRC policy statement on decommissioning criteria for WVDP is also discussed in Chapter 5 of this EIS.

For the Sitewide Close-In-Place Alternative, there appear to be two primary options under the License Termination Rule: license termination under restricted conditions (10 CFR 20.1403) and license termination under alternate criteria (10 CFR 20.1404). While these options are applicable for those portions of the site where waste or contamination is closed in place, other portions of the site with minimal residual contamination could be released for unrestricted reuse under the criteria of 10 CFR 20.1402.

The various decommissioning requirements include dose standards, standards for institutional controls, and procedural requirements. This appendix only addresses comparison with dose standards. **Table L–1** presents a summary matrix of the regulatory dose standards for the various regulatory options that could be applied to the Sitewide Close-In-Place Alternative.

**Table L–1 Sitewide Close-In-Place Alternative Summary of U.S. Nuclear Regulatory Commission  
Dose Standards for Regulatory Options**

<i>Regulatory Option</i>	<i>Dose Standards</i>	
	<i>Dose Standard Assuming Institutional Controls</i>	<i>Dose Standard Assuming Immediate Loss of Institutional Controls</i>
License termination with restriction (10 CFR 20.1403)	25 millirem per year	100/500 millirem per year
License termination under alternate criteria (10 CFR 20.1404)	Up to 100 millirem per year from all manmade sources other than medical	100/500 millirem per year

CFR = *Code of Federal Regulations*.

The balance of this section presents and discusses the result of the dose assessment for the NRC-regulated facilities on WNYNSC under the Sitewide Close-In-Place Alternative. The estimated doses for the situation where it is assumed that institutional controls remain in place are presented first in Section L.2.1.<sup>1</sup>

The estimated doses for the situation where it is assumed that institutional controls fail are presented second in Section L.2.2. Consistent with License Termination Rule compliance guidance (NRC 2006), the analysis assumes loss of institutional controls immediately after license termination. There is uncertainty about when the license might be terminated, so two timeframes are analyzed and presented in the tables. The first assumes license termination immediately following completion of the decommissioning actions. The second assumes license termination after 100 years, a timeframe that might be used to allow for decay of short-lived radionuclides in the North Plateau Groundwater Plume or Cesium Prong. It is possible that even longer timeframes might be used to allow for decay prior to license termination, but the effect of these longer timeframes was not analyzed.

### **L.2.1 Sitewide Close-In-Place Alternative with Continuation of Institutional Controls**

The following are three offsite receptors, in order of distance from the site.

- An individual outside the current site boundary who uses contaminated Cattaraugus Creek water for drinking and irrigation and consumes fish raised in the local Cattaraugus Creek waters
- An individual along the lower reaches of Cattaraugus Creek near Gowanda who also uses contaminated Cattaraugus Creek water for drinking and irrigation and consumes large amounts of fish raised in the Cattaraugus Creek waters near Gowanda, assumed to be a member of the Seneca Nation of Indians (Seneca Nation)
- An individual who uses water from Lake Erie or the Niagara River

In addition to the offsite receptors, a dose estimate for an onsite worker engaged in postclosure monitoring and maintenance activities is presented. The dose estimate is based on information from historical measurements for similar activities.

Estimated peak annual doses to each of these receptors are presented in Sections L.2.1.1 through L.2.1.4.

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<sup>1</sup> This information for the offsite receptors is a subset of that presented in Chapter 4, Section 4.1.10, of this EIS, but is limited to the NRC-regulated facilities or areas.

### L.2.1.1 Cattaraugus Creek Receptor

**Table L–2** presents the dose to a Cattaraugus Creek receptor immediately outside the current WNYNSC. The total peak annual dose to this receptor from all NRC-regulated facilities/areas is projected to be about 0.5 millirem; the peak would be dominated by the North Plateau Groundwater Plume.

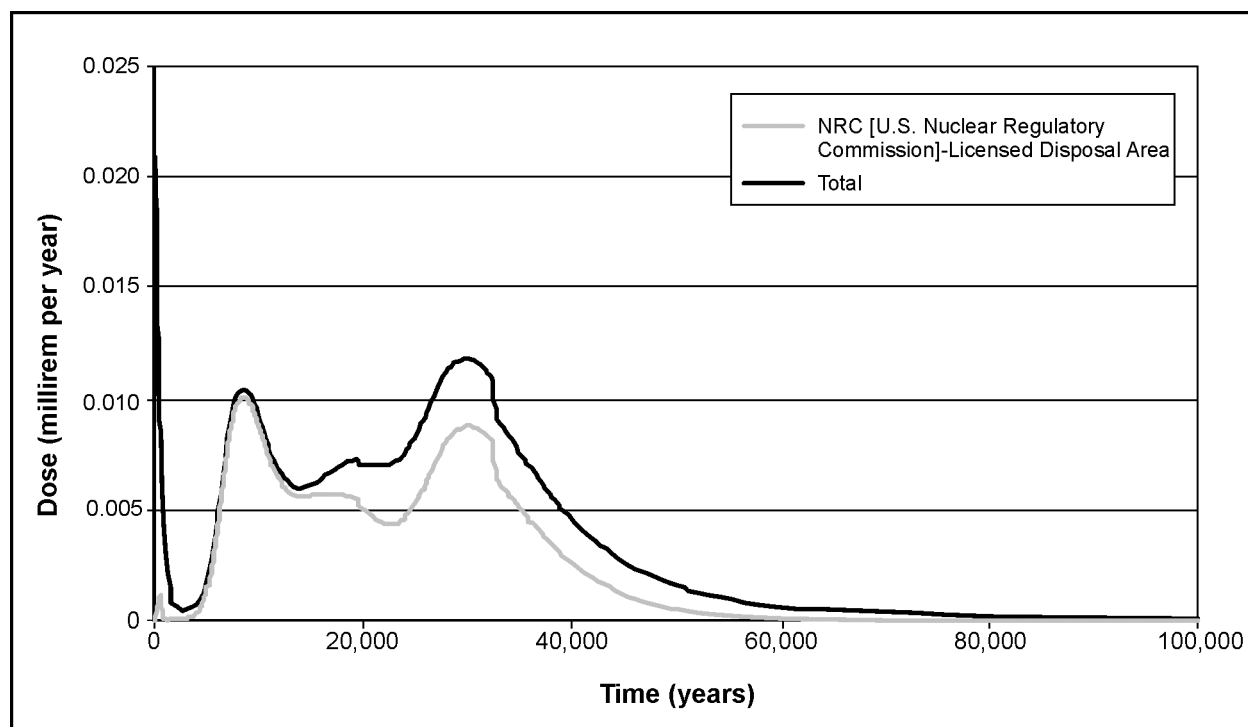
**Table L–2 Sitewide Close-In-Place Alternative with Continuation of Institutional Controls  
Peak Annual Dose<sup>a</sup> to Cattaraugus Creek Receptor**

Waste Management Areas	Sitewide Close-In-Place Alternative (millirem per year) (years until peak exposure)
Main Plant Process Building – WMA 1	0.019 (200)
Vitrification Facility – WMA 1	0.000037 (1,000)
Low-Level Waste Treatment Facility – WMA 2	0.00026 (100)
Waste Tank Farm – WMA 3	0.0019 (300)
NDA – WMA 7	0.010 (8,700)
North Plateau Groundwater Plume	0.51 (34)
Total	0.51 (34)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

**Figure L–1** shows this same information with emphasis on the peak annual dose as a function of time. The figure does not show the short-term peak from the North Plateau Groundwater Plume which occurs in year 34 as shown in Table L–2. It is not shown because, for the timescale used in the figure, the peak would essentially lie on the y-axis. The figure does show the later peaks including those due to releases from the NDA.



**Figure L–1 Sitewide Close-In-Place Alternative with Continuation of Institutional Controls Peak  
Annual Dose to Cattaraugus Creek Receptor**

### L.2.1.2 Seneca Nation of Indians Receptor

**Table L-3** presents the peak annual dose to the Seneca Nation of Indians receptor. The total peak annual dose to this receptor would be slightly higher than the dose to the Cattaraugus Creek receptor because of the higher assumed fish consumption rate. The total peak annual dose is about 0.7 millirem per year and would be dominated in the first 200 years by releases from the North Plateau Groundwater Plume and the Main Plant Process Building.

**Table L-3 Sitewide Close-In-Place Alternative with Continuation of Institutional Controls  
Peak Annual Dose<sup>a</sup> to Seneca Nation of Indians Receptor**

<i>Waste Management Areas</i>	<i>Sitewide Close-In-Place Alternative (millirem per year) (years until peak exposure)</i>
Main Plant Process Building – WMA 1	0.053 (200)
Vitrification Facility – WMA 1	0.000090 (1,000)
Low-Level Waste Treatment Facility – WMA 2	0.00047 (100)
Waste Tank Farm – WMA 3	0.0019 (300)
NDA – WMA 7	0.027 (8,600)
North Plateau Groundwater Plume	0.68 (34)
Total	0.68 (34)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

### L.2.1.3 Lake Erie/Niagara River Water User

The Lake Erie/Niagara River water user that would receive the highest dose would be a Sturgeon Point water user because the water entering this intake structure would have higher concentrations of radionuclides than water from other intake structures. The peak annual dose to this receptor is presented in **Table L-4**. This receptor is assumed to drink water and eat fish from Lake Erie and to raise produce in a garden irrigated with water from Sturgeon Point. The small total peak annual dose (0.17 millirem per year) would be dominated by releases from the North Plateau Groundwater Plume.

**Table L-4 Sitewide Close-In-Place Alternative with Continuation of Institutional Controls  
Peak Annual Dose<sup>a</sup> to Sturgeon Point Receptor**

<i>Waste Management Areas</i>	<i>Sitewide Close-In-Place Alternative (millirem per year) (years until peak exposure)</i>
Main Plant Process Building – WMA 1	0.002 (200)
Vitrification Facility – WMA 1	0.000005 (1,000)
Low-Level Waste Treatment Facility – WMA 2	0.00007 (100)
Waste Tank Farm – WMA 3	0.0007 (300)
NDA – WMA 7	0.002 (30,100)
North Plateau Groundwater Plume	0.17 (34)
Total	0.17 (34)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

### L.2.1.4 Site Worker

Site workers would be responsible for monitoring and maintenance activities after the site is closed in place. The peak annual dose to such a worker has been estimated based on a review of historical exposure records for

workers that have participated in environmental monitoring and grounds maintenance activities (WVES 2008). The estimated annual dose to site workers is estimated to be in the range of 10 to 20 millirem per year.

### L.2.1.5 Conclusion

The analysis of future offsite receptors indicates that the peak annual dose to an average member of the critical group (receptors outside the current site boundary) for the Sitewide Close-In-Place Alternative with continuation of institutional controls is projected to be well below 25 millirem per year, the dose standard for unrestricted release in the NRC License Termination Rule. The historical information on occupational exposure of site monitoring and maintenance workers suggests that the annual dose to monitoring and maintenance workers who would work at the site following implementation of the Sitewide Close-In-Place actions is projected to be below 25 millirem per year.

## L.2.2 Sitewide Close-In-Place Alternative with Loss of Institutional Controls

Multiple scenarios have been analyzed in Appendix H of this EIS. For presentation in this Appendix L, the scenarios are organized according to the estimated time for the scenario to develop, from shortest to longest. These specific scenarios are presented in **Table L-5**. The last column in the table provides information on the duration of the exposure once it is initiated. As discussed earlier, two time frames for license termination are analyzed in this appendix. The first analysis assumes the intruder scenario occurs immediately after completion of the decommissioning activities, consistent with license termination immediately after decommissioning. The second analysis assumes the intruder scenario occurs 100 years after completion of the decommissioning actions. This second analysis would be consistent with an assumption that the license was terminated after 100 years, a strategy that could be used for management of areas such as the Cesium Prong or North Plateau Groundwater Plume, where dominant contaminating radionuclides have a moderately short half-life (30 years or less).

**Table L-5 Exposure Scenarios and Estimated Scenario Development Time**

<i>Scenario</i>	<i>Estimated Scenario Development Time (time until the start of exposure)</i>	<i>Duration of Exposure</i>
Well driller (Section L.2.2.1)	On the order of a few weeks	On the order of hours, acute
Resident farmer (with or without a well) (Section L.2.2.2)	1 – 2 years	Ongoing, chronic
Erosion (Section L.2.2.3)	Hundreds of years of unmitigated erosion	Ongoing, chronic

### L.2.2.1 Well Driller

**Table L-6** presents the doses to an intruder worker assumed to be a well driller. For the well driller, exposure pathways include inadvertent ingestion of contaminated soil, inhalation of contaminated dust, and direct exposure to contaminated water in a cuttings pond.

The projected peak annual dose to the well driller in the area of the Low-Level Waste Treatment Facility is projected to be 4.8 millirem per year if the license is terminated immediately after completion of the Sitewide Close-In-Place decommissioning actions. A well driller in areas other than the Low-Level Waste Treatment Facility and North Plateau Groundwater Plume was not analyzed because it was assumed that well-drilling equipment would not be placed over areas protected by multi-layered engineered barriers with rock on the sides and top.



**Table L-6 Sitewide Close-In-Place Alternative with Loss of Institutional Controls  
 Peak Annual Dose<sup>a</sup> to Well Driller**

Waste Management Areas	Sitewide Close-In-Place Alternative	
	Immediate License Termination (millirem per year)	License Termination After 100 Years (millirem per year)
Main Plant Process Building – WMA 1	Not applicable	Not applicable
Vitrification Facility – WMA 1	Not applicable	Not applicable
Low-Level Waste Treatment Facility – WMA 2	4.8	1.0
Waste Tank Farm – WMA 3	Not applicable	Not applicable
NDA – WMA 7	Not applicable	Not applicable
North Plateau Groundwater Plume	$5 \times 10^{-8}$	$1 \times 10^{-6}$

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

### L.2.2.2 Resident Farmer (with or without a well)

Three types of resident farmers are presented in this section. The first is a resident farmer along Buttermilk Creek below the confluence with Franks Creek. This receptor is assumed to experience the impacts of releases from all the WMAs on the North and South Plateaus. The second is a resident farmer whose garden contains contaminated soil from either home construction or well drilling directly into a WMA that is not covered by an intrusion barrier for the Sitewide Close-In-Place Alternative. The third is a resident farmer who drills a well downgradient of a WMA. This scenario is particularly relevant for WMAs that have engineered multi-layer caps that would make direct intrusion more difficult.

#### Resident Farmer Along Buttermilk Creek

A resident farmer along the lower reaches of Buttermilk Creek was analyzed. This receptor would use contaminated water in the lower reaches of Buttermilk Creek for drinking and irrigation and would consume fish assumed to be raised in the local contaminated waters. The results of this analysis are presented in Table L-7.

**Table L-7 Sitewide Close-In-Place Alternative with Loss of Institutional Controls  
 Peak Annual Dose<sup>a</sup> to Buttermilk Creek Receptor**

Waste Management Areas	Sitewide Close-In-Place Alternative	
	Immediate License Termination (millirem per year) (years until peak exposure)	License Termination After 100 Years (millirem per year) (years until peak exposure)
Main Plant Process Building – WMA 1	0.14 (200)	0.14 (200)
Vitrification Facility – WMA 1	0.00028 (1,000)	0.00028 (1,000)
Low-Level Waste Treatment Facility – WMA 2	0.0020 (100)	0.0020 (100)
Waste Tank Farm – WMA 3	0.014 (300)	0.014 (300)
NDA – WMA 7	0.076 (8,700)	0.076 (8,700)
North Plateau Groundwater Plume	3.9 (34)	0.00067 (4,800)
Total	3.9 (34)	0.16 (200)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

The predicted peak annual dose to the Buttermilk Creek receptor would be about 4 millirem per year for the immediate license termination and less than 0.2 millirem per year for the delayed license termination analysis. The peaks are both dominated by releases from the North Plateau Groundwater Plume.

### Resident Farmer Using Contaminated Soil

**Table L–8** presents the doses to a resident farmer as a result of direct contact with contaminated soil that would be brought to the surface and placed in a garden following a house construction or well-drilling scenario. The highest dose would affect a farmer whose garden is contaminated by cuttings from the Low-Level Waste Treatment Facility. These peak doses would occur in the year of license termination.

**Table L–8 Sitewide Close-In-Place Alternative with Loss of Institutional Controls Peak Annual Dose<sup>a</sup> to Resident Farmer Using Contaminated Soil**

<i>Waste Management Areas</i>	<i>Sitewide Close-In-Place Alternative</i>	
	<i>Immediate License Termination (millirem per year) (years until peak exposure)</i>	<i>License Termination After 100 Years (millirem per year) (years until peak exposure)</i>
Main Plant Process Building – WMA 1	Not applicable	Not applicable
Vitrification Facility – WMA 1	Not applicable	Not applicable
Low-Level Waste Treatment Facility – WMA 2	69 (1)	7 (100)
Waste Tank Farm – WMA 3	Not applicable	Not applicable
NDA – WMA 7	Not applicable	Not applicable
North Plateau Groundwater Plume	0.2 (1)	0
Cesium Prong	44 (1)	4.4 (100)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

### Resident Farmer Using Contaminated Groundwater

**Table L–9** presents the doses to a resident farmer whose contact with the waste would be through an indirect pathway – the use of contaminated water. The receptors for the North Plateau facilities (Main Plant Process Building, Low-Level Waste Treatment Facility, Waste Tank Farm, and North Plateau Groundwater Plume) are assumed to have wells in the sand and gravel layer on the North Plateau about 100 meters (330 feet) downgradient from source area in each WMA. For units other than the North Plateau Groundwater Plume, the estimate of peak annual dose is not strongly sensitive to well location because the dose is dominated by long-lived radionuclides that do not decay appreciably as they travel downgradient and because conservative assumptions were made about lateral dispersion that would reduce downgradient radionuclide concentrations. The scenario is not applied to the NDA because of the low hydraulic conductivity of the unweathered Lavery till and the unsaturated conditions in the Kent Recessional Sequence.

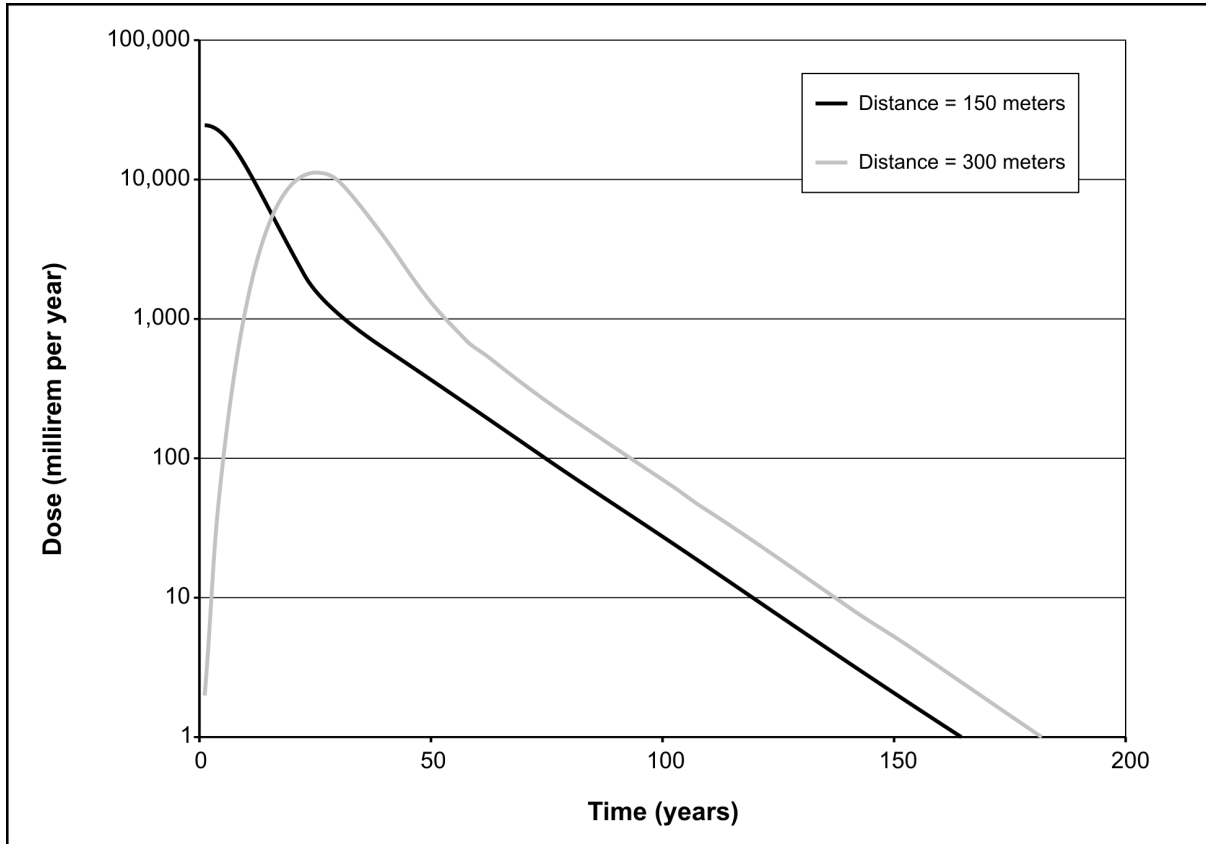
**Table L–9 Sitewide Close-In-Place Alternative with Loss of Institutional Controls Annual Peak Dose<sup>a</sup> to Resident Farmer Using Contaminated Groundwater**

<i>Waste Management Areas</i>	<i>Sitewide Close-In-Place Alternative</i>	
	<i>Immediate License Termination (millirem per year) (years until peak exposure)</i>	<i>License Termination After 100 Years (millirem per year) (years until peak exposure)</i>
Main Plant Process Building – WMA 1	162 (165)	162 (165)
Vitrification Facility – WMA 1	1.9 (1,000)	1.9 (1,000)
Low-Level Waste Treatment Facility – WMA 2	42 (66)	32 (100)
Waste Tank Farm – WMA 3	157 (231)	157 (231)
NDA – WMA 7	Not applicable	Not applicable
North Plateau Groundwater Plume	25,590 (2)	72 (100)
Cesium Prong	44 (1)	4.4 (100)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

The dose would be greatest to a resident farmer with a well in the North Plateau Groundwater Plume, but there is a noticeable decrease with time for this situation due to decay, and the dose is projected to decrease to levels below 100 millirem per year after 100 years as shown on **Figure L-2**. The dose would be greater than 100 millirem per year to receptors with wells downgradient of the Main Plant Process Building and the Waste Tank Farm, but there is not as noticeable a decrease in the dose from these wells with a delay in license termination.



**Figure L-2 Sitewide Close-In-Place Alternative with Loss of Institutional Controls Time Series of Peak Dose to Onsite Receptors of North Plateau Groundwater Plume**

The time series of doses to receptors 150 and 300 meters (490 and 980 feet) from the source of the North Plateau Groundwater Plume under the Sitewide Close-In-Place Alternative is presented on Figure L-2. The figure illustrates how sensitive the dose is to the time at which the intrusion occurs and where the intruder places his or her well. The peak dose for immediate license termination in Table L-9 comes from the receptor at 150 meters (490 feet). The peak dose for termination after 100 years comes from the receptor at 300 meters (980 feet) as shown in Figure L-2. The distance of 150 meters (490 feet) is in the vicinity of the peak concentration of the plume at the first year of the period of analysis and just outside of the downgradient slurry wall for the Sitewide Close-In-Place Alternative. The distance of 300 meters is located just upgradient of the North Plateau drainage ditch, the first location of discharge of the plume to the surface.

### **L.2.2.3 Scenarios Leading to Unmitigated Erosion**

Erosion is recognized as a site phenomenon, so a conservative erosion scenario (unmitigated erosion where no credit is taken for monitoring and maintenance of erosion control structures) was analyzed to estimate the dose to various receptors. The erosion scenarios presented here are the same ones analyzed in Appendix H of this

EIS, although the timeframes for initiation of unmitigated erosion in this analysis are (1) immediately after completion of the sitewide close-in-place actions, and (2) 100 years after completion of the sitewide close-in-place actions. This is consistent with the assumptions stated earlier in this appendix. The scenarios for erosion in the area of the NDA and Low-Level Waste Treatment Facility are presented in this section in an order that reflects their distance from the industrialized portion of the site.

### NDA Resident/Recreational Hiker

**Table L–10** presents the peak annual dose to a resident/recreational hiker in the area of the Low-Level Waste Treatment Facility and the NDA if unmitigated erosion of the site were allowed to take place. Exposure modes for a hiker include inadvertent ingestion of soil, inhalation of fugitive dust, and exposure to direct radiation. The peak annual dose to this receptor is not sensitive to the timing of license termination.

**Table L–10 Sitewide Close-In-Place Alternative with Loss of Institutional Controls, Unmitigated Erosion Scenario, Peak Annual Dose<sup>a</sup> to Resident/Recreational Hiker Near the Low-Level Waste Treatment Facility and NRC-Licensed Disposal Area**

<i>Waste Management Areas</i>	<i>Sitewide Close-In-Place Alternative</i>	
	<i>Immediate License Termination (millirem per year) (years until peak exposure)</i>	<i>License Termination After 100 Years (millirem per year) (years until peak exposure)</i>
Low-Level Waste Treatment Facility – WMA 2	11 (180)	11 (180)
NDA – WMA 7	34 (200)	34 (200)
Total	41 (200)	41 (200)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

### Buttermilk Creek Resident Farmer

**Table L–11** presents the peak annual dose to a Buttermilk Creek resident farmer given unmitigated erosion at the Low-Level Waste Treatment Facility and NDA. A receptor at this location would experience a dose contribution from both the Low-Level Waste Treatment Facility and the NDA, but the peaks are in the future and would occur in very different timeframes. The greater peak is associated with the NDA. The peak annual doses to this receptor are not sensitive to the timing of license termination.

**Table L–11 Sitewide Close-In-Place Alternative with Loss of Institutional Controls, Unmitigated Erosion Scenario, Peak Annual Dose<sup>a</sup> to a Buttermilk Creek Receptor**

<i>Waste Management Areas</i>	<i>Sitewide Close-In-Place Alternative</i>	
	<i>Immediate License Termination (millirem per year) (years until peak exposure)</i>	<i>License Termination After 100 Years (millirem per year) (years until peak exposure)</i>
Low-Level Waste Treatment Facility – WMA 2	6 (200)	6 (200)
NDA – WMA 7	12 (490)	12 (490)
Total	13 (490)	13 (490)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

**Cattaraugus Creek Resident Farmer**

**Table L-12** presents the peak annual dose to a Cattaraugus Creek resident farmer from the Low-Level Waste Treatment Facility and the NDA under the unmitigated erosion scenario.

**Table L-12 Sitewide Close-In-Place Alternative with Loss of Institutional Controls, Unmitigated Erosion Scenario, Peak Annual Dose<sup>a</sup> to Cattaraugus Creek Receptor**

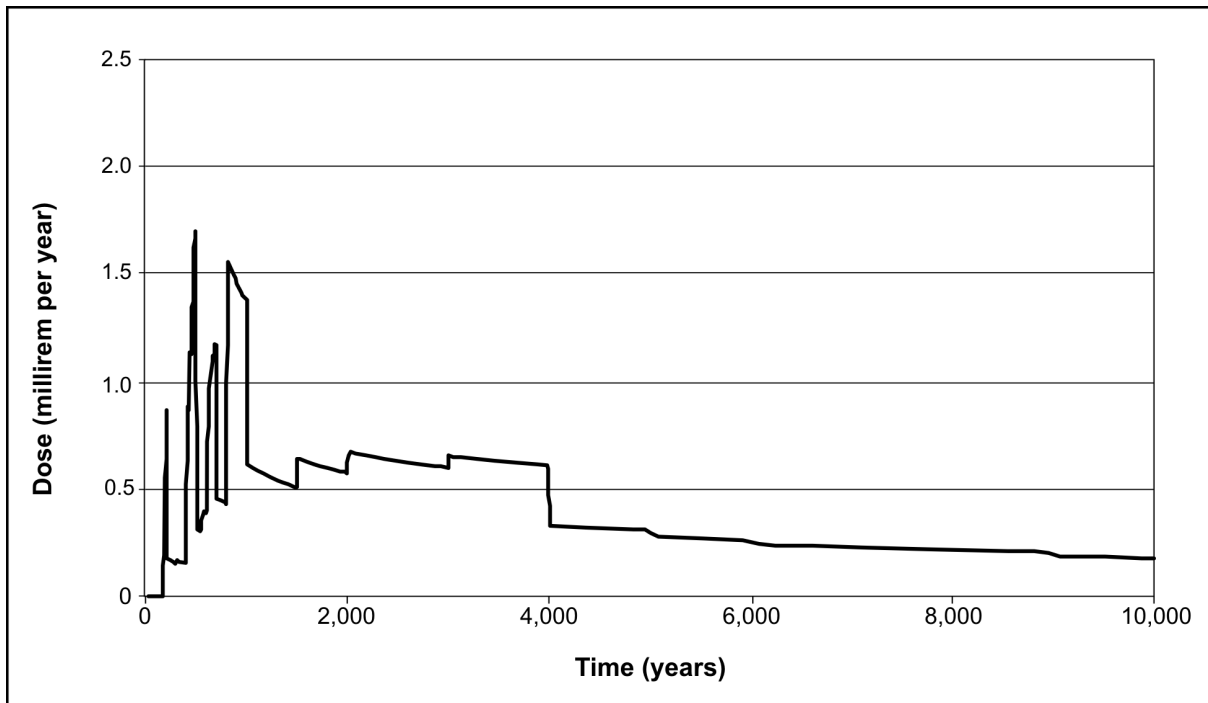
Waste Management Areas	Sitewide Close-In-Place Alternative	
	Immediate License Termination (millirem per year) (years until peak exposure)	License Termination After 100 Years (millirem per year) (years until peak exposure)
Low-Level Waste Treatment Facility – WMA 2	0.74 (200)	0.74 (200)
NDA – WMA 7	1.5 (490)	1.5 (490)
Total	1.7 (490)	1.7 (490)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

The results for this receptor show a similar pattern to that seen for the Buttermilk Creek resident farmer, but the doses are lower because of the reduced contaminant concentrations further downstream. Again, the doses are not sensitive to the timing of license termination.

An illustration of how the peak annual dose to the Cattaraugus Creek receptor would vary as a function of time under the Sitewide Close-In-Place Alternative is presented on **Figure L-3**. The figure shows the short-term peak for erosion of the Low-Level Waste Treatment Facility and the later peak for erosion of the NDA. The dose-time curve would have a similar pattern for all offsite receptors, but the magnitude of the peaks would vary.



**Figure L-3 Sitewide Close-In-Place Alternative with Loss of Institutional Controls, Unmitigated Erosion Scenario, Time Series of Peak Annual Dose to Cattaraugus Creek Resident Farmer**

### Seneca Nation of Indians Receptor

A Seneca Nation receptor is postulated to use Cattaraugus Creek near Gowanda for drinking water and to consume large quantities of fish raised in these waters. The peak annual dose to this receptor under the unmitigated erosion scenario is presented in **Table L-13**. The greater peak is associated with the NDA. None of the doses is sensitive to the timing of license termination.

As noted in Section L.2.1.2, the dose-time pattern for the Seneca Nation receptor is similar to that seen for the other downgradient water users, but the numerical values of the peaks are greater as a result of the higher assumed fish consumption rate.

**Table L-13 Sitewide Close-In-Place Alternative with Loss of Institutional Controls, Unmitigated Erosion Scenario, Peak Annual Dose<sup>a</sup> to Seneca Nation of Indians Receptor**

<i>Waste Management Areas</i>	<i>Sitewide Close-In-Place Alternative</i>	
	<i>Immediate License Termination (millirem per year) (years until peak exposure)</i>	<i>License Termination After 100 Years (millirem per year) (years until peak exposure)</i>
Low-Level Waste Treatment Facility – WMA 2	2 (200)	2 (200)
NDA – WMA 7	4 (490)	4 (490)
Total	4 (490)	4 (490)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

### Lake Erie Niagara River Water User

In addition to the Cattaraugus Creek and Seneca Nation receptors, the peak annual dose to a Sturgeon Point water user has been projected for the unmitigated erosion release scenario (see **Table L-14**). Again, two separate peaks are shown, with releases from the NDA producing the higher dose level. Doses are the same regardless of the timing of license termination.

**Table L-14 Sitewide Close-In-Place Alternative with Loss of Institutional Controls, Unmitigated Erosion Scenario, Peak Annual Dose<sup>a</sup> to Sturgeon Point Receptor**

<i>Waste Management Areas</i>	<i>Sitewide Close-In-Place Alternative</i>	
	<i>Immediate License Termination (millirem per year) (years until peak exposure)</i>	<i>License Termination After 100 Years (millirem per year) (years until peak exposure)</i>
Low-Level Waste Treatment Facility – WMA 2	0.14 (200)	0.14 (200)
NDA – WMA 7	0.24 (490)	0.24 (490)
Total	0.27 (490)	0.27 (490)

NDA = NRC [U.S. Nuclear Regulatory Commission]-Licensed Disposal Area, WMA = Waste Management Area.

<sup>a</sup> Total effective dose equivalent.

### Dose from Multiple Sources

The previous discussion presented information on the doses to various receptors from individual WMAs. There is the potential for receptors to come in contact with contamination from multiple areas and therefore experience higher doses than those from a single WMA. The highest doses would generally affect resident farmers who use contaminated water near a specific WMA (see Table L-9). It is conceivable that a single well on the North Plateau could intercept contamination from multiple sources. The information in Table L-9 suggests there may be combined impacts for plumes that have peaks that occur during similar timeframes.

A water well on the North Plateau that would intercept the plume from both the Main Plant Process Building and the Waste Tank Farm appears to have the greatest potential to distribute a multisource dose. The peak dose for the Main Plant Process Building and Waste Tank Farm is estimated to occur around year 200 (see Table L-9). A conservative estimate of the combined dose from the Main Plant Process Building and the Waste Tank Farm is projected to be about 300 millirem per year (approximately 162 from Main Plant Process Building and approximately 157 from the Waste Tank Farm).

Other combinations for the Sitewide Close-In-Place Alternative appear to have much less potential for high doses. The thick engineered caps would limit the peak annual dose for well-drilling or home construction scenarios to a few millirem, doses that are small in comparison to the doses from using contaminated water for drinking and irrigation.

#### **L.2.2.4 Conclusions**

Assuming the area of institutional controls is consistent with the current site boundary, the analysis in Section L.2.1 indicates that the Sitewide Close-In-Place Alternative could comply with the dose criteria that apply when institutional controls are in effect.

The analysis in Section L.2.2 indicates that, in some cases, the Sitewide Close-In-Place Alternative could exceed the dose criteria for situations involving the loss of institutional controls. It is recognized that there is uncertainty about which scenarios would be appropriate for assessing compliance with the License Termination Rule as well as uncertainty about the acceptability of the models and parameters used in the analysis. For scenarios assuming institutional controls as well as scenarios assuming loss of institutional control, the determination of what constitutes the License Termination Rule compliance scenarios and what are justifiable assumptions for the long-term performance will be critical in determining whether the dose criteria are met.

These issues, along with compliance with the decommissioning requirements for institutional controls and procedural requirements, are being addressed and resolved as part of the *Decommissioning Plan* preparation and review process.

### **L.3 Radiological Decommissioning of the State-Licensed Disposal Area**

It is expected that the SDA would continue to be regulated via a 6 NYCRR Part 380 permit and a New York State Department of Health license. Decommissioning criteria that would apply for a close-in-place option for the SDA have not been established. The 6 NYCRR Part 384 regulations being developed by NYSDEC (NYSDEC 2008) could apply to the SDA, but it is not clear that these regulations would accommodate a close-in-place option. The outreach materials requesting public comment on the planned 6 NYCRR Part 384 regulations did not mention the SDA.

#### **L.4 References**

NRC (U.S. Nuclear Regulatory Commission), 2002, *Decommissioning Criteria for the West Valley Demonstration Project (M-32) at the West Valley Site; Final Policy Statement*, 67 *Federal Register* 5003, Washington, DC, February 1.

NRC (U.S. Nuclear Regulatory Commission), 2006, *Consolidated Decommissioning Guidance*, NUREG-1757, Volume 2, Rev. 1, Washington, DC, September.

NRC (U.S. Nuclear Regulatory Commission), 2007, *Radiological Criteria for License Termination*, 10 CFR Part 20, Subpart E, Washington, DC, January.

NYSDEC (New York State Department of Environmental Conservation), 2008, *Public Outreach for Proposed Regulation 6 NYCRR Part 384, New Regulations for Cleanup of Radioactively Contaminated Sites* (accessed August 29, 2008, <http://www.dec.ny.gov/chemical/42047.html>), February 11.

WVES (West Valley Environmental Services) 2008, Personal Communication (email) from K. Mortensen to R. Steiner, Washington Safety Management Solutions, "EIS Dose Information," September 3.