APPENDIX A
DECOMMISSIONING PLAN ANNOTATED CHECKLIST

PURPOSE OF THIS APPENDIX

The purpose of this appendix is to assist NRC staff in review of the plan by providing the checklist used in its preparation, annotated to show where each applicable topic is addressed.

INFORMATION IN THIS APPENDIX

This appendix provides in Table A-1 a comparison between the major topics of the decommissioning plan evaluation checklist found in Appendix D to Volume 1 of NUREG-1757, *Consolidated Decommissioning Guidance, Decommissioning Process for Materials Licensees* (NRC 2006), and the major sections of this plan.

It then replicates the NUREG-1757 Appendix D checklist and identifies:

- The topics that do not apply to this plan based on discussions between NRC and DOE that took place in a decommissioning plan scoping meeting held on May 19, 2008 (NRC 2008), which are marked NA for not applicable;
- The section and page number in this plan where each applicable topic is addressed; and
- The cases where NRC has agreed that DOE procedures (i.e., DOE regulations, orders, and technical standards) can be cited in the plan instead of providing details called for by the NRC checklist (NRC 2008).

RELATIONSHIP TO OTHER PARTS OF THE PLAN

This appendix shows how the other parts of this plan address the applicable topics of the NRC decommissioning plan evaluation checklist.

Table A-1. NUREG-1757 Checklist – Phase 1 Decommissioning Plan Comparison

NUREG-1757 Checklist		WVDP Phase 1 Decommissioning Plan	
Sec	**Subject**	**Sec**	**Subject**
I	Executive Summary		Executive Summary
		1	Introduction
II	Facility Operating History	2	Facility Operating History
III	Facility Description	3	Facility Description
IV	Radiological Status of Facility	4	Radiological Status of Facility
V	Dose Modeling	5	Dose Modeling
VI	Environmental Information	3	Facility Description
VII	ALARA Analysis	6	ALARA Analysis
VIII	Planned Decommissioning Activities	7	Planned Decommissioning Activities
IX	Project Management and Organization	1.6	Project Management and Organization
X	Health and Safety	1.7	Health and Safety
XI	Environmental Monitoring and Control	1.8	Environmental Monitoring and Control
XII	Radioactive Waste Management Program	1.9	Radioactive Waste Management Program
XIII	Quality Assurance Program	8	Quality Assurance Program
XIV	Facility Radiation Surveys	9	Facility Radiation Surveys
XV	Financial Assurance		Not applicable.
XVI	Restricted Release/Alternate Criteria		Not applicable.
		App A	Decommissioning Plan Annotated Checklist
		App B	Environmental Radioactivity Data
		App C	Details of DCGL Development and Integrated Dose Analysis
		App D	Engineered Barriers and Post Remediation Activities
		App E	Dose Modeling Probabilistic Uncertainty Analysis
		App F	Estimated Radioactivity in Subsurface Piping
		App G	Phase 1 Final Status Survey Conceptual Framework

The annotated NUREG-1757 decommissioning plan evaluation checklist begins on the next page. Acronyms and abbreviations used in the checklist are as follows:

App = appendix ES = Executive Summary NA = not applicable

CONTENT	SECTION	PAGE
I. EXECUTIVE SUMMARY		
The name and address of the licensee or owner of the site	ES	ES-3
The location and address of the site	ES	ES-3
A brief description of the site and immediate environs	ES	ES-4
A summary of the licensed activities that occurred at the site	ES	ES-10
The nature and extent of contamination at the site	ES	ES-13
The decommissioning objective proposed by the licensee (i.e., restricted or unrestricted use)	ES	ES-17
The DCGLs for the site, the corresponding doses from these DCGLs, and the method that was use to determine the DCGLs *[Note that cleanup goals below the DCGLs are the criteria to be used for remediation activities in Phase 1. These are specified in Table ES-2.]*	Table ES-1 Table ES-2	ES-19 ES-20
A summary of the ALARA evaluations performed to support the decommissioning	ES	ES-21
~~If the licensee requests license termination under restricted conditions, the restrictions the licensee intends to use to limit doses as required in 10 CFR Part 20.1403 or 20.1404, and a summary of institutional controls and financial assurance~~	NA	NA
~~If the licensee requests license termination under restricted conditions or using alternate criteria, a summary of the public participation activities undertaken by the licensee to comply with 10 CFR Part 20.1403(d) or 20.1404(a)(4)~~	NA	NA
The proposed initiation and completion dates of decommissioning	ES	ES-21
Any post-remediation activities (such as ground water monitoring) that the licensee proposes to undertake prior to requesting license termination	ES	ES-21
~~A statement that the licensee is requesting that its license be amended to incorporate the DP~~	NA	NA

CONTENT	SECTION	PAGE
1. Introduction		
Because of the complexities of the project, DOE has included an Introduction section. It addresses matters such as the purpose of the plan and the scope of the Phase 1 decommissioning activities. It explains the background of the project, including the relationship between the plan and the Decommissioning EIS and the general responsibilities of the organizations involved. It describes the site conditions that will be in effect at the time the decommissioning activities begin, i.e., the interim end state. It explains the relationship between Phase 1 and Phase 2. *The Introduction also briefly addresses the following matters covered by DOE procedures:* • *Project management,* • *Health and safety,* • *Environmental monitoring and control, and* • *The radioactive waste management program.*		
II. FACILITY OPERATING HISTORY		
II.a. LICENSE NUMBER/STATUS/AUTHORIZED ACTIVITIES		
~~The radionuclides and maximum activities of radionuclides authorized and used under the current license~~	NA	NA
~~The chemical forms of the radionuclides authorized and used under the current license~~	NA	NA
~~A detailed description of how the radionuclides are currently being used at the site~~	NA	NA
~~The location(s) of use and storage of the various radionuclides authorized under current licenses~~	NA	NA
~~A scale drawing or map of the building or site and environs showing the current locations of radionuclide use at the site~~	NA	NA
~~A list of amendments to the license since the last license renewal~~	NA	NA
II.b. LICENSE HISTORY		
The radionuclides and maximum activities of radionuclides authorized and used under all previous licenses	2.1 Table 2-1 Table 2-2 Table 2-3	2-2 2-2 2-3 2-3

CONTENT	SECTION	PAGE
☐ The chemical forms of the radionuclides authorized and used under all previous licenses	Table 2-1 Table 2-2 Table 2-6 Table 2-7 Table 2-8 Table 2-9	2-2 2-3 2-11 2-12 2-13 2-17
☐ A detailed description of how the radionuclides were used at the site	2.1.1 2.1.2	2-5 2-14
☐ The location(s) of use and storage of the various radionuclides authorized under all previous licenses	2.1.1 2.1.2	2-5 2-15
☐ A scale drawing or map of the site, facilities, and environs showing previous locations of radionuclide use at the site	Figure 2-3 Figure 2-4	2-21 2-22
II.c. PREVIOUS DECOMMISSIONING ACTIVITIES		
☐ A list or summary of areas at the site that were remediated in the past *Also addresses additional remediation planned to achieve the interim end state.*	2.2 Table 2-11 Table 2-13 Figure 2-5	2-18 2-19 2-25 2-23
☐ A summary of the types, forms, activities, and concentrations of radionuclides that were present in previously remediated areas	Table 2-11 Table 2-13	2-19 2-25
☐ The activities that caused the areas to become contaminated	2.1.1 2.1.2	2-5 2-14
☐ The procedures used to remediate the areas, and the disposition of radioactive material generated during the remediation	2.2.1 2.2.2	2-19 2-19
☐ A summary of the results of the final radiological evaluation of the previously remediated area	Table 2-13 2.2.2 Table 4-5 Table 4-6 Table 4-8	2-25 2-29 4-16 4-17 4-19
☐ A scale drawing or map of the site, facilities, and environs showing the locations of previous remedial activity	Figure 2-5	2-22
II.d. SPILLS *Does not include spills inside facilities that did not impact the environment.*		
☐ A summary of areas at the site where spills (or uncontrolled releases) of radioactive material occurred in the past	2.3	2-32

CONTENT	SECTION	PAGE
☐ The types, forms, activities, and concentrations of radionuclides involved in the spill or uncontrolled release	Table 2-16 Table 2-17 Table 2-18	2-34 2-38 2-41
☐ A scale drawing or map of the site, facilities, and environs showing the locations of spills *The locations of major spills are shown in the figures listed. The locations of minor spills are identified in Table 2-17 (page 2-39) and Table 2-18 (page 2-41).*	Figure 2-3 Figure 2-4 Figure 2-6 Figure 2-7	2-21 2-22 2-33 2-37
II.e. PRIOR ONSITE BURIALS		
☐ A summary of areas at the site where radioactive material has been buried in the past	2.4	2-42
☐ The types, forms, activities and concentrations of waste and radionuclides in the former burial	Table 2-19 Table 2-20 Table 2-21	2-43 2-44 2-45
☐ A scale drawing or map of the site, facilities, and environs showing the locations of former burials	Figure 2-3 Figure 2-4	2-21 2-22
III. FACILITY DESCRIPTION *This section incorporates information from the DEIS. The SDA is not addressed.*		
III.a. SITE LOCATION AND DESCRIPTION		
☐ The size of the site in acres or square meters	3.1.2	3-2
☐ The State and county in which the site is located	3.1.1	3-2
☐ The names and distances to nearby communities, towns, and cities	3.1.1 3.2.2	3-2 3-32
☐ A description of the contours and features of the site	3.1.2 Figure 3-3 Figure 3-4	3-2 3-95 3-96
☐ The elevation of the site	3.1.2	3-2
☐ A description of property surrounding the site, including the location of all off-site wells used by nearby communities or individuals	3.1.4 3.2.1	3-27 3-29
☐ The location of the site relative to prominent features such as rivers and lakes	Figure 3-1 Figure 3-2	3-93 3-94

CONTENT	SECTION	PAGE
☐ A map that shows the detailed topography of the site using a contour interval	Figure 3-3 Figure 3-4	3-95 3-96
☐ The location of the nearest residences and all significant facilities or activities near the site	3.1.4	3-27
☐ A description of the facilities (e.g., buildings, parking lots, and fixed equipment) at the site	3.1.3	3-3
III.b. POPULATION DISTRIBUTION		
☐ A summary of the current population in and around the site, by compass vectors	3.2 Figure 3-44	3-29 3-130
☐ A summary of the projected population in and around the site by compass vectors *[Projections not available by compass vector.]*	3.2.2	3-32
III.c. CURRENT/FUTURE LAND USE		
☐ A description of the current land uses in and around the site	3.3.1 Figure 3-45	3-35 3-131
☐ A summary of anticipated land uses	3.3.2	3-38
III.d. METEOROLOGY AND CLIMATOLOGY		
☐ A description of the general climate of the region	3.4.1	3-40
☐ Seasonal and annual frequencies of severe weather phenomena	3.4.2	3-41
☐ Weather-related radionuclide transmission parameters	3.4.3	3-41
☐ Routine weather-related site deterioration parameters	3.4.4	3-42
☐ Extreme weather-related site deterioration parameters	3.4.4	3-42
☐ A description of the local (site) meteorology	3.4.5	3-42
☐ The National Ambient Air Quality Standards Category of the area in which the facility is located and, if the facility is not in a Category 1 zone, the closest and first downwind Category 1 Zone	3.4.5	3-47
III.e. GEOLOGY AND SEISMOLOGY		
☐ A detailed description of the geologic characteristics of the site and the region around the site	3.5	3-47

CONTENT	SECTION	PAGE
☐ A discussion of the tectonic history of the region, regional geomorphology, physiography, stratigraphy, and geochronology	3.5	3-47
☐ A regional tectonic map showing the site location and its proximity to tectonic structures	Figure 3-55	3-41
☐ A description of the structural geology of the region and its relationship to the site geologic structure	3.5	3-47
☐ A description of any crustal tilting, subsidence, karst terrain, landsliding, and erosion	3.5.3	3-52
☐ A description of the surface and subsurface geologic characteristics of the site and its vicinity	3.5	3-47
☐ A description of the geomorphology of the site	3.5.3	3-52
☐ A description of the location, attitude, and geometry of all known or inferred faults in the site and vicinity	3.5.4	3-55
☐ A discussion of the nature and rates of deformation	3.5.3	3-52
☐ A description of any man-made geologic features such as mines or quarries	3.1.1	3-2
☐ A description of the seismicity of the site and region	3.5.5	3-61
☐ A complete list of all historical earthquakes that have a magnitude of 3 or more, or a modified Mercalli intensity of IV or more within 200 miles of the site	3.5.5 Table 3-15	3-61 3-61
III.f. SURFACE WATER HYDROLOGY		
☐ A description of site drainage and surrounding watershed fluvial features	3.6.1	3-65
☐ Water resource data including maps, hydrographs, and stream records from other agencies (e.g., U.S. Geological Survey and U.S. Army Corps of Engineers)	3.6.1 Figure 3-3	3-65 3-95
☐ Topographic maps of the site that show natural drainages and man-made features	Figure 3-3 Figure 3-4	3-95 3-96
☐ A description of the surface water bodies at the site and surrounding areas	3.6.1	3-65
☐ A description of existing and proposed water control structures and diversions (both upstream and downstream) that may influence the site	none	-

CONTENT	SECTION	PAGE
Flow-duration data that indicate minimum, maximum, and average historical observations for surface water bodies in the site areas	3.6.1	3-67
Aerial photography and maps of the site and adjacent drainage areas identifying features such as drainage areas, surface gradients, and areas of flooding	Figure 3-3 Figure 3-4	3-95 3-96
An inventory of all existing and planned surface water users, whose intakes could be adversely affected by migration of radionuclides from the site	3.6.4	3-68
Topographic and/or aerial photographs that delineate the 100-year floodplain at the site	Figure 3-4	3-96
A description of any man-made changes to the surface water hydrologic system that may influence the potential for flooding at the site	*No such changes*	-
III.g. GROUND WATER HYDROLOGY		
A description of the saturated zone	3.7.1	3-70
Descriptions of monitoring wells	3.7.2 4.2.8 Figure 4-12 Table B-15	3-72 4-58 4-63 B-41
Physical parameters	3.7.3	3-73
A description of ground water flow directions and velocities	3.7.1 Figure 3-62 Figure 3-63 Figure 3-64 Figure 3-65	3-71 3-148 3-149 3-150 3-151
A description of the unsaturated zone	3.7.4	3-73
Information on all monitor stations including location and depth	Table B-15	B-41
A description of physical parameters	3.7.3	3-73
A description of the numerical analyses techniques used to characterize the unsaturated and saturated zones	3.7.7	3-75
The distribution coefficients of the radionuclides of interest at the site	3.7.8 Table 3-20	3-77 3-80

CONTENT	SECTION	PAGE
III.h. NATURAL RESOURCES		
☐ A description of the natural resources occurring at or near the site	3.8	3-82
☐ A description of potable, agricultural, or industrial ground or surface waters	3.8.3	3-84
☐ A description of economic, marginally economic, or subeconomic known or identified natural resources as defined in U.S. Geological Survey Circular 831	3.8	3-82
☐ Mineral, fuel, and hydrocarbon resources near and surrounding the site which, if exploited, would effect the licensee's dose estimates	*none*	-
IV. RADIOLOGICAL STATUS OF FACILITY		
Information on residual radioactivity and radiation levels in facilities is provided at a summary level consistent with DOE having primary responsibility for the health and safety aspects of the facility removal activities. Additional characterization will be performed in connection with the decommissioning activities as specified in Section 9.		
IV.a CONTAMINATED STRUCTURES		
☐ A list or description of all structures at the facility where licensed activities occurred that contain residual radioactive material in excess of site background levels	4.1.2 Figure 4-1 Figure 4-2 Figure 4-3 Figure 4-4 Figure 4-5	4-5 4-7 4-8 4-9 4-10 4-11
☐ A summary of the structures and locations at the facility that the licensee has concluded have not been impacted by licensed operations and the rationale for the conclusion	4.1.3	4-12
☐ ~~A list or description of each room or work area within each of these structures~~	NA	NA
☐ ~~A summary of the background levels used during scoping or characterization surveys~~	NA	NA
☐ ~~A summary of the locations of contamination in each room or work area~~	NA	NA
☐ ~~A summary of the radionuclides present at each location, the maximum and average radionuclide activities in dpm/100 cm^2, and, if multiple radionuclides are present, the radionuclide ratios~~	NA	NA
☐ ~~The mode of contamination for each surface (i.e., whether the radioactive material is present only on the surface of the material or if it has penetrated the material)~~	NA	NA

CONTENT	SECTION	PAGE
~~The maximum and average radiation levels in mrem/hr in each room or work area~~	NA	NA
~~A scale drawing or map of the rooms or work areas showing the locations of radionuclide material contamination~~	NA	NA
IV.b. CONTAMINATED SYSTEMS AND EQUIPMENT		
~~A list or description and the location of all systems or equipment at the facility that contain residual radioactive material in excess of site background levels~~	NA	NA
~~A summary of the radionuclides present in each system or on the equipment at each location, the maximum and average radionuclide activities in dpm/100cm^2, and, if multiple radionuclides are present, the radionuclide ratios~~	NA	NA
~~The maximum and average radiation levels in mrem/hr at the surface of each piece of equipment~~	NA	NA
~~A summary of the background levels used during scoping or characterization surveys~~	NA	NA
~~A scale drawing or map of the rooms or work areas showing the locations of the contaminated systems or equipment~~	NA	NA
IV.c. SURFACE SOIL CONTAMINATION *Information provided focuses on the project premises using existing data, which are not available for all locations on the project premises. Contamination in stream sediment is also addressed.*		
A list or description of all locations at the facility where surface soil contains residual radioactive material in excess of site background levels	4.2.3 Figure 4-6	4-29 4-32
A summary of the background levels used during scoping or characterization surveys	4.2.2 Table 4-11 Figure B-1 Table B-1	4-26 4-27 B-3 B-4
A summary of the radionuclides present at each location, the maximum and average radionuclide activities in pCi/gm, and, if multiple radionuclides are present, the radionuclide ratios	4.2.3 4.2.5	4-29 4-36
The maximum and average radiation levels in mrem/hr at each location *[Data are not available at sample locations.]*	4.2.6	4-49

CONTENT	SECTION	PAGE
☐ A scale drawing or map of the site showing the locations of radionuclide material contamination in surface soil	Figure 4-6	4-32
IV.d. SUBSURFACE SOIL CONTAMINATION *Information provided focuses on the project premises using existing data, which are not available for all locations on the project premises.*		
☐ A list or description of all locations at the facility where subsurface soil contains residual radioactive material in excess of site background levels	4.2.4 Figure 4-7 Figure 4-8	4-31 4-33 4-35
☐ A summary of the background levels used during scoping or characterization surveys	4.2.2	4-26
☐ A summary of the radionuclides present at each location, the maximum and average radionuclide activities in pCi/gm, and, if multiple radionuclides are present, the radionuclide ratios	4.2.4 4.2.5	4-31 4-36
☐ The depth of the subsurface soil contamination at each location	Figure 4-8 4.2.5	4-35 4-36
☐ A scale drawing or map of the site showing the locations of subsurface soil contamination	Figure 4-7 Figure 4-8	4-33 4-35
IV.e. SURFACE WATER *[Information provided focuses on the project premises using existing data, which are not available for all locations on the project premises.]*		
☐ A list or description of all surface water bodies at the facility that contain residual radioactive material in excess of site background levels	4.2.7 Figure 4-11	4-55 4-56
☐ A summary of the background levels used during scoping or characterization surveys	Table 4-11	4-27
☐ A summary of the radionuclides present in each surface water body and the maximum and average radionuclide activities in becquerel per liter (Bq/L) (picocuries per liter (pCi/L)	Table 4-24	4-57
IV.f. GROUND WATER *Information provided focuses on the project premises.*		
☐ A summary of the aquifer(s) at the facility that contain residual radioactive material in excess of site background levels	4.2.8	4-58
☐ A summary of the background levels used during scoping or characterization surveys	Table 4-11	4-27

CONTENT	SECTION	PAGE
☐ Description of the conceptual model of the site including the source term, physical features important to modeling the transport pathways, and the critical group	5.2.1 5.2.2 5.2.3 5.2.8 Figure 5-7 Figure 5-8 Figure 5-9 Figure 5-10 Figure 5-13	5-21 5-26 5-34 5-52 5-21 5-27 5-32 5-34 5-53
☐ Identification/description of the mathematical model used (e.g., hand calculations, DandD Screen v1.0, and RESRAD v5.81)	5.2.4 5.2.8	5-38 5-55
☐ Description of the parameters used in the analysis	Table C-1 Table C-2 Table E-1 Table E-2 Table E-3 Table E-4 Table E-5 Table E-6	C-3 C12 E-10 E-11 E-12 E-13 E-14 E-15
☐ Discussion about the effect of uncertainty on the results	5.2.6	5-44
☐ Input and output files or printouts, if a computer program was used	App C Related CD App E Related CD	C-1 E-1
V.c. RESTRICTED RELEASE USING SITE-SPECIFIC INFORMATION *Although Phase 1 decommissioning activities will not result in a restricted release, this plan provides a limited site-wide integrated dose assessment to help place the Phase 1 decommissioning activities involving remediation of soil in the WMA 1 and WMA 2 excavations into context with regard to supporting potential Phase 2 decommissioning alternatives. Information provided on the topics in this subsection is limited to that necessary to support this assessment. The level of detail is similar to that in the Decommissioning EIS.*		
☐ Source term information including nuclides of interest, configuration of the source, areal variability of the source, and chemical forms	5.1.2	5-2
☐ A description of the exposure scenarios, including a description of the critical group for each scenario	5.2.1 5.2.2 5.2.3 5.2.8 Figure 5-7 Figure 5-8 Figure 5-9 Figure 5-10 Figure 5-13	5-21 5-26 5-34 5-52 5-21 5-27 5-32 5-34 5-53

CONTENT	SECTION	PAGE
☐ A description of the conceptual model(s) of the site that includes the source term, physical features important to modeling the transport pathways, and the critical group for each scenario	5.2.1 5.2.2 5.2.3 5.2.8 Figure 5-7 Figure 5-8 Figure 5-9 Figure 5-10 Figure 5-13	5-21 5-26 5-34 5-52 5-21 5-27 5-32 5-34 5-53
☐ Identification/description of the mathematical model(s) used (e.g., hand calculations and RESRAD v5.81)	5.2.4 5.2.8	5-38 5-55
☐ A summary of parameters used in the analysis	Table C-1 Table C-2 Table E-1 Table E-2 Table E-3 Table E-4 Table E-5 Table E-6	C-3 C12 E-10 E-11 E-12 E-13 E-14 E-15
☐ A discussion about the effect of uncertainty on the results	5.2.6	5-44
☐ Input and output files or printouts, if a computer program was used	App C Related CD App E Related CD	C-1 E-1
V.d. RELEASE INVOLVING ALTERNATE CRITERIA *DOE will not use alternative criteria.*		
☐ ~~Source term information including nuclides of interest, configuration of the source, areal variability of the source, and chemical forms~~	NA	NA
☐ ~~A description of the exposure scenarios, including a description of the critical group for each scenario~~	NA	NA
☐ ~~A description of the conceptual model(s) of the site that includes the source term, physical features important to modeling the transport pathways, and the critical group for each scenario~~	NA	NA
☐ ~~Identification/description of the mathematical model(s) used (e.g., hand calculations and RESRAD v5.81)~~	NA	NA
☐ ~~A summary of parameters used in the analysis~~	NA	NA
☐ ~~A discussion about the effect of uncertainty on the results~~	NA	NA

CONTENT	SECTION	PAGE
~~Input and output files or printouts, if a computer program was used~~	NA	NA
VI. ENVIRONMENTAL INFORMATION		
Environmental information described in NUREG-1748	3	3-1[1]
For an EIS, the environmental information is reviewed by the EPAD EIS project manager	Noted	-
VII. ALARA ANALYSIS *The ALARA analysis focuses on the DCGLs for surface and subsurface soil and streambed sediment.*		
A description of how the licensee will achieve a decommissioning goal below the dose limit	6.2	6-3
A quantitative cost benefit analysis	6.3 6.4	6-6 6-12
A description of how costs were estimated	6.3.2	6-8
A demonstration that the doses to the average member of the critical group are ALARA	6.3 6.4	6-8 6-12
VIII. PLANNED DECOMMISSIONING ACTIVITIES *The remediation tasks are described in general terms. Every room and area is not addressed since decontamination will be limited and the facilities will be demolished. Typical remediation techniques to be used are described in Section 7.12, starting on page 7-48. More detail will be provided later in the Decommissioning Work Plan(s). Measures for preventing contamination or recontamination of the site due to decommissioning activities are addressed in Section 7.2.2 on page 7-6.*		
VIII.a. CONTAMINATED STRUCTURES		
A summary of the remediation tasks planned for each room or area in the contaminated structure, in the order in which they will occur	7.3.3 to 7.3.9	7-16 to 7-29
A description of the remediation techniques that will be employed in each room or area of the contaminated structure	7.12	7-47
~~A summary of the radiation protection methods and control procedures that will be employed in each room or area~~	NA	NA
~~A summary of the procedures already authorized under the existing license and those for which approval is being requested in the DP~~	NA	NA

[1] Section 3 provides a detailed description of the affected environment. All of the information specified in NUREG-1748 is contained in the Decommissioning EIS.

CONTENT	SECTION	PAGE
A commitment to conduct decommissioning activities in accordance with written, approved procedures	7.2.2	7-5
A summary of any unique safety or remediation issues associated with remediating the room or area	7.2.2	7-5
~~For Part 70 licensees, a summary of how the licensee will ensure that the risks addressed in the facility's Integrated Safety Analysis will be addressed during decommissioning~~	NA	NA
VIII.b. CONTAMINATED SYSTEMS AND EQUIPMENT		
A summary of the remediation tasks planned for each system in the order in which they will occur, including which activities will be conducted by licensee staff and which will be performed by a contractor	7.3.3 to 7.3.9	7-16 to 7-29
A description of the techniques that will be employed to remediate each system in the facility or site	7-12	7-47
~~A description of the radiation protection methods and control procedures that will be employed while remediating each system~~	NA	NA
A summary of the equipment that will be removed or decontaminated and how the decontamination will be accomplished	7.3 7.4.2 7.5	7-16 7-31 7-38
~~A summary of the procedures already authorized under the existing license and those for which approval is being requested in the DP~~	NA	NA
A commitment to conduct decommissioning activities in accordance with written, approved procedures	7.2.2	7-5
A summary of any unique safety or remediation issues associated with remediating any system or piece of equipment	7.2.2	7-6
~~For Part 70 licensees, a summary of how the licensee will ensure that the risks addressed in the facility's Integrated Safety Analysis will be addressed during decommissioning~~	NA	NA
VIII.c. SOIL		
A summary of the removal/remediation tasks planned for surface and subsurface soil at the site in the order in which they will occur, including which activities will be conducted by licensee staff and which will be performed by a contractor	7.3.8 7.4.3 7.7.4	7-21 7-32 7-43

CONTENT	SECTION	PAGE
A description the techniques that will be employed to remove or remediate surface and subsurface soil at the site	7.3.8 7.4.3 7.7.4 7.12	7-21 7-32 7-43 7-47
~~A description of the radiation protection methods and control procedures that will be employed during soil removal/ remediation~~	NA	NA
~~A summary of the procedures already authorized under the existing license and those for which approval is being requested in the DP~~	NA	NA
A commitment to conduct decommissioning activities in accordance with written, approved procedures	7.2.2	7-5
A summary of any unique safety or removal/remediation issues associated with remediating the soil	7.2.2	7-6
~~For Part 70 licensees, a summary of how the licensee will ensure that the risks addressed in the facility's Integrated Safety Analysis will be addressed during decommissioning~~	NA	NA
VIII.d. SURFACE AND GROUND WATER *Surface water removed from the lagoons will be remediated in Phase 1 of the decommissioning, and groundwater removed from the WMA 1 and WMA 2 excavations will be treated also.*		
A summary of the remediation tasks planned for ground and surface water in the order in which they will occur, including which activities will be conducted by licensee staff and which will be performed by a contractor	7.3.8 7.4.3	7-26 7-35
A description of the remediation techniques that will be employed to remediate the ground or surface water	7.3.8 7.4.3	7-26 7-32
~~A description of the radiation protection methods and control procedures that will be employed during ground or surface water remediation~~	NA	NA
~~A summary of the procedures already authorized under the existing license and those for which approval is being requested in the DP~~	NA	NA
A commitment to conduct decommissioning activities in accordance with written, approved procedures	7.2.2	7-5
A summary of any unique safety or remediation issues associated with remediating the ground or surface water	7.2.2	7-6

CONTENT	SECTION	PAGE
VIII.e. SCHEDULES		
A Gantt or PERT chart detailing the proposed remediation tasks in the order in which they will occur	Figure 7-16	7-56
A statement acknowledging that the dates in the schedule are contingent upon NRC approval of the DP	7.13	7-55
A statement acknowledging that circumstances can change during decommissioning, and, if the licensee determines that the decommissioning cannot be completed as outlined in the schedule, the licensee will provide an updated schedule to NRC	7.13	7-55
~~If the decommissioning is not expected to be completed within the timeframes outlined in NRC regulations, a request for alternative schedule for completing the decommissioning~~	NA	NA
IX. PROJECT MANAGEMENT AND ORGANIZATION		
~~*This section focuses on project management and organization related to the final status surveys.*~~ *Matters in this section are addressed by the DOE procedures identified in Section 1.6.*		
IX.a. DECOMMISSIONING MANAGEMENT ORGANIZATION		
~~A description of the decommissioning organization~~	NA	NA
~~A description of the responsibilities of each of these decommissioning project units~~	NA	NA
~~A description of the reporting hierarchy within the decommissioning project management organization~~	NA	NA
~~A description of the responsibility and authority of each unit to ensure that decommissioning activities are conducted in a safe manner and in accordance with approved written procedures~~	NA	NA
IX.b. DECOMMISSIONING TASK MANAGEMENT		
~~A description of the manner in which the decommissioning tasks are managed~~	NA	NA
~~A description of how individual decommissioning tasks are evaluated and how the Radiation Work Permits (RWPs) are developed for each task~~	NA	NA
~~A description of how the RWPs are reviewed and approved by the decommissioning project management organization~~	NA	NA

CONTENT	SECTION	PAGE
~~A description of how RWPs are managed throughout the decommissioning project~~	NA	NA
~~A description of how individuals performing the decommissioning tasks are informed of the procedures in the RWP~~	NA	NA
IX.c. DECOMMISSIONING MANAGEMENT POSITIONS AND QUALIFICATIONS		
~~A description of the duties and responsibilities of each management position in the decommissioning organization and the reporting responsibility of the position~~	NA	NA
~~A description of the duties and responsibilities of each chemical, radiological, physical, and occupational safety-related position in the decommissioning organization and the reporting responsibility of each position~~	NA	NA
~~A description of the duties and responsibilities of each engineering, quality assurance, and waste management position in the decommissioning organization and the reporting responsibility of each position~~	NA	NA
~~The minimum qualifications for each of the positions describe above, and the qualifications of the individuals currently occupying the positions~~	NA	NA
~~A description of all decommissioning and safety committees~~	NA	NA
IX.d. RADIATION SAFETY OFFICER		
~~A description of the health physics and radiation safety education and experience required for individuals acting as the licensee's RSO~~	NA	NA
~~A description of the responsibilities and duties of the RSO~~	NA	NA
~~A description of the specific authority of the RSO to implement and manage the licensee's radiation protection program~~	NA	NA
IX.e. TRAINING		
~~A description of the radiation safety training that the licensee will provide to each employee~~	NA	NA
~~A description of any daily worker "jobside" or "tailgate" training that will be provided at the beginning of each workday or job task to familiarize workers with job-specific procedures or safety requirements~~	NA	NA
~~A description of the documentation that will be maintained to demonstrate that training commitments are being met~~	NA	NA

CONTENT	SECTION	PAGE
IX.f. CONTRACTOR SUPPORT		
~~☐ A summary of decommissioning tasks that will be performed by contractors~~	NA	NA
~~☐ A description of the management interfaces that will be in place between the site's management and onsite supervisors, and contractor management and onsite supervisors~~	NA	NA
~~☐ A description of the oversight responsibilities and authority that the licensee will exercise over contractor personnel~~	NA	NA
~~☐ A description of the training that will be provided to contractor personnel by the licensee and the training that will be provided by the contractor~~	NA	NA
~~☐ A commitment that the contractor will comply with all radiation safety and license requirements at the facility~~	NA	NA
X. HEALTH AND SAFETY PROGRAM DURING DECOMMISSIONING: RADIATION SAFETY CONTROLS AND MONITORING FOR WORKERS *Matters in this section are addressed by the DOE procedures identified in Section 1.7.*		
X.a. AIR SAMPLING PROGRAM		
~~☐ A description which demonstrates that the air sampling program is representative of the workers breathing zones~~	NA	NA
~~☐ A description of the criteria which demonstrates that air samplers with appropriate sensitivities will be used, and that samples will be collected at appropriate frequencies~~	NA	NA
~~☐ A description of the conditions under which air monitors will be used~~	NA	NA
~~☐ A description of the criteria used to determine the frequency of calibration of the flow meters on the air samplers~~	NA	NA
~~☐ A description of the action levels for air sampling results~~	NA	NA
~~☐ A description of how minimum detecTable activities (MDA) for each specific radionuclide that may be collected in air samples are determined~~	NA	NA
X.b. RESPIRATORY PROTECTION PROGRAM		
~~☐ A description of the process controls, engineering controls, or procedures to control concentrations of radioactive materials in air~~	NA	NA

CONTENT	SECTION	PAGE
~~A description of the evaluation which will be performed when it is not practical to apply engineering controls or procedures~~	NA	NA
~~A description of the considerations used which demonstrates respiratory protection equipment is appropriate for a specific task based on the guidance on assigned protection factors~~	NA	NA
~~A description of the medical screening and fit testing required before workers will use any respirator that is assigned a protection factor~~	NA	NA
~~A description of the written procedures maintained to address all the elements of the respiratory protection program~~	NA	NA
~~A description of the use, maintenance, and storage of respiratory protection devices~~	NA	NA
~~A description of the respiratory equipment users training program~~	NA	NA
~~A description of the considerations made when selecting respiratory protection equipment~~	NA	NA
X.c. INTERNAL EXPOSURE DETERMINATION		
~~A description of the monitoring to be performed to determine worker exposure~~	NA	NA
~~A description of how worker intakes are determined using measurements of quantities of radionuclides excreted from, or retained in the human body~~	NA	NA
~~A description of how worker intakes are determined by measurements of the concentrations of airborne radioactive materials in the workplace~~	NA	NA
~~A description of how worker intakes for an adult, a minor, and a declared pregnant woman (DPW) are determined using any combination of the measurements above, as may be necessary~~	NA	NA
~~A description of how worker intakes are converted into committed effective dose equivalent~~	NA	NA
X.d. EXTERNAL EXPOSURE DETERMINATION		
~~A description of the individual monitoring devices which will be provided to workers~~	NA	NA
~~A description of the type, range, sensitivity, and accuracy of each individual monitoring device~~	NA	NA

CONTENT	SECTION	PAGE
~~A description of the use of extremity and whole body monitors when the external radiation field is non-uniform~~	NA	NA
~~A description of when audible-alarm dosimeters and pocket dosimeters will be provided~~	NA	NA
~~A description of how external dose from airborne radioactive material is determined~~	NA	NA
~~A description of the procedure to insure that surveys necessary to supplement personnel monitoring are performed~~	NA	NA
~~A description of the action levels for worker's external exposure, and the technical bases and actions to be taken when they are exceeded~~	NA	NA
X.e. SUMMATION OF INTERNAL AND EXTERNAL EXPOSURES		
~~A description of how the internal and external monitoring results are used to calculate TODE and TEDE doses to occupational workers~~	NA	NA
~~A description of how internal doses to the embryo/fetus, which is based on the intake of an occupationally exposed DPW will be determined~~	NA	NA
~~A description of the monitoring of the intake of a DPW, if determined to be necessary~~	NA	NA
~~A description of the program for the preparation, retention, and reporting of records for occupational radiation exposures~~	NA	NA
X.f. CONTAMINATION CONTROL PROGRAM		
~~A description of the written procedures to control access to, and stay time in, contaminated areas by workers, if they are needed~~	NA	NA
~~A description of surveys to supplement personnel monitoring for workers during routine operations, maintenance, clean-up activities, and special operations~~	NA	NA
~~A description of the surveys which will be performed to determine the baseline of background radiation levels and radioactivity from natural sources for areas where decommissioning activities will take place~~	NA	NA
~~A description in matrix or Tableular form which describes contamination action limits (that is, actions taken to either decontaminate a person, place, or area, restrict access, or modify the type or frequency of radiological monitoring)~~	NA	NA

CONTENT	SECTION	PAGE
☐ ~~A description (included in the matrix or Table mentioned above) of proposed radiological contamination guidelines for specifying and modifying the frequency for each type of survey used to assess the reduction of total contamination~~	NA	NA
☐ ~~A description of the procedures used to test sealed sources, and to insure that sealed sources are leaked tested at appropriate intervals~~	NA	NA
X.g. INSTRUMENTATION PROGRAM		
☐ ~~A description of the instruments to be used to support the health and safety program~~	NA	NA
☐ ~~A description of instrumentation storage, calibration, and maintenance facilities for instruments used in field surveys~~	NA	NA
☐ ~~A description of the method used to estimate the MDC or MDA (at the 95 percent confidence level) for each type of radiation to be detected~~	NA	NA
☐ ~~A description of the instrument calibration and quality assurance procedures~~	NA	NA
☐ ~~A description of the methods used to estimate uncertainty bounds for each type of instrumental measurement~~	NA	NA
☐ ~~A description of air sampling calibration procedures or a statement that the instruments will be calibrated by an accredited laboratory~~	NA	NA
X.h. NUCLEAR CRITICALITY SAFETY		
☐ ~~A description of how the NCS functions, including management responsibilities and technical qualifications of safety personnel, will be maintained when needed throughout the decommissioning process~~	NA	NA
☐ ~~A description of how an awareness of procedures and other items relied on for safety will be maintained throughout decommissioning among all personnel, with access to systems that may contain fissionable material in sufficient amounts for criticality~~	NA	NA
☐ ~~A summary of the review of NCSA's or the ISA indicating either that the process needs no new safety procedures or requirements, or that new requirements or analysis have been performed~~	NA	NA
☐ ~~A summary of any generic NCS requirements to be applied to general decommissioning, decontamination, or dismantlement operations, including those dealing with systems that may unexpectedly contain fissionable material~~	NA	NA

CONTENT	SECTION	PAGE
X.i. HEALTH PHYSICS AUDITS, INSPECTIONS, AND RECORDKEEPING PROGRAM		
~~A general description of the annual program review conducted by executive management~~	NA	NA
~~A description of the records to be maintained of the annual program review and executive audits~~	NA	NA
~~A description of the types and frequencies of surveys and audits to be performed by the RSO and RSO staff~~	NA	NA
~~A description of the process used in evaluating and dealing with violations of NRC requirements or license commitments identified during audits~~	NA	NA
~~A description of the records maintained of RSO audits~~	NA	NA
XI. ENVIRONMENTAL MONITORING AND CONTROL PROGRAM *Matters in this section are to be addressed by the DOE procedures identified in Section 1.8.*		
XI.a. ENVIRONMENTAL ALARA EVALUATION PROGRAM		
~~A description of ALARA goals for effluent control~~	NA	NA
~~A description of the procedures, engineering controls, and process controls to maintain doses ALARA~~	NA	NA
~~A description of the ALARA reviews and reports to management~~	NA	NA
XI.b. EFFLUENT MONITORING PROGRAM		
~~A demonstration that background and baseline concentrations of radionuclides in environmental media have been esTablelished through appropriate sampling and analysis~~	NA	NA
~~A description of the known or expected concentrations of radionuclides in effluents~~	NA	NA
~~A description of the physical and chemical characteristics of radionuclides in effluents~~	NA	NA
~~A summary or diagram of all effluent discharge locations~~	NA	NA
~~A demonstration that samples will be representative of actual releases~~	NA	NA
~~A summary of the sample collection and analysis procedures~~	NA	NA
~~A summary of the sample collection frequencies~~	NA	NA

CONTENT	SECTION	PAGE
~~A description of the environmental monitoring recording and reporting procedures~~	NA	NA
~~A description of the quality assurance program to be established and implemented for the effluent monitoring program~~	NA	NA
XI.c. EFFLUENT CONTROL PROGRAM		
~~A description of the controls that will be used to minimize releases of radioactive material to the environment~~	NA	NA
~~A summary of the action levels and a description of the actions to be taken should a limit be exceeded~~	NA	NA
~~A description of the leak detection systems for ponds, lagoons, and tanks~~	NA	NA
~~A description of the procedures to ensure that releases to sewer systems are controlled and maintained to meet the requirements of 10 CFR 20.2003~~	NA	NA
~~A summary of the estimates of doses to the public from effluents and a description of the method used to estimate public dose~~	NA	NA
XII. RADIOACTIVE WASTE MANAGEMENT PROGRAM *Matters in this section are to be addressed by the DOE procedures identified in Section 1.9.*		
XII.a. SOLID RADWASTE		
~~A summary of the types of solid radwaste that are expected to be generated during decommissioning operations~~	NA	NA
~~A summary of the estimated volume, in cubic feet, of each solid radwaste type summarized in Line 1 above~~	NA	NA
~~A summary of the radionuclides (including the estimated activity of each radionuclide) in each estimated solid radwaste type summarized in Line 1 above~~	NA	NA
~~A summary of the volumes of Class A, B, C, and Greater-than-Class-C solid radwaste that will be generated by decommissioning operations~~	NA	NA
~~A description of how and where each of the solid radwaste summarized in Line 1 above will be stored onsite prior to shipment for disposal~~	NA	NA

CONTENT	SECTION	PAGE
~~☐ A description of how the each of the solid radwastes summarized in Line 1 above will be treated and packaged to meet disposal site acceptance criteria prior to shipment for disposal~~	NA	NA
~~☐ If appropriate, how the licensee intends to manage volumetrically contaminated material~~	NA	NA
☐ A description of how the licensee will prevent contaminated soil, or other loose solid radwaste, from being re-disbursed after exhumation and collection	7.2.2	7-6
~~☐ The name and location of the disposal facility that the licensee intends to use for each solid radwaste type summarized in Line 1 above~~	NA	NA
XII.b. LIQUID RADWASTE		
~~☐ A summary of the types of liquid radwaste that are expected to be generated during decommissioning operations~~	NA	NA
~~☐ A summary of the estimated volume, in liters, of each liquid radwaste type summarized in Line 1 above~~	NA	NA
~~☐ A summary of the radionuclides (including the estimated activity of each radionuclide) in each liquid radwaste type summarized in Line 1 above~~	NA	NA
~~☐ A summary of the estimated volumes of Class A, B, C, and Greater-than-Class-C liquid radwaste that will be generated by decommissioning operations~~	NA	NA
~~☐ A description of how and where each of the liquid radwastes summarized in Line 1 above will be stored onsite prior to shipment for disposal~~	NA	NA
~~☐ A description of how the each of the liquid radwastes summarized in Line 1 above will be treated and packaged to meet disposal site acceptance criteria prior to shipment for disposal~~	NA	NA
~~☐ The name and location of the disposal facility that the licensee intends to use for each liquid radwaste type summarized in Line 1 above~~	NA	NA
XII.c. MIXED WASTE		
~~☐ A summary of the types of solid and liquid mixed waste that are expected to be generated during decommissioning operations~~	NA	NA

CONTENT	SECTION	PAGE
☐ ~~A summary of the estimated volumes in cubic feet of each solid mixed waste type summarized in Line 1 above, and in liters for each liquid mixed waste~~	NA	NA
☐ ~~A summary of the radionuclides (including the estimated activity of each radionuclide) in each type of mixed waste type summarized in Line 1 above~~	NA	NA
☐ ~~A summary of the estimated volumes of Class A, B, C, and Greater than Class C mixed waste that will be generated by decommissioning operations~~	NA	NA
☐ ~~A description of how and where each of the mixed wastes summarized in Line 1 above will be stored onsite prior to shipment for disposal~~	NA	NA
☐ ~~A description of how the each of the mixed wastes summarized in Line 1 above will be treated and packaged to meet disposal site acceptance criteria prior to shipment for disposal~~	NA	NA
☐ ~~The name and location of the disposal facility that the licensee intends to use for each mixed waste type summarized in Line 1 above~~	NA	NA
☐ ~~A discussion of the requirements of all other regulatory agencies having jurisdiction over the mixed waste~~	NA	NA
☐ ~~A demonstration the that the licensee possesses the appropriate EPA or State permits to generate, store, and/or treat the mixed wastes~~	NA	NA
XIII. QUALITY ASSURANCE PROGRAM *This section focuses on characterization surveys, the final status survey, engineering data, calculations, and dose modeling.*		
XIII.a. ORGANIZATION		
☐ A description of the QA program management organization	8.1 Figure 8-1	8-2 8-2
☐ A description of the duties and responsibilities of each unit within the organization and how delegation of responsibilities is managed within the decommissioning program	8.1.1 8.1.2	8-3 8-4
☐ A description of how work performance is evaluated	8.2	8-4
☐ A description of the authority of each unit within the QA program	8.1.1 8.1.2	8-3 8-4
☐ An organization chart of the QA program organization	Figure 8-1	8-2

CONTENT	SECTION	PAGE
XIII.b. QUALITY ASSURANCE PROGRAM		
☐ A commitment that activities affecting the quality of site decommissioning will be subject to the applicable controls of the QA program and activities covered by the QA program are identified on program defining documents	8.3.1	8-7
☐ A brief summary of the company's [DOE's] corporate QA policies	8.3.1	8-7
☐ A description of provisions to ensure that technical and quality assurance procedures required to implement the QA program are consistent with regulatory, licensing, and QA program requirements and are properly documented and controlled	8.3	8-6
☐ A description of the management reviews, including the documentation of concurrence in these quality-affecting procedures	8.1.1 8.2.1 8.2.2	8-3 8-5 8-6
☐ A description of the quality-affecting procedural controls of the principal contractors	8.2.1 8.2.2 8.2.3 8.3.2	8-4 8-5 8-6 8-7
☐ A description of how NRC will be notified of changes (a) for review and acceptance in the accepted description of the QA program as presented or referenced in the DP before implementation and (b) in organizational elements within 30 days after the announcement of the changes	8.3.1	8-7
☐ A description is provided of how management regularly assesses the scope, status, adequacy, and compliance of the QA program	8.8	8-12
☐ A description of the instruction provided to personnel responsible for performing activities affecting quality	8.2.1 8.2.2 8.2.3 8.3.2	8-4 8-5 8-6 8-8
☐ A description of the training and qualifications of personnel verifying activities	8.3.1	8-7
☐ For formal training and qualification programs, documentation includes the objectives and content of the program, attendees, and date of attendance	8.9	8-13
☐ A description of the self-assessment program to confirm that activities affecting quality comply with the QA program	8.8	8-13
☐ A commitment that persons performing self-assessment activities are not to have direct responsibilities in the area they are assessing	8.8	8-13

CONTENT	SECTION	PAGE
☐ A description of the organizational responsibilities for ensuring that activities affecting quality are (a) prescribed by documented instructions, procedures, and drawings and (b) accomplished through implementation of these documents	8.1.1 8.1.2	8-3 8-4
☐ A description of the procedures to ensure that instructions, procedures, and drawings include quantitative acceptance criteria and qualitative acceptance criteria for determining that important activities have been satisfactorily performed	8.3.1	8-7
XIII.c. DOCUMENT CONTROL		
☐ A summary of the types of QA documents that are included in the program	8.4	8-11
☐ A description of how the licensee develops, issues, revises, and retires QA documents	8.4	8-11
XIII.d. CONTROL OF MEASURING AND TEST EQUIPMENT		
☐ A summary of the test and measurement equipment used in the program	8.5	8-12
☐ A description of how and at what frequency the equipment will be calibrated	8.5 9.4.3	8-12 9-11
☐ A description of the daily calibration checks that will be performed on each piece of test or measurement equipment	8.5	8-12
☐ A description of the documentation that will be maintained to demonstrate that only properly calibrated and maintained equipment was used during the decommissioning	8.5	8-12
XIII.e. CORRECTIVE ACTION		
☐ A description of the corrective action procedures for the facility, including a description of how the corrective action is determined to be adequate	8.7	8-12
☐ A description of the documentation maintained for each corrective action and any follow-up activities by the QA organization after the corrective action is implemented	8.7	8-12
XIII.f. QUALITY ASSURANCE RECORDS		
☐ A description of the manner in which the QA records will be managed	8.9	8-13
☐ A description of the responsibilities of the QA organization	8.1.1	8-3

CONTENT	SECTION	PAGE
A description of the QA records storage facility	8.9	8-14
XIII.g. AUDITS AND SURVEILLANCES		
A description of the audit program	8.8	8-14
A description of the records and documentation generated during the audits and the manner in which the documents are managed	8.8	8-14
A description of all follow-up activities associated with audits or surveillances	8.8	8-14
A description of the trending/tracking that will be performed on the results of audits and surveillances	8.8	8-14
XIV. FACILITY RADIATION SURVEYS		
XIV.a. RELEASE CRITERIA		
The Phase 1 DP focuses on DCGLs for surface soil. subsurface soil, and streambed sediment. DCGLs are provided in Section 5 only to avoid duplication. Note that cleanup goals below the DCGLs are specified in Section 5 in Table 5-14 on page 5-61 – these are the criteria to be used for remediation activities in Phase 1.		
A summary Table or list of the $DCGL_W$ for each radionuclide and impacted media of concern *[Table 5-14 provides the cleanup goals.]*	Table 5-14	5-62
If Class 1 survey units are present, a summary Table or list of area factors that will be used for determining a $DCGL_{EMC}$ for each radionuclide and media of concern	Table 9-1 Table 9-2 Table 9-3	9-3 9-3 9-4
If Class 1 survey units are present, the $DCGL_{EMC}$ values for each radionuclide and medium of concern	Table 5-14	5-62
If multiple radionuclides are present, the appropriate $DCGL_W$ for the survey method to be used *[A $DCGL_W$ for a surrogate radionuclide will be developed if practicable after additional characterization data are obtain during Phase 1 decommissioning activities.]*	NA	NA
XIV.b. CHARACTERIZATION SURVEYS		
A description and justification of the survey measurements for impacted media	9.2.4 9.4 9.7	9-6 9-8 9-30
A description of the field instruments and methods that were used for measuring concentrations and the sensitivities of those instruments and methods	9.4 Table 9-4	9-11 9-11

CONTENT	SECTION	PAGE
☐ A description of the laboratory instruments and methods that were used for measuring concentrations and the sensitivities of those instruments and methods	9.4.1 9.4.3 Table 9-5	9-11 9-15 9-12
☐ The survey results, including tables or charts of the concentrations of residual radioactivity measured *[The report of additional characterization to be performed early in Phase 1 of the decommissioning will present data in tables and figures similar to those in Section 2 and Section 4.]*	Table 2-10 Table 2-19 Table 4-3 Table 4-4 Table 4-5 Table 4-6 Table 4-8 Table 4-9	2-18 2-43 4-15 4-16 4-16 4-17 4-19 4-21
☐ Maps or drawings of the site, area, or building, showing areas classified as non-impacted or impacted *[The drawings provided in Section 4 will be confirmed or revised when additional characterization data become available early in Phase 1 of the decommissioning.]*	Figure 4-1 Figure 4-2 Figure 4-3 Figure 4-4 Figure 4-5	4-7 4-8 4-9 4-10 4-11
☐ Justification for considering areas to be non-impacted *[The justification provided in Section 4 will be confirmed or revised when additional characterization data become available early in Phase 1 of the decommissioning.]*	4.1.3	4-12
☐ A discussion of why the licensee considers the characterization survey to be adequate to demonstrate that it is unlikely that significant quantities of residual radioactivity have gone undetected *[The subsections of Section 9.7 provide justification for both previous and planned characterization measurements by WMA.]*	9.7	9-30
☐ For areas and surfaces that are inaccessible or not readily accessible, a discussion of how they were surveyed or why they did not need to be surveyed	9.7.1	9-32
☐ For sites, areas, or buildings with multiple radionuclides, a discussion justifying the ratios of radionuclides that will be assumed in the final status survey or an indication that no fixed ratio exists and each radionuclide will be measured separately	9.4.1	9-9
XIV.c. IN-PROCESS SURVEYS		
☐ A description of field screening methods and instrumentation	9.5	9-20
☐ A demonstration that field screening should be capable of detecting residual radioactivity at the DCGL *[As indicated in Section 9.5, methods and instruments for in-process surveys will be similar to those used during characterization and final status surveys. The field instruments suitable for scanning soil will not be able to detect non-gamma emitting radionuclides.]*	9.5 Table 9-7	9-20 9-21

CONTENT	SECTION	PAGE
XIV.d. FINAL STATUS SURVEY DESIGN		
Phase 1 final status surveys will be performed in cases where the decommissioning activities will make an area inaccessible for later final status surveys and confirmatory surveys. These surveys will be managed as final status surveys although a potential for recontamination may exist in certain areas. Details will be provided in the Phase 1 Final Status Survey Plan. Appendix G describes the conceptual framework for the Phase 1 Final Status Survey Plan.		
A brief overview describing the final status survey design	9.6.1	9-24
A description and map or drawing of impacted areas of the site, area, or building classified by residual radioactivity levels (Class 1, 2, or 3) and divided into survey units with an explanation of the basis for division into survey units *[Survey units will be specified in the Final Status Survey Plan as indicated in Section 9.6.1 on page 9-17.]*	9.6.1	9-24
A description of the background reference areas and materials, if they will be used, and a justification for their selection *[Details will appear in the Final Status Survey Plan.]*	9.6.1	9-25
A summary of the statistical tests that will be used to evaluate the survey results *[Details will appear in the Final Status Survey Plan.]*	9.3 9.6.1	9-8 9-28
A description of scanning instruments, methods, calibration, operational checks, coverage, and sensitivity for each media and radionuclide	Table 9-8 9.6.1	9-26 9-26
For in-situ sample measurements made by field instruments, a description of the instruments, calibration, operational checks, sensitivity, and sampling methods, with a demonstration that the instruments and methods have adequate sensitivity *[The only field instruments planned for use are the instruments in Table 9-5 on page 9-18.]*	Table 9-8 9.6.1	9-26 9-26
A description of the analytical instruments for measuring samples in the laboratory, as well as calibration, sensitivity, and methods with a demonstration that the instruments and methods have adequate sensitivity	9.6.1 Table 9-5	9-26 9-12
A description of how the samples to be analyzed in the laboratory will be collected, controlled, and handled	9.6.1	9-27
A description of the final status survey investigation levels and how they were determined	Appen G	G-9
A summary of any significant additional residual radioactivity that was not accounted for during site characterization	9.6.1	9-24

CONTENT	SECTION	PAGE
☐ A summary of direct measurement results and/or soil concentration levels in units that are comparable to the DCGL, and if data is used to estimate or update the survey unit	9.6.1	9-28
☐ A summary of the direct measurements or sample data used to both evaluate the success of remediation and to estimate the survey unit variance	9.6.1	9-28
XIV.e. FINAL STATUS SURVEY REPORT *DOE is addressing each checklist topic as a requirement for the report.*		
☐ An overview of the results of the final status survey	9.8.1	9-45
☐ A discussion of any changes that were made in the final status survey from what was proposed in the DP or other prior submittals	9.8.2	9-45
☐ A description of the method by which the number of samples was determined for each survey unit	9.8.3	9-46
☐ A summary of the values used to determine the number of samples and a justification for these values	9.8.4	9-46
☐ The survey results for each survey unit include:	9.8.5	9-46
— The number of samples taken for the survey unit;	9.8.5	9-46
— A description of the survey unit, including (a) a map or drawing of the survey unit showing the reference system and random start systematic sample locations for Class 1 and 2 survey units and random locations shown for Class 3 survey units and reference areas, and (b) a discussion of remedial actions and unique features;	9.8.5	9-46
— The measured sample concentrations in units that are comparable to the DCGL;	9.8.5	9-46
— The statistical evaluation of the measured concentrations;	9.8.5	9-46
— Judgmental and miscellaneous sample data sets reported separately from those samples collected for performing the statistical evaluation;	9.8.5	9-46
— A discussion of anomalous data, including any areas of elevated direct radiation detected during scanning that exceeded the investigation level or measurement locations in excess of $DCGL_W$; and	9.8.5	9-46

CONTENT	SECTION	PAGE
~~A description of the arrangement or contract with the entity charged with carrying out the actions necessary to maintain control at the site~~	NA	NA
~~A demonstration that the contract or arrangement will remain in effect for as long as feasible, and include provisions for renewing or replacing the contract~~	NA	NA
~~A description of the manner in which independent oversight of the entity charged with maintaining the site will be conducted and what entity will conduct the oversight~~	NA	NA
~~A demonstration that the entity providing the oversight has the authority to replace the entity charged with maintaining the site~~	NA	NA
~~A description of the authority granted to the third party to perform, or have performed, any necessary maintenance activities~~	NA	NA
~~Unless the entity is a government entity, a demonstration that the third party is not the entity holding the financial assurance mechanism~~	NA	NA
~~A demonstration that sufficient records evidencing to official actions and financial payments made by the third party are open to public inspection~~	NA	NA
~~A description of the periodic site inspections that will be performed by the third party, including the frequency of the inspections~~	NA	NA
~~A copy of the financial assurance mechanism provided by the licensee~~	NA	NA
~~A demonstration that the amount of financial assurance provided is sufficient to allow an independent third party to carry out any necessary control and maintenance activities~~	NA	NA
XVI.a.4. Obtaining Public Advice *This section does not apply because public advice is not being sought under the provisions of 10 CFR 20.1403(d) to support license termination under restricted conditions.*		
~~A description of how individuals and institutions that may be affected by the decommissioning were identified and informed of the opportunity to provide advice to the licensee~~	NA	NA
~~A description of the manner in which the licensee obtained advice from these individuals or institutions~~	NA	NA
~~A description of how the licensee provided for participation by a broad cross-section of community interests in obtaining the advice~~	NA	NA
~~A description of how the licensee provided for a comprehensive, collective discussion on the issues by the participants represented~~	NA	NA

CONTENT	SECTION	PAGE
~~A copy of the publicly available summary of the results of discussions, including individual viewpoints of the participants on the issues, and the extent of agreement and disagreement among the participants~~	NA	NA
~~A description of how this summary has been made available to the public~~	NA	NA
~~A description of how the licensee evaluated the advice, and the rationale for incorporating or not incorporating the advice from affected members of the community into the DP~~	NA	NA
XVI.a.5. Dose Modeling and ALARA Demonstration		
~~A summary of the dose to the average member of the critical group when radionuclide levels are at the DCGL with institutional controls in place, as well as the estimated doses if they are no longer in place~~	NA	NA
~~A summary of the evaluation performed pursuant to Chapter 6 of Volume 2 of this NUREG series, demonstrating that these doses are ALARA~~	NA	NA
~~If the estimated dose to the average member of the critical group could exceed 100 mrem/y (but would be less than 500 mrem/y) when the radionuclide levels are at the DCGL, a demonstration that the criteria in 10 CFR 20.1403(e) have been met~~	NA	NA
XVI.b. ALTERNATE CRITERIA		
~~A summary of the dose in TEDE(s) to the average member of the critical group when the radionuclide levels are at the DCGL (considering all man-made sources other than medical)~~	NA	NA
~~A summary of the evaluation performed pursuant to Chapter 6 of Volume 2 of this NUREG series demonstrating that these doses are ALARA~~	NA	NA
~~An analysis of all possible sources of exposure to radiation at the site and a discussion of why it is unlikely that the doses from all man-made sources, other than medical, will be more than 1 mSv/y (100 mrem/y)~~	NA	NA
~~A description of the legally enforceable institutional control(s) and an explanation of how the institutional control is a legally enforceable mechanism~~	NA	NA
~~A description of any detriments associated with the maintenance of the institutional control(s)~~	NA	NA
~~A description of the restrictions on present and future landowners~~	NA	NA

CONTENT	SECTION	PAGE
~~A description of the entities enforcing and their authority to enforce the institutional control(s)~~	NA	NA
~~A discussion of the durability of the institutional control(s)~~	NA	NA
~~A description of the activities that the party with the authority to enforce the institutional controls will undertake to enforce the institutional control(s)~~	NA	NA
~~A description of the manner in which the entity with the authority to enforce the institutional control(s) will be replaced if that entity is no longer willing or able to enforce the institutional control(s)~~	NA	NA
~~A description of the duration of the institutional control(s), the basis for the duration, the conditions that will end the institutional control(s), and the activities that will be undertaken to end the institutional control(s)~~	NA	NA
~~A description of the corrective actions that will be undertaken in the event the institutional control(s) fail~~	NA	NA
~~A description of the records pertaining to the institutional controls, how and where they will be maintained, and how the public will have access to the records~~	NA	NA
~~A description of how individuals and institutions that may be affected by the decommissioning were identified and informed of the opportunity to provide advice to the licensee~~	NA	NA
~~A description of the manner in which the licensee obtained advice from affected individuals or institutions~~	NA	NA
~~A description of how the licensee provided for participation by a broad cross-section of community interests in obtaining the advice~~	NA	NA
~~A description of how the licensee provided for a comprehensive, collective discussion on the issues by the participants represented~~	NA	NA
~~A copy of the publicly available summary of the results of discussions, including individual viewpoints of the participants on the issues and the extent of agreement and disagreement among the participants~~	NA	NA
~~A description of how this summary has been made available to the public~~	NA	NA
~~A description of how the licensee evaluated advice from individuals and institutions that could be affected by the decommissioning and the manner in which the advice was addressed~~	NA	NA

References

NRC 2006, NUREG-1757, *Consolidated Decommissioning Guidance*, Volume 1, Revision 2. U.S. Nuclear Regulatory Commission, Washington, D.C., September 2006.

NRC 2008, *Summary of a Meeting Between NRC and DOE on the WVDP Phase 1 Decommissioning Plan*, May 19, 2008.

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APPENDIX B
ENVIRONMENTAL RADIOACTIVITY DATA

PURPOSE OF THIS APPENDIX

The purpose of this appendix is to provide information on radioactivity in environmental media to supplement information in Section 4.2. This appendix discusses how radionuclide-specific and media-specific background values were developed and describes the methods used to determine whether specific areas of the site have been impacted (i.e., contain media with radioactivity concentrations in excess of background).

INFORMATION IN THIS APPENDIX

This appendix identifies locations used in establishing background radioactivity concentrations and methods used for calculating these concentrations. It also provides tables of background summary data for each environmental medium, explains methods used to evaluate concentrations exceeding background in onsite environmental media, provides tables of radionuclide ratios, and provides summary data of radioactivity concentrations and status with respect to background at onsite routine monitoring locations. Supplementary data for groundwater sampling points (e.g., location coordinates, sample depth, geologic unit) are also provided.

RELATIONSHIP TO OTHER PARTS OF THE PLAN

The information in this appendix supplements that provided in Section 4.2 and supports planning for additional characterization of soil and sediment in accordance with the Characterization Sample and Analysis Plan described in Section 9.

1.0 Locations Used for Background Calculations

Samples of surface soil, sediment, surface water, and groundwater are routinely collected from background locations (i.e., "control" or "rference" locations) as part of the WVDP *Environmental Monitoring Program Plan* (WVES 2008a) and the WVDP *Groundwater Monitoring Plan* (WVES 2008b). Environmental radiation measurements are also taken with thermoluminescent dosimeters (TLDs) at background locations as described in the *Environmental Monitoring Program Plan*. Location designators beginning with a "W" indicate a water sample. Those beginning with an "S" indicate soil or sediment samples. A designator beginning with a "D" indicates direct measurement of environmental exposure.

1.1 Surface Soil

Surface soil samples were collected annually until 2004, when the collection period was reduced to once every three years. (In 2008, the frequency was reduced further to once every five years, and sampling at most locations was discontinued.) Data from only two background locations were available. One (SFGRVAL, located at the air sampling station in Great Valley) is the primary (and current) background location. The other (SFNASHV, located at the former air sampling station at Nashville) was discontinued in 2003. (See Figure B-1.) Therefore, few data points were available to calculate surface soil backgrounds.

To increase the number of data points for estimating background radionuclide concentrations, data from soil collected at other offsite sampling locations (i.e., at perimeter locations and in the nearby communities of West Valley and Springville) were evaluated for the possibility of using data from each in soil background calculations. Data sets for each radionuclide from each soil sampling location (1995-2007) were statistically compared with the comparable data set from the primary background location, SFGRVAL, using the nonparametric Mann-Whitney U-test (Sheskin 1997). The null hypothesis being tested was that the median of the test data set was higher than the median at the reference data set (SFGRVAL) (one-tailed test, $P<0.05$). The results are summarized in Table B-1 below, with the sample locations shown in Figure B-1 or B-2. (Note that, at the 0.05 level, the possibility of making an incorrect decision regarding the status of the location with respect to background could have occurred by chance alone five percent of the time.)

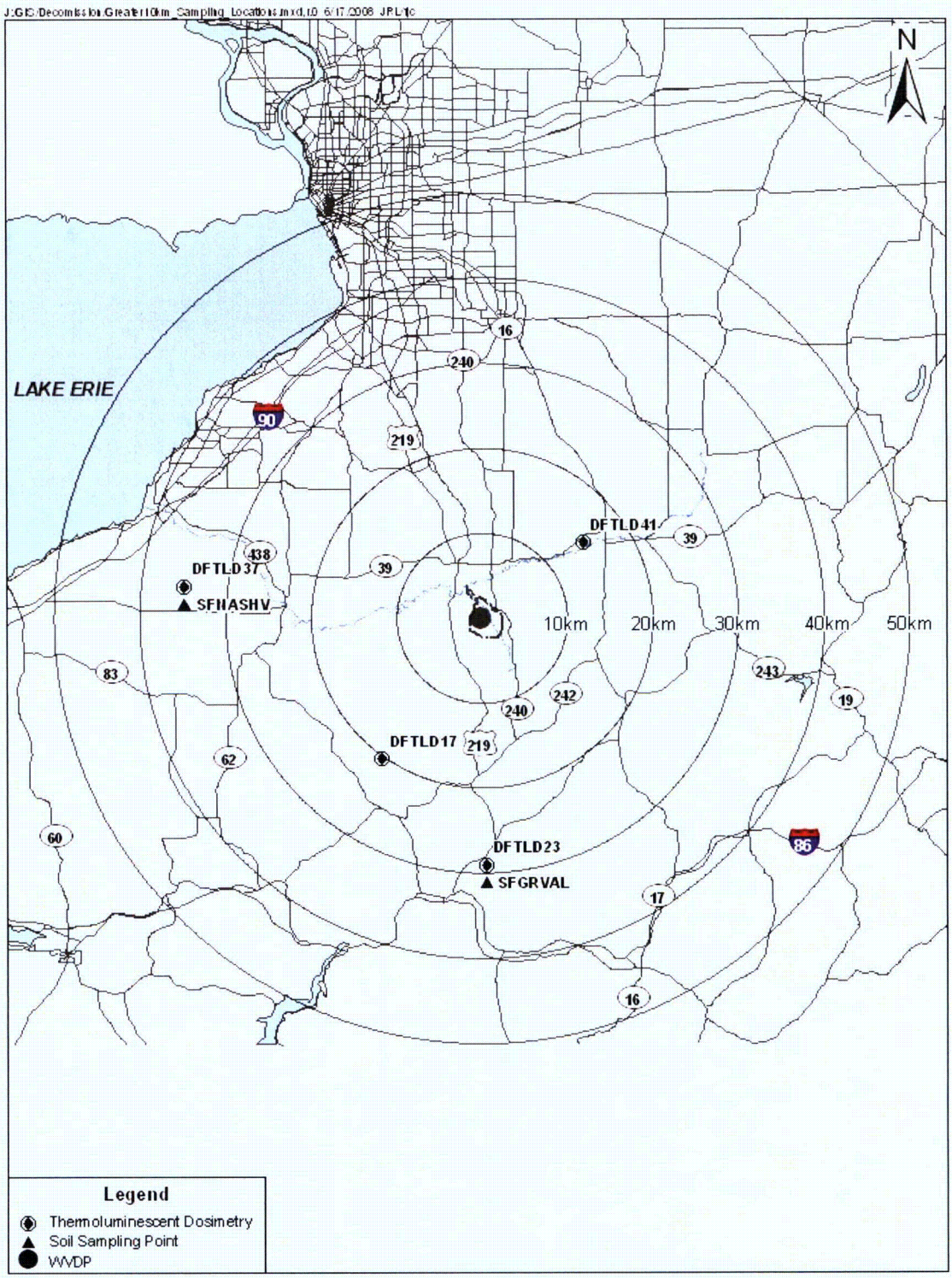

Figure B-1. Background Sampling Locations More Than 10 Kilometers From the WVDP

Table B-1. Summary of Comparisons of Radionuclide Data from Test Surface Soil Locations vs. SFGRVAL Background

Location	Radionuclide Measurement										
	Gross alpha	Gross Beta	Sr-90	Cs-137	U-232	U-233/ 234	U-235/ 236	U-238	Pu-238	Pu-239/ 240	Am-241
SFGRVAL vs.											
SFNASHV	NS	NS	NS	NS	---	---	---	---	NS	NS	NS
SFFXVRD	NS	NS	NS	NS	---	---	---	---	NS	NS	NS
SFTCORD	NS	**Higher**	NS	NS	---	---	---	---	NS	NS	NS
SFRT240	NS	NS	NS	NS	---	---	---	---	NS	NS	NS
SFSPRVL	NS	NS	NS	NS	---	---	---	---	NS	NS	NS
SFWEVAL	NS	NS	NS	NS	---	---	---	---	NS	NS	NS
SFBOEHN	NS	NS	NS	NS	NS	**Higher**	NS	NS	NS	NS	NS
SFRSPRD	NS	NS	NS	**Higher**	NS	NS	NS	NS	NS	NS	NS
SFBLKST	NS	**Higher**	NS	NS	---	---	---	---	NS	NS	NS

KEY: **Higher** = Null hypothesis was not rejected; results higher than background ($P<0.05$).
NS = Null hypothesis was rejected; results were not significantly higher than background.
--- = Constituent was not measured at this location.

LOCATION CODES: SFGRVAL = Background at Great Valley;
SFNASHV = Background at Nashville in the town of Hanover;
SFTCORD = Perimeter at Thomas Corners Road;
SFRT240 = Perimeter at Route 240;
SFSPRVL = Community at Springville;
SFWEVAL = Community at West Valley;
SFBOEHN = Perimeter at Boehn Road;
SFRSPRD = Perimeter at Rock Springs Road;
SFBLKST = Perimeter at Bulk Storage Warehouse.
(Location SFNASHV was discontinued in 2003; locations SFTCORD, SFBOEHN, and SFBLKST were discontinued 2005.)
See Figures B-1 and B-2 for sample locations.

If data were determined not to be statistically higher than background (i.e., unlikely to have been impacted by the WVDP, indicated by "NS" results in the above table), the data were pooled with data from Great Valley and included in background calculations.

As discussed in Section 4.2.1 of this plan, data were extracted from the WVDP Laboratory Information Management System. Samples from which the data were taken had been collected and analyzed in accordance with controlled sampling plans and defined quality assurance protocols. All data used for background calculations were independently validated and approved.

Although not all analyses were performed by the same laboratories over the years, before a laboratory was awarded a contract, analytical procedures were reviewed, laboratories were audited by WVDP personnel familiar with radioanalytical methods, and

performance on proficiency samples for the radionuclides of interest were examined for acceptability. Analysis of alpha-emitting radionuclides – U-232, U-233/234, U-235/236, U-238, Pu-238, Pu-239/240, and Am-241 – was done by alpha spectrometry to meet contractual detection limits. After contracts were awarded, laboratories were contractually required to participate in formal crosscheck programs and perform acceptably. During the term of the contracts, laboratories were routinely audited by WVDP personnel to ensure that contractually required standards were maintained.

1.2 Subsurface soil

Data from only two boreholes (BH-38 on the north plateau and BH-39 on the south plateau) were available for this calculation when Revision 0 to this plan was prepared. The boreholes were driven into areas of the WVDP classified as non-impacted as part of a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) soil characterization study in 1993. (See Figure B-3.) Although samples were taken from three depths at each borehole, the surficial samples (0-2 feet depth) were classified as surface soil for the purposes of this plan. Therefore, only two samples from each borehole, a total of four samples, were classified as subsurface soil. Although subsurface soil background values were calculated from these four data points, they were not used initially as reference values because there were too few points. Instead, surface soil background results were used to evaluate the presence of radionuclide concentrations in excess of background in subsurface soil samples.

In 2008, subsurface soil background locations in the sand and gravel and unweathered Lavery till geological units underlying the site were sampled as part of the North Plateau Characterization Program (Michalczak 2007, Klenk 2008). Results from the sand and gravel and unweathered Lavery till samples were statistically indistinguishable, so all were combined, together with the 1993 results, to produce a subsurface soil background for the site.

1.3 Surface Water and Sediment

The routine Environmental Monitoring Program background locations were used as the source of background data. Both surface water and sediment background data were taken from samples collected at Buttermilk Creek upstream of the WVDP (surface water monitoring point WFBCBKG and sediment monitoring point SFBCSED) and at Bigelow Bridge on Cattaraugus Creek upstream of the point where Buttermilk Creek, containing effluent from the WVDP, flows into Cattaraugus Creek (surface water point WFBIGBR and sediment point SFBISED). (See Figure B-2.)

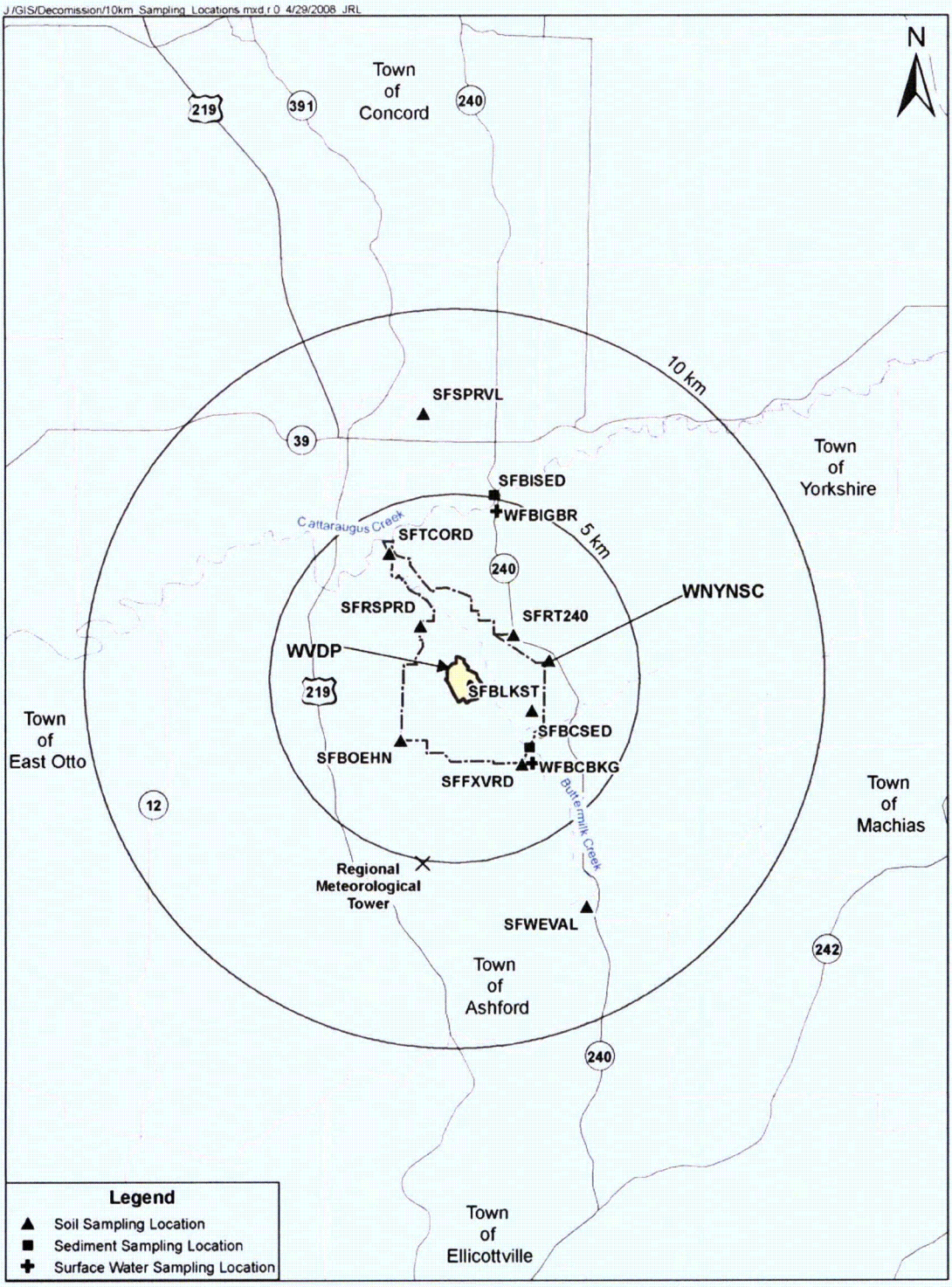

Figure B-2. Sampling Locations Within 10 Kilometers of the WVDP Used for Background Calculations

1.4 Groundwater

The routine background locations from the Groundwater Monitoring Program were used as the source of background data. (See Figure B-3.) Radionuclide concentrations were taken from monitoring wells WNWNB1S, WNW0204, WNW0301, WNW0401, WNW0405, WNW0706, WNW0901, and WNW0908, which serve(d) as upgradient reference locations for the following geologic units: the sand and gravel (S&G) unit (WNWNB1S, WNW0301, WNW0401, and WNW0706); the Lavery till sand (LTS) unit (WNW0204); the unweathered Lavery till (ULT) unit (WNW0405); the Kent recessional sequence (KRS) unit (WNW0901); and the weathered Lavery till (WLT) unit (WNW0908).

Because few background data points were available for most radionuclides in groundwater and no background isotopic data (or very limited data) were available for groundwater from some of the geological units (e.g., the Lavery till sand and the Kent recessional sequence), data sets for the various units were combined to calculate one overall site groundwater background value for each radionuclide. Potential implications of pooling the data were considered to be minimal because most of the data sets were comprised largely of nondetect values as shown in Table B-7, and because, when positive detects were noted (with the exception of naturally occurring radionuclides), they were usually below (or slightly higher than) the contractual detection limits.

1.5 Gamma Radiation Measurements From TLDs

TLD data were taken from four background locations (three no longer active) over the 1986-2007 time period. (See Figure B-1.) Measurements were taken at:

(1) The current background location (DFTLD23), located 18 miles (29 km) south of the WVDP at the Great Valley air sampler;

(2) The five-points landfill (DFTLD17), located 12 miles (19 km) southwest of the Site;

(3) The former air sampling location at Nashville in the town of Hanover (DFTLD37), located 23 miles (37 km) northwest of the Site; and

(4) Sardinia-Savage Road (DFTLD41), 15 miles (24 km) northeast of the Site.

Quarterly exposure rates (in mR/qtr) and hourly exposure rates (in mR/h) were calculated.

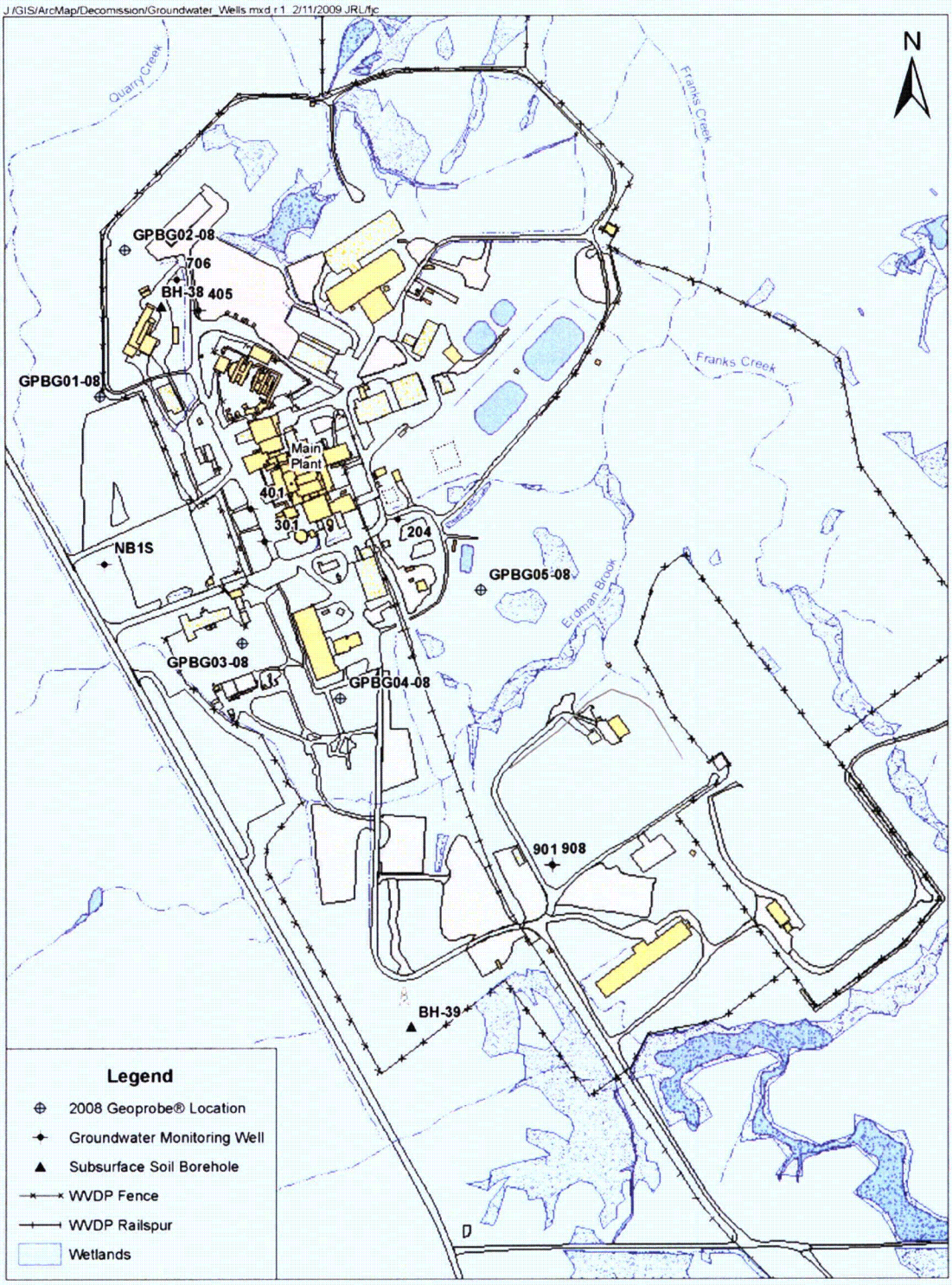

Figure B-3. Onsite Groundwater and Subsurface Soil Locations Used as Background

2.0 Methods Used for Background Calculations

Radionuclides for which backgrounds were estimated were selected with consideration of (1) radionuclides of interest from the Facility Characterization Project, as listed in Decommissioning Plan section 4.1.1, and (2) radionuclides that are routinely monitored in environmental media at the WVDP, for which sufficient data were available to develop a reliable estimate of background. (See Section 4.2.2 of this plan for a more detailed discussion of how background constituents were selected.)

Once radionuclides and locations applicable to each environmental medium had been defined, sample results were extracted from the Laboratory Information Management System database using the Environmental Affairs Trend Tool. As part of the extraction process, data from duplicate samples (i.e., separate samples of one medium collected at the same place and time; co-located samples) were combined into a single result for use in calculations, as were data from replicate samples (i.e., recounts or splits of the same sample). Calculations to combine results from duplicates and replicates, using protocols defined in controlled WVDP Procedure EM-11 (WVNSCO 2004b), were automatically done by the Environmental Affairs Trend Tool during data extraction.

Extracted data files were block copied into Microsoft Excel® spreadsheets and the information identified in Table B-2 was summarized for each environmental medium.

Table B-2. Summary Information for Environmental Medium Background Calculations

Item	Explanatory Notes
Constituent	Gross measurement, radionuclide measurement, or direct radiation measurement
Average result	In the LIMS database, individual radionuclide concentration measurements are represented by a result term plus or minus an associated uncertainty term. The average result is the direct average of result terms from all samples in the data set, including negative numbers and zeros.
Uncertainty associated with the average result	The uncertainty term associated with the average result is calculated from the sample uncertainty terms in accordance with Procedure EM-11 per the following formula: $\text{uncertainty} = \text{SQRT}((\text{uncertainty}_1^2 + \ldots + \text{uncertainty}_N^2) / N)$ where uncertainty_1 = the uncertainty term from sample 1 uncertainty_N = the uncertainty term from sample N N = the total number of samples SQRT = square root
Median	To estimate the median of each data set, each sample result±uncertainty was assigned a single result equal to the larger of the result or the uncertainty term. Using the Excel® median function, the median was selected from the set of single values. If more than half the sample results were nondetects, the median was assigned a "<" sign, indicating that the median represented a nondetect value.

Table B-2. Summary Information for Environmental Medium Background Calculations

Item	Explanatory Notes
	Note that if a data set is symmetric, the average and median will be the same. However, if the distribution is skewed to the right (that is, it contains a large number of low values and a few high values), the average will usually be higher than the median. For this reason, with asymmetrically distributed data sets (as is often the case with environmental data) the median may be the more reliable estimator of central tendency.
Maximum	The maximum was selected from only the results indicating that activity had been detected. If no activity had been detected in any of the samples from that data set, the maximum was set equal to the highest uncertainty term and assigned a "<" sign, indicating that it was a nondetect.
N	Total number of samples. (Duplicate samples were counted as one, as were replicate samples.)
% NDs	If the uncertainty term for a sample was larger than the result (i.e., the range around the result term included zero), the radionuclide was considered not detected (ND) in that sample. Total number of ND samples divided by the total number of samples was expressed as a percentage.
Years	The period of years from which the data set was taken.
Data source locations	A listing of the sampling locations from which background data were taken.

Soil and sediment data, as extracted from the Laboratory Information Management System, were in units of µCi/g (dry weight). Surface water and groundwater data were in units of µCi/mL. All calculations were performed in units as extracted from the Laboratory Information Management System. Environmental dosimetry readings were in mR/qtr. For comparisons with onsite sample results, background data were then converted to the units specified in the Decommissioning Plan using the following conversion factors:

Soil and sediment: 1 µCi/g = 1E+06 pCi/g

Water: 1 µCi/mL = 1E+09 pCi/L

3.0 Background Summary Data for Each Environmental Medium

Summary tables of background values (in units of pCi/g per unit dry weight [soil or sediment], pCi/L [surface water and groundwater], or mR/quarter [environmental exposure]) used to evaluate data from onsite sampling locations are presented in the following tables.

Table B-3. Surface Soil Background Radionuclide Concentrations for the WVDP[1],[2]

Constituent	Avg. Concentration (pCi/g) Result ± Uncertainty	Median (pCi/g)	Maximum (pCi/g)	N	% NDs	Years	Data Source Locations
Gross alpha	1.34E+01 ± 3.58E+00	1.29E+01	2.73E+01	104	0%	1995-2007	SFGRVAL, SFNASHV, SFFXVRD, SFTCORD, SFRT240, SFSPRVL, SFWEVAL, SFBOEHN, SFRSPRD, SFBLKST
Gross beta	2.03E+01 ± 3.11E+00	2.00E+01	4.00E+01	84	0%	1995-2007	SFGRVAL, SFNASHV, SFFXVRD, SFRT240, SFSPRVL, SFWEVAL, SFBOEHN, SFRSPRD
Sr-90	1.51E-01 ± 1.46E-01	9.48E-02	3.10E+00	104	25%	1995-2007	SFGRVAL, SFNASHV, SFFXVRD, SFTCORD, SFRT240, SFSPRVL, SFWEVAL, SFBOEHN, SFRSPRD, SFBLKST
Cs-137	4.50E-01 ± 6.68E-02	4.17E-01	1.21E+00	93	0%	1995-2007	SFGRVAL, SFNASHV, SFFXVRD, SFTCORD, SFRT240, SFSPRVL, SFWEVAL, SFBOEHN, SFBLKST
U-232	5.52E-03 ± 2.80E-02	< 2.35E-02	1.89E-02	32	97%	1995-2007	SFGRVAL, SFBOEHN, SFRSPRD
U-233/234	7.79E-01 ± 1.15E-01	7.88E-01	9.39E-01	22	0%	1995-2007	SFGRVAL, SFRSPRD
U-235/236	5.98E-02 ± 3.36E-02	5.24E-02	2.18E-01	32	9%	1995-2007	SFGRVAL, SFBOEHN, SFRSPRD
U-238	7.79E-01 ± 1.13E-01	7.87E-01	9.31E-01	32	0%	1995-2007	SFGRVAL, SFBOEHN, SFRSPRD
Pu-238	5.39E-03 ± 1.38E-02	< 1.21E-02	4.02E-02	92	86%	1996-2007	SFGRVAL, SFNASHV, SFFXVRD, SFTCORD, SFRT240, SFSPRVL, SVWEVAL, SFBOEHN, SFRSPRD, SFBLKST
Pu-239/240	2.01E-02 ± 1.79E-02	1.55E-02	2.34E-01	104	44%	1995-2007	SFGRVAL, SFNASHV, SFFXVRD, SFTCORD, SFRT240, SFSPRVL, SFWEVAL, SFBOEHN, SFRSPRD, SFBLKST
Am-241	1.45E-02 ± 1.92E-02	< 1.62E-02	1.93E-01	104	64%	1995-2007	SFGRVAL, SFNASHV, SFFXVRD, SFTCORD, SFRT240, SFSPRVL, SFWEVAL, SFBOEHN, SFRSPRD, SFBLKST

LEGEND: N = Number of samples
ND = Nondetect

NOTES: (1) Soil samples collected at air samplers at background locations (SFGRVAL = Great Valley; SFNASHV = Nashville), perimeter locations (SFFXVRD = Fox Valley Road; SFTCORD = Thomas Corners Road; SFRT240 = Route 240; SFBOEHN = Boehn Road; SFRSPRD = Rock Springs Road; SFBLKST = Bulk Storage Warehouse), and community locations (SFSPRVL = Springville; SFWEVAL = West Valley).

(2) Data from perimeter and community samplers were pooled with data from background locations if they were not statistically higher than background.

Table B-4. Sediment Background Radionuclide Concentrations for the WVDP[1]

Constituent	Average concentration (pCi/g)			Median (pCi/g)	Maximum (pCi/g)	N	% NDs	Years	Data Source Locations
	Result	±	Uncertainty						
Gross alpha	1.02E+01	±	3.28E+00	9.21E+00	2.18E+01	22	0%	1995-2006	SFBCSED, SFBISED
Gross beta	1.74E+01	±	3.01E+00	1.64E+01	2.71E+01	23	0%	1995-2007	SFBCSED, SFBISED
Sr-90	1.49E-02	±	4.91E-02	< 3.35E-02	1.57E-01	23	65%	1995-2007	SFBCSED, SFBISED
Cs-137	3.50E-02	±	2.50E-02	3.75E-02	7.84E-02	23	30%	1995-2007	SFBCSED, SFBISED
U-232	1.15E-02	±	5.50E-02	< 3.10E-02	3.92E-02	23	87%	1995-2007	SFBCSED, SFBISED
U-233/234	5.99E-01	±	1.19E-01	6.59E-01	8.58E-01	23	4%	1995-2007	SFBCSED, SFBISED
U-235/236	5.31E-02	±	3.67E-02	4.57E-02	2.78E-01	23	22%	1995-2007	SFBCSED, SFBISED
U-238	6.11E-01	±	1.19E-01	6.52E-01	9.01E-01	23	4%	1995-2007	SFBCSED, SFBISED
Pu-238	1.67E-02	±	1.79E-02	< 1.41E-02	1.29E-01	23	74%	1995-2007	SFBCSED, SFBISED
Pu-239/240	1.08E-02	±	1.37E-02	< 1.22E-02	6.07E-02	23	83%	1995-2007	SFBCSED, SFBISED
Am-241	1.07E-02	±	1.83E-02	< 1.41E-02	8.60E-02	23	74%	1995-2007	SFBCSED, SFBISED

LEGEND: N = Number of samples
ND = Nondetect

NOTE: (1) Sediment samples were collected at upstream sampling locations on Buttermilk Creek (SFBCSED) and Cattaraugus Creek (SFBISED).

Table B-5. Subsurface Soil Background Radionuclide Concentrations for the WVDP

Constituent	Average concentration (pCi/g) Result ± Uncertainty	Median (pCi/g)	Maximum (pCi/g)	N	% NDs	Years	Data Source Locations[1]
Gross alpha	1.20E+01 ± 4.76E+00	1.26E+01	1.69E+01	18	0%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
Gross beta	3.19E+01 ± 3.99E+00	2.86E+01	6.10E+01	18	0%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
Sr-90	1.80E-02 ± 2.59E-02	< 2.30E-02	1.24E-01	18	89%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
Cs-137	4.51E-03 ± 2.43E-02	< 2.41E-02	1.49E-01	18	94%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
U-232	-2.65E-03 ± 2.55E-02	< 2.44E-02	< 4.19E-02	18	100%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
U-233/234	6.83E-01 ± 1.19E-01	7.91E-01	1.08E+00	18	0%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
U-235/236	5.14E-02 ± 3.47E-02	4.25E-02	1.17E-01	18	33%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
U-238	7.19E-01 ± 1.22E-01	8.64E-01	1.11E+00	18	0%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
Pu-238	4.32E-04 ± 1.30E-02	< 1.15E-02	< 2.41E-02	18	100%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
Pu-239/240	1.72E-03 ± 1.19E-02	< 1.04E-02	< 1.87E-02	18	100%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)
Am-241	-1.93E-03 ± 1.07E-02	< 1.09E-02	< 1.27E-02	18	100%	1993, 2008	BH-38 and 39 (1993); GPBG01-08, GPBG02-08, GPBG03-08, GPBG04-08, and GPBG05-08 (2008)

LEGEND: N = Number of samples
ND = Nondetect

NOTE: (1) Background locations are shown on Figure B-3. After testing to ensure that subsurface soil results for the sand and gravel unit and the unweathered Lavery till were statistically indistinguishable, values were combined into a single subsurface soil background value for each radionuclide.

Table B-6. Surface Water Background Radionuclide Concentrations for the WVDP

Constituent	Average concentration (pCi/L)			Median (pCi/L)	Maximum (pCi/L)	N	% NDs	Years	Data Source Locations
	Result	±	Uncertainty						
Gross alpha	4.74E-01	±	1.28E+00	< 9.55E-01	5.43E+00	387	74%	1991-2007	WFBCBKG, WFBIGBR
Gross beta	2.64E+00	±	1.43E+00	2.34E+00	2.03E+01	388	12%	1991-2007	WFBCBKG, WFBIGBR
H-3	1.35E+01	±	8.43E+01	< 8.21E+01	6.33E+02	388	85%	1991-2007	WFBCBKG, WFBIGBR
C-14	1.19E+01	±	4.44E+01	< 1.33E+01	4.05E+02	68	81%	1991-2007	WFBCBKG
Sr-90	2.00E+00	±	1.61E+00	9.04E-01	1.23E+01	251	47%	1991-2007	WFBCBKG, WFBIGBR
Tc-99	-4.40E-01	±	1.80E+00	< 1.80E+00	7.25E+00	52	85%	1995-2007	WFBCBKG
I-129	1.39E-01	±	8.71E-01	< 7.86E-01	2.02E+00	68	90%	1991-2007	WFBCBKG
Cs-137	6.31E-01	±	5.98E+00	< 4.15E+00	1.01E+01	250	95%	1991-2007	WFBCBKG, WFBIGBR
U-232	1.81E-02	±	8.91E-02	< 4.28E-02	2.60E-01	68	87%	1991-2007	WFBCBKG
U-233/234	1.10E-01	±	7.02E-02	9.94E-02	2.98E-01	61	16%	1992-2007	WFBCBKG
U-235/236	1.71E-02	±	4.07E-02	< 3.28E-02	1.00E-01	67	82%	1991-2007	WFBCBKG
U-238	7.44E-02	±	6.35E-02	5.72E-02	4.00E-01	68	35%	1991-2007	WFBCBKG
Pu-238	1.45E-02	±	6.24E-02	< 3.10E-02	1.02E-01	68	93%	1991-2007	WFBCBKG
Pu-239/240	9.17E-03	±	3.50E-02	< 2.71E-02	1.98E-01	68	91%	1991-2007	WFBCBKG
Am-241	5.42E-02	±	7.15E-02	< 3.27E-02	2.20E+00	68	81%	1991-2007	WFBCBKG

LEGEND: N = Number of samples
ND = Nondetect
WFBCBKG = Buttermilk Creek background; WFBIGBR = Cattaraugus Creek background at Bigelow Bridge.

Table B-7. Groundwater Background Radionuclide Concentrations for the WVDP

Constituent	Average concentration (pCi/L)			Median (pCi/L)	Maximum (pCi/L)	N	% NDs	Years	Data Source Locations
	Result	±	Uncertainty						
Gross alpha	1.06E+00	±	5.69E+00	< 2.59E+00	2.19E+01	566	87%	1991-2007	WNW-NB1S, -0204, -0301, -0401, -0405, -0706, -0901, -0908
Gross beta	6.19E+00	±	5.11E+00	4.56E+00	2.82E+01	566	28%	1991-2007	WNW-NB1S, -0204, -0301, -0401, -0405, -0706, -0901, -0908
H-3	2.11E+01	±	8.55E+01	< 8.58E+01	9.41E+02	566	81%	1991-2007	WNW-NB1S, -0204, -0301, -0401, -0405, -0706, -0901, -0908
C-14	4.95E+00	±	2.63E+01	< 2.66E+01	7.43E+00	56	98%	1993-2007	WNW-NB1S, -0401, -0405, -0706, -0908
Sr-90	2.69E+00	±	1.35E+00	2.44E+00	7.38E+00	56	16%	1993-2007	WNW-NB1S, -0401, -0405, -0706, -0908
Tc-99	-3.71E-01	±	1.91E+00	< 1.85E+00	3.98E+00	56	96%	1993-2007	WNW-NB1S, -0401, -0405, -0706, -0908
I-129	2.39E-01	±	7.38E-01	< 6.01E-01	1.58E+00	56	86%	1993-2007	WNW-NB1S, -0401, -0405, -0706, -0908
Cs-137	1.75E+00	±	2.39E+01	< 2.22E+01	1.90E+01	258	98%	1991-2007	WNW-NB1S, -0204, -0301, -0401, -0405, -0706, -0901, -0908
U-232	2.28E-02	±	1.00E-01	< 4.92E-02	3.78E-01	56	88%	1993-2007	WNW-NB1S, -0401, -0405, -0706, -0908
U-233/234	4.88E-01	±	1.94E-01	1.60E-01	8.20E+00	56	13%	1993-2007	WNW-NB1S, -0401, -0405, -0706, -0908
U-235/236	4.52E-02	±	6.03E-02	< 5.00E-02	1.93E-01	56	71%	1993-2007	WNW-NB1S, -0401, -0405, -0706, -0908
U-238	3.18E-01	±	1.48E-01	1.21E-01	5.30E+00	56	21%	1993-2007	WNW-NB1S, -0401, -0405, -0706, -0908
Pu-238	5.94E-02	±	9.59E-02	< 4.65E-02	2.20E-01	6	83%	1993-1994	WNW-NB1S, -0405, -0908
Pu-239/240	4.95E-02	±	8.35E-02	< 5.28E-02	2.70E-01	6	83%	1993-1994	WNW-NB1S, -0405, -0908
Am-241	4.32E-02	±	4.76E-02	< 3.81E-02	1.80E-01	6	83%	1993-1994	WNW-NB1S, -0405, -0908

Legend: N = Number of samples

ND = Nondetect

"WNW" locations refer to individual wells that serve as groundwater backgrounds for solid waste management units in the groundwater monitoring program.

Table B-8. Background Environmental Radiation Levels at the WVDP

Constituent	Average (mR/quarter) Result ± Uncertainty	Median	Maximum	N	Years	Data Source Locations[1]
Environmental radiation	19.3 ± 7.1	19.2	35.0	264	1986-2007	DFTLD23, DFTLD17, DFTLD37, DFTLD41

NOTE: (1) Background locations: DFTLD17 (Five Point Landfill); DFTLD23 (Great Valley); DFTLD37 (Dunkirk); DFTLD41 (Sardinia-Savage Road).

4.0 Methods for Evaluating Concentrations Above Background in Onsite Environmental Media

Data from onsite sampling were available in three forms:

(1) Single observations or measurements with no associated uncertainty term (for example, a sediment concentration from 1988 presented in a historical report);

(2) A radionuclide concentration result, plus or minus an associated uncertainty term, from a sample collected as part of a one-time sampling project (i.e., the RFI soil, sediment, and subsurface soil survey done in 1993; Geoprobe® studies done in 1994, 1997, 1998, and 2008); and

(3) Multi-year data sets from samples collected at specified locations as part of the routine Environmental Monitoring or Groundwater Monitoring programs.

4.1 Single-Value Observations

Single-value observations were directly compared with the maximum result from the applicable background radionuclide-medium combination. For example, a Cs-137 concentration from lagoon sediment, as reported in WVNSCO 1994, was compared directly with the maximum Cs-137 concentration observed in background sediment. A value higher than the background result was classified as exceeding background.

4.2 Single Samples With Specified Uncertainty

A single-sample result reported with an associated uncertainty term, such as the result from a sample collected as part of the 1993 RFI investigation, was compared with background using the relative errors ratio test. This test (as described in WVDP procedure EM-74, WVNSCO 2004a) is primarily used as a data validation tool to test the acceptability of results from duplicate samples (i.e., to determine the likelihood that the samples could have come from the same population).

In the relative errors ratio test, one sample result (plus or minus its associated uncertainty term) is compared another sample result (plus or minus its associated uncertainty term). To perform the relative errors ratio calculation, the absolute value of the difference between the two sample results is divided by the sum of the squares of the estimated standard deviations (as based on the error terms) from each. If the result is not greater than 1.96 (approximating a 95 percent confidence interval), the two samples would be considered acceptable as duplicates. In other words, the samples could have been drawn from the same population (the test sample could have been drawn from the background population) if the confidence intervals bracketing the result terms from the two samples overlap.

For purposes of the current evaluation, each onsite sample result was tested against the mean (plus or minus the associated uncertainty term) of the applicable radionuclide/ medium background value. If the test sample result met the three following conditions, the result was classified as exceeding background:

- The radionuclide was detected

- The relative errors ratio value was greater than 1.96, and
- The result term for the sample was higher than the average result term for the background.

Areas with radiological concentrations exceeding background, as determined by the RER calculation, are summarized in Decommissioning Plan Figures 4-6 (surface soil and sediment), 4-7 (subsurface soil), and 4-13 (Geoprobe® groundwater). Maximum above-background concentrations for specific radionuclides at locations in each WMA are summarized in Decommissioning Plan Section 4.2.5, Tables 4-12 through 4-22 (surface soil, sediment, and subsurface soil), and Decommissioning Plan Section 4.2.8, Table 4-26 (Geoprobe® groundwater).

4.3 Data From Routine Monitoring Locations

Radionuclide concentration data sets from routine monitoring locations were compared with applicable background data sets using the nonparametric Mann-Whitney "U" test. As recommended in MARSSIM, a nonparametric test was used because environmental data are usually not normally distributed and because there are often a significant number of results lower than detectable concentrations. Both conditions were true of the WVDP data sets examined in this evaluation.

Because of the larger number of observations available for these comparisons, the "U" test was more sensitive at detecting concentrations exceeding background at a specific location than was the RER test that considered only one measurement. Note that trends (i.e., increasing or decreasing radionuclide concentrations) were not evaluated as part of this exercise, which focused only on comparisons with background. (Data trends at the WVDP are routinely evaluated and conclusions summarized in formal reports associated with the Environmental Monitoring and Groundwater Monitoring Programs.)

The Mann-Whitney U test, similar to the Wilcoxon Rank Sum test used in MARSSIM, is a rank-based test. The null hypothesis being tested was that the median of the tested data set was higher than the median at the background location (one-tailed test, $P<0.05$). To perform the test, data sets were assembled for radionuclide concentrations at each of the onsite routine monitoring points (soil/sediment sampling locations, surface water sampling locations, and routine groundwater sampling locations). So that the data could be ranked, each radionuclide measurement was assigned a single value. All "detect" values (i.e., the result term was larger than the uncertainty term) were set equal to the result term of the measurement; all "nondetect" values (i.e., the uncertainty term was larger than the result term) were set equal to zero. In this way, all nondetect values received the same rank. (Note that summary statistics, such as averages, had already been calculated for each data set. The arbitrarily assigned zero values were used only for ranking purposes.)

The two data sets (test location and background reference location) were then combined into one data set and the results ranked in numerical order from the smallest to the largest. From the assigned ranks, the test statistic (i.e., "U") was calculated for each (Sheskin 1997). The normal approximation for larger sample sizes ("z") was also calculated. Critical values of "U" and "z" were taken from statistical tables in Sheskin 1997.

If the "U" value was lower than the critical value of "U" (or, for larger numbers of samples, if the "z" value exceeded the critical level of "z"), and the mean rank from the test data set was greater than that from the background data set, then the null hypothesis (i.e., that the median of the test data set exceeded that of the background data set) was not rejected. In other words, at a 95% confidence level, it was likely that the median of the test data set exceeded that of the background data set.

Locations where results from routine monitoring locations exceeded background are summarized by waste management area and radionuclide in section 4.2, Table 4-17 (sediment from sampling location SNSWAMP), Table 4-18 (sediment from sampling location SNSW74A), Table 4-22 (sediment from sampling location SNSP006), Table 4-24 (routine onsite surface water monitoring locations), and Table 4-25 (routine groundwater monitoring locations).

Direct onsite measurements of environmental radiation (TLD results), for which the data sets approximate a normal distribution, were compared with background measurements using the one-way analysis of variance (ANOVA) Excel® function ($p<0.05$). If the "F" statistic exceeded the critical value of "F," and the average from the test data set exceeded the background average, measurements from the test location were determined to exceed background. Results are summarized in section 4.2, Table 4-23.

5.0 Radionuclide Ratios to Cs-137

The concentrations of hard-to-measure radionuclides in a medium are often estimated on the basis of their relationship to a more easily measured nuclide, such as Cs-137, as defined in a well-characterized distribution. As discussed in Section 4.1.4 of this plan, two primary distributions have been identified at the WVDP: (1) the Spent Nuclear Fuel distribution — applicable to nuclear fuel prior to reprocessing, and (2) the Batch 10 distribution — applicable to the high-level waste after the uranium and plutonium had been extracted. Comparable ratios from the two distributions are presented in Table 4-3. As shown in Table 4.3 of this plan, Sr-90 may comprise a larger relative fraction of the total radioactivity in the "feed and waste" category (i.e., before waste reprocessing), while a larger relative fraction of Am-241 may be more characteristic of the "product" category (i.e., after waste reprocessing).

If surface soil, sediment or subsurface soil samples contained both Cs-137 and other radionuclides at above-background concentrations, the ratio of each above-background radionuclide to Cs-137 was calculated. Only data from the same discrete samples were used to calculate ratios. Ratios in surface soil, sediment, and subsurface soil are summarized by WMA in Tables B-9, B-10, and B-11, respectively. For each medium, the following information is listed:

- Number of samples for which each nuclide exceeded background,
- Minimum ratio,
- Median ratio,
- Maximum ratio,

- Concentration of Cs-137 (in pCi/g dry) in the sample with the maximum ratio, and
- Location at which the maximum ratio was observed.

With respect to environmental concentrations exceeding background, the ratio of a radionuclide to Cs-137 may help to better trace the source of the activity. For instance, the area of elevated Sr-90 concentrations on the north plateau downgradient of the Process Building has been traced to a leak of radioactively contaminated acid in the late 1960s. This plume is characterized by high Sr-90-to-Cs-137 ratios.

6.0 Supplementary Data for Onsite Monitoring Locations

Summary statistics were calculated for radiological constituents measured at all routine monitoring locations on the WVDP site, sediment for the years 1995 through 2007, and surface water and groundwater for 1998 through 2007. Constituents exceeding background levels at each location are presented in Section 4.2. Complete results, including those from locations determined to be non-impacted, are presented in the following tables for onsite sediment (Table B-12), surface water (B-13), and groundwater (B-14).

Supplementary information about routine groundwater monitoring locations (i.e., location coordinates, surface elevation, construction material of the well or trench, diameter of the well [if applicable], screened interval, and geologic unit monitored) are summarized in Table B-15. Similar information for special Geoprobe® groundwater sampling points is provided in Table B-16.

Note that only routine monitoring locations included in the current Groundwater Monitoring Program were included in the evaluation presented in Section 4.2.8 of this plan. A large number of points at which groundwater had been sampled in the past were not included in this evaluation. For completeness, information on excluded points is summarized in Table B-17. Reasons for exclusion included:

- The well was dry;
- No radiological data were available;
- Data were not validated (e.g., piezometers, surface elevation points, wells for the north plateau groundwater recovery system, wells used to evaluate the pilot permeable treatment wall);
- Wells had been dropped from the groundwater program because existing coverage was considered sufficient (e.g., more than twenty wells discontinued in 1995); or
- Sampling points were located in areas outside the scope of the Phase 1 Decommissioning Plan (e.g., groundwater seeps outside the process premises, wells from WMA 8 [New York State-Licensed Disposal Area]).

7.0 References

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Table B-9. Radionuclides in Surface Soil: Ratios to Cs-137[1]

Area[2]	Radionuclide	N	Minimum	Median	Maximum	Cs-137 (pCi/g)[3]	Location of Maximum Ratio
WMA 2	Sr-90	5	0.015	0.28	1.4	8.5E-01	Surface soil near Lagoons 4 and 5 (BH-04)
WMA 3	U-238	1	0.047	0.047	0.047	2.2E+01	Surface soil near Waste Tank Farm
	Am-241	1	0.011	0.011	0.011	2.2E+01	Surface soil near Waste Tank Farm
WMA 4	Sr-90	3	0.29	0.96	9.5	1.2E+00	CDDL soil (6-12" depth, 1990)
WMA 5	Sr-90	2	0.019	0.047	0.075	1.1E+01	Surface soil near RHWF (BH-38)
	Pu-238	1	0.0033	0.0033	0.0033	1.1E+01	Surface soil near RHWF (BH-38)
	Pu-239/240	1	0.015	0.015	0.015	1.1E+01	Surface soil near RHWF (BH-38)
	Am-241	4	0.026	0.033	0.073	1.2E+01	LSA 3 & 4 footers (1990)
WMA 6	Sr-90	12	0.036	0.094	1.7	2.9E+00	Rail spur by FRS (1994)
WMA 7	Sr-90	8	0.11	1.9	8.3	1.1E+00	NDA Surface Soil (1994)
	Pu-238	1	0.021	0.021	0.021	4.1E+00	Surface soil by the NDA Interceptor Trench (BH-42)
	Pu-239/240	1	0.022	0.022	0.022	4.1E+00	Surface soil by the NDA Interceptor Trench (BH-42)
	Am-241	1	0.037	0.037	0.037	4.1E+00	Surface soil by the NDA Interceptor Trench (BH-42)
WMA 12	Sr-90	4	0.14	0.25	0.29	4.5E+00	Surface soil near WMA 2 and WMA 6 (BH-16)

NOTES: (1) Ratios were calculated from samples for which both Cs-137 and the nuclide of interest exceeded background, with ratios rounded to two significant digits or nearest integer.

(2) No surface soil data were available for WMA 1. No radionuclides exceeded background in WMA 9. Only Cs-137 exceeded background in WMA 10.

(3) Cs-137 concentration at the location with the maximum ratio.

LEGEND: BH = bore hole CDDL = Construction and Demolition Debris Landfill FRS = Fuel Receiving and Storage LSA = Lag Storage Addition N = number of samples RHWF = Remote-Handled Waste Facility.

Table B-10. Radionuclides in Sediment: Ratios to Cs-137[1]

Area[2]	Radionuclide	N	Minimum	Median	Maximum	Cs-137 (pCi/g)[3]	Location of Maximum Ratio
WMA 2	Sr-90	41	0.0063	0.065	144	1.0E+01	Sediment from the Solvent Dike (1986)
	U-232	1	0.0054	0.0054	0.0054	1.4E+03	Lagoon 3 sediment (1994)
	U-233/234	2	0.0032	0.030	0.056	1.7E+01	Sediment from drainage downgradient of Solvent Dike (ST-28)
	U-235/236	7	0.000010	0.000076	0.011	1.7E+01	Sediment from drainage downgradient of Solvent Dike (ST-28)
	U-238	28	0.000052	0.0014	0.057	2.1E+01	Lagoon 3 sediment (1990)
	Pu-238	10	0.00028	0.0015	0.018	4.4E+04	Lagoon 2 shoreline sediment (1990)
	Pu-239/240	9	0.00051	0.0011	0.019	1.7E+01	Sediment from drainage downgradient of Solvent Dike (ST-28)
	Am-241	29	0.00058	0.0019	4.2	1.0E+01	Sediment from the Solvent Dike (1986)
WMA 4	Sr-90	18	0.041	0.80	16	3.1E+00	Sediment from drainage through CDDL (ST-30)
	U-233/234	9	0.036	0.11	1.4	6.6E-01	Sediment at Northeast Swamp (SNSWAMP)
	U-235/236	2	0.023	0.14	0.27	6.6E-01	Sediment at Northeast Swamp (SNSWAMP)
	U-238	9	0.036	0.12	1.3	6.6E-01	Sediment at Northeast Swamp (SNSWAMP)
	Pu-238	10	0.0057	0.022	0.057	5.2E+00	Sediment at Northeast Swamp (SNSWAMP)
	Pu-239/240	13	0.0089	0.033	0.21	1.1E+01	Sediment at Northeast Swamp (SNSWAMP)
	Am-241	14	0.010	0.056	0.22	2.1E+00	Sediment at Northeast Swamp (SNSWAMP)
WMA 5	Sr-90	15	0.026	0.13	3.3	6.4E-01	Sediment at North Swamp (SNSW74A)
	U-233/234	4	0.12	0.37	0.75	1.1E+00	Sediment at North Swamp (SNSW74A)
	U-235/236	1	0.047	0.047	0.047	2.7E+00	Sediment at North Swamp (SNSW74A)
	U-238	4	0.15	0.34	2.0	4.7E-01	Sediment at North Swamp (SNSW74A)
	Pu-238	1	0.015	0.015	0.015	3.8E+00	Sediment at North Swamp (SNSW74A)
	Pu-239/240	9	0.019	0.035	0.096	4.7E-01	Sediment at North Swamp (SNSW74A)
	Am-241	11	0.0011	0.057	0.087	6.4E-01	Sediment at North Swamp (SNSW74A)

Table B-10. Radionuclides in Sediment: Ratios to Cs-137[1]

Area[2]	Radionuclide	N	Minimum	Median	Maximum	Cs-137 (pCi/g)[3]	Location of Maximum Ratio
WMA 6	Sr-90	3	0.062	0.27	0.59	5.9E-01	Sediment from south Demineralizer Sludge Pond (ST-36)
WMA 7	Sr-90	1	3.7	3.7	3.7	9.0E-01	Sediment from drainage near Interceptor Trench (ST-23)
	Pu-238	1	0.096	0.096	0.096	9.0E-01	Sediment from drainage near Interceptor Trench (ST-23)
	Am-241	1	0.046	0.046	0.046	9.0E-01	Sediment from drainage near Interceptor Trench (ST-23)
WMA 12	Sr-90	33	0.022	0.058	0.59	2.7E-01	Sediment from Franks Creek (ST-13) near burial areas
	U-232	2	0.0010	0.0021	0.0031	3.5E+01	Sediment from Erdman Brook (ST-19) after Lagoon 3 discharge
	U-233/234	3	0.034	0.038	0.075	1.1E+01	Sediment from Franks Creek at fence line (SNSP006)
	U-238	4	0.0094	0.035	0.058	1.4E+01	Sediment from Franks Creek at fence line (SNSP006)
	Pu-238	10	0.00070	0.0034	0.042	5.9E+01	Sediment from Erdman Brook (ST-20) after drainage from WMA 2
	Pu-239/240	7	0.00068	0.0029	0.012	5.9E+01	Sediment from Erdman Brook (ST-20) after drainage from WMA 2
	Am-241	18	0.0012	0.0047	0.033	4.3E+01	Sediment from Erdman Brook (ST-22) downgradient of NDA

NOTES: (1) Ratios were calculated from samples for which both Cs-137 and the nuclide of interest exceeded background, with the ratios rounded to two significant digits or the nearest integer.

(2) No sediment data were available for WMAs 1, 3, or 9. Only Cs-137 exceeded background in WMA 10.

(3) Cs-137 concentration at the location with the maximum ratio.

LEGEND: CDDL = Construction and Demolition Debris Landfill N = number of samples

Table B-11. Radionuclides in Subsurface Soil: Ratios to Cs-137[1]

Area[2]	Radionuclide	N	Minimum	Median	Maximum	Cs-137 (pCi/g)[3]	Location of Maximum Ratio
WMA 1	Sr-90	45	0.31	303	63,419	5.0E-02	Inside MPPB (GP7898, 21-23' depth)
	Tc-99	6	0.0027	2.3	5.6	1.1E-01	Outside MPPB, south of FRS (GP7208, 14-16' depth)
	U-232	1	0.023	0.023	0.023	2.0E+00	Outside southeast corner of MPPB (GP2908, 14-16' depth)
	U-233/234	9	0.0074	0.79	12	7.2E-02	Inside MPPB (GP10008, 30-32' depth)
	U-235/236	5	0.013	0.063	1.1	1.4E-01	Outside eastern wall of MPPB (GP3008, 4-6' depth)
	U-238	7	0.82	6.1	18	7.2E-02	Outside MPPB, north of FRS (GP10108, 20-22' depth)
	Pu-238	5	0.0025	0.019	0.18	1.5E-01	Outside MPPB, south of FRS (GP7208, 4-6' depth)
	Pu-239/240	8	0.015	0.067	0.80	5.5E-02	East of laundry building (BH-18, 14-16' depth)
	Am-241	16	0.025	0.19	2.7	3.6E-02	Inside MPPB (GP77, 19-23' depth)
	Cm-243/244	1	0.015	0.015	0.015	1.0E+01	Inside MPPB (GP8008, 25-27' depth)
WMA 2	Sr-90	27	0.037	1.9	750	4.8E-02	Northwest of Lagoon 1 (BH-09, 10-12' depth)
	U-232	11	0.0050	0.021	1.0	4.8E-02	Northwest of Lagoon 1 (BH-09, 10-12' depth)
	U-233/234	8	0.0046	1.9	7.0	2.7E-01	Solvent dike (BH-11, 10-12' depth)
	U-235/236	7	0.000038	0.55	1.1	2.7E-01	Solvent dike (BH-11, 10-12' depth)
	U-238	7	0.00052	0.052	4.4	2.7E-01	Solvent dike (BH-11, 10-12' depth)
	Pu-238	15	0.0049	0.023	0.089	1.9E+00	Between Interceptors and Lagoon 1 (BH-14, 14-16' depth)
	Pu-239/240	15	0.0046	0.031	0.11	1.6E-01	Maintenance Shop Leach Field (BH-35, 18-20' depth)
	Pu-241	7	0.030	0.11	0.21	1.6E+01	East of Test and Storage Building (BH-35, 6-8' depth)
	Am-241	18	0.010	0.051	0.23	2.7E-01	Solvent dike (BH-11, 10-12' depth)
WMA 4	Sr-90	2	0.73	0.75	0.77	8.8E-02	Southeast corner of CDDL (BH-28, 6-8' depth)
WMA 5	Sr-90	1	6.3	6.3	6.3	4.8E-02	Between LSA 3 and LSA 4 (BH-30, 10-12' depth)
WMA 6	Sr-90	5	1.1	174	1115	1.3E-01	Downgradient of MPPB (GP10208, 16-18' depth)
	U-232	1	0.087	0.087	0.087	1.1E+00	Downgradient of MPPB (GP10208, 14-16' depth)

Table B-11. Radionuclides in Subsurface Soil: Ratios to Cs-137[1]

Area[2]	Radionuclide	N	Minimum	Median	Maximum	Cs-137 (pCi/g)[3]	Location of Maximum Ratio
	U-233/234	2	1.2	4.6	8.0	1.3E-01	Downgradient of MPPB (GP10208, 16-18' depth)
	U-235/236	2	0.33	0.82	1.3	1.3E-01	Downgradient of MPPB (GP10208, 16-18' depth)
	U-238	2	1.3	5.2	9.0	1.3E-01	Downgradient of MPPB (GP10208, 16-18' depth)
	Pu-238	2	0.025	0.030	0.035	4.3E+00	Southeast of FRS (BH-19A, 12-14' depth)
	Pu-239/240	3	0.040	0.047	0.047	1.1E+00	Downgradient of MPPB (GP10208, 14-16' depth)
	Pu-241	1	0.35	0.35	0.35	4.3E+00	Southeast of FRS (BH-19A, 12-14' depth)
	Am-241	4	0.13	0.20	0.33	1.3E-01	Downgradient of MPPB (GP10208, 16-18' depth)
WMA 7	Sr-90	1	2.6	2.6	2.6	5.4E-02	Northern corner of NDA (BH-42, 25-27' depth)
WMA 12	Sr-90	1	1.5	1.5	1.5	4.4E-02	Northwest of the NDA (BH-24, 6-8' depth)

NOTES: (1) Ratios were calculated from samples for which both Cs-137 and the nuclide of interest exceeded background, with ratios rounded to two significant digits or the nearest integer.

(2) No subsurface soil data were available for WMAs 3 and 9. No Cs-137 results exceeding background were found in WMA 10.

(3) Cs-137 concentration at the location with the maximum ratio.

LEGEND: N = Number of Samples; MPPB = Main Plant Process Building; FRS = Fuel Receiving and Storage; CDDL = Construction and Demolition Debris Landfill; LSA = Lag Storage Area; NDA = Nuclear Regulatory Commission Licensed Disposal Area

Table B-12. Summary of Radionuclide Results from Routine Onsite Sediment Monitoring Locations

WMA	Monitoring *Point*	Constituent	N	Median (pCi/g)	Average (pCi/g) *Result* ± *Uncertainty*	Maximum (pCi/g)	Exceeded Background?(1)
WMA 4	SNSWAMP Sediment at northeast swamp drainage	Gross alpha	13	1.73E+01	1.68E+01 ± 3.95E+00	2.26E+01	Yes
		Gross beta	13	5.43E+01	5.51E+01 ± 4.66E+00	8.98E+01	Yes
		Sr-90	17	2.35E+00	5.20E+00 ± 4.97E-01	2.98E+01	Yes
		Cs-137	17	7.40E+00	9.99E+00 ± 1.39E+00	3.14E+01	Yes
		U-232	17	<2.19E-02	9.20E-03 ± 3.41E-02	4.79E-02	No
		U-233/234	16	8.21E-01	7.24E-01 ± 1.79E-01	1.13E+00	Yes
		U-235/236	16	5.82E-02	5.94E-02 ± 5.38E-02	1.76E-01	No
		U-238	16	7.93E-01	7.06E-01 ± 1.65E-01	1.14E+00	Yes
		Pu-238	10	2.79E-01	2.62E-01 ± 6.87E-02	4.32E-01	Yes
		Pu-239/240	17	2.26E-01	2.58E-01 ± 7.10E-02	6.42E-01	Yes
		Am-241	17	4.59E-01	5.13E-01 ± 1.22E-01	1.29E+00	Yes
WMA 5	SNSW74A Sediment at north swamp drainage	Gross alpha	13	1.19E+01	1.29E+01 ± 3.06E+00	2.20E+01	Yes
		Gross beta	13	2.33E+01	2.35E+01 ± 2.97E+00	3.47E+01	Yes
		Sr-90	17	3.28E-01	4.67E-01 ± 8.73E-02	2.10E+00	Yes
		Cs-137	17	2.55E+00	2.83E+00 ± 2.54E-01	8.82E+00	Yes
		U-232	17	<2.16E-02	8.57E-03 ± 2.53E-02	4.23E-02	No
		U-233/234	16	7.18E-01	6.24E-01 ± 1.74E-01	1.06E+00	No
		U-235/236	16	5.49E-02	5.59E-02 ± 4.05E-02	1.26E-01	No
		U-238	17	6.82E-01	6.36E-01 ± 1.80E-01	1.35E+00	No
		Pu-238	10	2.37E-02	2.30E-02 ± 1.88E-02	5.59E-02	No
		Pu-239/240	17	6.17E-02	6.52E-02 ± 4.13E-02	1.92E-01	Yes
		Am-241	17	6.10E-02	9.01E-02 ± 5.09E-02	2.58E-01	Yes

Table B-12. Summary of Radionuclide Results from Routine Onsite Sediment Monitoring Locations

WMA	Monitoring Point	Constituent	N	Median (pCi/g)	Average (pCi/g) Result ± Uncertainty	Maximum (pCi/g)	Exceeded Background?(1)
WMA 12	SNSP006 Sediment from Franks Creek at security fence	Gross alpha	13	1.10E+01	1.01E+01 ± 2.84E+00	1.32E+01	No
		Gross beta	13	4.27E+01	5.01E+01 ± 4.09E+00	1.60E+02	Yes
		Sr-90	17	8.38E-01	1.49E+00 ± 2.29E-01	9.98E+00	Yes
		Cs-137	17	1.30E+01	2.10E+01 ± 2.75E+00	9.76E+01	Yes
		U-232	17	4.07E-02	4.01E-02 ± 6.81E-02	1.43E-01	Yes
		U-233/234	16	6.40E-01	6.05E-01 ± 1.78E-01	1.02E+00	No
		U-235/236	16	4.56E-02	3.87E-02 ± 5.46E-02	1.04E-01	No
		U-238	17	6.07E-01	5.53E-01 ± 1.68E-01	9.15E-01	No
		Pu-238	10	3.17E-02	4.29E-02 ± 2.58E-02	1.40E-01	Yes
		Pu-239/240	17	2.60E-02	2.97E-02 ± 2.54E-02	1.08E-01	Yes
		Am-241	17	4.34E-02	6.51E-02 ± 4.78E-02	2.40E-01	Yes

NOTE: (1) Using the nonparametric Mann-Whitney "U" Test, the data set of sediment background results (summarized in Table B-4) was compared with the data set from each of the sampling locations. See Appendix B, Section 4.3.

Table B-13. Summary of Radionuclide Results from Routine Onsite Surface Water Monitoring Locations

WMA	Monitoring Point	Constituent	N	Median (pCi/L)[2]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[1]
WMA 2	WNSP001 Lagoon 3 Discharge Weir	Gross alpha	232	1.75E+01	1.92E+01 ± 1.32E+01	1.01E+02	Yes
		Gross beta	433	2.56E+02	3.01E+02 ± 2.25E+01	8.18E+02	Yes
		H-3	231	2.47E+03	2.75E+03 ± 1.42E+02	7.17E+03	Yes
		C-14	62	<2.82E+01	1.35E+01 ± 2.24E+01	4.75E+01	Yes
		Sr-90	231	9.88E+01	1.21E+02 ± 7.42E+00	3.19E+02	Yes
		Tc-99	197	6.53E+01	7.90E+01 ± 4.79E+01	3.36E+02	Yes
		I-129	62	2.13E+00	2.44E+00 ± 1.48E+00	1.04E+01	Yes
		Cs-137	231	6.10E+01	7.57E+01 ± 1.88E+01	3.29E+02	Yes
		U-232	62	8.02E+00	8.98E+00 ± 9.91E-01	2.14E+01	Yes
		U-233/234	62	5.04E+00	5.49E+00 ± 6.20E-01	1.36E+01	Yes
		U-235/236	62	2.62E-01	2.75E-01 ± 1.21E-01	5.84E-01	Yes
		U-238	62	3.76E+00	3.82E+00 ± 4.87E-01	7.57E+00	Yes
		Pu-238	62	6.53E-02	1.53E-01 ± 6.78E-02	1.62E+00	Yes
		Pu-239/240	62	5.17E-02	1.34E-01 ± 6.19E-02	1.39E+00	Yes
		Am-241	62	6.79E-02	1.18E-01 ± 6.01E-02	9.74E-01	Yes
WMA 4	WNSWAMP Northeast Swamp Drainage	Gross alpha	450	<1.87E+00	2.86E-01 ± 2.28E+00	7.25E+00	No
		Gross beta	451	3.01E+03	3.24E+03 ± 5.33E+01	9.98E+03	Yes
		H-3	451	1.13E+02	1.13E+02 ± 8.21E+01	5.20E+02	Yes
		C-14	34	<1.58E+01	2.13E+00 ± 2.09E+01	3.72E+01	No
		Sr-90	121	1.52E+03	1.70E+03 ± 3.14E+01	5.16E+03	Yes
		I-129	34	<9.05E-01	5.39E-01 ± 9.28E-01	1.29E+00	No
		Cs-137	120	<2.43E+00	6.76E-01 ± 3.33E+00	5.74E+00	No
		U-232	34	<6.42E-02	7.47E-03 ± 1.59E-01	9.76E-02	No
		U-233/234	34	1.73E-01	1.97E-01 ± 1.36E-01	9.27E-01	Yes
		U-235/236	34	<4.20E-02	2.54E-02 ± 5.77E-02	8.82E-02	No
		U-238	34	1.01E-01	1.21E-01 ± 1.07E-01	7.21E-01	Yes
		Pu-238	34	<3.11E-02	1.20E-02 ± 9.54E-02	1.50E-01	No
		Pu-239/240	34	<2.90E-02	1.48E-02 ± 6.65E-02	1.44E-01	No
		Am-241	34	<3.42E-02	2.86E-02 ± 9.57E-02	1.79E-01	No

Table B-13. Summary of Radionuclide Results from Routine Onsite Surface Water Monitoring Locations

WMA	Monitoring Point	Constituent	N	Median (pCi/L)[2]	Average (pCi/L)			Maximum (pCi/L)	Exceeded Background?[1]
					Result	±	Uncertainty		
WMA 5	WNSW74A North Swamp Drainage	Gross alpha	450	<2.17E+00	3.88E-02	±	3.09E+00	7.89E+00	No
		Gross beta	450	1.17E+01	1.21E+01	±	4.34E+00	4.24E+01	Yes
		H-3	450	<8.18E+01	-2.14E+00	±	8.07E+01	2.80E+02	No
		C-14	34	<1.40E+01	-7.72E-01	±	1.94E+01	1.50E+01	No
		Sr-90	120	5.52E+00	5.46E+00	±	1.89E+00	1.25E+01	Yes
		I-129	34	<7.10E-01	2.09E-01	±	7.37E-01	1.31E+00	No
		Cs-137	120	<7.08E+00	1.20E+00	±	8.85E+00	1.18E+01	No
		U-232	34	<4.83E-02	8.38E-03	±	6.79E-02	6.22E-02	No
		U-233/234	34	1.54E-01	1.64E-01	±	8.44E-02	3.54E-01	Yes
		U-235/236	34	<3.70E-02	1.89E-02	±	3.99E-02	1.38E-01	No
		U-238	34	1.01E-01	1.04E-01	±	6.65E-02	2.00E-01	Yes
		Pu-238	34	<2.10E-02	1.43E-02	±	3.36E-02	1.16E-01	No
		Pu-239/240	34	<2.39E-02	4.73E-03	±	2.73E-02	<6.94E-02	No
		Am-241	34	<2.81E-02	1.68E-02	±	3.17E-01	8.63E-02	No
WMA 6	WNSP007 Sanitary Waste Discharge	Gross alpha	324	<2.62E+00	1.37E-01	±	3.32E+00	4.80E+00	No
		Gross beta	324	1.45E+01	1.53E+01	±	5.02E+00	4.05E+01	Yes
		H-3	324	<8.25E+01	2.26E+01	±	8.18E+01	1.53E+03	No
		Sr-90	14	3.11E+00	3.38E+00	±	1.75E+00	1.17E+01	Yes
		Cs-137	35	<2.92E+00	8.12E-01	±	3.94E+00	4.44E+00	No
	WNCOOLW Cooling Tower Water	Gross alpha	73	<1.91E+00	5.65E-01	±	2.03E+00	5.81E+00	No
		Gross beta	73	6.83E+00	9.05E+00	±	3.64E+00	3.43E+01	Yes
		H-3	73	<8.17E+01	2.86E+00	±	7.94E+01	4.27E+02	No
		Sr-90	10	1.60E+00	1.50E+00	±	1.40E+00	4.68E+00	No
		Cs-137	31	<7.20E+00	8.61E-01	±	8.32E+00	9.15E+00	No

Table B-13. Summary of Radionuclide Results from Routine Onsite Surface Water Monitoring Locations

WMA	Monitoring Point	Constituent	N	Median (pCi/L)[2]	Average (pCi/L)			Maximum (pCi/L)	Exceeded Background?[1]
					Result	±	Uncertainty		
WMA 12	WNSP006 Franks Creek at security fence	Gross alpha	471	<1.50E+00	9.49E-01	±	1.61E+00	1.07E+01	No
		Gross beta	471	3.53E+01	4.44E+01	±	3.99E+00	1.94E+02	Yes
		H-3	471	<8.54E+01	1.36E+02	±	8.33E+01	2.25E+03	Yes
		C-14	40	<1.85E+01	-1.31E+00	±	2.09E+01	2.06E+01	No
		Sr-90	120	1.87E+01	1.98E+01	±	2.99E+00	4.96E+01	Yes
		Tc-99	40	<2.09E+00	3.28E+00	±	2.15E+00	5.24E+01	Yes
		I-129	40	<7.04E-01	3.26E-01	±	7.25E-01	1.65E+00	No
		Cs-137	120	<8.02E+00	6.32E+00	±	9.50E+00	7.33E+01	Yes
		U-232	40	3.17E-01	3.16E-01	±	1.34E-01	7.51E-01	Yes
		U-233/234	40	3.66E-01	3.73E-01	±	1.31E-01	6.87E-01	Yes
		U-235/236	40	<4.41E-02	3.26E-02	±	4.61E-02	9.57E-02	No
		U-238	40	2.54E-01	2.77E-01	±	1.12E-01	7.43E-01	Yes
		Pu-238	40	<3.36E-02	2.14E-02	±	3.39E-02	1.36E-01	Yes
		Pu-239/240	40	<2.79E-02	1.13E-02	±	3.02E-02	6.62E-02	No
		Am-241	40	<3.30E-02	3.23E-02	±	3.69E-02	1.60E-01	No
	WNSP005 Facility yard drainage	Gross alpha	140	<2.71E+00	1.22E+00	±	3.24E+00	1.85E+01	No
		Gross beta	140	1.50E+02	1.63E+02	±	9.11E+00	4.53E+02	Yes
		H-3	140	<8.28E+01	3.78E+01	±	8.23E+01	1.25E+03	Yes
		Sr-90	35	9.61E+01	1.02E+02	±	6.52E+00	1.98E+02	Yes
		Cs-137	14	<1.91E+00	9.28E-01	±	2.19E+00	<3.69E+00	No
	WNNDADR Drainage between NDA and SDA	Gross alpha	130	<1.34E+00	8.22E-01	±	1.40E+00	5.84E+00	No
		Gross beta	136	1.74E+02	1.83E+02	±	6.45E+00	4.06E+02	Yes
		H-3	546	1.00E+03	1.16E+03	±	1.02E+02	4.02E+03	Yes
		Sr-90	41	8.48E+01	8.40E+01	±	5.45E+00	1.22E+02	Yes
		I-129	34	<8.12E-01	2.62E-01	±	8.53E-01	1.15E+00	No
		Cs-137	120	<6.67E+00	5.99E-01	±	8.48E+00	1.86E+01	No

Table B-13. Summary of Radionuclide Results from Routine Onsite Surface Water Monitoring Locations

WMA	*Monitoring* Point	Constituent	N	*Median* (pCi/L)[2]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[1]
WMA 12	WNERB53 Erdman Brook north of burial areas	Gross alpha	401	<1.45E+00	1.56E-01 ± 1.65E+00	2.51E+00	No
		Gross beta	401	1.73E+01	1.81E+01 ± 2.92E+00	4.37E+01	Yes
		H-3	403	<8.31E+01	3.08E+01 ± 8.11E+01	3.46E+02	Yes
		Sr-90	14	8.23E+00	8.04E+00 ± 1.98E+00	9.91E+00	Yes
		Cs-137	14	<2.07E+00	7.52E-01 ± 3.96E+00	2.41E+00	No
	WNFRC67 Franks Creek east of burial areas	Gross alpha	99	<7.00E-01	9.41E-02 ± 7.56E-01	3.89E+00	No
		Gross beta	99	2.63E+00	2.56E+00 ± 1.50E+00	9.00E+00	No
		H-3	99	<8.31E+01	3.08E+01 ± 8.11E+01	3.46E+02	Yes
		Sr-90	19	<1.17E+00	5.00E-01 ± 1.09E+00	3.42E+00	No
		Cs-137	19	<2.13E+00	5.50E-01 ± 2.58E+00	2.26E+00	No

NOTES: (1) Using the nonparametric Mann-Whitney "U" Test, the data set of surface water background results (summarized in Table B-6) was compared with the data set from each of the above sampling locations. See Appendix B, Section 4.3.

(2) 1 pCi/L = 3.7E-02 Bq/L

Table B-14. Summary of Radionuclide Results from Routine Onsite Groundwater Monitoring Locations[1]

WMA	Monitoring Point[2]	Constituent	N	Median (pCi/L)[3]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[4]
WMA 1	WP-A S&G	Gross alpha	12	<3.56E-01	1.71E-01 ± 2.12E+00	1.82E+00	No
		Gross beta	12	2.41E+01	3.09E+01 ± 4.55E+00	5.44E+01	Yes
		H-3	12	1.18E+04	1.12E+04 ± 6.24E+02	1.26E+04	Yes
WMA 2	WNW0103 S&G	Gross alpha	40	<7.32E+00	1.06E+00 ± 1.01E+01	1.25E+01	No
		Gross beta	40	1.45E+02	1.85E+02 ± 1.93E+01	5.53E+02	Yes
		H-3	40	<8.42E+01	5.19E+01 ± 8.12E+01	2.02E+02	No
	WNW0104 S&G	Gross alpha	40	<3.86E+00	2.23E-01 ± 5.95E+00	5.04E+00	No
		Gross beta	40	5.88E+04	5.63E+04 ± 1.64E+03	1.01E+05	Yes
		H-3	40	3.73E+02	3.91E+02 ± 8.65E+01	7.53E+02	Yes
	WNW0105 S&G	Gross alpha	41	<4.21E+00	1.04E+00 ± 7.17E+00	4.60E+00	No
		Gross beta	41	3.88E+04	3.30E+04 ± 1.54E+03	1.02E+05	Yes
		H-3	40	3.57E+02	3.72E+02 ± 9.12E+01	7.09E+02	Yes
	WNW0106 S&G	Gross alpha	40	<2.50E+00	1.94E+00 ± 3.44E+00	1.31E+01	No
		Gross beta	40	1.64E+01	8.22E+01 ± 7.99E+00	5.76E+02	Yes
		H-3	40	9.56E+02	1.04E+03 ± 1.00E+02	1.82E+03	Yes
	WNW0107 ULT	Gross alpha	40	<1.85E+00	8.97E-01 ± 1.88E+00	5.71E+00	No
		Gross beta	40	7.00E+00	8.23E+00 ± 2.63E+00	2.22E+01	Yes
		H-3	40	3.74E+02	4.78E+02 ± 9.04E+01	9.85E+02	Yes
	WNW0108 ULT	Gross alpha	40	1.64E+00	1.47E+00 ± 1.46E+00	4.31E+00	Yes
		Gross beta	40	2.49E+00	2.42E+00 ± 1.90E+00	5.36E+00	No
		H-3	40	1.17E+02	1.10E+02 ± 8.38E+01	2.47E+02	Yes
	WNW0110 ULT	Gross alpha	40	<1.49E+00	1.01E+00 ± 1.61E+00	4.39E+00	No
		Gross beta	40	2.32E+00	2.23E+00 ± 1.95E+00	7.92E+00	No
		H-3	40	1.31E+03	1.28E+03 ± 1.08E+02	1.66E+03	Yes
	WNW0111 S&G	Gross alpha	40	<4.38E+00	3.15E+00 ± 5.06E+00	1.03E+01	Yes
		Gross beta	40	5.55E+03	5.87E+03 ± 1.40E+02	1.18E+04	Yes
		H-3	40	1.97E+02	2.34E+02 ± 8.39E+01	7.97E+02	Yes

Table B-14. Summary of Radionuclide Results from Routine Onsite Groundwater Monitoring Locations[1]

WMA	Monitoring Point[2]	Constituent	N	Median (pCi/L)[3]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[4]
WMA 2	WNW0116 S&G	Gross alpha	40	<3.08E+00	8.94E-01 ± 4.35E+00	7.03E+00	No
		Gross beta	40	8.69E+02	1.98E+03 ± 1.55E+02	9.51E+03	Yes
		H-3	40	1.67E+02	1.88E+02 ± 8.24E+01	4.66E+02	Yes
	WNW0205 S&G	Gross alpha	35	<4.87E+00	4.37E-01 ± 7.67E+00	<2.73E+01	No
		Gross beta	35	1.61E+01	1.66E+01 ± 8.39E+00	4.08E+01	Yes
		H-3	35	<8.14E+01	9.44E+00 ± 8.02E+01	2.09E+02	No
	WNW0206 LTS	Gross alpha	35	<2.47E+00	6.69E-01 ± 3.33E+00	5.02E+00	No
		Gross beta	35	<3.16E+00	1.95E+00 ± 3.53E+00	6.11E+00	No
		H-3	35	<8.18E+01	2.94E+01 ± 7.96E+01	2.07E+02	No
	WNW0408 S&G	Gross alpha	40	<3.58E+00	-7.91E+00 ± 9.05E+00	6.44E+00	No
		Gross beta	39	3.96E+05	4.01E+05 ± 3.04E+03	6.28E+05	Yes
		H-3	40	1.52E+02	1.86E+02 ± 1.13E+02	2.21E+03	Yes
		C-14	10	<2.16E+01	-7.20E-01 ± 2.27E+01	<3.42E+01	No
		Sr-90	10	1.54E+05	1.54E+05 ± 1.73E+02	2.53E+05	Yes
		Tc-99	10	1.57E+01	1.70E+01 ± 3.28E+00	2.51E+01	Yes
		I-129	10	<9.94E-01	7.65E-02 ± 2.53E+00	9.46E-01	No
		Cs-137	10	<4.01E+00	-3.24E-01 ± 4.29E+00	<6.72E+00	No
		U-232	10	<6.32E-02	6.31E-02 ± 2.04E-01	5.31E-02	No
		U-233/234	10	4.51E-01	5.34E-01 ± 2.22E-01	1.27E+00	Yes
		U-235/236	10	<5.44E-02	8.34E-02 ± 9.98E-02	3.11E-01	No
		U-238	10	2.87E-01	3.11E-01 ± 1.57E-01	4.82E-01	Yes
		Pu-238	2	<6.83E-02	2.09E-02 ± 7.45E-02	<9.80E-02	No
		Pu-239/240	2	<6.56E-02	7.70E-03 ± 6.65E-02	<7.68E-02	No
		Am-241	2	4.60E-02	3.60E-02 ± 4.72E-02	5.90E-02	No
	WNW0501	Gross alpha	40	<4.79E+00	4.82E-01 ± 8.34E+00	6.10E+00	No

Table B-14. Summary of Radionuclide Results from Routine Onsite Groundwater Monitoring Locations[1]

WMA	Monitoring Point[2]	Constituent	N	Median (pCi/L)[3]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[4]
WMA 2	S&G	Gross beta	40	1.93E+05	1.91E+05 ± 2.61E+03	3.24E+05	Yes
		H-3	40	1.35E+02	1.25E+02 ± 8.37E+01	3.15E+02	Yes
		Sr-90	10	9.18E+04	9.33E+04 ± 2.43E+02	1.48E+05	Yes
	WNW0502 S&G	Gross alpha	40	<4.40E+00	7.94E-01 ± 8.04E+00	1.46E+01	No
		Gross beta	40	1.68E+05	1.64E+05 ± 2.80E+03	2.33E+05	Yes
		H-3	40	1.33E+02	1.44E+02 ± 8.36E+01	4.98E+02	Yes
		Sr-90	10	8.36E+04	8.27E+04 ± 2.05E+02	1.16E+05	Yes
	WNW8603 S&G	Gross alpha	41	<5.02E+00	3.92E-01 ± 7.89E+00	9.30E+00	No
		Gross beta	41	5.66E+04	4.81E+04 ± 1.20E+03	9.01E+04	Yes
		H-3	40	3.37E+02	3.43E+02 ± 8.79E+01	5.81E+02	Yes
	WNW8604 S&G	Gross alpha	35	<4.68E+00	1.07E+00 ± 7.83E+00	9.00E+00	No
		Gross beta	35	4.12E+04	4.57E+04 ± 1.12E+03	1.04E+05	Yes
		H-3	35	3.48E+02	3.76E+02 ± 8.38E+01	6.41E+02	Yes
	WNW8605 S&G	Gross alpha	40	9.11E+00	8.46E+00 ± 7.66E+00	2.08E+01	Yes
		Gross beta	40	1.09E+04	1.10E+04 ± 1.73E+02	1.62E+04	Yes
		H-3	40	3.70E+02	4.19E+02 ± 8.68E+01	1.27E+03	Yes
	WP-C S&G	Gross alpha	12	<3.95E-01	9.03E-01 ± 2.74E+00	<6.92E+00	No
		Gross beta	12	2.44E+01	4.16E+01 ± 5.48E+00	1.19E+02	Yes
		H-3	12	4.91E+04	4.75E+04 ± 1.56E+03	6.61E+04	Yes
	WP-H S&G	Gross alpha	13	6.08E+00	7.90E+01 ± 2.33E+01	7.42E+02	Yes
		Gross beta	13	6.97E+03	7.23E+03 ± 1.87E+02	1.25E+04	Yes
		H-3	13	2.99E+03	3.42E+03 ± 5.00E+02	7.38E+03	Yes
WMA 3	WNW8609 S&G	Gross alpha	40	<3.10E+00	-3.75E-01 ± 5.55E+00	3.84E+00	No
		Gross beta	40	1.51E+03	1.37E+03 ± 4.15E+01	2.28E+03	Yes
		H-3	40	4.51E+02	4.66E+02 ± 9.10E+01	7.88E+02	Yes
		Sr-90	20	7.99E+02	7.17E+02 ± 2.07E+01	1.12E+03	Yes
WMA 4	WNW0801	Gross alpha	40	<3.85E+00	6.31E-02 ± 6.49E+00	5.45E+00	No

Table B-14. Summary of Radionuclide Results from Routine Onsite Groundwater Monitoring Locations[1]

WMA	Monitoring Point[2]	Constituent	N	Median (pCi/L)[3]	Average (pCi/L)			Maximum (pCi/L)	Exceeded Background?[4]
					Result	±	Uncertainty		
WMA 4	S&G	Gross beta	40	7.95E+03	8.59E+03	±	2.72E+02	1.46E+04	Yes
		H-3	40	1.51E+02	1.64E+02	±	8.24E+01	3.82E+02	Yes
		Sr-90	40	4.13E+03	4.33E+03	±	4.73E+01	7.99E+03	Yes
	WNW0802 S&G	Gross alpha	40	<1.33E+00	1.05E+00	±	2.03E+00	1.66E+01	No
		Gross beta	40	9.94E+00	3.47E+01	±	5.14E+00	2.84E+02	Yes
		H-3	40	<1.05E+02	9.00E+01	±	8.00E+01	4.20E+02	Yes
	WNW0803 S&G	Gross alpha	40	<3.01E+00	9.79E-01	±	3.38E+00	8.96E+00	No
		Gross beta	40	1.48E+01	1.51E+01	±	4.69E+00	2.50E+01	Yes
		H-3	40	1.84E+02	1.60E+02	±	8.46E+01	3.42E+02	Yes
	WNW0804 S&G	Gross alpha	40	<2.04E+00	6.00E-01	±	2.87E+00	6.54E+00	No
		Gross beta	40	2.58E+02	2.86E+02	±	1.07E+01	6.89E+02	Yes
		H-3	40	1.19E+02	1.14E+02	±	7.98E+01	3.60E+02	Yes
	WNW8612 S&G	Gross alpha	40	<2.62E+00	3.33E-01	±	3.34E+00	4.57E+00	No
		Gross beta	41	<3.58E+00	1.57E+00	±	3.60E+00	5.91E+00	No
		H-3	40	4.21E+02	4.33E+02	±	8.88E+01	8.46E+02	Yes
WMA 5	WNW0406 S&G	Gross alpha	40	<2.22E+00	1.54E-01	±	2.58E+00	4.49E+00	No
		Gross beta	40	7.44E+00	8.08E+00	±	3.49E+00	1.67E+01	Yes
		H-3	40	1.17E+02	1.06E+02	±	8.42E+01	4.38E+02	Yes
		C-14	10	<2.65E+01	-2.04E+00	±	2.36E+01	2.72E+01	No
		Sr-90	10	1.92E+00	2.15E+00	±	1.45E+00	4.57E+00	No
		Tc-99	11	2.19E+00	2.53E+00	±	1.91E+00	8.50E+00	Yes
		I-129	10	<8.91E-01	3.48E-01	±	9.17E-01	1.72E+00	No
		Cs-137	10	<6.41E+00	-9.30E-01	±	7.35E+00	<1.48E+01	No
		U-232	10	<4.55E-02	2.47E-02	±	1.24E-01	<3.59E-01	No
		U-233/234	10	1.37E-01	1.42E-01	±	1.05E-01	2.67E-01	No
		U-235/236	10	<3.97E-02	2.32E-02	±	5.51E-02	6.92E-02	No
		U-238	10	8.08E-02	8.87E-02	±	8.17E-02	1.92E-01	No

Table B-14. Summary of Radionuclide Results from Routine Onsite Groundwater Monitoring Locations[1]

WMA	Monitoring Point[2]	Constituent	N	Median (pCi/L)[3]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[4]
WMA 5	WNW0409 ULT	Gross alpha	40	<1.01E+00	9.39E-01 ± 9.94E-01	2.32E+00	Yes
		Gross beta	40	2.56E+00	2.36E+00 ± 1.37E+00	4.38E+00	No
		H-3	40	<8.01E+01	-3.82E+00 ± 7.86E+01	2.10E+02	No
	WNW0602A S&G	Gross alpha	35	<1.37E+00	4.04E-01 ± 1.60E+00	2.51E+00	No
		Gross beta	35	1.21E+01	1.32E+01 ± 2.87E+00	3.46E+01	Yes
		H-3	35	2.15E+02	2.18E+02 ± 8.88E+01	4.88E+02	Yes
	WNW0604 S&G	Gross alpha	41	<2.04E+00	3.35E-01 ± 2.45E+00	3.10E+00	No
		Gross beta	41	6.06E+00	6.29E+00 ± 2.97E+00	1.29E+01	Yes
		H-3	40	<8.14E+01	1.99E+01 ± 8.01E+01	2.07E+02	No
	WNW0605 S&G	Gross alpha	35	<1.54E+00	4.40E-01 ± 1.59E+00	1.13E+01	No
		Gross beta	35	4.83E+01	5.07E+01 ± 3.98E+00	8.82E+01	Yes
		H-3	35	<8.08E+01	1.59E+01 ± 7.86E+01	1.44E+02	No
	WNW0704 ULT/S&G	Gross alpha	40	<1.93E+00	1.75E-01 ± 2.25E+00	2.23E+00	No
		Gross beta	40	8.05E+00	8.20E+00 ± 3.05E+00	1.34E+01	Yes
		H-3	40	<8.20E+01	-1.69E+01 ± 8.24E+01	2.16E+02	No
	WNW0707 ULT/S&G	Gross alpha	40	<1.15E+00	3.09E-01 ± 1.35E+00	4.40E+00	No
		Gross beta	40	4.17E+00	4.16E+00 ± 1.98E+00	9.85E+00	No
		H-3	40	<8.22E+01	-1.89E+01 ± 8.11E+01	1.05E+02	No
	WNW1303 ULT	Gross alpha	19	<9.42E-01	1.19E+00 ± 2.06E+00	5.46E+00	No
		Gross beta	19	2.17E+00	2.24E+00 ± 2.25E+00	9.38E+00	No
		H-3	19	<8.25E+01	-4.98E+01 ± 2.09E+02	1.26E+02	No
	WNW1304 S&G	Gross alpha	19	<6.14E+00	-8.58E-01 ± 8.32E+00	6.92E+00	No
		Gross beta	19	<8.20E+00	4.92E+00 ± 8.11E+00	1.33E+01	No
		H-3	19	<9.44E+01	2.36E+01 ± 2.16E+02	1.60E+02	No
		C-14	18	<3.03E+01	2.02E+00 ± 2.92E+01	3.69E+01	No
		Sr-90	18	1.60E+00	1.93E+00 ± 1.28E+00	6.33E+00	No
		Tc-99	18	<1.94E+00	1.25E-01 ± 1.91E+00	2.62E+00	No

Table B-14. Summary of Radionuclide Results from Routine Onsite Groundwater Monitoring Locations[1]

WMA	Monitoring Point[2]	Constituent	N	Median (pCi/L)[3]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[4]
WMA 5		I-129	18	<7.52E-01	3.39E-01 ± 1.33E+00	2.83E+00	No
		Cs-137	18	<2.77E+00	7.11E-01 ± 4.88E+00	2.52E+00	No
		U-232	18	<3.73E-02	-1.09E-02 ± 6.74E-02	<2.17E-01	No
		U-233/234	18	2.66E-01	2.93E-01 ± 1.26E-01	5.65E-01	Yes
		U-235/236	18	<4.07E-02	3.85E-02 ± 5.31E-02	1.77E-01	No
		U-238	18	1.91E-01	2.15E-01 ± 1.05E-01	5.77E-01	Yes
	WNW8607 S&G	Gross alpha	40	<2.36E+00	-7.83E-02 ± 4.40E+00	9.45E+00	No
		Gross beta	40	2.57E+01	2.75E+01 ± 5.30E+00	7.63E+01	Yes
		H-3	40	<8.47E+01	1.97E+01 ± 8.30E+01	2.04E+02	No
WMA 7	WNW0902 KRS	Gross alpha	20	1.46E+00	1.34E+00 ± 1.34E+00	5.44E+00	Yes
		Gross beta	20	2.70E+00	2.76E+00 ± 1.64E+00	4.92E+00	No
		H-3	20	<8.08E+01	-3.35E+01 ± 8.18E+01	1.18E+02	No
	WNW0909 WLT	Gross alpha	26	<3.24E+00	1.16E+00 ± 3.83E+00	1.14E+01	No
		Gross beta	34	3.74E+02	3.70E+02 ± 1.40E+01	6.44E+02	Yes
		H-3	30	8.23E+02	1.54E+03 ± 1.20E+02	3.95E+03	Yes
		C-14	10	<2.49E+01	7.23E+00 ± 2.39E+01	3.53E+01	No
		Sr-90	17	1.87E+02	1.83E+02 ± 8.33E+00	2.21E+02	Yes
		Tc-99	11	<1.86E+00	1.31E+00 ± 1.82E+00	5.01E+00	Yes
		I-129	11	6.21E+00	6.30E+00 ± 1.88E+00	9.65E+00	Yes
		Cs-137	10	<5.51E+00	1.09E+00 ± 6.42E+00	<1.28E+01	No
		U-232	12	<5.99E-02	6.37E-02 ± 1.62E-01	5.26E-01	No
		U-233/234	12	5.97E-01	7.42E-01 ± 2.40E-01	1.34E+00	Yes
		U-235/236	11	6.71E-02	7.66E-02 ± 7.65E-02	2.48E-01	No
		U-238	12	4.72E-01	5.44E-01 ± 1.97E-01	1.03E+00	Yes

Table B-14. Summary of Radionuclide Results from Routine Onsite Groundwater Monitoring Locations[1]

WMA	Monitoring Point[2]	Constituent	N	Median (pCi/L)[3]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[4]
WMA 7	WNW0910 ULT	Gross alpha	25	<2.53E+00	1.88E+00 ± 2.29E+00	3.45E+00	Yes
		Gross beta	25	3.80E+01	1.46E+02 ± 8.51E+00	1.54E+03	Yes
		H-3	24	<8.06E+01	-1.24E+01 ± 8.05E+01	2.39E+02	No
	WNNDATR WLT	Gross alpha	160	2.22E+00	2.08E+00 ± 2.11E+00	1.06E+01	Yes
		Gross beta	166	1.45E+02	1.75E+02 ± 8.36E+00	5.51E+02	Yes
		H-3	164	3.65E+03	5.00E+03 ± 2.28E+02	1.99E+04	Yes
		C-14	20	<2.18E+01	3.02E-01 ± 2.39E+01	1.33E+01	No
		Sr-90	28	5.84E+01	7.85E+01 ± 5.55E+00	2.84E+02	Yes
		Tc-99	21	<1.94E+00	6.32E-01 ± 1.89E+00	5.12E+00	No
		I-129	41	<9.14E-01	8.44E-01 ± 9.35E-01	7.00E+00	Yes
		Cs-137	140	<6.80E+00	7.20E-01 ± 8.88E+00	1.50E+01	No
		U-232	21	<7.12E-02	5.11E-02 ± 1.18E-01	4.72E-01	No
		U-233/234	21	1.67E+00	1.51E+00 ± 2.81E-01	2.11E+00	Yes
		U-235/236	21	1.06E-01	1.35E-01 ± 9.47E-02	3.04E-01	Yes
		U-238	21	1.30E+00	1.22E+00 ± 2.50E-01	1.73E+00	Yes
	WNW8610 KRS	Gross alpha	20	<2.21E+00	6.60E-01 ± 2.88E+00	6.35E+00	No
		Gross beta	20	4.41E+00	4.79E+00 ± 3.09E+00	9.91E+00	No
		H-3	20	<8.17E+01	-3.80E+01 ± 7.96E+01	1.46E+02	No
	WNW8611 KRS	Gross alpha	21	<1.98E+00	1.23E+00 ± 2.25E+00	4.50E+00	No
		Gross beta	21	<2.71E+00	2.83E+00 ± 2.81E+00	1.67E+01	No
		H-3	20	<8.15E+01	-4.98E+01 ± 8.08E+01	8.44E+01	No
WMA 9	WNW1005 WLT	Gross alpha	20	<2.49E+00	1.97E+00 ± 2.92E+00	4.69E+00	No
		Gross beta	20	<3.52E+00	2.36E+00 ± 2.98E+00	5.14E+00	No
		H-3	20	<8.36E+01	1.24E+01 ± 8.14E+01	2.01E+02	No

Table B-14. Summary of Radionuclide Results from Routine Onsite Groundwater Monitoring Locations[1]

WMA	Monitoring Point[2]	Constituent	N	Median (pCi/L)[3]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[4]
WMA 9	WNW1006 WLT	Gross alpha	20	<5.10E+00	4.24E+00 ± 5.50E+00	1.02E+01	Yes
		Gross beta	20	<6.80E+00	4.58E+00 ± 5.68E+00	1.03E+01	No
		H-3	20	<8.20E+01	-1.81E+01 ± 8.24E+01	1.67E+02	No
WMA 10	WNW0302 S&G	Gross alpha	36	<5.51E+00	8.24E-01 ± 9.02E+00	1.55E+00	No
		Gross beta	36	<7.22E+00	4.13E+00 ± 8.13E+00	1.27E+01	No
		H-3	36	<8.23E+01	3.72E+01 ± 8.11E+01	1.87E+02	No
	WNW0402 S&G	Gross alpha	35	<5.13E+00	5.02E-01 ± 6.93E+00	7.45E+00	No
		Gross beta	35	<5.64E+00	2.53E+00 ± 6.56E+00	8.33E+00	No
		H-3	35	<8.21E+01	2.73E+01 ± 8.05E+01	1.99E+02	No
	WNW0403 S&G	Gross alpha	35	<2.11E+00	3.85E-01 ± 2.45E+00	5.94E+00	No
		Gross beta	35	5.76E+00	6.17E+00 ± 3.26E+00	1.06E+01	No
		H-3	35	<8.22E+01	2.20E+01 ± 7.97E+01	1.92E+02	No
	WNW1008B KRS	Gross alpha	20	<1.08E+00	7.09E-01 ± 1.12E+00	3.11E+00	No
		Gross beta	20	2.68E+00	3.15E+00 ± 1.46E+00	9.18E+00	No
		H-3	20	<8.04E+01	-2.23E+01 ± 7.96E+01	7.81E+01	No
	WNW1008C WLT	Gross alpha	20	<1.51E+00	8.13E-02 ± 1.48E+00	<1.89E+00	No
		Gross beta	20	<1.86E+00	1.15E+00 ± 2.00E+00	3.03E+00	No
		H-3	20	<8.15E+01	-1.06E+00 ± 8.10E+01	1.33E+02	No
	WNW1301 ULT	Gross alpha	1	<1.48E+01	1.43E+01 ± 1.48E+01	<1.48E+01	No
		Gross beta	1	<1.02E+01	-1.04E+01 ± 1.02E+01	<1.02E+01	No
		H-3	1	<8.61E+02	-6.09E+02 ± 8.61E+02	<8.61E+02	No
	WNW1302 S&G	Gross alpha	19	<3.69E+00	1.00E+00 ± 5.69E+00	4.88E+00	No
		Gross beta	19	<5.62E+00	2.76E+00 ± 6.44E+00	6.47E+00	No
		H-3	19	<9.37E+01	-4.07E+01 ± 2.05E+02	1.15E+02	No

Table B-14. Summary of Radionuclide Results from Routine Onsite Groundwater Monitoring Locations[1]

WMA	Monitoring Point[2]	Constituent	N	Median (pCi/L)[3]	Average (pCi/L) Result ± Uncertainty	Maximum (pCi/L)	Exceeded Background?[4]
WMA 12	WNW0903 KRS	Gross alpha	20	<1.90E+00	3.35E-01 ± 2.26E+00	4.29E+00	No
		Gross beta	20	<2.42E+00	2.30E+00 ± 2.62E+00	9.21E+00	No
		H-3	20	<8.20E+01	-5.34E+01 ± 8.16E+01	1.62E+02	No
	WNW0906 WLT	Gross alpha	20	<1.78E+00	1.47E+00 ± 1.72E+00	4.19E+00	No
		Gross beta	20	4.50E+00	4.92E+00 ± 2.22E+00	1.41E+01	No
		H-3	20	<8.43E+01	3.80E+00 ± 8.23E+01	1.55E+02	No

NOTES: (1) See Figure 4-12 in Section 4 of this plan for the locations of monitoring wells where concentrations exceed background.

(2) Geologic unit is indicated below each monitoring point.

(3) 1 pCi/L = 3.7E-02 Bq/L.

(4) Data sets for radiological constituents in groundwater were compared with data sets from background wells using the nonparametric Mann-Whitney "U" test, as described in Appendix B, Section 4.3.

LEGEND: S&G = Sand and Gravel; ULT = unweathered Lavery till; KRS = Kent Recessional Sequence; WLT = weathered Lavery till; LTS = Lavery till sand.

Table B-15. Groundwater Monitoring Locations: Coordinates, Depth, Screened Interval, and Geologic Unit

Monitoring Location[1]	North Coordinate[2]	East Coordinate[2]	Surface Elevation (ft)	Well Construction Material	Well Diameter (in)	Depth to Screen Top (ft)	Depth to Screen Bottom (ft)	Geologic Unit of Screened Interval
WNW0103	893013.68	1129469.99	1399.99	ST. STL.	2	6	21	S&G-TBU
WNW0104	893295.07	1129574.51	1399.29	ST. STL.	2	8	23	S&G-TBU/SWS
WNW0105	893536.70	1129768.63	1385.59	ST. STL.	2	13	28	S&G-TBU/SWS
WNW0106	893495.37	1129926.24	1383.73	ST. STL.	2	9.5	14.5	S&G-TBU
WNW0107	893399.05	1130060.32	1376.40	ST. STL.	2	8	28	ULT
WNW0108	893110.00	1129915.26	1381.66	ST. STL.	2	13	33	ULT
WNW0110	893024.67	1129881.74	1387.74	ST. STL.	2	13	33	ULT
WNW0111	892874.91	1129694.33	1392.54	ST. STL.	2	6	11	S&G-TBU
WNW0116	893518.81	1129560.10	1387.39	ST. STL.	2	6	11	S&G-TBU
WNW0204	892670.48	1129380.67	1406.83	ST. STL.	2	38	43	LTS
WNW0205	892696.37	1129528.87	1398.32	ST. STL.	2	6	11	S&G-TBU
WNW0206	892705.65	1129535.43	1398.39	ST. STL.	2	32.8	37.8	LTS
WNW0301	892593.20	1128914.31	1418.44	ST. STL.	2	6	16	S&G-TBU
WNW0302	892599.05	1128910.79	1418.46	ST. STL.	2	23	28	S&G-SWS
WNW0401	892708.28	1128864.51	1418.57	ST. STL.	2	6	16	S&G-TBU
WNW0402	892702.84	1128867.50	1419.34	ST. STL.	2	24	29	S&G-SWS
WNW0403	892865.78	1128790.38	1419.66	ST. STL.	2	8	13	S&G-TBU
WNW0405	893405.48	1128685.08	1408.56	ST. STL.	2	7.5	12.5	ULT
WNW0406	893250.04	1128992.47	1405.85	ST. STL.	2	11.8	16.8	S&G-TBU
WNW0408	893074.34	1129214.81	1405.56	ST. STL.	2	28	38	S&G-TBU/SWS
WNW0409	893256.53	1128988.16	1404.34	ST. STL.	2	44	54	ULT
WNW0501	893186.25	1129277.65	1402.18	ST. STL.	2	23	33	S&G-SWS
WNW0502	893325.38	1129406.73	1397.45	ST. STL.	2	8	18	S&G-TBU/SWS
WNW0602A	893403.75	1129244.07	1397.27	PVC	2	5	15	S&G-TBU

Table B-15. Groundwater Monitoring Locations: Coordinates, Depth, Screened Interval, and Geologic Unit

Monitoring Location[1]	North Coordinate[2]	East Coordinate[2]	Surface Elevation (ft)	Well Construction Material	Well Diameter (in)	Depth to Screen Top (ft)	Depth to Screen Bottom (ft)	Geologic Unit of Screened Interval
WNW0604	893576.30	1128926.84	1398.95	ST. STL.	2	6	11	S&G-TBU
WNW0605	893815.08	1129254.11	1383.90	ST. STL.	2	6	11	S&G-TBU
WNW0704	893763.67	1128814.82	1395.36	ST. STL.	2	5.5	15.5	ULT
WNW0706	893512.77	1128608.18	1409.03	ST. STL.	2	6	11	S&G-TBU
WNW0707	893896.47	1128617.53	1396.26	ST. STL.	2	6	11	ULT
WNW0801	893679.20	1129555.29	1383.51	ST. STL.	2	7.5	17.5	S&G-TBU
WNW0802	893904.53	1129687.61	1377.50	ST. STL.	2	6	11	S&G-TBU
WNW0803	893914.79	1129907.88	1370.17	ST. STL.	2	8	18	S&G-SWS
WNW0804	893751.72	1129982.56	1373.04	ST. STL.	2	4	9	S&G-TBU
WNW0901	891449.83	1129923.88	1392.72	ST. STL.	2	121	136	KRS
WNW0902	891671.96	1129774.24	1390.46	ST. STL.	2	118	128	KRS
WNW0903	892064.50	1129974.91	1380.69	ST. STL.	2	118	133	KRS
WNW0906	891945.99	1129796.90	1384.55	ST. STL.	2	5	10	WLT
WNW0908	891453.85	1129920.53	1392.94	ST. STL.	2	6	21	WLT
WNW0909	892085.66	1130121.37	1372.99	ST. STL.	2	8	23	WLT
WNW0910	892088.89	1130128.11	1372.69	PVC	2	25	30	ULT
WNW1005	890964.33	1130017.26	1389.68	ST. STL.	2	9	19	WLT
WNW1006	891264.17	1130206.69	1392.32	ST. STL.	2	10	20	WLT
WNW1008B	890904.46	1129534.09	1402.35	ST. STL.	2	46	51	KRS
WNW1008C	890914.13	1129545.20	1402.43	ST. STL.	2	8	18	WLT
WNW1301	893111.93	1128386.20	1429.49	PVC	2	20	30	ULT
WNW1302	893111.83	1128386.64	1429.47	PVC	2	5	8	S&G-TBU
WNW1303	893400.10	1128599.38	1414.65	PVC	2	23	38	ULT
WNW1304	893405.10	1128595.82	1414.36	PVC	2	6	10	S&G-TBU

Table B-15. Groundwater Monitoring Locations: Coordinates, Depth, Screened Interval, and Geologic Unit

Monitoring Location[1]	North Coordinate[2]	East Coordinate[2]	Surface Elevation (ft)	Well Construction Material	Well Diameter (in)	Depth to Screen Top (ft)	Depth to Screen Bottom (ft)	Geologic Unit of Screened Interval
WNW8603	893537.65	1129716.56	1385.45	PVC	4	8.25	23.25	S&G-TBU/SWS
WNW8604	893396.47	1129624.90	1390.41	PVC	4	6	21	S&G-TBU/SWS
WNW8605	892864.58	1129650.32	1393.19	PVC	4	5.5	10.5	S&G-TBU
WNW8607	893392.16	1128904.17	1405.03	PVC	4	11	16	S&G-TBU
WNW8609	893126.56	1129091.64	1407.07	PVC	4	12.7	22.7	S&G-TBU
WNW8610	891896.52	1130392.29	1376.88	STL.	2	97.33	112.33	KRS
WNW8611	892067.89	1130297.10	1376.34	STL.	2	103.5	118.5	KRS
WNW8612	893983.30	1130028.31	1367.76	PVC	4	6.6	16.6	S&G-TBU/SWS
WNWNB1S	892513.28	1128353.79	1447.08	ST. STL.	2	8	13	S&G-TBU
WNNDATR	892068.35	1130126.06	1374.89	CONCRETE	60	0	0	WLT
WP-A	892883.92	1129232.58	1408.34	IRON	2	29	33	S&G-TBU/SWS
WP-C	892986.95	1129411.57	1400.89	IRON	2	19	23	S&G-TBU
WP-H	892925.41	1129367.85	1405.38	IRON	2	13	17	S&G-TBU

NOTES: (1) Radiological data from the current monitoring locations, as listed in the 2008 Groundwater Monitoring Program, were evaluated for the WVDP Phase 1 DP. Monitoring point WNNDATR is an interceptor trench.

(2) Western New York State Planar Coordinate System

LEGEND: STL = steel, ST.STL = stainless steel, PVC = polyvinyl chloride, S&G = sand and gravel, TBU = thick bedded unit, SWS = slack water sequence, ULT = unweathered Lavery till, LTS = Lavery till sand, KRS = Kent recessional sequence, WLT = weathered Lavery till.

Table B-16. Location, Elevation, and Depth of Geoprobe® Groundwater Sampling Points

Location Code	Year Sampled	North Coordinate(1)	East Coordinate(1)	Surface Elevation (ft)	Sample Depths (ft) and Geologic Units(2)
GP01	1994	893754.94	1129433.58	1375.00	04-06
GP0197	1997	893527.20	1129733.08	1382.35	00-04, 04-08, 08-12, 12.5-14, 12-16, 16-20, 17.5-19, 20-24, 22.5-24, 24-28 (ULT)
GP02	1994	893701.98	1129480.46	1378.95	06-08
GP0297	1997	893527.37	1129689.35	1383.08	00-04, 04-08, 08-12, 12.5-14, 12-16, 16-20, 17.5-19, 20-24, 24-28. 25.5-27
GP03	1994	893684.86	1129546.39	1380.07	08-10, 13-15
GP0397	1997	893527.23	1129662.34	1383.08	00-04, 04-08, 08-12, 10.5-12, 12-16, 15.5-17, 16-20, 20.5-22, 20-24, 24.5-26, 24-28, 28-32 (ULT)
GP04	1994	893587.10	1129609.73	1381.96	10-12
GP0497	1997	893529.48	1129630.86	1383.10	08.5-10, 13.5-15, 18.5-20, 23-24.5
GP05	1994	893556.85	1129746.34	1391.59	15-17, 20-22, 25-27
GP0597	1997	893531.83	1129600.53	1383.51	08.5-10, 13.5-15
GP06	1994	893523.31	1129743.01	1382.59	15-17, 20-22, 25-27
GP0697	1997	893635.51	1129508.65	1381.39	08.5-10, 13.5-15, 17.5-19
GP07	1994	893623.69	1129777.03	1378.60	07.5-09.5
GP0797	1997	893633.61	1129535.22	1380.88	08.5-10, 13.5-15, 18.5-20
GP08	1994	893485.68	1129640.70	1384.66	09-11, 14-16, 19-21
GP0897	1997	893629.21	1129567.72	1380.15	08.5-10, 12.5-14.5, 17.5-18.5
GP09	1994	893446.05	1129609.75	1385.81	09-11, 14-16, 19-21
GP0997	1997	893630.01	1129599.46	1379.30	08.5-10, 13.5-15
GP10	1994	893495.08	1129514.19	1386.41	09-11
GP1097	1997	893628.00	1129624.69	1379.01	08.5-10, 13.5-15, 18.5-20
GP11	1994	893514.96	1129468.64	1386.51	08-10
GP1197	1997	893625.73	1129664.22	1378.57	08.5-10, 13.5-15, 17.5-19, 23.4-25
GP12	1994	893594.08	1129526.20	1382.41	07-09
GP1297	1997	893623.09	1129706.63	1378.15	00-04, 04-08, 07.5-09, 08-12, 12.5-14, 12-16, 16-20, 17.5-19, 20-24, 22-23.5, 24-28 (ULT)
GP13	1994	893422.90	1129419.73	1390.67	10-12
GP1397	1997	893621.53	1129744.33	1377.93	09-10.5, 13.5-15, 18.5-20
GP13A	1994	893385.24	1129395.73	1392.97	11-13, 15-17, 16-18
GP14	1994	893179.41	1129370.33	1399.11	15-17, 20-22, 25-27, 30-32
GP1497	1997	893619.43	1129784.76	1378.09	00-04, 04-08, 08-09.5, 08-12, 12-16, 16-20 (ULT)

Table B-16. Location, Elevation, and Depth of Geoprobe® Groundwater Sampling Points

Location Code	Year Sampled	North Coordinate[1]	East Coordinate[1]	Surface Elevation (ft)	Sample Depths (ft) and Geologic Units[2]
GP15	1994	893222.77	1129158.76	1402.57	15-17
GP1597	1997	893662.03	1129761.57	1376.85	08-10, 13-15, 18-20
GP16	1994	893217.10	1129056.60	1402.66	15-17, 20-22
GP1697	1997	893662.85	1129707.70	1377.19	08-10, 12-15, 18-20
GP17	1994	893055.18	1129446.69	1399.01	12-14
GP1797	1997	893733.87	1130014.29	1370.09	08-10, 13-15
GP18	1994	892932.47	1129283.29	1404.16	18-20, 21.5-23.5
GP1897	1997	893666.65	1129642.75	1387.08	08-10, 13-15, 17.5-19.5
GP1898	1998	892929.53	1129281.76	1403.99	12-14, 16-19, 22-24
GP1997	1997	893528.51	1129675.56	1383.27	00-04, 04-08, 08-12, 12-16, 14-16, 16-20, 19-21, 20-22, 22-24, 24-26, 26-28, 28-30
GP20	1994	893141.44	1129083.93	1403.07	15-17
GP2097	1997	893529.48	1129645.74	1383.35	00-04, 04-08, 08-12, 12-14, 12-16, 16-20, 17-19, 20-24, 22-24, 24-28
GP2197	1997	893531.19	1129615.48	1383.43	00-04, 04-08, 08-12, 12-16, 13-15, 16-20, 20-24, 23-25, 24-28 (ULT), 28-32 (ULT), 32-36 (ULT)
GP2297	1997	893462.46	1129692.02	1384.93	12-14, 17-19, 22-24
GP23	1994	892960.50	1129165.19	1409.41	20-22, 22.5-24.5, 27-29, 32-34
GP2397	1997	893512.71	1129715.96	1383.06	12-14, 16-19, 22-24
GP2397	1998	892980.83	1129165.77	1408.96	17-19, 22-24, 25-29, 32-34
GP24	1994	893006.32	1129151.08	1408.99	17-19, 22-24, 26-28, 30-32
GP2497	1997	893506.39	1129771.02	1382.83	00-04, 04-08, 08-12, 12-16, 14-16, 16-20, 19-21, 20-24, 24-26, 24-28, 28-30, 30-32 (ULT)
GP2597	1997	893804.22	1129989.94	1368.40	08-10
GP26	1994	892992.21	1129084.84	1409.63	17-19
GP2697	1997	893671.61	1129961.64	1375.36	04.5-06.5, 09-11, 14-16
GP27	1994	892960.10	1129096.04	1408.86	16-18, 21-23, 26-28
GP2797	1997	893576.18	1129713.16	1381.18	12-14, 16-19, 22-24
GP28	1994	892855.87	1129220.94	1408.08	16-18, 21-23, 26-28, 31-33
GP2897	1997	893579.60	1129663.78	1381.44	12-14, 16-19, 22-24
GP29	1994	892783.34	1129163.61	1410.01	15-17, 21-23, 27-29, 33-35
GP2997	1997	893583.58	1129622.59	1381.56	12-14

Table B-16. Location, Elevation, and Depth of Geoprobe® Groundwater Sampling Points

Location Code	Year Sampled	North Coordinate[1]	East Coordinate[1]	Surface Elevation (ft)	Sample Depths (ft) and Geologic Units[2]
GP2998	1998	892781.53	1129163.00	1409.81	17-19, 19-21, 21-23, 22-24, 23-25, 25-27, 27-29, 29-31, 31-33, 33-35, 34-36, 35-37, 37-38 (ULT), 38-39 (ULT), 39-40 (ULT), 40-41 (ULT)
GP2908	2008	892784.10	1129167.91	1410.50	17-19, 29-31, 35-37
GP30	1994	892835.65	1129144.49	1409.32	18-20, 22-24, 27-29, 32-34
GP3098	1998	892829.94	1129141.96	1409.18	18-20, 20-22, 22-24, 23-27, 23-37, 24-26, 26-28, 28-30, 30-32, 32-34, 34-36, 36-36.5, 36.5-37 (ULT), 37-37.5 (ULT), 37.5-38 (ULT), 38-38.5 (ULT), 38.5-39 (ULT), 39-39.5 (ULT), 39.5-40 (ULT)
GP3008	2008	892837.12	1129147.27	1409.83	20-22, 28-30, 35-37
GP31	1994	893269.27	1129335.71	1396.59	12-14, 17-19
GP32	1994	893827.03	1129487.70	1372.83	05-07
GP32A	1994	893831.75	1129475.59	1372.45	05-07
GP33	1994	893813.09	1129337.41	1375.73	05-07
GP33A	1994	893819.60	1129347.72	1375.24	05-07
GP35	1994	893858.20	1129143.23	1384.48	04-06
GP36	1994	893815.85	1128971.59	1387.17	03.5-05.5
GP37	1994	893720.92	1128930.11	1389.11	05-07
GP38	1994	893594.09	1128959.27	1392.71	06.5-08.5
GP39	1994	893498.24	1128979.05	1396.44	06-08, 10-12
GP40	1994	893459.75	1129103.74	1394.08	08-10, 13-15
GP41	1994	893388.58	1129138.49	1396.59	14-16
GP42	1994	893362.12	1129180.49	1395.96	11-13
GP43	1994	893334.39	1129257.32	1396.17	12-14
GP44	1994	893003.49	1129551.08	1393.29	09-11, 14-16
GP45	1994	892995.79	1129523.66	1394.34	10-12, 15-17, 18.5-20.5
GP46	1994	892968.45	1129466.90	1397.24	12-14, 17-19
GP47	1994	892969.21	1129522.40	1394.24	11-13, 16-18
GP48	1994	892924.74	1129842.93	1386.88	07-09
GP50	1994	892833.51	1129852.05	1384.55	08-10
GP51	1994	893825.87	1129561.74	1374.48	06.5-08.5
GP52	1994	893859.57	1129634.30	1374.21	08-10
GP53	1994	893278.77	1128978.62	1401.62	14-16
GP56	1994	892704.20	1129025.11	1410.49	06-08, 15.5-17.5

Table B-16. Location, Elevation, and Depth of Geoprobe® Groundwater Sampling Points

Location Code	Year Sampled	North Coordinate[1]	East Coordinate[1]	Surface Elevation (ft)	Sample Depths (ft) and Geologic Units[2]
GP59	1994	892859.54	1129363.33	1399.83	09-11, 17-19
GP60	1994	892870.18	1129409.83	1400.01	12-14, 17-19
GP61	1994	893875.01	1129563.26	1372.91	06-08
GP62	1994	893933.30	1129567.59	1371.20	04-06
GP64	1994	893781.92	1129295.55	1379.81	09-11
GP66	1994	893125.94	1129318.33	1403.62	17-19, 22-24, 26-28, 30-32
GP67	1994	893186.02	1129410.00	1399.12	15-17, 20-22, 25-27, 30-32
GP68	1994	893199.21	1129449.59	1398.42	15-17, 20-22, 25-27, 30-32
GP69	1994	892721.81	1129189.75	1410.10	19-21, 29-31, 34-36
GP70	1994	892815.80	1129223.19	1409.19	16-18, 21-23, 26-28
GP71	1994	892845.53	1129242.84	1406.51	16-18, 21-23, 25-27
GP72	1994	892873.33	1129179.42	1409.41	16-18, 21-23, 20-32
GP7298	1998	892873.12	1129178.71	1409.17	17-19, 19-21, 21-23, 22-24, 23-25, 25-27, 27-29, 29-31, 31-33, 32-34, 33-35, 35-37, 37-39 (ULT), 39-41 (ULT)
GP7208	2008	892871.89	1129180.55	1410.07	20-22, 25-27, 31-33, 38-40
GP73	1994	892908.21	1129176.59	1410.51	21-23, 26-28, 30-32
GP7398	1998	892899.43	1129186.81	1410.00	18-20, 20-22, 22-24, 24-26, 25-27, 26-28, 28-30, 30-32, 32-34, 34-36, 35-37, 36-38, 38-40, 40.5-41 (ULT), 40-45.5 (ULT), 41.5-42 (ULT), 41-41.5 (ULT)
GP74	1994	892906.72	1129072.17	1409.69	18-20, 23-25, 28-30
GP75	1994	892804.03	1129071.55	1410.49	19-21, 23-25, 27-29
GP76	1994	892829.00	1129049.17	1414.49	19-21, 23-25, 27-29
GP7608	2008	892824.00	1129049.00	1415.00	20-22, 34-36
GP77	1994	892748.07	1129075.00	1414.49	19-21, 19-23, 27-29, 31-33
GP78	1994	892841.92	1129109.44	1414.48	19-21, 19-23, 23-25, 27-29, 31-33
GP7898	1998	892831.03	1129127.81	1409.70	19-21, 20-22, 21-23, 23-25, 24-27, 25-27, 27-29, 29-31, 30-32, 31-33, 33-35, 35-37
GP7808	2008	892843.00	1129107.00	1410.21	20-22, 28-30, 34-36
GP79	1994	892757.54	1129099.11	1414.49	21-23, 25-27, 29-31
GP80	1994	892809.20	1129126.66	1414.48	25-27, 30-32, 34-39, 35-35, 35-37
GP8098	1998	892792.03	1129125.21	1414.28	22-24, 24-26, 26-28, 27-29, 28-30, 30-32, 32-34, 34-36, 36-38, 38-40, 40-42 (ULT)
GP8008	2008	892812.00	1129141.00	1415.00	25-27, 32-34, 39-41
GP8198	1998	893048.83	1129217.96	1403.98	15-17, 20-22, 25-27, 30-32, 35-37

Table B-16. Location, Elevation, and Depth of Geoprobe® Groundwater Sampling Points

Location Code	Year Sampled	North Coordinate(1)	East Coordinate(1)	Surface Elevation (ft)	Sample Depths (ft) and Geologic Units(2)
GP8298	1998	892996.19	1129315.09	1402.13	12-14, 17-19, 20-24
GP8398	1998	892982.69	1129187.54	1407.43	17-19, 19-21, 20-22, 21-23, 23-25, 25-27, 27-29, 29-31, 31-33, 32-34, 33-35, 35-37
GP8308	2008	892980.71	1129181.86	1409.79	22-24, 30-32, 38-40
GP8698	1998	892845.57	1129161.24	1409.02	18-20, 20-22, 22-24, 24-26, 24-27, 26-28, 28-30, 30-32, 32-34, 34-36, 35-37, 36-38, 38-39, 39-39.5, 39.5-40 (ULT), 40-40.5 (ULT), 40.5-41 (ULT), 41-41.5 (ULT), 41.5-42 (ULT)
GP8798	1998	892813.15	1129225.60	1408.43	15-17, 20-22, 25-27, 28-32
GP8898	1998	893533.28	1129528.60	1384.14	07-09, 12-14
GP8998	1998	893722.00	1129516.58	1379.09	06-08, 11-13, 16-18
GP9098	1998	893826.72	1129596.32	1373.46	03-05, 08-10
GP9198	1998	893875.44	1129596.20	1372.82	03-05
GP9298	1998	893811.26	1129533.79	1373.71	04-06, 09-11, 14-16, 18.5-21
GP9398	1998	893821.48	1129568.33	1372.62	04-06, 09-11, 14-16
GP9498	1998	893874.66	1129532.98	1372.01	03-05, 08-10, 12-15
GP10008	2008	892805.00	1129048.00	1415.00	20-22, 35-37
GP10108	2008	892924.08	1129094.92	1410.30	21-23, 28-30
GP10208	2008	892838.12	1129224.43	1409.11	27-29
GP10308	2008	892977.38	1129140.72	1410.53	21-23, 30-32, 35-37
GP10408	2008	892953.72	1129241.54	1405.91	21-23
GP10508	2008	893026.27	1129223.72	1405.04	16-18, 28-30, 34-36
GP10608	2008	893026.76	1129312.67	1403.39	16-18, 20-22, 28-30
GP10708	2008	893119.33	1129306.52	1403.80	15-17, 22-24, 30-32
GP10908	2008	893138.89	1129224.21	1402.60	14-16, 28-30, 34-36

NOTES: (1) Western New York State Planar Coordinate System

(2) All screened intervals were within the Sand and Gravel (S&G) unit except for those from the Unweathered Lavery Till unit, designated as "ULT."

Table B-17. Groundwater Points Excluded from the Evaluation[1]

Sampling Location	North Coordinate [2]	East Coordinate [2]	Surface Elevation (ft)	Elevation at Top of Screened Interval (ft)	Elevation at Bottom of Screened Interval (ft)	Geologic Unit of Screened Interval
NDA WP-A	892047.61	1130117.37	1375.47	1355.27	1348.77	ULT
NDA WP-B	892045.71	1130112.17	1375.45	1360.25	1357.75	WLT
NDA WP-C	892006.26	1130115.39	1378.47	1367.67	1362.17	WLT
NP0101	893602.56	1129427.10	1386.10	1379.60	1374.60	S&G
NP0102	893577.38	1129428.82	1389.40	1381.90	1376.90	S&G
NP0103	893586.49	1129466.86	1385.10	1376.60	1371.60	S&G
NP0104	893621.36	1129460.64	1384.10	1379.60	1369.60	S&G
NP0105	893528.03	1129853.06	1382.50	1374.50	1359.50	S&G
NP0106	893598.16	1129779.73	1380.70	1369.70	1364.70	S&G
NP0107	893542.52	1129601.69	1384.10	1375.60	1370.60	S&G
NP0108	893518.32	1129601.99	1385.30	1376.30	1371.30	S&G
NP0109	893543.29	1129552.36	1384.30	1376.30	1369.30	S&G
NP0110	893573.10	1129628.57	1383.50	1373.50	1370.50	S&G
NP0111	893609.48	1129621.28	1381.40	1366.40	1363.40	S&G
NP0112	893605.26	1129622.72	1381.50	1373.50	1368.50	S&G
NP0113	893578.74	1129574.71	1383.00	1373.00	1368.00	S&G
NP0114	893564.04	1129564.66	1383.50	1375.50	1370.50	S&G
NP0115	893484.80	1129685.67	1385.60	1366.60	1359.60	S&G
NP0116	893490.96	1129688.62	1385.30	1373.80	1368.80	S&G
NP0117	893446.35	1129634.45	1386.40	1368.40	1363.40	S&G
NP0118	893439.47	1129630.61	1386.60	1375.60	1370.60	S&G
NP0119	893526.14	1129664.12	1385.10	1364.10	1359.10	S&G
NP0120	893526.24	1129655.74	1385.30	1371.30	1366.30	S&G
NP0121	893518.59	1129668.60	1384.60	1373.60	1358.60	S&G
NP0122	893512.26	1129663.29	1384.60	1377.60	1362.60	S&G
NP0123	893513.46	1129649.40	1384.90	1370.90	1365.90	S&G
NP0124	893512.56	1129653.52	1384.70	1365.70	1360.70	S&G
NP0125	893518.72	1129631.75	1384.60	1377.60	1362.60	S&G
NP0126	893513.83	1129634.52	1384.70	1377.70	1362.70	S&G
NP0127	893561.96	1129508.64	1386.10	1379.60	1369.60	S&G
NP0128	893611.18	1129516.76	1382.80	1375.80	1365.80	S&G
NP0129	893585.08	1129529.17	1383.40	1376.40	1366.40	S&G
NP0130	893629.71	1129576.60	1381.00	1374.00	1364.00	S&G
NP0131	893535.80	1129735.81	1383.00	1366.00	1356.00	S&G
NP0132	893556.54	1129690.68	1383.70	1364.70	1360.70	S&G
NP0133	893616.82	1129670.92	1379.90	1364.90	1354.90	S&G
PTWRP	893516.03	1129663.87	1384.88	1380.88	1360.88	S&G

Table B-17. Groundwater Points Excluded from the Evaluation[1]

Sampling Location	North Coordinate [2]	East Coordinate [2]	Surface Elevation (ft)	Elevation at Top of Screened Interval (ft)	Elevation at Bottom of Screened Interval (ft)	Geologic Unit of Screened Interval
PZ01	893501.64	1129644.29	1385.10	1378.10	1363.10	S&G
PZ02	893502.55	1129658.76	1385.10	1378.10	1363.10	S&G
PZ03	893509.15	1129639.29	1384.60	1377.60	1362.60	S&G
PZ04	893508.56	1129664.33	1384.70	1377.70	1362.70	S&G
PZ05	893519.11	1129676.77	1384.40	1377.40	1362.40	S&G
PZ06	893538.60	1129638.19	1384.30	1377.30	1362.30	S&G
PZ07	893537.58	1129663.80	1384.00	1377.00	1362.00	S&G
PZ08	893516.74	1129643.87	1385.40	1368.40	1365.40	S&G
PZ09	893516.34	1129651.79	1385.40	1367.90	1365.40	S&G
PZ10	893521.60	1129632.18	1384.60	1375.60	1372.60	S&G
RW01	893556.21	1129506.87	1384.43	1379.43	1369.43	S&G
RW02	893559.26	1129478.22	1384.38	1380.38	1370.38	S&G
RW03	893565.07	1129493.51	1385.28	1380.28	1370.28	S&G
WNGSEEP	893765.77	1130322.30	1356.89	NA	NA	S&G
WNGSP04	893866.63	1130309.52	NA	NA	NA	S&G
WNGSP06	893960.73	1130283.50	NA	NA	NA	S&G
WNGSP11	894065.05	1130090.45	NA	NA	NA	S&G
WNGSP12	894171.90	1130050.85	NA	NA	NA	S&G
WNNDATR	892068.35	1130126.06	1372.49	NA	NA	WLT
WNSE007	893850.15	1129578.86	1371.11	NA	NA	S&G
WNSE008	893791.04	1130002.44	1368.52	NA	NA	S&G
WNSE009	893683.63	1129699.74	1378.11	NA	NA	S&G
WNSE011	893838.93	1129534.25	1373.08	NA	NA	S&G
WNW0109	892972.05	1129830.09	1386.84	1373.84	1353.84	ULT
WNW0114	893452.77	1129988.66	1377.01	1368.01	1348.01	ULT
WNW0115	893525.49	1129564.84	1384.19	1366.19	1356.19	ULT
WNW0201	892419.73	1129383.16	1408.19	1398.19	1388.19	S&G
WNW0202	892407.19	1129390.47	1407.95	1374.95	1369.95	LTS
WNW0203	892670.42	1129376.09	1404.62	1396.62	1386.62	S&G
WNW0207	892503.34	1129677.53	1396.11	1390.11	1385.11	S&G
WNW0208	892488.90	1129674.25	1396.26	1378.26	1373.26	LTS
WNW0305	892630.33	1129176.24	1410.38	1394.38	1379.38	S&G
WNW0306	892633.70	1129174.87	1410.32	1344.32	1329.32	KRS
WNW0307	892634.87	1129177.55	1410.53	1404.53	1394.53	S&G
WNW0404	892871.77	1128786.30	1416.69	1390.19	1380.19	S&G
WNW0407	893250.92	1128996.78	1402.40	1336.90	1326.90	ULT
WNW0410	892868.61	1128789.26	1416.64	1348.64	1338.64	KRS

Table B-17. Groundwater Points Excluded from the Evaluation[1]

Sampling Location	North Coordinate [2]	East Coordinate [2]	Surface Elevation (ft)	Elevation at Top of Screened Interval (ft)	Elevation at Bottom of Screened Interval (ft)	Geologic Unit of Screened Interval
WNW0411	892694.15	1128869.23	1416.27	1370.27	1350.27	KRS
WNW0601	893810.70	1129256.11	1381.14	1377.14	1375.14	S&G
WNW0603	893519.08	1128736.33	1401.14	1393.14	1388.14	S&G
WNW0701	893501.78	1128611.97	1406.52	1383.52	1378.52	ULT
WNW0702	893775.67	1128516.08	1397.68	1369.68	1359.68	ULT
WNW0703	893887.50	1128622.76	1393.12	1382.12	1372.12	ULT
WNW0705	893779.24	1128509.78	1397.87	1391.87	1376.87	ULT
WNW0904	892066.15	1129984.19	1377.95	1361.95	1351.95	ULT
WNW0905	892131.67	1130069.18	1373.56	1355.56	1350.56	S&G
WNW0907	891901.62	1129774.48	1382.27	1376.27	1366.27	WLT
WNW1001	890969.42	1130010.26	1387.55	1281.55	1271.55	KRS
WNW1002	891267.67	1130208.43	1389.76	1291.76	1276.76	KRS
WNW1003	891303.20	1130437.01	1387.65	1259.65	1249.65	KRS
WNW1004	891085.15	1130459.09	1383.89	1290.89	1275.89	KRS
WNW1007	891306.41	1130433.26	1387.55	1374.55	1364.55	WLT
WNW1101A	891062.41	1130830.41	1379.37	1373.37	1363.37	WLT
WNW1101B	891060.33	1130826.90	1379.42	1359.42	1349.42	ULT
WNW1101C	891058.61	1130823.07	1379.13	1285.13	1270.13	KRS
WNW1102A	891508.74	1131146.27	1382.71	1375.71	1365.71	WLT
WNW1102B	891514.11	1131142.06	1382.59	1361.59	1351.59	ULT
WNW1103A	891925.14	1130822.28	1379.90	1373.90	1363.90	WLT
WNW1103B	891929.54	1130818.73	1379.83	1358.83	1343.83	ULT
WNW1103C	891934.64	1130815.86	1379.51	1273.51	1258.51	KRS
WNW1104A	892289.10	1130545.05	1376.12	1372.12	1357.12	WLT
WNW1104B	892285.42	1130549.21	1376.10	1355.10	1340.10	ULT
WNW1104C	892282.05	1130553.29	1375.96	1261.96	1251.96	KRS
WNW1105A	892608.51	1130294.17	1365.80	1354.80	1344.80	ULT
WNW1105B	892608.20	1130289.77	1366.01	1345.01	1330.01	ULT
WNW1106A	891960.87	1130374.92	1374.36	1368.36	1358.36	WLT
WNW1106B	891964.09	1130372.02	1374.32	1353.62	1343.62	ULT
WNW1107A	892368.58	1130256.16	1377.16	1373.16	1358.16	WLT
WNW1108A	891312.43	1130600.10	1380.93	1374.93	1364.93	WLT
WNW1109A	891929.92	1130329.31	1374.86	1368.86	1358.86	WLT
WNW1109B	891934.27	1130326.01	1374.02	1358.02	1343.02	ULT
WNW1110A	892100.29	1130691.11	1377.05	1367.05	1357.05	WLT
WNW1111A	891654.21	1131042.28	1380.22	1369.22	1359.22	ULT
WNW80-4	893687.98	1129428.98	1386.55	1373.98	1368.98	S&G

Table B-17. Groundwater Points Excluded from the Evaluation[1]

Sampling Location	North Coordinate [2]	East Coordinate [2]	Surface Elevation (ft)	Elevation at Top of Screened Interval (ft)	Elevation at Bottom of Screened Interval (ft)	Geologic Unit of Screened Interval
WNW834D	893670.95	1129435.35	1380.48	1256.18	1249.98	KRS
WNW834E	893670.95	1129435.35	1381.64	NA	NA	BR
WNW8606	892694.89	1129523.46	1396.49	1390.89	1385.89	S&G
WNW8608	893250.67	1128985.62	1401.59	1394.59	1384.59	S&G
WNW90I7	891913.54	1130323.78	NA	NA	NA	WLT
WNW96I1	891991.27	1130117.11	1379.89	1374.89	1369.89	WLT
WNW96I2	891915.18	1130305.03	1380.41	1374.91	1369.91	WLT
WNW96I3	891898.75	1129901.48	1380.32	1372.32	1367.32	WLT
WNW96I4	891872.40	1129910.29	1381.36	1374.36	1369.36	WLT
WNWEW-1	893578.98	1129453.22	1384.91	1379.91	1371.91	S&G
WNWEW-4	893546.14	1129515.19	1384.17	1380.17	1368.17	S&G
WNWWP-4	893486.96	1129473.70	1387.63	1379.63	1377.63	S&G
WP01	893485.51	1129520.87	1386.57	1378.57	1376.57	S&G
WP02	893566.19	1129521.75	1383.10	1376.10	1373.10	S&G
WP03	893513.64	1129490.62	1385.88	1377.88	1375.88	S&G
WP05	893584.51	1129490.37	1383.91	1376.91	1373.91	S&G
WP06	893548.40	1129479.09	1384.94	1377.94	1374.94	S&G
WP07	893520.93	1129467.36	1386.08	1378.08	1376.08	S&G
WP08	893500.03	1129447.32	1387.34	1379.34	1377.34	S&G
WP09	893591.43	1129438.20	1384.81	1377.81	1374.81	S&G
WP10	893533.21	1129414.87	1390.47	1383.47	1380.47	S&G
WP11	893537.89	1129741.98	1382.08	1370.08	1367.08	S&G
WP12	893552.47	1129785.92	1381.68	1369.68	1366.68	S&G
WP13	893603.74	1129840.46	1379.78	1367.78	1364.78	S&G
WP14	893561.33	1129744.79	1381.38	1369.38	1366.38	S&G
WP15	893530.52	1129536.70	1384.08	1377.08	1374.08	S&G
WP16	893591.77	1129669.06	1381.61	1365.61	1362.61	S&G
WP17	893631.05	1129660.29	1379.01	1371.01	1368.01	S&G
WP18	893627.96	1129702.66	1378.66	1370.66	1367.66	S&G
WP20D	892845.95	1129162.30	1409.60	1379.60	1376.6	S&G
WP20S	892844.41	1129162.58	1409.60	1388.60	1385.60	S&G
WP21	893534.74	1129529.93	1384.50	1377.50	1374.50	S&G
WP22	893723.11	1129517.68	1379.80	1365.80	1362.80	S&G
WP23	893809.43	1129533.65	1374.60	1366.60	1363.60	S&G
WP24	893874.64	1129534.13	1372.50	1364.50	1361.50	S&G
WP25	893522.25	1129629.76	1384.70	1377.70	1362.70	S&G
WP26	893511.05	1129650.65	1384.50	1377.50	1362.50	S&G

Table B-17. Groundwater Points Excluded from the Evaluation[1]

Sampling Location	North Coordinate [2]	East Coordinate [2]	Surface Elevation (ft)	Elevation at Top of Screened Interval (ft)	Elevation at Bottom of Screened Interval (ft)	Geologic Unit of Screened Interval
WP27	893519.23	1129672.49	1384.40	1377.40	1362.40	S&G
WP28	893513.60	1129644.17	1384.60	1377.60	1362.60	S&G
WP29	893519.34	1129643.90	1385.10	1378.10	1363.10	S&G
WP30	893526.35	1129644.34	1385.20	1378.20	1363.20	S&G
WP31	893519.50	1129651.73	1385.40	1378.40	1363.40	S&G
WP32	893520.70	1129651.71	1385.40	1378.40	1363.40	S&G
WP33	893522.25	1129651.70	1385.40	1378.40	1363.40	S&G
WP34	893526.13	1129651.67	1385.40	1378.40	1363.40	S&G
WP35	893538.42	1129651.63	1384.00	1377.00	1362.00	S&G
WP36	893513.55	1129659.28	1384.70	1377.70	1362.70	S&G
WP37	893519.29	1129659.11	1385.30	1378.30	1363.30	S&G
WP38	893520.62	1129659.08	1385.40	1378.40	1363.40	S&G
WP39	893522.08	1129659.00	1385.40	1378.40	1363.40	S&G
WP40	893526.27	1129659.35	1385.30	1378.30	1363.30	S&G

NOTES: (1) This table lists points that were not included in the evaluation for DP section 4.2 because: a) no radiological data were available; b) data from that point were not validated (e.g., piezometers, surface elevation points, wells for the north plateau groundwater recovery system, wells for evaluation of the permeable treatment wall); c) sampling was dropped from the groundwater program because coverage was considered sufficient and no additional sampling was required (e.g., several points discontinued in 1995); d) the well was dry; or e) the sampling point was from an area outside the scope of the Phase 1 DP (e.g., groundwater seeps outside the process premises, wells from WMA 8).

(2) Western New York State Planar Coordinate System

LEGEND: S&G = sand and gravel, ULT = unweathered Lavery till, WLT = weathered Lavery till, LTS = Lavery till sand, KRS = Kent recessional sequence, BR = bedrock.