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 to be performed early in Phase 1 of the proposed decommissioning 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.)

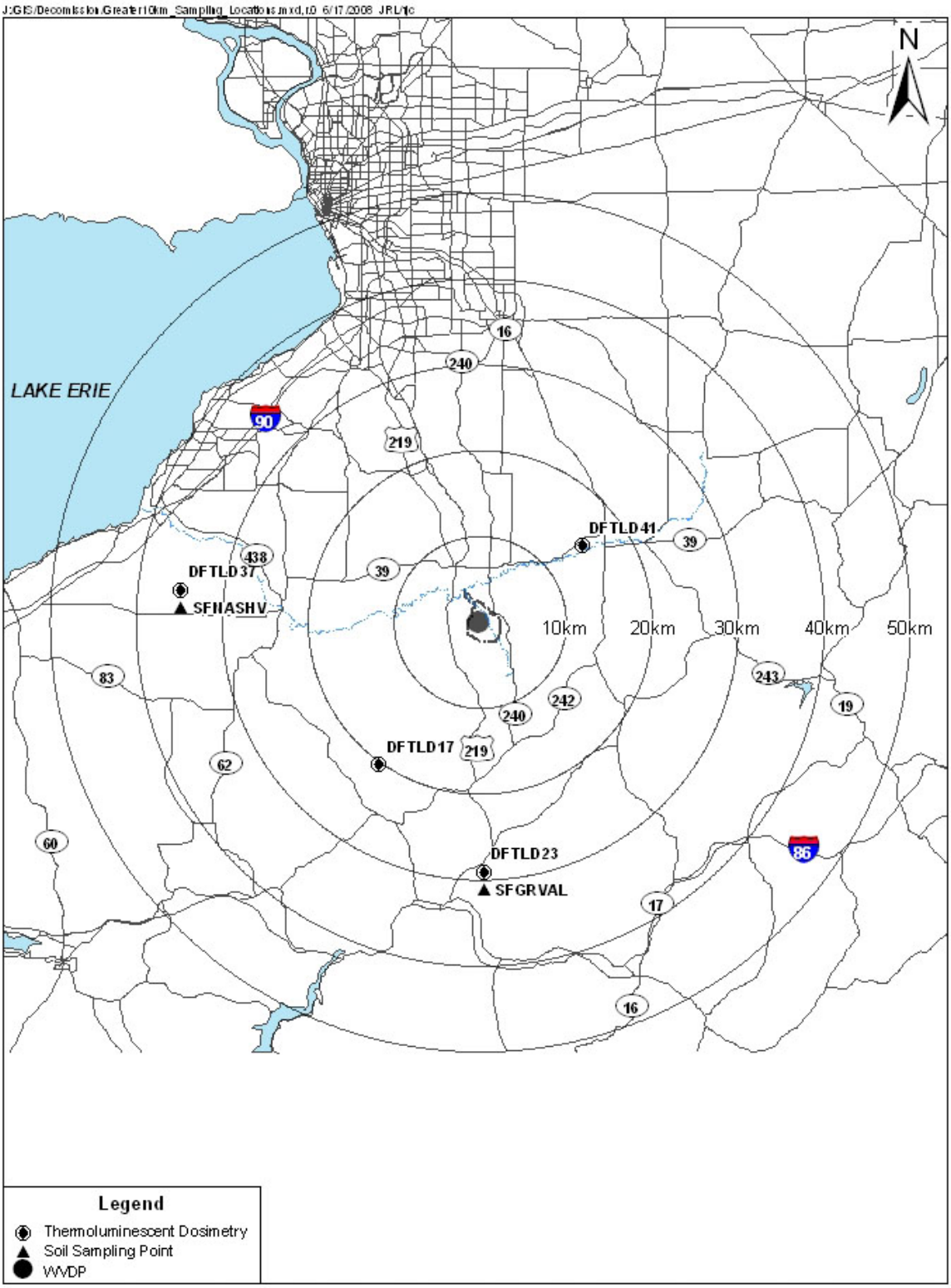

Figure B-1. Background Sampling Locations More Than 10 Kilometers From the WVDP

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.)

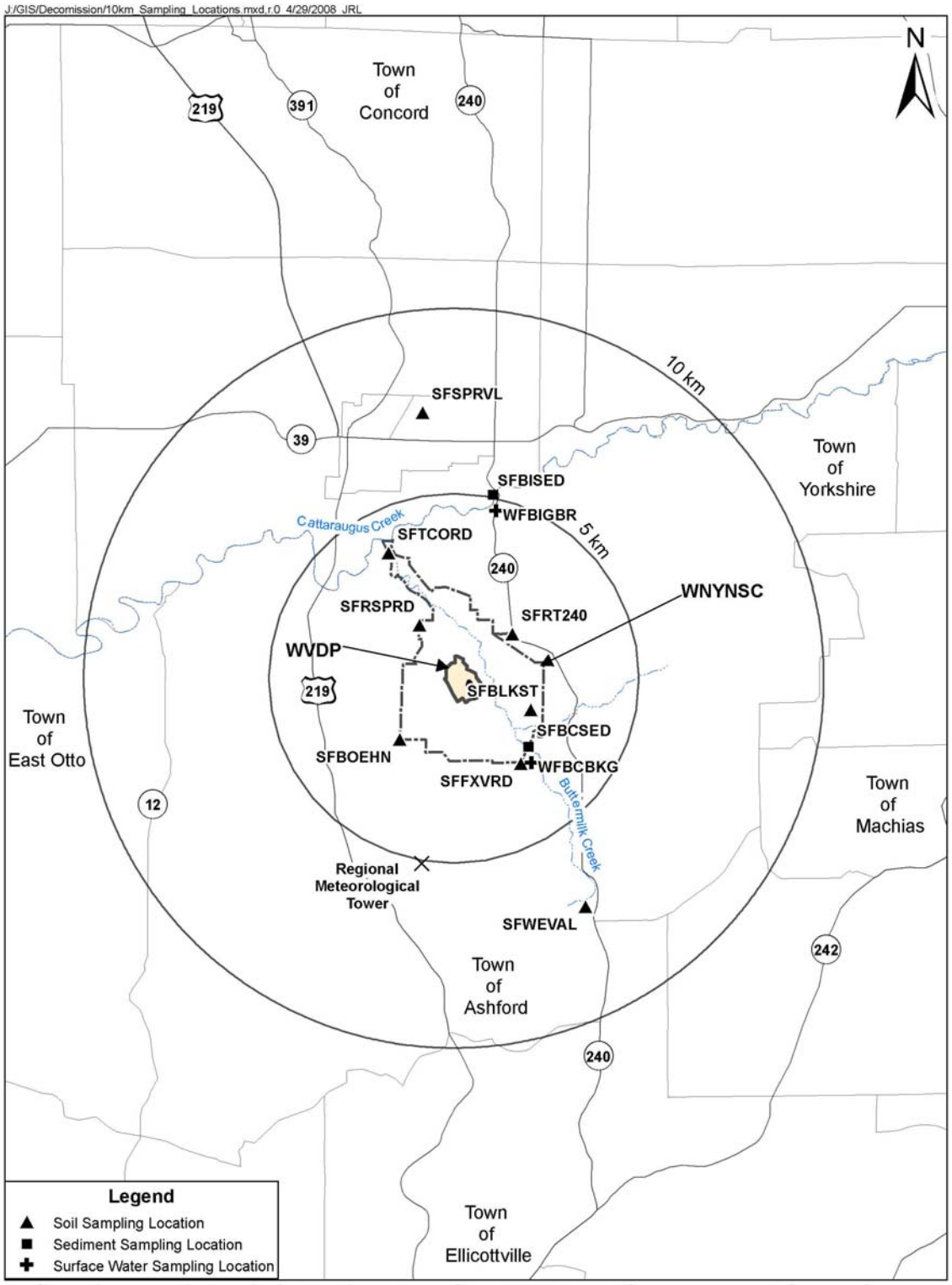

Figure B-2. Sampling Locations Within 10 Kilometers of the WVDP Used for Background Calculations

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.

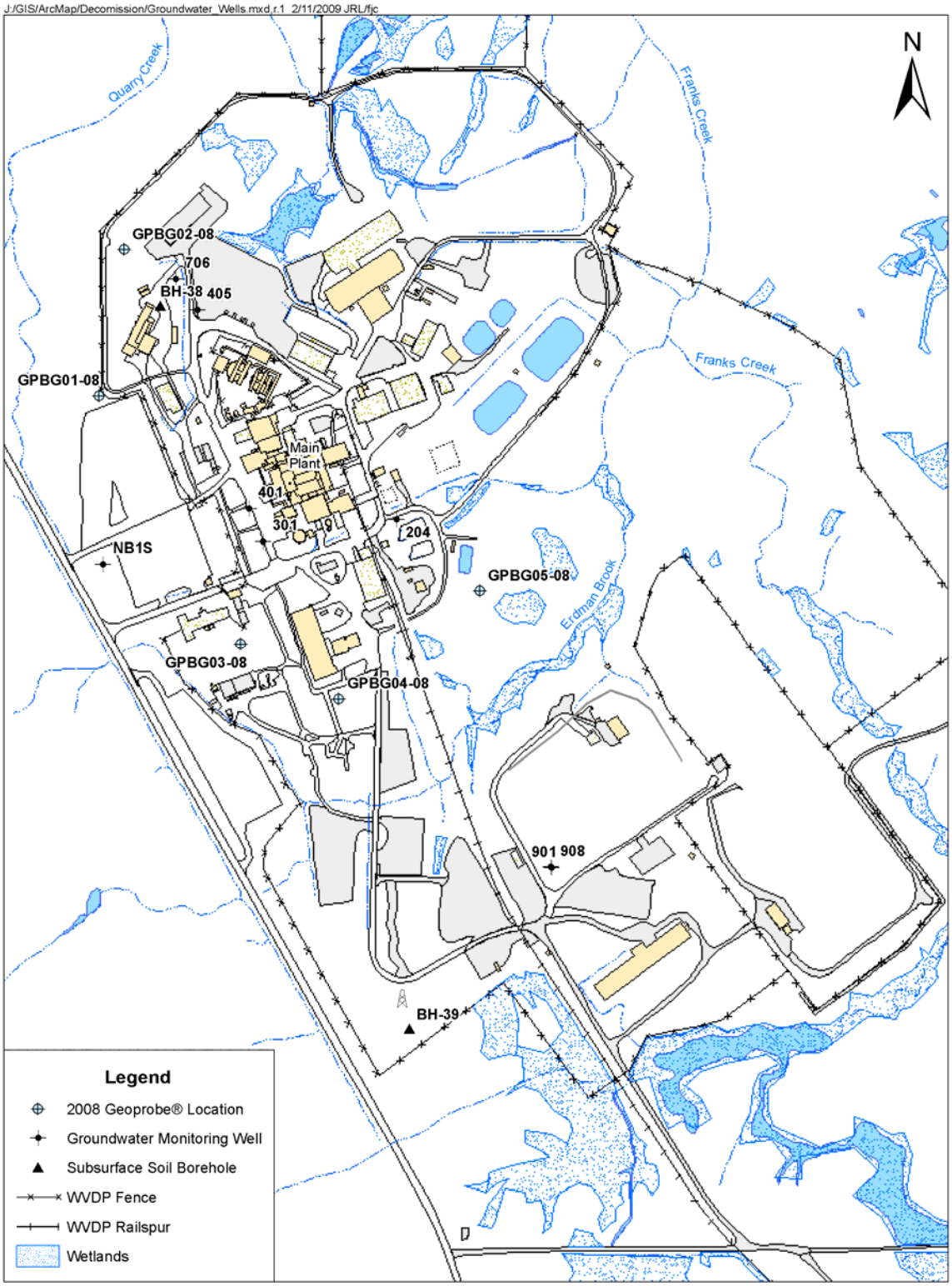

Figure B-3. Onsite Groundwater and Subsurface Soil Locations Used as Background

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		23	65%	1995-2007	SFBCSED, SFBISED
Cs-137	3.50E-02	±	2.50E-02	3.75E-02	1.57E-01 7.84E-02	23	30%	1995-2007	SFBCSED, SFBISED
U-232	1.15E-02	±	5.50E-02	< 3.10E-02		23	87%	1995-2007	SFBCSED, SFBISED
U-233/234	5.99E-01	±	1.19E-01	6.59E-01	3.92E-02 6.58E-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		23	4%	1995-2007	SFBCSED, SFBISED
Pu-238	1.67E-02	±	1.79E-02	< 1.41E-02	9.01E-01	23	74%	1995-2007	SFBCSED, SFBISED
Pu-239/240	1.08E-02	±	1.37E-02	< 1.22E-02	1.29E-01	23	83%	1995-2007	SFBCSED, SFBISED
Am-241	1.07E-02	±	1.83E-02	< 1.41E-02	6.07E-02	23	74%	1995-2007	SFBCSED, SFBISED
					8.60E-02				

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		387	74%	1991-2007	WFBCBKG, WFBIGBR
Gross beta	2.64E+00	±	1.43E+00	2.34E+00	5.43E+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		251	47%	1991-2007	WFBCBKG, WFBIGBR
Tc-99	-4.40E-01	±	1.80E+00	< 1.80E+00	1.23E+01 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		250	95%	1991-2007	WFBCBKG, WFBIGBR
U-232	1.81E-02	±	8.91E-02	< 4.28E-02	1.01E+01 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)			Median	Maximum	N	Years	Data Source Locations(1)
	Result	±	Uncertainty					
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)
		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)
U-238		11	0.0011	0.057	0.087	6.4E-01	Sediment at North Swamp (SNSW74A)

Am-241

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)			Maximum (pCi/g)	Exceeded Background?(1)
					Result	±	Uncertainty		
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)			Maximum (pCi/g)	Exceeded Background?(1)
					Result	±	Uncertainty		
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)			Maximum (pCi/L)	Exceeded Background?(1)
					Result	±	Uncertainty		
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)			Maximum (pCi/L)	Exceeded Background?(1)
					Result	±	Uncertainty		
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)			Maximum (pCi/L)	Exceeded Background?[4]
					Result	±	Uncertainty		
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)			Maximum (pCi/L)	Exceeded Background?[4]
					Result	±	Uncertainty		
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)			Maximum (pCi/L)	Exceeded Background?[4]
					Result	±	Uncertainty		
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	Gross alpha	40	<4.40E+00	7.94E-01	±	8.04E+00	1.46E+01	No
	S&G	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	Gross alpha	41	<5.02E+00	3.92E-01	±	7.89E+00	9.30E+00	No
	S&G	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	Gross alpha	35	<4.68E+00	1.07E+00	±	7.83E+00	9.00E+00	No
	S&G	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	Gross alpha	40	9.11E+00	8.46E+00	±	7.66E+00	2.08E+01	Yes
	S&G	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	Gross alpha	12	<3.95E-01	9.03E-01	±	2.74E+00	<6.92E+00	No
	S&G	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	Gross alpha	13	6.08E+00	7.90E+01	±	2.33E+01	7.42E+02	Yes
	S&G	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	Gross alpha	40	<3.10E+00	-3.75E-01	±	5.55E+00	3.84E+00	No
	S&G	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	Gross alpha	40	<1.33E+00	1.05E+00	±	2.03E+00	1.66E+01	No
	S&G	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	Gross alpha	40	<3.01E+00	9.79E-01	±	3.38E+00	8.96E+00	No
	S&G	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	Gross alpha	40	<2.04E+00	6.00E-01	±	2.87E+00	6.54E+00	No
	S&G	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	Gross alpha	40	<2.62E+00	3.33E-01	±	3.34E+00	4.57E+00	No
	S&G	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	Gross alpha	40	<2.22E+00	1.54E-01	±	2.58E+00	4.49E+00	No
	S&G	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)			Maximum (pCi/L)	Exceeded Background?[4]
					Result	±	Uncertainty		
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)			Maximum (pCi/L)	Exceeded Background?[4]
					Result	±	Uncertainty		
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)			Maximum (pCi/L)	Exceeded Background?[4]
					Result	±	Uncertainty		
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)			Maximum (pCi/L)	Exceeded Background?[4]
					Result	±	Uncertainty		
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)			Maximum (pCi/L)	Exceeded Background?[4]
					Result	±	Uncertainty		
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.

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