

APPENDIX B-5

Ambient Surface Water Data

TABLE B-5A
2010 Radioactivity and pH in Surface Water Downstream of the WVDP in Cattaraugus Creek at Felton Bridge (WFFELBR)

Analyte	Units	N	WFFELBR Concentrations		N	Reference Values	
			Average	Maximum		WFBIGBR Background Range	Guideline ^a or Standard ^b
Gross Alpha	µCi/mL	12	0.58±1.40E-09	1.70E-09	98	<3.59E-10–4.62E-09	3E-08 ^d
Gross Beta	µCi/mL	12	3.42±2.13E-09	4.82E-09	98	<9.03E-10–1.37E-08	1E-06 ^e
Tritium	µCi/mL	12	0.61±4.65E-08	<4.81E-08	98	<4.46E-08–2.65E-07	2E-03
Sr-90	µCi/mL	12	0.90±1.01E-09	1.59E-09	98	<3.57E-10–1.10E-08	1E-06
Cs-137	µCi/mL	12	0.68±1.65E-09	1.58E-09	98	<1.34E-09–5.29E-09	3E-06
pH	SU	38	7.91	8.19	98	5.80–8.34	6.5–8.5

Note: Historical background data are from Bigelow Bridge, on Cattaraugus Creek upstream of WFFELBR. Sampling at WFBIGBR was discontinued in 2008. Range was calculated from the most recent 10 years of sampling, 1998–2007.

N - Number of samples

^a DOE ingestion-based DCGs for 100 mrem/yr dose limit are provided as a guideline for radiological results in the absence of water quality standards.

^b New York State Water Quality Standards, Class "B" as a comparative reference for nonradiological results

^c Values represent composite concentrations weighted to monthly stream flow.

^d Alpha as Am-241

^e Beta as Sr-90

TABLE B-5B
2010 Water Quality of Surface Water Downstream of the WVDP in Buttermilk Creek at Thomas Corners Bridge (WFBCTCB)

RADIOACTIVITY CONCENTRATIONS

Analyte	Units	N	WFBCTCB Concentrations		N	Reference Values	
			Average	Maximum		WFBCTCBK ^a Background Range	Guideline ^b
Gross Alpha	µCi/mL	12	1.20±1.22E-09	3.25E-09	12	<4.48E-10–2.12E-09	3E-08 ^c
Gross Beta	µCi/mL	12	7.96±2.27E-09	1.33E-08	12	<1.33E-09–3.37E-09	1E-06 ^d
Tritium	µCi/mL	12	-0.71±4.49E-08	6.13E-08	12	<4.48E-08–5.90E-08	2E-03
Sr-90	µCi/mL	2	3.40±1.04E-09	4.14E-09	2	<1.03E-09–<1.09E-09	1E-06
Cs-137	µCi/mL	2	-0.07±1.93E-09	<2.11E-09	2	<1.94E-09–<1.94E-09	3E-06

N - Number of samples

^a Background location

^b DOE ingestion-based DCGs for 100 mrem/yr dose limit are provided as a guideline for radiological results in the absence of water quality standards.

^c Alpha as Am-241

^d Beta as Sr-90

TABLE B-5B (*continued*)
**2010 Water Quality of Surface Water Downstream of the WVDP in Buttermilk Creek at
 Thomas Corners Bridge (WFBCTCB)**

CHEMICAL CONSTITUENTS

Analyte	Units	N	WFBCTCB		Standard ^a
			Average	Maximum	
Alpha-BHC	µg/L	2	<0.009	<0.009	0.002
Aluminum, Dissolved	mg/L	2	<0.100	<0.100	0.10
Ammonia-N	mg/L	2	<0.02	<0.02	0.09–2.1
Antimony, Total	mg/L	2	<0.003	<0.003	--
Arsenic, Dissolved	mg/L	2	<0.005	<0.005	0.150
Barium, Total	mg/L	2	0.07	0.08	--
Boron, Total	mg/L	2	0.02	0.03	10.0
Bromide	mg/L	2	<0.50	<0.50	--
Cadmium, Dissolved	mg/L	2	<0.001	<0.001	0.004 ^b
Calcium, Total	mg/L	12	45.2	57.7	--
Chloride	mg/L	2	25	29	--
Chromium, Dissolved	mg/L	2	<0.01	<0.01	0.119 ^b
Cobalt, Total	mg/L	2	<0.005	<0.005	0.005 ^c
Copper, Dissolved	mg/L	2	<0.005	<0.005	0.015 ^b
Dissolved, Oxygen	mg/L	2	13.4	14.1	4.0 (min)
Fluoride	mg/L	2	<0.20	<0.20	3.58 ^b
Hardness	mg/L	12	144	178	--
Iron, Total	mg/L	2	0.94	1.46	0.30
Lead, Dissolved	mg/L	2	<0.0005	<0.0005	0.007 ^b
Magnesium, Total	mg/L	12	7.6	11.3	--
Manganese, Total	mg/L	2	0.02	0.03	--
Mercury, Dissolved, Method 1631	µg/L	2	0.001444	0.00205	0.0007
Nickel, Dissolved	mg/L	2	<0.04	<0.04	0.085 ^b
Nitrate-N	mg/L	2	0.18	0.22	--
Nitrite-N	mg/L	2	<0.05	<0.05	0.10
NPOC	mg/L	2	2	2.3	--

N - Number of samples

-- No reference standard available for this analyte

^a New York State Water Quality Standards, Class "C" as a comparative reference for nonradiological results

^b Calculated from maximum measurement of hardness of surface water stream at WFBCTCB

^c Standards for cobalt, thallium, and vanadium are applicable to the acid-soluble fraction.

TABLE B-5B (*concluded*)
2010 Water Quality of Surface Water Downstream of the WVDP in Buttermilk Creek at
Thomas Corners Bridge (WFBCTCB)

CHEMICAL CONSTITUENTS (*concluded*)

Analyte	Units	N	WFBCTCB		Standard^a
			Average	Maximum	
Oil & Grease	mg/L	2	<5	<5	--
pH	SU	2	8.03	8.25	6.5–8.5
Selenium, Dissolved	mg/L	2	<0.001	<0.001	0.0046
Sodium, Total	mg/L	2	16	18.3	--
Solids, Total Dissolved	mg/L	2	228	262	500
Solids, Total Suspended	mg/L	2	<11	17	--
Sulfate	mg/L	2	30.4	35.9	--
Sulfide (as S)	mg/L	2	<0.05	<0.05	0.002
Surfactant	mg/L	2	<0.02	<0.02	0.04
Thallium, Total	mg/L	2	<0.008	<0.008	0.008 ^c
Titanium, Total	mg/L	2	<0.0500	<0.0500	--
TOX	mg/L	2	<0.02	0.03	--
Vanadium, Total	mg/L	2	<0.0100	<0.0100	0.014 ^c
Zinc, Dissolved	mg/L	2	<0.02	<0.02	0.135 ^b

N - Number of samples

-- No reference standard available for this analyte

^a New York State Water Quality Standards, Class "C" as a comparative reference for nonradiological results

^b Calculated from maximum measurement of hardness of surface water stream at WFBCTCB

^c Standards for cobalt, thallium, and vanadium are applicable to the acid-soluble fraction.

TABLE B-5C
2010 Radioactivity in Surface Water Downstream of the WVDP at Franks Creek (WNSP006)

Analyte	Units	N	WNSP006 Concentrations		N	Reference Values	
			Average	Maximum		WFCBKG^a Background Range	Guideline^b
Gross Alpha	µCi/mL	34	1.62±1.82E-09	6.60E-09	12	<4.48E-10–2.12E-09	3E-08 ^c
Gross Beta	µCi/mL	34	4.17±0.43E-08	1.11E-07	12	<1.33E-09–3.37E-09	1E-06 ^d
Tritium	µCi/mL	34	6.22±4.55E-08	2.80E-07	12	<4.48E-08–5.90E-08	2E-03
C-14	µCi/mL	4	-1.09±2.97E-08	<3.25E-08	2	<3.01E-08–<3.20E-08	7E-05
Sr-90	µCi/mL	12	1.74±0.22E-08	2.61E-08	2	<1.03E-09–<1.09E-09	1E-06
Tc-99	µCi/mL	4	0.94±1.55E-09	1.98E-09	2	<1.64E-09–<2.12E-09	1E-04
I-129	µCi/mL	4	3.51±8.19E-10	<1.10E-09	2	<5.32E-10–<8.87E-10	5E-07
Cs-137	µCi/mL	12	1.64±2.47E-09	3.08E-09	2	<1.94E-09–<1.94E-09	3E-06
U-232	µCi/mL	4	2.26±1.25E-10	4.61E-10	2	<2.81E-11–<2.96E-11	1E-07
U-233/234	µCi/mL	4	3.07±1.35E-10	4.97E-10	2	8.06E-11–1.37E-10	5E-07
U-235/236	µCi/mL	4	4.07±5.23E-11	7.00E-11	2	<2.67E-11–<3.64E-11	5E-07 ^e
U-238	µCi/mL	4	2.20±1.14E-10	3.19E-10	2	<3.58E-11–<3.77E-11	6E-07
Total U	µg/mL	4	5.14±0.12E-04	9.15E-04	2	1.26E-04–1.89E-04	--
Pu-238	µCi/mL	4	0.80±2.93E-11	<4.14E-11	2	<1.73E-11–<2.25E-11	4E-08
Pu-239/240	µCi/mL	4	0.81±3.01E-11	<3.89E-11	2	<1.92E-11–<3.14E-11	3E-08
Am-241	µCi/mL	4	0.54±2.42E-11	<2.78E-11	2	<2.09E-11–<2.19E-11	3E-08

N - Number of samples

-- No guideline or standard available for these analytes

^a Background location^b DOE ingestion-based DCGs for 100 mrem/yr dose limit are provided as a guideline for radiological results.^c Alpha as Am-241^d Beta as Sr-90^e DCG for U-236 is used for this comparison.

TABLE B-5D
2010 Radioactivity and pH in Surface Water at Erdman Brook (WNERB53)

Analyte	Units	N	WNERB53 Concentrations		N	Reference Values	
			Average	Maximum		WFCBKG^a Background Range	Guideline^b or Standard^c
Gross Alpha	µCi/mL	4	0.73±1.50E-09	2.81E-09	12	<4.48E-10–2.12E-09	3E-08 ^d
Gross Beta	µCi/mL	4	8.16±2.37E-09	1.22E-08	12	<1.33E-09–3.37E-09	1E-06 ^e
Tritium	µCi/mL	4	-3.11±4.28E-08	<4.75E-08	12	<4.48E-08–5.90E-08	2E-03
Sr-90	µCi/mL	2	2.08±1.02E-09	3.47E-09	2	<1.03E-09–<1.09E-09	1E-06
Cs-137	µCi/mL	2	0.71±1.91E-09	<1.92E-09	2	<1.94E-09–<1.94E-09	3E-06
pH	SU	4	7.9	8.0	292	6.4–8.7	6.0–9.5

N - Number of samples

^a Background data are from Buttermilk Creek, upstream of the WVDP. Sampling for nonradiological data was discontinued at this location in 2008. The pH range was calculated from the most recent 10 years of sampling, 1998–2007.^b DOE ingestion-based DCGs for 100 mrem/yr dose limit are provided as a guideline for radiological results.^c New York State Water Quality Standards, Class "D" for surface waters as a standard for nonradiological results^d Alpha as Am-241^e Beta as Sr-90

TABLE B-5E
2010 Radioactivity and pH in Surface Water at Franks Creek East of the SDA (WNFRC67)

Analyte	Units	N	WNFRC67 Concentrations		N	Reference Values	
			Average	Maximum		WFBCBKG^a Background Range	Guideline^b or Standard^c
Gross Alpha	$\mu\text{Ci}/\text{mL}$	4	1.03±0.97E-09	2.53E-09	12	<4.48E-10–2.12E-09	3E-08 ^d
Gross Beta	$\mu\text{Ci}/\text{mL}$	4	1.99±1.86E-09	3.48E-09	12	<1.33E-09–3.37E-09	1E-06 ^e
Tritium	$\mu\text{Ci}/\text{mL}$	4	4.34±4.79E-08	1.60E-07	12	<4.48E-08–5.90E-08	2E-03
Sr-90	$\mu\text{Ci}/\text{mL}$	2	0.62±8.99E-10	<9.78E-10	2	<1.03E-09–<1.09E-09	1E-06
Cs-137	$\mu\text{Ci}/\text{mL}$	2	0.26±1.93E-09	<1.94E-09	2	<1.94E-09–<1.94E-09	3E-06
pH	SU	4	7.6	8.1	292	6.4–8.7	6.0–9.5

N - Number of samples

^a Background data are from Buttermilk Creek, upstream of the WVDP. Sampling for nonradiological data was discontinued at this location in 2008. The pH range was calculated from the most recent 10 years of sampling, 1998–2007.

^b DOE ingestion-based DCGs for 100 mrem/yr dose limit are provided as a guideline for radiological results.

^c New York State Water Quality Standards for Class “D” surface waters as a standard for nonradiological results

^d Alpha as Am-241

^e Beta as Sr-90

TABLE B-5F
**Radioactivity and pH in Surface Water at Fox Valley Road
 Buttermilk Creek Background (WFBCBKG)**

Analyte	Units	N	WFBCBKG^a Concentrations			Reference Values	
			Average	Maximum		Guideline^b or Standard^c	
Gross Alpha	$\mu\text{Ci}/\text{mL}$	12	6.12±9.73E-10	2.12E-09		3E-08 ^d	
Gross Beta	$\mu\text{Ci}/\text{mL}$	12	2.06±1.82E-09	3.37E-09		1E-06 ^e	
Tritium	$\mu\text{Ci}/\text{mL}$	12	0.45±4.60E-08	5.90E-08		2E-03	
C-14	$\mu\text{Ci}/\text{mL}$	2	-2.36±3.11E-08	<3.20E-08		7E-05	
Sr-90	$\mu\text{Ci}/\text{mL}$	2	0.79±1.06E-09	<1.09E-09		1E-06	
Tc-99	$\mu\text{Ci}/\text{mL}$	2	-1.21±1.90E-09	<2.12E-09		1E-04	
I-129	$\mu\text{Ci}/\text{mL}$	2	3.05±7.31E-10	<8.87E-10		5E-07	
Cs-137	$\mu\text{Ci}/\text{mL}$	2	0.10±1.94E-09	<1.94E-09		3E-06	
U-232	$\mu\text{Ci}/\text{mL}$	2	0.05±2.89E-11	<2.96E-11		1E-07	
U-233/234	$\mu\text{Ci}/\text{mL}$	2	1.09±0.76E-10	1.37E-10		5E-07	
U-235/236	$\mu\text{Ci}/\text{mL}$	2	1.14±3.19E-11	<3.64E-11		5E-07	
U-238	$\mu\text{Ci}/\text{mL}$	2	2.65±3.68E-11	<3.77E-11		6E-07	
Pu-238	$\mu\text{Ci}/\text{mL}$	2	-0.26±2.01E-11	<2.25E-11		4E-08	
Pu-239/240	$\mu\text{Ci}/\text{mL}$	2	0.71±2.60E-11	<3.14E-11		3E-08	
Am-241	$\mu\text{Ci}/\text{mL}$	2	0.00±2.14E-11	<2.19E-11		3E-08	
pH	SU	292	Range: 6.4–8.7			6.0–9.5	

N - Number of samples

^a Radiological data are from samples collected in CY 2010. Sampling for nonradiological constituents was discontinued in 2008. The pH values represent measurements from the most recent 10 years of sampling, 1998–2007.

^b DOE ingestion-based DCGs for 100 mrem/yr dose limit are provided as a guideline for radiological results.

^c The New York State Water Quality Standard for Class “D” is provided as a comparative reference for pH.

^d Alpha as Am-241

^e Beta as Sr-90

TABLE B-5G
Ten-Year Average and Maximum Radioactivity and pH in Surface Water at Bigelow Bridge
Cattaraugus Creek Background (WFBIGBR)

Analyte	Units	N	WFBIGBR^a Concentrations		Reference Values Guideline^b or Standard^c
			Average	Maximum	
Gross Alpha	$\mu\text{Ci}/\text{mL}$	98	$0.45 \pm 1.05 \times 10^{-9}$	4.62×10^{-9}	$3 \times 10^{-8}^d$
Gross Beta	$\mu\text{Ci}/\text{mL}$	98	$2.64 \pm 1.35 \times 10^{-9}$	1.37×10^{-8}	$1 \times 10^{-6}^e$
Tritium	$\mu\text{Ci}/\text{mL}$	98	$0.71 \pm 7.79 \times 10^{-8}$	2.65×10^{-7}	2×10^{-3}
Sr-90	$\mu\text{Ci}/\text{mL}$	98	$1.27 \pm 1.46 \times 10^{-9}$	1.10×10^{-8}	1×10^{-6}
Cs-137	$\mu\text{Ci}/\text{mL}$	98	$0.59 \pm 3.27 \times 10^{-9}$	5.29×10^{-9}	3×10^{-6}
pH	SU	98	Range: 5.80–8.34		6.5–8.5

N - Number of samples

^a Sampling was discontinued in 2008. Data represent measurements from the most recent 10 years of sampling, 1998–2007.

^b DOE ingestion-based DCGs for 100 mrem/yr dose limit are provided as a guideline for radiological results.

^c The New York State Water Quality Standard for Class “B” is provided as a comparative reference for pH.

^d Alpha as Am-241

^e Beta as Sr-90