APPENDIX B-4

Site Surface Drainage, Subsurface Drainage, and Contained Water Data

TABLE B-4A
2007 Radioactivity and pH in Surface Water at Facility Yard Drainage (WNSP005)

Analyte	*Units*	*N*	*WNSP005 Concentrations*			*Guideline [a] or Standard [b]*
			Minimum	*Average*	*Maximum*	
Gross Alpha	µCi/mL	11	<1.42E-09	0.39±4.81E-09	1.88E-09	3E-08[c]
Gross Beta	µCi/mL	11	2.56E-08	1.19±0.10E-07	2.81E-07	1E-06[d]
Tritium	µCi/mL	11	<3.23E-08	2.63±5.73E-08	1.54E-07	2E-03
Sr-90	µCi/mL	2	7.99E-08	1.03±0.04E-07	1.27E-07	1E-06
Cs-137	µCi/mL	2	<1.86E-09	1.40±1.89E-09	<1.92E-09	3E-06
pH	SU	12	7.28	7.62	7.94	6.0–9.5

N - Number of samples
[a] DOE ingestion-based DCGs for 100 mrem/yr dose limit are provided as a guideline for radiological results.
[b] New York State Water Quality Standards for Class "D" as a comparative reference for nonradiological results
[c] Alpha as Am-241
[d] Beta as Sr-90

TABLE B-4B
2007 Radioactivity in Surface Water at French Drain (WNSP008)

No Discharge From the French Drain Since May 2001

TABLE B-4C
2007 Water Quality of Surface Water at the North Swamp (WNSW74A)

RADIOACTIVE CONSTITUENTS

Isotope [a]	N	Discharge Activity [b] (Ci)	Radioactivity [c] (Becquerels)	Average Concentration (µCi/mL)	DCG (µCi/mL)	% of DCG
Gross Alpha	26	1.70±8.04E-05	0.63±2.98E+06	0.36±1.72E-09	NA[d]	NA
Gross Beta	26	6.39±0.91E-05	2.36±0.34E+07	1.36±1.95E-08	NA[d]	NA
Tritium	26	-7.37±7.75E-04	-2.73±2.87E+07	-1.57±1.66E-08	2E-03	<0.01
C-14	2	-0.28±1.13E-03	-1.05±4.19E+07	-0.61±2.42E-08	7E-05	0.04
Sr-90	12	2.51±0.15E-04	9.29±0.55E+06	5.36±0.32E-09	1E-06	0.54
I-129	2	1.28±1.98E-05	4.75±7.34E+05	2.74±4.24E-10	5E-07	0.09
Cs-137	12	4.18±2.59E-05	1.54±0.96E+06	8.92±5.52E-10	3E-06	0.03
U-232[e]	2	0.17±1.50E-06	0.63±5.54E+04	0.36±3.20E-11	1E-07	0.03
U-233/234[e]	2	6.51±2.91E-06	2.41±1.08E+05	1.39±0.62E-10	5E-07	0.03
U-235/236[e]	2	1.24±1.25E-06	4.59±4.61E+04	2.65±2.66E-11	5E-07[f]	<0.01
U-238[e]	2	2.97±2.12E-06	1.10±0.79E+05	6.35±4.53E-11	6E-07	0.01
Pu-238	2	-1.88±4.73E-07	-0.70±1.75E+04	-0.40±1.01E-11	4E-08	0.03
Pu-239/240	2	-9.92±7.30E-07	-3.67±2.70E+04	-2.12±1.56E-11	3E-08	0.05
Am-241	2	0.90±1.43E-06	3.34±5.29E+04	1.93±3.05E-11	3E-08	0.10
Total % of DCG						0.95

N - Number of samples
NA - Not applicable
[a] Half-lives are listed in Table UI-1.
[b] Total estimated volume released: 4.68E+10 mL (1.23E+07 gal)
[c] 1 curie (Ci) = 3.7E+10 becquerels (Bq); 1 Bq= 2.7E-11 Ci
[d] DOE-derived concentration guides (DCGs) do not exist for indicator parameters gross alpha and gross beta.
[e] Total Uranium (g) = 6.29±0.21E+00; Average Total Uranium (µg/mL) = 1.34±0.04E-04
[f] DCG for U-236 is used for this comparison.

TABLE B-4C *(continued)*
2007 Water Quality of Surface Water at the North Swamp (WNSW74A)

CHEMICAL CONSTITUENTS

Analyte	Units	N	WNSW74A Concentrations Average	WNSW74A Concentrations Maximum	N	Reference Values Background Range WFBCBKG [a]	Reference Values Standard [b]
Alpha-BHC	µ/L	2	<0.011	<0.011	2	<0.009–<0.011	0.002
Aluminum, Total	mg/L	2	<0.10	0.11	0	NA	--
Ammonia-N	mg/L	2	<0.02	<0.02	2	<0.02–<0.02	0.67–29
Antimony, Total	mg/L	2	<0.003	<0.003	2	<0.003–<0.003	--
Arsenic, Dissolved	mg/L	2	<0.005	<0.005	2	<0.005–<0.005	0.340

N - Number of samples
NA - No data available
-- No guideline or standard available for these analytes
[a] Background location
[b] New York State Water Quality Standards, Class "D" as a comparative reference for nonradiological results at WNSW74A

TABLE B-4C *(concluded)*
2007 Water Quality of Surface Water at the North Swamp (WNSW74A)

CHEMICAL CONSTITUENTS *(concluded)*

Analyte	*Units*	*N*	*WNSW74A*		*N*	*Reference Values*	
			Concentrations			*Background Range WFBCBKG* [a]	*Standard* [b]
			Average	*Maximum*			
Boron, Total	mg/L	2	0.04	0.06	2	0.02–0.04	--
Bromide	mg/L	2	<0.68	0.87	2	<0.50–<0.50	--
Cadmium, Total	mg/L	2	<0.001	<0.001	0	NA	--
Calcium, Total	mg/L	2	96.2	102	12	17.3–53.3	--
Chromium, Total	mg/L	2	<0.01	<0.01	0	NA	--
Cobalt, Total	mg/L	2	<0.005	<0.005	2	<0.005–<0.005	0.110[c]
Copper, Dissolved	mg/L	2	<0.005	<0.005	2	<0.005–<0.005	0.039[d]
Copper, Total	mg/L	2	<0.005	<0.005	0	NA	--
Fluoride	mg/L	2	<0.10	<0.10	2	<0.10–<0.10	29.4[d]
Hardness	mg/L	2	294	308	12	56–164	--
Iron, Total	mg/L	2	0.14	0.16	2	0.29–0.44	0.30
Lead, Total	mg/L	2	<0.0005	<0.0005	0	NA	--
Magnesium, Total	mg/L	2	12.9	13	12	3.05–7.55	--
Manganese, Total	mg/L	2	0.07	0.08	2	0.03–0.04	--
Mercury, Total, Method 1631	µg/L	2	R	R	0	NA	--
Nickel, Total	mg/L	2	<0.040	<0.040	0	NA	--
Nitrate-N	mg/L	2	0.22	0.26	2	0.14–0.22	--
Nitrite-N	mg/L	2	<0.05	<0.05	2	<0.05–<0.05	--
NPOC	mg/L	2	4.6	4.8	2	1.9–2.9	--
Oil & Grease	mg/L	2	<5	<5	2	<5–<5	--
pH	SU	28	7.13	7.81	2	7.92–7.98	6.0–9.5
Selenium, Total	mg/L	2	<0.001	<0.001	0	NA	--
Solids, Total Dissolved	mg/L	2	886	901	2	196–226	--
Solids, Total Suspended	mg/L	2	<7	11	2	<4–<4	--
Sulfate	mg/L	2	50	59.7	2	20.1–47.2	--
Sulfide	mg/L	2	<0.04	<0.04	2	<0.04–<0.04	--
Surfactants	mg/L	2	<0.07	<0.10	2	<0.02–<0.10	--
Thallium, Total	mg/L	2	<0.008	<0.008	2	<0.008–<0.008	0.020[c]
Titanium, Total	mg/L	2	<0.050	<0.050	2	<0.050–<0.050	--
TOX	mg/L	2	<0.02	0.02	2	0.05–0.13	--
Vanadium, Total	mg/L	2	<0.010	<0.010	2	<0.010–<0.010	0.190[c]
Zinc, Total	mg/L	2	<0.02	<0.02	0	NA	--

N - Number of samples
NA - No data available
R - Sample data rejected due to analytical quality control failure.
-- No guideline or standard available for these analytes
[a] Background location
[b] New York State Water Quality Standards, Class "D" as a comparative reference for nonradiological results at WNSW74A
[c] Standards for cobalt, thallium, and vanadium are applicable to the acid-soluble fraction.
[d] Calculated from maximum measurement of hardness of surface water drainage at WNSW74A

TABLE B-4D
2007 Water Quality of Surface Water at the Northeast Swamp (WNSWAMP)

RADIOACTIVE CONSTITUENTS

Isotope [a]	Discharge Activity [b] (Ci)	Radioactivity [c] (Becquerels)	Average Concentration (µCi/mL)	DCG [d] (µCi/mL)	Ratio of Concentration to DCG
Gross Alpha	1.26±4.12E-04	0.47±1.53E+07	0.58±1.88E-09	NA[e]	NA
Gross Beta	6.44±0.12E-01	2.38±0.05E+10	2.94±0.06E-06	NA[e]	NA
H-3	1.11±0.77E-02	4.12±2.86E+08	5.07±3.52E-08	2E-03	<0.0001
C-14	-5.39±6.91E-03	-1.99±2.56E+08	-2.46±3.15E-08	7E-05	0.0005
Sr-90	3.43±0.02E-01	1.27±0.01E+10	1.56±0.01E-06	1E-06	1.56
I-129	-0.26±1.00E-04	-0.97±3.72E+06	-1.19±4.58E-10	5E-07	0.0009
Cs-137	0.57±2.09E-04	2.09±7.74E+06	2.57±9.54E-10	3E-06	0.0003
U-232[f]	0.66±1.35E-05	2.45±4.98E+05	3.01±6.13E-11	1E-07	0.0006
U-233/234[f]	4.62±1.95E-05	0.17±7.22E+05	2.11±0.89E-10	5E-07	0.0004
U-235/236[f]	0.95±1.14E-05	3.53±1.23E+05	4.35±5.22E-11	5E-07[g]	0.0001
U-238[f]	3.61±1.67E-05	0.13±6.18E+05	1.64±0.76E-10	6E-07	0.0003
Pu-238	0.00±1.24E-05	0.03±4.58E+05	0.04±5.65E-11	4E-08	0.0014
Pu-239/240	0.66±1.24E-05	2.46±4.58E+05	3.03±5.65E-11	3E-08	0.0019
Am-241	1.13±2.63E-06	4.18±9.75E+04	0.52±1.20E-11	3E-08	0.0004
Sum of Ratios					**1.57**

NA - Not applicable
[a] Half-lives are listed in Table UI-4.
[b] Total volume released: 2.19E+11 mL (5.80E+07 gal)
[c] 1 curie (Ci) = 3.7E+10 becquerels (Bq); 1 Bq = 2.7E-11 Ci
[d] DCGs are listed for reference only. DCGs are applicable at the point at which water is available for ingestion by the public (i.e., at the site boundary), but not to release point concentrations, as might be inferred from their inclusion in this table.
[e] DOE DCGs do not exist for indicator parameters gross alpha and gross beta.
[f] Total Uranium (g) = 6.67±0.38E+01; Average Total Uranium (µg/mL) = 3.04±0.18E-04
[g] DCG for U-236 is used for this comparison.

TABLE B-4D *(continued)*
2007 Water Quality of Surface Water at the Northeast Swamp (WNSWAMP)

CHEMICAL CONSTITUENTS

Analyte	Units	N	WNSWAMP Concentrations		N	Reference Values	
			Average	Maximum		WFBCBKG [a] Background Range	Standard [b]
Alpha-BHC	µ/L	2	<0.009	<0.009	2	<0.009–<0.011	0.002
Aluminum, Total	mg/L	2	<0.10	<0.10	0	NA	--
Ammonia-N	mg/L	2	<0.06	0.08	2	<0.02–<0.02	0.67–29
Antimony, Total	mg/L	2	<0.003	<0.003	2	<0.003–<0.003	--

N - Number of samples
NA - Not applicable
-- No guideline or standard available for these analytes
[a] Background location
[b] New York Water Quality Standards, Class "D" as a comparative reference for non-radiological results at WNSWAMP

TABLE B-4D *(concluded)*
2007 Water Quality of Surface Water at the Northeast Swamp (WNSWAMP)

CHEMICAL CONSTITUENTS *(concluded)*

Analyte	*Units*	*N*	*WNSWAMP Concentrations*		*N*	*Reference Values*	
			Average	*Maximum*		*WFBCBKG* [a] *Background Range*	*Standard* [b]
Arsenic, Dissolved	mg/L	2	<0.005	<0.005	2	<0.005–<0.005	0.340
Boron, Total	mg/L	2	0.04	0.05	2	0.02–0.04	--
Bromide	mg/L	2	0.82	0.84	2	<0.50–<0.50	--
Cadmium, Total	mg/L	2	<0.001	<0.001	0	NA	--
Calcium, Total	mg/L	2	122	125	12	17.3–53.3	--
Chromium, Total	mg/L	2	<0.010	<0.010	0	NA	--
Cobalt, Total	mg/L	2	<0.005	<0.005	2	<0.005–<0.005	0.110[c]
Copper, Dissolved	mg/L	2	<0.005	<0.005	2	<0.005–<0.005	0.047[d]
Copper, Total	mg/L	2	<0.005	<0.005	0	NA	--
Fluoride	mg/L	2	0.12	0.12	2	<0.10–<0.10	35.6[d]
Hardness	mg/L	2	374	380	12	56–164	--
Iron, Total	mg/L	2	<0.52	1	2	0.29–0.44	0.30
Lead, Total	mg/L	2	<0.0005	<0.0005	0	NA	--
Magnesium, Total	mg/L	2	16.9	17.3	12	3.05–7.55	--
Manganese, Total	mg/L	2	0.41	0.69	2	0.03–0.04	--
Mercury, Total, Method 1631	µg/L	2	0.000814	0.00106	0	NA	--
Nickel, Total	mg/L	2	<0.040	<0.040	0	NA	--
Nitrate-N	mg/L	2	0.2	0.28	2	0.14–0.22	--
Nitrite-N	mg/L	2	<0.03	<0.03	2	<0.05–<0.05	--
NPOC	mg/L	2	3.7	4.7	2	1.9–2.9	--
Oil & Grease	mg/L	2	<5	<5	2	<5–<5	--
pH	SU	27	7.48	7.96	2	7.92–7.98	6.0–9.5
Selenium, Total	mg/L	2	<0.002	<0.002	0	NA	--
Solids, Total Dissolved	mg/L	2	930	963	2	196–226	--
Solids, Total Suspended	mg/L	2	<4	<4	2	<4–<4	--
Sulfate	mg/L	2	28.6	32.5	2	20.1–47.2	--
Sulfide (as S)	mg/L	2	<0.04	<0.06	2	<0.04–<0.04	--
Surfactant	mg/L	2	0.04	0.05	2	<0.02–<0.10	--
Thallium, Total	mg/L	2	<0.008	<0.008	2	<0.008–<0.008	0.020[c]
Titanium, Total	mg/L	2	<0.050	<0.050	2	<0.050–<0.050	--
TOX	mg/L	1	0.02	0.02	2	0.05–0.13	--
Vanadium, Total	mg/L	2	<0.010	<0.010	2	<0.010–<0.010	0.190[c]
Zinc, Total	mg/L	2	<0.02	<0.02	0	NA	--

N - Number of samples
NA - Not applicable
-- No guideline or standard available for these analytes
[a] Background location
[b] New York Water Quality Standards, Class "D" as a comparative reference for non-radiological results at WNSWAMP
[c] Standards for cobalt, thallium, and vanadium are acid-soluble.
[d] Calcuated from maximum measurement of hardness of surface water stream at WNSWAMP

TABLE B-4E
2007 Water Quality Results at Storage and Disposal Area Drainage (WNNDADR)

Analyte	Units	N	WNNDADR Concentrations			Standard [a]
			Minimum	Average	Maximum	
Gross Alpha	µCi/mL	14	<1.02E-09	1.66±2.01E-09	5.84E-09	--
Gross Beta	µCi/mL	14	1.50E-07	2.09±0.09E-07	4.06E-07	--
Tritium	µCi/mL	25	1.50E-07	5.87±0.66E-07	1.15E-06	--
Sr-90	µCi/mL	2	8.86E-08	9.83±0.45E-08	1.08E-07	--
I-129	µCi/mL	2	5.92E-10	3.14±5.57E-10	5.92E-10	--
Cs-137	µCi/mL	12	<1.30E-09	0.87±2.16E-09	4.30E-09	--
NPOC	mg/L	26	2	6.4	23	--
pH	SU	26	6.96	7.57	7.94	6.0–9.5
TOX	mg/L	25	<0.01	<0.01	0.02	--

N - Number of samples
-- No applicable reference standard available
[a] New York State Water Quality Standards, Class "D" as a comparative reference for nonradiological results at WNNDADR

TABLE B-4F
2007 Water Quality Results in Subsurface Water at the NDA Interceptor Trench (WNNDATR)

Analyte	Units	N	WNNDATR Concentrations		
			Minimum	Average	Maximum
Gross Alpha	µCi/mL	12	<1.60E-09	3.34±3.03E-09	1.05E-08
Gross Beta	µCi/mL	12	2.05E-07	3.63±0.17E-07	5.50E-07
Tritium	µCi/mL	12	5.91E-07	2.02±0.10E-06	3.50E-06
I-129	µCi/mL	2	7.30E-10	3.65±9.62E-10	7.30E-10
Cs-137	µCi/mL	12	<1.31E-09	0.48±1.74E-09	<2.01E-09
NPOC	mg/L	12	2.7	3.7	4.4
TOX	mg/L	11	<0.01	<0.01	0.02

Note: No applicable reference standard available for this location. These waters are pumped and treated at the LLWTF prior to discharge at outfall WNSP001.
N - Number of samples

TABLE B-4G
2007 Radioactivity and pH in Surface Water at Cooling Tower Basin (WNCOOLW)

Analyte	Units	N	WNCOOLW
Gross Alpha	µCi/mL	1	2.65±1.94E-09
Gross Beta	µCi/mL	1	6.28±3.88E-09
Tritium	µCi/mL	1	9.12±9.79E-08
Sr-90	µCi/mL	1	-4.22±6.66E-10
Cs-137	µCi/mL	1	-0.06±1.94E-09
pH	SU	1	7.67

Note: No applicable reference standard available for this location. These waters are pumped and treated at the LLWTF prior to discharge at outfall WNSP001.
N - Number of samples