ENVIRONMENTAL MONITORING PLAN MATRIX FOR CALENDAR YEAR 2016

Sampling Location	Reporting to Regulators	Reporting to Departments	Lead Organization	Sample Type	Analysis/Frequency
Air Monitoring: Surveillance - Particulate Filter (See Chapters 5 and 6))					
P7, P7-2, P4, P2, P9, NYSDOH	SER	SER	EPD	Weekly Composite	Gross alpha/beta - sampled and analyzed weekly
BLIP and Bldg. 801	SER	SER	EPD	Weekly Composite	Gross alpha/beta - sampled and analyzed weekly
HWM 865 – FLT-101, -102, -103, -107, -108	SER	SER	EPD	Continuous	Gross alpha/beta, gamma – Only on request by Waste Management
Air Emissions: Compliance, Non-Radiological (See Chapter 5)					
CSF – Boiler #6 Stack	SER/QES	Yes	EU	Continuous	Opacity - continuous emissions monitoring
CSF – Boiler #6 Stack	SER/QES	Yes	EU	Continuous	NO_x, CO_2, CO - continuous emissions monitoring
CSF – Boiler #7 Stack	SER/QES	Yes	EU	Continuous	NO_x, CO_2, CO - continuous emissions monitoring
CSF – Boiler #7 Stack	SER/QES	Yes	EU	Continuous	Opacity - continuous emissions monitoring
CSF – Tank Nos. 4, 9, and 10	SER/QES	Yes	EU	Quarterly	Sulfur and nitrogen fuel content - quarterly analysis if fuel is delivered
Satellite Boiler Fuel Storage Tanks	SER/QES	Yes	EU	Quarterly	Sulfur content – quarterly analysis if fuel is delivered
CSF - Boiler #1A Stack	SER/STR	Yes	EU	Performance Test	NO_x TSP - every 5 years
CSF- Boiler #5 Stack	SER/STR	Yes	EU	Performance Test	NO_x TSP - every 5 years
CSF - Boiler #6 Stack	SER/STR	Yes	EU	Performance Test	TSP - every 5 years
CSF - Boiler #7 Stack	SER/STR	Yes	EU	Performance Test	TSP - every 5 years
Upton Station Gasoline Fueling Stage II Vapor Recovery Systems	SER/CCR	Yes	SS	Performance Test	Back pressure, liquid blockage, and leak tests - every 5 years (due December 2018)
Used AC Shop Compressor Oil and Collider Accelerator Waste Separator Oil	SER/QES	Yes	EU	3-4 times per year	Cadmium, arsenic, lead, chromium, sulfur, PCBs, total halogens, flashpoint, and gross heat content - sampled and analyzed as needed
CSF – Tank Nos. 4, 9, and 10	SER/QES	Yes	EU	Quarterly	Sulfur and nitrogen fuel content - quarterly analysis
Satellite Boiler Fuel Storage Tanks	SER/QES	Yes	EU	Quarterly	Sulfur content - quarterly analysis if fuel is delivered
Fleet Station and Upton Station Gasoline Fueling Stage II Vapor Recovery Systems	SER/CCR	Yes	EU and SS	Performance Test	Back pressure, liquid blockage, and leak tests – every 5 years (due March 2013)
Used AC Shop compressor oil and Collider Accelerator waste separator oil	SER/QES	Yes	EU	3-4 times per year	Cadmium, arsenic, lead, chromium, sulfur, PCBs, total halogens, flashpoint, and gross heat content - sampled and analyzed as needed

ENVIRONMENTAL MONITORING PLAN MATRIX FOR CALENDAR YEAR 2016

Sampling Location	Reporting to Regulators	Reporting to Departments	Lead Organization	Sample Type	Analysis/Frequency
Air Emissions: Surveillance - Radiological, Silica Gel (See Chapters 5 and 6)					
P7, P2, P4, P9.	SER	SER	EPD	Silica Gel	Tritium biweekly
BLIP	SER	SER	EPD	Silica Gel	Tritium - sampled weekly
HFBR T-Tube	SER	As Required	EPD	Silica gel	Tritium - sampled monthly
Ambient Air: Surveillance - Radiological, Off-Site TLD Exchange - BNL Personnel (See Chapter 7)					
000-TLD8, 000-TLD9, 000-TLD10, 500-TLD4, 600-TLD3, 700-TLD3, 700-TLD4, 800-TLD1, 900-TLD2, 900-TLD4, 900-TLD5, 900TLD-6, and 999-TLD1	SER	SER	EPD	External Dose	Beta/gamma - exchanged quarterly
P4, S6, P7, P2, S5, 011-TLD1, 013-TLD1, 025-TLD1, 025-TLD4, 027-TLD1, 027-TLD2, 030-TLD1, 034-TLD1, 034-TLD2, 036-TLD1, 036-TLD2, 037-TLD1, 043-TLD1, 043-TLD2, 044-TLD1, 044-TLD2, 044-TLD3, 044-TLD4, 044-TLD5, 045-TLD1, 045-TLD2, 045TLD3, 045-TLD4, 045TLD5, 049-TLD1, 053-TLD1, 054-TLD1, 054-TLD 2, 054-TLD3, 063-TLD1, 066-TLD1, 073-TLD1, 074-TLD1, 074-TLD2, 075-TLD3, 075-TLD4, 075-TLD5, 080-TLD1, 081-TLD1, 081-TLD2, 082-TLD1, 084-TLD1, 085-TLD1, 085-TLD2, 086-TLD1, 088-TLD1, 088-TLD2, 088-TLD3, 088-TLD4, 105-TLD1, 108-TLD1, 111-TLD1, 122-TLD1, 126-TLD1, 25-TLD-N1, 025-TLD-N2, 034-TLD-N1, 034-TLD-N2, 044-TLD-N1, 054-TLD-N1, 054-TLD-N2, 064-TLD-N1, 045-TLD-N1, 043-TLD-N1, 052-TLD-N1, 043-TLD-N1	SER	SER	EPD	Quarterly	Beta/gamma - exchanged and analyzed quarterly; neutron chip TLD - exchanged quarterly
Ambient Air: Surveillance - Radiological, TLD Exchange - Off Site Facilities (See Chapter 7)					
000-TLD-5, 400-TLD1, 600-TLD4, 800-TLD3, 800-TLD4	SER	SER	EPD	Quarterly Composite	Beta/gamma exchanged and analyzed quarterly
Precipitation: Surveillance (See Chapter 8)					
P4, S5	SER	SER	EPD	Monthly Composite	Gross alpha/beta, gamma, tritium, Sr-90, low level mercury, and water quality - sampled and analyzed once per quarter
Flora and Fauna: Surveillance - On-Site Terrestrial Sampling (See Chapter 8)					
Soil	SER/IAG	SER	EPD	Grab	Gamma - concurrent sampling with vegetation
Vegetation	SER/IAG	SER	EPD	Grab	Gamma - 10-12 random locations
Deer - onsite	SER	SER	EPD	Grab Sample	Gamma analysis on meat and liver - 25 samples, as available
Soil/Sediment - Recharge Basins	SER	SER	EPD	Grab Sample	Gamma, S-VOCs, TAL - Metals, PCBs - 10 samples for CY 2017

ENVIRONMENTAL MONITORING PLAN MATRIX FOR CALENDAR YEAR 2016

Sampling Location	Reporting to Regulators	Reporting to Departments	Lead Organization	Sample Type	Analysis/Frequency
Deer - off site	SER	SER	EPD	Grab Sample	Gamma analysis on meat and liver - 40 samples, as available
Flora and Fauna: Surveillance - Off-Site Terrestrial Sampling (See Chapter 8)					
Fish (only Lower Lake in 2015)	SER	SER	EPD	Grab Sample - fillets	Gamma, metals, and PCBs analysis (on site only) - 30 samples bi-annually - 3 locations (BNL Area D, Donahue's Pond, Lower Lake, Carmans River)
Vegetation	SER	SER	EPD	Grab Sample	Gamma, metals, analysis - 4 samples annually EA to HQ
Sediment	SER	SER	EPD	Grab Sample	Gamma, metals (mercury included), - 1 sample annually from locations where fish are taken (Lower Lake only)
Surface Water	SER/IAG	SER	EPD	None	Gamma, metals (including mercury) same locations as fish annually (Lower Lake only)
Surface Water	SER	SER	EPD	Grab	TAL metals, nutrients, water quality parameters - Meadow Marsh
Peconic River Sediment: Environmental Restoration, Long-Term Response Actions (See Chapter 8)					
Sediment PR-WC-06, Sediment Trap Area, PR-SS-15	SER	SER	LTRA	Core	Mercury, PCBs, Cs-137 – sampled and analyzed annually in June
Peconic River Surface Water: Environmental Restoration, Long-Term Response Actions (See Chapter 8)					
Water - PR-WC-15, PR-WC-14, PR-WC-13, PR-WC-12D7, PR-WC-11DS, PR-WC-10, PR-WC-09, PR-WC-08, PR-WC-07, PR-WC-06, PR-WC-05, PR-WC-04, PR-WC-03, PR-WC-02	SER/IAG	SER	LTRA	Grab	Total mercury, methyl mercury, TSS Field Measurements: Turbidity, DO, pH, depth, width Collect twice annually in June and between last week of July and first week of August
Peconic River Fish: Environmental Restoration, Long-Term Response Actions (See Chapter 8)					
On BNL property: Area A (HM-N), North St. (Area D)	SER/IAG	SER	LTRA	Grab	Mercury, PCBs, Cs-137- collected once annually between late April and September, as fish population and flow conditions permit. Fish scales or otoliths for aging.
Outside BNL property: Schultz Rd. (Area P), Donahue's Pond	SER/IAG	SER	LTRA	Grab	Mercury, Cs-137, and other gamma-emitting radionuclides, as fish population and flow conditions permit. Fish scales or otoliths for aging
Water - SPDES: Compliance (See Chapter 9)					
STP Influent (12 months/year)	DMR	Yes	EPD	24 hr. Composite	TAL metals, BOD_5, TSS - sampled and analyzed twice per month
STP Effluent (12 months/year)	DMR	Yes	EPD	24 hr. Composite	TAL metals, BOD_5, TSS, TDS, total phosphorous, nitrogen series, HEDP, TTA - sampled and analyzed twice per month
STP Effluent (12 months/year)	DMR	Yes	EPD	Grab Sample	VOCs (EPA 624) and ketones, low-level mercury (EPA 1631), cyanide - sampled and analyzed twice per month
STP Effluent (Daily)	DMR	Yes	EU	Grab Sample	Temperature, pH, settable solids, flow - sampled and

ENVIRONMENTAL MONITORING PLAN MATRIX FOR CALENDAR YEAR 2016

Sampling Location	Reporting to Regulators	Reporting to Departments	Lead Organization	Sample Type	Analysis/Frequency
					analyzed daily
HN, HT-W, HS, CSF, HT-E, HW, Bldg. 1004/1002-Outfall 002B (monthly)	DMR	Yes	EPD	Grab Sample	Oil &Grease and pH (VOCs EPA 624, HW only) - sampled and analyzed monthly
HX (monthly)	DMR	Yes	EPD/EU	Grab Sample	Flow (EP totalizer) and pH
HN, HT-W, HT-E, HW, CSF, HS, Bldg. 1004/1002-Outfall 002B (quarterly)	DMR	Yes	EPD	Grab Sample	HEDP, TTA, VOCs (EPA 624) at HN, TAL Metals at HN, HS, CSF, and HW (filtered) - sampled and analyzed quarterly
Bldg. 498 Central Cleaning Facility	DMR	Yes	EPD/EU	Grab Sample	pH, Semi-VOCs (EPA 625), TAL metals, flow - sampled and analyzed quarterly
Bldg. 902 Cooling Tower (quarterly)	DMR	Yes	EPD/CA	Grab Sample	pH, flow (CA), PPGMBE - sampled and analyzed quarterly
HS, HO, HN, HT-W, HT-E, HM-N, HM-S, HQ, HZ, Outfall 002B (Flow circular chart/strip chart exchange)	SER	SER	EPD	Grab Sample	Flow readings collected weekly - HO, HZ,HM-S, HM-N, and HQ surveillance only; not reported to regulators
Recharge Basins: Surveillance (See Chapter 9)					
HT-E, HT-W	SER	SER	EPD	24 Hr. Composite	Metals (filtered/unfiltered), anions, gross alpha/beta, tritium, and gamma - sampled and analyzed semiannually
HN, HS	SER	SER	EPD	24 Hr. Composite	Anions, gross alpha/beta, tritium, and gamma – sampled and analyzed semiannually
HT-E, HT-W, HS, HO, HZ	SER	SER	EPD	Grab Sample	VOCs (EPA 624) - sampled and analyzed semiannually
HZ, HO	SER	SER	EPD	Grab Sample	Metals (filtered/unfiltered), anions, gross alpha/beta, tritium, and gamma – sampled and analyzed semiannually
HW	SER	SER	EPD	Grab Sample	Anions, gross alpha/beta, tritium, and gamma – sampled and analyzed semiannually
CSF	SER	SER	EPD	Grab Sample	Anions, VOCs (EPA 624) - sampled and analyzed semiannually
Sewage Treatment Plant: Surveillance (See Chapter 9)					
EA	SER	SER	EPD	Composite	Sr-90 and gamma - sampled weekly and composited by contract analytical laboratory for monthly analysis
	SER	SER	EPD	Composite	Gross alpha/beta, tritium - sampled and analyzed weekly
DA	SER	SER	EPD	Composite	Sr-90 and gamma - sampled weekly and composited by contract analytical laboratory for monthly analysis
	SER	SER	EPD	Composite	Gross alpha/beta, tritium - sampled and analyzed weekly
Miscellaneous Monitoring (See Chapter 9)					
MH #192, STP influent and effluent to the primary clarifier	NA	NA	EPD	Daily Performance	Sewer line radiological monitors daily performance checked with Cs-137 button source

ENVIRONMENTAL MONITORING PLAN MATRIX FOR CALENDAR YEAR 2016

Sampling Location	Reporting to Regulators	Reporting to Departments	Lead Organization	Sample Type	Analysis/Frequency
				Check	
Surface Water - Peconic River: Surveillance (See Chapter 10)					
HY (outside RHIC Ring)	SER	SER	EPD	Grab Sample	Gross alpha/beta, gamma, tritium, Sr-90, metals (filtered/unfiltered), anions, VOCs (EPA 624) - sampled and analyzed semiannually
HV (inside RHIC Ring)	SER	SER	EPD	Grab Sample	Gross alpha/beta, gamma, tritium - sampled and analyzed semiannually
HM-S	SER	SER	EPD	Grab Sample	Metals (filtered/unfiltered), anions, VOCs (EPA 624), Sr-90, gross alpha/beta, gamma, and tritium - sampled and analyzed semiannually
HQ	SER	SER	EPD	24 Hr. Composite	Metals (filtered/unfiltered), anions - sampled and analyzed quarterly
HQ	SER	SER	EPD	24 Hr. Composite	Sr-90, gamma- sampled and analyzed quarterly
	SER	SER	EPD	24 Hr. Composite	Gross alpha/beta, tritium - sampled and analyzed quarterly
	SER	SER	EPD	Grab Sample	VOCs (EPA 624) - sampled and analyzed quarterly
HH	SER	SER	EPD	Grab Sample	Metals (filtered/unfiltered), anions, VOCs (EPA 624), gross alpha/beta, gamma, and tritium - sampled and analyzed semiannually
Potable Water: Compliance (See Chapter 11)					
Potable Wells 4, 6, 7, 10, and 11	WTPR	Yes	EPD	Grab Sample	Gross alpha/beta, gamma, tritium, Sr-90 - sampled and analyzed quarterly; inorganic chemicals (IOC Groups 1, 2, 3, 4) - sampled and analyzed annually; water quality (alkalinity/calcium) - sampled and analyzed biannually

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Sampling Location	Reporting to Regulators	Reporting to Departments	Lead Organization	Sample Type	Analysis/Frequency
Potable Wells 4, 6, 7, 10, and 11	WTPR	Yes	EU	Grab Sample	Principle Organic Contaminants (EPA 502.2) - sampled and analyzed quarterly
Potable Wells 4, 6, 7, 10, 11, and Water Treatment Facility	WTPR	Yes	EU	Grab Sample	Bacteriology - sampled and analyzed quarterly
Potable Water Distribution System	WTPR	Yes	EU	Grab Sample	Bacteriology - sampled and analyzed at seven locations monthly
	WTPR	Yes	EU	Grab Sample	Water Quality - sampled and analyzed quarterly at three locations
	WTPR	Yes	EU	Grab Sample	Inorganic chemicals (IOC 1, 2, 3, 4), Nitrate/Nitrite, THMs, HAA5 - sampled and analyzed semiannually
	WTPR	Yes	EU	Grab Sample	Asbestos - sampled and analyzed once per year
	WTPR	Yes	EU	Grab Sample	Lead and Copper - sampled and analyzed once every 3 years at 20 locations
Western Well Field (Wells 4, 6, and 7)	WTPR	Yes	EU	Composite	SOCs - sampled and analyzed once per year; sample composited by contract analytical laboratory
Eastern Well Field (Wells 10 and 11)	WTPR	Yes	EU	Composite	SOCs - sampled and analyzed once per year; sample composited by contract analytical laboratory
Points of Entry	WTPR	Yes	EU	Grab	Temperature, conductivity, and pH - sampled and analyzed biweekly by operating personnel
Potable Water: Surveillance(See Chapter 11)					
Wells #4, #6, #7, #10, #11	SER	SER	EPD	Grab Sample	VOCs (EPA 524.2) - sampled and analyzed quarterly
Wells #4, #6, #7, #10, #11	SER	SER	EPD	Grab Sample	Anions, metals - sampled and analyzed annually
Groundwater: Compliance (See Chapter 12)					
Major Petroleum Facility (8 wells)	MPF License SER/GMR	Yes	EPD	Grab Sample	VOCs and MTBE (EPA 624), Semi-VOCs (EPA 625) - sampled and analyzed semiannually
	MPF License	Yes	EPD	Grab Sample	Floating product check - sampled and analyzed monthly
Waste Management Facility (8 wells)	RCRA Permit	Yes	EPD	Grab Sample	VOCs (EPA 524.2), tritium, gamma, gross alpha/beta - sampled and analyzed semi-annually
STP (7 wells)	SER/GMR DMR	SER/GMR	EPD	Grab Sample	Metals (unfiltered) and pesticides annually.
g-2 (5 wells)	SER/GMR	SER/GMR	EPD	Grab Sample	Tritium - sampled and analyzed semiannually; temporary wells installed to track downgradient sections of the g-2 tritium plume near NSLS-II
BLIP (4 wells)	SER/GMR	SER/GMR	EPD	Grab Sample	Tritium - sampled and analyzed semiannually to annually

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Sampling Location	Reporting to Regulators	Reporting to Departments	Lead Organization	Sample Type	Analysis/Frequency
Building 452 Freon-11 (14 wells)	SER/GMR	SER/GMR	EPD	Grab Sample	VOCs - sampled and analyzed quarterly for 11 wells, semiannually for three wells.
Groundwater: Surveillance (See Chapter 12)					
BMRR (4 wells)	SER/GMR	SER/GMR	EPD	Grab Sample	Tritium, gross alpha/beta, gamma - sampled and analyzed every 2 years; next samples collected in 2016
RHIC (13 wells)	SER/GMR	SER/GMRl	EPD	Grab Sample	Tritium - sampled and analyzed semiannually
NSLS-II (6 wells)	SER/GMR	SER/GMR	EPD	Grab Sample	Tritium - sampled and analyzed annually
AGS (48 wells)	SER/GMR	SER/GMR	EPD	Grab Sample	Tritium - sampled and analyzed annually
Motor Pool Facility (6 wells)	SER/GMR	SER/GMR	EPD	Grab Sample	VOCs - sampled and analyzed annually Floating product check in 3 wells annually;
Service Station (5 wells)	SER/GMR	SER/GMR	EPD	Grab Sample	VOCs - sampled and analyzed annually. Floating product check in 2 wells annually;
Groundwater: Environmental Restoration - Long Term Response Actions (See Chapter 12)					
Site Background (10 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed annually
Current Landfill (11 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed semiannual to annually Anions, metals, cyanide - sampled and analyzed semiannually Gamma, tritium, Sr-90 - analyzed annually
Former Landfill (14 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs, pesticides/PCBs, gross alpha/beta, gamma, tritium, Sr-90, anions, cyanide, metals - sampled and analyzed every even numbered year
OU III Middle Road (39 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed annually to quarterly
OU VI Ethylene Dibromide (26 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed annually EDB - sampled and analyzed annually to quarterly
Chemical/Animal Holes (32 wells)	SER/GMR	NA	EPD	Grab Sample	Sr-90 - sampled and analyzed annually to semiannually
OU I South Boundary (49 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs and gamma - sampled and analyzed annually Tritium and Sr-90 - sampled and analyzed semiannually for core and perimeter and annually for core and perimeter and annually for background wells

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Sampling Location	Reporting to Regulators	Reporting to Departments	Lead Organization	Sample Type	Analysis/Frequency
OU III North Street (19 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - Plume core and bypass wells will be sampled semiannually and perimeter wells will be sampled annually Tritium - sampled and analyzed annually
OU III Central (9 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - all wells sampled and analyzed annually except for 109-03 and 109-04, which are sampled and analyzed quarterly
OU III Building 96 (35 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs, chromium, and hexavalent chromium - sampled and analyzed annually to quarterly
OU III South Boundary (45 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed annually to semiannually
OU III South Boundary Radionuclide (50 wells)	SER/GMR	NA	EPD	Grab Sample	Gross strontium-90, gamma, tritium - sampled and analyzed annually
OU III Western South Boundary (18 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed semi-annually to quarterly
OU III Magothy (42 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed annually to quarterly
OU III (BGRR/WCF Sr-90) (95 wells)	SER/GMR	NA	EPD	Grab Sample	Sr-90 - sampled and analyzed semi-annually to annually
OU III Offsite (11 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed annually
OU III – HFBR (60 wells)	SER/GMR	NA	EPD	Grab Sample	Tritium - sampled and analyzed annually to quarterly VOCs in selected wells - sampled and analyzed annually
OU III –Industrial Park (52 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed quarterly
OU IV – AOC 6 (20 wells)	SER/GMR	NA	EPD	Grab Sample	Sr-90 - sampled and analyzed annually to semiannually.
OU III Long Island Power Authority (18 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed semi-annually to quarterly
OU III Industrial Park East (11 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed quarterly
OU III North Street East (16 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed quarterly
OU III Airport (31 wells)	SER/GMR	NA	EPD	Grab Sample	VOCs - sampled and analyzed quarterly
Landfill Gas and Surface Leachate Monitoring (See Chapter 13)					
Current Landfill - Wooded Wetland Monitoring (7 locations with samples of both sediment and surface water)	ALMR	NA	ERD	Grab Sample	Metals - sampled and analyzed every 2 years
BNL Landfills, Soil Gas Monitoring - Current Landfill (58 sampling points) Former Landfill (24 sampling points)	ALMR	NA	ERD	Grab Sample	Methane and hydrogen sulfate - sampled and analyzed quarterly for the Current Landfill and annually for the Former Landfill

Note:
See Appendix A for acronym definitions.