

## Compliance Status

# 3

*Brookhaven National Laboratory (BNL) is subject to more than 100 sets of federal, state, and local environmental regulations; numerous site-specific permits; ten equivalency permits for operation of groundwater remediation systems; and several other binding agreements. In 2018, the Laboratory operated in compliance with most of the requirements defined in these governing documents. Instances of noncompliance were reported to regulatory agencies and corrected expeditiously.*

*Emissions of nitrogen oxides, carbon monoxide, and sulfur dioxide from the Central Steam Facility were all well within permit limits in 2018. There were 21 recorded excess opacity measurements. 13 were due to blizzard-like conditions that obstructed the Boiler 7 transmissometer light path; three were due to unsuccessful attempts to start-up Boiler 7 on No. 6 oil; one was due to unknown causes; and four excess opacity readings occurred during quarterly quality assurance tests of the Boiler 6 and 7 opacity monitors. All the excursions were documented in quarterly Site-Wide Air Emissions and Monitoring Systems Performance Reports submitted to the New York State Department of Environmental Conservation (NYSDEC).*

*In 2018, there were no discharges of Halon 1211 from portable fire extinguishers or Halon 1301 from accidental or fire-induced activation of fixed fire suppression systems. Halon-portable fire extinguishers continue to be removed and replaced by dry-chemical or clean agent units as part of an ongoing program to phase out the use of chlorofluorocarbons as extinguishing agents.*

*With the exception of an iron exceedance at the Water Treatment Plant in June, BNL's drinking water and the supply and distribution system were in compliance with all applicable county, state, and federal regulations regarding drinking water quality, monitoring, operations, and reporting in 2018. Most of the liquid effluents discharged to surface water and groundwater also met applicable New York State Pollutant Discharge Elimination System (SPDES) permit requirements. An investigation into the cause(s) of tolyltriazole (TTA) exceedances at the Sewage Treatment Plant and associated corrective actions have been ongoing throughout 2018. BNL staff continue to work closely with the Department of Energy (DOE) and NYSDEC on this issue and finding possible solutions. Groundwater monitoring at the Laboratory's Major Petroleum Facility continued to demonstrate that current oil storage and transfer operations are not affecting groundwater quality.*

*Efforts to minimize impacts of spills of materials continued in 2018. There were 12 spills in 2018 and six of those spills met regulatory agency reporting criteria.*

*BNL participated in ten environmental inspections or reviews by external regulatory agencies in 2018. These inspections included Sewage Treatment Plant operations; hazardous waste management facilities; regulated emission sources; and the potable water system. Immediate corrective actions were taken to address all compliance issues raised during these inspections.*

### 3.1 COMPLIANCE WITH REQUIREMENTS

The federal, state, and local environmental statutes and regulations that BNL operates under are summarized in Table 3-1, along with a discussion of the Laboratory's compliance status with each. A list of all applicable environmental regulations is contained in Appendix D.

### 3.2 ENVIRONMENTAL PERMITS

#### 3.2.1 Existing Permits

Many processes and facilities at BNL operate under permits issued by environmental regulatory agencies. Table 3-2 provides a complete list of the existing permits, some of which are briefly described below.

**Table 3-1. Federal, State, and Local Environmental Statutes and Regulations Applicable to BNL.**

Regulator: Codified Regulation	Regulatory Program Description	Compliance Status	Report Sections
EPA: 40 CFR 300 40 CFR 302 40 CFR 355 40 CFR 370	The Comprehensive Environmental Response, Compensation & Liability Act (CERCLA) provides the regulatory framework for remediation of releases of hazardous substances and remediation (including decontamination and decommissioning [D&D]) of inactive hazardous waste disposal sites. Regulators include EPA, DOE, and the New York State Department of Environmental Conservation (NYSDEC).	In 1992, BNL entered into a triparty agreement with EPA, NYSDEC, and DOE. BNL site remediation is conducted by the Environmental Protection Division in accordance with milestones established under this agreement. The cleanup is currently in the long-term surveillance and maintenance mode for the groundwater treatment systems, former soil/sediment cleanup areas, and the reactors; this includes monitoring of institutional controls. The High Flux Beam Reactor (HFBR) stack and reactor vessel are scheduled for D&D by 2020 and 2072, respectively.	2.3.4.8
Council for Env. Quality: 40 CFR 1500–1508 DOE: 10 CFR 1021	The National Environmental Policy Act (NEPA) requires federal agencies to follow a prescribed process to anticipate the impacts on the environment of proposed major federal actions and alternatives. DOE codified its implementation of NEPA in 10 CFR 1021.	BNL is in full compliance with NEPA requirements and has established sitewide procedures for implementing these requirements.	3.3
Advisory Council on Historic Preservation: 36 CFR 60 36 CFR 63 36 CFR 79 36 CFR 800 16 USC 470	The National Historic Preservation Act (NHPA) identifies, evaluates, and protects historic properties eligible for listing in the National Register of Historic Places, commonly known as the National Register. Such properties can be archeological sites or historic structures, documents, records, or objects. NHPA is administered by state historic preservation offices (SHPOs; in New York State, NYSHPO). At BNL, structures that may be subject to NHPA include the HFBR, the Brookhaven Graphite Research Reactor (BGRR) complex, World War I training trenches near the Relativistic Heavy Ion Collider (RHIC) project, and the former Cosmotron building.	The HFBR, BGRR complex, and World War I (WWI) trenches are eligible for inclusion in the National Register. The former Cosmotron building was identified as potentially eligible in an April 1991 letter from NYSHPO. Any proposed activities involving these facilities must be identified through the NEPA/NHPA processes and evaluated to determine if the action would affect the features that make the facility eligible. Actions required for D&D of the BGRR were determined to affect its eligibility, and mitigative actions have been completed based on a Memorandum of Agreement between DOE and NYSHPO. BNL has a Cultural Resource Management Plan to ensure compliance with cultural resource regulations. Buildings 50 years or older are reviewed under Section 106 of NHPA when proposed projects may significantly alter the structure or for building demolition. In 2016, four 1960s era apartments were evaluated under Section 106 requirements and were determined to be eligible for listing on the National Register of Historic Places. A full recordation of the structures which was completed in 2018 and submitted to NYSHPO resulted in their requesting a Memorandum of Agreement for the mitigative actions associated with the negative impact of demolition. Additionally, concrete roads associated with WW I Camp Upton were evaluated under Section 106 to determine their eligibility for listing on the National Register. These roads were determined to be 'not eligible' for listing, and the finding received concurrence from the NYSHPO.	3.4
EPA: 40 CFR 50 40 CFR 60-61 40 CFR 63 40 CFR 80 40 CFR 82 40 CFR 98 NYSDEC: 6 NYCRR 200–257 6 NYCRR 307	The Clean Air Act (CAA) and the NY State Environmental Conservation Laws regulate the release of air pollutants through permits and air quality limits. Emissions of radionuclides are regulated by EPA, via the National Emission Standards for Hazardous Air Pollutants (NESHAPs) authorizations.	All air emission sources are incorporated into the BNL Title V permit or have been exempted under the New York State air program, which is codified under the New York Codes, Rules, and Regulations (NYCRR). All applicable CAA and NYCRR regulations are incorporated into the BNL Title V permit. Radiological air emission sources are registered with the EPA.	3.5

(continued on next page)

Table 3-1. Federal, State, and Local Environmental Statutes and Regulations Applicable to BNL (continued).

Regulator: Codified Regulation	Regulatory Program Description	Compliance Status	Report Sections
EPA: 40 CFR 109–140 40 CFR 230, 231 40 CFR 401, 403 NYSDEC: 6 NYCRR 700–703 6 NYCRR 750	The Clean Water Act (CWA) and NY State Environmental Conservation Laws seek to improve surface water quality by establishing standards and a system of permits. Wastewater discharges are regulated by NYSDEC permits through the State Pollutant Discharge Elimination System (SPDES).	At BNL, permitted discharges include treated sanitary waste, and cooling tower and stormwater discharges. With the exception of eight excursions at BNL's sewage treatment plant, these discharges met the SPDES permit limits in 2018.	3.6
EPA: 40 CFR 141–149 NYSDOH: 10 NYCRR 5	The Safe Drinking Water Act (SDWA) and New York State Department of Health (NYSDOH) standards for public water supplies establish minimum drinking water standards and monitoring requirements. SDWA requirements are enforced by the Suffolk County Department of Health Services (SCDHS).	BNL maintains a sitewide public water supply. With the exception of an iron exceedance at the Water Treatment Plant in June, BNL's drinking water and the supply and distribution system were in compliance with all applicable county, state, and federal regulations regarding drinking-water quality, monitoring, operations, and reporting in 2018. Corrective actions for all identified operation and maintenance deficiencies were established and communicated with SCDHS and are being addressed by the Laboratory's Energy and Utilities Division.	3.7
EPA: 40 CFR 112 40 CFR 300 40 CFR 302 40 CFR 355 40 CFR 370 40 CFR 372	The Oil Pollution Act, the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Superfund Amendment Reauthorization Act (SARA) require facilities with large quantities of petroleum products or chemicals to prepare emergency plans and report their inventories to EPA, the state, and local emergency planning groups.	Since some facilities at BNL store or use chemicals or petroleum in quantities exceeding threshold planning quantities, the Laboratory is subject to these requirements. BNL fully complied with all reporting and emergency planning requirements in 2018.	3.8.1 3.8.2 3.8.3
EPA: 40 CFR 280 NYSDEC: 6 NYCRR 595–597 6 NYCRR 611–613 SCDHS: SCSC Article 12	Federal, state, and local regulations govern the storage of chemicals and petroleum products to prevent releases of these materials to the environment. Suffolk County Sanitary Codes (SCSC) are more stringent than federal and state regulations.	The regulations require that these materials be managed in facilities equipped with secondary containment, overfill protection, and leak detection. BNL complies with all federal and state requirements and continues to conform to county codes.	3.8.4 3.8.5 3.8.6
EPA: 40 CFR 260–280 NYSDEC: 6 NYCRR 360–372	The Resource Conservation Recovery Act (RCRA) and New York State Solid Waste Disposal Act govern the generation, storage, handling, and disposal of hazardous wastes.	BNL is defined as a large-quantity generator of hazardous waste and has a permitted waste management facility.	3.9
EPA: 40 CFR 700–763	The Toxic Substances Control Act (TSCA) regulates the manufacture, use, and distribution of all chemicals.	BNL manages all TSCA-regulated materials, including PCBs, and is in compliance with all requirements.	3.10
EPA: 40 CFR 162–171(f) NYSDEC: 6 NYCRR 320 6 NYCRR 325–329	The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and corresponding NY State regulations govern the manufacture, use, storage, and disposal of pesticides, herbicides, biocides, rodenticides, fungicides, tickicides, as well as the pesticide containers and residuals.	BNL contracts and/or employs NYSDEC-certified pesticide applicators for specific pesticide categories to apply pesticides, herbicides, biocides, rodenticides, fungicides, and tickicides. Each applicator attends Continuing Education training, as needed, to maintain current category certifications and BNL (or the contractor that applies regulated materials) files an annual report to the NYSDEC Pesticide Bureau detailing the above applications including EPA Registration Nos., dates of applications, method of application, target organisms, types, locations, quantity and dosage rates of pesticides applied.	3.11
DOE: 10 CFR 1022 NYSDEC: 6 NYCRR 663 6 NYCRR 666	DOE regulations require its facilities to comply with floodplain/wetland review requirements. The New York State Fresh Water Wetlands and Wild, Scenic, and Recreational Rivers rules govern development in the state's natural waterways. Development or projects within a half-mile of regulated waters must have NYSDEC permits.	BNL is in the Peconic River watershed and has several jurisdictional wetlands; consequently, development of locations in the north and east of the site requires NYSDEC permits and review for compliance under DOE wetland/floodplain regulations. A small section of the Peconic River required additional clean-up which was conducted under a Wetlands Equivalency Permit in 2017. As part of the permit requirements the restoration process requires evaluation of vegetation for at least two growing seasons after completion. The clean-up area was evaluated, and most of the area is considered 'open water' which does not have a vegetative cover standard, therefore the area is meeting permit requirements.	3.12

(continued on next page)

## CHAPTER 3: COMPLIANCE STATUS

**Table 3-1. Federal, State, and Local Environmental Statutes and Regulations Applicable to BNL** *(continued)*.

Regulator: Codified Regulation	Regulatory Program Description	Compliance Status	Report Sections
U.S. Fish & Wildlife Service: 50 CFR 17 NYSDEC: 6 NYCRR 182	The Endangered Species Act and corresponding New York State regulations prohibit activities that would jeopardize the continued existence of an endangered or threatened species or cause adverse modification to a critical habitat.	BNL is host to numerous species of flora and fauna. Many species have been categorized by New York State as endangered, threatened, or of special concern; and one threatened species has been designated under the Endangered Species Act. The Laboratory's Natural Resource Management Plan outlines activities to protect these vulnerable species and their habitats (see Chapter 6 for details).	3.13
U.S. Fish & Wildlife Service:  Migratory Bird Treaty Act 16 USC 703-712  The Bald and Golden Eagle Protection Act 16 USC 668 a-d	The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful. Birds protected under the act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and others, and includes their body parts (feathers, plumes etc.), nests, and eggs. The Bald and Golden Eagle Protection Act (BGEPA) prohibits any form of possession or taking of both bald and golden eagles.	Compliance with the MBTA and the BGEPA are documented through the BNL Natural Resource Management Plan. The plan includes provisions for enhancing local habitat through the control of invasive species, planting of native grasses as food sources, and construction of nesting sites. All construction activities, including demolition, are reviewed to ensure there are no impacts to nesting birds.	3.13
DOE: Order 231.1B Manual 231.1-1A	The Environment, Safety, and Health Reporting program objective is to ensure timely collection, reporting, analysis, and dissemination of information on environment, safety, and health issues as required by law or regulations or as needed to ensure that DOE is kept fully informed on a timely basis about events that could adversely affect the health and safety of the public, workers, the environment, the intended purpose of DOE facilities, or the credibility of the Department. Included in the order are the requirements for the Occurrence Reporting and Processing of Operations Program (ORPS).	BNL prepares an annual Site Environmental Report and provides data for DOE to prepare annual NEPA summaries and other Safety, Fire Protection, and Occupational Health and Safety Administration (OSHA) reports. The Laboratory developed the ORPS Subject Area for staff and management who perform specific duties related to discovery, response, notification, investigation, and reporting of occurrences to BNL and DOE management. The ORPS Subject Area is supported by: Occurrence Reporting Program Description, Critiques Subject Area, Occurrence Categorizer's Procedure, and the ORPS Office Procedure.	All chapters
DOE: Order 414.1D 10 CFR 830, Subpart A Policy 450.5	The Quality Assurance (QA) program objective is to establish an effective management system using the performance requirements of this Order/Rule, coupled with consensus standards, where appropriate, to ensure: 1) products and services meet or exceed customers' expectations; 2) management support for planning, organization, resources, direction, and control ; 3) performance and quality improvement thorough rigorous assessment and corrective action and; and 4) environmental, safety, and health risks and impacts associated with work processes are minimized while maximizing reliability and performance of work products.	BNL has a Quality Assurance (QA) Program in place to implement quality management methodology throughout its management systems and associated processes to: (1) achieve and maintain compliance with applicable environmental, safety, security, and health (ESSH) requirements; (2) continue improvement in ESSH performance; (3) provide a safe and healthy workplace; (4) protect the environment and conserve resources; (5) prevent pollution; (6) provide services and products of the highest quality consistent with the needs, expectations, and resources of our customers; and (7) continuously improve processes, systems, and capabilities to improve operations and increase the value of research products delivered to customers. Having a comprehensive program ensures that all environmental monitoring data meet QA and quality control requirements. Samples are collected and analyzed using standard operating procedures to ensure representative samples and reliable, defensible data. Quality control in the analytical labs is maintained through daily instrument calibration, efficiency and background checks, and testing for precision and accuracy. Data are verified and validated according to project-specific quality objectives before they are used to support decision making.	Chapter 9

*(continued on next page)*

Table 3-1. Federal, State, and Local Environmental Statutes and Regulations Applicable to BNL (concluded).

Regulator: Codified Regulation	Regulatory Program Description	Compliance Status	Report Sections
DOE: Order 435.1 Chg. 1	The Radioactive Waste Management Program objective is to ensure that all DOE radioactive waste is managed in a manner that protects workers, public health and safety, and the environment. Order 435.1 requires all DOE organizations that generate radioactive waste to implement a waste certification program. DOE Laboratories must develop a Radioactive Waste Management Basis (RWMB) Program description, which includes exemption and timeframe requirements for staging and storing both routine and non-routine radioactive wastes.	The BNL Waste Certification Program Plan (WCPP) in the RWMB Program description defines the radioactive waste management program's structure, logic, and methodology for waste certification. New or modified operations or activities that do not fall within the scope of the RWMB Program description must be documented and approved before implementation. The Laboratory's RWMB Program description describes the BNL policies, procedures, plans, and controls demonstrating that the Laboratory has the management systems, administrative controls, and physical controls to comply with DOE Order 435.1 Chg. 1.	2.3.4.3
DOE: Order 436.1	The DOE Departmental Sustainability Order replaces former DOE Orders 450.1A, Environmental Protection Programs, and 430.2B, Departmental Energy, Renewable Energy and Transportation Management. The intent of the new order is to incorporate and implement the requirements of Executive Order (EO) 13514 and to continue compliance with EO 13423 though both of those orders were replaced by EO 13693, Planning for Federal Sustainability in the Next Decade. However, O 436.1 is still supported by DOE requirements for sound sustainability programs implemented under the DOE 2010 Strategic Sustainability Performance Plan (SSPP). Contractor requirements under the order require preparation of a Site Sustainability Plan and implementation of a sound Environmental Management System (EMS).	In accordance with the requirements of the DOE SSPP, BNL has developed its own SSP. The Goals and Strategic Objectives of the DOE SSPP are tracked and reported annually. BNL's EMS was officially registered to the ISO 14001:1996 standard in 2001 and recertified to the revised standard in 2004, 2007, 2010, 2013, and 2016. Certification to the ISO14001:2015 revised standard occurred in 2018.	Chapter 2
DOE: Order 458.1, Change 3	In February 2011, DOE released DOE Order 458.1 Radiation Protection of the Public and Environment, which replaced former Order 5400.5. The order establishes requirements to protect the public and the environment against undue risk from radiation associated with radiological activities conducted under the control of DOE pursuant to the Atomic Energy Act of 1954, as amended. The Order requires the preparation of an Environmental Radiation Protection Plan which outlines how facilities monitor their impacts on the public and environment. Full compliance with the Order was required by August 2012.	In accordance with the requirements of DOE Order 458.1, BNL maintains and implements several plans and programs for ensuring that the management of facilities, wastes, effluents, and emissions do not present a risk to the public, workers, or environment. These plans and programs have existed for decades and were previously implemented under prior DOE Order 5400.5 and in accordance with the current DOE O 435.1, Radioactive Waste Management, and 10 CFR 835. Environmental monitoring plans are well documented, and the results are published annually in BNL's Site Environmental Report, which is prepared in accordance with DOE O 231.1B. The Environmental Radiation Protection Program, which was published in September 2012, provides a record of the requirements of DOE O 458.1 and documents how the Laboratory meets these requirements.	Chapters 3, 4, 5, 6, and 8

## Notes:

CFR = Code of Federal Regulations

NYCRR = New York Codes, Rules, and Regulations

SCSC = Suffolk County Sanitary Code



## CHAPTER 3: COMPLIANCE STATUS

**Table 3-2. BNL Environmental Permits**

Issuing Agency	Bldg. or Facility	Process/Permit Description	Permit ID No.	Expiration or Completion	Emission Unit ID	Source ID
EPA - NESHAPs	510	Calorimeter Enclosure	BNL-689-01	None	NA	NA
EPA - NESHAPs	705	Tritium Evaporator	BNL-288-01	None	NA	NA
EPA - NESHAPs	820	Accelerator Test Facility	BNL-589-01	None	NA	NA
EPA - NESHAPs	AGS	AGS Booster - Accelerator	BNL-188-01	None	NA	NA
EPA - NESHAPs	RHIC	Accelerator	BNL-389-01	None	NA	NA
EPA - NESHAPs	931	Brookhaven LINAC Isotope Producer	BNL-2009-1	None	NA	NA
NYSDEC - NESHAPs	REF	Radiation Effects/Neutral Beam	BNL-789-01	None	NA	NA
NYSDEC - NESHAPs	RTF	Radiation Therapy Facility	BNL-489-01	None	NA	NA
EPA - SDWA	BNL	Underground Injection Control	NYU500001	(a)	NA	NA
NYSDEC - Air Equivalency	517/518	South Boundary/Middle Road System	1-51-009	NA	NA	NA
NYSDEC - Air Equivalency	598	OU I Remediation System	1-52-009	NA	NA	NA
NYSDEC - Air Equivalency	539	Western South Boundary System	1-52-009	NA	NA	NA
NYSDEC - Air Equivalency	TR 867	T-96 Remediation System	1-52-009	NA	NA	NA
NYSDEC - Air Equivalency	644	Freon-11 Treatment System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	517/518	South Boundary/Middle Road System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	539	West South Boundary System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	598	OU I Remediation System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	598	Tritium Remediation System	1-52-009	04-May-21	NA	NA
NYSDEC - SPDES Equivalency	670	Sr-90 Treatment System	1-52-009	25-Feb-23	NA	NA
NYSDEC - SPDES Equivalency	TR 829	Carbon Tetrachloride System	None	Closed out 2010	NA	NA
NYSDEC - SPDES Equivalency	OS-4	Airport/LIPA Treatment System	None	NA	NA	NA
NYSDEC - SPDES Equivalency	OS-2	Industrial Park East Treatment System	None	Closed out 2013	NA	NA
NYSDEC - SPDES Equivalency	OS-5	North St./North St. East Treatment System	None	NA	NA	NA
NYSDEC - SPDES Equivalency	OS-6	Ethylene Di-Bromide Treatment System	1-52-009	16-Dec-19	NA	NA
NYSDEC - SPDES Equivalency	855	Sr-90 Treatment System - BGRR/WCF	1-52-009	16-Dec-19	NA	NA
NYSDEC - SPDES Equivalency	TR 867	T-96 Remediation System	1-52-009	20-Mar-22	NA	NA
NYSDEC - SPDES Equivalency	644	Freon-11 Treatment System	1-52-009	20-Mar-22	NA	NA
NYSDEC - SPDES Equivalency	OS-2	Industrial Park Treatment System	1-52-009	30-Sep-19	NA	NA
NYSDEC - Hazardous Substance	BNL	Bulk Storage Registration Certificate	1-000263	27-Jul-19	NA	NA
NYSDEC - LI Well Permit	BNL	Domestic Potable/Process Wells	1-4722-00032/00151	17-Jul-26	NA	NA
NYSDEC - Air Quality	423	Metal Parts Cleaning Tank	1-4722-00032/00115	03-Feb-19	U-METAL	42308
NYSDEC - Air Quality	423	Gasoline Storage and Fuel Pumps	1-4722-00032/00115	03-Feb-19	U-FUELS	42309-10
NYSDEC - Air Quality	423/630	Motor Vehicle A/C Servicing	1-4722-00032/00115	03-Feb-19	U-MVACS	MVAC1- 3
NYSDEC - Air Quality	244	Paint Spray Booth	1-4722-00032/00115	03-Feb-19	U-PAINT	24402
NYSDEC - Air Quality	244	Flammable Liquid Storage Cabinet	1-4722-00032/00115	03-Feb-19	U-PAINT	244AE
NYSDEC - Air Quality	479	Metal Parts Cleaning Tank	1-4722-00032/00115	03-Feb-19	U-METAL	47908
NYSDEC - Air Quality	510	Spin Coating Operation	1-4722-00032/00115	03-Feb-19	U-INSIG	510AK
NYSDEC - Air Quality	801	Target Processing Laboratory	1-4722-00032/00115	03-Feb-19	U-INSIG	80101
NYSDEC - Air Quality	Site	Aerosol Can Processing Units	1-4722-00032/00115	03-Feb-19	U-INSIG	AEROS
NYSDEC - Air Quality	498	Aqueous Cleaning Facility	1-4722-00032/00115	03-Feb-19	U-METAL	49801
NYSDEC - Air Quality	535B	Plating Tanks	1-4722-00032/00115	03-Feb-19	U-INSIG	53501
NYSDEC - Air Quality	535B	Etching Machine	1-4722-00032/00115	03-Feb-19	U-INSIG	53502
NYSDEC - Air Quality	535B	Printed Circuit Board Process	1-4722-00032/00115	03-Feb-19	U-INSIG	53503

(continued on next page)

Table 3-2. BNL Environmental Permits (concluded).

Issuing Agency	Bldg. or Facility	Process/Permit Description	Permit ID No.	Expiration or Completion	Emission Unit ID	Source ID
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-61005	61005
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-61006	61006
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-61007	61007
NYSDEC - Air Quality	610	Metal Parts Cleaning Tray	1-4722-00032/00115	03-Feb-19	U-METAL	61008
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-61005	6101A
NYSDEC - Air Quality	630	Gasoline Storage and Fuel Pumps	1-4722-00032/00115	03-Feb-19	U-FUELS	63001-03
NYSDEC - Air Quality	902	Epoxy Coating/Curing Exhaust	1-4722-00032/00115	03-Feb-19	U-COILS	90206
NYSDEC - Air Quality	903	Metal Parts Cleaning Tank	1-4722-00032/00115	03-Feb-19	U-METAL	90304
NYSDEC - Air Quality	922	Electroplating Operation	1-4722-00032/00115	03-Feb-19	U-INSIG	92204
NYSDEC - Air Quality	923	Electronic Equipment Cleaning	1-4722-00032/00115	03-Feb-19	U-METAL	9231A
NYSDEC - Air Quality	923	Parts Drying Oven	1-4722-00032/00115	03-Feb-19	U-METAL	9231B
NYSDEC - Air Quality	Site	Halon 1211 Portable Extinguishers	1-4722-00032/00115	03-Feb-19	U-HALON	H1211
NYSDEC - Air Quality	Site	Halon 1301 Fire Suppression Systems	1-4722-00032/00115	03-Feb-19	U-HALON	H1301
NYSDEC - Air Quality	Site	Commercial Refrigeration Equipment	1-4722-00032/00115	03-Feb-19	U-RFRIG	COMRE
NYSDEC - Air Quality	Site	Packaged A/C Units	1-4722-00032/00115	03-Feb-19	U-RFRIG	PKG01-02
NYSDEC - Air Quality	Site	Reciprocating Chillers (45)	1-4722-00032/00115	03-Feb-19	U-RFRIG	REC01-53
NYSDEC - Air Quality	Site	Rotary Screw Chillers (15)	1-4722-00032/00115	03-Feb-19	U-RFRIG	ROTO1-15
NYSDEC - Air Quality	Site	Split A/C Units	1-4722-00032/00115	03-Feb-19	U-RFRIG	SPL01-02
NYSDEC - Air Quality	Site	Centrifugal Chillers (19)	1-4722-00032/00115	03-Feb-19	U-RFRIG	CEN01-26
NYSDEC - Air Quality	463	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	46301
NYSDEC - Air Quality	490	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	49006
NYSDEC - Air Quality	515	Diesel Non-Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	51501
NYSDEC - Air Quality	555	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	55503
NYSDEC - Air Quality	635	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	63501
NYSDEC - Air Quality	734	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	73401
NYSDEC - Air Quality	735	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	73501
NYSDEC - Air Quality	740	Diesel Emergency Generators (2)	1-4722-00032/00115	03-Feb-19	U-GENER	74001-02
NYSDEC - Air Quality	801	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	80102
NYSDEC - Air Quality	912	Diesel Emergency Generators (3)	1-4722-00032/00115	03-Feb-19	U-GENER	912A1-A3
NYSDEC - Air Quality	30	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-SMBLR	030AB
NYSDEC - Air Quality	244	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-SMBLR	244AB
NYSDEC - Air Quality	422	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-SMBLR	422AF
NYSDEC - Air Quality	423	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-SMBLR	42304
NYSDEC - Hazardous Waste	WMF	Waste Management	1-4722-00032/00102	06-Sep-22	NA	NA
NYSDEC - Water Quality	CSF	Major Petroleum Facility	1-1700	31-Mar-22	NA	NA
NYSDEC - WQ- Equivalency	Site	Peconic River Cleanup	1-4722-00032/00153	24-Apr-22	NA	NA

## Notes:

(a) Permit renewal under review by EPA

A/C = Air Conditioning

AGS = Alternating Gradient Synchrotron

BGRR = Brookhaven Graphite Research Reactor

CSF = Central Steam Facility

EPA = Environmental Protection Agency

LIPA = Long Island Power Authority

NA = Not Applicable

NESHAPs = National Emission Standards for  
Hazardous Air PollutantsNYSDEC = New York State Department of  
Environmental Conservation

OU = Operable Unit

RTF = Radiation Therapy Facility

RHIC = Relativistic Heavy Ion Collider

SDWA = Safe Drinking Water Act

SPDES = State Pollutant Discharge  
Elimination System

Sr-90 = Strontium-90

STP = Sewage Treatment Plant

WCF = Waste Concentration  
Facility

WMF = Waste Management Facility

- State Pollutant Discharge Elimination System (SPDES) permits, issued by NYSDEC
- Major Petroleum Facility (MPF) license, issued by NYSDEC
- Resource Conservation and Recovery Act (RCRA) permit, issued by NYSDEC for BNL's Waste Management Facility
- Registration certificate from NYSDEC for tanks storing bulk quantities of hazardous substances (e.g., fuel oil)
- Eight radiological emission authorizations issued by the U. S. Environmental Protection Agency (EPA) under the National Emission Standards for Hazardous Air Pollutants (NESHAPs)
- Air emissions permit issued by NYSDEC under Title V of the Clean Air Act (CAA) Amendments authorizing the operation of 13 emission units
- EPA Underground Injection Control (UIC) Area permit for the operation of 125 UIC wells (e.g., dry wells and cesspools)
- Permit for the operation of six domestic water supply wells, one irrigation well, and one fire protection well issued by NYSDEC
- 12 SPDES equivalency permits for the operation of groundwater remediation systems installed via the Interagency Agreement (Federal Facility Agreement under the Comprehensive Environmental Response, Compensation and Liability Act [CERCLA])

### 3.2.2 New or Modified Permits

#### 3.2.2.1 New York State Wetlands and Wild, Scenic, Recreational Rivers Act

The New York State Wild, Scenic, and Recreational Rivers Act was created by the state legislature in 1972 to protect and preserve certain rivers considered to have remarkable scenic, recreational, geologic, fish wildlife, historic, cultural, or other similar values. The Laboratory has one Wetland and Wild, Scenic, and Recreational Rivers Permit that was opened in 2017. The permit is an equivalency permit for the cleanup of a small area of contamination within the Peconic River. The Laboratory expects to close the permit after vegetation monitoring in 2019.

### 3.3 NEPA ASSESSMENTS

National Environmental Policy Act (NEPA) regulations require federal agencies to evaluate the environmental effects of proposed major federal activities. The prescribed evaluation process ensures that the proper level of environmental review is performed before an irreversible commitment of resources is made. During 2018, environmental evaluations were completed for 138 proposed projects at BNL. Of those, 135 were considered minor actions requiring no additional documentation. Three projects were addressed by submitting notification forms to DOE, which determined that the projects were covered by existing "Categorical Exclusions" (per 10 CFR 1021) or fell within the scope of a previous environmental assessment.

### 3.4 PRESERVATION LEGISLATION

The Laboratory is subject to several cultural resource laws, most notably the National Historic Preservation Act and the Archeological Resource Protection Act. These laws require agencies to consider the effects of proposed federal actions on historic structures, objects, and documents, as well as cultural or natural places important to Native Americans or other ethnic or cultural groups.

BNL has four structures or sites that are eligible for listing on the National Register of Historic Places: the Brookhaven Graphite Research Reactor (BGRR) complex, the High Flux Beam Reactor (HFBR) complex, the 1960s-era efficiency apartments, and the WWI Army training trenches associated with Camp Upton. Several other structures of historic significance are identified in BNL's Cultural Resources Management Plan (BNL 2013a), including the Brookhaven Center and Building 120. Two other buildings, Berkner Hall and the Chemistry Building, are considered "Architecturally Significant." Cultural resource activities are described in Chapter 6.

### 3.5 CLEAN AIR ACT (CAA)

The objectives of the CAA, which is administered by EPA and NYSDEC, are to improve or maintain regional ambient air quality through operational and engineering controls on stationary or mobile sources of air pollution. Both



conventional and hazardous air pollutants are regulated under the CAA.

### 3.5.1 Conventional Air Pollutants

The Laboratory has a variety of conventional, nonradioactive air emission sources that are subject to federal or state regulations. The following subsections describe the more significant sources, and the methods used by BNL to comply with the applicable regulatory requirements.

#### 3.5.1.1 Boiler Emissions

BNL has four boilers (Nos. 1A, 5, 6, and 7) at the Central Steam Facility (CSF) that are subject to NYSDEC “Reasonably Available Control Technology” (RACT) requirements. Three of the boilers can burn either residual fuel oil or natural gas; Boiler 1A burns fuel oil only. In 2018, natural gas was the predominant fuel burned at the CSF. For boilers with maximum operating heat inputs greater than or equal to 25 MMBtu/hr. (7.3 MW), the RACT requirements establish emission standards for oxides of nitrogen (NOx). The NOx RACT standard for the combustion of natural gas and No. 6 oil burned in the Laboratory’s three large boilers (Nos. 5, 6, and 7) is 0.15 lbs./MMBtu for both fuels. The NOx RACT emission limit for the CSF’s one mid-size boiler (No. 1A) is 0.20 lbs./MMBtu.

Boilers with a maximum operating heat input between 25 and 250 MMBtu/hr. (7.3 and 73.2 MW) can demonstrate compliance with the NOx standard using periodic emission tests or by using continuous emission monitoring equipment; all four CSF boilers fall in this operating range. Boilers 6 and 7 use continuous emission monitoring systems (CEMS) to demonstrate compliance with NOx standards. Because past emissions testing and CEMS results when No. 6 oil was burned have shown that CSF boilers 5, 6, and 7 cannot meet the new lower NOx RACT standards effective as of July 2014, BNL uses an approved system averaging plan to demonstrate compliance in quarterly reports submitted to NYSDEC.

The Laboratory also maintains continuous opacity monitors for Boilers 6 and 7. These monitors measure the transmittance of light through the exhaust gas and report the

measurement in percent attenuated. Opacity limitations state that no facility may emit particulates such that the opacity exceeds 20 percent, calculated in six-minute averages, except for one period not to exceed 27 percent in any one hour.

During 2018, there were no recorded exceedances of the NOx RACT limit by the Boiler 6 CEMS. Three one-hour exceedances of the NOx RACT limit recorded in June by the Boiler 7 CEMS were due to failed attempts to start-up the boiler in preparation for National Grid shut-down of the CSF natural gas supply train prior to scheduled grit blasting of its regulator/metering station.

Using the system averaging approach, actual weighted average NOx emission rates for operating boilers for the first through fourth quarters were 0.079, 0.088, 0.078, and 0.102 lbs./MMBtu, respectively, which were below the corresponding quarterly permissible weighted average emissions rate of 0.150 lbs./MMBtu each quarter.

In 2018, there were 21 recorded excess opacity measurements. Thirteen were due to blizzard-like conditions that obstructed the Boiler 7 transmissometer light path; three were due to unsuccessful attempts to start-up Boiler 7 on No. 6 oil; one was due to unknown causes; and four excess opacity readings occurred during quarterly quality assurance tests of the Boiler 6 and 7 opacity monitors. All the excursions were documented in quarterly Site-Wide Air Emissions and Monitoring Systems Performance Reports submitted to NYSDEC. Chapter 4 discusses CSF compliance with NOx RACT standards and opacity limits in greater detail.

#### 3.5.1.2 Ozone-Depleting Substances

Refrigerant: The Laboratory’s preventative maintenance program requires regular inspection and maintenance of refrigeration and air conditioning equipment that contains ozone-depleting substances such as R-11, R-12, and R-22. All refrigerant recovery and recycling equipment is certified to meet refrigerant evacuation levels specified by 40 CFR 82.158. As a matter of BNL’s standard practice, if a refrigerant leak is found, technicians will either

immediately repair the leak or isolate it and prepare a work order for the needed repairs. This practice is more stringent than the leak repair provisions of 40 CFR 82.156.

In 2018, 304 pounds of R-22, ten pounds of R-134A, and 24 pounds of R-410A were recovered and recycled from refrigeration equipment that was serviced. Meanwhile, 302 pounds of R-22, 300 pounds of R-123, 487 pounds of R-134A, and 82 pounds of R-410A leaked from refrigeration and air conditioning equipment on site. These leaks were subsequently reported as emissions in the Annual Emissions Statement transmitted to NYSDEC.

**Halon:** Halon 1211 and 1301 are extremely efficient fire suppressants but are being phased out due to their effect on the earth's ozone layer. In 1998, the Laboratory purchased equipment to comply with the halon recovery and recycling requirements of the CAA, 40 CFR 82 Subpart H. Halon recovered from excessed systems is shipped to the Department of Defense Ozone Depleting Substances Reserve in accordance with the Class I Ozone Depleting Substances Disposition Guidelines prepared by the DOE Office of Environmental Policy and Guidance. In 2018, there were no discharges of Halon 1211 from portable fire extinguishers or Halon 1301 from accidental or fire-induced activation of fixed fire suppression systems.

### 3.5.2 Hazardous Air Pollutants

In 1970, the CAA established standards to protect the general public from hazardous air pollutants that may lead to death or an increase in irreversible or incapacitating illnesses. The NESHAPs program was established in 1977 and the governing regulations were updated significantly in 1990. EPA developed NESHAPs to limit the emission of 189 toxic air pollutants. The program includes a list of regulated contaminants, a schedule for implementing control requirements, aggressive technology-based emission standards, industry-specific requirements, special permitting provisions, and a program to address accidental releases. The following subsections describe BNL's compliance with NESHAPs regulations.

#### 3.5.2.1 Maximum Available Control Technology

Based on the Laboratory's periodic review of Maximum Available Control Technology (MACT) standards in 2018, it has been determined that none of the proposed or newly promulgated MACT standards apply to the emissions from existing permitted operations or the anticipated emissions from proposed activities and operations at BNL.

#### 3.5.2.2 Asbestos

In 2018, the Laboratory notified the EPA Region II office regarding the removal of materials containing asbestos. During the year, 90,640 pounds of friable asbestos (e.g., pipe insulation, sheetrock, popcorn ceiling, transite board, floor tiles, water main pipes) materials were removed and disposed of according to EPA requirements.

#### 3.5.2.3 Radioactive Airborne Emissions

Minor and major sources of radiological airborne emissions from BNL's facilities and activities are evaluated to ensure that they do not impact the environment, on-site workers, or people residing at or near the Laboratory. A full description of radiological emissions monitoring conducted in 2018 is provided in Chapter 4.

BNL transmitted all data pertaining to radioactive air emissions and dose calculations to EPA in fulfillment of its annual reporting requirement. As in past years, the maximum off-site dose due to airborne radioactive emissions from the Laboratory continued to be far below the 10 mrem (100  $\mu$ Sv) annual dose limit specified in 40 CFR 61 Subpart H (see Chapters 4 and 8 for more information on the estimated air dose). Using EPA modeling software, the dose to the maximally exposed off-site individual resulting from BNL's airborne emissions in 2018 was 1.63 mrem (16.3  $\mu$ Sv).

### 3.6 CLEAN WATER ACT

The disposal of wastewater generated by Laboratory operations is regulated under the Clean Water Act (CWA) as implemented by NYSDEC and under DOE Order 458.1, Radiation Protection of the Public and the Environment. The goals of the CWA are to achieve a level of water

quality that promotes the propagation of fish, shellfish, and wildlife; to provide waters suitable for recreational purposes; and to eliminate the discharge of pollutants into surface waters. New York State was delegated CWA authority in 1975. NYSDEC has issued a SPDES permit to BNL that regulates wastewater effluents. The permit specifies monitoring requirements and effluent limits for nine of 12 outfalls, as described below. See Figure 5-3 in Chapter 5 for the locations of the following BNL outfalls:

- Outfall 001 is used to discharge treated effluent from the Sewage Treatment Plant (STP) to groundwater recharge basins.
- Outfalls 002, 002B, 003, 005, 006A, 006B, 008, 010, 011, and 012 are recharge basins used to discharge cooling tower blow-down, once-through cooling water, and/or stormwater. Because only stormwater or once-through cooling water is discharged to Outfalls 003, 011, and 012, NYSDEC imposes no monitoring requirements for these discharges.
- Outfall 007 receives backwash water from the Potable Water Treatment Plant filter building.
- Outfall 009 consists of numerous subsurface and surface wastewater disposal systems (e.g., cesspools) that receive predominantly sanitary waste and steam- and air-compressor condensate discharges. NYSDEC does not require monitoring of these disposal systems.

Each month, the Laboratory prepares Discharge Monitoring Reports (DMRs) that describe monitoring results, evaluate compliance with permit limitations, and identify corrective measures taken to address permit excursions. These reports are submitted electronically to EPA, NYSDEC central and regional offices, and the Suffolk County Department of Health Services (SCDHS) through a Network DMR (NetDMR) system. Details of the monitoring program conducted for the groundwater treatment systems where SPDES equivalency permits are in effect are provided in SER Volume II, Groundwater Status Report. Evaluation of the current effluent quality shows it to consistently meets groundwater effluent standards, and

in most cases, ambient water quality standards for surface water. Details on monitoring results, evaluation of compliance with permit limits, and description of any corrective actions taken to address permit excursions are provided in the following sections.

### 3.6.1 Sewage Treatment Plant

Sanitary and process wastewater generated by BNL operations is conveyed to the STP for processing before discharge to groundwater recharge basins. The STP provides tertiary treatment of the wastewater and includes the following processes: settling/sedimentation, biological reduction of organic matter and nitrogen, and final filtration. Chapter 5 provides a detailed description of the treatment process.

A summary of SPDES monitoring results for the STP discharge at Outfall 001 is provided in Table 3-3, along with relevant SPDES permit limits. The Laboratory monitors the STP discharge for more than 100 parameters monthly and more than 200 parameters quarterly. BNL's overall compliance with effluent limits was greater than 96 percent in 2018.

There were eight excursions of SPDES permit limits at Outfall 001 in 2018: one was for Total Nitrogen and seven for tolyltriazole (TTA).

A 24-hour composite sample collected on December 12, 2018 for routine compliance analysis exhibited a Total Nitrogen concentration of 12.5 mg/L. The permit limit for Total Nitrogen is 10 mg/L. The excursion was most likely caused by the aerobic bacteria process being upset when sludge from the North Modular Aeration Tank was transferred to the South Aeration Tank, so that required maintenance could be performed. This changeover, along with the colder weather experienced during that time period (below freezing for several days) disrupted biological activity and contributed to inefficient plant operations. As a preventative correction action, future change-overs of aeration tanks for maintenance purposes will be planned during warmer weather when biological processes are optimal and system loading is minimal.

The effluent limit for TTA (0.05 mg/L) at Outfall 001 was exceeded in January, February, April, May, June, and December of 2018. TTA

**Table 3-3. Analytical Results for Wastewater Discharges to Sewage Treatment Plant Outfall 001.**

Analyte	Low Report	High Report	Min. Monitoring. Freq.	SPDES Limit	Exceedances	% Compliance*
pH (SU)	6.7	8.0	Continuous Recorder	Min 5.8, Max. 8.5	0	100
Solids, Total Dissolved (mg/L)	241	509	Monthly	1000	0	100
Total nitrogen (mg/L)	0.9	12.5	Twice Monthly	10	1	96
Total phosphorus (mg/L)	0.08	1.5	Twice Monthly	NA	0	100
Cyanide (mg/L)	< 0.002	< 0.002	Twice Monthly	0.1	0	100
Copper (mg/L)	< 0.003	0.05	Twice Monthly	0.15	0	100
Iron (mg/L)	0.06	0.42	Twice Monthly	0.6	0	100
Lead (mg/L)	< 0.001	0.005	Twice Monthly	0.025	0	100
Mercury (ng/L)	3	17	Twice Monthly	200	0	100
Methylene chloride (ug/L)	<2	< 2	Twice Monthly	5	0	100
Nickel (mg/L)	< 0.002	0.004	Twice Monthly	0.1	0	100
Silver (mg/L)	< 0.001	0.001	Twice Monthly	0.015	0	100
Toluene (ug/L)	< 1	< 1	Twice Monthly	5	0	100
Zinc (mg/L)	0.02	0.14	Twice Monthly	2	0	100
1,1,1-trichloroethane (ug/L)	< 1	< 1	Twice Monthly	5	0	100
Max. Flow (MGD)	0.31	0.97	Continuous Recorder	2.3	0	100
Avg. Flow (MGD)	0.21	0.45	Continuous Recorder	NA	0	100
HEDP (mg/L)	<0.05	0.1	Monthly	0.5	0	100
Tolytriazole (mg/L)	< 0.005	0.3	Monthly	0.05	7	42

Notes: Notes:

See Figure 5-3 for location of Outfall 001.

\* % Compliance = total no. samples – total no. exceedances/total no. of samples x 100

HEDP = 1-hydroxyethylidene diphosphonic acid

MGD = million gallons per day

NA = Not Applicable

SPDES = State Pollutant Discharge Elimination System

SU = standard unit

is a corrosion inhibitor used throughout the site for copper systems and is the industry standard for this type of protection. This parameter was added to BNL's SPDES Permit in 2009 and effluent concentrations were consistently below the contract laboratory's detection limit of 0.005 mg/L until the first exceedance was observed in January 2018. An investigation into the cause(s) of these exceedances and corrective actions have been ongoing. Possible contributing causes include the following:

- Emergency New York State Department of Health Legionella Disease prevention regulations enforced in 2015 resulted in an increased amount of cooling towers being treated with water treatment chemicals, including TTA, and discharging to STP.
- Much lower flow conditions at the STP over the years due to sustainability improvements

to reduce water usage.

- A propylene glycol product used to winterize over 100 chilled water systems at BNL was found to contain TTA, which helped protect the copper coils and prevent freezing. In these closed loop systems, while there is a procedure to capture this material during the winterization and spring start-up operations, final rinses were drained to sanitary and likely contained residual amounts of the product.

Several corrective actions have been implemented including, but not limited to:

- Decreased the control limits for the Water Treatment Chemical Assetguard-7286T (Assetguard) to reduce the overall amount of this chemical that is currently being used to treat onsite cooling tower systems and contains TTA.

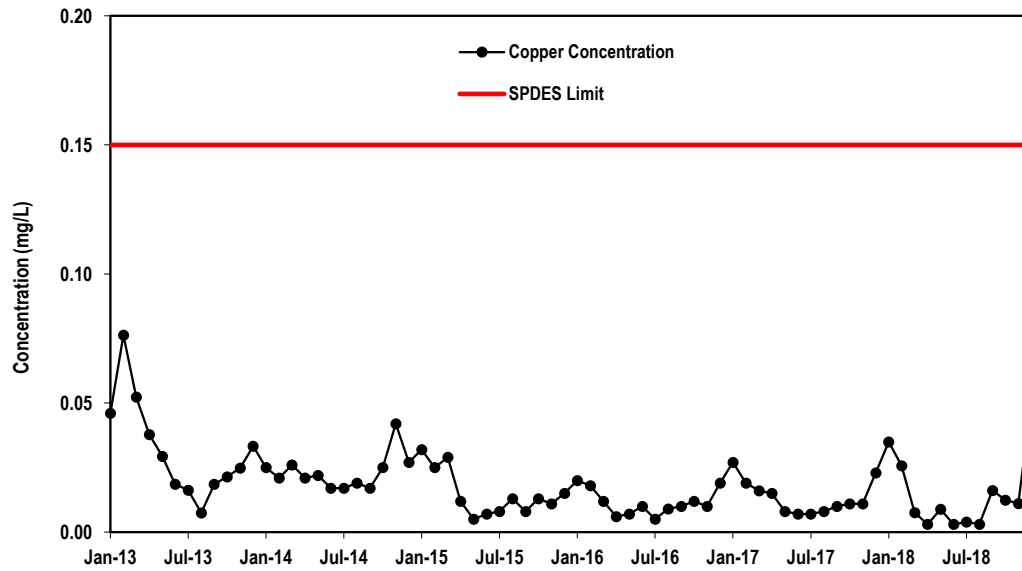


Figure 3-1. Maximum Concentrations of Copper Discharged from the BNL Sewage Treatment Plant, 2013–2018.

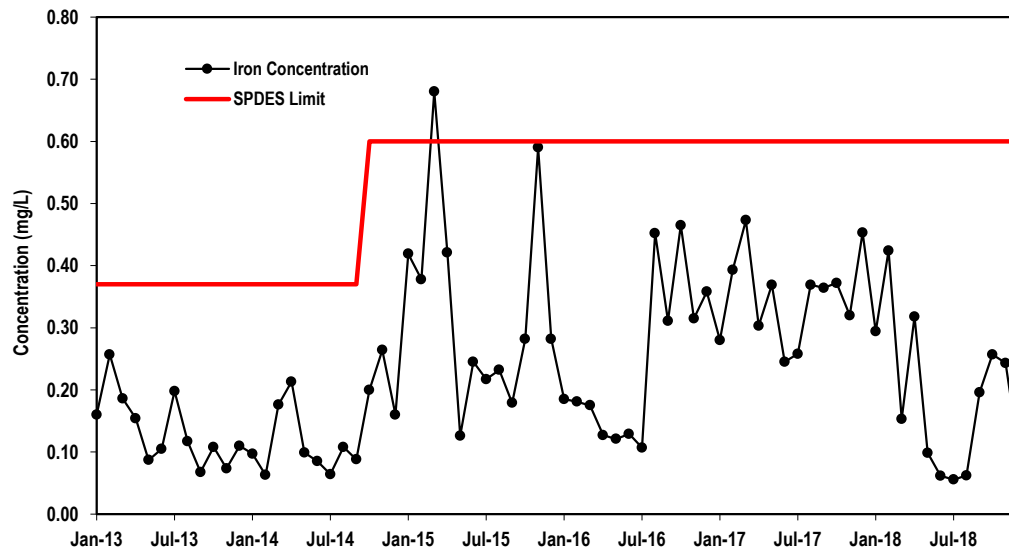


Figure 3-2. Maximum Concentrations of Iron Discharged from the BNL Sewage Treatment Plant, 2013–2018.



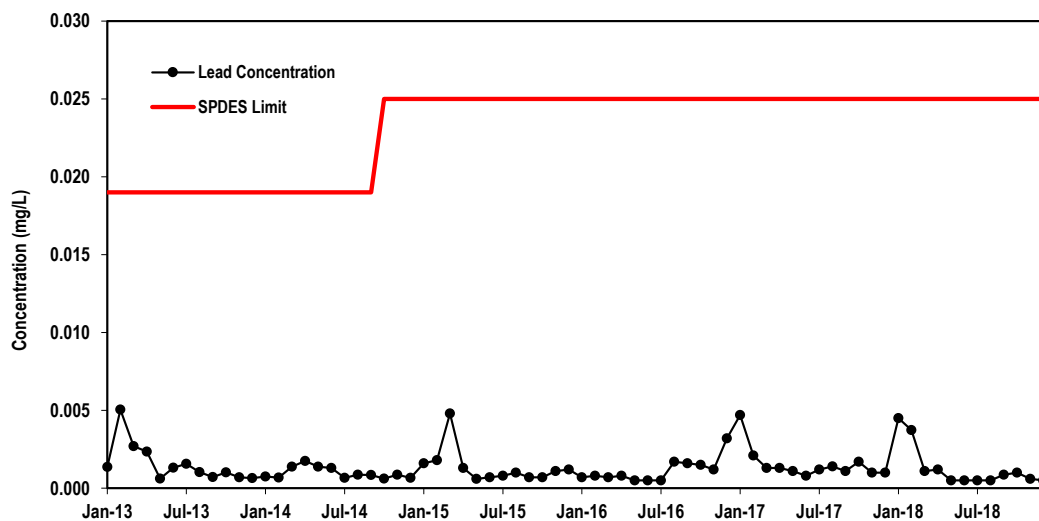


Figure 3-3. Maximum Concentrations of Lead Discharged from the BNL Sewage Treatment Plant, 2013–2018.

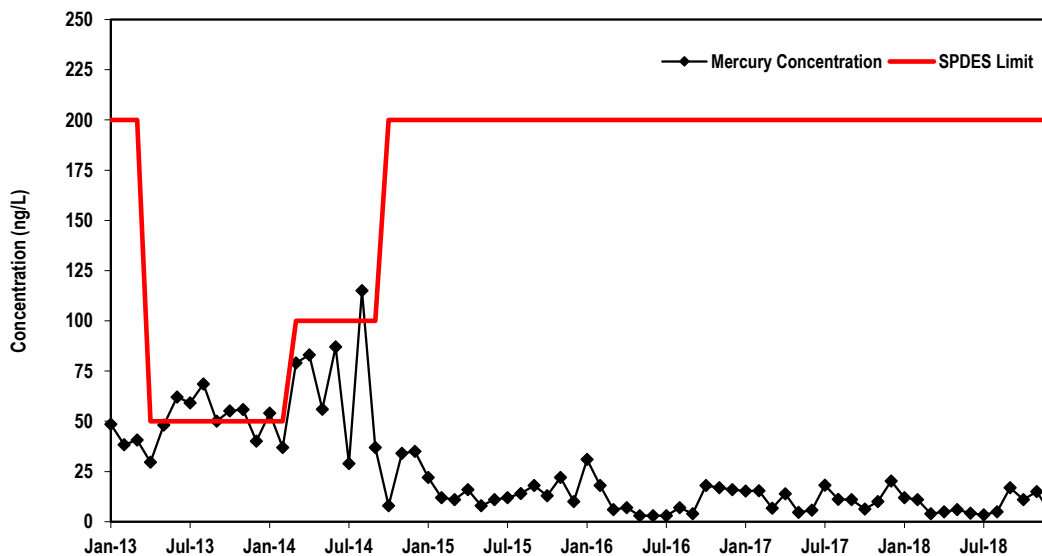


Figure 3-4. Maximum Concentrations of Mercury Discharged from the BNL Sewage Treatment Plant, 2013–2018.

Figure 3-5. Maximum Concentrations of Nickel Discharged from the BNL Sewage Treatment Plant, 2013–2018.

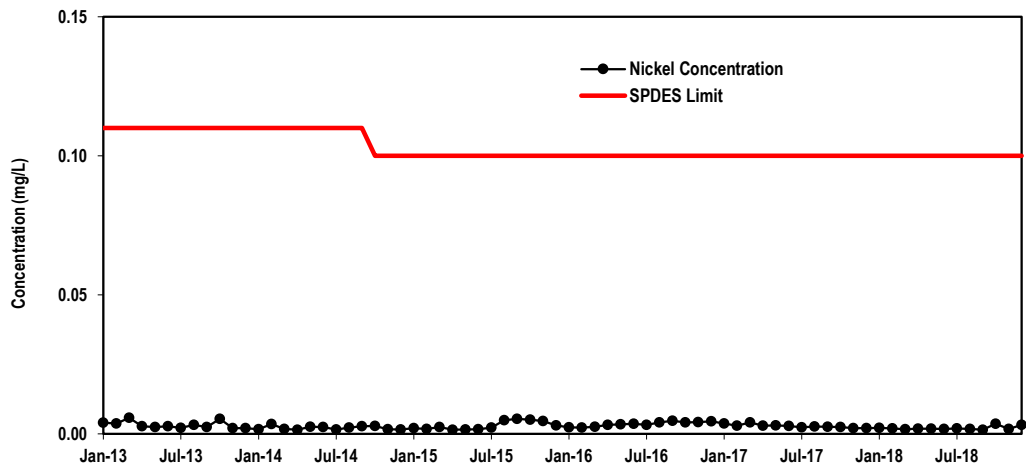


Figure 3-6. Maximum Concentrations of Silver Discharged from the BNL Sewage Treatment Plant, 2013–2018.

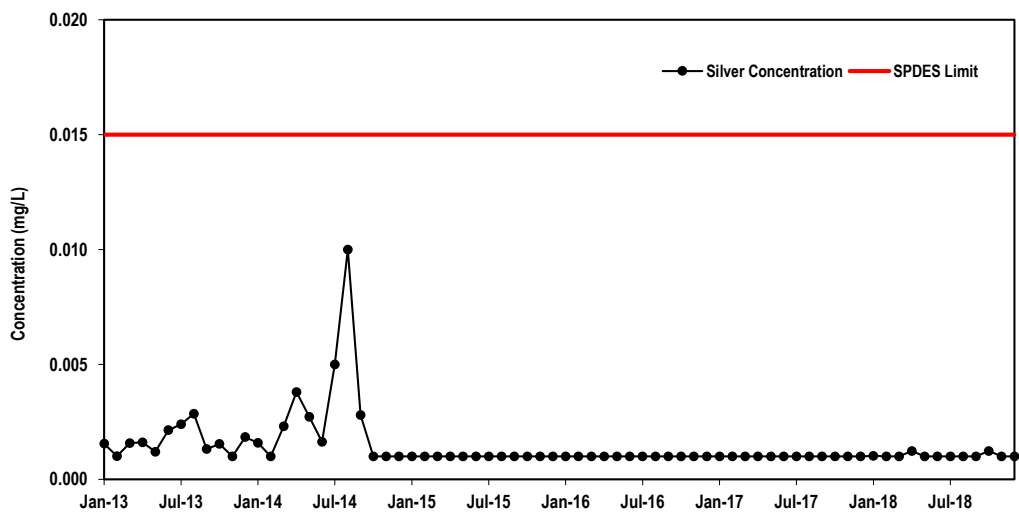
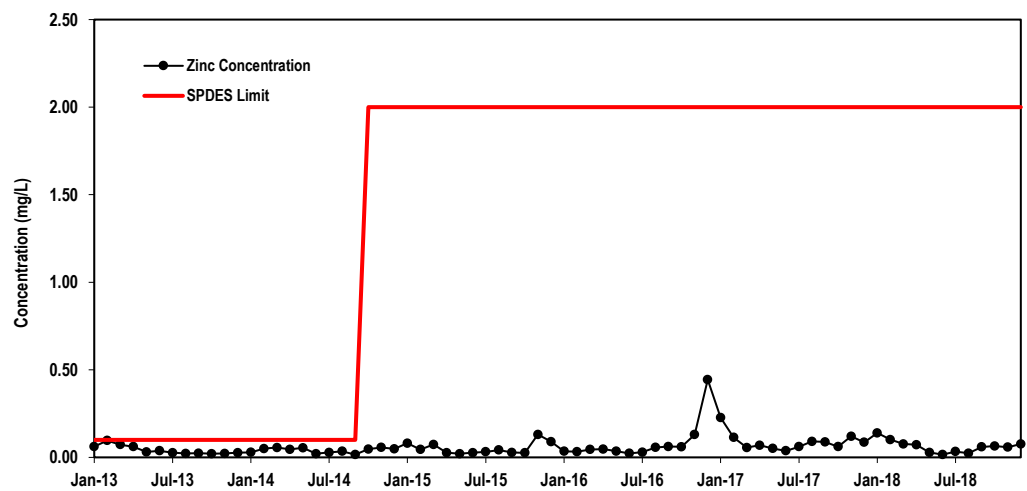


Figure 3-7. Maximum Concentrations of Zinc Discharged from the BNL Sewage Treatment Plant, 2013–2018.



CHAPTER 3: COMPLIANCE STATUS

Table 3-4. Analytical Results for Wastewater Discharges to Outfalls 002, 005 - 008, and 010.

Analyte	Outfall 002	Outfall 002B	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 008	Outfall 010	SPDES Limit	No. of Exceedances	% Compliance*
Flow (MGD)	N Min. Max.	CR	CR	CR	CR	CR	11	11			
		0.18	0.0008	0.06	0.02	0.08	0.01	0.003	NA		
		0.38	0.08	0.1	0.07	0.16	2.3	0.7	NA	NA	NA
pH (SU)	Min. Max.	6.0	7.3	6.1	7.0	6.5	6.4	6.4	NA		
		8.4	8.7	8.5	8.8	8.9	8.1	8.2	8.5, 9.0 (a)	0	100
Oil and Grease (mg/L)	N Min. Max.	12	12	12	12	NR	11	11			
		< 1.1	< 1.1	< 1.1	< 1.1	NR	< 1.1	< 1.2	NA		
		1.9	1.3	1.8	1.2	NR	1.7	3.4	15	0	100
Copper (mg/L)	N Min. Max.	NR	NR	4	NR	NR	NR	4			
		NR	NR	< 0.003 (T)	NR	NR	NR	< 0.003 (D)	NA		
		NR	NR	0.004 (T)	NR	NR	NR	0.01 (D)	1.0	0	100
Aluminum (mg/L)	N Min. Max.	4	NR	NR	NR	NR	4	4			
		< 0.07 (T)	NR	NR	NR	NR	< 0.07 (D)	< 0.07 (D)	NA		
		0.2 (T)	NR	NR	NR	NR	0.13 (D)	1.9 (D)	2.0	0	100
Lead, Dissolved (mg/L)	N Min. Max.	NR	NR	NR	NR	NR	NR	4			
		NR	NR	NR	NR	NR	NR	< 0.005	NA		
		NR	NR	NR	NR	NR	NR	0.03	0.05	0	100
Vanadium, Dissolved (mg/L)	N Min. Max.	NR	NR	NR	NR	NR	NR	4			
		NR	NR	NR	NR	NR	NR	0.004	NA		
		NR	NR	NR	NR	NR	NR	0.01	NPL	NA	NA
Chloroform (µg/L)	N Min. Max.	4	NR	NR	NR	NR	NR	NR			
		< 1.0	NR	NR	NR	NR	NR	NR	NA		
		1.8	NR	NR	NR	NR	NR	NR	7	0	100
Bromodichloromethane (µg/L)	N Min. Max.	4	NR	NR	NR	NR	NR	NR			
		< 1.0	NR	NR	NR	NR	NR	NR	NA		
		< 1.0	NR	NR	NR	NR	NR	NR	50	0	100
1,1,1-trichloroethane (µg/L)	N Min. Max.	4	NR	NR	NR	NR	11	NR			
		< 1.0	NR	NR	NR	NR	< 1.0	NR	NA		
		< 1.0	NR	NR	NR	NR	< 1.0	NR	5	0	100
1,1-dichloroethane (µg/L)	N Min. Max.	NR	NR	NR	NR	NR	11	NR			
		NR	NR	NR	NR	NR	< 1.0	NR	NA		
		NR	NR	NR	NR	NR	< 1.0	NR	5	0	100

**Table 3-4. Analytical Results for Wastewater Discharges to Outfalls 002, 005 - 008, and 010 (concluded).**

Hydroxyethylidene- diphosphonic acid (mg/L)	N Min. Max.	4	NR	4	4	4	NR	4	NR	NR	NR	
		<0.05	NR	<0.05	<0.05	<0.05	<0.05	NR	<0.05	NR	NR	NA
Tolyltriazole (mg/L)	N Min. Max.	<0.05	NR	<0.05	<0.05	<0.05	NR	<0.05	NR	NR	NR	0
		4	NR	4	4	4	NR	NR	NR	NR	NR	0.5
		<0.005	NR	<0.005	<0.005	<0.005	NR	<0.005	NR	NR	NR	NA
		<0.005	NR	<0.005	<0.005	<0.005	NR	<0.005	NR	NR	NR	0
<p>Notes:</p> <p>See Figure 5-3 for location of outfalls.</p> <p>There are no monitoring requirements for Outfalls 009, 011, and 012.</p> <p>** % Compliance = total no. samples – total no. exceedances/total no. of samples x 100</p> <p>(a) pH limit is 8.5 for Outfalls 005, 008, and 010; pH limit is 9.0 for Outfalls 002, 002B, 006A, 006B, and 007</p> <p>CR = continuous recorder</p> <p>D = dissolved</p> <p>MGD = million gallons per day</p> <p>Max. = maximum value</p> <p>Min. = minimum value</p> <p>N = number of samples</p> <p>NA = not applicable</p> <p>NPL = no permit limit; monitoring only</p> <p>NR = analysis not required</p> <p>SU = standard unit</p> <p>T = total recoverable</p>												

- Initiated the collection of “in-house” process control samples of STP Effluent. Personnel at the STP are qualitatively measuring the TTA influent and effluent concentrations of the unit operations within the STP to study potential increased treatment efficiencies.
- Accelerated the installation of automated chemical control systems at cooling towers where they are manually dosed to prevent overfeeding of product.
- Reviewed current control schemes for conductivity control and blowdown at the largest cooling tower on site (Building 600, Chilled Water Facility). Raising the conductivity upper thresholds and increasing the cycles of concentration reduces the amount of blowdown reduced to the STP containing TTA.
- A survey was performed to determine which equipment does not contain any copper tubes. If equipment is found not to contain copper, BNL will use a corrosion inhibitor without any azole constituent.
- Volume studies of all cooling tower systems were conducted to ensure systems are being treated to the correct volumes and prevent overdosing.
- BNL is working with chemical manufacturers to identify air handler frost protection chemicals that do not contain TTA, and is looking into adding warm air bypass installations on air handlers to further limit the number of units that will need chemical freeze protection in the winter.

EPD and Facilities & Operations Directorate staff continue to work closely with the DOE and NYSDEC to investigate the cause(s) of this issue and possible solutions.

Figures 3-1 through 3-7 plot the five-year trends for monthly concentrations of copper, iron, lead, mercury, nickel, silver, and zinc in the STP discharge.

### 3.6.2 Recharge Basins and Stormwater

Water discharged to Outfalls 002 through 008 and Outfalls 010 through 012 recharges to groundwater. Monitoring requirements for each of these discharges vary, depending on the type

## CHAPTER 3: COMPLIANCE STATUS

**Table 3-5. Potable Water Wells and Potable Distribution System: Analytical Results (Maximum Concentration, Minimum pH Value)**

Compound	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Potable Distribution Sample	NYS DWS
<b>Water Quality Indicators</b>							
Ammonia (µg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	SNS
Chlorides (µg/L)	47.1	50.6	38.2	66	74.2	53.7	250
Color (units)	< 5	< 5	< 5	< 5	< 5	< 5	15
Conductivity (µmhos/cm)	199	210	179	309	389	341	SNS
Cyanide (mg/L)	< 10	< 10	< 10	< 10	< 10	< 10	SNS
MBAS (mg/L)	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	SNS
Nitrates (mg/L)	0.24	0.33	0.25	0.51	0.59	0.23	10
Nitrites (mg/L)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1
Odor (units)	0	0	0	0	0	0	3
pH (Standard Units)	6.3	6.1	6.2	6.4	6.2	6	SNS
Sulfates (mg/L)	8.8	11.5	9.8	10.6	14.5	11.5	250
Total coliform	ND	ND	ND	ND	ND	ND	Negative
<b>Metals</b>							
Antimony (µg/L)	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	6
Arsenic (µg/L)	< 1.0	1.1	1.1	< 1.0	< 1.0	< 1.0	50
Barium (mg/L)	0.036	0.034	0.025	0.049	0.06	0.021	2
Beryllium (µg/L)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	4
Cadmium (µg/L)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5
Chromium (mg/L)	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.1
Fluoride (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2.2
Iron (mg/L)	0.8*	4.96*	2.75*	< 0.20	< 0.20	0.64	0.3
Lead (µg/L)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	15
Manganese (mg/L)	0.16	0.094	0.076	< 0.010	< 0.010	0.015	0.3
Mercury (µg/L)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.28	2
Nickel (mg/L)	0.0006	0.0045	0.0015	0.0006	0.0023	0.0024	SNS
Selenium (µg/L)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	50
Sodium (mg/L)	26.7	28	21.6	40.2	40.7	35.8	SNS
Silver (µg/L)	< 1	< 1	< 1	< 1	< 1	< 1	100
Thallium (µg/L)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	2
Zinc (mg/L)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.022	5
<b>Radioactivity</b>							
Gross alpha activity (pCi/L)	< 1.98	2.27 ± 1.57	2.5 ± 1.56	< 1.99	< 1.99	NR	15
Gross beta activity (pCi/L)	< 2.3	2.4 ± 1.02	1.69 ± 0.93	3.42 ± 0.83	3.37 ± 1.18	NR	(a)
Radium-228 (pCi/L)	NS	NS	NS	NS	NS	NR	5
Strontium-90 (pCi/L)	< 0.79	< 0.79	< 0.80	< 0.76	< 0.80	NR	8
Tritium (pCi/L)	< 458	< 448	< 448	< 455	< 452	NR	20,000

(continued on next page)



Table 3-5. Potable Water Wells and Potable Distribution System: Analytical Results (Maximum Concentration, Minimum pH Value) (concluded).

Compound	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Potable Distribution Sample	NYS DWS
<b>Other</b>							
Alkalinity (mg/L)	8.2	7.2	13	31.2	23.4	48.4	SNS
Asbestos (M. fibers/L)	NR	NR	NR	NR	NR	< 0.20	7
Calcium (mg/L)	4.98	4.51	5.28	10.1	10.7	15.2	SNS
HAA5 (mg/L)	NR	NR	NR	NR	NR	0.007	0.06**
Residual chlorine - MRDL (mg/L)	NR	NR	NR	NR	NR	1.3	4
TTHM (mg/L)	NR	NR	NR	NR	NR	0.024	0.08**

**Notes:**

See Figure 7-1 for well locations.

Well 12 was not operational for 2018; no testing was completed during this time.

HAA5 = five haloacetic acids

MBAS = methylene blue active substances

MRDL = maximum residual disinfectant level

ND = not detected

NR = analysis not required

NS = not sampled

NYS DWS = New York State Drinking Water Standard

SNS = drinking water standard not specified

TTHM = total trihalomethanes

\* Water from these wells is treated at the Water Treatment Plant for color and iron reduction prior to site distribution.

\*\* Limit imposed on distribution samples only.

(a) The drinking water standard was changed from 50 pCi/L (concentration based) to 4 mrem/yr (dose based) in late 2003. Gross beta activity does not identify specific radionuclides; therefore, a dose equivalent can not be calculated. No specific nuclides were detected; therefore, compliance with the requirement is demonstrated.

of wastewater received and the type of cooling water treatment reagents used. Table 3-4 summarizes the monitoring requirements and performance results.

In 2018, no non-compliance events occurred for any of the permitted recharge basin outfalls.

### 3.7 SAFE DRINKING WATER ACT

The extraction and distribution of drinking water are regulated under the federal Safe Drinking Water Act (SDWA). In New York State, implementation of the SDWA is delegated to the New York State Department of Health (NYSDOH) and administered locally by SCDHS. Because BNL provides potable water to more than 25 full-time residents, it is subject to the same requirements as a municipal water supplier. Monitoring requirements are prescribed annually by SCDHS, and a Potable Water Sampling and Analysis Plan (Bruno 2018) is prepared by the Laboratory to comply with these requirements.

#### 3.7.1 Potable Water

The Laboratory has six water supply wells for on-site distribution of potable water, five of which were active during 2018. As required by NYSDOH regulations, BNL monitors the potable wells regularly for bacteria, inorganics, organics, and pesticides. The Laboratory also voluntarily monitors drinking water supplies for radiological contaminants yearly. Tables 3-5 and 3-6 provide potable water supply monitoring data. With the exception of an iron exceedance at the Water Treatment Plant in June, BNL's drinking water and the supply and distribution system were in compliance with all applicable county, state, and federal regulations regarding drinking water quality, monitoring, operations, and reporting in 2018.

The iron exceedance in June 2018 was caused by the failure of a temporary chemical feed system that aids in the iron removal process at the Laboratory's Water Treatment Facility. This system was set up to accommodate construction of the Lime Room Phase I renovation project.

# CHAPTER 3: COMPLIANCE STATUS

**Table 3-6. Potable Water Wells: Analytical Results for Principal Organic Compounds, Synthetic Organic Chemicals, Pesticides, and Micro-Extractables**

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	NYS DWS
	µg/L						
Dichlorodifluoromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Vinyl Chloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2
Bromomethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Trichlorofluoromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1-dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Methylene Chloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
trans-1,2-dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1-dichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
cis-1,2-dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
2,2-dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Bromochloromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1,1-trichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Carbon Tetrachloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1-dichloropropene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2-dichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Trichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2-dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Dibromomethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
trans-1,3-dichloropropene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
cis-1,3-dichloropropene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1,2-trichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,3-dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1,1,2-tetrachloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Bromobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,3-trichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
2-chlorotoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
4-chlorotoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,3-dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,4-dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2-dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,4-trichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Hexachlorobutadiene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Tetrachloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1,2,2-Tetrachloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,3-trichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Benzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Toluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Ethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
m,p-xylene	< 1	< 1	< 1	< 1	< 1	< 1	5
o-xylene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Styrene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Isopropylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
n-propylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,3,5-trimethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5

(continued on next page)

Table 3-6. Potable Water Wells: Analytical Results for Principal Organic Compounds, Synthetic Organic Chemicals, Pesticides, and Micro-Extractables (continued).

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	NYS DWS
	µg/L						
Chlorodifluoromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Tert-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,4-trimethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
sec-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
4-Isopropyltoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
n-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloroform	2.1	0.9	18.7	0.7	1.7	2.0	50
Bromodichloromethane	3.7	< 0.5	1.8	< 0.5	< 0.5	0.95	50
Dibromochloromethane	4.6	< 0.5	0.57	< 0.5	< 0.5	1.5	50
Bromoform	4.2	< 0.5	< 0.5	< 0.5	< 0.5	1.4	50
Methyl tert-butyl ether	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
Toxaphene	< 1	< 1	< 1	< 1	< 1	< 1	3
Total PCB's	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	0.5
2,4,5,-TP (Silvex)	< 0.13	< 0.13	< 0.13	< 0.13	< 0.13	< 0.13	10
Dinoseb	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	50
Dalapon	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	50
Pichloram	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	50
Dicamba	< 1	< 1	< 1	< 1	< 1	< 1	50
Pentachlorophenol	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	1
Hexachlorocyclopentadiene	< 0.1	0.018	< 0.1	< 0.1	< 0.1	< 0.1	5
Bis(2-ethylhexyl)Phthalate	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	50
Bis(2-ethylhexyl)Adipate	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	50
Hexachlorobenzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	5
Benzo(A)Pyrene	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	50
Aldicarb Sulfone	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	SNS
Aldicarb Sulfoxide	< 0.5	< 0.5	< 0.5	< 0.5	1.1	1.1	SNS
Aldicarb	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	SNS
Oxamyl	< 1	< 1	< 1	< 1	< 1	< 1	50
3-Hydroxycarbofuran	< 1	< 1	< 1	< 1	< 1	< 1	50
Carbofuran	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	40
Carbaryl	< 1	< 1	< 1	< 1	< 1	< 1	50
Methomyl	< 1	< 1	< 1	< 1	< 1	< 1	50
Glyphosate	< 6	< 6	< 6	< 6	< 6	< 6	50
Diquat	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	50
1,2-dibromoethane (EDB)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.05
1,2-dibromo-3-chloropropane	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2
Lindane	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.2
Heptachlor	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.4
Aldrin	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	5
Heptachlor Epoxide	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.2
Dieldrin	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	5
Endrin	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2
Methoxychlor	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	40
Chlordane	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
2,4,-D	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	50
Alachlor	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
Simazine	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	50

(continued on next page)

Table 3-6. Potable Water Wells: Analytical Results for Principal Organic Compounds, Synthetic Organic Chemicals, Pesticides, and Micro-Extractables (concluded).

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	NYS DWS
	µg/L						
Atrazine	<0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	3
Metolachlor	<1	<1	<1	<1	<1	<1	50
Metribuzin	<0.5	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	50
Butachlor	<1	<1	<1	<1	<1	<1	50
Endothall	<9	< 9	< 9	< 9	< 9	< 9	100
Propachlor	<1	<1	<1	<1	<1	<1	50
Freon-113	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
Perfluorobutanesulfonic Acid	<0.08	<0.08	0.003	<0.8	0.003	0.001	50
Perfluoroheptanoic Acid	<0.009	<0.009	0.001	<0.09	0.003	0.0008	50
Perfluorohexanesulfonic Acid	0.001	<0.03	0.03	<0.3	0.013	0.008	50
Perfluorooctanoic Acid (ng/L)*	3.3	0.69	5.4	0.88	7.3	2.7	70
Perfluorooctanesulfonic Acid (ng/L)*	2.1	< 37	65	0.88	26.1	16.1	70
Perfluorononanoic Acid	<0.02	<0.02	<0.02	<0.18	0.003	0.0007	50

## Notes:

See Figure 7-1 for well locations.

For compliance determination with New York State Department of Health standards, potable water samples were analyzed quarterly for Principal Organic Compounds and annually for other organics by Pace Labs, a New York State-certified contractor laboratory.

The minimum detection limits for principal organic compound analytes are 0.5 µg/L. Minimum detection limits for synthetic organic chemicals and micro-extractables are compound-specific, and, in all cases, are less than the New York State Department of Health drinking water standard.

Well 12 was offline and remained unused during 2018.

\*Compounds results are reported in ng/L

SNS = drinking water standard not specified

NYS DWS = New York State Drinking Water Standard

WTP = Water Treatment Plant

This temporary system took the place of the permanent chemical feed system normally used at the water treatment facility, as it was being removed from service. The temporary system failure combined with increased demand on the facility during the month of June resulted in a short-term reduction of iron removal capabilities at the facility. Process control testing during this time indicated that the iron exceedance only occurred for a few hours. Once discovered, the facility was removed from service so the temporary chemical system could be repaired. Once repaired, the facility was returned to service following additional follow-up sampling for iron levels.

In 2013, the EPA required large water providers to start testing for six common Per- and Polyfluoroalkyl Substances (PFAS) chemicals under the third Unregulated Contaminant Monitoring Rule (UCMR 3). As a medium-size system, BNL was not required to participate in this testing program. In 2017, SCDHS began routine testing of all water supply systems, including BNL's, for PFAS. PFAS chemicals were detected in three of BNL's water supply wells. In these initial tests,

Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) were detected at concentrations below the current EPA Health Advisory Level of 70 ng/L (ppt) that was established specifically for the combined concentration of these two chemicals. Following repeated confirmed detections of PFAS in the supply wells, the Lab started routine quarterly testing for PFAS in 2018. The results are provided in Table 3-6.

EPA's health advisories are non-enforceable and non-regulatory and provide technical information to states agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water contamination. New York State is currently evaluating whether to establish enforceable drinking water standards for PFOS and PFOA at concentrations that may be lower than the current EPA advisory level. The other four PFAS chemicals would continue to be regulated under the current New York State limit of 50 µg/L (ppb) for unregulated contaminants. The Laboratory continues to monitor sample results

**Table 3-7. Applicability of EPCRA to BNL.**

<b>Applicability of EPCRA to BNL</b>				
EPCRA 302–303	Planning Notification	YES [X]	NO [ ]	NOT REQUIRED [ ]
EPCRA 304	EHS Release Notification	YES [ ]	NO [ ]	NOT REQUIRED [X]
EPCRA 311–312	MSDS/Chemical Inventory	YES [X]	NO [ ]	NOT REQUIRED [ ]
EPCRA 313	TRI Reporting	YES [X]	NO [ ]	NOT REQUIRED [ ]

and can utilize Granular Activated Carbon filters to remove PFAS, if necessary.

In addition to the compliance sampling program, all wells are also sampled and analyzed quarterly under the Laboratory's environmental surveillance program. Data collected under this program are consistent with the data reported in Tables 3-5 and 3-6. This additional testing goes beyond the minimum SDWA testing requirements.

To ensure that consumers are informed about the quality of Laboratory-supplied potable water, BNL publishes a Consumer Confidence Report (CCR) in May of each year, a deadline stipulated by the SDWA. This report provides information regarding source water supply system and the analytical tests conducted, and detected contaminants are compared to federal drinking water standards. The CCR also describes the measures the Laboratory takes to protect its water source and limit consumer exposure to contaminants. The CCR is distributed to all BNL employees and on-site residents, either in paper form or electronically at <http://www.bnl.gov/water/>.

### 3.7.2 Cross-Connection Control

The SDWA requires that public water suppliers implement practices to protect the water supply from sanitary hazards. One of the safety requirements is to rigorously prevent cross-connections between the potable water supply and facility piping systems. Cross-connection control is the installation of control devices (e.g., double-check valves, reduced pressure zone valves, etc.) at the interface between a facility and the domestic water main. Cross-connection control devices are required at all facilities where hazardous materials are used in a manner that could result in their accidental introduction

into the domestic water system, especially under low-pressure conditions. In addition, secondary cross-connection controls at the point of use are recommended to protect users within a specific facility from hazards that may be posed by intra-facility operations.

During 2018, the Laboratory inspected 288 cross-connection control devices, including primary devices installed at interfaces to the potable water main, and secondary control devices at the point of use. If a problem with a cross-connection device is encountered during testing, the device is repaired and re-tested to ensure proper function. Copies of the cross-connection device test reports are filed with SCDHS throughout the year.

### 3.7.3 Underground Injection Control

Underground Injection Control (UIC) wells are regulated under the SDWA. At the Laboratory, UICs include drywells, cesspools, septic tanks, and leaching pools, all of which are classified by EPA as Class V injection wells. Proper management of UIC devices is vital for protecting underground sources of drinking water. In New York State, the UIC program is implemented through EPA because NYSDEC has not adopted UIC regulatory requirements. (Note: New York State regulates the discharges of pollutants to cesspools under the SPDES program.) Under EPA's UIC program, all Class V injection wells must be included in an inventory maintained with the agency.

In addition to the UICs maintained for routine Laboratory discharges of sanitary waste and stormwater, UICs also are maintained at several on- and off-site treatment facilities used for groundwater remediation. Contaminated groundwater is treated and then returned to the aquifer via drywells, injection wells, or recharge



## CHAPTER 3: COMPLIANCE STATUS

**Table 3-8. Summary of Chemical and Oil Spill Reports.**

Spill No. and Date	Material/ Quantity	ORPS Report	Source/Cause and Corrective Actions
18-01 01/19/18	Hydraulic Fluid/ 1 gallon	No	While moving garbage in the pit area of BNL's Transfer Station, the payload operator noticed a trail of hydraulic fluid behind the vehicle. Production Division personnel placed rags beneath the leaking hose to capture any dripping fluid. Since the ground was frozen, the payload operator was used to recover approximately one inch of contaminated soil. Recovered soil was transferred to a 55-gallon drum in Bldg. 452 and sent offsite for disposal as industrial waste.
18-04 04/27/18	Antifreeze/ 4.2 quarts	No	While driving south on Upton Road, a Police Officer observed a warning light on the dashboard indicating that the oil pressure was low. After he pulled the vehicle to the side of the road and turned off the engine, he noticed oil dripping from the undercarriage. Speedy dry absorbent was placed beneath the vehicle to capture oil as it dripped and absorbent was spread onto the path of oil along the pavement. Oil contaminated soil from the edge of the road and oil contaminated absorbent were placed into a five-gallon pail. The pail was transferred to the Building 452 90-day storage area to be consolidated with similar waste for off-site disposal.
18-06 07/02/18	Hydraulic Fluid/ 4 gallons	No	The hydraulic line on a Volvo front end loader failed as the vehicle moved soil during a water main break repair on Cornell Ave. adjacent to Bldg. 901W. After the HEMO Shop operator returned the vehicle to Bldg. 326 for repairs, he notified Fire Rescue of the location where hydraulic fluid had leaked onto the pavement beneath vehicle. Pooled oil on the pavement was removed with absorbent pads. Further investigation of the work site the following morning revealed spots of contaminated soil along the path the front end loader travelled before the operator stopped. Grounds personnel shoveled the contaminated soil into a 55-gallon drum for offsite disposal as industrial waste.
18-07 09/10/18	50% Sodium Hydroxide Solution/ 260 gallons	Yes	After discovering the contents of a sodium hydroxide tank in Well House #11 in Building 635 had spilled into the secondary containment area surrounding the tank, the building's facility project manager contacted the Fire Rescue Group. In preparation for cleanup efforts, tents were set up outside the building entrance and a tarp was used to cover the concrete pad. To provide adequate building ventilation, Fire Rescue set up a centrifugal fan by the rear door of the building. Utilizing a peristaltic pump operated by Waste Management (WM) personnel, Fire Rescue crews of two donned in Level B HAZMAT personal protective gear pumped the spilled solution from the secondary containment area into seven 55-gallon drums. The drums were transferred to a HAZSTOR shed at the Sewage Treatment Plant to be reused. A single 55-gallon drum of waste consisting of used personal protective equipment (PPE) wipes, chemical flakes, and debris generated after the response was over was transferred to WM for proper off-site disposal.
18-11 11/15/18	Hydraulic Fluid/ 18 gallons	Yes	During an inspection the week of November 5, HEMO Shop personnel took the Building 555 freight elevator out of service after discovering that hydraulic fluid had overflowed the weep line of a five-gallon catch pail and covered the entire pit floor. A combination of oil absorbent pads and pigs were used to clean hydraulic fluid from the pit floor and the surface of the pit mounting bracket. After learning that the elevator had been shut down and hydraulic fluid had leaked into the pit, Environmental Protection Division (EPD) personnel made arrangements to investigate whether any of the hydraulic fluid had penetrated the fabricated metal flange covers installed in December 2017 around the base of the elevator jack assembly to seal gaps that had enabled oil from the May 2017 spill to drain into the annular space between the piston outer steel casing and the piston's PVC secondary containment liner. On November 15, HEMO Shop and EPD personnel removed the metal flanges to lower an audible oil-water detector to the groundwater interface. An audible response from the detector plus a sheen in water recovered with a submersible air-operated bladder pump suggested that hydraulic fluid had leaked into the annular space. Upon returning the following day, there was no observable sheen in the water collected using the submersible pump. After HEMO personnel inspected the piston, jack, and casing and found no evidence of oil inside the PVC secondary liner, the elevator was put back in service. Disposable PPE used by HEMO and EPD personnel, and all oil absorbent pads and pigs recovered during the cleanup were transferred to three large bags and transferred to a 55-gallon drum at the Bldg. 452 90-day waste storage area for offsite disposal.
18-12 12/01/18	Transformer Oil/ 1 pint	No	Safeguards & Security personnel notified Fire Rescue of a possible spill, after observing oil stains on the outer cabinet of transformer # 652-trmf-687 located north of Bldg. 817. Finding that transformer oil had dripped down the side of the cabinet and onto unpaved ground adjacent to the transformer pad, Fire Rescue used absorbent pads to wipe up oil from the cabinet and concrete pad. Contaminated soil was added to a bag with the contaminated absorbent pads and subsequently transferred to Waste Management for disposal as industrial waste.

basins. Discharges to these UICs are authorized by rule rather than by permit. Under the authorized by rule requirements, a separate inventory is maintained for these treatment facilities, and is periodically updated whenever a new device is added or closed. There were no changes to BNL's total UIC inventory (125) in 2018.

### 3.8 PREVENTING AND REPORTING SPILLS

Federal, state, and local regulations are in place to address the management of storage facilities containing chemicals, petroleum, and other hazardous materials. The regulations include specifications for the design of storage facilities, requirements for written plans relating to unplanned releases, and requirements for reporting releases that do occur. BNL's compliance with these regulations is further described in the following sections.

#### 3.8.1 Preventing Oil Pollution and Spills

As required by the Oil Pollution Act, BNL maintains a Spill Prevention Control and Countermeasures (SPCC) Plan as a condition of its license to store petroleum fuel (Bruno, 2016). The purpose of this plan is to provide information regarding release prevention measures, the design of storage facilities, and maps detailing storage facility locations. The plan also outlines mitigating and remedial actions that would be taken in the event of a major spill. BNL's SPCC plan is filed with NYSDEC, EPA, and DOE, and must be updated every five years. BNL remained in full compliance with SPCC requirements in 2018.

#### 3.8.2 Emergency Reporting Requirements

The Emergency Planning and Community Right-to-Know Act (EPCRA) and Title III of the Superfund Amendments and Reauthorization Act require that facilities report inventories and releases of certain chemicals that exceed specific release thresholds. Community Right-to-Know requirements are codified under 40 CFR Parts 355, 370, and 372. Table 3-7 summarizes the applicability of the regulations to BNL.

The Laboratory complied with these requirements through the submittal of Tier II and Tier III Reports required under EPCRA Sections

302, 303, 311, 312, and 313. In fulfillment of the Tier II requirements, BNL submitted an inventory of 41 on-site chemicals (with thresholds greater than 10,000 pounds or 500 pounds for acutely toxic materials) via E-Plan, the New York State-approved computer-based submittal program. The chemicals ranged from road salt (~1,220 tons) to Portland cement (10,656 pounds). To satisfy the requirements of the Tier III submittal, the Laboratory submitted its data via the EPA-approved TRI-ME computer-based submittal program. During 2018, BNL reported releases of lead (~60,000 pounds), mercury (~10 pounds), polychlorinated biphenyls (PCBs) (~1 pound), benzo(g,h,i)perylene (<1 pound), polycyclic aromatic compounds (<1 pound), and friable asbestos (~90,600 pounds). Releases of lead, PCBs, mercury, and asbestos were predominantly in the form of shipments of waste for off-site recycling or disposal. Releases of benzo(g,h,i)perylene and polycyclic aromatic compounds were as byproducts of the combustion of fuel oils. In 2018, there were no releases of extremely hazardous substances reportable under Part 304.

#### 3.8.3 Spills and Releases

When a spill of hazardous material occurs, Laboratory and contractor personnel are required to immediately notify the BNL Fire Rescue Group, whose members are trained to respond to such releases. Fire Rescue's initial response is to contain and control any release and to notify additional response personnel (e.g., BNL environmental professionals, industrial hygienists, etc.). Environmental professionals reporting to the scene assess the spill for environmental impact and determine if it is reportable to regulatory agencies. Any release of petroleum products to soil must be reported to both NYSDEC and SCDHS, and any release affecting surface water is also reported to the EPA National Response Center. In addition, a release of more than five gallons of petroleum product to impermeable surfaces or containment areas must be reported to NYSDEC and SCDHS. Spills of chemicals in quantities greater than the CERCLA-reportable limits must be reported to the EPA National Response Center, NYSDEC,

and SCDHS. Remediation of spills is conducted, as necessary, to prevent impacts to the environment, minimize human health exposures, and restore the site.

There were 12 spills in 2018 and six of those spills met regulatory agency reporting criteria. The remaining spills were small-volume releases either to containment areas or to other impermeable surfaces that did not exceed a reportable quantity. Table 3-8 summarizes each of the six reportable events, including a description of the cause and corrective actions taken. There were no long-term effects from these releases and no significant impact on the environment. In all instances, any recoverable material was removed, spill absorbents were used to remove the residual product, and all materials were collected and containerized for off-site disposal. For releases to soil, contaminated soil was removed to the satisfaction of the State inspector and containerized for off-site disposal.

#### **3.8.4 Major Petroleum Facility (MPF) License**

The storage and transfer of 2.3 million gallons of fuel oil (principally No. 6 oil) subjects the Laboratory to MPF licensing by NYSDEC. The fuel oil used at the CSF to produce high-pressure steam to heat and cool BNL facilities is stored in six tanks with capacities ranging from 300,000 to 600,000 gallons. The remaining storage facilities at BNL have capacities that range from 100 to 10,000 gallons and are located throughout the site where there is a need for building heat, emergency power, fuel, or other miscellaneous petroleum needs (e.g., motor oil, waste oil, lube oil).

There are currently 61 petroleum storage facilities listed on the License. During 2018, BNL remained in full compliance with MPF license requirements, which include monitoring groundwater near six above-ground storage tanks at the MPF. The license also requires the Laboratory to inspect the storage facilities monthly, test the tank leak detection systems, and ensure high-level monitoring and secondary containment. Tank integrity is also checked periodically. Groundwater monitoring consists of monthly checks for the presence of floating products and twice-yearly analyses for VOCs

and semi-volatile organic compounds (SVOCs). In 2018, no VOCs, SVOCs, or floating products attributable to MPF activities were detected. See SER Volume II, Groundwater Status Report, for additional information on groundwater monitoring results.

In September 2018, four Underground Storage Tanks regulated by the U.S. EPA and the NYSDEC that were associated with the onsite private gas station (Building 630) were cleaned of all product, thoroughly purged, excavated, and removed from the site. These tanks were transported to a local scrap metal yard for recycling. Resulting hazardous and non-hazardous wastes generated were disposed of at an off-site Treatment, Storage, and Disposal Facility (TSDF). Post-excavation analytical sampling was performed in the presence of NYSDEC officials. These samples were sent off-site for analysis at a NYS Department of Health-certified laboratory and the results were well below NYSDEC Part 375 Soil Cleanup Objective levels for Unrestricted usage.

Also in 2018, a major upgrade was completed at the MPF on the secondary containment berm for Tank No. 611-04 and permeability testing of the basin liner system satisfied NYSDEC requirements. Tank No. 611-04 still requires some minor steel floor repairs to be placed back into service and will remain empty of any product until the repairs are made and approval to fill tank is received from NYSDEC.

Due to favorable performances on petroleum bulk storage compliance audits and strong overall program, the NYSDEC exempted the Laboratory from its annual inspection in 2018.

#### **3.8.5 Chemical Bulk Storage**

Title 6 of the Official Compilation of the Codes, Rules, and Regulations of the State of New York (NYCRR) Part 597 requires that all aboveground tanks larger than 185 gallons and all underground tanks that store specific chemicals be registered with NYSDEC. The Laboratory holds a Hazardous Substance Bulk Storage Registration Certificate for six tanks that store treatment chemicals for potable water (sodium hydroxide and sodium hypochlorite). The tanks range in capacity from 200 to 1,000 gallons. In

2017, BNL renewed its Chemical Bulk Storage (CBS) Registration in accordance with NYSDEC directives and received a Hazardous Substance Bulk Storage Registration Certificate.

Due to favorable past performances on past chemical bulk storage compliance audits and strong overall program, the NYSDEC exempted the Laboratory from its annual inspection in 2018.

In September 2018, a registered chemical bulk storage tank (Tank No. 635-04) was the source of a reportable spill (260 gallons) of sodium hydroxide (50 percent solution) to secondary containment. The cause of the spill was determined to be a discharge valve that was inadvertently left opened. To prevent recurrence, a new system was installed for chemical conveyance using a foot pedal-operated nozzle and the spill detection equipment was upgraded to include annunciation of the spill alarm at the 24-hour staffed Site Supervisor's office. Additionally, the procedures on concerning chemical usage and safety were updated.

### 3.8.6 County Storage Requirements

Article 12 of the SCSC regulates the storage and handling of toxic and hazardous materials in aboveground or underground storage tanks, drum storage facilities, piping systems, and transfer areas. Article 12 specifies design criteria to prevent environmental impacts resulting from spills or leaks, and specifies administrative requirements such as identification, registration, and spill reporting procedures. In 1987, the Laboratory entered into a voluntary Memorandum of Agreement with SCDHS, in which DOE and BNL agreed to conform to the environmental requirements of Article 12. In April 2010, due to a directive from NYSDEC asserting their sole jurisdiction over petroleum storage at Major Oil Storage Facilities, SCDHS notified BNL that they will cease permitting activities (e.g., review/approval for new construction and modifications, issuance of operating permits, and registration requirement) for all petroleum bulk storage facilities. In 2011, the Laboratory received further information that indicated SCDHS had ceased applying Article 12 requirements to both petroleum and chemical storage at BNL regardless of whether the storage is regulated by NYSDEC. Currently, there

are approximately 125 active storage facilities that are not regulated by NYSDEC that would normally fall under SCSC Article 12 jurisdiction. This includes storage of wastewater and chemicals, as well as storage facilities used to support BNL research.

To ensure that storage of chemicals and petroleum continues to meet Article 12 requirements, BNL will continue to abide by the original 1987 agreement with Suffolk County and will maintain conformance with applicable requirements of Article 12. These requirements include design, operational, and closure requirements for current and future storage facilities. Although the Laboratory will no longer submit new design plans for SCDHS review/approval or continue to perform other administrative activities such as registration of exempt facilities and updates of shared databases, it will continue to inspect all storage facilities to ensure operational requirements of SCSC Article 12 are maintained.

### 3.9 RCRA REQUIREMENTS

The Resource Conservation and Recovery Act (RCRA) regulates hazardous wastes that, if mismanaged, could present risks to human health or the environment. The regulations are designed to ensure that hazardous wastes are managed from the point of generation to final disposal. In New York State, EPA delegates the RCRA program to NYSDEC, with EPA retaining an oversight role. Because the Laboratory may generate greater than 1,000 Kg (2,200 pounds) of hazardous waste in a month, it is considered a large-quantity generator, and has a RCRA permit to store hazardous wastes for up to one year before shipping the wastes offsite to licensed treatment and disposal facilities. As noted in Chapter 2, BNL also has several satellite accumulation and 90-Day Hazardous Waste Accumulation Areas. Included with the hazardous wastes regulated under RCRA are mixed wastes which are generated in small quantities at BNL. Mixed wastes are materials that are both hazardous (under RCRA guidelines) and radioactive.

In February 2018, BNL received a letter from the NYSDEC approving the final report for closure of two 90-Day Hazardous Waste Storage Areas located at Buildings 725 and 901. In



April 2018, the EPA performed an unannounced inspection of hazardous waste activities at BNL. The EPA inspector was satisfied with hazardous waste operations observed and identified no violations or concerns.

### 3.10 POLYCHLORINATED BIPHENYLS

The storage, handling, and use of Polychlorinated Biphenyls (PCBs) are regulated under the Toxic Substance and Control Act. Capacitors manufactured before 1979 that are believed to be oil filled are handled as if they contain PCBs, even when that cannot be verified from the manufacturer's records. All equipment containing PCBs must be inventoried, except for capacitors containing less than three pounds of dielectric fluid and items with a concentration of PCB source material of less than 50 parts per million. Certain PCB-containing articles or PCB containers must be labeled. The inventory is updated by July 1 of each year. The Laboratory responds to any PCB spill in accordance with standard emergency response procedures. BNL was in compliance with all applicable PCB regulatory requirements during 2018 and disposed of 437.3 pounds of PCB-contaminated equipment comprised predominantly of lighting ballasts and small capacitors. The Laboratory has aggressively approached reductions in its PCB inventory, reducing it by more than 99 percent since 1993. The only known regulated PCB-contaminated piece of electrical equipment remaining on site is a one-of-a-kind klystron located in BNL's Chemistry Department.

### 3.11 PESTICIDES

The storage and application of pesticides (e.g., insecticides, rodenticides, herbicides, and algicides) are regulated under the Federal Insecticide, Fungicide and Rodenticide Act. BNL uses an Integrated Pest Management plan that was developed over a decade ago and has subsequently been audited by a third-party. Pesticides are used at the Laboratory to control undesirable insects, mice, and rats; microbial growth in cooling towers; and to maintain certain areas free of vegetation (e.g., around fire hydrants and inside secondary containment berms). Insecticides are also applied in research greenhouses

on site and the Biology Field. Herbicide use is minimized wherever possible (e.g., through spot treatment of weeds). All pesticides are applied by BNL-employed, New York State-certified applicators. By February 1, each applicator files an annual report with NYSDEC detailing insecticide, rodenticide, algicide, and herbicide use for the previous year.

### 3.12 WETLANDS AND RIVER PERMITS

As noted in Chapter 1, portions of the site are situated in the Peconic River floodplain. Portions of the Peconic River are listed by NYSDEC as "scenic" under the New York Wild, Scenic, and Recreational River Systems Act. The Laboratory also has six areas regulated as wetlands and several vernal (seasonal) pools. Construction or modification activities performed within these areas require permits from NYSDEC.

Activities that could require review under the BNL Natural and Cultural Resource Management Programs (BNL 2016 and BNL 2013a) are identified during the NEPA process (see Section 3.3). In the preliminary design stages of a construction project, design details required for the permit application process are specified. These design details ensure that the construction activity will not negatively affect the area, or if it does, that the area will be restored to its original condition. When design is near completion, permit applications are filed. During and after construction, the Laboratory must comply with the permit conditions.

### 3.13 PROTECTION OF WILDLIFE

#### 3.13.1 Endangered Species Act

BNL updates its list of species that are endangered, threatened, and/or of special concern (see Table 6-1 in Chapter 6) as data from state and federal sources are provided. The northern long-eared bat (*Myotis septentrionalis*) was determined to be a federally threatened species on April 2, 2015 and is the first federally listed species known to be present at the Laboratory. This species is known to utilize the site at least during the summer months, and management options have been established for the protection of this species on site. The rusty-patched bumble bee (*Bombus affinis*) was determined to be federally



endangered on January 11, 2017. This bee was historically found on Long Island. There is a remote chance the bee may still exist on Long Island; therefore, care is taken during pollinator surveys to limit impacts to bumble bees.

State-recognized endangered (E) or threatened (T) species at BNL include: eastern tiger salamander (E), persius duskywing (E), bracken fern (E), crested fringed orchid (E), engelman spikerush (E), dwarf huckleberry (E), whorled loosestrife (E), fireweed (E), prostrate knotweed (E), possum haw (E), Ipecac spurge (E), swamp darter (T), banded sunfish (T), frosted elfin (T), little bluet (T), scarlet bluet (T), pine barrens bluet (T), northern harrier (T), stargrass (T), eastern showy aster (T), and stiff-leaved goldenrod (T).

Tiger salamanders are listed as endangered in New York State because populations have declined due to habitat loss through development, road mortality during breeding migration, introduction of predatory fish into breeding sites, historical collection for the bait and pet trade, water level fluctuations, pollution, and general disturbance of breeding sites. The BNL Natural Resource Management Plan (NRMP) (BNL 2016) formalizes the strategy and actions needed to protect 26 confirmed tiger salamander breeding locations on site. The strategy includes identifying and mapping habitats, monitoring breeding conditions, improving breeding sites, and controlling activities that could negatively affect breeding.

Banded sunfish and swamp darter have historically been found in the Peconic River drainage areas on site. Both species are listed as threatened within New York State, with eastern Long Island having the only known remaining populations of these fish in New York. Measures taken, or being taken, by the Laboratory to protect the banded sunfish and swamp darter and their habitats include: eliminating, reducing, or controlling pollutant discharges to the Peconic River; monitoring populations and water quality to ensure that habitat remains viable; and minimizing disturbances to the river and adjacent banks.

Long Island experienced an extended drought from 2015 through early 2017 which resulted in virtually all water-bodies on the BNL site drying, including the one remaining coastal plain

pond supporting banded sunfish and swamp darter. In 2018, groundwater levels began to rise, and coastal plain ponds began to hold water towards the end of 2018. The NYSDEC reported that all but a few banded sunfish habitats experienced the same drying, and that plans must be developed for the restoration of these two species once drought conditions lift.

Three butterfly species that are endangered, threatened, or of special concern have been historically documented at the Laboratory. These include the frosted elfin, persius duskywing, and the mottled duskywing. None have been documented in recent surveys. Limited habitat for the frosted elfin and persius duskywing exists on Laboratory property and the mottled duskywing is likely to exist on site; therefore, the need to manage habitat and surveys for the three butterflies has been added to the NRMP.

Surveys for damselflies and dragonflies conducted periodically during the summer months confirmed the presence of one of the three threatened species of damselflies expected to be found on site. The pine-barrens bluet, a threatened species, has been documented at one of the many coastal plain ponds at BNL.

The Laboratory is also home to 14 species that are listed as species of special concern. Such species have no protection under the state endangered species laws but may be protected under other state and federal laws (e.g., Migratory Bird Treaty Act). New York State monitors species of special concern and manages their populations and habitats, where practical, to ensure that they do not become threatened or endangered. Species of special concern found at BNL include the mottled duskywing butterfly, marbled salamander, eastern spadefoot toad, spotted turtle, eastern box turtle, eastern hognose snake, worm snake, horned lark, whip-poor-will, vesper sparrow, grasshopper sparrow, red-headed woodpecker, osprey, sharp-shinned hawk, and Cooper's hawk.

The management efforts for the tiger salamander also benefits the marbled salamander. At present, no protective measures are planned for the eastern box turtle or spotted turtle, as little activity occurs within their known habitat at the Laboratory. However, BNL is working with

Hofstra University to study reproductive strategies and habitat use of the eastern box turtle and it is a focal species for study within the Long Island Solar Farm. Results of these studies may show the need for conservation and management needs. The Laboratory continues to evaluate bird populations as part of the management strategy outlined in the NRMP.

The Laboratory has 33 plant species that are protected under state law: eight are endangered; three are threatened (as listed above); and four are rare plants: the small-flowered false fox-glove, narrow-leafed bush clover, wild lupine, and long-beaked bald-rush. The other 18 species are “exploitably vulnerable,” meaning that they may become threatened or endangered if factors that result in population declines continue. These plants are currently sheltered due to the large areas of undeveloped pine barren habitat on site. Five species on the BNL list are likely present or possible due to presence of correct habitat. As outlined in the NRMP, locations of these rare plants must be determined, populations estimated, and management requirements established. See Chapter 6 for further details.

### 3.13.2 Migratory Bird Treaty Act

As mentioned in Chapter 1, the Laboratory has identified more than 185 species of migratory birds since 1948; of those, approximately 84 species nest on site. Under the Migratory Bird Treaty Act, migratory birds are protected from capture, harassment, and destruction or disturbance of nests without permits issued by the U.S. Fish and Wildlife Service. In the past, migratory birds have caused health and safety issues, especially through the deposition of fecal matter and the birds’ assertive protection of nesting sites. When this occurs, proper procedures are followed to allow the birds to nest and preventive measures are taken to ensure that they do not cause problems in the future (e.g., access to nesting is closed or repaired, and/or deterrents to nesting are installed). Canada geese (*Branta canadensis*) are managed under an annual permit from the U.S. Fish and Wildlife Services goose nest management program. Occasionally, nesting migratory birds come in conflict with ongoing or planned construction

activities. When this occurs, the USDA-APHIS-Wildlife Services Division is called for consultation and resolution, if possible. Each incident is handled on a case-by-case basis to ensure the protection of migratory birds, while maintaining fiscal responsibility. See Chapter 6 for more information on migratory birds.

### 3.13.3 Bald and Golden Eagle Protection Act

While BNL does not have bald or golden eagles nesting on site, these birds are occasionally observed visiting the area during migration. At times, immature golden eagles have spent several weeks in the area. Bald eagles are known to spend long periods of time on the north and south shores of Long Island, and the first documentation of nesting on the island occurred in 2013. Since that time, seven additional nesting pairs have been documented on Long Island. Bald eagles have been documented on the BNL site and were routinely seen in the vicinity of the STP through much of 2018. Further information on bald eagles is presented in Chapter 6.

### 3.14 PUBLIC NOTIFICATION OF CLEARANCE OF PROPERTY

In accordance with DOE Order 458.1, authorized releases of property suspected of containing residual radioactive material must meet DOE and other federal, state, and local radiation protection policies and requirements. Released property must be appropriately surveyed, and the Laboratory must adequately demonstrate that authorized limits are met. In addition, documentation supporting the release of property should be publicly available. The release of property off the BNL site from radiological areas is controlled. No vehicles, equipment, structures, or other materials from these areas can be released from the Laboratory unless the amount of residual radioactivity on such items is less than the authorized limits. The default authorized limits are specified in the BNL Site Radiological Control Manual (BNL 2019 Rev 9) and are consistent with the pre-approved authorized release limits set by DOE Order 458.1.

In 2018, excess materials not identified as radioactive, such as scrap metal and electronics equipment resulting from normal operations, were released to interested parties or to an

off-site location. All materials were surveyed, as required, using appropriate calibrated instruments and released based on the DOE pre-approved authorized release limits. There were no releases of real property in 2018.

### 3.15 EXTERNAL AUDITS AND OVERSIGHT

#### 3.15.1 Regulatory Agency Oversight

A number of federal, state, and local agencies oversee BNL activities. In addition to external audits and oversight, the Laboratory has a comprehensive self-assessment program, as described in Chapter 2. In 2018, BNL was inspected by federal, state, or local regulators on ten occasions. These inspections included:

- *Air Compliance.* In July, a NYSDEC inspector was provided a facility tour of regulated emission sources at BNL. There were no findings.
- *Potable Water.* In July, SCDHS collected samples and conducted its annual inspection of the BNL potable water system. Corrective actions for all identified deficiencies were established and communicated with SCDHS and are being addressed by the Laboratory's Energy & Utilities Division.
- *Sewage Treatment Plant.* SCDHS conducts quarterly inspections of the Laboratory's STP to evaluate operations and sample the effluent for SPDES compliance. No performance or operational issues were identified. SCDHS also visited the site in February and June 2018 to perform a SPDES inspection and collected samples from some permitted outfalls. No issues were identified. NYSDEC did not perform a surveillance inspection at the STP in 2018.
- *RCRA.* In April, two inspectors from EPA performed an unannounced RCRA Compliance inspection and did not identify any concerns or findings.
- *Clean Water Act.* In August, two inspectors from EPA visited the site unannounced to discuss multiple TTA excursions at the SPDES Permitted Outfall 001 (STP). EPD staff provided a detailed summary of the issue, possible causes, corrective actions taken, and provided a tour of the STP. The inspectors were satisfied with the informa-

tion provided and actions taken to date to address the issue. No findings were issued.

#### 3.15.2 DOE Assessments/Inspections

The DOE Brookhaven Site Office (BHSO) performs routine inspections, assessments, and surveillances of BNL operations to ensure continual improvement and success in meeting the Laboratory's mission. In 2018, BHSO performed multiple inspections of Waste Management Operations that drove improvements in programs such as Conduct of Operations, Safety Basis for operations, work planning, and radiological control. Two surveillances were formally documented and results are summarized below.

In April, BHSO performed a radiological posting surveillance at Building 865 (Radiological Waste Storage Facility). The scope of the surveillance was to review radiological postings in and around Building 865 and evaluate compliance with Radiological Control Procedures and 10 CFR 835 regulations. No findings were identified.

In July, a surveillance of BLIP waste transfer operations at the Waste Management (WM) Facility was performed. The scope of this surveillance included a review of multiple work planning documents associated with this operation and observation of personnel performing the BLIP waste transfer operation. The review identified that the procedures were well-written and provided an adequate level of detail to ensure that the work is performed in accordance with expectations. Work controls established for the job were also effectively implemented and the work was performed in a safe and efficient manner. One minor finding was identified in reference to editorial and formatting procedural issues and immediately addressed.

#### 3.15.3 Environmental Multi-Topic Assessment

The BNL EPD conducts routine programmatic assessments. The determination of topics for these assessments is based upon past regulatory findings, results of Tier I inspections and/or other routine self-assessments, and frequency of past assessments. In 2018, EPD planned for a programmatic self-assessment of three programs

## CHAPTER 3: COMPLIANCE STATUS

**Table 3-9. Existing Agreements and Enforcement Actions Issued to BNL, with Status.**

Number	Title	Parties	Effective Date	Status
<b>Agreements</b>				
No Number	Suffolk County Agreement	BNL, DOE, SCDHS	Originally signed on 09/23/87	This agreement was developed to ensure that the storage and handling of toxic and hazardous materials at BNL conform to the environmental and technical requirements of Suffolk County codes.
II-CERCLA-FFA-00201	Federal Facility Agreement under the CERCLA Section 120 (also known as the Interagency Agreement or "IAG" of the Environmental Restoration Program)	DOE, EPA, NYSDEC	05/26/92	This agreement provides the framework, including schedules, for assessing the extent of contamination and conducting cleanup at BNL. Work is performed either as an Operable Unit or a Removal Action. The IAG integrates the requirements of CERCLA, RCRA, and NEPA. Cleanup is currently in long-term surveillance and maintenance mode for the groundwater treatment systems, former soil/sediment cleanup areas, and the reactors; this includes monitoring of institutional controls. The High Flux Beam Reactor (stack and reactor vessel are scheduled for decontamination and decommissioning by 2020 and 2072, respectively. All groundwater treatment systems operated as required in 2018.
<b>No Notices of Violation/Enforcement Actions for 2018.</b>				

**Notes:**

CERCLA = Comprehensive Environmental Response, Compensation and Liability Act

EPA = Environmental Protection Agency

NEPA = National Environmental Policy Act

NYSDEC = New York State Department of Environmental Conservation

RCRA = Resource Conservation and Recovery Act

SCDHS = Suffolk County Department of Health Services

**Table 3-10. Summary of Other Environmental Occurrence Reports, 2018.**

IOPS* Event #: E-00464	Date: 03/14/18
In March 2018, a small amount of acetone, less than 30 ml, was released into a laboratory sink during a glass cleaning operation. Environmental Protection Division staff were notified and performed an investigation including the collection of samples from the treated influent and effluent of the Laboratory's Sewage Treatment Plant and the laboratory sink trap. Analytical results showed that acetone was detected in both the sink trap and the sanitary influent; however, nothing was found in the effluent. While the amount of acetone released did not exceed any regulatory reportable quantities, several corrective actions were identified to prevent a similar incident including: reviewing and updating various training course material to ensure staff is sufficiently aware of sink disposal requirements; posting over sinks were improved with highly visible red stickers stating that discharges of chemicals to sinks are not allowed; and, improved notification and event training.	Status: All corrective action items were completed.
<b>Notes:</b> * Reported in accordance with BNL's Event/Issue Management Subject Area and documented in the Integrated Operational Performance System (IOPS).	



primarily implemented by the Laboratory's Groundwater Protection Group: Historical Contamination, Activated Soil Cap Inspection, and Environmental Data Quality. Due to competing priorities related to managing the Emerging Contaminants of Concern described in Chapter 7, these assessments were not completed. They will be considered for assessment in 2019 during business planning efforts.

#### 3.15.4 Nevada National Security Site

The Laboratory continues to be a certified Nevada National Security Site (NNSS) waste generator. As part of the NNSS waste certification process, the NNSS Maintenance and Operations Contractor conducts annual assessments of generator Waste Certification Programs.

The NNSS performed a surveillance on the BNL Radioactive Waste program from April 7 to April 10, 2018. The team consisted of six members of the Radiological Waste Assistance Program (RWAP), one DOE Nevada staff, and one State of Nevada regulator. The team concentrated on quality assurance, chemical and radiological waste characterization, waste traceability, and shipping and transportation. The quality assurance elements assessed pertained to training and qualifications, document and records management, procurement/supplier evaluations, and inspection and acceptance testing of materials/supplies. Chemical and radiological characterization was assessed for each waste stream's characterization process to ensure that the methods and records comply with the waste acceptance criteria (WAC). Shipping and transportation were assessed for compliance with Department of Transportation and WAC requirements.

The assessment resulted in one finding and six observations which ultimately resulted in the temporary suspension of BNL's approval to ship waste to the NNSS. The one finding, which involved the completion of parts of some waste characterization documentation prior to the actual completion of the steps, was the primary reason for the suspension. To restore BNL's shipping status, a Corrective Action Plan, identifying actions taken to resolve the finding/observations, their associated schedule for completion, along with objective evidence supporting their completion,

was requested. As a result, a Causal Analysis was performed by BNL to address the findings and observations and develop a Corrective Action Plan (CAP) to prevent their recurrence. The transmittal of objective evidence to support the actions identified in the CAP, which included revised procedures and training attendance sheets, was completed and accepted by RWAP in September 2018 with the reinstatement of BNL's shipping status also occurring that month.

#### 3.16 AGREEMENTS, ENFORCEMENT ACTIONS, AND OTHER ENVIRONMENTAL OCCURRENCE REPORTS

In addition to the rules and regulations discussed throughout this chapter, there were two existing agreements between BNL, DOE, and regulatory agencies that remained in effect in 2018 (see Table 3-9). There were no Notices of Violation accessed in 2018; however, there was one environmental event that was reported in accordance with BNL's *Event/Issues Management* Subject Area and documented in the Integrated Operational Performance System. The event is summarized in Table 3-10.

#### REFERENCES AND BIBLIOGRAPHY

- BNL 2013a. Cultural Resource Management Plan for Brookhaven National Laboratory. Brookhaven National Laboratory, Upton, NY. May 2013.
- BNL 2016. Natural Resource Management Plan for Brookhaven National Laboratory. BNL-112669-2017. Brookhaven National Laboratory, Upton, NY.
- BNL 2019. Brookhaven National Laboratory Site Radiological Control Manual, Rev. 9. Brookhaven National Laboratory, Upton, NY.
- Bruno, C. 2016. Brookhaven National Laboratory Spill Prevention Control and Countermeasure Plan. Brookhaven National Laboratory, Upton, NY.
- Bruno, C. 2018. Brookhaven National Laboratory 2016 Annual Potable Water Sampling Plan. Brookhaven National Laboratory, Upton, NY.
- DOE Order 458.1 2011. Radiation Protection of the Public and the Environment. U.S. Department of Energy, Washington, DC. February 11, 2011.
- EPA. 2000. Federal Facilities Agreement under CERCLA 120. Administrative Docket Number II-CERCLA-FFA-00201.
- SCDHS. 1993. Suffolk County Sanitary Code Article 12: Toxic and Hazardous Material Storage and Handling Controls. Suffolk County Department of Health Services, NY.

*Intentionally Left Blank*