3 Compliance Status

Brookhaven National Laboratory (BNL) is subject to more than 100 sets of federal, state, and local environmental regulations; numerous site-specific permits; 12 equivalency permits for operation of groundwater remediation systems; and several other binding agreements. In 2019, 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 2019. There were five recorded excess opacity measurements. Three were due to the start-up and shutdown of Boiler 6 in preparation for periodic emission tests conducted in January, and two Boiler 6 excess readings in December were from unknown causes. 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 2019, 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 a violation for missing the collection of an iron sample 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 2019. 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 continued throughout 2019. BNL staff continue to work closely with the Department of Energy (DOE) and NYSDEC on this issue to identify 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 implement release prevention measures and minimize impacts of spills of materials continued in 2019. There were 23 spills in 2019 and ten of those spills met regulatory agency reporting criteria.

BNL participated in 11 environmental inspections or reviews by external regulatory agencies in 2019. 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. 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).	Since 1992, BNL has been subject to a tri-party 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, and 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. The Laboratory has established sitewide procedures for implementing NEPA 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 are subject to NHPA include the HFBR, the Brookhaven Graphite Research Reactor (BGRR) complex (bldgs. 701, 703, 705, and 801), 1960's era Apartments (bldgs. 364, 365, 366, and 367), Bldg. 120, Berkner Hall (bldg.488), Chemistry (Bldg. 555), Physics (Bldg. 510), Computational Sciences (Bldg. 515), Instrumentation (Bldg. 535), and the World War I training trenches found throughout the site.	There are now multiple buildings and features at BNL that have been determined to be National Register Eligible (see list to the left). 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. BNL has a Cultural Resource Management Plan to ensure compliance with cultural resource regulations. Buildings that are 50 years old or older are reviewed under Section 106 of NHPA when proposed projects may significantly alter the structure or for building demolition. See Chapter 6 for detailed information on Cultural Resources.	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 non-radiological 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, with the exception of radiological air emissions. Sources of such emissions are registered with the EPA.	3.5
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 five excursions at BNL's sewage treatment plant, these discharges met the SPDES permit limits in 2019.	3.6

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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 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 a violation for missing the collection of an iron sample 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 2019. Corrective actions for all identified operation and maintenance deficiencies identified during the annual SCDHS sanitary survey 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 2019.	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. After evaluation of the area in 2019, a request to close the permit was sent to NYSDEC and included a request for a verification visit during the next growing season in 2020.	3.12

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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. Bald Eagles have been seen routinely at various locations on the BNL site and a pair of eagles were observed investigating the use of an osprey nest. NYSDEC was consulted for requirements should the eagles establish a nest. See Chapter 6 for more on migratory birds and bald eagles.	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

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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 Strategic Sustainability Performance Plan, BNL has developed and implemented a Site Sustainability Plan. The Goals and Strategic Objectives of the DOE SSPP are tracked and reported on annually. BNL's EMS was officially registered to the ISO 14001:2015 revised standard 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 (ERPP), 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

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[3]	None	NA	NA
EPA - NESHAPs	705	Tritium Evaporator	BNL-288-01[3]	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
EPA - NESHAPs	REF	Radiation Effects/Neutral Beam	BNL-789-01	None	NA	NA
EPA - NESHAPs	RTF	Radiation Therapy Facility	BNL-489-01[3]	None	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	Western 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 - Chemical Holes	1-52-009	25-Feb-23	NA	NA
NYSDEC - SPDES Equivalency	TR 829	Carbon Tetrachloride System	None	Closed 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 2013	NA	NA
NYSDEC - SPDES Equivalency	OS-5	North St./North St. East Treatment System	1-52-009	26-Mar-25	NA	NA
NYSDEC - SPDES Equivalency	OS-6	Ethylene Di-Bromide Treatment System	1-52-009	26-Mar-25	NA	NA
NYSDEC - SPDES Equivalency	855	Sr-90 Treatment System - BGRR/WCF	1-52-009	26-Mar-25	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	26-Mar-25	NA	NA
NYSDEC - Hazardous Substance	BNL	Bulk Storage Registration Certificate	1-000263	27-Jul-21	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 Tanks (2)	1-4722-00032/00115	30-Jan-25	U-METAL	42307-08
NYSDEC - Air Quality	423	Gasoline & E85 Storage and Fuel Pumps	1-4722-00032/00115	30-Jan-25	U-FUELS	42309-10
NYSDEC - Air Quality	423	Motor Vehicle A/C Servicing	1-4722-00032/00115	30-Jan-25	U-MVACS	MVAC2
NYSDEC - Air Quality	423	Motor Vehicle A/C Servicing	1-4722-00032/00115	30-Jan-25	U-MVACS	MVAC5
NYSDEC - Air Quality	244	Paint Spray Booth	1-4722-00032/00115	30-Jan-25	U-PAINT	24402
NYSDEC - Air Quality	244	Flammable Liquid Storage Cabinet	1-4722-00032/00115	30-Jan-25	U-PAINT	244AE
NYSDEC - Air Quality	479	Metal Parts Cleaning Tank	1-4722-00032/00115	30-Jan-25	U-METAL	47908
NYSDEC - Air Quality	510	Spin Coating Operation	1-4722-00032/00115	30-Jan-25	U-INSIG	510AK
NYSDEC - Air Quality	801	Target Processing Laboratory	1-4722-00032/00115	30-Jan-25	U-INSIG	80101
NYSDEC - Air Quality	Site	Aerosol Can Processing Units	1-4722-00032/00115	30-Jan-25	U-INSIG	AEROS
NYSDEC - Air Quality	498	Aqueous Cleaning Facility	1-4722-00032/00115	30-Jan-25	U-METAL	49801
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-61005	61005
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-61006	61006
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-61007	61007
NYSDEC - Air Quality	610	Metal Parts Cleaning Tray	1-4722-00032/00115	30-Jan-25	U-METAL	61008

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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	30-Jan-25	U-61005	6101A
NYSDEC - Air Quality	902	Epoxy Coating/Curing Exhaust	1-4722-00032/00115	30-Jan-25	U-COILS	90206
NYSDEC - Air Quality	922	Electroplating Operation	1-4722-00032/00115	30-Jan-25	U-INSIG	92204
NYSDEC - Air Quality	Site	Commercial Refrigeration Equipment	1-4722-00032/00115	30-Jan-25	U-RFRIG	COMRE
NYSDEC - Air Quality	Site	Packaged A/C Units (16)	1-4722-00032/00115	30-Jan-25	U-RFRIG	PKG01-16
NYSDEC - Air Quality	Site	Reciprocating Chillers (44)[1]	1-4722-00032/00115	30-Jan-25	U-RFRIG	REC01-651
NYSDEC - Air Quality	Site	Rotary Screw Chillers (19)	1-4722-00032/00115	30-Jan-25	U-RFRIG	ROTO1-20
NYSDEC - Air Quality	Site	Split A/C Units	1-4722-00032/00115	30-Jan-25	U-RFRIG	SPL01-02
NYSDEC - Air Quality	Site	Centrifugal Chillers (19)[2]	1-4722-00032/00115	30-Jan-25	U-RFRIG	CEN06-292
NYSDEC - Air Quality	463	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	46301
NYSDEC - Air Quality	490	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	49006
NYSDEC - Air Quality	515	Diesel Non-Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	51501
NYSDEC - Air Quality	555	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	55503
NYSDEC - Air Quality	635	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	63501
NYSDEC - Air Quality	734	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	73401
NYSDEC - Air Quality	735	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	73501
NYSDEC - Air Quality	740	Diesel Emergency Generators (2)	1-4722-00032/00115	30-Jan-25	U-GENER	74001-02
NYSDEC - Air Quality	801	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	80102
NYSDEC - Air Quality	912	Diesel Emergency Generators (3)	1-4722-00032/00115	30-Jan-25	U-GENER	912A1-A3
NYSDEC - Air Quality	30	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-SMBLR	030AB
NYSDEC - Air Quality	422	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-SMBLR	422AF
NYSDEC - Air Quality	423	Combustion Unit	1-4722-00032/00115	30-Jan-25	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:
[1] Multiple reciprocating chillers in list were removed and are no longer listed in BNL's Title V Permit.
[2] Multiple centrifugal chillers in list were removed and are no longer listed in BNL's Title V Permit.
[3] Source Facility Removed and awaiting termination of NESHAPs authorization.
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 Pollutants
NYSDEC = New York State Department of Environmental Conservation
OU = Operable Unit
RTF = Radiation Therapy Facility
RHIC = Relativistic Heavy Ion Collidar
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 12 emission units
- EPA Underground Injection Control (UIC) Area permit for the operation of 115 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
- Twelve 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 completed required vegetation monitoring in August 2019 and submitted documentation to NYSDEC to request permit closure. A site visit is required and will occur mid-2020 once vegetation is in full growth.

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 2019, environmental evaluations were completed for 168 proposed projects at BNL. Of those, 166 were considered minor actions requiring no additional documentation. Two 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 13 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, four 1960s-era efficiency apartments, Berkner Hall (Building 488), Chemistry (Building 555), Physics (Building 510), Computational Sciences (Building 515), Instrumentation (Building 535), the World War-II (WWII) barracks portion of Building 120, and the WWI Army training trenches associated with Camp Upton. 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 2019, 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 2019, there were no recorded exceedances of the NOx RACT limit by the Boiler 6 or Boiler 7 CEMS. Using the system averaging approach, actual weighted average NOx emission rates for operating boilers for the first through fourth quarters were 0.081, 0.083, 0.087, and 0.085 lbs./MMBtu, respectively, which were below the corresponding quarterly permissible weighted average emissions rate of 0.150 lbs./MMBtu each quarter.

In 2019, there were five recorded excess opacity measurements. Three were due to the start-up and shutdown of Boiler 6 in preparation for periodic emission tests conducted in January, and two Boiler 6 excess readings in December were from unknown causes. 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 are 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 2019, 182 pounds of R-22, 2,000 pounds of R-134A, and 30 pounds of R-410A were recovered and recycled from refrigeration equipment that was serviced. Meanwhile, 292 pounds of R-22, 430 pounds of R-134A, and 73 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 2019, 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.

Maximum Available Control Technology

Based on the Laboratory's periodic review of Maximum Available Control Technology (MACT) standards in 2019, 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.

3.5.2.1 Asbestos

In 2019, the Laboratory notified the EPA Region II office regarding the removal of materials containing asbestos. During the year, 17,500 pounds of non-scheduled friable asbestos from maintenance operations (e.g., pipe insulation, sheetrock, popcorn ceiling, transite board, floor tiles, water main pipes) materials were removed and disposed of according to EPA requirements.

3.5.2.2 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 2019 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 μSv) 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 2019 was 1.28 mrem (12.8 μSv).

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 blowdown, 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 meet 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 2019.

There were five excursions of SPDES permit limits at Outfall 001 in 2019, all of which involved Tolyltriazole (TTA). The effluent limit for TTA (0.05 mg/L) at Outfall 001 was exceeded in April, May, June, July, and September of 2019. TTA is a stable corrosion inhibitor that produces a protective electrochemical film on metal surfaces to slow the rate of corrosion. It can shield multiple types of metals against corrosion, though it is most commonly used for copper and copper alloy systems. TTA is the industry standard for this type of protection and BNL uses it throughout the site to protect valuable machinery and equipment from the corrosive conditions found in harsh operating environments, such as cooling towers.

This is a unique challenge for the Laboratory due to the large number of operating cooling water systems that require water treatment chemicals like TTA to prevent corrosion and the need to maintain compliance with New York State Department of Health Legionella Disease prevention regulations. Every time Legionella bacteria is detected in a cooling tower, New York State Law requires that the Laboratory follow its water safety plan which includes additional disinfections and draining of water that has residual levels of water treatment chemicals, including TTA. As a result, a large percentage of wastewater entering the STP during the cooling season (typically between June and September) is tower blowdown from cooling towers. The Lab's Environmental Protection Division and Facilities & Operations (F&O) Directorate staff

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)	6.9	8.3	Continuous Recorder	Min 5.8, Max. 8.5	0	100
Solids, Total Dissolved (mg/L)	260	620	Monthly	1000	0	100
Total nitrogen (mg/L)	1.4	9.4	Twice Monthly	10	0	100
Total phosphorus (mg/L)	0.3	1.4	Twice Monthly	NA	0	100
Cyanide (mg/L)	< 0.002	< 0.002	Twice Monthly	0.1	0	100
Copper (mg/L)	0.005	0.07	Twice Monthly	0.15	0	100
Iron (mg/L)	0.09	0.2	Twice Monthly	0.6	0	100
Lead (mg/L)	< 0.001	0.002	Twice Monthly	0.025	0	100
Mercury (ng/L)	3	11	Twice Monthly	200	0	100
Methylene chloride (ug/L)	<2	< 2	Twice Monthly	5	0	100
Nickel (mg/L)	< 0.002	0.003	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)	0.03	0.24	Twice Monthly	2	0	100
1,1,1-trichloroethane (ug/L)	< 1	< 1	Twice Monthly	5	0	100
Max. Flow (MGD)	0.35	0.50	Continuous Recorder	2.3	0	100
Avg. Flow (MGD)	0.17	0.31	Continuous Recorder	NA	0	100
HEDP (mg/L)	<0.05	0.1	Monthly	0.5	0	100
Tolytriazole (mg/L)	<0.005	0.1	Monthly	0.05	5	58

Notes: Notes:
See Figure 5-2 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

have been working closely with the DOE and NYSDEC to investigate the cause(s) of this issue and possible solutions.

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

- Decreasing the control limits for the TTA-containing 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;
- Initiating 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 efficiency gains from changes in treatment methodologies;
- Accelerating the installation of automated chemical control systems at cooling towers where treatment chemicals are manually added in order to reduce the amount of product used;
- Conducting volume studies of all cooling tower systems to ensure systems are being effectively treated and using the minimal amount of chemical product possible.

More recently, the Laboratory identified a water treatment chemical that does not contain TTA that was approved for use by NYSDEC. This new chemical has been added to the contract with the vendor that helps manage the water treatment chemical program at BNL and work planning has been initiated for a pilot study using this new chemical at the Chilled

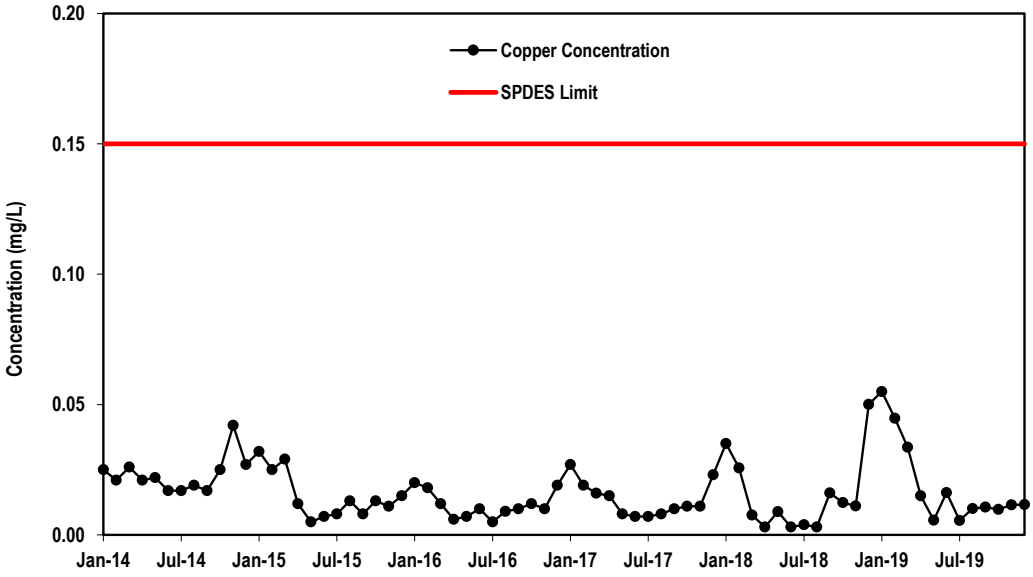

Figure 3-1. Maximum Concentrations of Copper Discharged from the BNL Sewage Treatment Plant, 2014–2019.

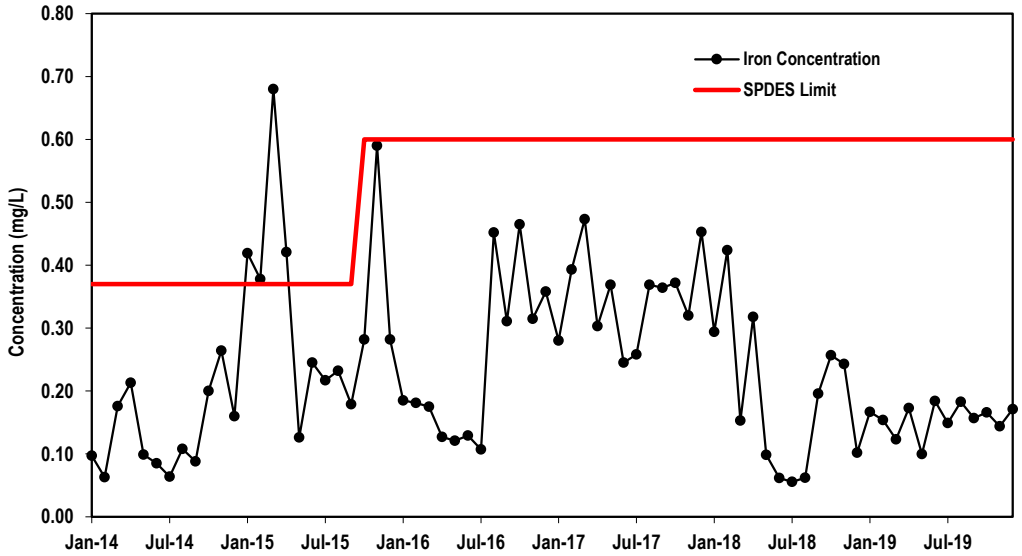

Figure 3-2. Maximum Concentrations of Iron Discharged from the BNL Sewage Treatment Plant, 2014–2019.

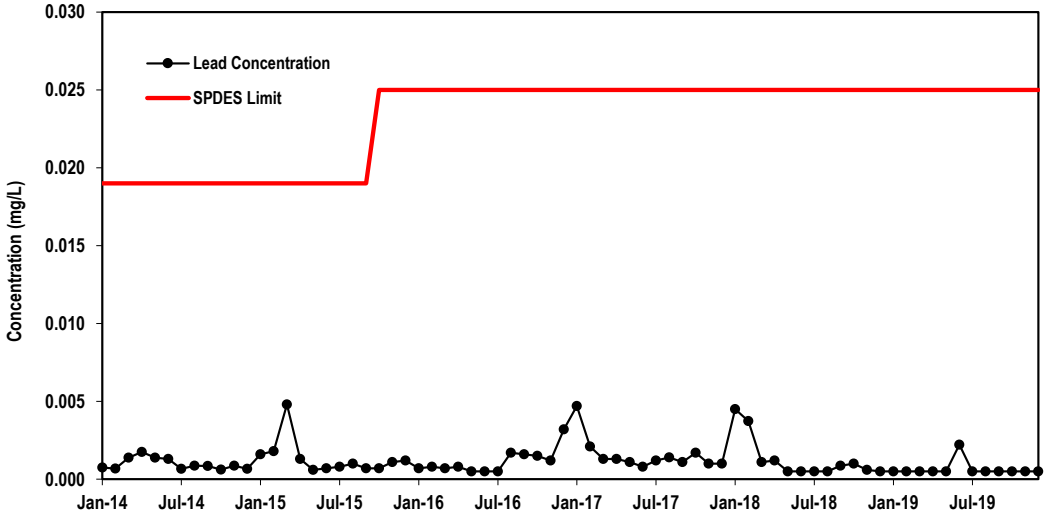

Figure 3-3. Maximum Concentrations of Lead Discharged from the BNL Sewage Treatment Plant, 2014–2019.

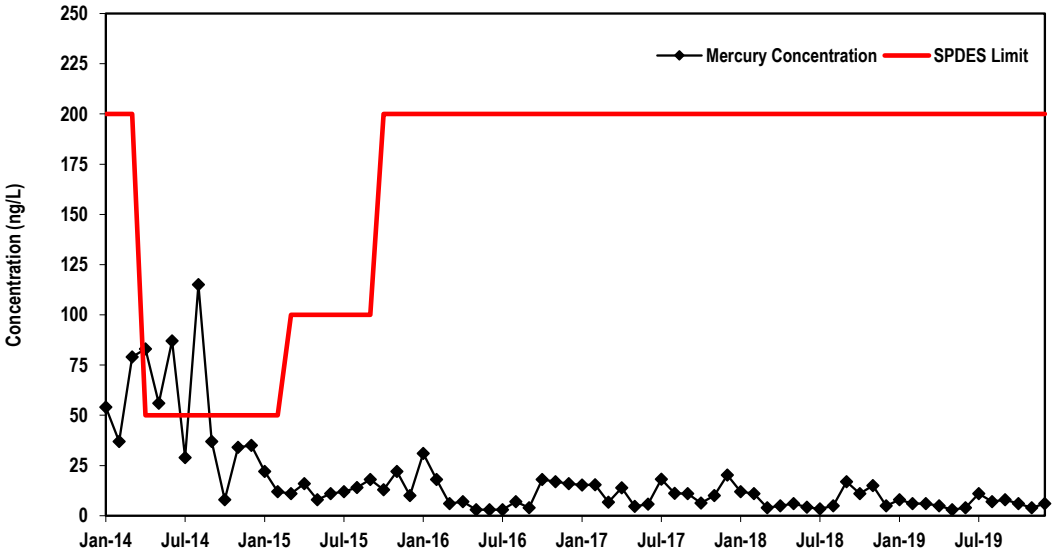

Figure 3-4. Maximum Concentrations of Mercury Discharged from the BNL Sewage Treatment Plant, 2014–2019.

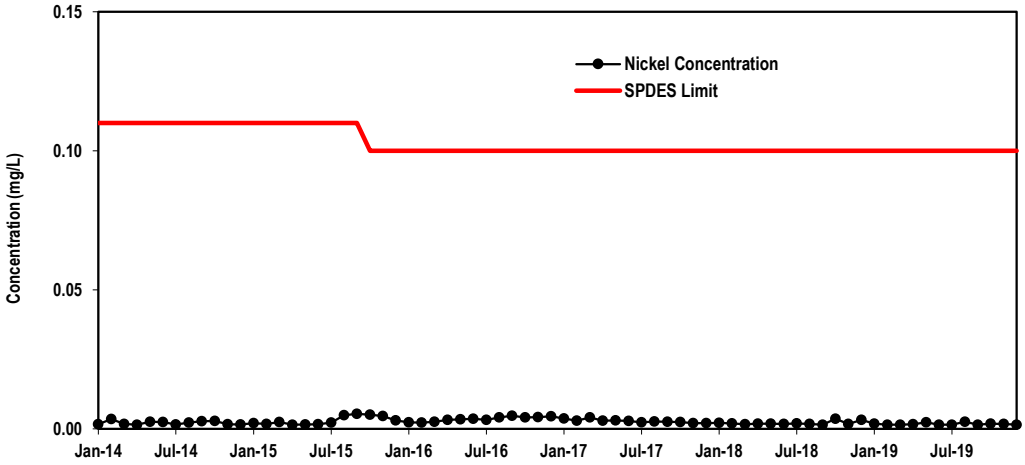

Figure 3-5. Maximum Concentrations of Nickel Discharged from the BNL Sewage Treatment Plant, 2014–2019.

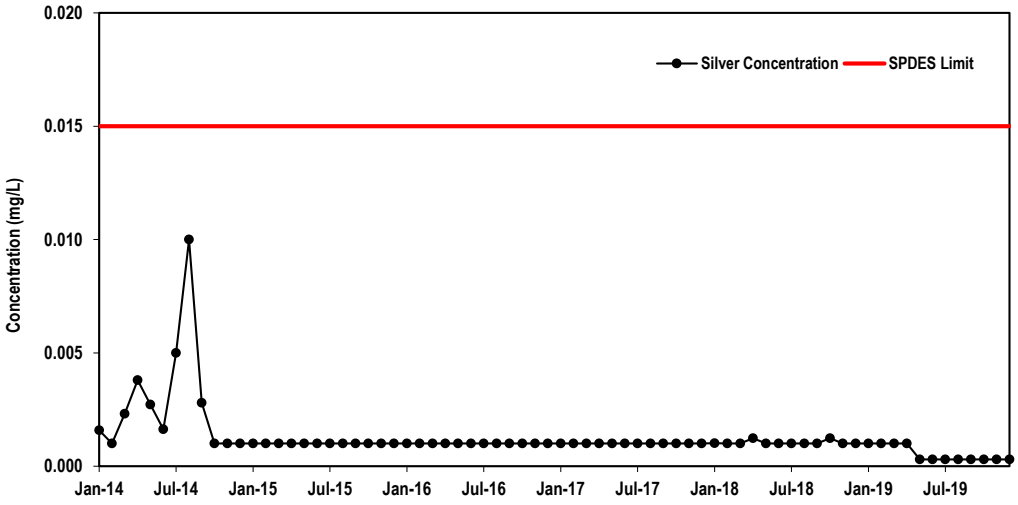

Figure 3-6. Maximum Concentrations of Silver Discharged from the BNL Sewage Treatment Plant, 2014–2019.

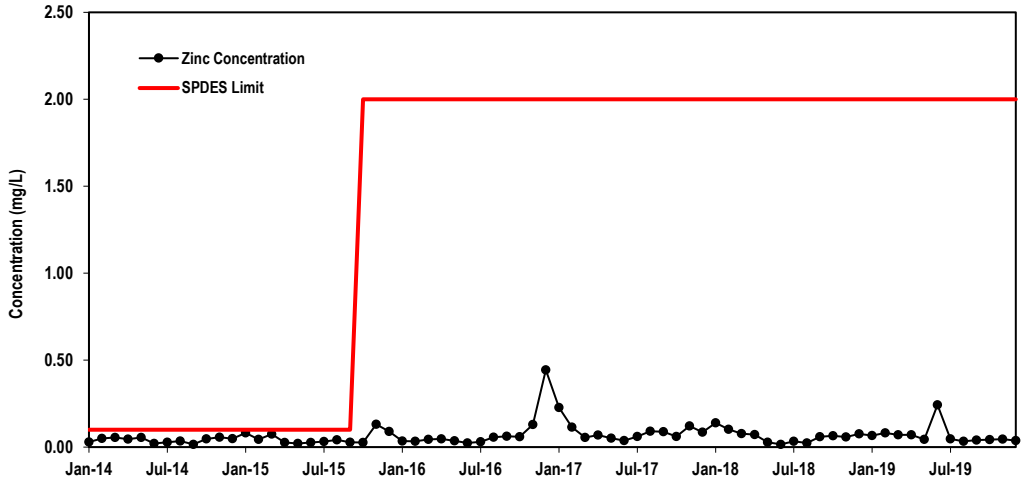

Figure 3-7. Maximum Concentrations of Zinc Discharged from the BNL Sewage Treatment Plant, 2014–2019.

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	CR	CR	CR	CR	CR	CR	10	10			
	Min.	0.14	0.002	0.1	0.07	0.02	0.08	0.04	0.002	NA		
	Max.	0.63	0.13	0.61	0.18	0.07	0.16	1	0.5	NA	NA	NA
pH (SU)	Min.	6.9	6.2	6	6.9	7.1	7	7.1	7.5	NA		
	Max.	8.4	8.6	8.5	8.7	8.6	8.8	8	8.4	8.5, 9.0 (a)	0	100
Oil and Grease (mg/L)	N	12	12	12	12	12	NR	11	11			
	Min.	< 1.2	< 1.1	< 1.1	< 1.2	< 1.1	NR	< 1.1	< 1.2	NA		
	Max.	2.0	3.2	1.4	1.9	1.6	NR	2.4	1.9	15	0	100
Copper (mg/L)	N	NR	NR	4	NR	NR	NR	NR	4			
	Min.	NR	NR	0.001 (T)	NR	NR	NR	NR	0.001 (D)	NA		
	Max.	NR	NR	0.004 (T)	NR	NR	NR	NR	0.004 (D)	1.0	0	100
Aluminum (mg/L)	N	4	NR	NR	NR	NR	NR	4	4			
	Min.	< 0.07 (T)	NR	NR	NR	NR	NR	< 0.07 (D)	< 0.07 (D)	NA		
	Max.	0.07 (T)	NR	NR	NR	NR	NR	0.11 (D)	0.11 (D)	2.0	0	100
Lead, Dissolved (mg/L)	N	NR	NR	NR	NR	NR	NR	NR	4			
	Min.	NR	NR	NR	NR	NR	NR	NR	<0.0005	NA		
	Max.	NR	NR	NR	NR	NR	NR	NR	<0.0005	0.05	0	100
Vanadium, Dissolved (mg/L)	N	NR	NR	NR	NR	NR	NR	NR	4			
	Min.	NR	NR	NR	NR	NR	NR	NR	0.002	NA		
	Max.	NR	NR	NR	NR	NR	NR	NR	0.006	NPL	NA	NA
Chloroform (µg/L)	N	4	NR	NR	NR	NR	NR	NR	NR			
	Min.	0.4	NR	NR	NR	NR	NR	NR	NR	NA		
	Max.	1.4	NR	NR	NR	NR	NR	NR	NR	7	0	100
Bromodichloromethane (µg/L)	N	4	NR	NR	NR	NR	NR	NR	NR			
	Min.	<1.0	NR	NR	NR	NR	NR	NR	NR	NA		
	Max.	2.6	NR	NR	NR	NR	NR	NR	NR	50	0	100
1,1,1-trichloroethane (µg/L)	N	4	NR	NR	NR	NR	NR	10	NR			
	Min.	< 1.0	NR	NR	NR	NR	NR	< 1.0	NR	NA		
	Max.	< 1.0	NR	NR	NR	NR	NR	< 1.0	NR	5	0	100
1,1-dicloroethane (µg/L)	N	NR	NR	NR	NR	NR	NR	10	NR			
	Min.	NR	NR	NR	NR	NR	NR	< 1.0	NR	NA		
	Max.	NR	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	4	NR	4	4	4	NR	NR	NR				
	Min.	<0.05	NR	<0.05	<0.05	<0.05	NR	NR	NR	NA			
	Max.	0.06	NR	<0.05	<0.05	<0.05	NR	NR	NR	0.5	0	100	
Tolyltriazole (mg/L)	N	4	NR	4	4	4	NR	NR	NR				
	Min.	<0.005	NR	<0.005	<0.005	<0.005	NR	NR	NR	NA			
	Max.	0.06	NR	<0.005	<0.005	0.09	NR	NR	NR	0.2	0	100	

Notes:
See Figure 5-3 for location of outfalls.
There are no monitoring requirements for Outfalls 009, 011, and 012.
* % Compliance = total no. samples – total no. exceedances/total no. of samples x 100
(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
CR = continuous recorder

D = dissolved
MGD = million gallons per day
Max. = maximum value
Min. = minimum value
N = number of samples

NA = not applicable
NPL = no permit limit; monitoring only
NR = analysis not required
SU = standard unit
T = total recoverable

Water Facility; however, it will take some time to determine if this product is effective. 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 of wastewater received and the type of cooling water treatment reagents used. Table 3-4 summarizes the monitoring requirements and performance results.

In 2019, 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 2019) 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 2019. 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 a violation for missing the collection of an iron sample at the Water Treatment Plant in June, BNL's drinking water and the supply and distribution system were in compliance with all

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
Water Quality Indicators							
Ammonia (µg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	SNS
Chlorides (µg/L)	41.1	32.4	34.7	65.9	66.7	40.4	250
Color (units)	10*	75*	20*	< 5	< 5	< 5	15
Conductivity (µmhos/cm)	175	157	175	383	395	333	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)	0.13	0.069	0.19	0.53	0.56	0.2	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	5.9	6	6	6	6	SNS
Sulfates (mg/L)	8.8	10.9	9.7	10.7	13	10.6	250
Total coliform	ND	ND	ND	ND	ND	ND	Negative
Metals							
Antimony (µg/L)	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	6
Arsenic (µg/L)	< 1.0	2.3	2.84	< 1.0	< 1.0	< 1.0	50
Barium (mg/L)	0.05	0.03	0.03	0.06	0.06	0.02	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
Copper (mg/L)	0.005	0.03	0.003	0.003	0.003	0.005	1.3
Fluoride (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2.2
Iron (mg/L)	5.1*	5.1*	2.9*	< 0.20	< 0.20	0.03	0.3
Lead (µg/L)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	15
Manganese (mg/L)	0.08	0.1	0.09	< 0.010	< 0.010	< 0.010	0.3
Mercury (µg/L)	3.89**	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
Nickel (mg/L)	0.002	0.415	0.0015	0.0015	0.002	<0.0005	SNS
Selenium (µg/L)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	50
Sodium (mg/L)	15.2	20.5	21.8	45.3	44.1	25.5	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	<0.02	5
Radioactivity							
Gross alpha activity (pCi/L)	< 2.0	<1.95	<1.98	<1.97	<1.97	NR	15
Gross beta activity (pCi/L)	<1.77	1.99 ± 1.21	<2.16	1.58± 1.0	2.54 ± 1.0	NR	(a)
Radium-228 (pCi/L)	NS	NS	NS	NS	NS	NR	5
Strontium-90 (pCi/L)	< 0.80	< 0.79	< 0.76	< 0.79	< 0.80	NR	8
Tritium (pCi/L)	< 469	< 459	< 448	< 476	< 459	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
Other							
Alkalinity (mg/L)	6.4	8	12.3	29.9	26	62	SNS
Asbestos (M. fibers/L)	NR	NR	NR	NR	NR	< 0.20	7
Calcium (mg/L)	7	4.5	6.03	13.9	11.8	16.1	SNS
HAA5 (mg/L)	NR	NR	NR	NR	NR	0.013	0.06***
Residual chlorine - MRDL (mg/L)	NR	NR	NR	NR	NR	1.2	4
TTHM (mg/L)	NR	NR	NR	NR	NR	0.037	0.08***

Notes:
See Figure 7-1 for well locations.
Well 12 was not operational for 2019; 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.
** This detection of mercury is an anomaly and suspect. Mercury was not detected in a subsequent sample and this well was not in use during 2019.
*** 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.

applicable county, state, and federal regulations regarding drinking water quality, monitoring, operations, and reporting in 2019.

The iron violation in June 2019 was issued after a second quarter iron sample was not taken at the Laboratory's Water Treatment Facility. At the time sampling was required, the water treatment plant was down for maintenance. The error was not discovered until after the quarter was over. A sample was immediately taken, which was below the regulatory limit. Procedures have been updated and personnel trained to ensure sampling requirements are met.

In 2013, the EPA required large water providers to start testing for six common Per- and Poly-fluoroalkyl 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 for PFAS, including BNL. 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 state 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.

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
Chlorodifluoromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5

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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						
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	2.7	1.0	0.9	0.8	0.9	1.4	50
Bromodichloromethane	2.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
Dibromochloromethane	2.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
Bromoform	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	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
Atrazine	<0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	3
Metolachlor	<1	<1	<1	<1	<1	<1	50

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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						
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	<0.002	<0.002	<0.002	<0.002	0.003	0.001	50
Perfluoroheptanoic Acid	<0.002	<0.002	<0.002	<0.002	0.003	0.0008	50
Perfluorohexanesulfonic Acid	<0.002	<0.002	<0.002	<0.002	0.016	0.005	50
Perfluorooctanoic Acid (ng/L)*	0.7	<2	1.2	0.7	6.6	2.9	70
Perfluorooctanesulfonic Acid (ng/L)*	1.8	<2	2.7	1.5	35.1	11.7	70

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.
* Compounds results are reported in ng/L
Well 12 was offline and remained unused during 2019.
SNS = drinking water standard not specified
NYS DWS = New York State Drinking Water Standard
WTP = Water Treatment Plant

The Laboratory continues to monitor sample results and is in the process of restoring the Granular Activated Carbon filters to remove PFAS on Well 10 and Well 11.

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 2019, the Laboratory inspected 254 cross-connection control devices, including

Table 3-7. Applicability of EPCRA to BNL.

Applicability of EPCRA to BNL				
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 [ ]

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 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.

In 2019, the Laboratory closed ten permitted UICs associated with former Buildings 130 and 134. Prior to closing a UIC, an assessment is performed to ensure that past operations did not result in the deposition of contaminants in the environment. This assessment is performed in accordance with an EPA approved Closure Plan. As outlined in the Closure Plan, assessment of UICs include collection of a bottom end-point sample for subsequent chemical analysis. Analysis typically includes volatile and semi-volatile organic compounds, PCB's, pesticides, herbicides, inorganic elements, and gamma spectroscopy detectable radioisotopes. The analytical findings collected during this UIC investigation were found to be less than the clean-up guidance levels and/or are within typical background ranges. Approval to backfill the UICs was received from Suffolk County Department of Health Services (SCDHS) in May 2019.

BNL's total UIC inventory at the end of 2019 was 115.

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

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

Spill No. and Date	Material/ Quantity	ORPS Report	Source/Cause and Corrective Actions
19-02 01/29/19	PCB Dielectric Oil / Unknown	No	As part of the Discovery Park Phase II Environmental Assessment, 19 soil samples were collected by P.W. Grosser Consulting on November 15, 2018 beneath the transformer pad and at four locations north-north-west of the pad to delineate the depth and lateral extent of historical PCB contamination for future remediation. This finding was reported to NYSDEC as a legacy spill for tracking purposes and to ensure area is remediated and waste properly disposed of.
19-03 01/29/19	PCB Dielectric Oil / Unknown	No	As part of the Discovery Park Phase II Environmental Assessment, 22 soil samples were collected by P.W. Grosser Consulting on November 14, 2018 at five locations south-southwest of the two transformer pads to delineate the depth and lateral extent of historical PCB contamination for future remediation. This finding was reported to NYSDEC as a legacy spill for tracking purposes and to ensure area is remediated and waste is properly disposed.
19-05 04/29/19	Transformer Oil / 2 gallons	No	During a routine inspection of a transformer adjacent to Bldg. 197, an Energy & Utilities technician noticed contaminated soil beside the transformer's concrete slab and a low-level reading on the tank gauge. A leaking gasket inside the transformer caused oil to seep beyond the transformer housing onto the concrete slab and into the soil. After the transformer was de-energized, staff removed contaminated soil around the perimeter of the slab to a depth of six to seven inches until clean, dry soil was evident. Contaminated soil and absorbent pads used to soak up soil inside the housing were transferred into three 55-gallon drums for off-site disposal as industrial waste. The transformer was replaced later during the year.
19-08 05/03/19	Hydraulic Fluid / 8 gallons	No	After cutting the lawn adjacent to Bldg. 860, the Production Division Grounds mower left tracks from a hydraulic fluid leak in the parking lot north of the building. A two-inch wide path of hydraulic fluid continued along the path taken by the mower operator including roadside grass traveling west on East Fifth Avenue to the mower's final destination in the parking lot across from Bldg. 97 where the operator first noted the hydraulic fluid leak. Vibrational wear of a metal hydraulic line against the metal bracket that holds the line in place created a hole in the line that caused it to leak. HEMO Shop personnel replaced the line and a rubber piece between the line and bracket. Grounds personnel lowered the cutting blade on another lawn mower to the grass-soil interface to skim cut the oil stained grass adjacent to East Fifth Ave where the mower had previously cut. The oil-stained clippings and disturbed soil were collected in a bag attached to the mower. Meanwhile, a HEMO Shop street sweeper followed the path on roads taken by the mower from Bldg. 860 to Bldg. 97 to sweep up oil coated road grit along the path.
19-09 07/13/19	Diesel Fuel / 0.5 gallons	No	After an employee reported a fuel oil odor in the parking lot of Bldg. 422 to Fire Rescue, personnel from the group discovered a sheen on a puddle that smelled of diesel fuel. The source of the oil sheen was a chunk of asphalt at the side of Woods Road west of the parking lot saturated with petroleum. Apparently, heavy rains the evening before washed away overburden and leached petroleum into stormwater that drained to the parking lot. Oil absorbent pads were used to soak up the sheen in the parking lot. The oil-soaked pads along with the asphalt chunk and petroleum contaminated sandy soil adjacent to Woods Road were placed in a five-gallon pail subsequently taken to the Bldg. 452 waste accumulation area.
19-15 09/03/19	Compressor Oil / 2 gallons	No	As riggers prepared to unload three boxes that contained a helium liquefier and two compressors from a flat-bed trailer near the loading dock at Bldg. 902, they noticed compressor oil leaking from one of the boxes and immediately called ext. 2222 to report the leak. When Fire Rescue responded and met up with the Magnet Division employee supervising the transfer of the boxes, they used oil absorbent pads and Speedi-dry to soak up compressor oil that had leaked in the flat-bed trailer and the pavement where oil had leaked from the trailer. The source of the leak was a broken lubricating line weld on one of the compressors. After learning that the flat-bed trailer had arrived at Bldg. 98 in the morning and waited there for several hours before it was dispatched to Bldg. 902, Fire Rescue personnel drove to Bldg. 98 and used oil absorbent pads and Speedi-Dri to absorb compressor oil that had leaked from the trailer-bed onto pavement leading to the loading dock and onto the road headed to the loading dock. They also placed oil absorbent socks within the loading dock drain to capture any oil that may have seeped into the drain. Finally, they also dug up a small patch of soil adjacent to the road stained with oil that had leaked from the trailer-bed. All materials used during the clean-up of the spilled oil at both buildings along with the contaminated soil were placed in a 55-gallon drum that was subsequently transferred to the Bldg. 452 90-day storage area.

(continued on next page)

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

Spill No. and Date	Material/ Quantity	ORPS Report	Source/Cause and Corrective Actions
19-16 09/10/19	Transformer Oil / 1 gallon	No	During a routine inspection of substations, Tower Line personnel observed stained gravel near the discharge valve of Transformer 930-534. Since the discharge valve on this transformer and other transformers in the Bldg. 930 transformer bank were defective and allowing transformer oil to be discharged, valve plugs were installed in this discharge valve and the discharge valves of the other transformers to prevent future leaks.Stained gravel around this transformer was subsequently recovered by Grounds personnel and placed in a five-gallon pail that was taken to the Bldg. 452 90-day waste area to be consolidated with similar waste for off-site disposal as non-hazardous industrial waste.
19-17 09/16/19	Transformer Oil / 1 pint	No	After a slow leak of synthetic non-PCB transformer oil from transformer 652-TRNF687 located to the east of Bldg. 817 was observed and called in to Fire Rescue, absorbent pads were used to clean impacted surfaces of the transformer cabinet and the concrete slab. About 0.3 cubic feet of contaminated soil adjacent to the pad were recovered by Grounds personnel and transferred to the Bldg. 452 90-day storage area. After Tower Line personnel made repairs to stop the leak, the transformer was inspected weekly to identify and repair leaks. The transformer is scheduled to be replaced in 2020.
19-18 09/16/19	Transformer Oil / 0.5 gallons	No	During a preventative maintenance inspection of the transformer 528-TRNF633 north of Bldg. 528, an EU Tower Line technician noted that silicone-based transformer oil was actively weeping from the transformer fuses and had leaked onto the concrete pad beneath the transformer and onto the surrounding gravel. After calling in the spill for assistance, Fire Rescue personnel responded and placed absorbent pads inside the transformer casing to capture leaking oil. Grounds personnel recovered the visibly contaminated gravel adjacent to the pad to a depth of six inches along the north edge of the pad and to a depth of nine inches along the west edge of the pad where oil had leaked. Contaminated gravel was placed in one 55-gallon drum that was taken to the Bldg. 326 90-day waste storage area. The transformer fuses were tightened to stop the leaks and the transformer has been inspected weekly to identify and repair leaks. The transformer is scheduled to be replaced in 2020.
19-22 12/12/19	Engine Oil / 0.5 gallons	No	Motor oil leaked onto an unpaved road bed adjacent to the weather tower at TR834 after a hose-fitting failed on a trailer mounted mobile emergency generator. The operator arranged for the unit to be transported back to the HEMO Shop for repairs. Grounds personnel recovered contaminated soil and placed it into five-gallon pails. The contaminated soil was subsequently transferred to a 55-gallon drum at the Bldg. 452 waste accumulation area.

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 2019.

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 39 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 (about 1,225 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 2019, BNL reported releases of lead (about 35,000 pounds), mercury (about nine pounds), polychlorinated biphenyls (PCBs) (about two pounds), benzo(g,h,i)perylene (less than one pound), polycyclic aromatic compounds (less than one pound), and friable asbestos (about 17,500 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 2019, 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 23 spills in 2019 and ten 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 ten 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 1.9 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 five 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. With exception of a violation identified at the Laboratory's diesel tank farm that is further described below, BNL remained in full compliance with MPF license requirements in 2019, 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 is functional. 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 2019, 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.

NYSDEC inspection of registered Petroleum Bulk Storage Facilities on June 25, 2019, resulted in a Notice of Violation (NOV) for the three aboveground storage tanks at the Laboratory's diesel tank farm (STO-651). The NOV was associated with the need to have both manual and solenoid valves located at the top of each tank on gravity flow lines leading to the dispenser to prevent back-siphonage in the event of a supply line leak. F&O began immediate planning for the correction of the deficiency and addressed the finding in accordance with NYSDEC directives.

Also, in 2019, the coating for the secondary containment berm for the three aboveground

diesel fuel tanks at Storage Facility/STO-651 was refurbished. This was in response to BNL staff inspections that identified delamination-loosening of the coating from the concrete base floor. This project included the complete removal of the existing coating, sealing of concrete floor cracks, and application of petroleum-compatible epoxy and fiberglass matting on the floor and walls of the berm in accordance with manufacturer's requirements. The secondary containment berm was flood tested by an independent consultant and the results of the test indicated that the coating passed the impermeability test as per NYSDEC directives.

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 2019, BNL renewed its Chemical Bulk Storage (CBS) Registration in accordance with NYSDEC directives and received a Hazardous Substance Bulk Storage Registration Certificate.

As part of the NYSDEC's regulatory inspection for the above petroleum tanks, the CBS-registered tanks were also inspected and there were no findings identified.

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 its sole jurisdiction over petroleum storage at Major Oil Storage Facilities, SCDHS notified BNL that it 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 121 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 SCDHS 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 March 2019, the NYSDEC performed an unannounced two-day inspection of hazardous waste activities at BNL. The inspectors visited BNL's Permitted Transportation, Storage, and Disposal Facility (Building 855), 90-Day, and Satellite Accumulation Areas and reviewed associated documentation. During the inspection the inspectors identified two labeling issues and one documentation issue, all of which were satisfactorily resolved before the conclusion of the inspection. A letter documenting the results of the inspection was received from the NYSDEC in April 2019 and indicated that no further actions were required. In September 2019, the EPA also visited BNL to perform an inspection of hazardous waste activities. The 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 2019 and disposed of 169.4 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 (Cornell Cooperative). Pesticides are used at the Laboratory to control undesirable insects and mice and 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). Nearly all pesticides are applied by BNL-employed, New York State–certified applicators. On an infrequent basis, an outside vendor who also possesses the required NYSDEC application licenses applies pesticides.

By February 1, each BNL applicator files an annual report with NYSDEC detailing insecticide, rodenticide, algaecide, and herbicide use for the previous year. Contractors who apply pesticides and cooling tower biocides are responsible for filing their own reports.

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.

In 2019, BNL had a single wetlands equivalency permit open. This permit was associated with the final cleanup of a small area of contamination within the Peconic River. The project was completed in 2017 and the area is being restored naturally. A final restoration report was submitted to the NYSDEC with a request to confirm restoration and close the permit.

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)* 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)* is federally endangered and was historically found on Long Island. There is a very 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), peregrine falcon (E), persius duskywing (E), bracken fern (E), crested fringed orchid (E), engelman spikerush (E), dwarf huckleberry (E), whorled loose-strife (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.

Peregrine falcons are listed as endangered in New York State due to historic declines associated with DDT. Falcons were confirmed nesting on the HFBR stack in 2019. They had been seen in earlier years but had not nested. The birds utilized an abandoned raven's nest and the pair raised and fledged three chicks. For more information, read the inside cover of this report.

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. Due to an extended drought from 2015 through mid-2017, these two fish are not likely to be found on site. Should NYSDEC establish a recovery plan, fish may be restored to historic habitats in the future.

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 benefit 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. 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 foxglove, 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, National Weather Service, and the cell tower near Building 30 through much of 2019. A pair of eagles frequented the osprey nest located on the cell tower in December 2019, suggesting the potential for utilizing the nest, but ultimately the pair did not nest there. 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 2020 Rev. 11) and are consistent with the pre-approved authorized release limits set by DOE Order 458.1.

In 2019, 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 offsite 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 2019.

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 2019, BNL was inspected by federal, state, or local regulators on 11 occasions. These inspections included:

- *Air Compliance.* In August, a NYSDEC inspector performed a full compliance evaluation of regulated emission sources at BNL. There were no findings.
- *Potable Water.* In August, 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. NYSDEC also visited the site in January and May 2019 to perform SPDES inspections. No issues were identified.
- *RCRA.* In March, inspectors from the NYSDEC performed an unannounced RCRA Compliance inspection. The inspectors identified two labeling issues and one documentation issue, all of which were satisfactorily resolved before the conclusion of the inspection. In September, the EPA also visited BNL to perform an inspection of hazardous waste activities and did not identify any concerns or findings.
- *Petroleum and Chemical Bulk Storage.* In June, two inspectors from the NYSDEC performed a regulatory inspection of permitted petroleum and chemical bulk storage tanks. BNL received a Notice of Violation for missing solenoid and operating valves on above ground tanks associated with the Laboratory's diesel tank farm (STO 651). BNL F&O staff began immediate planning for the correction of the deficiency and addressed the finding in accordance with NYSDEC directives.

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 2019, BHSO

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

Number	Title	Parties	Effective Date	Status
Agreements				
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 2019.
No Notices of Violation/Enforcement Actions for 2019.				
None	Notice of Violation (NOV)	NYSDEC/ MOSF	06/21/19	NYSDEC inspection of Petroleum Bulk Storage Facility and Major Oil Storage Facility on June 18, 2019 resulted in a Notice of Violation (NOV) for the MOSF (STO-651) received on June 21, 2019. The NOV was associated with the need to have both manual valves and solenoid valves located at the top of each tank on gravity flow lines leading to the dispenser. BNL Facility and Operations began immediate planning for the correction of the deficiency and addressed the finding in accordance with NYSDEC directives.
None	Notice of Violation (NOV)	SCDHS	7/11/2019	A formal NOV was issued by SCDHS in July 2019 after a second quarter iron sample was not taken at the Laboratory's Water Treatment Facility. At the time sampling was required, the water treatment plant was down for maintenance. The error was not discovered until after the quarter was over. A sample was immediately taken, which was below the regulatory limit. Procedures have been updated and personnel trained to ensure sampling requirements are met.

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
MOSF = Major Oil Storage Facility
RCRA = Resource Conservation and Recovery Act
SCDHS = Suffolk County Department of Health Services

performed a surveillance of BNL's compliance with NESHAPs, specifically, 40 CFR 61 Subpart H *National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities* and an assessment of BNL's Packaging and Transportation Program, as required by DOE O 460.2A, Departmental Material Transportation and Packaging Management.

The surveillance was conducted in conjunction with BHSO's review of BNL's annual NESHAPs compliance report and there were no findings identified.

The assessment of the Packaging and Transportation Program at BNL was performed with assistance from the Office of Science Consolidated Service Center and was coordinated with Brookhaven Science Associates (BSA) personnel. Overall, the assessment found that BSA continues to have a strong program with no significant programmatic deficiencies being identified. There were four Level 3 Findings, five Observations, three Improvement Opportunities, four Best Practices, and one Noteworthy Practice identified during the assessment. A Level 3 Finding is defined as a singular/isolated regulatory non-compliance where there is a process in place. A causal analysis was performed for the identified findings and corrective actions were developed to minimize the risk of recurrence.

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 2019, EPD planned for and executed a programmatic self-assessment of two programs: Activated Soil Cap Inspections and Waste Management (Hazardous, Industrial, and Radiological).

The Activated Soil Cap Inspections assessment reviewed Collider-Accelerator Department's (C-AD's) implementation of measures to minimize groundwater pollution caused by soil activation. The measures include groundwater cap inspections, maintenance of information systems, and the use of removable soil samples to estimate impacts caused by accelerator beam loss. This assessment resulted in one observation and nine opportunities for improvement and concluded that overall, the C-AD is properly implementing the required activities to prevent groundwater impacts from soil activation. The observation was immediately addressed and C-AD and EPD staff are working together to address the identified opportunities for improvement.

The hazardous and industrial waste management portion of the assessment focused on sitewide compliance and conformance with the relevant sections of the Laboratory's Waste Subject Area and other associated regulatory drivers. Due to the limited number of departments/facilities at BNL that routinely generate radioactive waste, the scope of the radioactive waste portion of the assessment focused on the high-dose radioactive wastes generated by C-AD's Medical Isotope Research and Production (MIRP) group and how they are characterized, documented, and stored in accordance with the requirements.

Overall, the assessment found that waste management programs are strong and that there were no significant programmatic deficiencies identified. The hazardous and industrial waste management portion of the assessment resulted in one noteworthy practice, three opportunities for improvement, one observation, and six non-conformances. The radiological waste portion of the assessment resulted in one opportunity for improvement and two non-conformances. All non-conformances and observations identified during the assessment were addressed and communicated to the relevant, responsible staff.

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 remote tabletop surveillance of the BNL Radioactive Waste program from July 9 to July 10, 2019. The assessment was conducted from the North Las Vegas offices of Navarro via teleconference. The team consisted of two members of the Radiological Waste Assistance Program (RWAP) and one DOE Nevada staff member and they concentrated on

Radiological Characterization and Waste Traceability compliance. Radiological characterization and waste traceability were assessed for each waste stream's characterization process to ensure that the methods and records comply with the waste acceptance criteria.

The assessment resulted in no observations against BNL's Waste Certification Program, enabling BNL continued access to the NNSS for radioactive waste disposal.

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 and two NOVs accessed in 2019. Existing agreements and details on the findings and corrective actions taken for the NOVs are summarized in Table 3-9.

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