

Compliance Status

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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 2017, 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 2017. There were two recorded excess opacity measurements due to unknown causes, five due to a temporary failure of the transmissometer blower motor, and a single excess opacity reading that occurred during quarterly quality assurance tests of the Boiler 6 and 7 opacity monitors. All of 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 2017, 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. Monitoring of BNL's potable water system indicated that all drinking water requirements were met during 2017. Most of the liquid effluents discharged to surface water and groundwater also met applicable New York State Pollutant Discharge Elimination System permit requirements. Only two excursions above permit limits were reported for the year; one non-compliance event for Biological Oxygen Demand (BOD5) occurred at the Sewage Treatment Plant and one non-compliance event was reported for a 1-Hydroxyethylidene-1, 1-diphosphonic acid (HEDP) at Outfall 002 (HN). The permit excursions were reported to NYSDEC and the Suffolk County Department of Health Services and corrective measures were taken. Groundwater monitoring at the Laboratory's Major Petroleum Facility continued to demonstrate that current oil storage and transfer operations are not affecting groundwater quality.

Efforts to minimize impacts of spills of materials continued in 2017. There were 21 spills and 11 of those spills met regulatory agency reporting criteria. The severity of releases were minor, and all releases were cleaned up to the satisfaction of NYSDEC.

BNL participated in ten environmental inspections or reviews by external regulatory agencies in 2017. These inspections included Sewage Treatment Plant operations; hazardous waste management facilities; regulated petroleum bulk storage facilities; and the potable water system. Immediate corrective actions were taken to address all issues raised during these inspections.

3.1 COMPLIANCE WITH REQUIREMENTS

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

3.2 ENVIRONMENTAL PERMITS

3.2.1 Existing Permits

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

- State Pollutant Discharge Elimination System (SPDES) permits, issued by NYSDEC

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

| Regulator: Codified Regulation | Regulatory Program Description | Compliance Status | Report Sections |
|--|--|---|-----------------|
| EPA: 40 CFR 300 40 CFR 302 40 CFR 355 40 CFR 370 | The Comprehensive Environmental Response, Compensation & Liability Act (CERCLA) provides the regulatory framework for remediation of releases of hazardous substances and remediation (including decontamination and decommissioning [D&D]) of inactive hazardous waste disposal sites. Regulators include EPA, DOE, and the New York State Department of Environmental Conservation (NYSDEC). | In 1992, BNL became 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 a long-term surveillance and maintenance mode for the groundwater treatment systems, former soil/sediment cleanup areas, and the reactors; this includes monitoring of institutional controls. The High Flux Beam Reactor (HFBR) stack and reactor vessel are scheduled for D&D by 2020 and 2072, respectively. | 2.3.4.8 |
| Council for Env. Quality: 40 CFR 1500–1508 DOE: 10 CFR 1021 | The National Environmental Policy Act (NEPA) requires federal agencies to follow a prescribed process to anticipate the impacts on the environment of proposed major federal actions and alternatives. DOE codified its implementation of NEPA in 10 CFR 1021. | BNL is in full compliance with NEPA requirements. 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 may be subject to NHPA include the HFBR, the Brookhaven Graphite Research Reactor (BGRR) complex, World War I training trenches near the Relativistic Heavy Ion Collider (RHIC) project, and the former Cosmotron building. | The HFBR, BGRR complex, and World War I trenches are eligible for inclusion in the National Register. The former Cosmotron building was identified as potentially eligible in an April 1991 letter from NYSHPO. Any proposed activities involving these facilities must be identified through the NEPA/NHPA processes and evaluated to determine if the action would affect the features that make the facility eligible. Actions required for D&D of the BGRR were determined to affect its eligibility, and mitigative actions have been completed based on a Memorandum of Agreement between DOE and NYSHPO. BNL has a Cultural Resource Management Plan to ensure compliance with cultural resource regulations. Buildings 50 years old or older are reviewed under Section 106 of NHPA when proposed projects may significantly alter the structure or for building demolition. In 2016, four (4) 1960s era apartments were evaluated under Section 106 requirements and were determined to be eligible for listing on the National Register of Historic Places. The package developed is expected to meet requirements for mitigation once additional documents are provided to the NYSHPO. | 3.4 |
| EPA: 40 CFR 50 40 CFR 60-61 40 CFR 63 40 CFR 80 40 CFR 82 40 CFR 98 NYSDEC: 6 NYCRR 200–257 6 NYCRR 307 | The Clean Air Act (CAA) and the NY State Environmental Conservation Laws regulate the release of air pollutants through permits and air quality limits. Emissions of radionuclides are regulated by EPA, via the National Emission Standards for Hazardous Air Pollutants (NESHAPs) authorizations. | All air emission sources are incorporated into the BNL Title V permit or have been exempted under the New York State air program, which is codified under the New York Codes, Rules, and Regulations (NYCRR). All applicable CAA and NYCRR regulations are incorporated into the BNL Title V permit. Radiological air emission sources are registered with the EPA. | 3.5 |

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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 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 two excursions, these discharges met the SPDES permit limits in 2017. | 3.6 |
| EPA: 40 CFR 141–149 NYSDOH: 10 NYCRR 5 | The Safe Drinking Water Act (SDWA) and New York State Department of Health (NYSDOH) standards for public water supplies establish minimum drinking water standards and monitoring requirements. SDWA requirements are enforced by the Suffolk County Department of Health Services (SCDHS). | BNL maintains a sitewide public water supply. This water supply met all primary drinking water standards in 2017. Corrective actions for all identified operation and maintenance deficiencies were established and communicated with SCDHS and are being addressed by the Laboratory's Energy and Utilities Division. | 3.7 |
| EPA: 40 CFR 112 40 CFR 300 40 CFR 302 40 CFR 355 40 CFR 370 40 CFR 372 | The Oil Pollution Act, the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Superfund Amendment Reauthorization Act (SARA) require facilities with large quantities of petroleum products or chemicals to prepare emergency plans and report their inventories to EPA, the state, and local emergency planning groups. | Since some facilities at BNL store or use chemicals or petroleum in quantities exceeding threshold planning quantities, the Laboratory is subject to these requirements. BNL fully complied with all reporting and emergency planning requirements in 2017. | 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, overflow 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. | 3.12 |

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CHAPTER 3: COMPLIANCE STATUS

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

| Regulator: Codified Regulation | Regulatory Program Description | Compliance Status | Report Sections |
|--|--|--|-----------------|
| U.S. Fish & Wildlife Service: 50 CFR 17 NYSDEC: 6 NYCRR 182 | The Endangered Species Act and corresponding New York State regulations prohibit activities that would jeopardize the continued existence of an endangered or threatened species, or cause adverse modification to a critical habitat. | BNL is host to numerous species of flora and fauna. Many species have been categorized by New York State as endangered, threatened, or of special concern; and one threatened species has been designated under the Endangered Species Act. The Laboratory's Natural Resource Management Plan outlines activities to protect these vulnerable species and their habitats (see Chapter 6 for details). | 3.13 |
| U.S. Fish & Wildlife Service: Migratory Bird Treaty Act 16 USC 703-712 The Bald and Golden Eagle Protection Act 16 USC 668 a-d | The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful. Birds protected under the act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and others, and includes their body parts (feathers, plumes etc), nests, and eggs. The Bald and Golden Eagle Protection Act (BGEPA) prohibits any form of possession or taking of both bald and golden eagles. | Compliance with the MBTA and the BGEPA are documented through the BNL Natural Resource Management Plan. The plan includes provisions for enhancing local habitat through the control of invasive species, planting of native grasses as food sources, and construction of nesting sites. All construction activities, including demolition, are reviewed to ensure there are no impacts to nesting birds. | 3.13 |
| DOE: Order 231.1B Manual 231.1-1A | The Environment, Safety, and Health Reporting program objective is to ensure timely collection, reporting, analysis, and dissemination of information on environment, safety, and health issues as required by law or regulations or as needed to ensure that DOE is kept fully informed on a timely basis about events that could adversely affect the health and safety of the public, workers, the environment, the intended purpose of DOE facilities, or the credibility of the Department. Included in the order are the requirements for the Occurrence Reporting and Processing of Operations Program (ORPS). | BNL prepares an annual Site Environmental Report and provides data for DOE to prepare annual NEPA summaries and other Safety, Fire Protection, and Occupational Safety and Health 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, <i>Environmental Protection Programs</i> , and 430.2B, <i>Departmental Energy, Renewable Energy and Transportation Management</i> . 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. The new order is 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 14001:1996 standard in 2001 and recertified to the revised standard in 2004, 2007, 2010, 2013, and 2016. Continued system conformance was internally verified during 2017 with a full independent, external assessment scheduled to certify BNL's conformance to ISO14001:2015 revised standard during 2018. | Chapter 2 |
| DOE: Order 458.1, Change 3 | In February 2011, DOE released DOE Order 458.1, <i>Radiation Protection of the Public and Environment</i> , 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 the means by which 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, <i>Radioactive Waste Management</i> , 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

CHAPTER 3: COMPLIANCE STATUS

Table 3-2. BNL Environmental Permits.

| Issuing Agency | Bldg. or Facility | Process/Permit Description | Permit ID No. | Expiration or Completion | Emission Unit ID | Source ID |
|------------------------------|-------------------|---|--------------------|--------------------------|------------------|-----------|
| EPA - NESHAPs | 510 | Calorimeter Enclosure | BNL-689-01 | None | NA | NA |
| EPA - NESHAPs | 705 | Tritium Evaporator | BNL-288-01 | None | NA | NA |
| EPA - NESHAPs | 820 | Accelerator Test Facility | BNL-589-01 | None | NA | NA |
| EPA - NESHAPs | AGS | AGS Booster - Accelerator | BNL-188-01 | None | NA | NA |
| EPA - NESHAPs | RHIC | Accelerator | BNL-389-01 | None | NA | NA |
| EPA - NESHAPs | 931 | Brookhaven LINAC Isotope Producer | BNL-2009-1 | None | NA | NA |
| NYSDEC - NESHAPs | REF | Radiation Effects/Neutral Beam | BNL-789-01 | None | NA | NA |
| NYSDEC - NESHAPs | RTF | Radiation Therapy Facility | BNL-489-01 | None | NA | NA |
| EPA - SDWA | BNL | Underground Injection Control | NYU500001 | (a) | NA | NA |
| NYSDEC - Air Equivalency | 517/518 | South Boundary/Middle Road System | 1-51-009 | NA | NA | NA |
| NYSDEC - Air Equivalency | 598 | OU I Remediation System | 1-52-009 | NA | NA | NA |
| NYSDEC - Air Equivalency | 539 | Western South Boundary System | 1-52-009 | NA | NA | NA |
| NYSDEC - Air Equivalency | TR 867 | T-96 Remediation System | 1-52-009 | NA | NA | NA |
| NYSDEC - Air Equivalency | 644 | Freon-11 Treatment System | 1-52-009 | NA | NA | NA |
| NYSDEC - SPDES Equivalency | 517/518 | South Boundary/Middle Road System | 1-52-009 | NA | NA | NA |
| NYSDEC - SPDES Equivalency | 539 | West South Boundary System | 1-52-009 | NA | NA | NA |
| NYSDEC - SPDES Equivalency | 598 | OU I Remediation System | 1-52-009 | NA | NA | NA |
| NYSDEC - SPDES Equivalency | 598 | Tritium Remediation System | 1-52-009 | 04-May-21 | NA | NA |
| NYSDEC - SPDES Equivalency | 670 | Sr-90 Treatment System | 1-52-009 | 25-Feb-18 | NA | NA |
| NYSDEC - SPDES Equivalency | TR 829 | Carbon Tetrachloride System | None | Closed out 2010 | NA | NA |
| NYSDEC - SPDES Equivalency | OS-4 | Airport/LIPA Treatment System | None | NA | NA | NA |
| NYSDEC - SPDES Equivalency | OS-2 | Industrial Park East Treatment System | None | Closed out 2013 | NA | NA |
| NYSDEC - SPDES Equivalency | OS-5 | North St./North St. East Treatment System | None | NA | NA | NA |
| NYSDEC - SPDES Equivalency | OS-6 | Ethylene Di-Bromide Treatment System | 1-52-009 | 16-Dec-19 | NA | NA |
| NYSDEC - SPDES Equivalency | 855 | Sr-90 Treatment System - BGRR/WCF | 1-52-009 | 16-Dec-19 | NA | NA |
| NYSDEC - SPDES Equivalency | TR 867 | T-96 Remediation System | 1-52-009 | 20-Mar-22 | NA | NA |
| NYSDEC - SPDES Equivalency | 644 | Freon-11 Treatment System | 1-52-009 | 20-Mar-22 | NA | NA |
| NYSDEC - SPDES Equivalency | OS-2 | Industrial Park Treatment System | 1-52-009 | 30-Sep-19 | NA | NA |
| NYSDEC - Hazardous Substance | BNL | Bulk Storage Registration Certificate | 1-000263 | 27-Jul-19 | NA | NA |
| NYSDEC - LI Well Permit | BNL | Domestic Potable/Process Wells | 1-4722-00032/00151 | 17-Jul-26 | NA | NA |
| NYSDEC - Air Quality | 423 | Metal Parts Cleaning Tank | 1-4722-00032/00115 | 03-Feb-19 | U-METAL | 42308 |
| NYSDEC - Air Quality | 423 | Gasoline Storage and Fuel Pumps | 1-4722-00032/00115 | 03-Feb-19 | U-FUELS | 42309-10 |
| NYSDEC - Air Quality | 423/630 | Motor Vehicle A/C Servicing | 1-4722-00032/00115 | 03-Feb-19 | U-MVACS | MVAC1- 3 |
| NYSDEC - Air Quality | 244 | Paint Spray Booth | 1-4722-00032/00115 | 03-Feb-19 | U-PAINT | 24402 |
| NYSDEC - Air Quality | 244 | Flammable Liquid Storage Cabinet | 1-4722-00032/00115 | 03-Feb-19 | U-PAINT | 244AE |
| NYSDEC - Air Quality | 479 | Metal Parts Cleaning Tank | 1-4722-00032/00115 | 03-Feb-19 | U-METAL | 47908 |
| NYSDEC - Air Quality | 510 | Spin Coating Operation | 1-4722-00032/00115 | 03-Feb-19 | U-INSIG | 510AK |
| NYSDEC - Air Quality | 801 | Target Processing Laboratory | 1-4722-00032/00115 | 03-Feb-19 | U-INSIG | 80101 |
| NYSDEC - Air Quality | Site | Aerosol Can Processing Units | 1-4722-00032/00115 | 03-Feb-19 | U-INSIG | AEROS |
| NYSDEC - Air Quality | 498 | Aqueous Cleaning Facility | 1-4722-00032/00115 | 03-Feb-19 | U-METAL | 49801 |
| NYSDEC - Air Quality | 535B | Plating Tanks | 1-4722-00032/00115 | 03-Feb-19 | U-INSIG | 53501 |
| NYSDEC - Air Quality | 535B | Etching Machine | 1-4722-00032/00115 | 03-Feb-19 | U-INSIG | 53502 |
| NYSDEC - Air Quality | 535B | Printed Circuit Board Process | 1-4722-00032/00115 | 03-Feb-19 | U-INSIG | 53503 |

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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 | 03-Feb-19 | U-61005 | 61005 |
| NYSDEC - Air Quality | 610 | Combustion Unit | 1-4722-00032/00115 | 03-Feb-19 | U-61006 | 61006 |
| NYSDEC - Air Quality | 610 | Combustion Unit | 1-4722-00032/00115 | 03-Feb-19 | U-61007 | 61007 |
| NYSDEC - Air Quality | 610 | Metal Parts Cleaning Tray | 1-4722-00032/00115 | 03-Feb-19 | U-METAL | 61008 |
| NYSDEC - Air Quality | 610 | Combustion Unit | 1-4722-00032/00115 | 03-Feb-19 | U-61005 | 6101A |
| NYSDEC - Air Quality | 630 | Gasoline Storage and Fuel Pumps | 1-4722-00032/00115 | 03-Feb-19 | U-FUELS | 63001-03 |
| NYSDEC - Air Quality | 902 | Epoxy Coating/Curing Exhaust | 1-4722-00032/00115 | 03-Feb-19 | U-COILS | 90206 |
| NYSDEC - Air Quality | 903 | Metal Parts Cleaning Tank | 1-4722-00032/00115 | 03-Feb-19 | U-METAL | 90304 |
| NYSDEC - Air Quality | 922 | Electroplating Operation | 1-4722-00032/00115 | 03-Feb-19 | U-INSIG | 92204 |
| NYSDEC - Air Quality | 923 | Electronic Equipment Cleaning | 1-4722-00032/00115 | 03-Feb-19 | U-METAL | 9231A |
| NYSDEC - Air Quality | 923 | Parts Drying Oven | 1-4722-00032/00115 | 03-Feb-19 | U-METAL | 9231B |
| NYSDEC - Air Quality | Site | Halon 1211 Portable Extinguishers | 1-4722-00032/00115 | 03-Feb-19 | U-HALON | H1211 |
| NYSDEC - Air Quality | Site | Halon 1301 Fire Suppression Systems | 1-4722-00032/00115 | 03-Feb-19 | U-HALON | H1301 |
| NYSDEC - Air Quality | Site | Commercial Refrigeration Equipment | 1-4722-00032/00115 | 03-Feb-19 | U-RFRIG | COMRE |
| NYSDEC - Air Quality | Site | Packaged A/C Units | 1-4722-00032/00115 | 03-Feb-19 | U-RFRIG | PKG01-02 |
| NYSDEC - Air Quality | Site | Reciprocating Chillers (45) | 1-4722-00032/00115 | 03-Feb-19 | U-RFRIG | REC01-53 |
| NYSDEC - Air Quality | Site | Rotary Screw Chillers (15) | 1-4722-00032/00115 | 03-Feb-19 | U-RFRIG | ROTO1-15 |
| NYSDEC - Air Quality | Site | Split A/C Units | 1-4722-00032/00115 | 03-Feb-19 | U-RFRIG | SPL01-02 |
| NYSDEC - Air Quality | Site | Centrifugal Chillers (19) | 1-4722-00032/00115 | 03-Feb-19 | U-RFRIG | CEN01-26 |
| NYSDEC - Air Quality | 463 | Diesel Emergency Generator | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 46301 |
| NYSDEC - Air Quality | 490 | Diesel Emergency Generator | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 49006 |
| NYSDEC - Air Quality | 515 | Diesel Non-Emergency Generator | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 51501 |
| NYSDEC - Air Quality | 555 | Diesel Emergency Generator | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 55503 |
| NYSDEC - Air Quality | 635 | Diesel Emergency Generator | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 63501 |
| NYSDEC - Air Quality | 734 | Diesel Emergency Generator | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 73401 |
| NYSDEC - Air Quality | 735 | Diesel Emergency Generator | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 73501 |
| NYSDEC - Air Quality | 740 | Diesel Emergency Generators (2) | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 74001-02 |
| NYSDEC - Air Quality | 801 | Diesel Emergency Generator | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 80102 |
| NYSDEC - Air Quality | 912 | Diesel Emergency Generators (3) | 1-4722-00032/00115 | 03-Feb-19 | U-GENER | 912A1-A3 |
| NYSDEC - Air Quality | 30 | Combustion Unit | 1-4722-00032/00115 | 03-Feb-19 | U-SMBLR | 030AB |
| NYSDEC - Air Quality | 244 | Combustion Unit | 1-4722-00032/00115 | 03-Feb-19 | U-SMBLR | 244AB |
| NYSDEC - Air Quality | 422 | Combustion Unit | 1-4722-00032/00115 | 03-Feb-19 | U-SMBLR | 422AF |
| NYSDEC - Air Quality | 423 | Combustion Unit | 1-4722-00032/00115 | 03-Feb-19 | U-SMBLR | 42304 |
| NYSDEC - Hazardous Waste | WMF | Waste Management | 1-4722-00032/00102 | 06-Sep-22 | NA | NA |
| NYSDEC - Water Quality | CSF | Major Petroleum Facility | 1-1700 | 31-Mar-22 | NA | NA |
| NYSDEC - WQ- Equivalency | Site | Peconic River Cleanup | 1-4722-00032/00153 | 24-Apr-22 | NA | NA |

Notes:

(a) Permit renewal under review by EPA
A/C = Air Conditioning
AGS = Alternating Gradient Synchrotron
BGRR = Brookhaven Graphite Research Reactor
CSF = Central Steam Facility
EPA = Environmental Protection Agency

LIPA = Long Island Power Authority
NA = Not Applicable
NESHAPs = National Emission Standards for Hazardous Air Pollutants
NYSDEC = New York State Department of Environmental Conservation

OU = Operable Unit
RTF = Radiation Therapy Facility
RHIC = Relativistic Heavy Ion Collider
SDWA = Safe Drinking Water Act
SPDES = State Pollutant Discharge Elimination System

Sr-90 = Strontium-90
STP = Sewage Treatment Plant
WCF = Waste Concentration Facility
WMF = Waste Management Facility

- 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 United States Environmental Protection Agency (EPA) under the National Emission Standards for Hazardous Air Pollutants (NESHAPs)
- Air emissions permit, issued by NYSDEC under Title V of the Clean Air Act (CAA) Amendments authorizing the operation of 13 emission units
- EPA Underground Injection Control (UIC) Area permit for the operation of 125 UIC wells (e.g., dry wells and cesspools)
- Permit for the operation of six domestic water supply wells and one irrigation 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 Laboratory had one wetland or Wild, Scenic, and Recreational Rivers Permit opened in 2017. 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 permit is an equivalency permit for the cleanup of a small area of contamination within the Peconic River.

3.3 NEPA ASSESSMENTS

The 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 2017, environmental evaluations were completed for 146 proposed projects at BNL. Of those, 144 were considered minor actions requiring no additional documentation. Two projects were addressed by submitting notification forms to DOE, which determined that both projects were covered by existing “Categorical Exclusions” (per 10 CFR 1021) or fell within the scope of a previous environmental assessment.

3.4 PRESERVATION LEGISLATION

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

BNL has four structures or sites that are eligible for listing on the National Register of Historic Places: the Brookhaven Graphite Research Reactor (BGRR) complex, the High Flux Beam Reactor (HFBR) complex, the 1960s Era Efficiency Apartments, and the World War I Army training trenches associated with Camp Upton. Several other structures of historic significance are identified in BNL’s Cultural Resources Management Plan (BNL 2013a), including the Brookhaven Center and Building 120. Two other buildings, Berkner Hall and the Chemistry Building, are considered “Architecturally Significant.” A Department of Interior questionnaire regarding historic and cultural resources is prepared annually. 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 2017, 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 (NO_x). The NO_x 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 NO_x 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 NO_x 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 NO_x standards. Because past emissions testing and CEMS results when No. 6 oil was burned have shown that all four CSF boilers cannot meet the new lower NO_x RACT standards effective as of July 2014, BNL is using 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 2017, there were no recorded exceedances of the NO_x RACT limit by the Boiler 6 and 7 CEMS. Using the system averaging approach, actual weighted average NO_x emission rates for operating boilers for the first through fourth quarters were 0.104, 0.102, 0.077, and 0.101 lbs/MMBtu, respectively, which were below the corresponding quarterly permissible weighted average emissions rates of 0.152, 0.150, 0.150, and 0.150 lbs/MMBtu.

In 2017, there were two recorded excess opacity measurements due to unknown causes, five due to a temporary failure of the transmissometer blower motor, and a single excess opacity reading that occurred during quarterly quality assurance tests of the Boiler 6 and 7 opacity monitors. All of the excursions were documented in quarterly Site-Wide Air Emissions and Monitoring Systems Performance Reports submitted to NYSDEC. Chapter 4 discusses CSF compliance with NO_x RACT standards and opacity limits in greater detail.

3.5.1.2 Ozone-Depleting Substances

Refrigerant: The Laboratory’s preventative maintenance program requires regular inspection and maintenance of refrigeration and air conditioning equipment that contains ozone-depleting substances such as R-11, R-12, and R-22. All refrigerant recovery and recycling equipment is certified to meet refrigerant evacuation levels specified by 40 CFR 82.158. As a matter of BNL’s standard practice, if a refrigerant leak is found, technicians will either immediately repair the leak or isolate it and prepare a work order for the needed repairs. This practice is more stringent than the leak repair provisions of 40 CFR 82.156.

In 2017, 144 pounds of R-22 and 2,100 pounds of R-123 were recovered and recycled from refrigeration equipment that was serviced. Meanwhile, two pounds of R-11, 426 pounds of R-22, 185 pounds of R-134A, and 54 pounds of R-410 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. When portable fire extinguishers or fixed systems are removed from service and when halon cylinders are periodically tested, Laboratory technicians use halon recovery and recycling devices to comply with CAA provisions. Halon recovered from excessed systems is stored for reuse by BNL or shipped to the Department of Defense Ozone Depleting Substances Reserve.

In 2017, 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. In April 2017, the Laboratory transferred 318 pounds of Halon 1301 from a decommissioned fire suppression system to the Department of Defense Ozone Depleting Substances Reserve in Richmond, Virginia. The transfer was made in accordance with the Class I Ozone Depleting Substances Disposition Guidelines prepared by the DOE Office of Environmental Policy and Guidance.

3.5.2 Hazardous Air Pollutants

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

3.5.2.1 Maximum Available Control Technology

Based on the Laboratory's periodic review of Maximum Available Control Technology (MACT) standards in 2017, it has been

determined that none of the proposed or newly promulgated MACT standards apply to the emissions from existing permitted operations or the anticipated emissions from proposed activities and operations at BNL.

3.5.2.2 Asbestos

In 2017, the Laboratory notified the EPA Region II office regarding the removal of materials containing asbestos. During the year, 35,420 pounds of friable asbestos (e.g., pipe insulation, transite board, floor tiles, water main pipes) materials were removed and disposed of according to EPA requirements.

3.5.2.3 Radioactive Airborne Emissions

Minor and major sources of radiological airborne emissions from BNL's facilities and activities are evaluated to ensure that they do not impact the environment, on-site workers, or people residing at or near the Laboratory. A full description of radiological emissions monitoring conducted in 2017 is provided in Chapter 4.

BNL transmitted all data pertaining to radioactive air emissions and dose calculations to EPA in fulfillment of the June 30, 2017 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 μ Sv) annual dose limit specified in 40 CFR 61 Subpart H (see Chapters 4 and 8 for more information on the estimated air dose). Using EPA modeling software, the dose to the maximally exposed off-site individual resulting from BNL's airborne emissions in 2017 was 7.24 E-01 mrem (7.24 μ Sv).

3.6 CLEAN WATER ACT

The disposal of wastewater generated by Laboratory operations is regulated under the Clean Water Act (CWA) as implemented by NYSDEC and under DOE Order 458.1, Radiation Protection of the Public and the Environment. The goals of the CWA are to achieve a level of water quality that promotes the propagation of fish, shellfish, and wildlife; to provide waters suitable for recreational purposes; and to eliminate the discharge of pollutants into surface waters. New York State was delegated CWA authority

in 1975. NYSDEC has issued a SPDES permit to BNL that regulates wastewater effluents. The permit specifies monitoring requirements and effluent limits for nine of 12 outfalls, as described below. See Figure 5-3 in Chapter 5 for the locations of the following BNL outfalls:

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

Each month, the Laboratory prepares Discharge Monitoring Reports (DMRs) that describe monitoring results, evaluate compliance with permit limitations, and identify corrective measures taken to address permit excursions. These reports are submitted electronically to EPA, NYSDEC central and regional offices, and the SCDHS through a new 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 all 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 99 percent in 2017.

There was one excursion of the SPDES permit limit for Biological Oxygen Demand (BOD₅) at Outfall 001. A composite sample collected on April 3, 2017 for routine compliance analysis exhibited a BOD₅ concentration of 5.8 mg/L. The permit limit for BOD₅ is 5 mg/L. The cause of this noncompliance event was not determined as there were no plant upsets during this time period. Fifteen years of analytical results for BOD₅ from the STP Outfall were reviewed and the limit was never exceeded; due to this past performance, this excursion was not expected to recur.

As a preventative (long term) corrective action, a permittee initiated SPDES Permit Modification request to NYSDEC to remove the permit limit for BOD₅ and other surface water based effluent limits at the STP was initiated and submitted for NYSDEC approval. The basis for this was that BNL's STP no longer discharges to surface water (Peconic River). Starting in October 2014, discharges to the river ceased after construction of a new final filtration system and groundwater recharge basins. The low BOD₅ effluent discharge limit was based on the fact that discharges prior to 2014 were to a stream where little or no streamflow was available for dilution and therefore subject to intermittent stream effluent limits. In October 2017, BNL received a new SPDES permit that included the removal of BOD₅ as a required permit limit.

Figures 3-1 through 3-7 plot the five-year trends for monthly concentrations of copper, iron,

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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, replenishing the underlying aquifer. 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 2017, there was one non-compliance event reported for Outfall 002 (HN). A grab sample collected on January 4, 2017 for routine quarterly compliance analysis exhibited a 1-Hydroxyethylidene-1, 1-diphosphonic acid (HEDP) concentration of 1.09 mg/L. The permit

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) | 6.2 | 8.4 | Continuous Recorder | Min 5.8, Max. 8.5 | 0 | 100 |
| Max. 5-Day BOD (mg/L) | <2 | 5.8 | Twice Monthly | 5 | 1 | 96 |
| % BOD Removal | > 89 | > 98 | Monthly | 85 | 0 | 100 |
| Max. TSS (mg/L) | <0.6 | 2.2 | Twice Monthly | 20 | 0 | 100 |
| % TSS Removal | > 96 | >99 | Monthly | 85 | 0 | 100 |
| Settleable solids (ml/L) | 0 | 0 | Daily | 0.1 | 0 | 100 |
| Solids, Total Dissolved (mg/L) | 303 | 503 | Monthly | 1000 | 0 | 100 |
| Ammonia nitrogen (mg/L) | < 0.1 | 1.2 | Twice Monthly | 2 | 0 | 100 |
| Total nitrogen (mg/L) | 0.85 | 9.8 | Twice Monthly | 10 | 0 | 100 |
| Total phosphorus (mg/L) | 1.1 | 1.9 | Twice Monthly | NA | 0 | 100 |
| Cyanide (mg/L) | < 0.002 | 0.003 | Twice Monthly | 0.1 | 0 | 100 |
| Copper (mg/L) | 0.006 | 0.027 | Twice Monthly | 0.15 | 0 | 100 |
| Iron (mg/L) | 0.22 | 0.47 | Twice Monthly | 0.6 | 0 | 100 |
| Lead (mg/L) | 0.001 | 0.005 | Twice Monthly | 0.025 | 0 | 100 |
| Mercury (ng/L) | 5 | 20 | Twice Monthly | 200 | 0 | 100 |
| Methylene chloride (ug/L) | <2 | < 2 | Twice Monthly | 5 | 0 | 100 |
| Nickel (mg/L) | < 0.002 | 0.004 | Twice Monthly | 0.1 | 0 | 100 |
| Silver (mg/L) | < 0.001 | 0.001 | Twice Monthly | 0.015 | 0 | 100 |
| Toluene (ug/L) | < 1 | < 1 | Twice Monthly | 5 | 0 | 100 |
| Zinc (mg/L) | 0.03 | 0.23 | Twice Monthly | 2 | 0 | 100 |
| 1,1,1-trichloroethane (ug/L) | < 1 | < 1 | Twice Monthly | 5 | 0 | 100 |
| Max. Flow (MGD) | 0.3 | 1.0 | Continuous Recorder | 2.3 | 0 | 100 |
| Avg. Flow (MGD) | 0.16 | 0.3 | Continuous Recorder | NA | 0 | 100 |
| HEDP (mg/L) | <0.05 | 0.28 | Monthly | 0.5 | 0 | 100 |
| Tolytriazole (mg/L) | < 0.005 | < 0.005 | Monthly | 0.05 | 0 | 100 |

Notes: Notes:
 See Figure 5-3 for location of Outfall 001.
 * % Compliance = total no. samples – total no. exceedances/total no. of samples x 100
 BOD = biological oxygen demand
 HEDP = 1-hydroxyethylidene diphosphonic acid
 MGD = million gallons per day
 NA = Not Applicable
 SPDES = State Pollutant Discharge Elimination System
 SU = standard unit
 TSS = total suspended solids

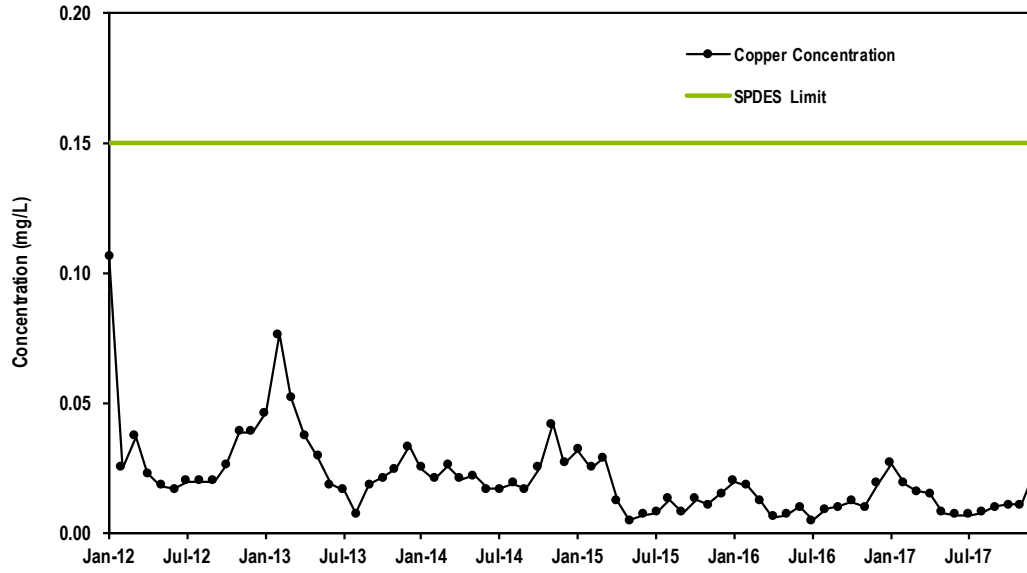


Figure 3-1. Maximum Concentrations of Copper Discharged from the BNL Sewage Treatment Plant, 2012–2017.

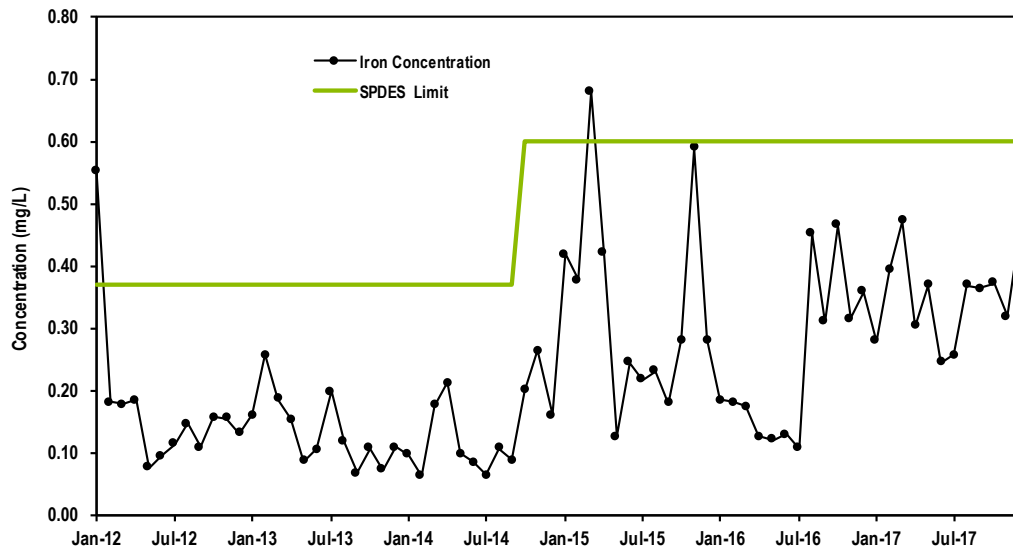


Figure 3-2. Maximum Concentrations of Iron Discharged from the BNL Sewage Treatment Plant, 2012–2017.

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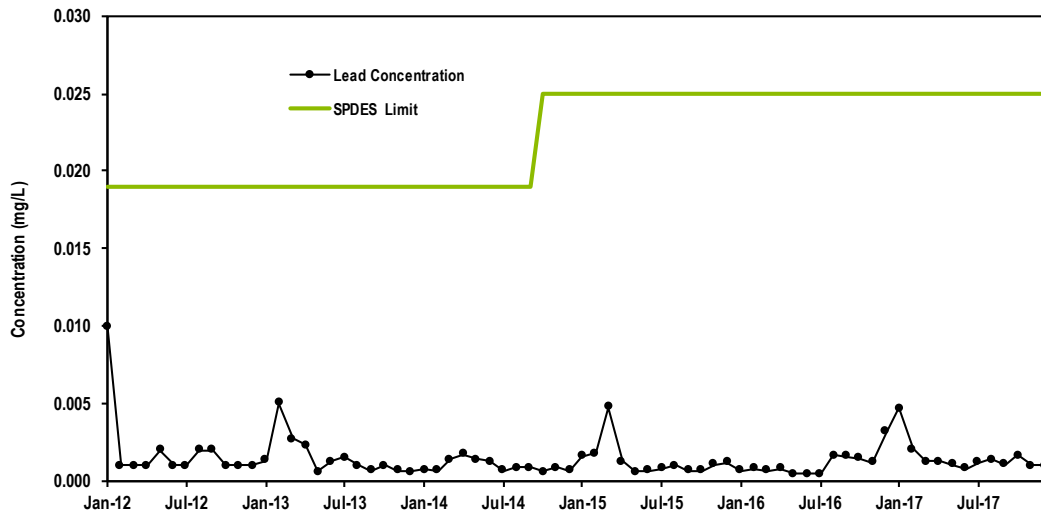


Figure 3-3. Maximum Concentrations of Lead Discharged from the BNL Sewage Treatment Plant, 2012–2017.

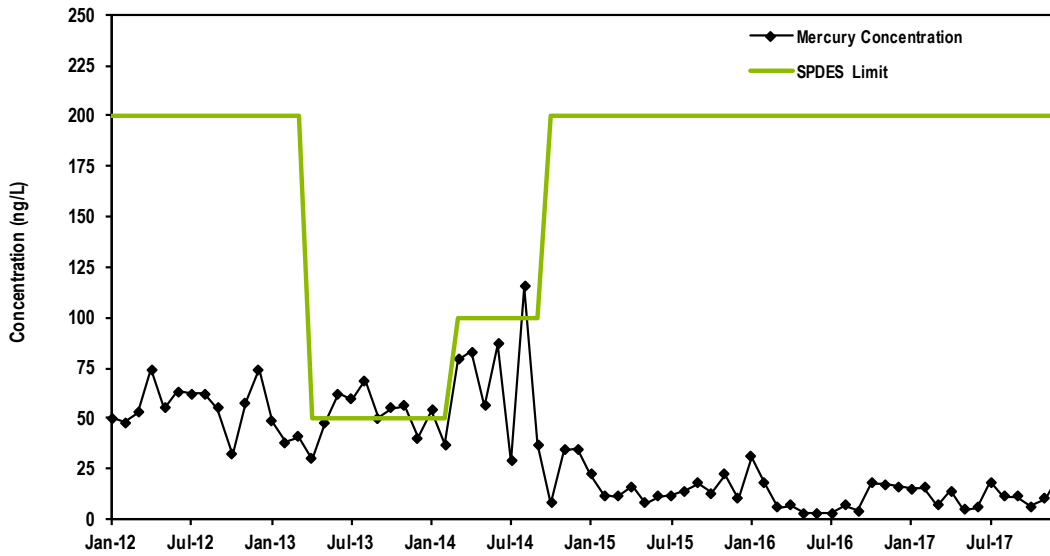


Figure 3-4. Maximum Concentrations of Mercury Discharged from the BNL Sewage Treatment Plant, 2012–2017.

Figure 3-5. Maximum Concentrations of Nickel Discharged from the BNL Sewage Treatment Plant, 2012–2017.

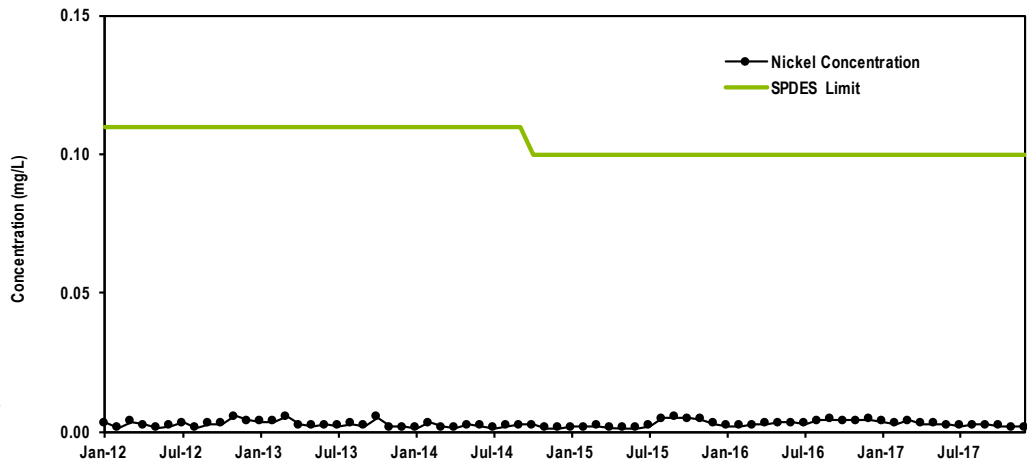


Figure 3-6. Maximum Concentrations of Silver Discharged from the BNL Sewage Treatment Plant, 2012–2017.

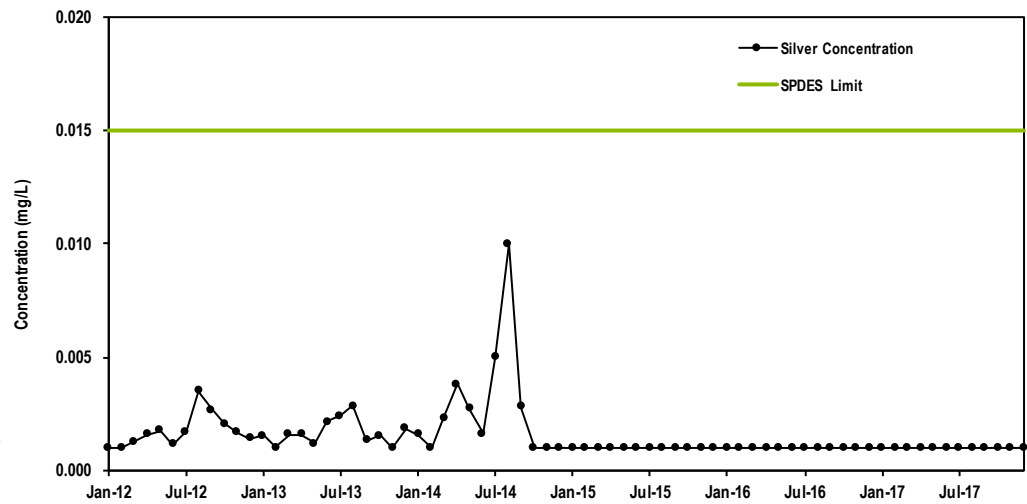


Figure 3-7. Maximum Concentrations of Zinc Discharged from the BNL Sewage Treatment Plant, 2012–2017.

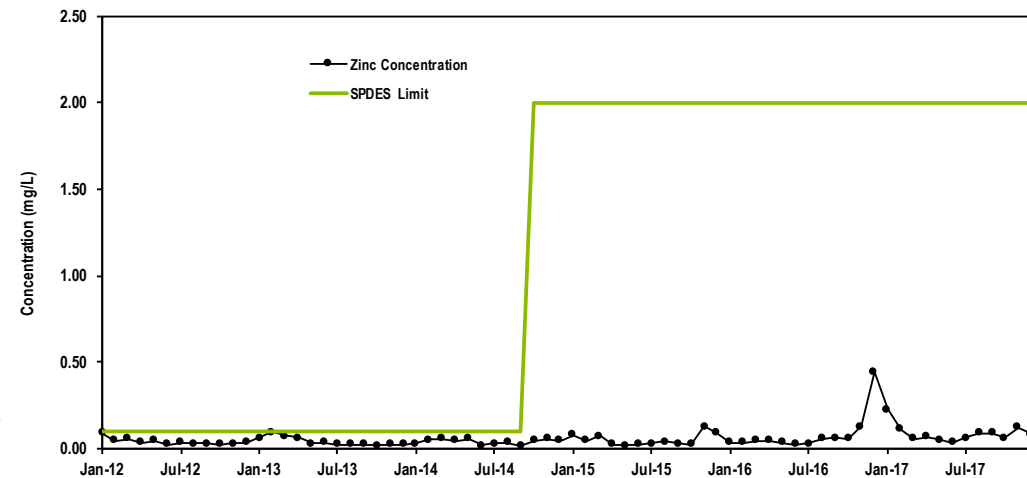


Table 3-4. Analytical Results for Wastewater Discharges to Outfalls 002, 005 - 008, and 010.

| 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 | 11 | 11 | | | |
| | Min. | CR | 0.05 | 0.04 | 0.04 | 0.08 | 0.004 | 0.002 | NA | | |
| | Max. | 0.41 | 0.04 | 0.48 | 0.13 | 0.2 | 2.2 | 1.8 | NA | NA | NA |
| 'pH (SU) | Min. | 6.5 | 7.6 | 6.5 | 6.4 | 6.5 | 6.8 | 7.2 | NA | | |
| | Max. | 8.4 | 8.5 | 8.1 | 8.3 | 8.3 | 8.1 | 8.3 | 8.5, 9.0 (a) | 0 | 100 |
| Oil and Grease (mg/L) | N | 12 | 12 | 12 | 12 | NR | 11 | 11 | | | |
| | Min. | <1.1 | <1.1 | <1.1 | <1.1 | NR | <1.1 | <1.1 | NA | | |
| | Max. | 1.3 | 9.4 | 3.7 | 1.5 | 1.4 | 2.4 | 4.8 | 15 | 0 | 100 |
| Copper (mg/L) | N | NR | 4 | NR | NR | NR | NR | 4 | NA | | |
| | Min. | NR | NR | <0.003 (T) | NR | NR | NR | <0.003 (D) | NA | | |
| | Max. | NR | NR | 0.008 (T) | NR | NR | NR | 0.004 (D) | 1.0 | 0 | 100 |
| Aluminum (mg/L) | N | 5 | NR | NR | NR | NR | 4 | 4 | NA | | |
| | Min. | <0.07 (T) | NR | NR | NR | NR | <0.07 (D) | <0.07 (D) | NA | | |
| | Max. | 0.56 (T) | NR | NR | NR | NR | 0.07 (D) | 0.2 (D) | 2.0 | 0 | 100 |
| Lead, Dissolved (mg/L) | N | NR | NR | NR | NR | NR | NR | 4 | NA | | |
| | Min. | NR | NR | NR | NR | NR | NR | <0.001 | NA | | |
| | Max. | NR | NR | NR | NR | NR | NR | 0.001 | 0.05 | 0 | 100 |
| Vanadium, Dissolved (mg/L) | N | NR | NR | NR | NR | NR | NR | 4 | NA | | |
| | Min. | NR | NR | NR | NR | NR | NR | 0.004 | NA | | |
| | Max. | NR | NR | NR | NR | NR | NR | 0.006 | NPL | NA | NA |
| Chloroform (µg/L) | N | 4 | NR | NR | NR | NR | NR | NR | NA | | |
| | Min. | 0.3 | NR | NR | NR | NR | NR | NR | NA | | |
| | Max. | 1.0 | NR | NR | NR | NR | NR | NR | 7 | 0 | 100 |
| Bromodichloromethane (µg/L) | N | 4 | NR | NR | NR | NR | NR | NR | NA | | |
| | Min. | <1.0 | NR | NR | NR | NR | NR | NR | NA | | |
| | Max. | <1.0 | NR | NR | NR | NR | NR | NR | 50 | 0 | 100 |
| 1,1,1-trichloroethane (µg/L) | N | 4 | NR | NR | NR | NR | 11 | NR | NA | | |
| | Min. | <1.0 | NR | NR | NR | NR | <1.0 | NR | NA | | |
| | Max. | <1.0 | NR | NR | NR | NR | <1.0 | NR | 5 | 0 | 100 |
| 1,1-dichloroethane (µg/L) | N | NR | NR | NR | NR | NR | 11 | NR | NA | | |
| | Min. | NR | NR | NR | NR | NR | <1.0 | NR | NA | | |
| | Max. | NR | NR | NR | NR | NR | <1.0 | NR | 5 | 0 | 100 |
| Hydroxyethylidene-diphosphonic acid (mg/L) | N | 4 | 4 | 4 | 4 | NR | NR | NR | NA | | |
| | Min. | <0.05 | NR | <0.05 | <0.05 | NR | NR | NR | NA | | |
| | Max. | 1.1 | NR | <0.05 | <0.05 | <0.05 | NR | NR | 0.5 | 1 | 75 |
| Tolyltriazole (mg/L) | N | 4 | 4 | 4 | 4 | NR | NR | NR | NA | | |
| | Min. | <0.005 | NR | <0.005 | <0.005 | NR | NR | NR | NA | | |
| | Max. | <0.005 | NR | <0.005 | <0.005 | 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

limit for HEDP is 0.5 mg/L. A determination was made that this exceedance was most likely due to compliance with a NY State mandate for disinfection of cooling towers for the prevention of Legionella bacteria and practice of manually dosing towers, which could create an abnormal spike in the tower treatment levels for a day or so following manual additions. Compliance with this mandate has resulted in the need to treat several additional cooling towers manually. Arrangements were made to collect an additional sample from Outfall 002 to ensure that HEDP concentrations were below permit limits. A grab sample was collected on February 1, 2017 and the results indicated that the HEDP concentration was < 0.25 mg/L, which is below the permit limit.

Facilities & Operations (F&O) and Environmental Protection Division (EPD) staff met on February 13, 2017 to discuss this issue and agreed that the following long-term corrective actions be further evaluated/implemented to prevent this exceedance from occurring in the future: 1) Improve automation at cooling towers to prevent overfeed of product; and 2) stagger the draining of the cooling towers to allow a more steady discharge of treated water to the outfall. To date, new feed stations have been installed in Building 912 and 957 towers. Additional feed stations are planned for Buildings 1000P, 1002, 1004, and 1010.

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 2017) 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 2017. 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. In 2017, BNL's drinking water and the supply and distribution system were in full compliance with all applicable county, state, and federal regulations regarding drinking water quality, monitoring, operations, and reporting. 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

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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 | 0.66 | 3.1 | < 0.1 | SNS |
| Chlorides (µg/L) | 39.7 | 44.8 | 37.1 | 71 | 62.5 | 64.9 | 250 |
| Color (units) | 10* | 30* | 30* | < 5 | < 5 | 5 | 15 |
| Conductivity (µmhos/cm) | 194 | 199 | 197 | 339 | 297 | 351 | 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) | 0.25 | 0.58 | 0.35 | 0.75 | 0.61 | 0.63 | 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) | 5.5 | 5 | 5.5 | 6 | 5.5 | 7.2 | SNS |
| Sulfates (mg/L) | 8.1 | 9.8 | 9.7 | 10.8 | 12.6 | 11.5 | 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 | 1 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | 50 |
| Barium (mg/L) | 0.035 | 0.034 | 0.025 | 0.055 | 0.053 | 0.052 | 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 | 0.001 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | 0.1 |
| Fluoride (mg/L) | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 2.2 |
| Iron (mg/L) | 0.46* | 4.99* | 2.7* | < 0.20 | < 0.20 | 0.2 | 0.3 |
| Lead (µg/L) | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | 15 |
| Manganese (mg/L) | 0.122 | 0.086 | 0.074 | < 0.010 | < 0.010 | < 0.010 | 0.3 |
| Mercury (µg/L) | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | 0.28 | 2 |
| Nickel (mg/L) | <0.0005 | 0.006 | 0.003 | 0.001 | 0.002 | 0.003 | SNS |
| Selenium (µg/L) | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | 2.3 | 50 |
| Sodium (mg/L) | 25 | 28.7 | 24.9 | 48.5 | 39.7 | 48.4 | 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) | 0.031 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | 5 |
| Radioactivity | | | | | | | |
| Gross alpha activity (pCi/L) | < 1.99 | < 1.93 | < 1.77 | < 2.06 | < 1.4 | NR | 15 |
| Gross beta activity (pCi/L) | < 2.2 | 1.84 ± 0.63 | 2.01 ± 0.58 | 3.51 ± 0.69 | 4.99 ± 0.71 | NR | (a) |
| Radium-228 (pCi/L) | NS | NS | NS | NS | NS | NR | 5 |
| Strontium-90 (pCi/L) | < 0.77 | < 0.47 | < 0.65 | < 0.60 | < 0.65 | NR | 8 |
| Tritium (pCi/L) | < 510 | < 500 | < 504 | < 503 | < 503 | 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) | 9.1 | 8.9 | 14.7 | 30 | 25.5 | 60.8 | SNS |
| Asbestos (M. fibers/L) | NR | NR | NR | NR | NR | < 0.20 | 7 |
| Calcium (mg/L) | 5.3 | 5.6 | 6.5 | 13 | 11.1 | 17 | SNS |
| HAA5 (mg/L) | NR | NR | NR | NR | NR | 0.007 | 0.06** |
| Residual chlorine - MRDL (mg/L) | NR | NR | NR | NR | NR | 1.3 | 4 |
| TTHM (mg/L) | NR | NR | NR | NR | NR | 0.024 | 0.08** |

Notes:

See Figure 7-1 for well locations.

Well 12 was not operational for 2017; no testing was completed during this time.

HAA5 = five haloacetic acids

MBAS = methylene blue active substances

MRDL = maximum residual disinfectant level

ND = not detected

NR = analysis not required

NS = not sampled

NYS DWS = New York State Drinking Water Standard

SNS = drinking water standard not specified

TTHM = total trihalomethanes

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

** Limit imposed on distribution samples only.

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

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 2017, the Laboratory inspected 275 cross-connection control devices, including primary devices installed at interfaces to the potable water main, and secondary control devices at the point of use. If a problem with a cross-connection device is encountered during testing, the device is repaired and retested 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 dry-wells, 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 June 2010, an application was filed with EPA to renew the Class V UIC permit for the site. In August 2012, BNL received a letter from EPA indicating that addition or removal of UICs from the existing inventory would be “authorized by rule,” pursuant to 40 CFR § 144.24; however, it is still unclear if EPA intends on renewing BNL’s Class V UIC permit. In addition to the UICs maintained for routine Laboratory discharges of sanitary waste and storm water,

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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 |
| 1,1,1,2-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.

| 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 | 2.3 | 2.4 | 40.8 | 0.7 | 0.6 | 2.0 | 50 |
| Bromodichloromethane | 2.8 | 0.5 | 2.5 | 12.3 | 1.1 | 3.5 | 50 |
| Dibromochloromethane | 2.9 | < 0.5 | 0.55 | 3.3 | < 0.5 | 0.6 | 50 |
| Bromoform | 1.1 | 0.9 | < 0.5 | 1.6 | < 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 |

(continued on next page)

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

| Compound | WTP Effluent | Well No. 4 | Well No. 6 | Well No. 7 | Well No. 10 | Well No. 11 | NYS DWS |
|-------------|--------------|------------|------------|------------|-------------|-------------|---------|
| | µg/L | | | | | | |
| Metolachlor | <1 | <1 | <1 | <1 | <1 | <1 | 50 |
| Metribuzin | <0.5 | < 0.15 | < 0.15 | < 0.15 | < 0.15 | < 0.15 | 50 |
| Butachlor | <1 | <1 | <1 | <1 | <1 | <1 | 50 |
| Endothall | <9 | < 9 | < 9 | < 9 | < 9 | < 9 | 100 |
| Propachlor | <1 | <1 | <1 | <1 | <1 | <1 | 50 |

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.

* Water is treated at the Water Treatment Plant prior to site distribution.
 Well 12 was offline and remained unused during 2017.
 NA = not available
 NR = analysis not required
 SNS = drinking water standard not specified
 NYS DWS = New York State Drinking Water Standard
 WTP = Water Treatment Plant

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 [] |

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. There were no changes to BNL’s total UIC inventory (125) in 2017.

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. The purpose of this plan is to provide information regarding release prevention measures, the design of storage facilities, and maps detailing storage facility locations. The plan also outlines mitigating and remedial actions that would be taken in the event of a major spill. BNL’s SPCC plan is filed with NYSDEC, EPA, and DOE and must be updated every 5 years. BNL remained in full compliance with SPCC requirements in 2017.

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 44 on-site chemicals (with thresholds greater than 10,000 pounds or 500 pounds for acutely toxic materials) via the New York State approved E-Plan computer-based submittal program. The chemicals ranged from road salt (~ 1,200 tons) to chromic chloride (1 pound). To satisfy the requirements of the Tier III submittal, the Laboratory submitted its data via the EPA approved TRI-ME computer-based submittal program. BNL reported releases of lead (~ 75,065 pounds), mercury (~6.5 pounds), polychlorinated biphenyls (PCBs) (~2 pounds), benzo(g,h,i)perylene (<1 pound), and polycyclic aromatic compounds (<1 pound) in 2017. Releases of lead, PCBs, and mercury 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 2017, 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 21 spills in 2017 and 11 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 11 reportable events, including a description of the cause and corrective actions taken. There were no long-term effects from these releases and no significant impact on the environment. In all instances, any recoverable material was removed, spill absorbents were used to remove the residual product, and all materials were collected and containerized for off-site disposal. For releases to soil, contaminated soil was removed to the satisfaction of the State inspector and containerized for off-site disposal.

3.8.4 Major Petroleum Facility (MPF) License

The storage and transfer of 2.3 million gallons of fuel oil (principally No. 6 oil) subjects the Laboratory to MPF licensing by NYSDEC. The fuel oil used at the CSF to produce high-pressure steam to heat and cool BNL facilities is stored in six tanks with capacities ranging from 300,000 to 600,000 gallons. The remaining storage facilities at BNL have capacities that range from 100 to 10,000 gallons and are located throughout the site where there is a need for building heat, emergency power, or other miscellaneous petroleum needs (motor oil, waste oil, lube oil). There were no changes to BNL’s MPF License in 2017.

CHAPTER 3: COMPLIANCE STATUS

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

| Spill No. and Date | Material/Quantity | ORPS Report | Source/Cause and Corrective Actions |
|--------------------|--------------------------------|-------------|---|
| 17-01 01/5/17 | Transformer Oil/ 1 gallon | No | While conducting a routine PM inspection, Tower Line personnel noticed oil on the concrete pad for a transformer serving Bldg. 832. The leak was apparently coming from three fuse holders located at the top of the transformer basin and the oil traveled down the transformer body onto the concrete pad and then onto the gravel surrounding the pad. Tower Line personnel placed adsorbent material on the concrete pad and the Grounds Dept. removed stained gravel and some soil that was impacted. A single 55-gallon drum was used for the disposal of the stained gravel, soil, adsorbent pads, PPE and debris. Liquid transformer oil was consolidated with similar wastes to be disposed offsite along with the 55-gallon drum as non-hazardous industrial waste by Waste Management. |
| 17-04 01/24/17 | Hydraulic Fluid/ 10 gallons | No | During routine shift surveillance of the AGS Siemens Motor-Generator Set in the basement of Building 928, an electrical technician noted oil leaking from a pipe fitting above the tank and a thin film of oil on the adjacent floor. Approximately 10 gallons of oil was estimated to have spilled when the condition was discovered. Operation of the Motor Generator set was immediately shut down. Speedy dry and absorbent pads were used to clean the spilled oil from the basement floor. The trap of a floor drain in the impacted area was also cleaned using oil-absorbent pads. Waste generated from the spill clean-up was placed into a 55 gallon drum to be disposed as non-hazardous industrial waste by Waste Management. |
| 17-05 04/11/17 | Hydraulic Fluid/ 1 gallon | No | While dumping leaves and tree branches at the Compost Area, Grounds personnel discovered a leak from the hydraulic mechanism of a Kubota utility vehicle. Contaminated soil beneath the vehicle was recovered and placed into a 55-gallon drum. The drum was transferred to the Waste Management Facility for eventual offsite disposal as non-hazardous industrial waste. |
| 17-08 05/18/17 | Hydraulic Fluid/ 30 gallons | No | While performing service work on the freight elevator in Bldg. 555, elevator technicians noted hydraulic system operational issues with the elevator as they lowered it from the 3rd floor to the lobby. Inspecting the elevator pit, they found traces of hydraulic oil on the framework around the piston. They also noted that oil levels were low in the elevator tank. Suspecting a leak, they immediately took the elevator out of service. Upon further investigation, they found oil present in the annular space between the piston steel casing and the piston's PVC secondary containment liner 46 feet below the pit floor. They estimated that 30 gallons leaked on the basis of oil added to the elevator hydraulic tank, its capacity, and measurements of the elevator position. Through additional inspection, they traced the leak to an open bleeder valve on the elevator jack head. Following elevator manufacturer instructions, technicians were able to confirm via tests that no hydraulic oil had leaked into the PVC secondary containment liner. Over multiple days, with assistance from Environmental Protection personnel, elevator technicians recovered 22.75 gallons of oil from the casing. After confirming all oil was removed from the casing, F&O contacted the elevator manufacturer and asked them to replace the piston shaft packing. Subsequent biweekly inspections conducted after the jack casing was replaced in September confirmed that hydraulic oil was no longer leaking into the annular space. |
| 17-09 07/11/17 | Hydraulic Fluid/ 4 gallons | No | While attempting to empty a dumpster by Bldg. 1002, the contractor driver found the hydraulic lift was not working as fluid had leaked from a hose and pooled on pavement and soil near the dumpster. The driver immediately alerted C-AD personnel in the building of the spill and then applied granular absorbent to the spill area. Roughly four (4) gallons of hydraulic fluid leaked to pavement and soil. He also contacted management at their facility. Additional contractor personnel arrived with a roll-off container and they dug down roughly 3 inches to clean soil removing roughly 10 cubic feet of contaminated soil into the roll-off. Grounds personnel arrived with the street sweeper and used brooms to work sand into the pavement of 1 yard wide 0.3 mile path of contaminated pavement between Bldg. 1002 and an earlier waste stop at Bldg. 1012. The sweeper picked up the sand and took it back to Bldg 326. The contractor took contaminated absorbent and recovered soil to a transfer facility in Yaphank where it was later taken to a licensed industrial waste facility in Waverly Virginia for final disposition. |
| 17-10 08/2/17 | Radiator Fluid/ 1 pint | No | As it was being used in the vicinity of South Boundary Path, a radiator hose on a contractor's pick-up failed releasing roughly a pint of antifreeze onto the soil. The vehicle was taken to the on-site service station for repairs. The contractor dug up and containerized contaminated soil for disposal as industrial waste. |

(continued on next page)

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

| Spill No. and Date | Material/Quantity | ORPS Report | Source/Cause and Corrective Actions |
|--------------------|----------------------------------|-------------|---|
| 17-12 08/24/17 | Mineral Oil/ 3 quarts | No | While removing a barricade around a dumpster at the rear of Bldg. 930, Collider-Accelerator Department personnel discovered mineral oil leaking from a corner of the dumpster onto soil. The oil had leaked from a vacuum pump within the dumpster. Speedy dry was applied to soil and pans were set by the corner of the dumpster to capture dripping oil. After the dumpster was moved to permit clean-up, Grounds personnel recovered contaminated speedy dry and soil and placed it into a 55-gallon drum that was transferred to 90-day waste storage area at Bldg. 452 to await off-site disposal as industrial waste via Waste Management. |
| 17-14 09/21/17 | Transmission Fluid/3 quarts | No | As riggers lifted a tensile tester machine to be excessed for scrap metal, it fell from the forklift spilling some residual transmission fluid in the equipment onto pavement and soil behind Bldg. 494. Green Stuff® absorbent was used to absorb spilled fluid. Contaminated soil and Green Stuff® were scraped up by Grounds personnel using a shovel and placed into a 5-gallon bucket that was transferred to 90-day waste accumulation area at Bldg. 452. Residual fluid within the machine was recovered and the machine was deposited into a scrap metal dumpster. |
| 17-16 10/3/17 | Hydraulic Fluid/ 0.75 gallons | No | While transferring soil to the center median in front of Bldg. 30, the operator of a Kubota utility vehicle noticed hydraulic fluid leaking beneath the vehicle after dumping soil from vehicle. Speedy dry and absorbent pads were used to clean-up hydraulic fluid leaking from the vehicle after the driver moved it onto pavement. Contaminated soil at the median was dug up by Grounds personnel and placed into two 55-gallon drums along with contaminated speedy dry and absorbent pads. The drums were taken to the 90-day waste storage area at Bldg. 452. |
| 17-17 10/13/17 | #6 Fuel Oil/ ≈1 quart | No | While Central Steam Facility (CSF) stationary engineers were bringing the #6 fuel oil shell & tube heat exchanger (#2 Station/bundle#1) online, an oil tube failed causing fuel oil to mix with condensate. The mixture discharged from the open condensate drain valve onto the concrete pad and into the building sanitary drain system. Oil adsorbent pads were used to clean oil from the pad. Water Systems staff opened sanitary drain manhole covers and placed retrievable oil absorbent booms by the sanitary drain inlet pipes to capture oil passing through the system. As a precautionary measure to prevent any oil from reaching the sewage treatment plant, oil absorbent booms were placed in two down gradient sanitary system manholes in the field east of North Sixth Street and before the influent to the sewage treatment plant. The first two sanitary manholes outside the CSF were the only manholes with observable oil and oil sheen present. After Water Systems and EPD personnel determined that no additional oil or oil sheen was visible in water flowing through the sanitary system, oil adsorbent pads were used to capture residual floating oil in the second sanitary manhole that hadn't been adsorbed by the first boom. The oil contaminated adsorbent pads and adsorbent booms were then removed and placed into a 55 gallon drum. The drum was transferred to the 90-day waste storage area at Bldg. 452. |
| 17-18 10/16/17 | Hydraulic Fluid/ 1 quart | No | While the 150 Grove Lattice Boom Crane was being used near Bldg. 1004, a hydraulic line ruptured causing hydraulic fluid to spray onto the side of the crane and onto the ground. After seeing fluid spraying from the ruptured line, the operator immediately shut down the crane and contacted Fire Rescue for assistance with the clean-up. Absorbent pads that were used to wipe down oil from the side of the crane and contaminated soil collected near its base were placed into two 5-gallon buckets for disposal by Waste Management. |

Notes: ORPS = Occurrence Reporting and Processing System

There are currently 66 petroleum storage facilities listed on the License, which expires on March 31, 2022. During 2017, BNL remained in full compliance with MPF license requirements, which include monitoring groundwater in the vicinity of the six above-ground storage tanks located at the MPF. The license also requires the Laboratory to inspect the storage facilities monthly, and test the tank leak detection

systems, high-level monitoring, and secondary containment. Tank integrity is also checked periodically. Groundwater monitoring consists of monthly checks for the presence of floating products and twice-yearly analyses for VOCs and semi-volatile organic compounds (SVOCs). In 2017, 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.

A major upgrade was performed at the MPF on the secondary containment berm for Tank No. 611-10, and Tank Nos. 611-04 and 611-09 were taken out-of-service, drained of all fuel, thoroughly cleaned, and inspected by a NACE-certified inspector. Repairs and more berm rehabilitation projects are scheduled for 2018.

On August 15, 2017, a representative from the U.S. EPA Office of Oil Pollution Prevention conducted an inspection of the storage tanks-facilities included on the MPF license. This inspection included a review of the Spill Prevention Control and Countermeasure (SPCC) Plan, facility blueprints-maps, training records, inspection records, the Spill Management Table-top Exercise (SMTTX) Drill records, and other documents. There were no findings.

Due to favorable past performances on past petroleum bulk storage compliance audits and strong overall program, the NYSDEC exempted the Laboratory from its annual inspection in 2017.

3.8.5 Chemical Bulk Storage

Title 6 of the Official Compilation of the Codes, Rules, and Regulations of the State of New York (NYCRR) Part 597 requires that all aboveground tanks larger than 185 gallons and all underground tanks that store specific chemicals be registered with NYSDEC. The Laboratory holds a Hazardous Substance Bulk Storage Registration Certificate for six tanks that store treatment chemicals for potable water (sodium hydroxide and sodium hypochlorite). The tanks range in capacity from 200 to 1,000 gallons. In 2017, BNL renewed its Chemical Bulk Storage (CBS) Registration in accordance with NYSDEC directives and received a Hazardous Substance Bulk Storage Registration Certificate. This certificate will expire on July 27, 2019.

Due to favorable past performances on past chemical bulk storage compliance audits and strong overall program, the NYSDEC exempted the Laboratory from its annual inspection in 2017.

3.8.6 County Storage Requirements

Article 12 of the Suffolk County Sanitary Code regulates the storage and handling of toxic

and hazardous materials in aboveground or underground storage tanks, drum storage facilities, piping systems, and transfer areas. Article 12 specifies design criteria to prevent environmental impacts resulting from spills or leaks, and specifies administrative requirements such as identification, registration, and spill reporting procedures. In 1987, the Laboratory entered into a voluntary Memorandum of Agreement with SCDHS, in which DOE and BNL agreed to conform to the environmental requirements of Article 12. In April 2010, due to a directive from NYSDEC asserting their sole jurisdiction over petroleum storage at Major Oil Storage Facilities, SCDHS notified BNL that they will cease permitting activities (e.g., review/approval for new construction and modifications, issuance of operating permits, and registration requirement) for all petroleum bulk storage facilities. In 2011, the Laboratory received further information that indicated SCDHS had ceased applying Article 12 requirements to both petroleum and chemical storage at BNL regardless of whether the storage is regulated by NYSDEC. Currently, there are approximately 120 active storage facilities that are not regulated by NYSDEC that would normally fall under SCSC Article 12 jurisdiction. This includes storage of wastewater and chemicals, as well as storage facilities used to support BNL research.

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

3.9 RCRA REQUIREMENTS

The Resource Conservation and Recovery Act 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 off site to licensed treatment and disposal facilities. As noted in Chapter 2, BNL also has a number of 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 2017, BNL received approval from the NYSDEC for its 6NYCRR Part 373 RCRA Permit renewal which regulates the storage of hazardous waste. Approval was also granted for the closure of two 90-Day Hazardous Waste Accumulation Areas which were no longer needed.

In March and September 2017, the NYSDEC and the EPA respectively performed an unannounced inspection of hazardous waste activities at BNL. Both agencies were 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 2017 and disposed of 614.5 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 subsequently audited by a third party in 2012. Pesticides are used at the Laboratory to control undesirable insects, mice, and rats; microbial growth in cooling towers; and to maintain certain areas free of vegetation (e.g., around fire hydrants and inside secondary containment berms). Insecticides are also applied in research greenhouses on site and the Biology Field. Herbicide use is minimized wherever possible (e.g., through spot treatment of weeds). All pesticides are applied by BNL-employed, New York State-certified applicators. By February 1, each applicator files an annual report with NYSDEC detailing insecticide, rodenticide, algicide, and herbicide use for the previous year.

3.12 WETLANDS AND RIVER PERMITS

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

Activities that could require review under the BNL Natural and Cultural Resource

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

3.13 PROTECTION OF WILDLIFE

3.13.1 Endangered Species Act

BNL updates its list of species that are endangered, threatened, and/or of special concern (see Table 6-1 in Chapter 6) as data from state and federal sources are provided. The northern long-eared bat (*Myotis septentrionalis*) was determined to be a federally threatened species on April 2, 2015 and is the first federally listed species known to be present at the Laboratory. This species is known to utilize the site at least during the summer months, and management options have been established for the protection of this species on site. The rusty-patched bumble bee (*Bombus affinis*) was determined to be federally endangered on January 11, 2017. This bee was historically found on Long Island. There is a remote chance the bee may still exist on Long Island; therefore, care is taken during pollinator surveys to limit impacts to bumble bees.

State-recognized endangered (E) or threatened (T) species at BNL include: eastern tiger salamander (E), persius duskywing (E), bracken fern (E), crested fringed orchid (E), engelman spikerush (E), dwarf huckleberry (E), whorled loosestrife (E), fireweed (E), prostrate knotweed (E), possum hawk (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. As part of environmental benefits associated with the Long Island Solar Farm (LISF), a small tiger salamander habitat was modified to ensure improved water retention for longer periods of time.

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

Long Island experienced an extended drought from 2015 through early 2017 which resulted in virtually all water-bodies on the BNL site drying, including the one remaining coastal plain pond supporting banded sunfish and swamp darter. The NYSDEC reported that all but a few banded sunfish habitats experienced the same drying, and that plans must be developed for the restoration of these two species once drought conditions lift.

Three butterfly species that are endangered, threatened, or of special concern have been historically documented at the Laboratory. These include the frosted elfin, persius duskywing, and the mottled duskywing. None have been documented in recent surveys. Habitat for the frosted elfin and persius duskywing exists on Laboratory property and the mottled duskywing is likely to exist on site; therefore, management of 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. However, BNL is working with Hofstra University to study reproductive strategies and habitat use of the eastern box turtle and it is a focal species for study within the LISF. Results of these studies may show the need for conservation and management needs. The Laboratory continues to evaluate bird populations as part of the management strategy outlined in the NRMP.

The Laboratory has 33 plant species that are protected under state law: eight are endangered; three are threatened (as listed above); and four are rare plants, the small-flowered false foxglove, narrow-leafed bush clover, wild lupine, and long-beaked bald-rush. The other 18 species are considered to be "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 considered to be 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. In an effort to locate and document rare plants, the Laboratory is working with a botanist to assess the flora found on site. 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, they do occasionally visit 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 Sewage Treatment Plant through much of 2017. 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 2013b) and are consistent with the pre-approved authorized release limits set by DOE Order 458.1.

In 2017, excess materials not identified as radioactive, such as scrap metal electronics equipment as a result of normal operations were released to interested parties or to an off-site location. All materials were surveyed, as required, using appropriate calibrated instruments and released based on DOE pre-approved authorized limits. There were no releases of real property in 2017.

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 2017, BNL was inspected by federal, state, or local regulators on 10 occasions. These inspections included:

- *Air Compliance.* In August, a NYSDEC inspector conducted a full compliance evaluation of regulatory emission sources including review of records. 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.
- *SPCC.* In August, EPA performed a Field Inspection to evaluate BNL's SPCC Plan and its implementation and there were no deficiencies identified.
- *Sewage Treatment Plant.* SCDHS conducts quarterly inspections of the Laboratory's STP to evaluate operations and sample the effluent. No performance or operational issues were identified. NYSDEC performed a surveillance inspection in November; there were no issues identified.
- *RCRA.* In March, three inspectors from NYSDEC performed a two-day RCRA inspection and did not identify any concerns or violations. In September, EPA performed an unannounced RCRA Compliance inspection and did not identify any concerns or findings.

3.15.2 DOE Assessments/Inspections

The DOE Brookhaven Site Office (BHSO) continued to provide oversight of BNL programs during 2017 and participated as an observer of the Brookhaven Sciences Associates (BSA) Multi-Topic Assessment of Brookhaven National Laboratory's of BNL's environmental protection programs described below. BHSO participation comprised of observing BSA's scoping, assessment conduct, and reporting. BHSO also performed a surveillance of Groundwater Treatment System Carbon Replacement at the Operable Unit IV Ethylene Dibromide treatment system. No findings were identified, and all operations were observed to be conducted in a safe and environmentally sound manner.

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 2017, EPD conducted a programmatic

self-assessment on BNL's Storage and Transfer of Hazardous and Nonhazardous Materials, Radioactive and Non-Radioactive Airborne Emissions, and Liquid Effluent programs. The specific objectives and scope of these assessments were described in assessment plans and implemented in accordance with the EPD's procedure for "*Preparing for and Conducting Regulatory Environmental Compliance Assessments*". During the course of these assessments, a representative sampling of managers, supervisors, and workers were interviewed. In addition, numerous documents and activities were reviewed to enable a comprehensive, independent, and objective assessment of the conformance to requirements and the effectiveness of implementation of these programs.

The assessment of these programs identified eight Noteworthy Practices, 16 Observations, 15 Opportunities for Improvement, and eight minor Nonconformances. Except for the noted minor Nonconformances, the assessed programs as a whole were found to be in conformance with applicable BNL Standards Based Management System and external regulatory requirements. A causal analysis was performed and a corrective action plans were prepared for the identified minor nonconformances and observations to address the issues. Progress on the actions are tracked to closure in BNL's Institutional Assessment Tracking System.

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 random unannounced inspections.

The NNSS performed surveillance on the BNL Radioactive Waste program on April 4 and 5, 2017. The team consisted of two members of the Rad-Waste Assistance Program (RWAP), one DOE Nevada staff, and one State of Nevada regulator. The team concentrated on Quality Assurance and Chemical Characterization. The Quality Assurance elements assessed pertained to Training and Qualifications, Document and Records Management, Procurement/Supplier Evaluations and Inspection and Acceptance Testing of materials/supplies. Chemical Characterization was

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 two findings and one observation for which a Corrective Action Plan, identifying actions taken to resolve the findings and their associated schedule for completion, was requested. The findings identified pertained to the review and submission of required documents that support BNL's waste certification program. The observation was that BNL's chemical characterization data was not clearly documented in its waste profiles and was difficult for the auditor to follow. The findings and observation were addressed in June 2017.

3.16 AGREEMENTS, ENFORCEMENT ACTIONS, AND OTHER ENVIRONMENTAL OCCURRENCE REPORTS

In addition to the rules and regulations discussed throughout this chapter, there were two existing agreements between BNL, DOE, and regulatory agencies that remained in effect in 2017 (see Table 3-9). There were no Notices of Violation accessed in 2017; however, there was one environmental event that was reported in accordance with BNL's Event/Issue Management Subject Area and documented in the Integrated Operational Performance System. The event is summarized in Table 3-10.

REFERENCES AND BIBLIOGRAPHY

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- DOE Order 458.1 2011. Radiation Protection of the Public and the Environment. U.S. Department of Energy, Washington, DC. February 11, 2011.
- EPA. 2000. Federal Facilities Agreement under CERCLA 120. Administrative Docket Number II-CERCLA-FFA-00201.
- SCDHS. 1993. Suffolk County Sanitary Code Article 12: Toxic and Hazardous Material Storage and Handling Controls. Suffolk County Department of Health Services, NY.

CHAPTER 3: COMPLIANCE STATUS

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 2017. |

No Notices of Violation/Enforcement Actions for 2017.

Notes:
 CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
 EPA = Environmental Protection Agency
 NEPA = National Environmental Policy Act
 NYSDEC = New York State Department of Environmental Conservation
 RCRA = Resource Conservation and Recovery Act
 SCDHS = Suffolk County Department of Health Services

Table 3-10. Summary of Other Environmental Occurrence Reports, 2017.

| IOPS* Event #: E-00186 | Date: 01/16/17 |
|--|--|
| Startup testing in preparation for the 2017 RHIC Run identified a small leak in a 35 foot underground section of a water system used to cool about 60 beam line magnets. The loss rate was determined to be approximately 4 gallons/day and it was estimated that approximately 375 gallons leaked during system testing and the search for the leak. Based upon cooling water surveillance data, the cooling water typically has an average tritium concentration of 1,299 pCi/L or less. For comparison, the drinking water standard for tritium is 20,000 pCi/L. Even though concentrations of the cooling water were ~5% of the drinking water standard a commitment was made to repair the pipe prior to starting the RHIC experiment run. Environmental impacts were investigated and tritium was not detected in groundwater. | Status: New piping was installed and tested and cooling water system was placed back in service for commissioning. Monitoring of tritium concentrations in cooling water system and in nearby groundwater monitoring well will continue. |

Notes:
 * Reported in accordance with BNL's Event/Issue Management Subject Area and documented in the Integrated Operational Performance System (IOPS).