

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; 11 equivalency permits for operation of groundwater remediation systems; and several other binding agreements. In 2022, 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 2022. There were nine recorded excess opacity measurements. One excess opacity reading recorded by the Boiler 6 monitor on February 6 was due to a load shift and eight Boiler 6 excess opacity readings on May 16 occurred during quarterly opacity calibration error tests. All the excursions were documented in quarterly Site-Wide Air Emissions and Monitoring Systems Performance Reports submitted to the New York State Department of Environmental Conservation (NYSDEC).

In 2022, 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.

BNL's drinking water and the supply and distribution system were in compliance with all applicable county, state, and federal regulations regarding drinking water quality, monitoring, operations, and reporting in 2022. Most of the liquid effluents discharged to surface water and groundwater also met applicable New York State Pollutant Discharge Elimination System (SPDES) permit requirements. There was one excursion above permit limits reported for the year; a sample collected from Outfall 010 (Central Steam Facility) for routine quarterly compliance analysis exhibited a lead concentration of 0.15 mg/L, which is above the permit limit of 0.05 mg/L. The permit excursion was 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 were not affecting groundwater quality. Efforts to implement release prevention measures and minimize impacts of spills of materials continued in 2022. There were 14 spills in 2022 and six of those spills met regulatory agency reporting criteria.

In 2022, due to the ongoing pandemic, inspections by federal, state, or local regulators were limited. BNL was inspected on eight occasions. These inspections included Sewage Treatment Plant operations, hazardous waste management facilities, petroleum and chemical storage tank management, and the potable water system. Immediate corrective actions were taken to address all compliance issues raised during these inspections.

3.1 COMPLIANCE WITH REQUIREMENTS

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

3.2 COMPLIANCE WITH REQUIREMENTS

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;
- 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);
- Nine radiological emission authorizations issued by the U.S. Environmental Protection Agency (EPA) under the National Emission Standards for Hazardous Air Pollutants (NESHAPs);
- Air emissions permit issued by NYSDEC under Title V of the Clean Air Act (CAA) Amendments authorizing the operation of 12 emission units;
- Permit for the operation of six domestic water supply wells, one cooling water well, one irrigation well, and one fire protection well issued by NYSDEC;
- 11 SPDES equivalency permits for the operation of groundwater remediation systems installed via the Interagency Agreement (Federal Facility Agreement under the Comprehensive Environmental Response, Compensation and Liability Act [CERCLA]).

3.2.2 New or Modified Permits

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

The New York State Wild, Scenic, and

Recreational Rivers Act was created by the state legislature in 1972 to protect and preserve certain rivers considered to have remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The Laboratory had no open permits in 2022.

3.2.2.2 SPDES Permit Renewal

Following an application request from BNL, on September 8, 2022, the Laboratory received two new SPDES Equivalency Permits from NYSDEC for operation of groundwater treatment systems at the Current Firehouse PFAS plume and the Former Firehouse PFAS plume. The permits expire September 7, 2032.

3.2.3 EPA's Enforcement & Compliance History Online (ECHO)

EPA's ECHO provides integrated compliance and enforcement information for more than one million regulated facilities nationwide. It allows users to search for facilities by media program (e.g., Clean Air Act, Clean Water Act, Safe Drinking Water Act), location, enforcement and compliance activity, or pollutant. The facility reports include three years of violation data and five years of compliance monitoring and enforcement data.

A detailed facility report for BNL including compliance status can be found in the ECHO database at: <https://echo.epa.gov/>. To access this report, use the following information:

ECHO Facility Name:

Brookhaven National Laboratory

Facility Registry Service (FRS) ID:

110000616726

Program Areas:

CAA, CWA, RCRA, SDWA

3.3 NEPA ASSESSMENTS

National Environmental Policy Act (NEPA) regulations require federal agencies to evaluate the environmental effects of proposed major federal activities. The prescribed evaluation process ensures that the proper level of environmental review is performed before an irreversible commitment of resources is made. During 2022,

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 among EPA, NYSDEC, and DOE. BNL site remediation is conducted by the Environmental Protection Division in accordance with milestones established under this agreement. The cleanup is currently in the long-term surveillance and maintenance mode for the groundwater treatment systems, former soil/sediment cleanup areas, and the reactors, and includes monitoring of institutional controls. Demolition of the High Flux Beam Reactor (HFBR) stack was completed in 2021. The HFBR reactor vessel is scheduled for decontamination and decommissioning by 2072. All groundwater treatment systems operated as required in 2022. Management of the characterization and remediation of PFOS, PFOA, and 1,4-dioxane was formally included under the BNL CERCLA program. Construction of two new treatment systems to address PFOS and PFOA in groundwater downgradient of three source areas was completed by the end of 2022.	2.3.4.8, Chapter 7
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 site-wide procedures for implementing NEPA requirements.	3.3
Advisory Council on Historic Preservation: 36 CFR 60 36 CFR 63 36 CFR 79 36 CFR 800 16 USC 470	The National Historic Preservation Act (NHPA) identifies, evaluates, and protects historic properties eligible for listing in the National Register of Historic Places, commonly known as the National Register. Such properties can be archeological sites or historic structures, documents, records, or objects. NHPA is administered by state historic preservation offices (SHPOs; in New York State, NYSHPO). At BNL, structures that are subject to NHPA include the HFBR (Bldg. 750), the Brookhaven Graphite Research Reactor (BGRR) complex (Bldgs. 701, 703, 705, and 801), 1960's era Apartments (Bldgs. 364 and 365), Bldg. 120, Berkner Hall (Bldg. 488), Chemistry (Bldg. 555), Physics (Bldg. 510), Computational Sciences (Bldg. 515), Instrumentation (Bldg. 535), Medical (Bldgs. 490 and 491), WWII-era water tower (STO-49), Accelerator Test Facility (Bldgs. 820, 820A, and 820B), EBNN research (Bldg. 830), Magnet Division (Bldg. 902), Alternating Gradient Synchrotron complex (Bldgs. 901, 901A, 911, 912, 913, 913a-e, and 930), and the WW I training trenches found throughout the site.	There are now multiple buildings and features at BNL that have been determined to be National Register Eligible (see list to the left). Any proposed activities involving these facilities must be identified through the NEPA/NHPA processes and evaluated to determine if the action would affect the features that make the facility eligible. BNL has a Cultural Resource Management Plan to ensure compliance with cultural resource regulations. Buildings that are 50 years old or older are reviewed under Section 106 of NHPA when proposed projects may significantly alter the structure or for building demolition. See Chapter 6 for detailed information on Cultural Resources.	3.4, Chapter 6
EPA: 40 CFR 50 40 CFR 60-61 40 CFR 63 40 CFR 80 40 CFR 82 40 CFR 98 NYSDEC: 6 NYCRR 200-202, 205, 207, 208, 211, 212, 215, 217, 218, 225, 226, 227-231, 239, 241, 248, 257, 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, Chapters 4 and 8

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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
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. Except for one lead excursion at Outfall 010 (Central Steam Facility), all other discharges met the SPDES permit limits in 2022.	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 site-wide public water supply. BNL's drinking water and the supply and distribution system were in compliance with all applicable county, state, and federal regulations regarding drinking-water quality, monitoring, operations, and reporting in 2022. Corrective actions for all identified operation and maintenance deficiencies identified during the annual SCDHS sanitary survey were established and communicated with SCDHS and are being addressed by the Laboratory's Energy and Utilities Division.	3.7
EPA: 40 CFR 112 40 CFR 300 40 CFR 302 40 CFR 355 40 CFR 370 40 CFR 372	The Oil Pollution Act, the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Superfund Amendment Reauthorization Act (SARA) require facilities with large quantities of petroleum products or chemicals to prepare emergency plans and report their inventories to EPA, the state, and local emergency planning groups.	Since some facilities at BNL store or use chemicals or petroleum in quantities exceeding threshold planning quantities, the Laboratory is subject to these requirements. BNL fully complied with all reporting and emergency planning requirements in 2022.	3.8.1 3.8.2 3.8.3
EPA: 40 CFR 280 NYSDEC: 6 NYCRR 596–598 6 NYCRR 613 SCDHS: SCSC Article 12	Federal, state, and local regulations govern the storage of chemicals and petroleum products to prevent releases of these materials to the environment. Suffolk County Sanitary Codes (SCSC) are more stringent than federal and state regulations.	The regulations require that these materials be managed in facilities equipped with secondary containment, overfill protection, and leak detection. BNL complies with all federal and state requirements and continues to conform to county codes.	3.8.4 3.8.5 3.8.6
EPA: 40 CFR 260–280 NYSDEC: 6 NYCRR 360, 361, 363-365, 367,371-374, and 376	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 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. BNL currently has no open wetland or scenic river permits.	3.12

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

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

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CHAPTER 3: COMPLIANCE STATUS

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. 2 & Chg. 3	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. 2 & 3.	2.3.4.3
DOE: Order 436.1	The DOE <i>Departmental Sustainability</i> 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 though both of those orders were replaced by EO 13693 "Planning for Federal Sustainability in the Next Decade". However, O 436.1 is still supported by DOE requirements for sound sustainability programs implemented under the DOE 2010 Strategic Sustainability Performance Plan (SSPP). Contractor requirements under the order require preparation of a Site Sustainability Plan and implementation of a sound Environmental Management System (EMS).	In accordance with the requirements of the DOE Strategic Sustainability Performance Plan, BNL has developed and implemented a Site Sustainability Plan. The Goals and Strategic Objectives of the DOE SSPP are tracked and reported on annually. BNL's EMS was officially registered to the ISO 14001:2015 revised standard in 2018.	Chapter 2
DOE: Order 458.1, Change 4	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 how facilities monitor their impacts on the public and environment. Full compliance with the Order was required by August 2012.	In accordance with the requirements of DOE Order 458.1, BNL maintains and implements several plans and programs for ensuring that the management of facilities, wastes, effluents, and emissions does not present a risk to the public, workers, or environment. These plans and programs have existed for decades and were previously implemented under prior DOE Order 5400.5 and in accordance with the current DOE O 435.1, Radioactive Waste Management, and 10 CFR 835. Environmental monitoring plans are well documented, and the results are published annually in BNL's Site Environmental Report, which is prepared in accordance with DOE O 231.1B. The Environmental Radiation Protection Program (ERPP), which was published in September 2012, provides a record of the requirements of DOE O 458.1 and documents how the Laboratory meets these requirements. This document is reviewed annually and updated, as necessary to ensure compliance with this requirement.	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

environmental evaluations were completed for 101 proposed projects at BNL. One hundred projects were considered minor actions requiring no additional documentation. One project was addressed by submitting a notification form to DOE, which determined that the project was 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 34 structures or sites that are eligible for listing on the National Register of Historic Places: the Brookhaven Graphite Research Reactor (BGRR) complex (Buildings 701, 703, and 801), the High Flux Beam Reactor (HFBR) complex (Buildings 750, 750A, and 751), two 1960s-era efficiency apartments (Buildings 364 and 365), Berkner Hall (Building 488), Medical Complex (Buildings 490 and 491), Chemistry (Building 555), Physics (Building 510), Computational Sciences (Building 515), Instrumentation (Building 535), Accelerator Test Facility (Buildings 820, 820A, and 820B), Environment, Biology, Nuclear Science & Nonproliferation Research (Building 830), Magnet Division (Building 902), the Alternating Gradient Synchrotron Complex (Buildings 901, 901A, 911, 912, 913, 913A-E, and 930), the World War-II (WWII) barracks portion of Building 120, the WWII-era Water Tower, the WWI Army training trenches associated with Camp Upton, and the Gamma Forest (added in 2022). 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 2022, 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 CSF boilers 5, 6, and 7 cannot meet the new lower NO_x RACT standards effective as of July 2014, BNL uses an approved system averaging plan to demonstrate compliance in quarterly reports submitted to NYSDEC.

The Laboratory also maintains continuous opacity monitors for Boilers 6 and 7. These monitors measure the transmittance of light through the exhaust gas and report the measurement in percent attenuated. Opacity limitations state that no facility may emit particulates such that the opacity exceeds 20 percent, calculated in six-minute averages, except for one period not

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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 ¹	None	NA	NA
EPA - NESHAPs	705	Tritium Evaporator	BNL-288-01 ¹	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-388-01	None	NA	NA
EPA - NESHAPs	931	Brookhaven LINAC Isotope Producer	BNL-2009-1	None	NA	NA
EPA - NESHAPs	REF	Radiation Effects/Neutral Beam	BNL-789-01	None	NA	NA
EPA - NESHAPs	RTF	Radiation Therapy Facility	BNL-489-01 ¹	None	NA	NA
EPA - NESHAPs	801	All-inclusive Production Hot Cells (RRPL)	BNL-2022-01	None	NA	NA
NYSDEC - Air Equivalency	517/518	South Boundary/Middle Road System	1-51-009	NA	NA	NA
NYSDEC - Air Equivalency	598	OU I Remediation System	1-52-009	NA	NA	NA
NYSDEC - Air Equivalency	539	Western South Boundary System	1-52-009	NA	NA	NA
NYSDEC - Air Equivalency	TR 867	T-96 Remediation System	1-52-009	NA	NA	NA
NYSDEC - Air Equivalency	644	Freon-11 Treatment System	1-52-009	NA	NA	NA
NYSDEC - SPDES Permit	Site	Brookhaven National Laboratory	NY0005835	31-Dec-30	NA	NA
NYSDEC - SPDES Equivalency	517/518	South Boundary/Middle Road System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	539	Western South Boundary System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	670	Sr-90 Treatment System - Chemical Holes	1-52-009	25-Feb-33	NA	NA
NYSDEC - SPDES Equivalency	OS-4	Airport/LIPA Treatment System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	OS-5	North St./North St. East Treatment System	1-52-009	26-Mar-25	NA	NA
NYSDEC - SPDES Equivalency	OS-6	Ethylene Di-Bromide Treatment System	1-52-009	26-Mar-25	NA	NA
NYSDEC - SPDES Equivalency	855	Sr-90 Treatment System - BGRR/WCF	1-52-009	26-Mar-25	NA	NA
NYSDEC - SPDES Equivalency	TR 867	T-96 Remediation System	1-52-009	20-Mar-32	NA	NA
NYSDEC - SPDES Equivalency	OS-2	Industrial Park Treatment System	1-52-009	26-Mar-25	NA	NA
NYSDEC - SPDES Equivalency	492	Current Firehouse PFAS Treatment System	1-52-009	07-Sep-32	NA	NA
NYSDEC - SPDES Equivalency	492	Former Firehouse PFAS Treatment System	1-52-009	07-Sep-32	NA	NA
NYSDEC - Hazardous Substance	BNL	Bulk Storage Registration Certificate	1-000263	27-Jul-23	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	30-Jan-25	U-METAL	42308
NYSDEC - Air Quality	423	Gasoline & E85 Storage and Fuel Pumps	1-4722-00032/00115	30-Jan-25	U-FUELS	42309-10
NYSDEC - Air Quality	423	Motor Vehicle A/C Servicing	1-4722-00032/00115	30-Jan-25	U-MVACS	MVAC2
NYSDEC - Air Quality	423	Motor Vehicle A/C Servicing	1-4722-00032/00115	30-Jan-25	U-MVACS	MVAC5
NYSDEC - Air Quality	244	Paint Spray Booth	1-4722-00032/00115	30-Jan-25	U-PAINT	24402
NYSDEC - Air Quality	244	Flammable Liquid Storage Cabinet	1-4722-00032/00115	30-Jan-25	U-PAINT	244AE
NYSDEC - Air Quality	734	Spin Coating Operation	1-4722-00032/00115	30-Jan-25	U-INSIG	734AA
NYSDEC - Air Quality	801	Target Processing Laboratory	1-4722-00032/00115	30-Jan-25	U-INSIG	80101
NYSDEC - Air Quality	Site	Aerosol Can Processing Units	1-4722-00032/00115	30-Jan-25	U-INSIG	AEROS
NYSDEC - Air Quality	498	Aqueous Cleaning Facility	1-4722-00032/00115	30-Jan-25	U-METAL	49801
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-61005	61005
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-61006	61006
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-61007	61007
NYSDEC - Air Quality	610	Metal Parts Cleaning Tray	1-4722-00032/00115	30-Jan-25	U-METAL	61008
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-61005	6101A
NYSDEC - Air Quality	902	Epoxy Coating/Curing Exhaust	1-4722-00032/00115	30-Jan-25	U-COILS	90206

(continued on next page)

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

Issuing Agency	Bldg. or Facility	Process/Permit Description	Permit ID No.	Expiration or Completion	Emission Unit ID	Source ID
NYSDEC - Air Quality	922	Electroplating Operation	1-4722-00032/00115	30-Jan-25	U-INSIG	92204
NYSDEC - Air Quality	Site	Commercial Refrigeration Equipment	1-4722-00032/00115	30-Jan-25	U-RFRIG	COMRE
NYSDEC - Air Quality	Site	Packaged A/C Units (16)	1-4722-00032/00115	30-Jan-25	U-RFRIG	PKG01-16
NYSDEC - Air Quality	Site	Reciprocating Chillers (44)	1-4722-00032/00115	30-Jan-25	U-RFRIG	REC01-65
NYSDEC - Air Quality	Site	Rotary Screw Chillers (19)	1-4722-00032/00115	30-Jan-25	U-RFRIG	ROTO1-20
NYSDEC - Air Quality	Site	Split A/C Units	1-4722-00032/00115	30-Jan-25	U-RFRIG	SPL01-02
NYSDEC - Air Quality	Site	Centrifugal Chillers (17)	1-4722-00032/00115	30-Jan-25	U-RFRIG	CEN06-29
NYSDEC - Air Quality	463	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	46301
NYSDEC - Air Quality	490	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	49006
NYSDEC - Air Quality	515	Diesel Non-Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	51501
NYSDEC - Air Quality	555	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	55503
NYSDEC - Air Quality	635	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	63501
NYSDEC - Air Quality	734	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	73401
NYSDEC - Air Quality	735	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	73501
NYSDEC - Air Quality	740	Diesel Emergency Generators (2)	1-4722-00032/00115	30-Jan-25	U-GENER	74001-02
NYSDEC - Air Quality	801	Diesel Emergency Generator	1-4722-00032/00115	30-Jan-25	U-GENER	80102
NYSDEC - Air Quality	912	Diesel Emergency Generators (3)	1-4722-00032/00115	30-Jan-25	U-GENER	912A1-A3
NYSDEC - Air Quality	30	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-SMBLR	030AB
NYSDEC - Air Quality	422	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-SMBLR	422AF
NYSDEC - Air Quality	423	Combustion Unit	1-4722-00032/00115	30-Jan-25	U-SMBLR	42304
NYSDEC - Hazardous Waste	WMF	Waste Management	1-4722-00032/00102	06-Sep-27	NA	NA
NYSDEC - Water Quality	CSF	Major Petroleum Facility	01-1700	31-Mar-27	NA	NA

Notes:

¹ Source Facility Removed and awaiting EPA termination of NESHAPs authorization. A/C = Air Conditioning AGS = Alternating Gradient Synchrotron BGRR = Brookhaven Graphite Research Reactor CSF = Central Steam Facility EPA = Environmental Protection Agency	LIPA = Long Island Power Authority NA = Not Applicable NESHAPs = National Emission Standards for Hazardous Air Pollutants NYSDEC = New York State Department of Environmental Conservation OU = Operable Unit	RTF = Radiation Therapy Facility RHIC = Relativistic Heavy Ion 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
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to exceed 27 percent in any one hour. During 2022, there were no recorded exceedances of the NO_x RACT limit by the Boiler 6 or Boiler 7 CEMS. Using the system averaging approach, actual weighted average NO_x emission rates for operating boilers for the first through fourth quarters were 0.117, 0.105, 0.098, and 0.111 lbs./MMBtu, respectively, which were below the corresponding quarterly permissible weighted average emissions rates of 0.149, 0.150, 0.150, and 0.152 lbs./MMBtu each quarter.

In 2022, there were nine recorded excess opacity measurements. One excess opacity reading recorded by the Boiler 6 monitor on February 6 was due to a load shift, and eight Boiler 6 excess opacity readings on May 16 were due

to the performance of the second quarter opacity calibration error test. All the excursions were documented in quarterly Site-Wide Air Emissions and Monitoring Systems Performance Reports submitted to NYSDEC. Chapter 4 discusses CSF compliance with 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 are certified to meet refrigerant evacuation levels

specified by 40 CFR 82.158. As a matter of BNL's standard practice, if a refrigerant leak is found, technicians will either immediately repair the leak or isolate it and prepare a work order for the needed repairs. This practice is more stringent than the leak repair provisions of 40 CFR 82.156. In 2022, 33 pounds of R-22 and 30 pounds of R-410A (a 50:50 blend of HFC-32 and HFC-125) were recovered and recycled from refrigeration equipment that was serviced. Meanwhile, 272 pounds of R-22 and 32 pounds of R-410A leaked from refrigeration and air conditioning equipment on site. These leaks were subsequently reported as emissions in the Annual Emissions Statement transmitted to NYSDEC.

Halon: Halon 1211 and 1301 are extremely efficient fire suppressants but are being phased out due to their effect on the earth's ozone layer. Halon recovered from excessed systems is shipped to the Department of Defense Ozone Depleting Substances Reserve in accordance with the Class I Ozone Depleting Substances Disposition Guidelines prepared by the DOE Office of Environmental Policy and Guidance. There were no discharges of Halon 1211 from remaining portable fire extinguishers or Halon 1301 from accidental or fire-induced activation of fixed fire suppression systems.

3.5.2 Hazardous Air Pollutants

In 1970, the CAA established standards to protect the general public from hazardous air pollutants that may lead to death or an increase in irreversible or incapacitating illnesses. The NESHAPs program was established in 1977 and the governing regulations were updated significantly in 1990. EPA developed NESHAPs to limit the emission of air pollutants. Since 1990, EPA has modified the list through rulemaking to include 187 hazardous 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 2022, it was determined that revisions to 40 CFR 63 Subpart GGGGG NESHAPs: Site Remediation now require the Lab's Groundwater Protection Group to document the process it uses to prove that sum total of hazardous air pollutants removed by Laboratory groundwater treatment systems is less than 1 megagram (2,204.62 pounds) annually.

3.5.2.2 Asbestos

In 2022, the Laboratory notified the EPA Region II office regarding the removal of materials containing asbestos. During the year, 47,740 pounds of both scheduled and non-scheduled friable asbestos from maintenance operations materials and building demolition preparation (e.g., pipe insulation, sheetrock, popcorn ceiling, transite board, floor tiles, water main pipes) 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 2022 is provided in Chapter 4.

BNL transmitted all data pertaining to radioactive air emissions and dose calculations to EPA in fulfillment of its annual reporting requirement. As in past years, the maximum off-site dose due to airborne radioactive emissions from the Laboratory continued to be far below the 10 mrem (100 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 2022 was 1.19 mrem (11.9 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 Chg 4

(LtdChg), 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 13 outfalls, as described below. See Figure 5-3 in Chapter 5 for the locations of the following BNL outfalls:

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

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

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

3.6.1 Sewage Treatment Plant

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

A summary of SPDES monitoring results for the STP discharge at Outfall 001 is provided in Table 3-3, along with relevant SPDES permit limits. The Laboratory monitors the STP discharge for more than 100 parameters monthly and more than 200 parameters quarterly. BNL was 100 percent compliant with effluent limits in 2022.

From 2018 to 2021, the Lab was not able to routinely meet the SPDES permit limit for Tolytriazole (TTA). Among the multiple corrective actions taken to address this issue over the years, the Lab hired a consultant to prepare a Tolytriazole Management and Treatability Report in response to a Consent Order issued by the NYSDEC in 2021. This report was completed and submitted to NYSDEC on September 29, 2022, and included a full evaluation of the management, alternatives, and possible treatment of TTA. Based on recommendations made in the report, BNL decided to convert all water treatment chemicals that discharge to a permitted SPDES Outfall to a non-TTA containing treatment chemical that was approved by NYSDEC. Since that conversion was made, BNL has been able to maintain SPDES compliance and the new water treatment chemical has provided equivalent corrosion protection.

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

3.6.2 Recharge Basins and Stormwater

Water discharged to Outfalls 002 through 008

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)	7.0	8.0	Continuous Recorder	Min 5.8, Max. 8.5	0	100
Solids, Total Dissolved (mg/L)	367	521	Monthly	1000	0	100
Total nitrogen (mg/L)	4.1	9.3	Twice Monthly	10	0	100
Total phosphorus (mg/L)	0.5	2.7	Twice Monthly	NA	0	100
Cyanide (mg/L)	< 0.002	< 0.002	Twice Monthly	0.1	0	100
Copper (mg/L)	0.004	0.04	Twice Monthly	0.15	0	100
Iron (mg/L)	0.09	0.27	Twice Monthly	0.6	0	100
Lead (mg/L)	<0.001	0.002	Twice Monthly	0.025	0	100
Mercury (ng/L)	2.5	11.8	Twice Monthly	200	0	100
Methylene chloride (ug/L)	<0.5	2	Twice Monthly	5	0	100
Nickel (mg/L)	< 0.002	0.006	Twice Monthly	0.1	0	100
Silver (mg/L)	< 0.001	< 0.001	Twice Monthly	0.015	0	100
Toluene (ug/L)	< 1	< 1	Twice Monthly	5	0	100
Zinc (mg/L)	0.02	0.15	Twice Monthly	2	0	100
1,1,1-trichloroethane (ug/L)	< 1	< 1	Twice Monthly	5	0	100
Max. Flow (MGD)	0.21	0.40	Continuous Recorder	2.3	0	100
Avg. Flow (MGD)	0.14	0.28	Continuous Recorder	NA	0	100
HEDP (mg/L)	<0.05	<0.05	Monthly	0.5	0	100
Tolytriazole (mg/L)	< 0.05	<0.05	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

HEDP = 1-hydroxyethylidene diphosphonic acid

MGD = million gallons per day

NA = Not Applicable

SPDES = State Pollutant Discharge Elimination System

SU = standard unit

and Outfalls 010 through 012 recharges to ground-water. 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.

A sample collected on April 6, 2022, from Outfall 010 (CSF) for routine quarterly compliance analysis exhibited a lead concentration of 0.15 mg/L, which is above the permit limit of 0.05 mg/L. The likely cause of this excursion was the dislodging of residual lead-contaminated sediments during a heavy rain event that were trapped in storm drain pipeline joints and low-lying areas upstream of this outfall. Upstream storm drain manholes and

catch basins were remediated for lead contamination back in 2007, which was the last time there was an excursion for lead at this outfall. This result was likely from a one-time event and not an indication of ineffective remediation or a new, unidentified lead contamination problem, as demonstrated by quarterly SPDES sampling results from this Outfall over the past several years which have not indicated an ongoing lead issue.

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

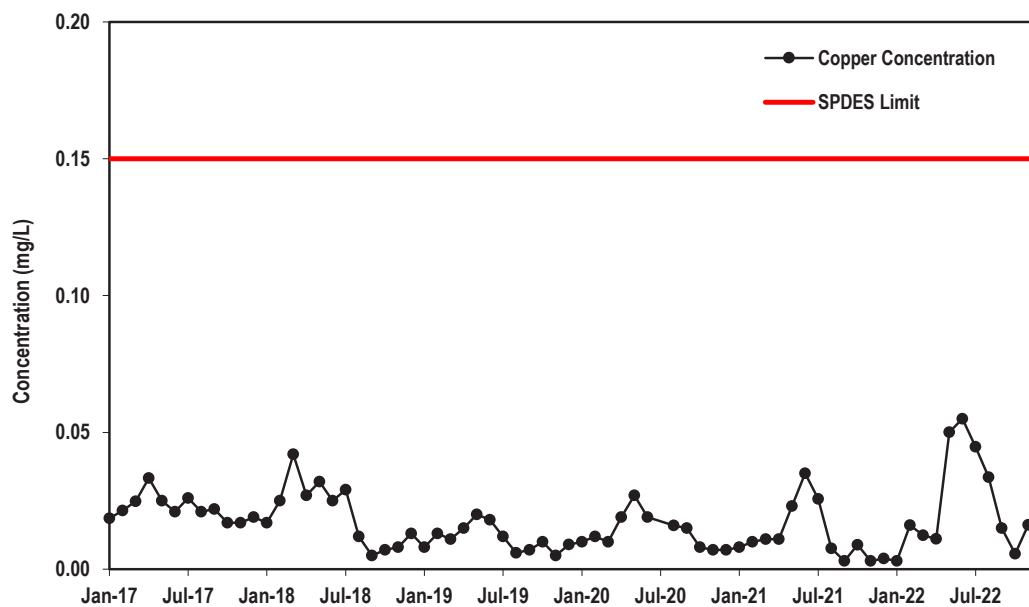


Figure 3-1. Maximum Concentrations of Copper Discharged from the BNL Sewage Treatment Plant, 2017–2022.

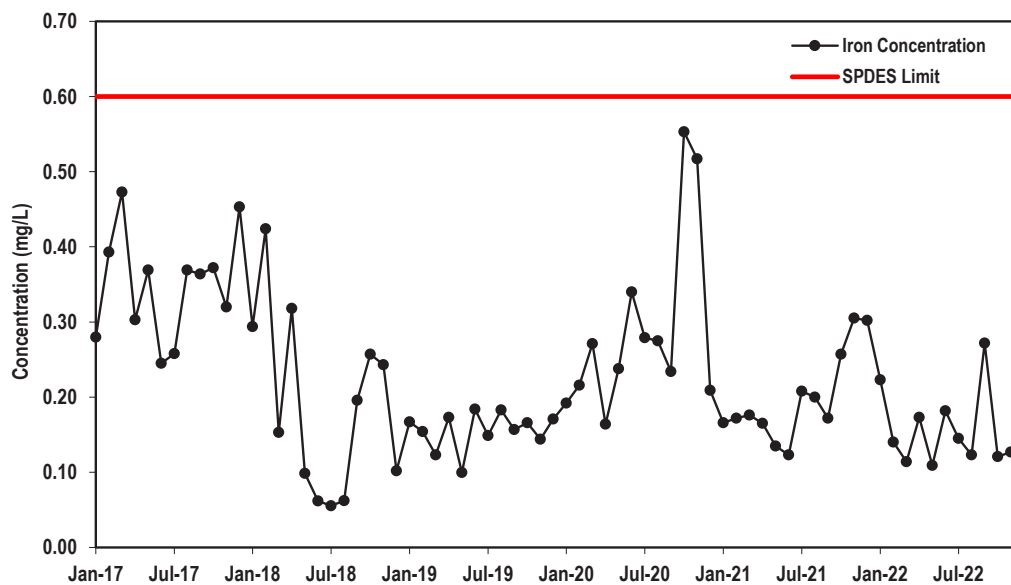


Figure 3-2. Maximum Concentrations of Iron Discharged from the BNL Sewage Treatment Plant, 2017–2022.

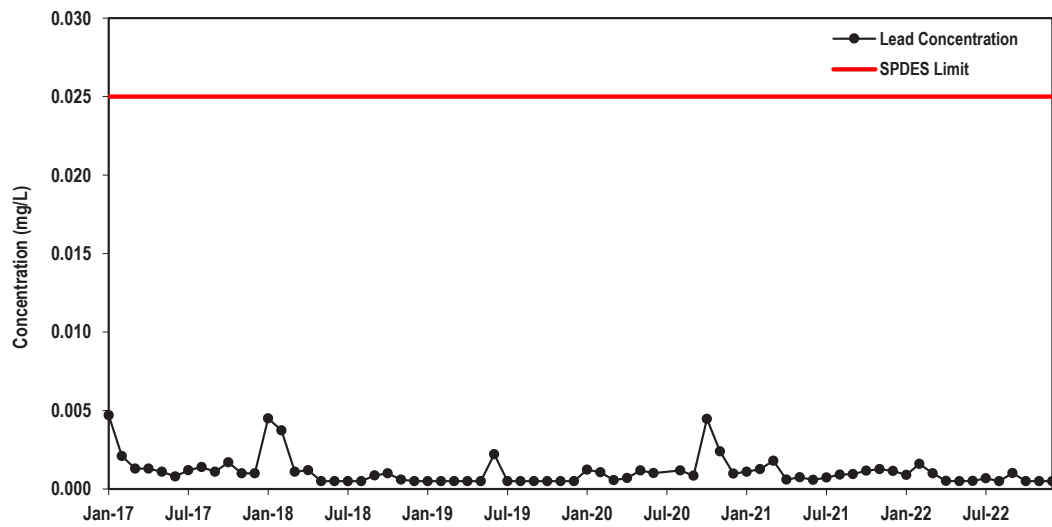


Figure 3-3. Maximum Concentrations of Lead Discharged from the BNL Sewage Treatment Plant, 2017–2022.

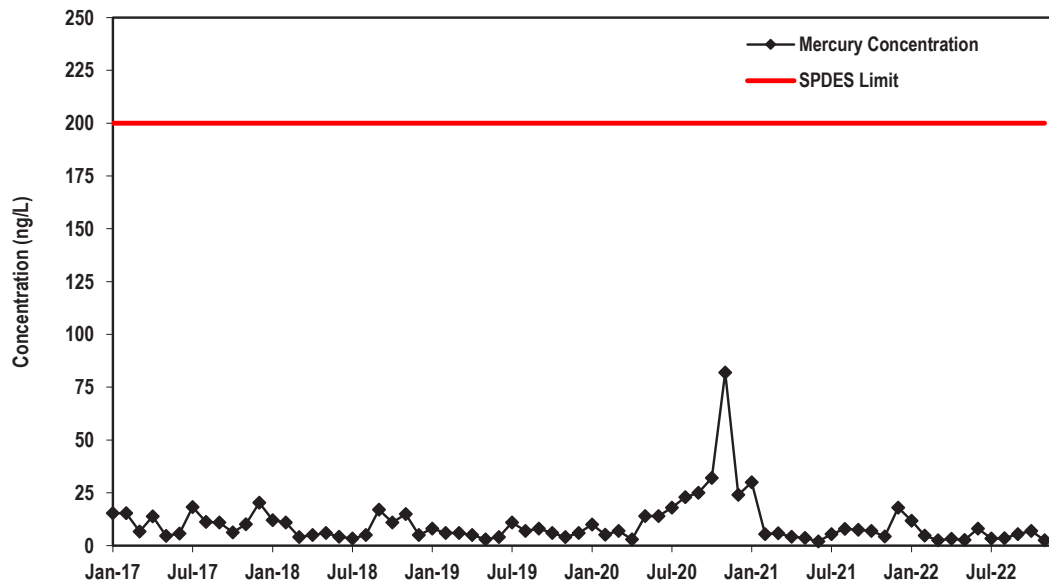


Figure 3-4. Maximum Concentrations of Mercury Discharged from the BNL Sewage Treatment Plant, 2017–2022.

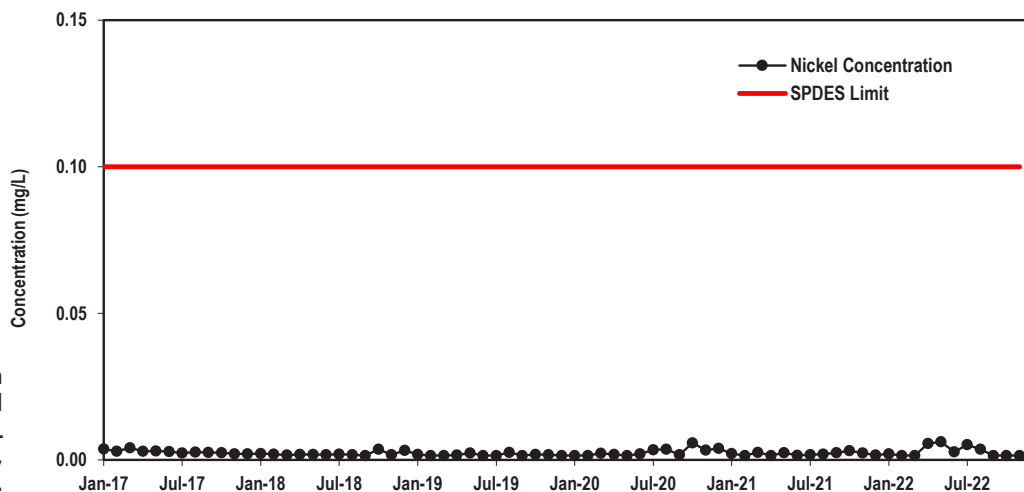


Figure 3-5. Maximum Concentrations of Nickel Discharged from the BNL Sewage Treatment Plant, 2017–2022.

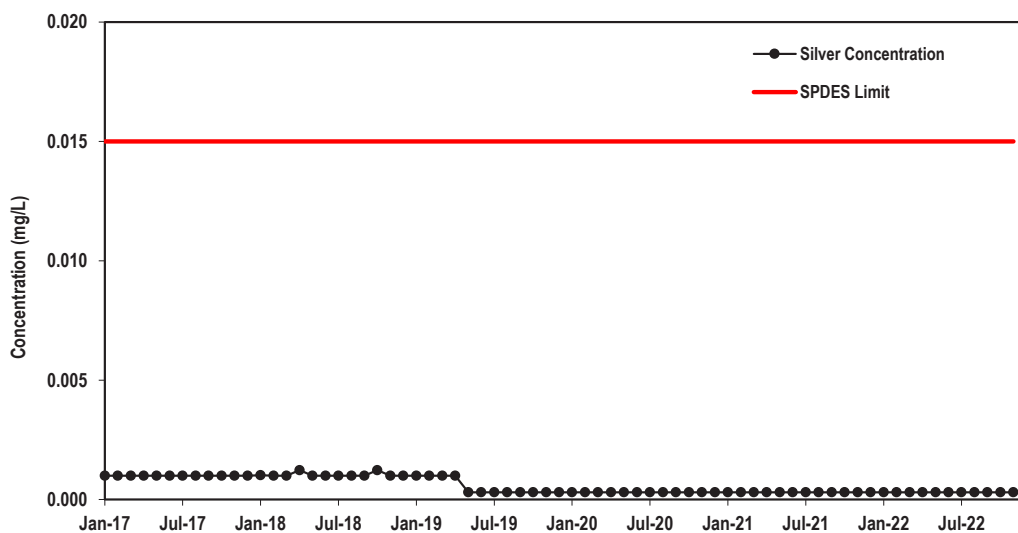


Figure 3-6. Maximum Concentrations of Silver Discharged from the BNL Sewage Treatment Plant, 2017–2022.

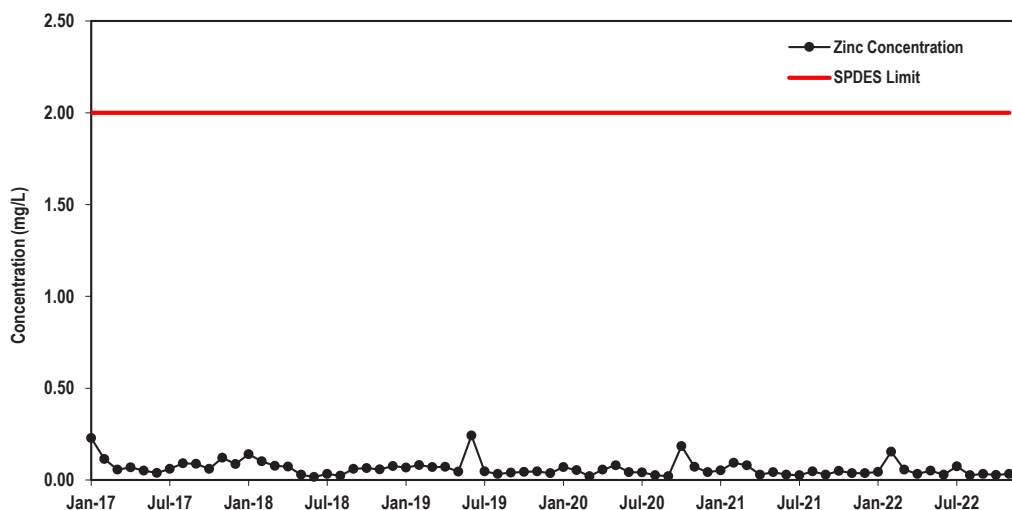


Figure 3-7. Maximum Concentrations of Zinc Discharged from the BNL Sewage Treatment Plant, 2017–2022.

CHAPTER 3: COMPLIANCE STATUS

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

Analyte	Outfall 002	Outfall 002B	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 008	Outfall 010	SPDES Limit	No. of Exceedances	% Compliance*
Flow (MGD)	N Min. Max.	CR	CR	CR	CR	CR	11	11			
	0.17	0	0.09	0.08	0	0.04	0	0	NA	NA	NA
	0.26	0.04	0.4	0.4	0.23	0.16	0.45	0.8	NA		
pH (SU)	Min. Max.	7.2	6.5	7.3	6.9	7.7	4.1	6.6	NA	0	100
		8.7	8.7	9	8.1	8.6	8.1	8.3	8.5, 9.0 (a)		
Oil and Grease (mg/L)	N Min. Max.	12	10	12	11	NR	11	11			
	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	NR	< 1.1	< 1.1	NA	0	100
	2.3	2.6	2.0	1.4	2.1	NR	2.0	1.6	15		
Copper (mg/L)	N Min. Max.	NR	NR	4	NR	NR	NR	4			
		NR	NR	0.002 (T)	NR	NR	NR	0.002 (D)	NA	0	100
	NR	NR	0.004 (T)	NR	NR	NR	NR	0.01 (D)	1.0		
Aluminum (mg/L)	N Min. Max.	4	NR	NR	NR	NR	4	4			
	< 0.07 (T)	NR	NR	NR	NR	NR	< 0.07 (D)	< 0.07 (D)	NA	0	100
	0.3 (T)	NR	NR	NR	NR	NR	0.13 (D)	0.35 (D)	2.0		
Lead, Dissolved (mg/L)	N Min. Max.	NR	NR	NR	NR	NR	NR	4			
		NR	NR	NR	NR	NR	NR	< 0.0005	NA	1	75
	NR	NR	NR	NR	NR	NR	NR	0.15	0.05		
Vanadium, Dissolved (mg/L)	N Min. Max.	NR	NR	NR	NR	NR	NR	4			
		NR	NR	NR	NR	NR	NR	< 0.001	NA	NA	NA
	NR	NR	NR	NR	NR	NR	NR	0.02	NPL		
Chloroform (µg/L)	N Min. Max.	4	NR	NR	NR	NR	NR	NR			
	0.66	NR	NR	NR	NR	NR	NR	NR	NA	0	100
	1.0	NR	NR	NR	NR	NR	NR	NR	7		
Bromodichloromethane (µg/L)	N Min. Max.	4	NR	NR	NR	NR	NR	NR			
		0.42	NR	NR	NR	NR	NR	NR	NA	0	100
	1.0	NR	NR	NR	NR	NR	NR	NR	50		
1,1,1-trichloroethane (µg/L)	N Min. Max.	4	NR	NR	NR	NR	11	NR			
	< 1.0	NR	NR	NR	NR	NR	< 1.0	NR	NA	0	100
	< 1.0	NR	NR	NR	NR	NR	< 1.0	NR	5		
1,1-dichloroethane (µg/L)	N Min. Max.	NR	NR	NR	NR	NR	11	NR			
		NR	NR	NR	NR	NR	< 1.0	NR	NA	0	100
	NR	NR	NR	NR	NR	NR	< 1.0	NR	5		

(continued on next page)

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

Analyte	Outfall 002	Outfall 002B	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 008	Outfall 010	SPDES Limit	No. of Exceedances	% Compliance*
Hydroxyethylene-diphosphonic acid (mg/L)	N	NR	4	4	4	NR	NR	NR			
	Min.	NR	<0.05	<0.05	<0.05	NR	NR	NR	NA	0	100
	Max.	NR	<0.05	<0.05	<0.05	NR	NR	NR	0.5		
Tolyltriazole (mg/L)	N	NR	4	4	4	NR	NR	NR			
	Min.	NR	<0.05	<0.05	<0.05	NR	NR	NR	NA	0	100
	Max.	NR	<0.05	<0.05	<0.05	NR	NR	NR	0.2		

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

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, 2022) 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, four of which were active during 2022. 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, 3-6, and 3-7 provide potable water supply monitoring data. 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 2022.

In 2013, the EPA required large water providers to start testing for six common Per- and Poly-fluoroalkyl Substances (PFAS) chemicals under the third Unregulated Contaminant Monitoring Rule (UCMR 3). As a medium-size system, BNL was not required to participate in this testing program. In 2017, SCDHS began routine testing of all water supply systems for PFAS, including BNL. PFAS chemicals were detected in three of BNL's active water supply wells. In these initial tests, Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) were detected at concentrations below the 2016 EPA Health Advisory Level of 70 ng/L (ppt) that was established specifically for the combined concentration of these two chemicals. Following repeated confirmed detections of PFAS in the supply wells, the Lab started routine quarterly testing for PFAS in 2018. The results for 2022 are provided in Table 3-7.

In 2020, New York State established enforceable drinking water standards for PFOS and PFOA at concentrations of 10 ng/L (ppt). The other four PFAS chemicals would continue to be regulated under the current New York State limit

CHAPTER 3: COMPLIANCE STATUS

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

Compound	Well No. 7	Well No. 10	Well No. 11	Well No. 12	Potable Distribution Sample	NYS DWS
Water Quality Indicators						
Ammonia (mg/L)	< 0.1	< 0.1	0.1	< 0.1	< 0.1	SNS
Chlorides (mg/L)	63.5	76.4	65.9	47.6	70.3	250
Color (units)	35*	<5	<5	<5	<5	15
Conductivity (µmhos/cm)	277	425	419	346	387	SNS
Cyanide (µg/L)	< 10	< 10	< 10	< 10	< 10	SNS
MBAS (mg/L)	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	SNS
Nitrates (mg/L)	0.4	0.66	0.6	0.35	0.48	10
Nitrites (mg/L)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1
Odor (units)	0	0	0	0	0	3
pH (Standard Units)	6.2	8.6	8.7	8.7	8.9	SNS
Sulfates (mg/L)	8.8	10.3	11	10.4	10	250
Total coliform	ND	ND	ND	ND	ND	Negative
Metals						
Antimony (µg/L)	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	6
Arsenic (µg/L)	1.4	<1.0	<1.0	< 1.0	< 1.0	50
Barium (mg/L)	0.04	0.05	0.05	0.04	0.04	2
Beryllium (µg/L)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	4
Cadmium (µg/L)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5
Chromium (mg/L)	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.1
Copper (mg/L)	0.002	0.003	0.005	<0.002	0.004	1.3
Fluoride (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2.2
Hexavalent Chromium (mg/L)	NR	<0.02	<0.02	<0.02	<0.02	0.05
Iron (mg/L)	3.2*	<0.02	<0.02	< 0.20	0.05	0.3
Lead (µg/L)	< 1.0	< 1.0	< 1.0	< 1.0	10.4	15
Manganese (mg/L)	0.12	<0.01	<0.01	< 0.01	< 0.01	0.3
Mercury (µg/L)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
Nickel (mg/L)	0.004	0.0005	0.002	<0.0005	<0.0005	SNS
Selenium (µg/L)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	50
Sodium (mg/L)	37.8	45.3	40.4	27.4	60	SNS
Silver (µg/L)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	100
Thallium (µg/L)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	2
Zinc (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	5
Radioactivity						
Cesium-137 (pCi/L)	<9.56	<7.96	<9.98	<8.02	NR	200
Gross alpha activity (pCi/L)	<1.98	<1.96	<1.91	<1.89	NR	15
Gross beta activity (pCi/L)	1.81	3.76±1.04	3.02 ±1.49	<2.42	NR	(a)
Strontium-90 (pCi/L)	<0.77	<0.79	<0.92	<0.79	NR	8
Tritium (pCi/L)	<507	<513	<501	<511	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. 7	Well No. 10	Well No. 11	Well No. 12	Potable Distribution Sample	NYS DWS
Other						
Alkalinity (mg/L)	10.6	35.2	27.9	32.9	60.8	SNS
Asbestos (MFL)	NR	NR	NR	NR	< 0.05	7
Calcium (mg/L)	7.1	12.5	9.3	6.7	18.4	SNS
HAA5 (mg/L)	NR	NR	NR	NR	<0.002	0.06**
Residual chlorine - MRDL (mg/L)	NR	NR	NR	NR	1.4	4
TTHM (mg/L)	NR	NR	NR	NR	0.005	0.08**

Notes:

See Figure 7-1 for well locations.

HAA5 = five haloacetic acids

MBAS = methylene blue active substances

MRDL = maximum residual disinfectant level

MFL = Million Fibers per Liter

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 this well is treated at the Water Treatment Plant for color and iron reduction prior to distribution.

** Limit imposed on distribution samples only.

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

of 50 µg/L (ppb) for unregulated contaminants. In May 2020, Granular Activated Carbon (GAC) filters were restored on Well 11 to remove PFOS and low levels of the other PFAS chemicals that may be present. In May 2021, GAC filters were restored on Well 10. Construction for the restoration of Well 12 and its GAC filters was completed in 2022.

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, the analytical tests conducted and the detected contaminants which are then compared to federal drinking water standards. The CCR also describes the measures the Laboratory takes to protect its water source and limit consumer exposure to contaminants. The CCR is distributed to all BNL employees and on-site residents, either in paper form or electronically at <http://www.bnl.gov/water/>.

3.7.2 Cross-Connection Control

The SDWA requires that public water suppliers implement practices to protect the water supply from sanitary hazards. One of the safety requirements is to rigorously prevent cross-connections between the potable water supply and facility piping systems. Cross-connection control is the installation of control devices (e.g., double-check valves, reduced pressure zone valves, etc.) at the interface between a facility and the domestic water main. Cross-connection control devices are required at all facilities where hazardous materials are used in a manner that could result in their accidental introduction into the domestic water system, especially under low-pressure conditions. In addition, secondary cross-connection controls at the point of use are recommended to protect users within a specific facility from hazards that may be posed by intra-facility operations.

During 2022, the Laboratory inspected 276 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

CHAPTER 3: COMPLIANCE STATUS

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

Compound	WTP Effluent	Well No. 7	Well No. 10	Well No.11	Well No. 12	NYS DWS
	µg/L					
Dichlorodifluoromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Vinyl Chloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2
Bromomethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Trichlorofluoromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1-dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Methylene Chloride	< 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	5
1,1-dichloroethane	< 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	5
2,2-dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Bromochloromethane	< 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	5
Carbon Tetrachloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1-dichloropropene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2-dichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Trichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2-dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Dibromomethane	< 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	5
cis-1,3-dichloropropene	< 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	5
1,3-dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chlorobenzene	< 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	5
Bromobenzene	< 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	5
2-chlorotoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
4-chlorotoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,3-dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,4-dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2-dichlorobenzene	< 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	5
Hexachlorobutadiene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Tetrachloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1,2,2-Tetrachloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,3-trichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Benzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Toluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Ethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
m,p-xylene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5
o-xylene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Styrene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Isopropylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
n-propylbenzene	< 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	5
Chlorodifluoromethane	< 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. 7	Well No. 10	Well No.11	Well No. 12	NYS DWS
Tert-butylbenzene	< 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	5
sec-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
4-Isopropyltoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
n-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloroform	1.2	<0.5	0.9	0.7	0.7	50
Bromodichloromethane	2.4	< 0.5	< 0.5	< 0.5	< 0.5	50
Dibromochloromethane	3.7	< 0.5	< 0.5	< 0.5	< 0.5	50
Bromoform	1.7	< 0.5	< 0.5	< 0.5	< 0.5	50
Methyl tert-butyl ether	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
Toxaphene	< 1	< 1	< 1	< 1	< 1	3
Total PCB's	< 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	10
Dinoseb	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	50
Dalapon	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	50
Pichloram	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	50
Dicamba	<1	<1	<1	<1	<1	50
Pentachlorophenol	< 0.04	<0.04	< 0.04	< 0.04	< 0.04	1
Hexachlorocyclopentadiene	< 0.1	0.02	< 0.1	< 0.1	< 0.1	5
Bis(2-ethylhexyl)Phthalate	< 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	50
Hexachlorobenzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	5
Benzo(A)Pyrene	0.03	< 0.02	< 0.02	< 0.02	< 0.02	50
Aldicarb Sulfone	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	SNS
Aldicarb Sulfoxide	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	SNS
Aldicarb	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	SNS
Oxamyl	< 1	< 1	< 1	< 1	< 1	50
3-Hydroxycarbofuran	<1	< 1	< 1	< 1	< 1	50
Carbofuran	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	40
Carbaryl	< 1	< 1	< 1	< 1	< 1	50
Methomyl	< 1	< 1	< 1	< 1	< 1	50
Glyphosate	< 6	< 6	< 6	< 6	< 6	50
Diquat	< 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	0.05
1,2-dibromo-3-chloropropane	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2
Lindane	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.2
Heptachlor	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.4
Aldrin	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	5
Heptachlor Epoxide	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.2
Dieldrin	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	5
Endrin	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2
Methoxychlor	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	40
Chlordane	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
2,4,-D	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	50
Alachlor	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
Simazine	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	50

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

Compound	WTP Effluent	Well No. 7	Well No. 10	Well No.11	Well No. 12	NYS DWS
	µg/L					
Metribuzin	< 0.5	< 0.15	< 0.15	< 0.15	< 0.15	50
Butachlor	< 1	< 1	< 1	< 1	< 1	50
Endothall	< 9	< 9	< 9	< 9	< 9	100
Propachlor	< 1	< 1	< 1	< 1	< 1	50
Freon-113	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
1,4-Dioxane	0.09	0.16	0.06	0.06	0.02	1

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 mg/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.

SNS = drinking water standard not specified

NYS DWS = New York State Drinking Water Standard

WTP = Water Treatment Plant

device is encountered during testing, the device is repaired and re-tested to ensure proper function. Copies of the cross-connection device test reports are filed with SCDHS throughout the year.

3.7.3 Underground Injection Control

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

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

permit. Under the authorized by rule requirements, a separate inventory is maintained for these treatment facilities, and is periodically updated whenever a new device is added or closed.

In 2022, the Laboratory installed one drywell for a newly constructed water tower (STO656). This drywell will be utilized for excess potable water overflows from the elevated tank when it is placed into service (scheduled for 2023). BNL's total UIC inventory at the end of 2022 was 1,209.

3.8 PREVENTING AND REPORTING SPILLS

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

3.8.1 Preventing Oil Pollution and Spills

As required by the Oil Pollution Act, BNL maintains a Spill Prevention Control and Countermeasures (SPCC) Plan as a condition of its license to store petroleum fuel (Bruno, 2021). The purpose

Table 3-7. Potable Water Wells and Potable Distribution System: Perfluorinated Compounds.

Compound	Well No. 7	Well No. 10	Well No.11	Well No. 12	Water Treatment Facility	NYS DWS
	ng/L					
Perfluorooctanesulfonate (PFOS)	1.60	<1.94	<2.14	<1.9	1.45	10
Perfluoroundecanoic acid (PFUdA)	<1.82	<1.88	<1.87	<1.9	<1.88	NS
Perfluoropentanoic acid (PFPeA)	1.42	<1.88	4.09	<1.9	0.95	NS
Perfluoropentanesulfonate (PFPeS)	<1.71	<1.76	<1.76	<1.78	<1.77	NS
Fluorotelomer sulfonate 6:2 (6:2 FTS)	<3.46	<3.56	<3.55	<3.6	<3.58	NS
Perfluorohexanoic acid (PFHxA)	1.57	<1.94	2.66	<1.9	0.92	NS
Perfluorododecanoic acid (PFDoA)	<1.82	<1.88	<1.87	<1.9	<1.88	NS
Perfluorooctanoic acid (PFOA)	1.95	<1.94	1.06	<1.9	1.29	10
Perfluorodecanoic acid (PFDA)	<1.82	<1.88	<1.87	<1.9	<1.88	NS
Perfluorohexanesulfonate (PFHxS)	<1.66	<1.77	1.07	<1.73	<1.71	NS
Perfluorobutyric acid (PFBA)	<1.80	52.7	45.6	<1.9	9.34	NS
Perfluorobutanesulfonate (PFBS)	<1.62	<1.73	1.05	<1.69	<1.68	NS
Perfluoroheptanoic acid (PFHpA)	<1.82	<1.94	<2.14	<1.9	0.96	NS
Perfluoroheptanesulfonate (PFHpS)	<1.73	<1.78	<1.77	<1.8	<1.79	NS
Perfluorononanoic acid (PFNA)	<1.82	<1.94	<2.14	<1.9	<1.88	NS
1H, 1H, 2H, 2H-Perfluorodecane sulfonic acid (8:2 FTS)	<3.5	<3.6	<3.59	<3.64	<3.62	NS
Fluorotelomer sulfonate 4:2 (4:2 FTS)	<3.34	<3.53	<3.51	<3.57	<3.48	NS
Hexafluoropropyleneoxide dimer acid (HFPO-DA)(Gen-X)	<1.78	<2.45	5.35	<1.9	<1.85	NS
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	<1.78	<1.88	<1.87	<1.9	<1.85	NS
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11-Cl-PF3OUdS)	<1.67	<1.77	<1.76	<1.79	<1.74	NS
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9-Cl-PF3ONS)	<1.66	<1.75	<1.74	<1.77	<1.73	NS
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	<3.55	<3.75	<3.74	<3.79	<3.7	NS
Perfluoro-3-methoxypropanoic acid (PFMPA)	<3.55	<3.75	<3.74	<3.79	<3.7	NS
Perfluoro-4-methoxybutanoic acid (PFMBA)	<3.55	<3.75	<3.74	<3.79	<3.7	NS
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	<1.78	<1.88	<1.87	<1.9	<1.85	NS

Notes:

NS - No Standard. NYS currently does not have a drinking water standard for these compounds.

Compounds are subjected to the 50 ug/L limit for nonregulated contaminants.

Results from wells 10,11,and 12 are post Granulated Active Carbon treatment.

of this plan is to provide information regarding release prevention measures, the design of storage facilities, and maps detailing storage facility locations. The plan also outlines mitigating and remedial actions that would be taken in the event of a major spill. BNL's SPCC plan is filed with NYSDEC, EPA, and DOE, and must be updated every five years. BNL remained in full compliance with SPCC requirements in 2022.

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 3-8 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 36 on-site chemicals (with thresholds greater than 10,000 pounds or 500 pounds for acutely toxic materials) via E-Plan, the New York State-approved computer-based submittal program.

To satisfy the requirements of the Tier III

Table 3-8. 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 []

Notes:

EHS: Extremely Hazardous Substance

SDS: Safety Data Sheet.

TRI: Toxic Release Inventory

submittal, the Laboratory submitted its data via the EPA-approved TRI-ME computer-based submittal program. During 2022, BNL reported releases of lead (about 36,000 pounds), mercury (about 13 pounds), polychlorinated biphenyls (PCBs) (about five pounds), benzo(g,h,i)perylene (less than one pound), polycyclic aromatic compounds (less than one pound), and friable asbestos (about 48,000 pounds). Releases of lead, PCBs, mercury, and asbestos were predominantly in the form of shipments of waste for off-site recycling or disposal. Releases of benzo(g,h,i)perylene and polycyclic aromatic compounds were byproducts of the combustion of fuel oils. In 2022, 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 14 spills in 2022 and six of those spills met regulatory agency reporting criteria. The remaining spills were small-volume releases either to containment areas or to other impermeable surfaces that did not exceed a reportable quantity. Table 3-9 summarizes each of the six reportable events, including a description of the cause and corrective actions taken. Figure 3-8 is a five-year trend of spills that have occurred at BNL. The slight increase in the number of spills over the last year is most likely due to increased activities occurring on site from reduced COVID-19-related restrictions.

There were no long-term effects from these releases and no significant impact on the environment. In all instances, any recoverable material was removed, spill absorbents were used to remove the residual product, and all materials were collected and containerized for off-site disposal. For releases to soil, contaminated soil was removed to the satisfaction of the State inspector and containerized for off-site disposal.

3.8.4 Major Petroleum Facility (MPF) License

The storage and transfer of 1.9 million gallons of fuel oil (principally No. 6 oil and No. 2 oil) subjects the Laboratory to MPF licensing by NYSDEC. The fuel oil used at the CSF to produce high-pressure steam to heat and cool BNL facilities is stored in five tanks with capacities ranging from 300,000 to 600,000 gallons. The remaining storage facilities at BNL have capacities that

Table 3-9. Summary of Chemical and Oil Spill Reports.

Spill No. and Date	Material/Quantity	ORPS Report	Source/Cause and Corrective Actions
22-04 03/03/22	Hydraulic Fluid / 1 pint	No	As Grounds personnel used a skid steer, the shovel dropped from the skid steer's mounting tongues which caused the shovel's hydraulic hose to disconnect from the shovel and leak hydraulic fluid onto shovel surface and to the ground beneath it. After the skid steer was taken to the HEMO Shop to be repaired, Grounds personnel recovered contaminated soil and placed it into a 55-gallon drum and transferred to the Bldg. 326 drum staging area for consolidation with similar wastes for off-site disposal.
22-06 03/18/22	Hydraulic Fluid / 1 quart	No	While moving through the woods near the northeast gate, a contractor excavator struck a log causing it to pop up and break a quarter inch hydraulic line beneath the excavator. Contaminated vegetation and soil from hydraulic fluid that leaked was recovered and placed into a 55-gallon drum that was transported to the Bldg. 326 Drum staging area for consolidation with similar wastes for off-site disposal.
22-08 05/10/22	Hydraulic Fluid / 1 gallon	No	As a contractor was laying piping into a trench south of Bldg. 50, they discovered hydraulic fluid leaking from a slit in the hydraulic line hose underneath their backhoe. After using a pail to recover fluid draining from the hydraulic line hose, the contractor replaced the hose and shoveled soil that had become contaminated into a 55-gallon drum. The drum was subsequently transferred from the Bldg. 50 parking lot to Waste Management for off-site disposal.
22-09 05/19/22	Hydraulic Fluid / 1 pint	No	After an oil sheen adjacent to a scrap metal container was observed in the Child Development Center parking lot and called in, Fire Rescue personnel responded and used multiple oil-absorbent pads to capture the oily water mixture and shoveled a small amount of contaminated soil adjacent into a clear plastic bag. The bag of spill clean-up products was taken to the Bldg. 630 90-day hazardous waste accumulation area to await pick-up by Waste Management for offsite disposal.
22-12 06/27/22	Ethylene Glycol / 1 pint	No	After a contractor vehicle drove over a hidden metal stake in the tall grass just west of the solar farm, the stake pierced the vehicle's radiator causing anti-freeze to leak onto soil. Environmental Protection personnel accompanying the contractor called the spill in and Fire Rescue and F&O Grounds staff responded and recovered two 5-gallon buckets of contaminated soil. The contractor vehicle was towed offsite for repairs and the containers of contaminated soil were taken to the Bldg. 630 90-day hazardous waste accumulation area to await pick-up by Waste Management for offsite disposal.
22-14 09/22/22	Hydraulic Fluid / 1 gallon	No	Upon noticing hydraulic fluid leaking from a municipal waste garbage truck onto the Bldg. 728M parking lot south of Brookhaven Avenue, the driver of the vehicle called the spill into Fire Rescue. Due to heavy rains at the time, F&O Grounds personnel placed absorbent pads on the parking lot and some small containment pigs onto hydraulic fluid stained areas of the parking lot. To prevent migration of contaminated water into the culvert that leads to SPDES Outfall HS Grounds' personnel placed multiple large adsorbent booms on the ponded water on Brookhaven Ave.'s northern curb directly downstream of the source of the spill. All waste from this spill event was subsequently transferred to Waste Management for off-site disposal.

range from 100 to 10,000 gallons and are located throughout the site where there is a need for building heat, emergency power, fuel, or other miscellaneous petroleum needs (e.g., motor oil, used oil, lube oil, biodiesel).

There are currently 58 active petroleum storage facilities listed on the license. BNL remained in full compliance with MPF license requirements in 2022, which includes monitoring groundwater near five active above-ground storage tanks at the MPF. The license also requires the Laboratory

to inspect the storage facilities monthly, test the tank leak detection systems, and ensure high-level monitoring and secondary containment is functional. Tank integrity is also checked periodically. Groundwater monitoring consists of monthly checks for the presence of floating products and twice-yearly analyses for VOCs and semi-volatile organic compounds (SVOCs). In 2022, no VOCs or floating products attributable to MPF activities were detected above detectable limits. One SVOC was found above NYS Ambient Water

Quality Standards – total phenols; however, this compound was flagged by the contract analytical laboratory as an estimated value that was below minimum detection levels. See SER Volume II, Groundwater Status Report, for additional information on groundwater monitoring results in areas where bulk petroleum products are being stored.

NYSDEC performed an inspection of registered Petroleum Bulk Storage Facilities in May 2022 and there were no findings identified.

3.8.5 Chemical Bulk Storage (CBS)

Title 6 of the Official Compilation of the Codes, Rules, and Regulations of the State of New York (NYCRR) Part 596 requires that all aboveground tanks larger than 185 gallons and all underground tanks that store specific chemicals are 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 2021, all NYSDEC-registered CBS tanks underwent the required Five-Year Tank Inspection, which was performed by a third-party consultant, P.W. Grosser Consulting. The result of the inspection of the four registered tanks in Building 624 (Tank Nos. 624-05/06/07/08) based on service life and overall condition was to perform an additional inspection prior to one-half of the tanks' remaining service life (September 2022). In lieu of this inspection, the older tanks were replaced with brand-new, double-walled tanks. In December 2021, the older tanks were formally closed as per NYSDEC requirements and

replaced (New Tank Nos. 624-12/13/14/15). An additional recommendation in the above report was to perform an interior inspection of Tank No. 635-04 due to potential excessive shell thinning and this inspection was completed in 2022. BNL made arrangements for the tank manufacturer, Mass Tank, to perform an external inspection and ultrasonic thickness survey of the shell on February 14, 2022. The results indicated that the tank had a useful life of 88 years. Two recommendations were made by the manufacturer to re-coat a small section of the tank shell and a tank support saddle. These recommendations were completed in the second quarter of 2022.

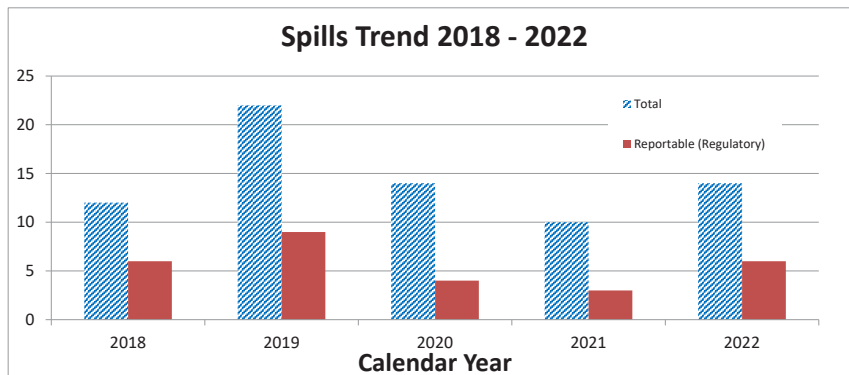
NYSDEC performed an inspection of registered Chemical Bulk Storage Facilities in May 2022 and there were no findings identified.

3.8.6 County Storage Requirements

Article 12 of the Suffolk County Sanitary Code (SCSC) regulates the storage and handling of toxic and hazardous materials in aboveground or underground storage tanks, drum storage facilities, piping systems, and transfer areas. Article 12 specifies design criteria to prevent environmental impacts resulting from spills or leaks, and specifies administrative requirements such as identification, registration, and spill reporting procedures. In 1987, the Laboratory entered into a voluntary Memorandum of Agreement with SCDHS, in which DOE and BNL agreed to conform to the environmental requirements of Article 12. In April 2010, due to a directive from NYSDEC asserting its sole jurisdiction over petroleum storage at Major Oil Storage Facilities, SCDHS notified BNL that it will cease permitting activities

(e.g., review/approval for new construction and modifications, issuance of operating permits, and registration requirement) for all petroleum bulk storage facilities. In 2011, the Laboratory received further information that indicated SCDHS had ceased applying Article 12 requirements

Figure 3-8. Spills Trend 2018-2022.



to both petroleum and chemical storage at BNL regardless of whether the storage is regulated by NYSDEC. Currently, there are approximately 122 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 and approval or continue to perform other administrative activities such as registration of exempt facilities and updates of shared databases, it will continue to inspect all storage facilities to ensure operational requirements of SCDHS Article 12 are maintained.

3.9 RCRA REQUIREMENTS

The Resource Conservation and Recovery Act (RCRA) regulates hazardous wastes that, if mismanaged, could present risks to human health or the environment. The regulations are designed to ensure that hazardous wastes are managed from the point of generation to final disposal. In New York State, EPA delegates the RCRA program to NYSDEC with EPA retaining an oversight role. Because the Laboratory may generate greater than 1,000 Kg (2,200 pounds) of hazardous waste in a month, it is considered a large quantity generator and has a RCRA permit to store hazardous wastes for up to one year before shipping the wastes off-site to licensed treatment and disposal facilities.

As noted in Chapter 2, BNL also has several satellite accumulation and 90-Day Hazardous Waste Accumulation Areas. Included with the hazardous wastes regulated under RCRA are mixed wastes which are generated in small quantities at BNL. Mixed wastes are materials that are both hazardous (under RCRA guidelines) and radioactive.

In September 2022, the EPA conducted a hazardous waste compliance evaluation inspection (CEI) at BNL to fulfill the statutory requirement

under RCRA for EPA to annually inspect all federally owned and/or operated hazardous waste treatment, storage, and disposal facilities (TSDFs). The inspection involved the review of shipping manifests, the Waste Management Facility's Part 373 RCRA Permit, inspection and training records, and a visit to the NYSDEC Permitted Treatment, Storage, and Disposal Facility (TSDF) and site 90-Day and Satellite Accumulation hazardous waste storage areas. A letter and report documenting the inspection was received from the EPA on September 27, 2022, which indicated that no regulatory concerns were identified.

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 2022 and disposed of 921 pounds of PCB-contaminated oil, debris, and other equipment comprised predominantly of lighting ballasts and small capacitors.

The Laboratory has aggressively approached reduction 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 and the NYSDEC Pesticide Regulations. BNL uses an Integrated

Pest Management approach that was developed over a decade ago and was assessed in 2021 by a third-party (Cornell Cooperative). Pesticides are used at the Laboratory to control undesirable insects and mice and microbial growth in cooling towers and to maintain certain areas free of vegetation (e.g., around fire hydrants and inside secondary containment berms). Insecticides are also applied in research greenhouses on site and the Biology Field. Herbicide use is minimized wherever possible (e.g., through spot treatment of weeds). Pesticides are applied by BNL-employed, NYSDEC pesticide-certified applicators. On an infrequent basis and for special projects, an outside vendor who also possesses the required NYSDEC application licenses applies pesticides. Cooling towers are regularly treated by another vendor that has NYSDEC-licensed pesticide applicators using NYSDEC approved biocides, corrosion inhibitors, and disinfectants in order to prevent corrosion and to disinfect the towers onsite.

In 2022, BNL-licensed pesticide applicators, in conjunction with the Environmental Protection Division (EPD) subject matter experts, performed a pilot test to reduce the amount of corn being placed inside the 4-Poster™ Tick Control Devices (see Chapter 6 for more details on these devices) to more effectively treat the target species (deer) and to minimize non-target species corn consumption. This strategy has resulted in the reduction of the amount of pesticide applied to the rollers on the devices. Thus, the amount of overall pesticide usage in 2022 versus previous years has decreased.

By February 1 of every year, each BNL pesticide applicator submits application records that are reviewed by EPD staff, and an electronic annual report is created and submitted to the NYSDEC detailing insecticide, rodenticide, algicide, and herbicide use for the previous year. Contractors who apply pesticides and cooling tower biocides are responsible for filing their own reports.

3.12 WETLANDS AND RIVER PERMITS

As noted in Chapter 1, portions of the site are situated in the Peconic River floodplain. Portions of the Peconic River are listed by NYSDEC as “scenic” under the New York Wild, Scenic, and Recreational River Systems Act. The Laboratory

also has six areas regulated as wetlands and several vernal (seasonal) pools. Construction or modification activities performed within these areas require permits from NYSDEC.

Activities that could require review under the BNL Natural and Cultural Resource Management Programs (BNL 2021 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. There were no open permits in 2022.

3.13 PROTECTION OF WILDLIFE

3.13.1 Endangered Species Act

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

State-recognized endangered (E) or threatened (T) species at BNL include: eastern tiger salamander (E), peregrine falcon (E), Persius dusky-wing (E), bracken fern (E), crested fringed orchid (E), Engelman spikerush (E), dwarf huckleberry (E), whorled loose-strife (E), prostrate knotweed (E), possum haw (E), ipecac spurge (E), swamp darter (T), banded sunfish (T), frosted elfin (T), little bluet (T), scarlet bluet (T), pine barrens bluet (T), northern harrier (T), stargrass (T), eastern showy aster (T), and stiff-leaved goldenrod (T).

Tiger salamanders are listed as endangered in New York State because populations have declined due to habitat loss through development, road mortality during breeding migration, introduction of predatory fish into breeding sites, historical collection for the bait and pet trade, water level fluctuations, pollution, and general

disturbance of breeding sites. The BNL Natural Resource Management Plan (NRMP) (BNL 2021) formalizes the strategy and actions needed to protect 26 confirmed tiger salamander breeding locations on site. The strategy includes identifying and mapping habitats, monitoring breeding conditions, improving breeding sites, and controlling activities that could negatively affect breeding.

Peregrine falcons are listed as endangered in New York State due to historic declines associated with DDT. Falcons were confirmed nesting on the Cell Tower behind Building 30 (Brookhaven Center) in 2021 and were documented again in 2022 but with a likely failed nesting.

Banded sunfish and swamp darter have historically been found in the Peconic River drainage areas on site. Both species are listed as threatened within New York State, with eastern Long Island having the only known remaining populations of these fish in New York. Measures taken, or being taken, by the Laboratory to protect the banded sunfish and swamp darter and their habitats include eliminating, reducing, or controlling pollutant discharges to the Peconic River; monitoring populations and water quality to ensure that habitat remains viable; and minimizing disturbances to the river and adjacent banks. Due to an extended drought from 2015 through mid-2017, these two fish are not likely to be found on site. Should NYSDEC establish a recovery plan, fish may be restored to historic habitats in the future.

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

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

The Laboratory is also home to 12 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, whippoorwill, vesper sparrow, red-headed woodpecker, osprey, sharp-shinned hawk, and Cooper's hawk. The horned lark and grasshopper sparrow were removed from the list in 2022 due to lack of suitable habitat.

The management efforts for the tiger salamander also benefit the marbled salamander. At present, no protective measures are planned for the eastern box turtle or spotted turtle, as little activity occurs within their known habitat at the Laboratory. The Laboratory continues to evaluate bird populations as part of the management strategy outlined in the NRMP.

The Laboratory has 33 plant species that are protected under state law: eight are endangered; three are threatened (as listed above); and four are rare plants: the small-flowered false foxglove, narrow-leaved bush clover, wild lupine, and long-beaked bald-rush. The other 18 species are "exploitably vulnerable," meaning that they may become threatened or endangered if factors that result in population declines continue. These plants are currently sheltered due to the large areas of undeveloped pine barren habitat on site. Five species on the BNL list are likely present or possible due to presence of correct habitat.

As outlined in the NRMP, locations of these rare plants must be determined, populations estimated, and management requirements established. See Chapter 6 for further details.

3.13.2 *Migratory Bird Treaty Act*

As mentioned in Chapter 1, the Laboratory has identified more than 185 species of migratory birds since 1948; of those, approximately 84 species nest on site. Under the Migratory Bird Treaty

Act, migratory birds are protected from capture, harassment, and destruction or disturbance of nests without permits issued by the U.S. Fish and Wildlife Service. In the past, migratory birds have caused health and safety issues, especially through the deposition of fecal matter and the birds' assertive protection of nesting sites. When this occurs, proper procedures are followed to allow the birds to nest and preventive measures are taken to ensure that they do not cause problems in the future (e.g., access to nesting is closed or repaired, and/or deterrents to nesting are installed). Canada geese (*Branta canadensis*) are managed under an annual permit from the U.S. Fish and Wildlife Services goose nest management program. Occasionally, nesting migratory birds come in conflict with ongoing or planned construction activities. When this occurs, the USDA-APHIS-Wildlife Services Division is called for consultation and resolution, if possible. Each incident is handled on a case-by-case basis to ensure the protection of migratory birds, while maintaining fiscal responsibility. See Chapter 6 for more information on migratory birds.

3.13.3 Bald and Golden Eagle Protection Act

While BNL does not have bald or golden eagles nesting on site, these birds are occasionally observed visiting the area during migration. Since the first documented nesting on Long Island in 2013, bald eagles have become a common site on Long Island and at BNL. Bald eagles are seen at numerous locations on the BNL site throughout the year. 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 2023 Rev. 13) and are consistent with the pre-approved authorized release limits set by DOE Order 458.1.

In 2022, excess materials not identified as radioactive, such as scrap metal and electronics equipment resulting from normal operations, were released to interested parties or to an off-site location. All materials were surveyed, as required, using appropriate calibrated instruments and released based on the DOE pre-approved authorized release limits. There were no releases of real property in 2022.

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 2022, due to the continued pandemic, BNL was only inspected by federal, state, or local regulators on eight occasions. These inspections included:

- *Potable Water.* On June 27, SCDHS performed the Annual Water Supply Sanitary Survey of the BNL potable water system. There were no violations identified; corrective actions for any minor deficiencies were established and communicated with SCDHS and are being addressed by the Laboratory's Energy & Utilities Division.
- *Sewage Treatment Plant.* SCDHS conducts quarterly inspections of the Laboratory's STP to evaluate operations and sample the effluent for SPDES compliance. No performance or operational issues were identified. NYSDDEC also visited the site on February 2 and performed a SPDES inspection of the STP. No issues were identified.
- *RCRA.* In September 2022, the EPA conducted a hazardous waste compliance evaluation inspection at BNL to fulfill the statutory requirement under RCRA for EPA to annually inspect all federally owned and/or operated

hazardous waste treatment, storage, and disposal facilities. A letter and report documenting the inspection were received from the EPA on September 27, which indicated that no regulatory concerns were identified.

- *Petroleum and Chemical Bulk Storage.* In May, the NYSDEC performed a Lab-wide regulatory audit of the Lab's petroleum and chemical bulk storage program. A letter documenting the inspection was received from the NYSDEC on May 13, which indicated that no violations were observed.

3.15.2 DOE Assessments/Inspections

The DOE Brookhaven Site Office (BHSO) performs routine inspections, assessments, and surveillances of BNL operations to ensure continual improvement and success in meeting the Laboratory's mission. In 2022, BHSO, with assistance from the DOE Office of Science (SC) Consolidated Service Center, performed an assessment of BNL's Packaging and Transportation Program.

Overall, the Transportation Safety and Operations Compliance Assurance Process (TCAP) assessment found that the packaging and transportation program at BNL is a robust program implemented through staff committed to perform work in compliance with the requirements and open to feedback for improvement and refinement. There was one Noteworthy Practice, four Strengths, and four Level 3 Findings identified during the assessment. A Level 3 Finding is defined as a singular/isolated regulatory non-compliance where there is a process in place. A causal analysis was performed for the identified findings and corrective actions were developed to minimize the risk of recurrence.

BHSO also participated as an observer of the BSA Multi-Topic Assessment of BNL's environmental protection programs described below. BHSO participation comprised of observing BSA's scoping, assessment conduct, and reporting.

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 environmental, safety, and health inspections and/or other routine self-assessments, and frequency of past assessments.

In 2022, EPD planned for and executed a programmatic self-assessment in five areas: Radioactive Air Emissions, Non-Radioactive Air Emissions, Liquid Effluents, Storage of Hazardous and Nonhazardous Materials, and Radioactive Waste Management. The primary objectives and results of these assessments are summarized below.

The Radiological Air Monitoring System External Assessment was performed by subject matter experts from Oak Ridge National Laboratory and the primary objectives were to assess the current emission monitoring systems for the level of compliance with the requirements specified in 40 CFR 61, Subpart H, for BNL's sources of radioactive airborne emissions and assess BNL's quality assurance program for radioactive airborne emissions for compliance with ANSI/HPS N13.1-2011. At the completion of the assessment there was one noteworthy practice, seven opportunities for improvement, and one minor non-conformance. The minor non-conformance was related to the fact that annual flow audits using EPA Reference Methods were not currently being completed as required by BNL's Quality Assurance Program Plan and per the requirements found in ANSI/HPS N13.1-2011. Per the Laboratory's *Event/Issues Management* Subject Area, a causal analysis was performed for the identified finding and corrective actions were developed and tracked to closure.

The Non-Radioactive Airborne Emissions assessment evaluated operations and activities that are sources of non-radioactive airborne emissions to assess their conformance with internal procedures (i.e., department/division procedures) and compliance with external requirements. It also evaluated Standards-Based Management System (SBMS) subject areas for necessary revisions and helped determine the extent to which the American Innovation and Manufacturing Act hydrofluorocarbon phase-out will affect line organizations. This assessment resulted in one noteworthy practice and four observations. The observations were related to BNL's management of sulfur hexafluoride (SF₆) leaks from high-energy equipment (High Energy Equipment Management Plan EU-PLAN-SF₆) and use of greenhouse gases in experimental activities. The identified observations were shared with the assessed organizations, documented in the Laboratory's Integrated Operational

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Performance System, and tracked to closure.

The primary objectives of the Liquid Effluents assessment included the evaluation of operations and activities that are sources of liquid effluents to assess their conformance with *Liquid Effluent* Subject Area and internal procedures (i.e., department/division procedures) and compliance with external requirements, and identification of strengths and areas for improvement of evaluated operations and activities in relation to their conformance/compliance with the *Liquid Effluent* Subject Area, internal procedures, and external requirements. The assessment team determined that the requirements of the *Liquid Effluents* Subject Area are adequately documented, known by appropriate staff, and implemented in the assessed organizations and areas. One noteworthy practice, one minor nonconformance, one observation, and two opportunities for improvement were identified. The minor nonconformance and observation were related to a Facilities & Operations Procedure, Daily Field Calibration of pH Meters (EU-CSF-019), with issues identified regarding expired buffers and documentation of daily pH checks. Per the Laboratory's *Event/Issues Management* Subject Area, a causal analysis was performed for the identified findings and corrective actions were developed and tracked to closure.

The Storage and Transfer of Hazardous and Nonhazardous Materials assessment evaluated the Lab's compliance with relevant federal, state and local regulatory drivers, SBMS requirements, and procedures; analyzed and evaluated effectiveness of corrective and preventative actions from previous assessments/audits; and, assessed program system strengths and possible opportunities for improvement. The assessment resulted in three noteworthy practices, two minor nonconformances, three observations, and five opportunities for improvement. The two minor nonconformances were related to operations (installation and inspections) of regulated storage facilities. Liquid-level gauges were missing from some water treatment chemical tanks and a coated secondary containment was compromised and actions were not taken to address the issue. A causal analysis was performed for the identified findings and corrective actions were developed and tracked to closure.

The Radioactive Waste Management assessment focused on randomly selected shipments of

radioactive waste to an off-site facility for disposal. These shipments were reviewed against select key steps of Waste Management (WM) Procedure WM-SOP-578 Rev. 39, Shipping Low-Level Radioactive and Mixed Waste, to demonstrate compliance. Specifically, the documentation associated with shipments of radioactive waste magnets from BNL's Collider Accelerator Department (C-AD) was reviewed. The assessment found that the procedures and processes evaluated pertaining to the selected off-site shipments of radioactive wastes were performed effectively and in accordance with the procedural steps assessed. The assessment found one noteworthy practice and one observation. The one observation was related to some information in a Waste Management Program procedure (WM-SOP-578 Rev. 39, Shipping Low-Level Radioactive and Mixed Waste) that was not properly documented in the shipping folder. This issue was immediately addressed by adding a step to an attachment in the existing procedure to properly capture the information.

3.15.4 Nevada National Security Site

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

BNL's Waste Certification Program was assessed in September 2022 by staff from Navaro (NNSS M&O Contractor) in the areas of waste traceability and characterization. The assessment resulted in no findings, observations, or opportunities for improvement, enabling BNL continued access to the NNSS for radioactive waste disposal. BNL is currently scheduled for its annual assessment of its Waste Certification Program in September 2023.

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 2022 (see Table 3-10). There were no Notice of Violations issued in 2022.

Table 3-10. 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	02/28/92	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. Demolition of the High Flux Beam Reactor (HFBR) stack was completed in 2021. The HFBR reactor vessel is scheduled for decontamination and decommissioning by 2072. All groundwater treatment systems operated as required in 2022. Management of the characterization and remediation of PFOS, PFOA and 1,4-dioxane was formally included under the BNL CERCLA program. Construction of two new treatment systems to address PFOS and PFOA in groundwater downgradient of two source areas was ongoing in 2022.
There were no Notices of Violation/Enforcement Actions in 2022.				

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

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