3 Compliance Status

Brookhaven National Laboratory is subject to more than 100 sets of federal, state, and local environmental regulations; numerous site-specific permits; 12 equivalency permits for operation of groundwater remediation systems; and several other binding agreements. In 2014, 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.

With the exception of one nitrogen oxide emission exceedance of the new Reasonably Available Control Technology limit for Boiler 6 in July 2014, emissions of nitrogen oxides, carbon monoxide, and sulfur dioxide from the Central Steam Facility were all within permit limits. In 2014, there was one excess opacity measurement recorded by Boiler 6 during scheduled service work on the continuous opacity system and five excess opacity measurements recorded by Boiler 7. Two of the Boiler 7 excess opacity readings were due to unknown causes during boiler startup and two were the result of a blower motor failure. The final opacity excess reading occurred during startup of Boiler 7 after the blower motor was replaced; other opacity excursions reported for Boiler 6 and 7 were only noted during testing periods. In 2014, there were no discharges of Halon 1211 from portable fire extinguishers or Halon 1301 from accidental or fire induced activation of fixed fire suppression systems. Halon portable fire extinguishers continue to be removed and replaced by dry-chemical or clean agent units as part of an ongoing program to phase out the use of chlorofluorocarbons as extinguishing agents.

Monitoring of BNL's potable water system indicated that all drinking water requirements were met during 2014. Most of the liquid effluents discharged to surface water and groundwater also met applicable New York State Pollutant Discharge Elimination System permit requirements. Eight excursions above permit limits were reported for the year; four occurred at the Sewage Treatment Plant (two total nitrogen and two mercury), two at recharge basin 002 (oil and grease and HEDP), one at recharge basin 010 (pH), and one at recharge basin 006B (oil and grease). The permit excursions were reported to the New York State Department of Environmental Conservation (NYSDEC) and the Suffolk County Department of Health Services and corrective measures were taken. Groundwater monitoring at the Laboratory's Major Petroleum Facility continued to demonstrate that current oil storage and transfer operations are not affecting groundwater quality.

Efforts to minimize impacts of spills of materials continued in 2014. There were 28 spills in 2014, a 34 percent reduction compared to 2013. Eleven of the 28 spills met regulatory agency reporting criteria. The severity of releases were minor, and all releases were cleaned up to the satisfaction of NYSDEC.

BNL participated in 10 environmental inspections or reviews by external regulatory agencies in 2014. These inspections included Sewage Treatment Plant operations, waste water discharges to other regulated outfalls and recharge basins, hazardous waste management facilities, regulated petroleum and chemical bulk storage facilities, and the potable water system. Immediate corrective actions were taken to address all issues raised during these inspections.

3.1 COMPLIANCE WITH REQUIREMENTS

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

3.2 ENVIRONMENTAL PERMITS

3.2.1 Existing Permits

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

- State Pollutant Discharge Elimination System (SPDES) permits, issued by NYSDEC.
- Major Petroleum Facility (MPF) license, issued by NYSDEC.
- Resource Conservation and Recovery Act (RCRA) permit, issued by NYSDEC for BNL's Waste Management Facility.
- Registration certificate from NYSDEC for tanks storing bulk quantities of hazardous substances (e.g., fuel oil).
- Eight radiological emission authorizations

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 was the subject of a tri-party agreement with EPA, NYSDEC, and DOE. BNL site remediation is conducted by the Environmental Protection Division in accordance with milestones established under this agreement. The cleanup is currently in the long-term surveillance and maintenance mode for the groundwater treatment systems, former soil/sediment cleanup areas, and the reactors; this includes monitoring of institutional controls. The High Flux Beam Reactor (HFBR) stack and reactor vessel are scheduled for D&D by 2020 and 2065, respectively.	2.3.4.8
Council for Env. Quality: 40 CFR 1500–1508 DOE: 10 CFR 1021	The National Environmental Policy Act (NEPA) requires federal agencies to follow a prescribed process to anticipate the impacts on the environment of proposed major federal actions and alternatives. DOE codified its implementation of NEPA in 10 CFR 1021.	BNL is in full compliance with NEPA requirements. The Laboratory has established sitewide procedures for implementing NEPA requirements.	3.3
Advisory Council on Historic Preservation: 36 CFR 60 36 CFR 63 36 CFR 79 36 CFR 800 16 USC 470	The National Historic Preservation Act (NHPA) identifies, evaluates, and protects historic properties eligible for listing in the National Register of Historic Places, commonly known as the National Register. Such properties can be archeological sites or historic structures, documents, records, or objects. NHPA is administered by state historic preservation offices (SHPOs; in New York State, NYSHPO).	The HFBR, BGRR complex, and World War I trenches are eligible for inclusion in the National Register. The former Cosmotron building was identified as potentially eligible in an April 1991 letter from NYSHPO. Any proposed activities involving these facilities must be identified through the NEPA/NHPA processes and evaluated to determine if the action would affect the features that make the facility eligible. Actions required for D&D of the BGRR were determined to affect its eligibility, and mitigative actions have been completed based on a Memorandum of Agreement between DOE and NYSHPO. BNL has a Cultural Resource Management Plan to ensure compliance with cultural resource regulations.	3.4
EPA: 40 CFR 50 40 CFR 60-61 40 CFR 63 40 CFR 80 40 CFR 82 40 CFR 98 NYSDEC: 6 NYCRR 200–257 6 NYCRR 307	The Clean Air Act (CAA) and the NY State Environmental Conservation Laws regulate the release of air pollutants through permits and air quality limits. Emissions of radionuclides are regulated by EPA, via the National Emission Standards for Hazardous Air Pollutants (NESHAPs) authorizations.	All air emission sources are incorporated into the BNL Title V permit or have been exempted under the New York State air program, which is codified under the New York Codes, Rules, and Regulations (NYCRR). All applicable CAA and NYCRR regulations are incorporated into the BNL Title V permit. Radiological air emission sources are registered with the EPA.	3.5

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

Regulator: Codified Regulation	Regulatory Program Description	Compliance Status	Report Sections
EPA: 40 CFR 109–140 40 CFR 230, 231 40 CFR 401, 403 NYSDEC: 6 NYCRR 700–703 6 NYCRR 750	The Clean Water Act (CWA) and NY State Environmental Conservation Laws seek to improve surface water quality by establishing standards and a system of permits. Wastewater discharges are regulated by NYSDEC permits through the State Pollutant Discharge Elimination System (SPDES).	At BNL, permitted discharges include treated sanitary waste, and cooling tower and stormwater discharges. With the exception of eight excursions, these discharges met the SPDES permit limits in 2014.	3.6
EPA: 40 CFR 141–149 NYSDOH: 10 NYCRR 5	The Safe Drinking Water Act (SDWA) and New York State Department of Health (NYSDOH) standards for public water supplies establish minimum drinking water standards and monitoring requirements. SDWA requirements are enforced by the Suffolk County Department of Health Services (SCDHS).	BNL maintains a sitewide public water supply. This water supply met all primary drinking water standards in 2014. Corrective actions for all identified operation and maintenance deficiencies were established and communicated with SCDHS and are being addressed by the Laboratory's Energy and Utilities Division.	3.7
EPA: 40 CFR 112 40 CFR 300 40 CFR 302 40 CFR 355 40 CFR 370 40 CFR 372	The Oil Pollution Act, the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Superfund Amendment Reauthorization Act (SARA) require facilities with large quantities of petroleum products or chemicals to prepare emergency plans and report their inventories to EPA, the state, and local emergency planning groups.	Since some facilities at BNL store or use chemicals or petroleum in quantities exceeding threshold planning quantities, the Laboratory is subject to these requirements. BNL fully complied with all reporting and emergency planning requirements in 2014.	3.8.1 3.8.2 3.8.3
EPA: 40 CFR 260–280 NYSDEC: 6 NYCRR 360–372	The Resource Conservation Recovery Act (RCRA) and New York State Solid Waste Disposal Act govern the generation, storage, handling, and disposal of hazardous wastes.	BNL is defined as a large-quantity generator of hazardous waste and has a permitted waste management facility.	3.9
EPA: 40 CFR 700–763	The Toxic Substances Control Act (TSCA) regulates the manufacture, use, and distribution of all chemicals.	BNL manages all TSCA-regulated materials, including PCBs, and is in compliance with all requirements.	3.10
EPA: 40 CFR 162–171[f] NYSDEC: 6 NYCRR 320 6 NYCRR 325–329	The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and corresponding NY State regulations govern the manufacture, use, storage, and disposal of pesticides, herbicides, biocides, rodenticides, fungicides, tickicides, as well as the pesticide containers and residuals.	BNL contracts and/or employs NYSDEC-certified pesticide applicators for specific pesticide categories to apply pesticides, herbicides, biocides, rodenticides, fungicides, and tickicides. Each applicator attends Continuing Education training, as needed, to maintain current category certifications and BNL (or the contractor that applies regulated materials) files an annual report to the NYSDEC Pesticide Bureau detailing the above applications including EPA Registration Nos., dates of applications, method of application, target organisms, types, locations, quantity, and dosage rates of pesticides applied.	3.11
DOE: 10 CFR 1022 NYSDEC: 6 NYCRR 663 6 NYCRR 666	DOE regulations require its facilities to comply with floodplain/wetland review requirements. The New York State Fresh Water Wetlands and Wild, Scenic, and Recreational Rivers rules govern development in the state's natural waterways. Development or projects within a half-mile of regulated waters must have NYSDEC permits.	BNL is in the Peconic River watershed and has several jurisdictional wetlands; consequently, development of locations in the north and east of the site requires NYSDEC permits and review for compliance under DOE wetland/floodplain regulations. In 2014, there were three projects permitted under the New York State Fresh Water Program.	3.12
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 flaura and fauna. Many species have been categorized by New York State as endangered, threatened, or of special concern. The Laboratory's Natural Resource Management Plan outlines activities to protect these vulnerable species and their habitats (see Chapter 6).	3.13

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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: Migratory Bird Treaty Act 16 USC 703-712 The Bald and Golden Eagle Protection Act 16 USC 668 a-d	The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful. Birds protected under the act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and others, and includes their body parts (feathers, plumes etc), nests, and eggs. The Bald and Golden Eagle Protection Act (BGEPA) prohibits any form of possession or taking of both bald and golden eagles.	Compliance with the MBTA and the BGEPA are documented through the BNL Natural Resource Management Plan. The plan includes provisions for enhancing local habitat through the control of invasive species, planting of native grasses as food sources, and construction of nesting sites. All construction activities, including demolition, are reviewed to ensure there are no impacts to nesting birds.	3.13
DOE: Order 231.1B Manual 231.1-1A	The Environment, Safety, and Health Reporting program objective is to ensure timely collection, reporting, analysis, and dissemination of information on environment, safety, and health issues as required by law or regulations or as needed to ensure that DOE is kept fully informed on a timely basis about events that could adversely affect the health and safety of the public, workers, the environment, the intended purpose of DOE facilities, or the credibility of the Department. Included in the order are the requirements for the Occurrence Reporting and Processing of Operations Program (ORPS).	BNL prepares an annual Site Environmental Report and provides data for DOE to prepare annual NEPA summaries and other Safety, Fire Protection, and Occupational Health and Safety Administration (OSHA) reports. The Laboratory developed the ORPS Subject Area for staff and management who perform specific duties related to discovery, response, notification, investigation, and reporting of occurrences to BNL and DOE management. The ORPS Subject Area is supported by: Occurrence Reporting Program Description, Critiques Subject Area, Occurrence Categorizer's Procedure, and the ORPS Office Procedure.	All chapters
DOE: Order 414.1D 10 CFR 830, Subpart A Policy 450.5	The Quality Assurance (QA) program objective is to establish an effective management system using the performance requirements of this Order/ Rule, coupled with consensus standards, where appropriate, to ensure: 1) products and services meet or exceed customers' expectations; 2) management support for planning, organization, resources, direction, and control ; 3) performance and quality improvement thorough rigorous assessment and corrective action and; and 4) environmental, safety, and health risks and impacts associated with work processes are minimized while maximizing reliability and performance of work products.	BNL has a Quality Assurance (QA) Program in place to implement quality management methodology throughout its management systems and associated processes to: (1) achieve and maintain compliance with applicable environmental, safety, security, and health (ESSH) requirements; (2) continue improvement in ESSH performance; (3) provide a safe and healthy workplace; (4) protect the environment and conserve resources; (5) prevent pollution; (6) provide services and products of the highest quality consistent with the needs, expectations, and resources of our customers; and (7) continuously improve processes, systems, and capabilities to improve operations and increase the value of research products delivered to customers. Having a comprehensive program ensures that all environmental monitoring data meet QA and quality control requirements. Samples are collected and analyzed using standard operating procedures, to ensure representative samples and reliable, defensible data. Quality control in the analytical labs is maintained through daily instrument calibration, efficiency and background checks, and testing for precision and accuracy. Data are verified and validated according to project-specific quality objectives before they are used to support decision making.	Chapter 9
DOE: Order 435.1 Chg. 1	The Radioactive Waste Management Program objective is to ensure that all DOE radioactive waste is managed in a manner that protects workers, public health and safety, and the environment. Order 435.1 requires all DOE organizations that generate radioactive waste to implement a waste certification program. DOE Laboratories must develop a Radioactive Waste Management Basis (RWMB) Program description, which includes exemption and timeframe requirements for staging and storing both routine and non-routine radioactive wastes.	The BNL Waste Certification Program Plan (WCPP) in the RWMB Program description defines the radioactive waste management program's structure, logic, and methodology for waste certification. New or modified operations or activities that do not fall within the scope of the RWMB Program description must be documented and approved before implementation. The Laboratory's RWMB Program description describes the BNL policies, procedures, plans, and controls demonstrating that the Laboratory has the management systems, administrative controls, and physical controls to comply with DOE Order 435.1 Chg. 1.	2.3.4.3

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

Regulator: Codified Regulation	Regulatory Program Description	Compliance Status	Report Sections
DOE: Order 436.1	The DOE Departmental Sustainability Order replaces former DOE Orders 450.1A, Environmental Protection Programs, and 430.2B, Departmental Energy, Renewable Energy and Transportation Management. The intent of the new order is to incorporate and implement the requirements of Executive Order (EO) 13514 and to continue compliance with EO 13423. The new order is supported by DOE requirements for sound sustainability programs implemented under the DOE 2010 Strategic Sustainability Performance Plan (SSPP). Contractor requirements under the order require preparation of a Site Sustainability Plan and implementation of a sound Environmental Management System (EMS).	In accordance with the requirements of the DOE Strategic Sustainability Performance Plan, BNL has developed and implemented a Site Sustainability Plan. The Goals and Strategic Objectives of the DOE SSPP are tracked and reported on annually. BNL's EMS, as a whole, was officially registered to the ISO 14001:1996 standard in 2001 and recertified to the revised standard in 2004, 2007, 2010, and 2013. In June 2014, an external surveillance audit was conducted that found the Laboratory's EMS to be fully integrated and effective, with no minor nonconformities and many system strengths.	Chapter 2
DOE: Order 458.1, Change 3	In February 2011, DOE released DOE Order 458.1 Radiation Protection of the Public and Environment, which replaced former Order 5400.5. The order establishes requirements to protect the public and the environment against undue risk from radiation associated with radiological activities conducted under the control of DOE pursuant to the Atomic Energy Act of 1954, as amended. The Order requires the preparation of an Environmental Radiation Protection Plan which outlines the means by which facilities monitor their impacts on the public and environment. Full compliance with the Order was required by August 2012.	In accordance with the requirements of DOE Order 458.1, BNL maintains and implements several plans and programs for ensuring that the management of facilities, wastes, effluents, and emissions do not present a risk to the public, workers, or environment. These plans and programs have existed for decades and were previously implemented under prior DOE Order 5400.5 and in accordance with the current DOE O 435.1, *Radioactive Waste Management*, and 10 CFR 835. Environmental monitoring plans are well documented and the results are published annually in BNL's Site Environmental Report, which is prepared in accordance with DOE O 231.1B. The Environmental Radiation Protection Program (ERPP), which was published in September 2012, provides a record of the requirements of DOE O 458.1 and documents how the Laboratory meets these requirements.	Chapters 3, 4, 5, 6, and 8

Notes:
CFR = Code of Federal Regulations
NYCRR = New York Codes, Rules, and Regulations
SCSC = Suffolk County Sanitary Code

issued by the United States Environmental Protection Agency (EPA) under the National Emission Standards for Hazardous Air Pollutants (NESHAPs).

- Air emissions permit, issued by NYSDEC under Title V of the Clean Air Act (CAA) Amendments authorizing the operation of 13 emission units.
- Four permits issued by NYSDEC for construction activities within the Peconic River corridor.
- EPA Underground Injection Control (UIC) Area permit for the operation of 128 UIC wells (e.g., dry wells and cesspools).
- Permit for the operation of six domestic water supply wells, issued by NYSDEC.
- Twelve 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 SPDES Permits

In September 2014, BNL received approval on its SPDES Permit Renewal application, which constitutes authorization to discharge wastewater in accordance with all terms, conditions, and limitations for 12 outfalls specified in the permit.

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

Three actions continued in 2014 that required

Table 3-2. BNL Environmental Permits.

Issuing Agency	Bldg. or Facility	Process/Permit Description	Permit ID No.	Expiration or Completion	Emission Unit ID	Source ID
EPA - NESHAPs	510	Calorimeter Enclosure	BNL-689-01	None	NA	NA
EPA - NESHAPs	705	Tritium Evaporator	BNL-288-01	None	NA	NA
EPA - NESHAPs	820	Accelerator Test Facility	BNL-589-01	None	NA	NA
EPA - NESHAPs	AGS	AGS Booster - Accelerator	BNL-188-01	None	NA	NA
EPA - NESHAPs	RHIC	Accelerator	BNL-389-01	None	NA	NA
EPA - NESHAPs	931	Brookhaven LINAC Isotope Producer	BNL-2009-1	None	NA	NA
NYSDEC - NESHAPs	REF	Radiation Effects/Neutral Beam	BNL-789-01	None	NA	NA
NYSDEC - NESHAPs	RTF	Radiation Therapy Facility	BNL-489-01	None	NA	NA
EPA - SDWA	BNL	Underground Injection Control	NYU500001	(a)	NA	NA
NYSDEC - Air Equivalency	517/518	South Boundary/Middle Road System	1-51-009	NA	NA	NA
NYSDEC - Air Equivalency	598	OU I Remediation System	1-52-009	NA	NA	NA
NYSDEC - Air Equivalency	539	Western South Boundary System	1-52-009	NA	NA	NA
NYSDEC - Air Equivalency	TR 867	T-96 Remediation System	1-52-009	NA	NA	NA
NYSDEC - Air Equivalency	644	Freon-11 Treatment System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	517/518	South Boundary/Middle Road System	1-51-009	NA	NA	NA
NYSDEC - SPDES Equivalency	539	West South Boundary System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	598	OU I Remediation System	1-52-009	NA	NA	NA
NYSDEC - SPDES Equivalency	598	Tritium Remediation System	1-52-009	04-May-16	NA	NA
NYSDEC - SPDES Equivalency	670	Sr-90 Treatment System	None	25-Feb-18	NA	NA
NYSDEC - SPDES Equivalency	TR 829	Carbon Tetrachloride System	None	Closed out 2010	NA	NA
NYSDEC - SPDES Equivalency	OS-4	Airport/LIPA Treatment System	None	NA	NA	NA
NYSDEC - SPDES Equivalency	OS-2	Industrial Park East Treatment System	None	Closed out 2013	NA	NA
NYSDEC - SPDES Equivalency	OS-5	North St./North St. East Treatment System	None	NA	NA	NA
NYSDEC - SPDES Equivalency	OS-6	Ethylene Di-Bromide Treatment System	None	16-Dec-19	NA	NA
NYSDEC - SPDES Equivalency	855	Sr-90 Treatment System - BGRR/WCF	None	16-Dec-19	NA	NA
NYSDEC - SPDES Equivalency	TR 867	T-96 Remediation System	1-52-009	20-Mar-17	NA	NA
NYSDEC - SPDES Equivalency	644	Freon-11 Treatment System	1-52-009	20-Mar-17	NA	NA
NYSDEC - SPDES Equivalency	OS-2	Industrial Park Treatment System	1-52-009	30-Sep-19	NA	NA
NYSDEC - Hazardous Substance	BNL	Bulk Storage Registration Certificate	1-000263	27-Jul-15	NA	NA
NYSDEC - LI Well Permit	BNL	Domestic Potable/Process Wells	1-4722-00032/00113	13-Sep-18	NA	NA
NYSDEC - Air Quality	423	Metal Parts Cleaning Tank	1-4722-00032/00115	03-Feb-19	U-METAL	42308
NYSDEC - Air Quality	423	Gasoline Storage and Fuel Pumps	1-4722-00032/00115	03-Feb-19	U-FUELS	42309-10
NYSDEC - Air Quality	423/630	Motor Vehicle A/C Servicing	1-4722-00032/00115	03-Feb-19	U-MVACS	MVAC1- 3
NYSDEC - Air Quality	244	Paint Spray Booth	1-4722-00032/00115	03-Feb-19	U-PAINT	24402
NYSDEC - Air Quality	244	Flammable Liquid Storage Cabinet	1-4722-00032/00115	03-Feb-19	U-PAINT	244AE
NYSDEC - Air Quality	479	Metal Parts Cleaning Tank	1-4722-00032/00115	03-Feb-19	U-METAL	47908
NYSDEC - Air Quality	510	Spin Coating Operation	1-4722-00032/00115	03-Feb-19	U-INSIG	510AK
NYSDEC - Air Quality	801	Target Processing Laboratory	1-4722-00032/00115	03-Feb-19	U-INSIG	80101
NYSDEC - Air Quality	Site	Aerosol Can Processing Units	1-4722-00032/00115	03-Feb-19	U-INSIG	AEROS
NYSDEC - Air Quality	498	Aqueous Cleaning Facility	1-4722-00032/00115	03-Feb-19	U-METAL	49801
NYSDEC - Air Quality	535B	Plating Tanks	1-4722-00032/00115	03-Feb-19	U-INSIG	53501
NYSDEC - Air Quality	535B	Etching Machine	1-4722-00032/00115	03-Feb-19	U-INSIG	53502
NYSDEC - Air Quality	535B	Printed Circuit Board Process	1-4722-00032/00115	03-Feb-19	U-INSIG	53503

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

Issuing Agency	Bldg. or Facility	Process/Permit Description	Permit ID No.	Expiration or Completion	Emission Unit ID	Source ID
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-61005	61005
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-61006	61006
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-61007	61007
NYSDEC - Air Quality	610	Metal Parts Cleaning Tray	1-4722-00032/00115	03-Feb-19	U-METAL	61008
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-61005	6101A
NYSDEC - Air Quality	630	Gasoline Storage and Fuel Pumps	1-4722-00032/00115	03-Feb-19	U-FUELS	63001-03
NYSDEC - Air Quality	902	Epoxy Coating/Curing Exhaust	1-4722-00032/00115	03-Feb-19	U-COILS	90206
NYSDEC - Air Quality	903	Metal Parts Cleaning Tank	1-4722-00032/00115	03-Feb-19	U-METAL	90304
NYSDEC - Air Quality	922	Electroplating Operation	1-4722-00032/00115	03-Feb-19	U-INSIG	92204
NYSDEC - Air Quality	923	Electronic Equipment Cleaning	1-4722-00032/00115	03-Feb-19	U-METAL	9231A
NYSDEC - Air Quality	923	Parts Drying Oven	1-4722-00032/00115	03-Feb-19	U-METAL	9231B
NYSDEC - Air Quality	Site	Halon 1211 Portable Extinguishers	1-4722-00032/00115	03-Feb-19	U-HALON	H1211
NYSDEC - Air Quality	Site	Halon 1301 Fire Suppression Systems	1-4722-00032/00115	03-Feb-19	U-HALON	H1301
NYSDEC - Air Quality	Site	Commercial Refrigeration Equipment	1-4722-00032/00115	03-Feb-19	U-RFRIG	COMRE
NYSDEC - Air Quality	Site	Packaged A/C Units	1-4722-00032/00115	03-Feb-19	U-RFRIG	PKG01-02
NYSDEC - Air Quality	Site	Reciprocating Chillers (46)	1-4722-00032/00115	03-Feb-19	U-RFRIG	REC01-53
NYSDEC - Air Quality	Site	Rotary Screw Chillers (15)	1-4722-00032/00115	03-Feb-19	U-RFRIG	ROTO1-15
NYSDEC - Air Quality	Site	Split A/C Units	1-4722-00032/00115	03-Feb-19	U-RFRIG	SPL01-02
NYSDEC - Air Quality	Site	Centrifugal Chillers (20)	1-4722-00032/00115	03-Feb-19	U-RFRIG	CEN01-26
NYSDEC - Air Quality	463	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	46301
NYSDEC - Air Quality	490	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	49006
NYSDEC - Air Quality	555	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	55503
NYSDEC - Air Quality	635	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	63501
NYSDEC - Air Quality	734	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	73401
NYSDEC - Air Quality	735	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	73501
NYSDEC - Air Quality	740	Diesel Emergency Generators (2)	1-4722-00032/00115	03-Feb-19	U-GENER	74001-02
NYSDEC - Air Quality	801	Diesel Emergency Generator	1-4722-00032/00115	03-Feb-19	U-GENER	80102
NYSDEC - Air Quality	912	Diesel Emergency Generators (3)	1-4722-00032/00115	03-Feb-19	U-GENER	912A1-A3
NYSDEC - Air Quality	30	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-SMBLR	030AB
NYSDEC - Air Quality	244	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-SMBLR	244AB
NYSDEC - Air Quality	422	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-SMBLR	422AF
NYSDEC - Air Quality	423	Combustion Unit	1-4722-00032/00115	03-Feb-19	U-SMBLR	42304
NYSDEC - Hazardous Waste	WMF	Waste Management	1-4722-00032/00102	19-Nov-16	NA	NA
NYSDEC - Water Quality	CSF	Major Petroleum Facility	1-1700	31-Mar-17	NA	NA
NYSDEC - Water Quality	STP	STP and Recharge Basins	NY-0005835	29-Feb-20	NA	NA
NYSDEC - Water Quality	STP	STP and Recharge Basins	1-4722-00032/00148	26-Aug-15	NA	NA
NYSDEC - Water Quality	STP	STP and Recharge Basins	1-4722-00032/00149	27-Aug-15	NA	NA
NYSDEC - Water Quality	Site	Solar farm construction	1-4722-05846/00001	06-May-15	NA	NA
NYSDEC - Water Quality	Site	Construction of Fences and Platforms at RHIC	1-4722-00032/00144	11-Jul-16	NA	NA

Notes:
(a) Permit renewal under review by EPA
A/C = Air Conditioning
AGS = Alternating Gradient Synchrotron
BGRR = Brookhaven Graphite Research Reactor
CSF = Central Steam Facility
EPA = Environmental Protection Agency
LIPA = Long Island Power Authority
NA = Not Applicable
NESHAPs = National Emission Standards for Hazardous Air Pollutants
NYSDEC = New York State Department of Environmental Conservation
OU = Operable Unit
RTF = Radiation Therapy Facility
RHIC = Relativistic Heavy Ion Collidar
SDWA = Safe Drinking Water Act
SPDES = State Pollutant Discharge Elimination System
Sr-90 = Strontium-90
STP = Sewage Treatment Plant
WCF = Waste Concentration Facility
WMF = Waste Management Facility

permits under the New York State Wetland and/or Wild, Scenic and Recreational Rivers Act legislation. Continuation projects included post-construction activities associated with the on-site Long Island Solar Farm (LISF), installation of fencing and air conditioning platforms at the Relativistic Heavy Ion Collider (RHIC), and a project for the construction of recharge basins associated with upgrades to the Laboratory's Sewage Treatment Plant (STP), which will allow for the discharge of tertiary-treated wastewater directly to groundwater.

3.2.2.3 Title V Permit

In February 2014, NYSDEC approved BNL's application to renew its Title V Permit that was submitted in December 2012 with supplemental information added in January 2013. The effective date of the five-year renewal permit is February 4, 2014. The renewed Title V Permit covers 13 emission units encompassing 130 emission sources, wherein the emission sources are grouped together because they are subject to one or more common Clean Air Act regulatory requirements.

3.3 NEPA ASSESSMENTS

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

During 2014, environmental evaluations were completed for 134 proposed projects at BNL. Of those, 127 were considered minor actions requiring no additional documentation. Seven projects were addressed by submitting notification forms to DOE, which determined that all seven projects were covered by existing "Categorical Exclusions" (per 10 CFR 1021) or fell within the scope of a previous environmental assessment.

3.4 PRESERVATION LEGISLATION

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

BNL has three structures or sites that are eligible for listing on the National Register of Historic Places: the Brookhaven Graphite Research Reactor (BGRR) complex, the High Flux Beam Reactor (HFBR) complex, and the World War I Army training trenches associated with Camp Upton. Several other structures of historic significance are identified in BNL's Cultural Resources Management Plan (BNL 2013), including the Brookhaven Center, and Building 120. Two other buildings, Berkner Hall and the Chemistry Building, are considered "Architecturally Significant." A Department of Interior questionnaire regarding historic and cultural resources is prepared annually. Additional activities associated with historic preservation compliance 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 2014, natural gas was the predominant fuel burned at the

CSF. For boilers with maximum operating heat inputs greater than or equal to 25 MMBtu/hr (7.3 MW), the RACT requirements establish emission standards for oxides of nitrogen (NOx). On July 1, 2014, new lower NOx RACT standards went into effect. The Laboratory also maintains continuous opacity monitors for Boilers 6 and 7.

On July 17, 2014, Boiler 6 exceeded the new NOx RACT limit of 0.15 lbs/MMBtu with a 24-hour average emission rate of 0.21 lbs/MMBtu while firing No. 6 oil. The exceedance occurred after natural gas service was interrupted to the CSF to permit modifications of natural gas line utility services. This exceedance was documented in the quarterly Site-Wide Air Emissions and Monitoring Systems Performance Report submitted to NYSDEC. Also in 2014, on November 25, there was one excess opacity measurement recorded by Boiler 6 during scheduled service work on the continuous opacity system, and five excess opacity measurements recorded by Boiler 7.

All of the excursions were documented in quarterly Site-Wide Air Emissions and Monitoring Systems Performance Reports submitted to NYSDEC. Chapter 4 discusses CSF compliance with NOx RACT standards and opacity limits in greater detail.

3.5.1.2 Ozone-Depleting Substances

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

In 2014, 21 pounds of R-12, 420 pounds of R-22, and 47 pounds of R-123 were recovered and recycled from refrigeration equipment that was serviced. Four hundred pounds of R-11, 780 pounds of R-22, 6 pounds of R-134a, 41 pounds of R-401a, and 42 pounds of R-410A leaked from refrigeration and air conditioning equipment on site. These leaks were subsequently reported as emissions in an Annual Emissions Statement transmitted to NYSDEC.

Halon: Halon 1211 and 1301 are extremely efficient fire suppressants, but are being phased out due to their effect on the earth's ozone layer. In 1998, the Laboratory purchased equipment to comply with the halon recovery and recycling requirements of the CAA, 40 CFR 82 Subpart H. When portable fire extinguishers or fixed systems are removed from service and when halon cylinders are periodically tested, Laboratory technicians use halon recovery and recycling devices to comply with CAA provisions. Halon recovered from excessed systems is stored for reuse by BNL or shipped to the Department of Defense Ozone Depleting Substances Reserve.

In 2014, 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. There were also no Laboratory transfers of excess ozone depleting substances to the Ozone Depleting Substances Reserve. Plans for 2015 include the transfer of excess cylinders of Halon 1301 from three fixed fire suppression systems scheduled for removal, recovering R-11 from two centrifugal chillers scheduled to be decommissioned, and the transfer of several cylinders of excess R-12 and R-22, and nine 1-pint bottles of unused CFC-113 to the Ozone Depleting Substances Reserve. The transfer will be made in accordance with the Class I Ozone Depleting Substances Disposition Guidelines prepared by the DOE Office of Environmental Policy and Guidance.

3.5.2 Hazardous Air Pollutants

In 1970, the CAA established standards to protect the general public from hazardous air pollutants that may lead to death or an increase in irreversible or incapacitating illnesses. The NESHAPs program was established in 1977 and the governing regulations were updated significantly in 1990. EPA developed NESHAPs to limit the emission of 189 toxic air pollutants. The program includes a list of regulated contaminants, a schedule for implementing control requirements, aggressive technology-based

emission standards, industry-specific requirements, special permitting provisions, and a program to address accidental releases. The following subsections describe BNL's compliance with NESHAPs regulations.

3.5.2.1 Maximum Available Control Technology

In 2011, the Laboratory had determined that its four CSF boilers were subject to the work practice standards and management practices of 40 CFR 63 Subpart JJJJJJ NESHAPs for Industrial, Commercial, and Institutional Boilers and Area Sources, requiring a one-time energy assessment of the boilers be performed no later than March 21, 2014. The objective of the energy assessment was to produce a comprehensive report with a list of recommendations to improve boiler combustion efficiencies and potential energy savings measures. Following the completion of the energy assessment in March, a copy of the engineering report was transmitted to the EPA Region 2 office on June 29, 2014.

3.5.2.2 Asbestos

In 2014, the Laboratory notified the EPA Region II office regarding the removal of materials containing asbestos. During the year, 1,250 linear feet of pipe insulation and 750 square feet of non-friable (e.g., floor tiles, siding material) materials were removed and disposed of according to EPA requirements.

3.5.2.3 Radioactive Airborne Emissions

Minor and major sources of radiological airborne emissions from BNL's facilities and activities are evaluated to ensure that they do not impact the environment, on-site workers, or people residing at or near the Laboratory. A full description of radiological emissions monitoring conducted in 2014 is provided in Chapter 4.

BNL transmitted all data pertaining to radioactive air emissions and dose calculations to EPA in fulfillment of the June 30 annual reporting requirement. As in past years, the maximum off-site dose due to airborne radioactive emissions from the Laboratory continued to be far below the 10 mrem (100 μSv) annual dose limit specified in 40 CFR 61 Subpart H (see Chapters 4 and 8 for more information on the estimated air dose). Using EPA modeling software, the dose to the maximally exposed off-site individual resulting from BNL's airborne emissions in 2014 was 2.85 E-01 mrem (2.85 μSv).

3.6 CLEAN WATER ACT

The disposal of wastewater generated by Laboratory operations is regulated under the Clean Water Act (CWA) as implemented by NYSDEC and under DOE Order 458.1, *Radiation Protection of the Public and the Environment*. The goals of the CWA are to achieve a level of water quality that promotes the propagation of fish, shellfish, and wildlife; to provide waters suitable for recreational purposes; and to eliminate the discharge of pollutants into surface waters. New York State was delegated CWA authority in 1975. NYSDEC has issued a SPDES permit to BNL that regulates wastewater effluents. The permit specifies monitoring requirements and effluent limits for 9 of 12 outfalls, as described below. See Figure 5-2 in Chapter 5 for the locations of BNL outfalls.

- Outfall 001 is used to discharge treated effluent from the STP to groundwater via recharge basins (starting in October 2014).
- 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. Since 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., drywells) 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 that describe monitoring results, evaluate compliance with permit

limitations, and identify corrective measures taken to address permit excursions. These reports are submitted to NYSDEC central and regional offices and the SCDHS. Details of the monitoring program conducted for the groundwater treatment systems where SPDES equivalency permits are in effect are provided in SER Volume II, *Groundwater Status Report*. Evaluation of the current effluent quality shows it to consistently meet all groundwater effluent standards, and in most cases, ambient water quality standards for groundwater.

As stated in Section 3.2.2.1, BNL received approval on its SPDES Permit Renewal application in September 2014, which reflected a modified treatment process that replaced the STP sand filters with free standing self-enclosed filtration units and diverted the discharge to on-site recharge basins. Construction of the new filtration units was completed in September 2014 and the system was placed into operation during the first week of October 2014.

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. 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 Tables 3-3 (Peconic River) and 3-4 (Groundwater), along with relevant SPDES permit limits. Two tables are provided because STP discharge at Outfall 001 was to the Peconic River from January 1, 2014 to September 30, 2014 and then to groundwater discharge via recharge beds from October 1, 2014 to December 31, 2014, due to changes in the Laboratory's SPDES permit. Relevant SPDES permit limits are provided in both tables because there were some changes to analytes and associated permit limits. The Laboratory monitors the STP discharge for more than 100 parameters monthly and more than 200 parameters quarterly. BNL's overall compliance with effluent limits was greater than 99 percent in 2014.

There were four excursions of the SPDES permit limits at Outfall 001 in 2014: two for mercury and two for total nitrogen. In January, a grab sample exhibited a mercury concentration of 54 ng/L, which was just above the permit limit of 50 ng/L. A grab sample collected in August exhibited a mercury concentration of 115 ng/L, which at that time, was just above the SPDES permit limit of 100 ng/L. The SPDES Permit issued by NYSDEC on June 9, 2009 included a mercury limit of 50 ng/l and requirements to conduct a mercury minimization program. An interim mercury limit of 200 ng/L was in effect until September 30, 2012, while the Laboratory implemented a mercury minimization program with the goal of achieving the mercury limit of 50 ng/L.

BNL prepared and implemented an extensive mercury minimization program, which included summarizing past minimization efforts and staff training prior to 2009. As part of these earlier efforts, lab sink traps and piping had been cleaned out on several occasions since 1992. Glass piping was installed in some of the chemistry labs so that mercury deposits could be located visually and removed. Under the new SPDES permit requirements, additional source investigations were conducted and a pilot study using a mercury release compound followed by rinsing and collection of the wastewaters to remove legacy contamination at one laboratory building was performed. Approximately 90 sink traps and 900 linear feet of waste piping have been replaced as part of recent science building renovations. BNL continues efforts to reduce the on-site inventory of elemental mercury and mercury-containing equipment. All of these efforts have resulted in mercury concentration reductions measured at the STP outfall.

Concurrent to the mercury removal efforts, BNL was also required to conduct a Quantification & Removal Study with the goal of

identifying controllable sources of copper, iron, lead, nickel, and zinc for treatment or alternate disposal. This was a result of the SPDES Permit evaluation which included more stringent water quality-based effluent limits for these metals. The Quantification & Removal Study did not identify controllable sources of these metals and, as reported in previous Site Environmental Reports, the Laboratory evaluated several treatment and disposal options and ultimately

Table 3-3. Analytical Results for Wastewater Discharges to Sewage Treatment Plant Outfall 001 (Peconic River).

Analyte	Low Report	High Report	Min. Monitoring. Freq.	SPDES Limit	Exceedances	% Compliance*
Max. temperature (°F)	45	77	Daily	90	0	100
pH (SU)	6.5	7.9	Continuous Recorder	Min 5.8, Max. 9.0	0	100
Max. 5-Day BOD (mg/L)	<2	<2	Twice Monthly	5	0	100
% BOD Removal	> 89	> 99	Monthly	85	0	100
Max. TSS (mg/L)	<0.6	<1.0	Twice Monthly	20	0	100
% TSS Removal	> 98	>99	Monthly	85	0	100
Settleable solids (ml/L)	0	0	Daily	0.1	0	100
Ammonia nitrogen (mg/L)	< 0.1	0.7	Twice Monthly	1.5	0	100
Total nitrogen (mg/L)	1.9	11.9 (a)	Twice Monthly	10	2	93
Total nitrogen (lbs./day)	9	16	(May – October)	20	0	100
Total phosphorus (mg/L)	0.9	1.6	Twice Monthly	NA	0	100
Cyanide (mg/L)	< 0.002	0.009	Twice Monthly	0.1	0	100
Copper (mg/L)	0.012	0.042	Twice Monthly	0.15	0	100
Iron (mg/L)	0.049	0.264	Twice Monthly	0.37	0	100
Lead (mg/L)	0.001	0.002	Twice Monthly	0.019	0	100
Mercury (ng/L)	29	115 (b)	Twice Monthly	50/100 (c)	2	100
Methylene chloride (ug/L)	1.3	< 2	Twice Monthly	5	0	100
Nickel (mg/L)	<0.002	0.004	Twice Monthly	0.11	0	100
Silver (mg/L)	< 0.001	<0.01	Twice Monthly	0.015	0	100
Toluene (ug/L)	< 1	< 1	Twice Monthly	5	0	100
Zinc (mg/L)	0.013	0.057	Twice Monthly	0.1	0	100
1,1,1-trichloroethane (ug/L)	< 1	< 1	Twice Monthly	5	0	100
2-butanone (ug/L)	< 5	< 5	Twice Monthly	50	0	100
Chlorine, Total Residual (mg/L)	0.02	0.05	Weekly	0.05	0	100
Max. Flow (MGD)	0.29	0.75	Continuous Recorder	2.3	0	100
Avg. Flow (MGD)	0.23	0.49	Continuous Recorder	NA	0	100
Avg. Fecal Coliform (MPN/100 ml)	<2	7	Twice Monthly	200	0	100
Max. Fecal Coliform (MPN/100 ml)	<2	17	Twice Monthly	400	0	100
HEDP (mg/L)	<0.05	0.59	Monthly	NA	0	100
Tolytriazole (mg/L)	< 0.005	< 0.005	Monthly	NA	0	100

Notes:
See Figure 5-2 for location of Outfall 001 (Groundwater).
* % Compliance = total no. samples – total no. exceedances/total no. of samples x 100
BOD = biological oxygen demand
HEDP = 1-hydroxyethylidene diphosphonic acid
MGD = million gallons per day
NA = Not Applicable
SPDES = State Pollutant Discharge Elimination System
SU = standard unit
TSS = total suspended solids

(a) Two permit exceedances for total nitrogen were reported in March (see Section 3.6.1 for an explanation of this permit exceedance).
(b) Two permit exceedances for mercury were reported in January and August.
(c) Mercury limit in January and February was 50 ng/L. The limit from March to September was 100 ng/L.

chose to relocate the treatment plant discharge from the Peconic River to newly constructed groundwater recharge basins. BNL submitted a May 18, 2012, SPDES Permit modification for the relocation of this discharge and to modify the interim mercury limit from 200 ng/L to 100 ng/L until the recharge basins were constructed in 2014.

Because the SPDES Permit modification had not yet been issued by NYSDEC in September 2012, BNL was granted an extension of the interim mercury limit of 200 ng/L for six months or until the permit modification was completed, whichever came first. Because of delays in issuing this permit modification, the interim limit expired on March 31, 2013, and the mercury limit became 50 ng/L. Upon issuance of the Laboratory's permit modification in March 2014, the

Table 3-4. Analytical Results for Wastewater Discharges to Sewage Treatment Plant Outfall 001 (Groundwater).

Analyte	Low Report	High Report	Min. Monitoring. Freq.	SPDES Limit	Exceedances	% Compliance*
pH (SU)	6.5	7.9	Continuous Recorder	Min 5.8, Max. 8.5	0	100
Max. 5-Day BOD (mg/L)	<2	<2	Twice Monthly	5	0	100
% BOD Removal	> 89	> 96	Monthly	85	0	100
Max. TSS (mg/L)	<0.6	1.5	Twice Monthly	20	0	100
% TSS Removal	> 98	>99	Monthly	85	0	100
Settleable solids (ml/L)	0	0	Daily	0.1	0	100
Solids, Total Dissolved (mg/L)	151	234	Monthly	1000	0	100
Ammonia nitrogen (mg/L)	0.3	1.7	Twice Monthly	2	0	100
Total nitrogen (mg/L)	7.1	8	Twice Monthly	10	0	100
Total phosphorus (mg/L)	1	1.5	Twice Monthly	NA	0	100
Cyanide (mg/L)	< 0.002	<0.002	Twice Monthly	0.1	0	100
Copper (mg/L)	0.025	0.042	Twice Monthly	0.15	0	100
Iron (mg/L)	0.2	0.26	Twice Monthly	0.6	0	100
Lead (mg/L)	0.00062	0.00086	Twice Monthly	0.025	0	100
Mercury (ng/L)	8	35	Twice Monthly	200	0	100
Methylene chloride (ug/L)	<2	< 2	Twice Monthly	5	0	100
Nickel (mg/L)	0.002	0.003	Twice Monthly	0.1	0	100
Silver (mg/L)	< 0.001	<0.001	Twice Monthly	0.015	0	100
Toluene (ug/L)	< 1	< 1	Twice Monthly	5	0	100
Zinc (mg/L)	0.05	0.06	Twice Monthly	2	0	100
1,1,1-trichloroethane (ug/L)	< 1	< 1	Twice Monthly	5	0	100
Max. Flow (MGD)	0.46	0.61	Continuous Recorder	2.3	0	100
Avg. Flow (MGD)	0.3	0.33	Continuous Recorder	NA	0	100
HEDP (mg/L)	<0.05	<0.1	Monthly	0.5	0	100
Tolytriazole (mg/L)	< 0.005	< 0.005	Monthly	0.05	0	100

Notes:
See Figure 5-2 for location of Outfall 001 (Groundwater).
* % Compliance = total no. samples – total no. exceedances/total no. of samples x 100
BOD = biological oxygen demand
HEDP = 1-hydroxyethylidene diphosphonic acid
MGD = million gallons per day
NA = Not Applicable
SPDES = State Pollutant Discharge Elimination System
SU = standard unit
TSS = total suspended solids

interim mercury limit became 100 ng/L for the existing Outfall 001 (Peconic River) until the discharge was relocated to the recharge beds. Once the recharge beds were completed and the discharge diverted to groundwater, the mercury limit became 200 ng/L. With the new filtration system completed and in operation, effluent mercury concentrations are well below permit limits.

Composite samples collected on March 10 and 14, 2014, from Outfall 001 for routine compliance nitrogen series analysis exhibited total nitrogen concentrations of 11.9 mg/L and 11.3 mg/L, respectively. Permit limits for total nitrogen is 10 mg/L. Based on review/analysis of activated sludge by a wastewater microbiological specialist in January 2014, it appears that the pH in the STP's aeration tank was too low. Whereas the optimal pH should be 7.5 SU or greater, in February 2014, the pH was measured at 5.8 SU. Actions taken to improve this process (e.g., raising the pH in the aeration tank and adding magnesium hydroxide to help reduce the toxicity of the organic acids and other chemicals in sewage) appear to have been effective in reducing effluent total nitrogen concentrations.

Figures 3-1 through 3-7 plot the 5-year trends for monthly concentrations of copper, iron, lead, mercury, nickel, silver, and zinc in the STP discharge.

3.6.1.1 Chronic Toxicity Testing

The Laboratory's modified SPDES permit required that "whole effluent toxicity" (WET) tests continue to be conducted while discharging to the Peconic River to ensure that chemicals present in the STP effluent are not toxic to aquatic organisms. Between January and September 2014, BNL continued to perform quarterly chronic toxicity testing using water fleas (Ceriodaphnia dubia). In each test, sets of 10 organisms are exposed to varying concentrations of the STP effluent (100, 75, 50, 25, and 12.5 percent) for seven days. During testing, the rate of reproduction for the water flea is measured and compared to untreated organisms (i.e., controls).

Testing in 2014 showed that there was no toxicity demonstrated in the three tests performed. Reproduction and survival rates were comparable to the control population, indicating that the STP effluent was not toxic to invertebrate organisms. Under the terms of the Laboratory's most recent SPDES Permit, testing is no longer required now that STP discharge is to groundwater; consequently, testing was discontinued in October 2014.

3.6.2 Recharge Basins and Stormwater

Water discharged to Outfalls 002 through

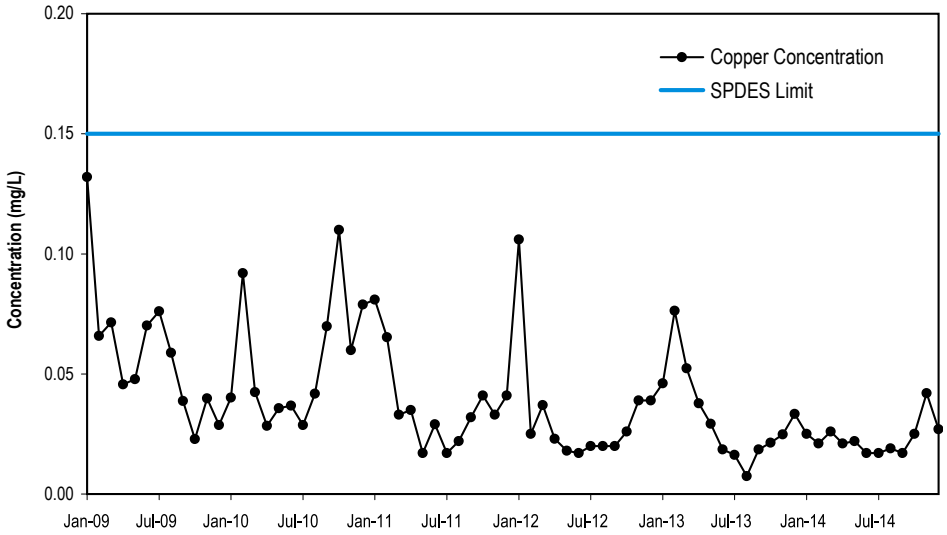

Figure 3-1. Maximum Concentrations of Copper Discharged from the BNL Sewage Treatment Plant, 2009–2014.

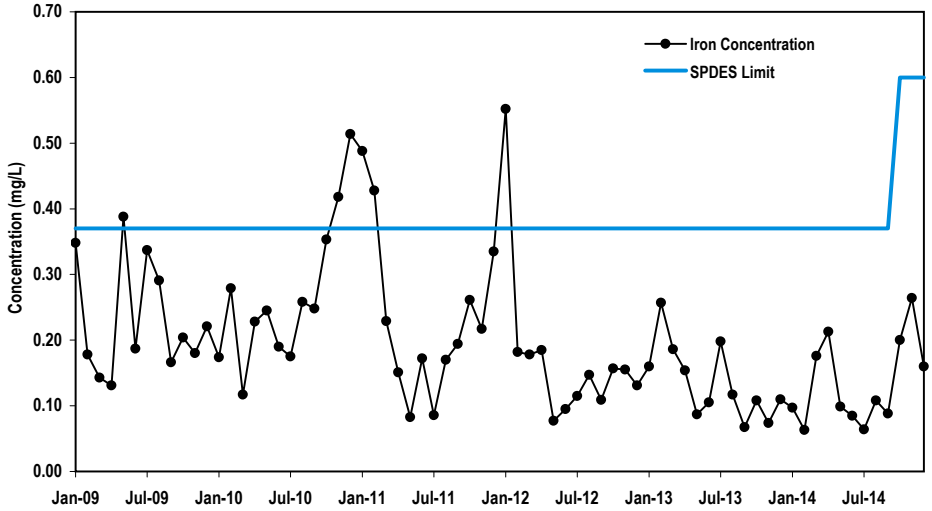

Figure 3-2. Maximum Concentrations of Iron Discharged from the BNL Sewage Treatment Plant, 2009–2014.

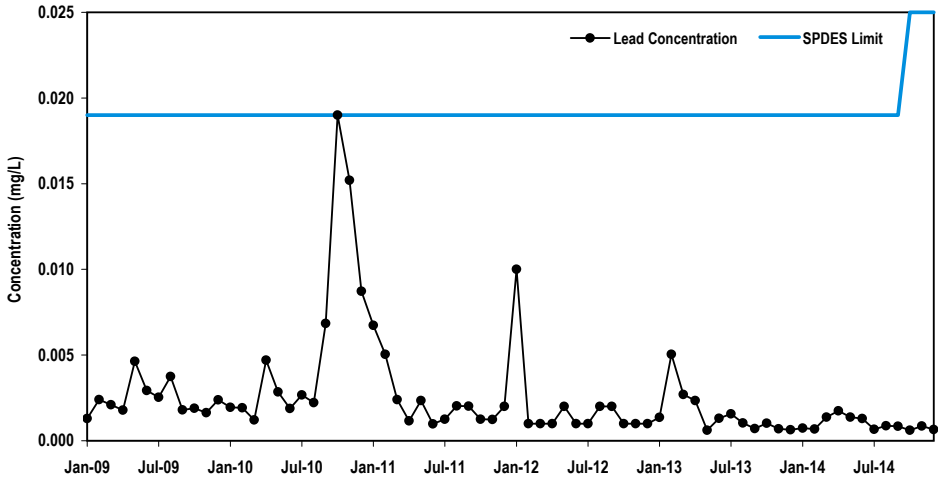

Figure 3-3. Maximum Concentrations of Lead Discharged from the BNL Sewage Treatment Plant, 2009–2014.

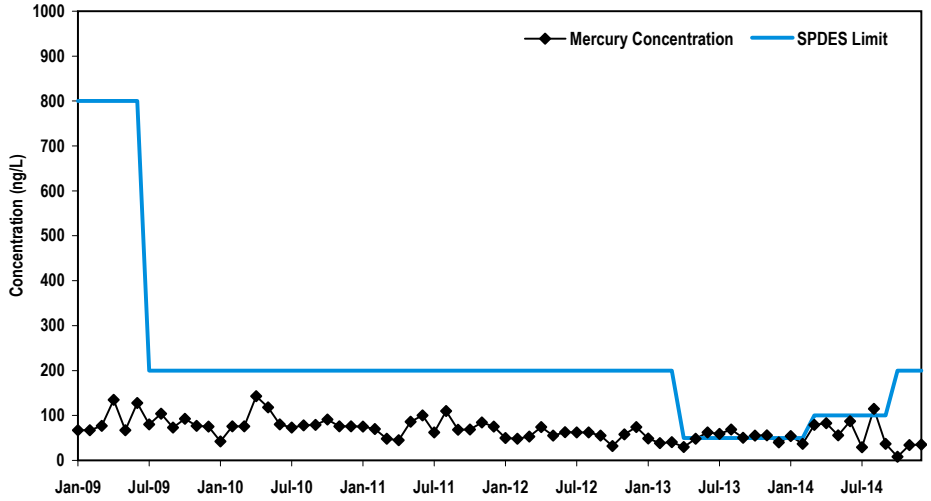

Figure 3-4. Maximum Concentrations of Mercury Discharged from the BNL Sewage Treatment Plant, 2009–2014.

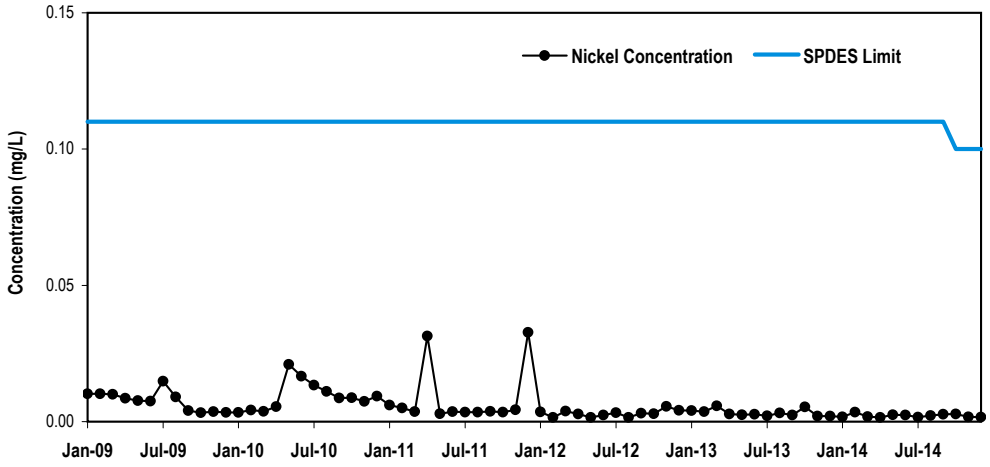

Figure 3-5. Maximum Concentrations of Nickel Discharged from the BNL Sewage Treatment Plant, 2009–2014.

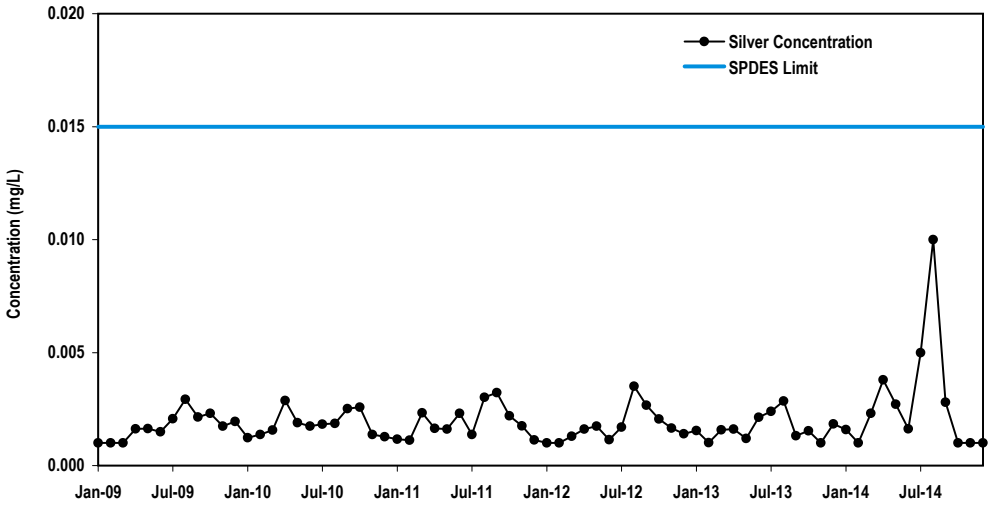

Figure 3-6. Maximum Concentrations of Silver Discharged from the BNL Sewage Treatment Plant, 2009–2014.

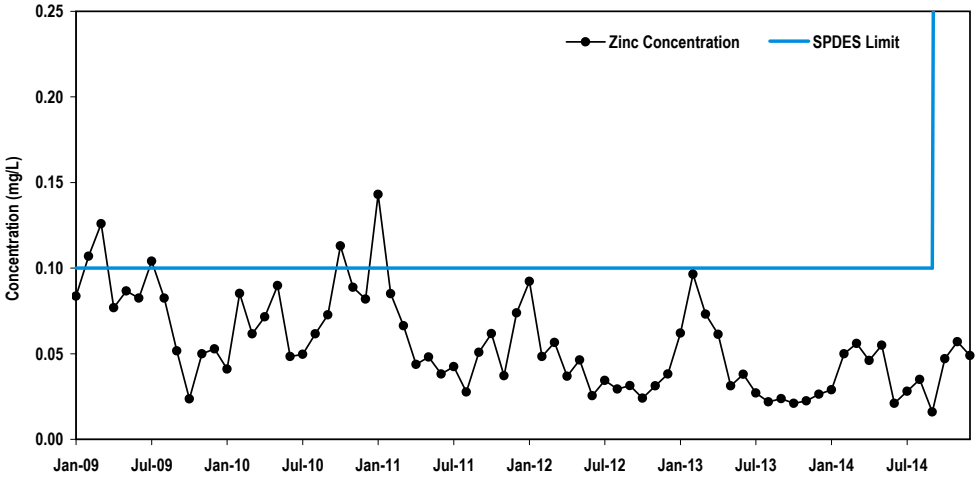

Figure 3-7. Maximum Concentrations of Zinc Discharged from the BNL Sewage Treatment Plant, 2009–2014.

008 and Outfalls 010 through 012 recharges to groundwater, replenishing the underlying aquifer. Monitoring requirements for each of these discharges vary, depending on the type of wastewater received and the type of cooling water treatment reagents used. Table 3-5 summarizes the monitoring requirements and performance results.

There were four excursions reported for these outfalls during 2014: one pH excursion at Outfall 010, two oil and grease excursions at Outfalls 002 and 006B, and one 1-Hydroxyethylidene 1,1-Diphosphonic Acid (HEDP) excursion at Outfall 002.

A grab sample collected from Outfall 010 on April 8, 2014, following a significant rain event exhibited a pH of 10.7 SU, which exceeded the SPDES Permit level of 8.5 SU. This outfall only receives stormwater runoff from the CSF. The area immediately surrounding the CSF was under construction (i.e. future site of the Northeast Solar Energy Research Center (NSERC)), which included the addition of road base using recycled concrete aggregate (RCA), the most likely cause of the elevated pH. A follow-up sample collected at this outfall soon after the main storm event passed showed that the pH decreased and was within limits. At that time, the NSERC contractor was reminded to maintain good housekeeping at the construction site, including repairing silt fencing and filter fabric associated with catch basins connected to Outfall 010.

A grab sample collected on March 5, 2014, from Outfall 006B (HT-E) exhibited an oil and grease concentration of 19 mg/L, which was just above the permit limit of 15 mg/L. No visible observations of any sheen were identified at the time of sample collection and follow-up inspection of the outfall did not reveal any obvious oil staining. The discharges to Outfall 006B is comprised of mainly stormwater runoff. There are no once-through cooling water systems and only one active cooling tower that discharges to this outfall. The cause of this elevated oil and grease value was determined to be an isolated event and most likely runoff from parking lot discharges.

A request was made to collect a grab sample from Outfall 002 (HN) on April 11, 2014, for oil and grease analysis after a report was made that there was a slight sheen in the discharge immediately downstream of the outfall. Results received on April 28 revealed an oil and grease concentration of 23.5 mg/L, which was above the permit limit of 15 mg/L. The slight sheen was treated as a release, and emergency spill response personnel immediately responded to the scene to initiate cleanup activities. Absorbent pads/socks were placed downstream of the outfall and a 25 foot "creek boom" was deployed to ensure the sheen was contained. Inspection of upstream inputs to this outfall did not reveal any continuous sources, indicating that this was a onetime event. A sample of the water/sheen mixture was also collected by emergency response personnel for in-field analysis. The analysis indicated that the material was propylene glycol (with 99.6 percent confidence). The initial absorbent pads/socks were placed in containers for proper disposal and new ones were left overnight to pick up any residual material. Inspection of the outfall the following day did not show any further sheen. Remaining absorbent materials were picked up and the boom was removed. Potential sources of propylene glycol were evaluated, but it appeared that the release was an isolated event from a piece of equipment or vehicle that was not identified or reported at that time.

A quarterly sample collected from Outfall 002 (HN) on April 28, 2014, exhibited a HEDP concentration of 0.57 mg/L, which was above the permit limit of 0.5 mg/L. Other permitted recharge basins sampled on the same day also exhibited elevated HEDP concentrations but were below the permit limit. These results were very unusual, and review of the past five years of quarterly sampling results show that concentrations of this compound at Outfall 002 and other permitted basins were < 0.05 mg/L, indicating that Water Treatment Chemical (WTC) residuals in the systems discharging to the outfalls are effectively controlled. The cause of the elevated HEDP is not known; however, analytical results of samples collected from Outfall 002 and other permitted recharge basins in July 2014 showed that all HEDP concentrations were < 0.07 mg/l,

indicating that this was most likely a one-time event.

3.7 SAFE DRINKING WATER ACT

The extraction and distribution of drinking water is regulated under the federal Safe Drinking Water Act (SDWA). In New York State, implementation of the SDWA is delegated to the New York State Department of Health (NYSDOH) and administered locally by SCDHS. Because BNL provides potable water to more than 25 full-time residents, it is subject to the same requirements as a municipal water supplier. Monitoring requirements are prescribed annually by SCDHS, and a Potable Water Sampling and Analysis Plan (Bruno 2014) is prepared by the Laboratory to comply with these requirements.

3.7.1 Potable Water

The Laboratory has six water supply wells for on-site distribution of potable water; five of which were active during 2014. 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 3-6 and 3-7 provide potable water supply monitoring data. In 2014, BNL's drinking water and the supply and distribution system was in full compliance with all applicable county, state, and federal regulations regarding drinking water quality, monitoring, operations, and reporting. In addition to the compliance sampling program, all wells are also sampled and analyzed quarterly under the Laboratory's environmental surveillance program. Data collected under this program are consistent with the data reported in Tables 3-6 and 3-7. This additional testing goes beyond the minimum SDWA testing requirements.

To ensure that consumers are informed about the quality of Laboratory-supplied potable water, in May of each year BNL publishes a Consumer Confidence Report (CCR), a deadline stipulated by the SDWA. This report provides information regarding source water, supply system, the analytical tests conducted, and detected

Table 3-5. Analytical Results for Wastewater Discharges to Outfalls 002, 005 - 008, and 010. *(Continued)*

Analyte		Outfall 002	Outfall 002B	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 008	Outfall 010	SPDES Limit	No. of Exceedances	% Compliance*
Flow (MGD)	N	CR	CR	CR	CR	CR	CR	11	11	NA	NA	NA
	Min.	0.06	0.00006	0.16	0.02	0.05	0.08	0.00082	0.0015	NA		
	Max.	3.8	0.08	0.73	0.18	0.33	0.32	1.5	1.2			
pH (SU)	Min.	6.7	7.1	6.5	7.1	7.0	6.9	7.2	7.3	NA	1	98
	Max.	8.6	8.3	8.4	8.9	8.9	8.6	8.5	10.7	8.5, 9.0 (a)		
Oil and Grease (mg/L)	N	13	11	12	12	12	NR	11	11	NA	2	98
	Min.	< 1.1	< 1.1	< 1.2	< 1.1	< 1.1	NR	< 1.1	< 1.1	15		
	Max.	23.5	3.3	4.7	1.9	19.0	NR	2.9	4.18			
Copper (mg/L)	N	NR	NR	4	NR	NR	NR	NR	4	NA	0	100
	Min.	NR	NR	< 0.003 (T)	NR	NR	NR	NR	< 0.003 (D)	1.0		
	Max.	NR	NR	0.02	NR	NR	NR	NR	0.05 (D)			
Aluminum (mg/L)	N	4	NR	NR	NR	NR	NR	4	4	NA	0	100
	Min.	< 0.07 (T)	NR	NR	NR	NR	NR	< 0.07 (D)	0.1 (D)	2.0		
	Max.	0.09	NR	NR	NR	NR	NR	0.4 (D)	0.6 (D)			

Table 3-5. 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*
Lead, Dissolved (mg/L)	N	NR	NR	NR	NR	NR	NR	NR	4			
	Min.	NR	NR	NR	NR	NR	NR	NR	< 0.001	NA		
	Max.	NR	NR	NR	NR	NR	NR	NR	0.006	0.05	0	100
Vanadium, Dissolved (mg/L)	N	NR	NR	NR	NR	NR	NR	NR	4			
	Min.	NR	NR	NR	NR	NR	NR	NR	0.003	NA		
	Max.	NR	NR	NR	NR	NR	NR	NR	0.03	NPL	NA	NA
Chloroform (µg/L)	N	5	NR	NR	NR	NR	NR	NR	NR			
	Min.	< 1	NR	NR	NR	NR	NR	NR	NR	NA		
	Max.	0.8	NR	NR	NR	NR	NR	NR	NR	7	0	100
Bromodichloromethane (µg/L)	N	4	NR	NR	NR	NR	NR	NR	NR			
	Min.	< 1	NR	NR	NR	NR	NR	NR	NR	NA		
	Max.	0.5	NR	NR	NR	NR	NR	NR	NR	50	0	100
1,1,1-trichloroethane (µg/L)	N	4	NR	NR	NR	NR	NR	11	NR			
	Min.	< 1	NR	NR	NR	NR	NR	< 1	NR	NA		
	Max.	< 1	NR	NR	NR	NR	NR	< 1	NR	5	0	100
1,1-dicloroethane (µg/L)	N	NR	NR	NR	NR	NR	NR	11	NR			
	Min.	NR	NR	NR	NR	NR	NR	< 1	NR	NA		
	Max.	NR	NR	NR	NR	NR	NR	< 1	NR	5	0	100
Hydroxyethylidene-diphosphonic acid (mg/L)	N	4	NR	4	4	4	NR	NR	NR			
	Min.	<0.05	NR	<0.05	<0.05	<0.05	NR	NR	NR	NA		
	Max.	0.6	NR	0.09	0.4	0.4	NR	NR	NR	0.5	1	94
Tolyltriazole (mg/L)	N	4	NR	4	4	4	NR	NR	NR			
	Min.	<0.005	NR	<0.005	<0.005	<0.005	NR	NR	NR	NA		
	Max.	<0.005	NR	<0.005	<0.005	<0005	NR	NR	NR	0.2	0	100

Notes:
See Figure 5-2 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

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

3.7.2 Cross-Connection Control

The SDWA requires that public water suppliers implement practices to protect the water supply from sanitary hazards. One of the safety requirements is to rigorously prevent cross-connections between the potable water supply and facility piping systems that may contain hazardous substances. 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 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 2014, the Laboratory inspected 260 cross-connection control devices, including primary devices installed at interfaces to the potable water main, and secondary control devices at the point of use. If a problem with a cross-connection device is encountered during testing, the device is repaired and retested to ensure proper function. Copies of the cross-connection device test reports are filed with SCDHS throughout the year.

3.7.3 Underground Injection Control (UIC)

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

At the end of 2014, BNL's total UIC inventory was 128. In June 2010, an application was filed with EPA to renew the Class V UIC permit for the site. In August 2012, BNL received a letter from EPA indicating that addition or removal of UICs from the existing inventory would be "authorized by rule," pursuant to 40 CFR §144.24; however, it is still unclear if EPA intends to renew BNL's Class V UIC permit. In addition to the UICs maintained for routine Laboratory discharges of sanitary waste and storm water, UICs also are maintained at several on- and off-site treatment facilities used for groundwater remediation. Contaminated groundwater is treated and then returned to the aquifer via drywells, injection wells, or recharge basins. Discharges to these UICs are authorized by rule rather than by permit. Under the authorized by rule requirements, a separate inventory is maintained for these treatment facilities, and is periodically updated whenever a new device is added or closed.

3.8 PREVENTING AND REPORTING SPILLS

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

3.8.1 Preventing Oil Pollution and Spills

As required by the Oil Pollution Act, BNL maintains a Spill Prevention Control and Countermeasures (SPCC) Plan as a condition of its license to store petroleum fuel. The purpose of this plan is to provide information regarding release prevention measures, the design of storage facilities, and maps detailing storage

Table 3-6. Potable Water Wells and Potable Distribution System: Analytical Results (Maximum Concentration, Minimum pH Value).

Compound	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Potable Distribution Sample	NYS DWS
Water Quality Indicators							
Ammonia ((mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	SNS
Chlorides (mg/L)	37.2	42.9	42.4	57.9	46.4	47.1	250
Color (units)	45*	55*	25*	< 5	< 5	<5	15
Conductivity (mmhos/cm)	208	198	211	313	320	321	SNS
Cyanide (mg/L)	< 10	< 10	< 10	< 10	< 10	< 10	SNS
MBAS (mg/L)	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	SNS
Nitrates (mg/L)	0.21	0.33	0.52	0.63	0.73	0.75	10
Nitrites (mg/L)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1
Odor (units)	0	0	0	0	0	0	3
pH (Standard Units)	6	5.9	6	6.2	6	7.3	SNS
Sulfates (mg/L)	9.2	10.6	12.5	11.4	12	11.7	250
Total coliform	ND	ND	ND	ND	ND	ND	Negative
Metals							
Antimony (mg/L)	< 0.4	<0.4	<0.4	<0.4	<0.4	<0.4	6
Arsenic (mg/L)	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	50
Barium (mg/L)	0.0225	0.0318	0.0187	0.0448	0.0411	0.042	2
Beryllium (mg/L)	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	4
Cadmium (mg/L)	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	5
Chromium (mg/L)	0.004	0.004	<0.002	<0.002	<0.002	<0.002	0.1
Fluoride (mg/L)	<0.1	<0.1	0.19	< 0.1	< 0.1	< 0.1	2.2
Iron (mg/L)	2.3*	3.95*	1.96*	<0.018	<0.018	0.051	0.3
Lead (mg/L)	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	15
Manganese (mg/L)	0.22	0.094	0.056	< 0.002	< 0.002	0.004	0.3
Mercury (mg/L)	< 0.067	< 0.067	< 0.067	< 0.067	< 0.067	< 0.2	2
Nickel (mg/L)	< 0.002	0.022	0.017	< 0.002	< 0.002	< 0.04	SNS
Selenium (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0	4.1	50
Sodium (mg/L)	22.7	20.3	24.5	30.9	25.2	39.2	SNS
Silver (mg/L)	<10	<10	<10	<10	<10	<10	100
Thallium (mg/L)	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	2
Zinc (mg/L)	<0.003	<0.003	<0.003	<0.003	<0.003	0.0043	5
Radioactivity							
Gross alpha activity (pCi/L)	< 1.99	< 1.98	< 1.99	<1.96	<1.98	NR	15
Gross beta activity (pCi/L)	3.15 ± 1.5	<1.72	2.36 ± 1.03	3.55± 1.62	6.78 ± 1.48	NR	(a)
Radium-228 (pCi/L)	NS	NS	NS	NS	NS	NR	5
Strontium-90 (pCi/L)	< 0.77	< 0.76	< 0.79	< 0.79	< 0.79	NR	8
Tritium (pCi/L)	< 268	<267	< 268	< 262	< 268	NR	20,000
Other							
Alkalinity (mg/L)	12.7	11.3	15.5	26	20.6	54.9	SNS
Asbestos (M. fibers/L)	NR	NR	NR	NR	NR	< 0.20	7
Calcium (mg/L)	6.8	5.3	6.3	12.8	9.4	13.9	SNS
HAA5 (mg/L)	NR	NR	NR	NR	NR	0.011	0.06**
Residual chlorine - MRDL (mg/L)	NR	NR	NR	NR	NR	1.3	4
TTHM (mg/L)	NR	NR	NR	NR	NR	0.034	0.08**

Notes:
Well 12 was not operational for 2014; no testing was completed during this time.
* Water from these wells is treated at the Water Treatment Plant for color and iron reduction prior to site distribution.
** Limit imposed on distribution samples only.
(a) The drinking water standard was changed from 50 pCi/L (concentration based) to 4 mrem/yr (dose based) in late 2003. Gross beta activity does not identify specific radionuclides; therefore, a dose equivalent can not be calculated. No specific nuclides were detected; therefore, compliance with the requirement is demonstrated.

HAA5 = five haloacetic acids
MBAS = methylene blue active substances
MRDL = maximum residual disinfectant level
ND = not detected
NR = analysis not required
NS = not sampled
NYS DWS = New York State Drinking Water Standard
SNS = drinking water standard not specified
TTHM = total trihalomethanes

Table 3-7. Potable Water Wells: Analytical Results for Principal Compounds, Synthetic Organic Chemicals, Pesticides, and Micro-Extractables.

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	NYS DWS
	µg/L						
Tert-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,4-trimethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
sec-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
4-Isopropyltoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
n-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloroform	1.7	1.2	2.5	1	0.83	0.73	50
Bromodichloromethane	2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
Dibromochloromethane	1.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
Bromoform	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.9	50
Methyl tert-butyl ether	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
Toxaphene	< 1	< 1	< 1	< 1	< 1	< 1	3
Total PCB's	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	0.5
2,4,5,-TP (Silvex)	< 0.13	< 0.13	< 0.13	< 0.13	< 0.13	< 0.13	10
Dinoseb	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	50
Dalapon	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	50
Pichloram	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	50
Dicamba	< 1	< 1	< 1	< 1	< 1	< 1	50
Pentachlorophenol	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	1
Hexachlorocyclopentadiene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	5
Bis (2-ethylhexyl) Phthalate	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	50
Bis (2-ethylhexyl) Adipate	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	50
Hexachlorobenzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	5
Benzo (A) Pyrene	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	50
Aldicarb Sulfone	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	SNS
Aldicarb Sulfoxide	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	SNS
Aldicarb	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	SNS
Oxamyl	< 1	< 1	< 1	< 1	< 1	< 1	50
3-Hydroxycarbofuran	< 1	< 1	< 1	< 1	< 1	< 1	50
Carbofuran	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	40
Carbaryl	< 1	< 1	< 1	< 1	< 1	< 1	50
Methomyl	< 1	< 1	< 1	< 1	< 1	< 1	50
Glyphosate	< 6	< 6	< 6	< 6	< 6	< 6	50
Diquat	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	50
1,2-dibromoethane (EDB)	NR	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.05
1,2-dibromo-3-chloropropane	NR	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2
Lindane	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.2
Heptachlor	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.4
Aldrin	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	5
Heptachlor Epoxide	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.2
Dieldrin	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	5
Endrin	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2
Methoxychlor	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	40
Chlordane	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
2,4,-D	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	50
Alachlor	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
Simazine	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	50
Atrazine	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	3
Metolachlor	< 1	< 1	< 1	< 1	< 1	< 1	50
Metribuzin	< 0.5	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	50
Butachlor	< 1	< 1	< 1	< 1	< 1	< 1	50
Endothall	< 9	< 9	< 9	< 9	< 9	< 9	100
Propachlor	< 1	< 1	< 1	< 1	< 1	< 1	50

Notes:

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 H2M Labs Inc., 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.

Well 12 was offline and remained unused during 2014.

* Water is treated at the Water Treatment Plant prior to site distribution.

NA = not available

NR = analysis not required

SNS = drinking water standard not specified

NYS DWS = New York State Drinking Water Standard

WTP = Water Treatment Plant

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 (Chaloupka 2011) is filed with NYSDEC, EPA, and DOE and must be updated every five years. BNL remained in full compliance with SPCC requirements in 2014.

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 (SARA) require that facilities report inventories (i.e., Tier II Report) and releases (i.e., Tier III Report) 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 reports under EPCRA Sections 302, 303, 311, 312, and 313. In fulfillment of the Tier II requirements, BNL submitted an inventory of 45 on-site chemicals (with thresholds greater than 10,000 pounds; or 500 pounds for acutely toxic materials) via the New York State approved E-Plan computer based submittal program. These chemicals ranged from road salt (1,200 tons) to nitric acid (632 pounds). To satisfy the requirements of the Tier III submittal, the Laboratory submitted its data via the EPA approved TRI-ME computer based submittal program. BNL reported releases of lead (~88,913 pounds), mercury (~51 pounds), polychlorinated biphenyls (PCBs) (~22 pounds), benzo(g,h,i)perylene (<1 pound), and polycyclic aromatic compounds (<1 pound) in 2014. Releases of lead, PCBs, and mercury were predominantly in the form of shipments of waste for off-site recycling or disposal. Releases of benzo(g,h,i)perylene and polycyclic aromatic compounds were as byproducts of the combustion of fuel oils. In 2014, 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 5 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 the spill is conducted, as necessary, to prevent impacts to the environment, minimize human health exposures, and restore the site.

There were 28 spills in 2014, a 34 percent reduction compared to 2013. Eleven of the 28 spills met regulatory agency reporting criteria. The remaining 17 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

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 [ ]

the eleven reportable events, including a description of the cause and corrective actions taken. There were no long-term effects from these releases and no significant impact on the environment. All but three of the reported events were 5 gallons or less in volume. Four of the releases occurred during Laboratory construction/operational activities, either by leaks from construction equipment (i.e. backhoe, skid steer, crane, and dump truck), vehicles, or from operational equipment. The two larger-volume petroleum-based releases included a 10 gallon spill of lubricating oil from a failed pressure gauge associated with a Westinghouse motor-generator and an approximate 30-gallon release of engine oil from piping associated with a bulk oil storage tank at the Motor Pool after a Swagelok fitting failed. The one larger chemical release was approximately 100 gallons of Drew Industries Coreactant 6110 solution, which leaked into a secondary containment tray beneath a newly installed 150-gallon water treatment chemical tank in Building 600 after a corroded metal bushing on the feed pump to the tank failed.

In all instances described above, any recoverable material was removed, spill absorbents were used to remove the residual product, and all materials were collected and containerized for off-site disposal. For releases to soil, contaminated soil was removed to the satisfaction of the State inspector and containerized for off-site disposal.

3.8.4 Major Petroleum Facility (MPF) License

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

There were no changes to the MPF license in 2014, which currently has 66 petroleum storage facilities listed and expires on March 3, 2017. During 2014, BNL remained in full compliance with MPF license requirements, which include monitoring groundwater in the vicinity of the six above-ground storage tanks. The license also requires the Laboratory to inspect the storage facilities monthly, and test the tank leak detection systems, high-level monitoring, and secondary containment. Tank integrity is also checked periodically. Groundwater monitoring consists of monthly checks for the presence of floating products and twice-yearly analyses for VOCs and semi-volatile organic compounds (SVOCs). In 2014, no VOCs, SVOCs, or floating products attributable to MPF activities were detected. See SER Volume II, Groundwater Status Report, for additional information on groundwater monitoring results.

On April 17 and 18, 2014, NYSDEC conducted its annual inspection of all storage facilities included on the MPF license. Seven findings that required corrective action were identified: evaluation/repairs of the cathodic protection system for Tanks 9 and 10; need for repairs of Tank 3 secondary containment to satisfy permeability requirements for product stored; shear valve for mid-grade dispenser not installed correctly; additional cleanup required from a previously reported spill of motor oil from failed piping on Tank 423-17; completion of ten-year Out-of-Service inspections/reporting for Tanks 3 and 6; minor paint failure on shell plate of Tank 5; and the need to update BNL's Best Management Practices (BMP) Plan. Five of the seven findings were corrected in 2014 in accordance with NYSDEC directives. The remaining two findings will continue to be evaluated/addressed in 2015, and updates on progress will be provided to NYSDEC on a regular basis.

3.8.5 Chemical Bulk Storage

Title 6 of the Official Compilation of the Codes, Rules, and Regulations of the State of New York (NYCRR) Part 597 requires that all aboveground tanks larger than 185 gallons and all underground tanks that store specific chemicals be registered with NYSDEC. The Laboratory holds a Hazardous Substance Bulk Storage Registration Certificate for six tanks that store

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

Spill No. and Date	Material/ Quantity	ORPS Report	Source/Cause and Corrective Actions
14-02 01/16/14	Hydraulic Fluid/ 0.5 gallons	No	Hydraulic fluid leaked onto soil beneath a skid steer loader at the Transfer Station off of Princeton Avenue when a hydraulic line failed. The absorbent pads set beneath the loader to capture the dripping fluid and contaminated soil were placed into two 55-gallon drums for off-site disposal.
14-05 03/20/14	Lubrication Oil/ 10 gallons	No	During morning rounds, Collider Accelerator staff noticed oil leaking from a pressure gauge above a Westinghouse Motor-Generator lubricating oil tank in Building 911 and into the secondary containment vault housing the tank. After closing a valve to stop the leak, oil adsorbent pads and Simple Green degreaser were used to wipe down the sidewall of the tank, the vault floor, and other tank appurtenances coated with oil from the leak. Oil contaminated pads were placed into a 55-gallon drum for off-site disposal. Approximately 20 gallons of water that had accumulated in the vault due to a prior steam pipe leak and subsequently contaminated by the leaking oil was siphoned from the vault floor into another 55-gallon drum for off-site disposal.
14-08 04/10/14	Sodium Hypochlorite/ 100 gallons	No	Approximately 100 gallons of Drew Industries Coreactant 6110 solution leaked into a secondary containment tray beneath a newly installed 150-gallon water treatment tank in Building 600 when a corroded metal bushing on the feed pump to the tank failed. After the contractor responsible for installing the treatment tank was contacted, responding staff isolated the leak, repaired the feed pump, and pumped the product back into the treatment tank.
14-09 04/11/14	Propylene Glycol/ <1 gallon	No	During scheduled State Pollutant Discharge Elimination System (SPDES) Permit sampling at Outfall HN, a slight yellow/brown oil sheen was evident in standing water before and after the weir. Fire Rescue personnel responded and used oil absorbent pads on the water before and after the weir to capture the floating product. To prevent migration of the oil sheen, a 25-foot creek boom, roughly 40 feet downstream from the weir, was also inserted. Analysis of a sample of the water/sheen mixture processed via a portable Fourier Transform Infrared Spectroscopy (FT-IR) revealed with 99.6 percent confidence that the oily sheen was propylene glycol. A subsequent grab sample collected from the outfall was analyzed and found to have an oil and grease concentration of 23.5 mg/L. Because the result was above the SPDES limit of 15 mg/l, it was reported to the New York State Department of Environmental Conservation in the April Discharge Monitoring Report. Additional oil pads were used overnight to recover any oily residue passing through the weir. No visible sheen was observed in standing water in an inspection of the outfall the following day.
14-10 04/13/14	Engine Oil/ <30 gallons	No	After plumbers re-piped the overhead connections from the bulk oil storage tank to the oil fill guns in the Building 423 Fleet Service Shop, a Swagelok fitting failed causing the release of pressurized oil into the shop area. The oil also breached the overhead door and flowed down an incline onto Princeton Avenue, continuing west until it drained into soil adjacent to the road. Fire Rescue personnel applied speedy-dry and other absorbent materials to the pavement and impacted soil. Grounds personnel worked the speedy-dry into crevices with brooms and the contaminated absorbent was recovered by a street sweeper. Contaminated soil was dug out by hand and with a skid-steer backhoe and deposited in a 20-cubic yard dumpster. Collected speedy-dry and absorbent pads were transferred into three 55-gallon drums for off-site disposal.
14-15 06/04/14	Gear Oil/ <1 gallon	No	During an Environmental Occupational Safety and Health audit of the NSLS-II complex, soil contamination from a past spill was spotted on the asphalt pavement and soil adjacent to the nitrogen tanks east of Building 745. Based on oil staining within the space of tire tracks leading to the nitrogen tanks, it appeared that gear oil had leaked from a contractor vehicle. Speedy-dry was applied to the stained area of the pavement and the contaminated speedy-dry was placed in a 55-gallon drum along with the oil stained soil.
14-18 06/25/14	Hydraulic Fluid/ 0.5 gallons	No	As shielding blocks were being moved to the rear of Building 933 with a Bay Crane, a hydraulic hose sprayed oil onto recycled crushed aggregate (RCA). The contaminated RCA was excavated by hand and placed into a 55-gallon drum for off-site disposal and the failed hose was replaced.
14-19 07/09/14	Hydraulic Fluid/ 3.5 quarts	No	While planting trees along the median and sides of Upton Road and Princeton Avenue, hydraulic fluid began leaking from a loose hydraulic fitting on a BNL backhoe. Grounds personnel placed the contaminated soil in a 55-gallon drum for off-site disposal. The backhoe was transported to the Heavy Equipment Shop for repairs.
14-24 10/27/14	Diesel Fuel/ <1 gallon	No	During morning daily rounds/inspections, Central Steam Facility personnel observed fluid leaking from a contractor vehicle onto the gravel road just east of Tank No. 6 in the Major Petroleum Facility. A containment tray was placed beneath the leaking fuel line to collect dripping fuel while the leaking fitting was temporarily wrapped in plastic and refastened to the fuel line. The contractor recovered the stained gravel and placed it in a 5-gallon pail that was later transferred to Waste Management for off-site disposal.
14-26 11/17/14	Hydraulic Fluid/ 0.5 gallons	No	As a BNL dump truck was unloading soil at the waste transfer center, hydraulic fluid started leaking from the truck's hydraulic lift reservoir. The driver reported the leak to the Fleet Services Supervisor and Fleet Services personnel responded and placed a tray beneath the reservoir to capture the dripping fluid. Absorbent pads were also placed onto the gravel bed to capture the fluid. The residual product in the reservoir was drained and containerized before the vehicle was driven back to Fleet Services for repairs. The contaminated gravel and soiled absorbent pads were containerized and transferred to Waste Management for off-site disposal.

(continued).

Table 3-9. Summary of Chemical and Oil Spill Reports. *(concluded).*

Spill No. and Date	Material/ Quantity	ORPS Report	Source/Cause and Corrective Actions
14-28 12/04/14	Sulfuric Acid/ 0.5 liters	Yes	A waste container of Piranha Etch solution (3 parts 98 percent sulfuric acid to 1 part hydrogen peroxide) ruptured when an organic solvent added to the container caused an unanticipated chemical reaction. The solution splattered onto the floor and adjoining walls in the Center for Functional Nanomaterials (CFN) clean room where the spill occurred. Off-gasses from the reaction triggered the Highly Toxic Gas Alarms in the clean room, alerting CFN occupants to evacuate the building. Responding emergency personnel inadvertently walked through the spilled solution spreading contamination to other floor areas. Waste Management personnel used rags and a mixture of acid neutralizer and water to wipe down floor areas contaminated by the emergency responders and the wall surfaces contaminated by splattered solution. An alkaline cleaning solution was used to clean up the majority of the floor.

Notes:
ORPS = Occurrence Reporting and Procesing System

treatment chemicals for potable water (sodium hydroxide and sodium hypochlorite). The tanks range in capacity from 200 to 1,000 gallons. In June 2013, BNL renewed its Chemical Bulk Storage Registration in accordance with NYSDEC directives and received a Hazardous Substance Bulk Storage Registration Certificate, which will not expire until July 27, 2015.

NYSDEC conducted an inspection of the Chemical Bulk Storage facilities in April 2014. One finding related to the integrity of the containment systems for truck transfer areas for Tanks 634-02 and 635-04 was identified. The containment systems were thoroughly inspected and repairs were made to stress cracks in accordance with NYSDEC directives.

3.8.6 County Storage Requirements

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

To ensure that storage of chemicals and petroleum continue 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. The Laboratory will no longer submit new design plans for SCDHS review/approval or continue to perform other administrative activities such as registration of exempt facilities and updates of shared databases. BNL will continue to inspect all storage facilities to ensure operational requirements of SCSC Article 12 are maintained.

3.9 RCRA REQUIREMENTS

The Resource Conservation and Recovery Act regulates hazardous wastes that, if mismanaged, could present risks to human health or the environment. The regulations are designed to ensure that hazardous wastes are managed

from the point of generation to final disposal. In New York State, EPA delegates the RCRA program to NYSDEC, with EPA retaining an oversight role. Because the Laboratory may generate greater than 1,000 Kg (2,200 pounds) of hazardous waste in a month, it is considered a large-quantity generator, and has a RCRA permit to store hazardous wastes for up to one year before shipping the wastes off site to licensed treatment and disposal facilities. As noted in Chapter 2, BNL also has a number of satellite accumulation and 90-day waste storage 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 2014, EPA performed an unannounced inspection of Hazardous Waste activities at BNL; there were no findings.

3.10 POLYCHLORINATED BIPHENYLS

The storage, handling, and use of PCBs are regulated under the Toxic Substance and Control Act. Capacitors manufactured before 1970 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 3 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 2014. The Laboratory has aggressively approached reductions in its PCB inventory, reducing it by more than 99 percent since 1993. The only known regulated PCB-contaminated 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 (insecticides, rodenticides, herbicides, and algicides) are regulated under the Federal Insecticide, Fungicide and Rodenticide Act. BNL uses an Integrated Pest Management (IPM) plan that was developed over a decade ago, and subsequently audited by a third party during 2012. Pesticides are used at the Laboratory to control undesirable insects, mice, and rats; microbial growth in cooling towers; and to maintain certain areas free of vegetation (e.g., around fire hydrants and inside secondary containment berms). Insecticides are also applied in research greenhouses on site. Herbicide use is minimized wherever possible (e.g., through spot treatment of weeds). All pesticides are applied by BNL-employed, New York State–certified applicators. By February 1, each applicator files an annual report with NYSDEC detailing insecticide, rodenticide, algaecide, and herbicide use for the previous year.

3.12 WETLANDS AND RIVER PERMITS

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

Activities that could require review under the BNL Natural and Cultural Resource Management Programs (BNL 2011 and BNL 2013a) are identified during the NEPA process (see Section 3.3). In the preliminary design stages of a construction project, design details required for the permit application process are specified. These design details ensure that the construction activity will not negatively affect the area, or if it does, that the area will be restored to its original condition. When design is near completion, permit applications are filed. During and after construction, the Laboratory must comply with the permit conditions.

In 2012, BNL submitted a permit package to NYSDEC for the construction of recharge basins associated with upgrades to the STP as required by wetlands regulations and the Wild, Scenic, and Recreational River Systems Act.

The upgrades for the STP allow for the discharge of the tertiary treated wastewater directly to groundwater, and removal of the former chlorine house and UV light disinfection system. A 2011 permit for the installation of fencing and air conditioning platforms at the RHIC facility continues to remain open, pending completion of work. In addition, a permit prepared by BNL for the LISF continues to be open, and will be closed once vegetation is established throughout the solar farm and invasive plants in a modified tiger salamander habitat are under control.

3.13 PROTECTION OF WILDLIFE

3.13.1 Endangered Species Act

The Laboratory updates its list of endangered, threatened, and species of special concern (see Table 6-1 in Chapter 6) as data from state and federal sources are provided. There are no federally recognized endangered species on the BNL site. However, in October 2013 the U.S. Fish & Wildlife Service published a notice in the Federal Register proposing the listing of the Northern Long-eared Bat (Myotis septentrionalis) as a federally endangered species. This species is known to utilize the BNL site during the summer months. Therefore, BNL began consideration of management options to protect this species in preparation for its eventual listing, now expected in early 2015. The northern long-eared bat will be the first federally listed species known to be present at the Laboratory. State recognized endangered (E) or threatened (T) species include: eastern tiger salamander (E), persius duskywing (E), crested fringed orchid (E), Engelman spikerush (E), dwarf huckleberry (E), whorled loosestrife (E), fireweed (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). Although the tiger salamander is no longer the only state endangered species found at the Laboratory, it is the most notable and best-studied species on site. 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 2011) formalizes the strategy and actions needed to protect 26 confirmed tiger salamander breeding locations on site. The strategy includes identifying and mapping habitats, monitoring breeding conditions, improving breeding sites, and controlling activities that could negatively affect breeding. As part of environmental benefits associated with the LISF, a small tiger salamander habitat was modified to ensure improved water retention for longer periods of time.

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

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

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

The Laboratory is also home to 14 species that are listed as species of special concern.

Such species have no protection under the state endangered species laws, but may be protected under other state and federal laws (e.g., Migratory Bird Treaty Act). New York State monitors species of special concern and manages their populations and habitats, where practical, to ensure that they do not become threatened or endangered. Species of special concern found at BNL include the mottled duskywing butterfly, marbled salamander, eastern spadefoot toad, spotted turtle, eastern box turtle, eastern hognose snake, worm snake, horned lark, whip-poor-will, vesper sparrow, grasshopper sparrow, red-headed woodpecker, osprey, sharp-shinned hawk, and Cooper's hawk. The management efforts for the tiger salamander also benefit the marbled salamander. At present, no protective measures are planned for the eastern box turtle or spotted turtle, as little activity occurs within their known habitat at the Laboratory. However, BNL is working with Hofstra University to study reproductive strategies and habitat use of the eastern box turtle, and it is a focal species for study within the LISF. Results of these studies may show the need for conservation and management needs. BNL continues to evaluate bird populations as part of the management strategy outlined in the NRMP.

The Laboratory has 28 plant species that are protected under state law: four are endangered plants, the Engelman spikerush, dwarf huckleberry, whorled loosestrife, and crested fringed orchid; two are threatened plants, the stiff-leaved goldenrod and stargrass; and four are rare plants, the small-flowered false foxglove, narrow-leafed bush clover, wild lupine, and long-beaked baldrush. The other 18 species are considered to be "exploitably vulnerable," meaning that they may become threatened or endangered if factors that result in population declines continue. These plants are currently sheltered due to the large areas of undeveloped pine-barren habitat on site. An additional five species are considered to be likely present or possible due to presence of correct habitat. As outlined in the NRMP, locations of these rare plants must be determined, populations estimated, and management requirements established. In an effort to locate and document rare plants, BNL is working with a botanist to assess the flora found on site. See Chapter 6 for further details.

3.13.2 Migratory Bird Treaty Act

As mentioned in Chapter 1, the Laboratory has identified more than 185 species of migratory birds since 1948; of those, approximately 85 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 bird's assertive protection of nesting sites. When this occurs, proper procedures are followed to allow the birds to nest and preventive measures are taken to ensure that they do not cause problems in the future (e.g., access to nesting is closed or repaired, and/or deterrents to nesting are installed). Canada geese (Branta canadensis) are managed under an annual permit from the U.S. Fish and Wildlife Services goose nest management program. Occasionally, nesting migratory birds come in conflict with ongoing or planned construction activities. When this occurs, the USDA-APHIS-Wildlife Services Division is called for consultation and resolution, if possible. Each incident is handled on a case-by-case basis to ensure the protection of migratory birds, while maintaining fiscal responsibility. See Chapter 6 for more information on migratory birds.

3.13.3 Bald and Golden Eagle Protection Act

While BNL does not have bald or golden eagles nesting on site, they do occasionally visit the area during migration. At times, immature golden eagles have spent several weeks in the area. Bald eagles are known to spend long periods of time on the north and south shores of Long Island, and the first documentation of nesting on the island occurred in 2013. Since that time, additional nesting pairs have been documented on Long Island. Currently, the Laboratory has no concerns with eagles and no specific management requirements have been identified. The growth of the bald eagle population on Long Island is being monitored and protections will be put in place, as necessary.

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 Brookhaven National Laboratory Site Radiological Control Manual (RCM) (BNL 2013b) and are consistent with the pre-approved authorized release limits set by DOE Order 458.1.

In 2014, excess materials such as scrap metal (256 tons) and electronics equipment (29 tons) were released to interested parties or to an off-site location. All materials were surveyed, as required, using appropriate calibrated instruments and released based on DOE pre-approved authorized limits. There were no releases of real property in 2014.

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 2014, BNL was inspected by federal, state, or local regulators on ten occasions. These inspections included:

- *Air Compliance.* BNL representatives accompanied NYSDEC on a site tour of Title V permitted facilities in December. No issues or areas of concern were identified.
- *Potable Water.* In October, SCDHS collected samples and conducted its annual inspection of the BNL potable water system. Corrective actions for all identified deficiencies were established and communicated with SCDHS and are being addressed by the Laboratory's Energy and Utilities Division.
- *Sewage Treatment Plant.* SCDHS conducts quarterly inspections of the Laboratory's STP to evaluate operations and sample the effluent; no performance or operational issues were identified. NYSDEC performed an annual surveillance inspection in February; there were no issues identified.
- *Recharge Basins.* In December, SCDHS inspected several on-site SPDES-regulated outfalls and collected samples; there were no issues identified.
- *Major Petroleum Facility.* The annual NYSDEC inspection of the MPF was performed in April 2014. See Section 3.8.4 for a discussion of the issues identified.
- *Chemical Bulk Storage (CBS) Facilities.* The CBS facilities are inspected periodically by NYSDEC. An inspection was conducted in April 2014. See Section 3.8.5 for a discussion of the issues identified.
- *RCRA.* EPA performed a RCRA inspection in September 2014; there were no compliance issues reported.

3.15.2 DOE Assessments/Inspections

The DOE Brookhaven Site Office (BHSO) continued to provide oversight of BNL programs during 2014 and observed the programmatic assessment of BNL's Waste Management Program. The results of that assessment are summarized in the following section.

3.15.3 Environmental Multi-Topic Assessment

In 2014, BNL conducted a programmatic self-assessment on several aspects of the Laboratory's environmental management program. Topics for this assessment were determined based on institutional risk, DOE and regulatory agency expectations, and to ensure that key environmental requirements are being implemented as designed. The scope of the 2014 self-assessment focused on requirements related to BNL's waste management programs. The specific elements that were focused on during this assessment included compliance and conformance with hazardous, industrial, PCB,

regulated medical, mixed, and radioactive waste management. During the course of the assessment, a representative sampling of managers, supervisors, and workers were interviewed. In addition, numerous documents and activities were reviewed to enable a comprehensive, independent, and objective assessment of the conformance to requirements and the effectiveness of implementation.

The assessment of these programs identified four Noteworthy Practices, forty-five Minor Nonconformances, and one Opportunity for Improvement. Except for the noted Minor Nonconformances, the waste management program as a whole was found to be in conformance with applicable BNL Standards Based Management System and external regulatory requirements. A causal analysis was performed and corrective action plan prepared for the identified nonconformances to address the issues. Progress on the corrective actions was tracked to closure in BNL's Institutional Assessment Tracking System.

3.15.4 Nevada National Security Site

The Laboratory continues to be a certified Nevada National Security Site (NNSS) waste generator. As part of the NNSS waste certification process, the NNSS Maintenance and Operations Contractor conducts random unannounced inspections. NNSS performed a short notice surveillance of the Radioactive Waste Management Program in 2014. There were no non-conformances issued. One minor observation was noted on traceability of waste packages. The issue was corrected and closed with the assessment team's concurrence.

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 2014 (Table 3-10). There were no Notices of Violation/Non-Compliance accessed in 2014; however, there was one environmental incident that required reporting through BNL's Occurrence Reporting and Processing System (ORPS). The incident is summarized in Table 3-11. A causal analysis was performed and corrective actions were taken to prevent recurrence of this event.

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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	05/26/92	This agreement provides the framework, including schedules, for assessing the extent of contamination and conducting cleanup at BNL. Work is performed either as an Operable Unit or a Removal Action. The IAG integrates the requirements of CERCLA, Resource Conservation and Recovery Act (RCRA), and the National Environmental Policy Act (NEPA). Cleanup is currently in long-term surveillance and maintenance mode for the groundwater treatment systems, former soil/sediment cleanup areas, and the reactors; this includes monitoring of institutional controls. The High Flux Beam Reactor (stack and reactor vessel are scheduled for decontamination and decommissioning by 2020 and 2072, respectively. All groundwater treatment systems operated as required in 2014.
No Notices of Violation/Enforcement Actions for 2014.				

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

Table 3-11. Summary of Other Environmental Occurrence Reports, 2014.

ORPS* ID: SC-BHSO-BNL-BNL-2014-0001	Date: 01/06/14
On January 6, 2014, Compressed Natural Gas (CNG) was simultaneously discharged from three pressure relief valves (PRVs) into the atmosphere at high pressure from the CNG Fueling Facility (Building 522). Fire Rescue personnel responded and assisted in isolating the area, de-energizing the gas compressor, closing the isolation valves upstream of the three PRVs, and closing the gas supply valve to the facility. BNL declared an Operational Emergency (OE) and activated the Emergency Operations Center (EOC). Impacted areas of the Laboratory were Sheltered-in-Place until it was confirmed that the natural gas had safely dissipated. It was estimated that between 700 to 1,000 lbs. of natural gas was released (far below the EPA reporting threshold of 10,000 lbs.). The facility was secured pending further investigation. No significant property damage was apparent and there were no injuries. The Alternate Laboratory Director for Facilities & Operations charged a team to investigate this event and determine the root and contributing causes, corrective actions, lessons learned, impact of the event, extent of condition, and OE response.	Status: Report is final; corrective actions have been identified and are being tracked to closure in BNL's Assessment Tracking System.

Notes:
* Reportable under the Occurrence Reporting and Processing System (ORPS), established by the requirements of DOE Order 231.1B Chg. 1, Environmental, Safety and Health Reporting.