3 Compliance Status

Brookhaven National Laboratory is subject to more than 100 sets of federal, state, and local environmental regulations; numerous site-specific permits; 13 equivalency permits for operation of groundwater remediation systems; and several other binding agreements. In 2012, 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. Routine inspections conducted during the year found no significant instances of noncompliance.

The Laboratory received two Notices of Violation (NOV) from EnergySolutions of Utah and one Notice of Non-Compliance from the Environmental Protection Agency. The two NOVs from EnergySolutions were received in June and August and resulted in 600 points against BNL's Utah Generator Site Access Permit, but with no monetary fines. In July, EPA issued a Notice of Non-Compliance of Subpart H, 40 CFR 61, National Emissions Standards for Hazardous Pollutants–radionuclides (rad-NESHAP) as a result of some findings from an inspection visit on July 12, 2012 and review of BNL's 2011 rad-NESHAPs Report. A revised annual report was submitted to address the non-compliance findings.

Emissions of nitrogen oxides, carbon monoxide, and sulfur dioxide from the Central Steam Facility were all within permit limits. There were nine unexpected opacity excursions on January 4, 2012 for Boiler 6 due to the sudden buildup of soot across the transmissometer light path, for which there was no apparent cause. Subsequent shutdown of the boiler and cleaning of the light path brought recorded opacity readings back to normal; other opacity excursions reported for Boiler 6 and 7 were only noted during testing periods. Halon portable fire extinguishers continue to be removed and replaced by dry-chemical or clean agent units as they are encountered. The existing supply of Halon in storage was transferred to the Department of Defense Ozone Depleting Substances Reserve during December 2012.

Monitoring of BNL's potable water system indicated that all drinking water requirements were met. During 2012, most of the liquid effluents discharged to surface water and groundwater met applicable New York State Pollutant Discharge Elimination System permit requirements. Nine minor excursions above permit limits were reported for the year; three occurred at the Sewage Treatment Plant (iron, total nitrogen, and total nitrogen load), five pH excursions were recorded for discharges to recharge basins (one at Outfall 007 and four at Outfall 008), and one oil and grease excursion at recharge basin 006B. The permit excursions were reported to the New York State Department of Environmental Conservation (NYSDEC) and the Suffolk County Department of Health Services. 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 2012. There were 15 reportable spills of petroleum products, antifreeze, or chemicals, which was slightly less than what was reported in 2011. The severity of releases were minor, and all releases were cleaned up to the satisfaction of NYSDEC.

BNL participated in 9 environmental inspections or reviews by external regulatory agencies in 2012. These inspections included Sewage Treatment Plant operations, waste water discharges to other regulated outfalls and recharge basins, 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) permit, 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
- Seven 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 decommis-sioning [D&D]) of inactive hazardous waste dis-posal sites. Regulators include EPA, DOE, and the New York State Department of Environmental Conservation (NYSDEC).	In 1992, BNL entered into a tri-party agreement with EPA, NYSDEC, and DOE. BNL site remediation is conducted by the Environmental Restoration Program in accordance with milestones established under this agreement. In 2005, BNL completed the restoration portion of the cleanup project and entered the surveillance and maintenance mode. In 2012 the D&D of the BGRR, including completion of the graphite pile removal and demolition of the bioshield, was completed. The BGRR was then transitioned to the long term surveillance and maintenance program managed by the Environmental Protection Division after completion of this work.	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 the 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 proper-ties 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 ad-ministered by state historic preservation offices (SHPOs; in New York State, NYSHPO). At BNL, structures that may be subject to NHPA include the High Flux Beam Reactor (HFBR), the Brookhaven Graphite Research Reactor (BGRR) complex, World War I training trenches near the Relativistic Heavy Ion Collider project, and the former Cosmotron building.	The HFBR, BGRR complex, and World War I trenches are eligible for inclusion in the National Register. The former Cosmotron building was identified as potentially eligible in an April 1991 letter from NYSHPO. Any proposed activities involving these facilities must be identified through the NEPA/NHPA processes and evaluated to deter-mine if the action would affect the features that make the facility eligible. Some actions required for D&D of the BGRR were determined to affect its eligibility, and mitigative actions are proceeding according to 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 50-0 40 CFR 82 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). 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 2012.	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) stan-dards for public water supplies establish mini-mum drinking water standards and monitoring requirements. SDWA requirements are enforced by the Suffolk County Department of Health Ser-vices (SCDHS).	BNL maintains a sitewide public water supply. This water supply met all primary drinking water standards, as well as operational and maintenance requirements.	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 quan-tities, the Laboratory is subject to these requirements. BNL fully complied with all reporting and emergency planning requirements in 2012.	3.8.1 3.8.2 3.8.3
EPA: 40 CFR 280 NYSDEC: 6 NYCRR 595–597 6 NYCRR 611–613 SCDHS: SCSC Article 12	Federal, state, and local regulations govern the storage of chemicals and petroleum products to prevent releases of these materials to the environment. Suffolk County Sanitary Codes (SCSC) are more stringent than federal and state regulations.	The regulations require that these materials be managed in facilities equipped with secondary containment, overfill pro-tection, and leak detection. BNL complies with all federal and state requirements and has achieved conformance to county codes.	3.8.4 3.8.5 3.8.6
EPA: 40 CFR 260–280 NYSDEC: 6 NYCRR 360–372	The Resource Conservation Recovery Act (RCRA) and New York State Solid Waste Disposal Act govern the generation, storage, handling, and disposal of hazardous wastes.	BNL is defined as a large-quantity generator of hazardous waste and has a permitted waste management facility.	3.9
EPA: 40 CFR 700–763	The Toxic Substances Control Act (TSCA) regulates the manufacture, use, and distribution of all chemicals.	BNL manages all TSCA-regulated materials, including PCBs, 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 and herbicides, as well as the pesticide containers and residuals.	BNL employs NY State-certified pesticide applicators to apply pesticides and herbicides. Each applicator attends training, as needed, to maintain current certification and files an annual report to the state detailing the types and quantity of pesticides applied.	3.11
DOE: 10 CFR 1022 NYSDEC: 6 NYCRR 663 6 NYCRR 666	DOE regulations require its facilities to comply with flood-plain/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 loca-tions in the north and east of the site requires NYSDEC permits and review for compliance under DOE wetland/ floodplain regulations. In 2012, there were three projects permitted under the NYS 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 spe-cies, or cause adverse modification to a critical habitat.	BNL is host to numerous species of flaura and fauna. Many species have been categorized by NYS as endangered, threatened, or of special concern. The Laboratory's Natural Resource Management Plan outlines activities to protect these vulnerable species and protect 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) imple-ments 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, swal-lows, 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 con-struction activities, including demolition, are reviewed to ensure no impacts to nesting individuals.	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 ad-versely affect the health and safety of the public, workers, the environment, the intended purpose of DOE facilities, or the credibility of the Depart-ment. 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 414.1 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, coupled with technical standards, where appropriate, to ensure: senior management provides planning, organization, direction, control, and support to achieve DOE objectives; line organizations achieve and maintain quality while minimizing safety and health risks and environ-mental impacts, and maximizing reliability and performance; line organizations have a basic management system in place supporting this Order; and each DOE element reviews, evaluates, and improves its overall performance and that of its contractors using a rigorous assessment process based on an approved QA Program.	BNL has a Quality Management (QM) system to implement quality management methodology throughout its management systems and associated processes to: 1) plan and perform Laboratory operations reliably and effectively to minimize the impact on the safety and health of humans and on the environment; 2) standardize processes and support continuous improvement in all aspects of Laboratory operations; and 3) enable the delivery of products and services that meet customers' requirements and expectations. 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	The Radioactive Waste Management Program (RWMB) 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 time-frame 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 BNL has the management systems, administrative controls, and physical controls to comply with DOE Order 435.1.	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 E.O 13514 and to continue compliance with E.O. 13423. The new order is supported by DOE requirements for sound sustainability programs implemented under the DOE 2010 Strategic Sustainability Performance Plan. Contractor requirements under the order require preparation of a site sustainability plan and implementation of a sound Environmental Management System (EMS).	In accordance with the requirements of the DOE Strategic Sustainability Performance Plan BNL has developed and implemented a Site Sustainability Plan. The Goals and Strategic Objectives of the DOE SSPP are tracked and reported on annually. BNL's EMS was officially registered to the ISO 14001:1996 standard in 2001 and recertified to the revised standard in 2004, 2007 and 2010. In June 2012, an external surveillance audit was conducted that found the BNL EMS to be functioning well.	Chapter 2
DOE: Order 458.1, Change 2	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 is required by August 2012.	In accordance with the requirements of DOE Order 458.1, Brookhaven National Laboratory (BNL) main-tains and implements several plans and programs for ensuring that the management of facilities, wastes, effluents, and emissions does not present 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 the Site Environmental Report 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 BNL meets these requirements.	Chapters 4, 5, 6 & 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 37 emission sources
- Three permits issued by NYSDEC for construction activities within the Peconic River corridor
- EPA Underground Injection Control (UIC) Area permit for the operation of 133 UIC wells
- Permit for the operation of six domestic water supply wells, issued by NYSDEC
- Thirteen 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 June 2009, NYSDEC finalized a major modification to BNL's SPDES permit. This modification was initiated in 2007 as a comprehensive review of the Laboratory's Sewage Treatment Plant (STP) and evaluation of point source discharges from BNL operations. The modified permit proposed significant reductions in the concentration of six metals (copper, iron, lead, mercury, nickel, and zinc) discharged from BNL's STP to the Peconic River. Studies were completed to assess the sources of these metals and to evaluate the feasibility of achieving new discharge limits. In order to achieve compliance

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	Building Ventilation	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 Linear 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 Bdry/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 - SPDES Equivalency	517/518	South Bdry/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	NA	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-14	NA	NA
NYSDEC - SPDES Equivalency	855	Sr-90 Treatment System - BGRR/WCF	None	16-Dec-14	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	None	NA	NA	NA
NYSDEC - Hazardous Substance	BNL	Bulk Storage Registration Certificate	1-000263	27-Jul-13	NA	NA
NYSDEC - LI Well Permit	BNL	Domestic Potable/Process Wells	1-4722-00032/00113	13-Sep-18	NA	NA
NYSDEC - Air Quality	197	Lithographic Printing Presses	1-4722-00032/00115	29-Jun-13	U-LITHO	19709-10
NYSDEC - Air Quality	423	Metal Parts Cleaning Tanks	1-4722-00032/00115	29-Jun-13	U-METAL	42308
NYSDEC - Air Quality	423	Gasoline Storage and Fuel Pumps	1-4722-00032/00115	29-Jun-13	U-FUELS	42309-10
NYSDEC - Air Quality	423	Motor Vehicle A/C Servicing	1-4722-00032/00115	29-Jun-13	U-MVACS	MVAC1- 4
NYSDEC - Air Quality	244	Paint Spray Booth	1-4722-00032/00115	29-Jun-13	U-PAINT	244-02
NYSDEC - Air Quality	244	Flammable Liquid Storage Cabinet	1-4722-00032/00115	29-Jun-13	U-PAINT	244 AE
NYSDEC - Air Quality	479	Metal Parts Cleaning Tank	1-4722-00032/00115	29-Jun-13	U-METAL	47908
NYSDEC - Air Quality	510	Spin Coating Operation	1-4722-00032/00115	29-Jun-13	U-INSIG	510 AR
NYSDEC - Air Quality	801	Target Processing Laboratory	1-4722-00032/00115	29-Jun-13	U-INSIG	80101
NYSDEC - Air Quality	Site	Aerosol Can Processing Units	1-4722-00032/00115	29-Jun-13	U-INSIG	AEROS
NYSDEC - Air Quality	498	Aqueous Cleaning Facility	1-4722-00032/00115	29-Jun-13	U-METAL	49801
NYSDEC - Air Quality	535B	Plating Tanks	1-4722-00032/00115	29-Jun-13	U-INSIG	53501
NYSDEC - Air Quality	535B	Etching Machine	1-4722-00032/00115	29-Jun-13	U-INSIG	53502
NYSDEC - Air Quality	535B	Printed Circuit Board Process	1-4722-00032/00115	29-Jun-13	U-INSIG	53503
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	29-Jun-13	U-61005	61005

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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	29-Jun-13	U-61006	61006
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	29-Jun-13	U-61007	61007
NYSDEC - Air Quality	610	Metal Parts Cleaning Tray	1-4722-00032/00115	29-Jun-13	U-METAL	61008
NYSDEC - Air Quality	610	Combustion Unit	1-4722-00032/00115	29-Jun-13	U-61005	6101A
NYSDEC - Air Quality	630	Gasoline Storage and Fuel Pumps	1-4722-00032/00115	29-Jun-13	U-FUELS	63001-03
NYSDEC - Air Quality	630	Parts Cleaning Tray	1-4722-00032/00115	29-Jun-13	U-METAL	630 AB
NYSDEC - Air Quality	902	Epoxy Coating/Curing Exhaust	1-4722-00032/00115	29-Jun-13	U-COILS	90206
NYSDEC - Air Quality	903	Metal Parts Cleaning Tank	1-4722-00032/00115	29-Jun-13	U-METAL	90304
NYSDEC - Air Quality	919B	Electroplating Operation	1-4722-00032/00115	29-Jun-13	U-INSIG	91904
NYSDEC - Air Quality	630	Parts Cleaning Tray	1-4722-00032/00115	29-Jun-13	U-METAL	630 AD
NYSDEC - Air Quality	922	Electroplating Operation	1-4722-00032/00115	29-Jun-13	U-INSIG	92204
NYSDEC - Air Quality	923	Electronic Equipment Cleaning	1-4722-00032/00115	29-Jun-13	U-METAL	9231A
NYSDEC - Air Quality	923	Parts Drying Oven	1-4722-00032/00115	29-Jun-13	U-METAL	9231B
NYSDEC - Air Quality	924	Magnet Coil Production Press	1-4722-00032/00115	29-Jun-13	U-INSIG	92402
NYSDEC - Air Quality	924	Vapor/Ultrasonic Degreasing Unit	1-4722-00032/00115	29-Jun-13	U-METAL	92404
NYSDEC - Air Quality	Site	Halon 1211 Portable Extinguishers	1-4722-00032/00115	29-Jun-13	U-HALON	H1211
NYSDEC - Air Quality	Site	Halon 1301 Fire Suppression Systems	1-4722-00032/00115	29-Jun-13	U-HALON	H1301
NYSDEC - Air Quality	Site	Packaged A/C Units	1-4722-00032/00115	29-Jun-13	U-RFRIG	PKG01-02
NYSDEC - Air Quality	Site	Reciprocating Chillers	1-4722-00032/00115	29-Jun-13	U-RFRIG	REC01-53
NYSDEC - Air Quality	Site	Rotary Screw Chillers	1-4722-00032/00115	29-Jun-13	U-RFRIG	ROTO1-11
NYSDEC - Air Quality	Site	Split A/C Units	1-4722-00032/00115	29-Jun-13	U-RFRIG	SPL01-02
NYSDEC - Air Quality	Site	Centrifugal Chillers	1-4722-00032/00115	29-Jun-13	U-RFRIG	CEN01-24
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	28-Feb-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

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

with the required discharge limits at the STP, a decision was made to modify the STP from a surface water discharge to a groundwater discharge system. Final design and specifications were approved by NYSDEC and the Suffolk Country Department of Health Services (SCDHS) in November 2012. The modified treatment process is scheduled to be completed by September 2014, and a modified SPDES permit application to reflect this change was prepared and submitted to NYSDEC for review in May 2012.

Included in the May 2012 permit modification was a request to change an existing September 2012 SPDES permit mercury limit from 50 ng/L to 100 ng/L until construction of a new filtration

system and recharge basins are complete. In September 2012, BNL received a letter from NYSDEC extending the current 200 ng/L mercury limit for 6 months or upon issuance of the above-mentioned SPDES permit modification, whichever comes first. This decision was based on BNL's efforts to implement a successful mercury minimization program and ultimate plans to relocate the on-site wastewater treatment plant discharge to groundwater via recharge basins.

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

Two actions continued and one new action commenced in 2012 that required 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) and the installation of fencing and air conditioning platforms at the Relativistic Heavy Ion Collider (RHIC). A new project for the construction of recharge basins associated with upgrades to the Laboratory's STP was initiated in 2012, which will allow for the eventual discharge of tertiary-treated wastewater directly to groundwater.

3.2.2.3 CERCLA Groundwater Equivalency Permits

During 2012, BNL maintained SPDES equivalency permits for 12 groundwater remediation systems where treated groundwater is discharged to either recharge basins or injection wells. In March 2012, NYSDEC issued an equivalency permit for the recently installed Building 452 Freon-11 Plume groundwater treatment system. The system started full-time operation in April 2012.

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 2012, environmental evaluations were completed for 104 proposed projects at BNL. Of those, 96 were considered minor actions requiring no additional documentation. Eight projects were addressed by submitting notification forms to DOE, which determined that seven of the projects were covered by existing "Categorical Exclusions" per 10 CFR 1021 or fell within the scope of a previous environmental assessment. One project, Management of the White-tailed Deer (Odocoileus virginianus) Population at Brookhaven National Laboratory, was determined to require an Environmental Assessment (EA) that will be completed in 2013. The Laboratory's three general categorical exclusions, which most of the research is conducted under, were updated and approved by DOE. These included bench scale work, general maintenance, and Work for Others/CRADA.

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 are also of historic significance as identified in BNL's Cultural Resources Management Plan, 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

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 2012, 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). Boilers with a maximum operating heat input between 25 and 250 MMBtu/hr (7.3 and 73.2 MW) can demonstrate compliance with the NOx standard using periodic emission tests or by using continuous emission monitoring equipment. Emission tests conducted in 1995 and 2006 confirmed that boilers 1A and 5, both in this size category, met the NOx emission standards when burning residual fuel oil with low nitrogen content. To ensure continued compliance, an outside contract analytical laboratory analyzes composite samples (collected quarterly) of fuel deliveries. The analyses conducted in 2012 confirmed that the fuel-bound nitrogen content met these requirements. Compliance with the 0.30 lbs/MMBtu NOx emission standards for boilers 6 and 7 was demonstrated by continuous emission monitoring of the flue gas. In 2012, NOx emissions from Boilers 6 and 7 averaged 0.088 lbs/MMBtu and 0.081 lbs/MMBtu, respectively. There were no known exceedances of the NOx emission standard for either boiler.

The Laboratory also maintains continuous opacity monitors for boilers 6 and 7. These monitors measure the transmittance of light through the exhaust gas and report the measurement in percent attenuated. Opacity limitations state that no facility may emit particulates such that the opacity exceeds 20 percent, calculated in 6-minute averages, except for one period not to exceed 27 percent in any one hour. In January 2012, there were nine 6-minute periods where measured opacity readings for Boiler 6 exceeded 20 percent. These were due to a sudden buildup of soot (with no apparent cause) across the transmissometer light path. Subsequent shut down of the boiler and cleaning of the light path brought recorded opacity readings back to normal. The only other reported periods when opacity measurements for Boilers 6 or 7 exceeded the 6-minute, 20 percent average, occurred during quarterly calibration error tests of the opacity monitors. These opacity measurements were artificially induced when opacity attenuator filters were inserted across the opacity transmissometer light path during the calibration error tests and are not considered excess opacity readings.

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 2012, 1,319 pounds of R-11, 20 pounds of R-12, 436 pounds of R-22, and 2 pounds of R-401a were recovered and recycled from refrigeration equipment that was serviced.

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, BNL 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 2012, there were no discharges of Halon 1211 from portable fire extinguishers or Halon 1301 from accidental or fire-induced activation of fixed fire suppression systems. In December 2012, the Laboratory transferred excess ozone depleting substances to the Department of Defense Ozone Depleting Substances Reserve in Richmond, Virginia. The transfer included 3,158 pounds of Halon 1211 from excessed potable extinguishers, 1,318 pounds of Halon 1301 from fixed fire suppression systems removed from service, and 460 pounds of R-500 from refrigeration equipment no longer in service. The transfer was made in accordance with the Class I Ozone Depleting Substances Disposition Guidelines prepared by the DOE Office of Environmental Policy and Guidance.

3.5.2 Hazardous Air Pollutants

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

3.5.2.1 Maximum Available Control Technology

Based on the Laboratory's periodic review of Maximum Available Control Technology (MACT) standards in 2012, it has been determined that none of the proposed or newly promulgated MACT standards apply to the emissions from existing permitted operations or the anticipated emissions from proposed activities and operations at BNL.

3.5.2.2 Asbestos

In 2012, the Laboratory notified the EPA Region II office regarding removal of materials containing asbestos. During the year, 9,500 linear feet of pipe insulation, 145,930 square feet of non-friable (e.g. floor tiles, siding material), and 120 cubic yards of asbestos-containing debris were removed and disposed of according to EPA requirements.

3.5.2.3 Radioactive Airborne Emissions

Minor and major sources of radiological emissions are evaluated from BNL's facilities and activities 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 2012 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 hypothetical maximally exposed individual resulting from BNL's airborne emissions in 2012 was 2.30E-01 mrem (≈2.0 μSv).

In July 2012, a representative from EPA visited the site and met with BNL and DOE personnel for the purpose of reviewing the Laboratory's implementation and compliance with Subpart H, 40 CFR 61. During this review, EPA identified two findings that resulted in a noncompliance with Subpart H. In reviewing the

Annual NESHAPs Report with BNL staff, the EPA inspector identified that BNL was reporting calculated dose to a hypothetical Maximally Exposed Individual (MEI) at the fence line and not a Maximally Exposed Off-Site Individual (MEOSI) at an actual point where there is a residence, school, business, or office, as required in Subpart H. In addition, the inspector noted that the wind rose data (see Chapter 1 for full description of wind rose) illustrated in BNL's Site Environmental Report and the wind file used in the CAP-88 calculations were inconsistent, which lead to incorrect identification of the MEOSI. BNL submitted a revised annual report on August 30, 2012, which addressed the two non-compliance findings; on December 3, 2012, EPA concluded that BNL was in compliance with Subpart H.

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 to regulate wastewater effluents from the Laboratory. The permit was significantly modified in June 2009 and renewed, effective March 1, 2010. The permit specifies monitoring requirements and effluent limits for 9 of 12 outfalls, as described below. See Figure 5-5 in Chapter 5 for the locations of BNL outfalls.

- Outfall 001 is used to discharge treated effluent from the STP to the Peconic River.
- Outfalls 002, 002B, 003, 005, 006A, 006B, 008, 010, 011, and 012 are recharge basins used to discharge cooling tower blow-down, once-through cooling water, and/or stormwater. 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 this outfall.

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 SCDHS. Details of the monitoring program conducted for the groundwater treatment systems and of SPDES equivalency permit performance 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 is in the process of modifying its SPDES permit to reflect an approved modified treatment process that will replace the existing sand filters with free standing self-enclosed filtration units and divert the discharge to on-site recharge basins. A NEPA EA for this upgrade project was prepared in 2011 and a Finding of No Significant Impact was issued by DOE. Final design and specifications for the modified treatment process were approved by NYSDEC and SCDHS in November 2012. Field preparation activities were initiated in August 2012 and construction will be completed by September 2014.

3.6.1 Sewage Treatment Plant

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

A summary of SPDES monitoring results for the STP discharge at Outfall 001 is provided in Table 3-3. The relevant SPDES permit limits are also shown. 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 2012.

There were three excursions of the SPDES permit limits at Outfall 001 in 2012: iron, total nitrogen, and total nitrogen loading. In January, the total iron concentration in the wastewater effluent sample for Outfall 001 was reported at 0.55mg/L, which exceeded the SPDES limit of 0.37 mg/L. In October, the total nitrogen concentration was 10.8 mg/L and the maximum total nitrogen load was calculated at 22.5 pounds per day, which exceeds the permit limits of 10 mg/L and 20 pounds per day, respectively. All other parameters at Outfall 001 were within permit limits.

Upstream sources of soluble iron were investigated in January and none were identified. Attention was then turned toward the STP process to determine what process parameter could be adjusted to reduce the levels of soluble iron in the effluent. Increased aeration of the treatment tanks was initiated in February, which proved effective in decreasing soluble iron levels in the effluent.

Maintenance (i.e. re-coating of concrete surfaces) being performed on the primary and backup modular aeration tanks in late September/early October, which disrupted biological activities, and lower than normal flow conditions were identified as the most likely causes to the increased levels of nitrogen in the discharge. Figures 3-1 through 3-7 plot the 5-year trends for the 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 SPDES permit requires that "whole effluent toxicity" (WET) tests be conducted to ensure that chemicals present in the STP effluent are not toxic to aquatic organisms. In 2012, 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 7 days. During testing, the rate of reproduction for the water flea is measured and compared to

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

Analyte	Low Report	High Report	Min. Monitoring. Freq.	SPDES Limit	Exceedances	% Compliance*
Max. temperature (°F)	50	81	Daily	90	0	100
pH (SU)	6.5	7.5	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	> 85	> 98	Monthly	85	0	100
Max. TSS (mg/L)	<0.5	<0.6	Twice Monthly	20	0	100
% TSS Removal	> 99	>99	Monthly	85	0	100
Settleable solids (ml/L)	0	0	Daily	0.1	0	100
Ammonia nitrogen (mg/L)	< 0.1	0.39	Twice Monthly	1.5	0	100
Total nitrogen (mg/L)	1.24	10.8	Twice Monthly	10	1	96
Total nitrogen (lbs./day)	11	22.5 (b)	(May – October)	20	1	83
Total phosphorus (mg/L)	0.6	1.7	Twice Monthly	NA	0	100
Cyanide (mcg/L)	< 1.5	< 3.3	Twice Monthly	100	0	100
Copper (mg/L)	0.015	0.106	Twice Monthly	0.15	0	100
Iron (mg/L)	0.072	0.552 (a)	Twice Monthly	0.37	1	96
Lead (mg/L)	<0.001	0.009	Twice Monthly	0.019	0	100
Mercury (ng/L)	32	74	Twice Monthly	200	0	100

(continued on next page)

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

Analyte	Low Report	High Report	Min. Monitoring. Freq.	SPDES Limit	Exceedances	% Compliance*
Methylene chloride (ug/L)	< 2	< 5.9	Twice Monthly	5	0	100
Nickel (mg/L)	0.002	0.006	Twice Monthly	0.11	0	100
Silver (mg/L)	< 0.001	0.004	Twice Monthly	0.015	0	100
Toluene (ug/L)	< 1	< 1	Twice Monthly	5	0	100
Zinc (mg/L)	0.016	0.092	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
PCBs (ug/L)	< 0.05	< 0.2	Quarterly	NA	0	100
Max. Flow (MGD)	0.33	1.10	Continuous Recorder	2.3	0	100
Avg. Flow (MGD)	0.26	0.50	Continuous Recorder	NA	0	100
Avg. Fecal Coliform (MPN/100 ml)	<1	4.5	Twice Monthly	200	0	100
Max. Fecal Coliform (MPN/100 ml)	<2	8	Twice Monthly	400	0	100
HEDP (mg/L)	<0.05	<0.25	Monthly	NA	0	100
Tolytriazole (mg/L)	< 0.005	< 0.005	Monthly	NA	0	100

Notes:
See Chapter 5, Figure 5-5, for location of Outfall 001.
* % Compliance = total no. samples – total no. exceedances/total no. of samples x 100
BOD = Biological Oxygen Demand
HEDP = 1-Hydroxyethylidene Diphosphonic acid
MGD = Million Gallons per Day
MPN = Most Probable Number
NA = Not Applicable
SPDES = State Pollutant Discharge Elimination System
SU = Standard Unit
TSS = Total Suspended Solids
(a) A single permit exceedance for iron was reported in January. See Section 3.6.1 for an explanation of this permit exceedance.
(b) A single permit exceedance for total nitrogen load was reported in October.

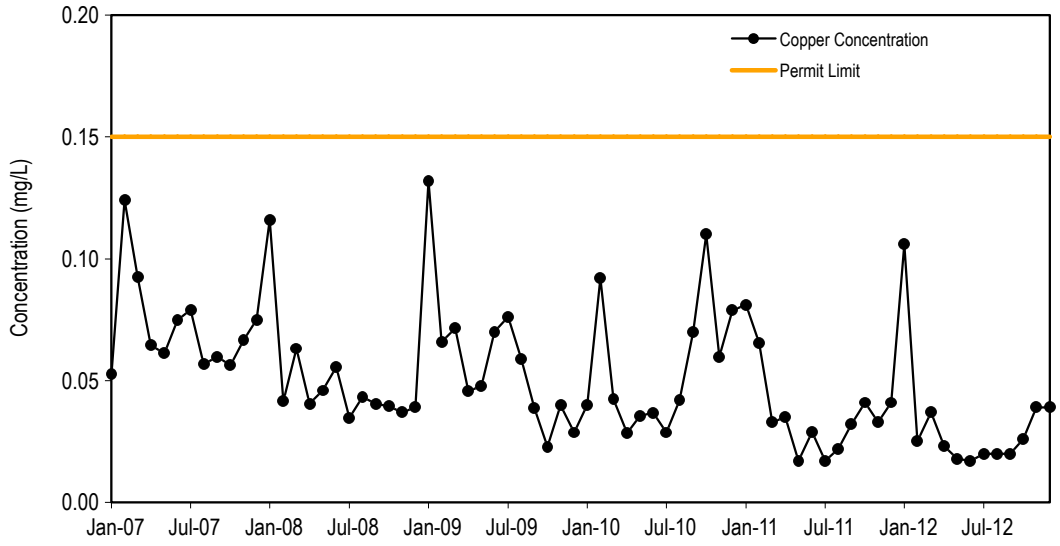


Figure 3-1. Maximum Concentrations of Copper Discharged from the BNL Sewage Treatment Plant, 2007–2012.

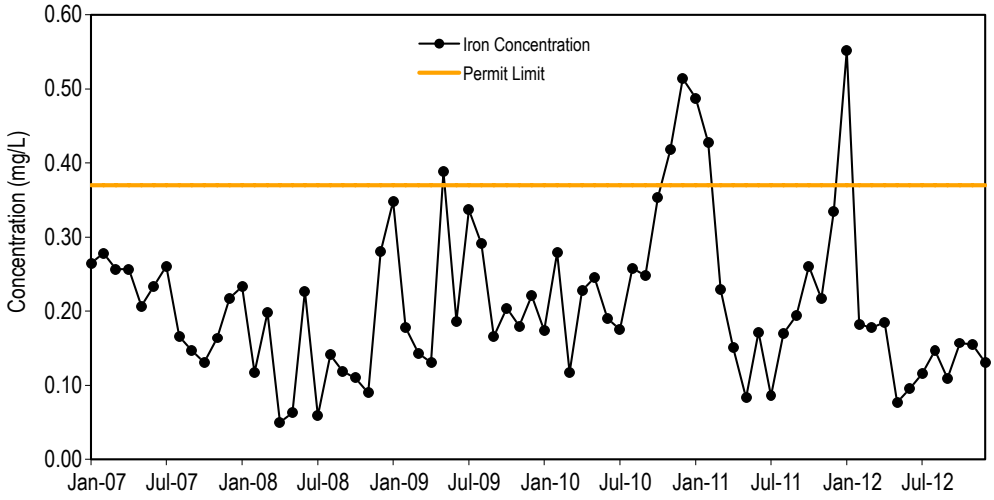


Figure 3-2. Maximum Concentrations of Iron Discharged from the BNL Sewage Treatment Plant, 2007–2012.

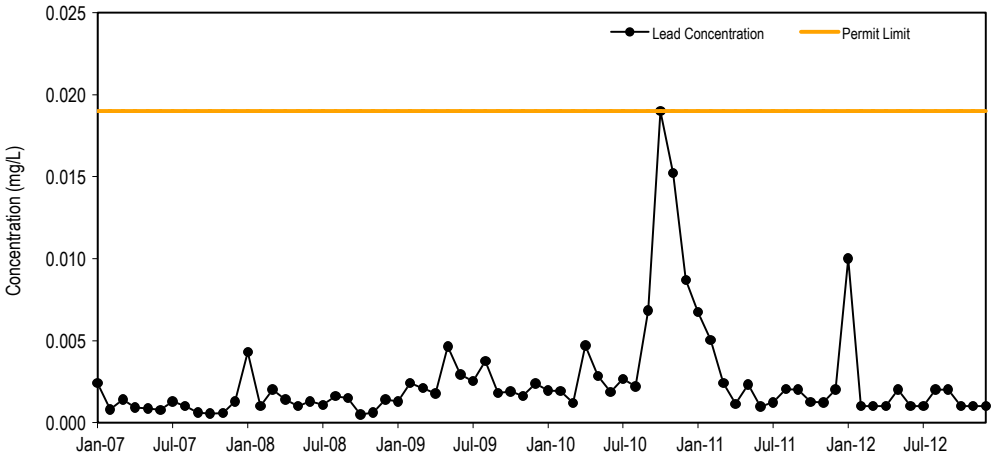


Figure 3-3. Maximum Concentrations of Lead Discharged from the BNL Sewage Treatment Plant, 2007–2012.

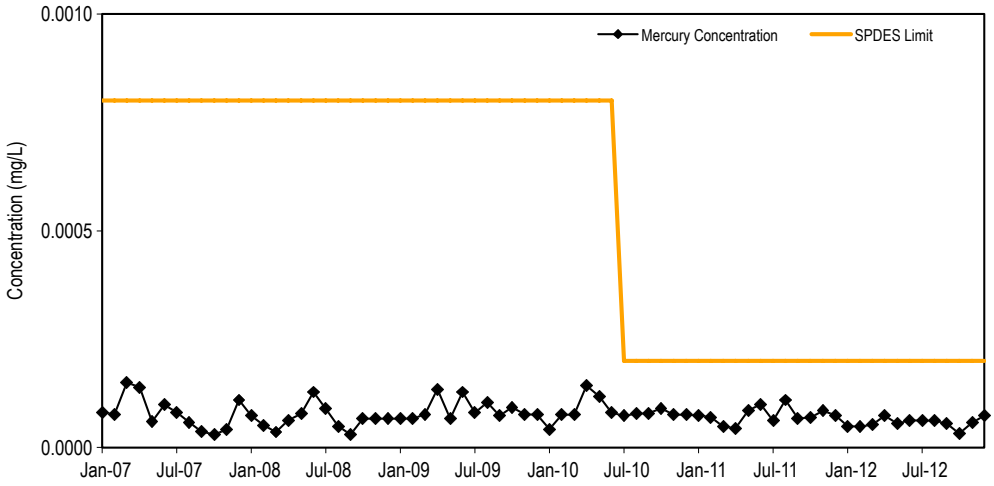


Figure 3-4. Maximum Concentrations of Mercury Discharged from the BNL Sewage Treatment Plant, 2007–2012.

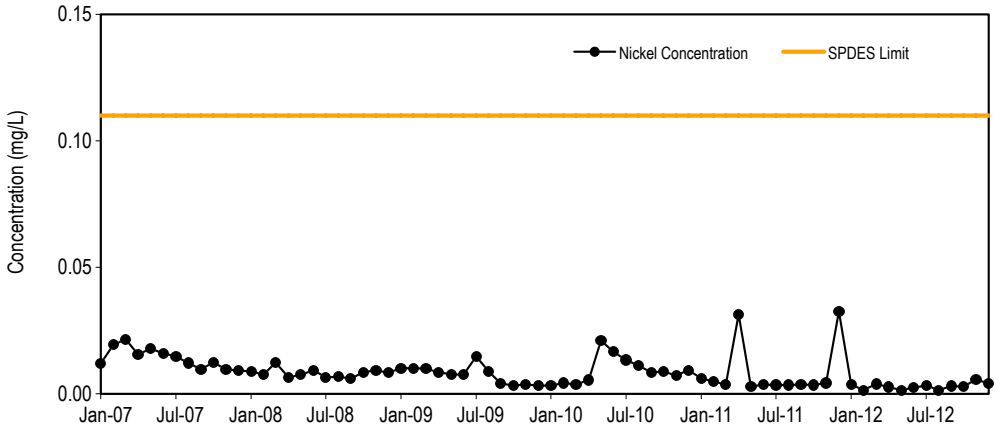


Figure 3-5. Maximum Concentrations of Nickel Discharged from the BNL Sewage Treatment Plant, 2007–2012.

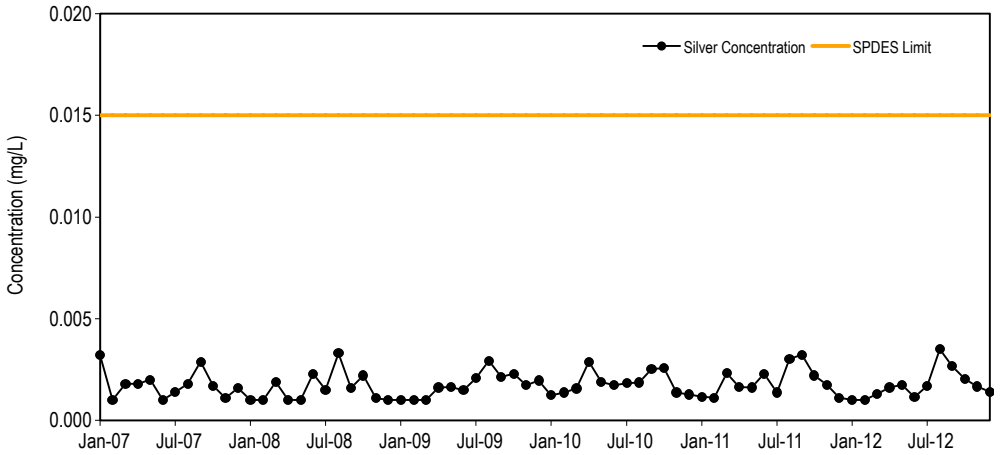
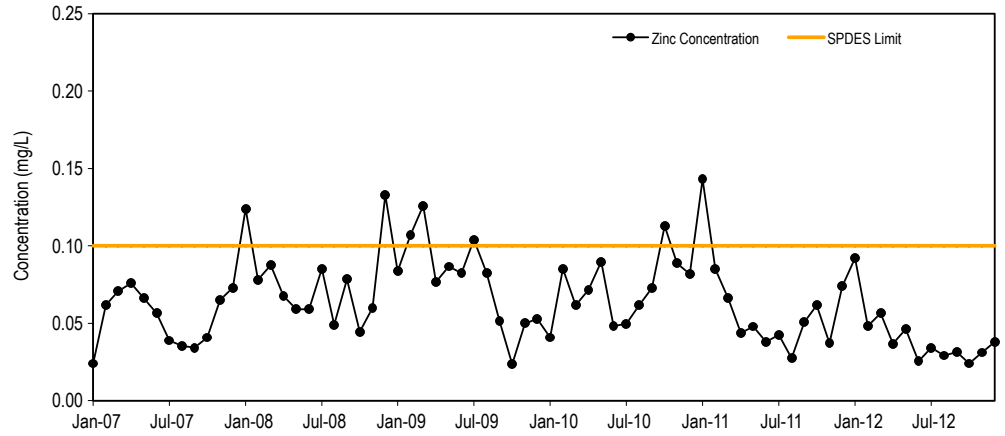


Figure 3-6. Maximum Concentrations of Silver Discharged from the BNL Sewage Treatment Plant, 2007–2012.



Note: Per New York State Department of Environmental Conservation guidance, the concentrations of zinc exhibited in the effluent during January and December 2008, February, March, July 2009, October 2010, and January 2011 were not considered in violation of the State Pollutant Discharge Elimination System effluent limit of 0.1 mg/L, due to rounding off of significant figures.

Figure 3-7. Maximum Concentrations of Zinc Discharged from the BNL Sewage Treatment Plant, 2007–2012.

untreated organisms (i.e., controls). The test results are submitted to NYSDEC for review.

Testing in 2012 showed that there was no toxicity demonstrated in the four tests performed. Reproduction and survival rates were comparable to the control population, indicating that the STP effluent is not toxic to invertebrate organisms. Under the terms of BNL's SPDES permit, testing is required throughout the term of the permit; consequently, testing will continue in 2013.

3.6.2 Recharge Basins and Stormwater

Water discharged to Outfalls 002 through 008 and Outfalls 010 through 012 recharges to groundwater, replenishing the underlying aquifer. Monitoring requirements for each of these discharges vary, depending on the type of wastewater received and the type of cooling water treatment reagents used. Table 3-4 summarizes the monitoring requirements and performance results.

There were five pH excursions and one oil and grease excursion reported for these outfalls during 2012. Samples collected from Outfall 008 (HW) in January, June, August, and December exhibited pH values of 9.1, 9.1, 9.2, and 9.6, respectively, which exceeded the SPDES permit limit of 8.5 SU. For each event, it was determined that the cause of the pH excursions was from construction activities associated with the National Synchrotron Light Source II (NSLS-II), including concrete forming/washout activities and the existence of construction road/parking lot base using recycled concrete aggregate (RCA). During heavy rain events, this outfall receives a significant amount of stormwater from the NSLS-II construction site. The prime contractor was directed to improve housekeeping in this area, which included moving and/or placing tarps over the concrete blocks and other building materials and repairing silt fencing and filter fabric associated with catch basins connected to Outfall 008. These corrective actions, along with completing final grading and seeding and installation of the final layer of asphalt over exposed RCA parking lots and roads, should address the elevated pH associated with these materials/activities.

In September, the pH at Outfall 007 was 9.2 SU, which exceeded the permit limit of 9.0 SU. Investigation into the pH excursion identified that Water Treatment Plant (WTP) operators were performing maintenance of the system and were also in the

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

Analyte		Outfall 002	Outfall 002B	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 008	Outfall 010	SPDES Limit	No. of Exceedances	% Compliance*
Flow (MGD)	N	CR	CR	CR	CR	CR	CR	9	9			
	Min.	0.03	0.00006	0.15	0.06	0.02	0.08	0.01	0.008	NA		
	Max.	0.83	0.06	0.66	0.17	0.15	0.16	1.4	0.72	NA	NA	NA
pH (SU)	Min.	7.1	7.5	6.8	7.0	7.0	6.4	7.6	7.2	NA		
	Max.	8.3	8.3	8.4	8.9	8.8	9.2	9.6	8.5	8.5, 9.0 (a)	5	99
Oil and grease (mg/L)	N	12	11	12	12	12	NR	10	10			
	Min.	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	NR	< 1.1	< 1.1	NA		
	Max.	1.5	2.0	1.8	1.6	59.8	NR	2.2	2.6	15	1	99
Copper (mg/L)	N	NR	NR	4	NR	NR	NR	NR	2			
	Min.	NR	NR	< 0.003 (T)	NR	NR	NR	NR	< 0.001 (D)	NA		
	Max.	NR	NR	0.09	NR	NR	NR	NR	0.005 (D)	1.0	0	100
Aluminum (mg/L)	N	4	NR	NR	NR	NR	NR	2	2			
	Min.	< 0.07 (T)	NR	NR	NR	NR	NR	0.1 (D)	< 0.07 (D)	NA		
	Max	< 0.07	NR	NR	NR	NR	NR	0.4 (D)	0.1 (D)	2.0	0	100

(continued on next page)

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

Analyte		Outfall 002	Outfall 002B	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 008	Outfall 010	SPDES Limit	No. of Exceedances	% Compliance*
Lead, Dissolved (mg/L)	N	NR	NR	NR	NR	NR	NR	NR	2			
	Min.	NR	NR	NR	NR	NR	NR	NR	< 0.0005	NA		
	Max	NR	NR	NR	NR	NR	NR	NR	< 0.0005	0.05	0	100
Vanadium, Dissolved (mg/L)	N	NR	NR	NR	NR	NR	NR	NR	2			
	Min.	NR	NR	NR	NR	NR	NR	NR	0.003	NA		
	Max	NR	NR	NR	NR	NR	NR	NR	0.003	NPL	NA	NA
Chloroform (µg/L)	N	4	NR	NR	NR	NR	NR	NR	NR			
	Min.	< 1	NR	NR	NR	NR	NR	NR	NR	NA		
	Max.	1.8	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.	1.9	NR	NR	NR	NR	NR	NR	NR	50	0	100
1,1,1-trichloroethane (µg/L)	N	4	NR	NR	NR	NR	NR	9	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-dicloroethylene (µg/L)	N	NR	NR	NR	NR	NR	NR	9	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	4	4	4	4	NR	NR	NR			
	Min.	<0.02	<0.05	<0.05	<0.05	<0.05	NR	NR	NR	NA		
	Max.	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	NR	NR	NR	0.5	0	100
Tolyltriazole (mg/L)	N	4	4	4	4	4	NR	NR	NR			
	Min.	<0.005	<0.005	<0.005	<0.005	<0.005	NR	NR	NR	NA		
	Max.	<0.005	<0.005	<0.005	<0.005	<0.005	NR	NR	NR	0.2	0	100

Notes:
See Chapter 5, Figure 5-5, 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
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
(a) pH limit is 8.5 for Outfalls 005, 008, and 010 and pH limit is 9.0 for Outfalls 002, 002B, 006A, 006B, and 007.

process of recalibrating and adjusting the lime system prior to sample collection activities. The maintenance procedure caused a temporary lime overfeed into the iron removal filter beds leading to a pH of 9.2 SU during backwashing. As soon as the high pH was discovered, the lime feed system was shut down allowing water of a lower pH to enter the system. This water was used to flush the WTP and distribution system until water quality was returned to background levels. The lime feed system was readjusted and returned to service following the flushing. A sample was collected the next day and the pH was 7.7 SU, indicating that the corrective actions were successful.

Also in September, the oil and grease result at Outfall 006B (HT-E) was 59.8 mg/L, which exceeded 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 in the area. The discharge to Outfall 006B is currently comprised of mainly stormwater runoff. There are no once-through cooling water systems and only one active cooling tower that discharge 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. The Laboratory has an active spill prevention program that educates employees on what they can do to help reduce both the number of spills that occur and the associated impacts to the environment.

A sample collected from this outfall in October exhibited an oil and grease concentration of 1.5 mg/L, which is 10 times lower than the permit limit of 15 mg/L and typical of what is normally observed at this location.

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 (Chaloupka 2012) is prepared by BNL to comply with these requirements.

3.7.1 Potable Water

The Laboratory maintains five water supply wells for on-site distribution of potable water. As required by NYSDOH regulations, BNL monitors the potable wells regularly for bacteria, inorganics, organics, and pesticides. The Laboratory also voluntarily monitors drinking water supplies for radiological contaminants yearly. Tables 3-5 and 3-6 provide potable water supply monitoring data. In 2012, only iron exceeded New York State Drinking Water Standards (NYS DWS) in samples collected from three of the wells (wells 4, 6, and 7) before distribution. Groundwater from these three wells is treated to reduce naturally occurring iron and the color index of the water. Treatment at BNL's WTP effectively reduces these levels to below NYS DWS limits. To ensure that the Laboratory's water supply continually meets NYS DWS, groundwater is also treated with air stripping to remove volatile organic compounds (VOCs). At the point of consumption, drinking water complied with all NYS DWS during 2012. In addition to the compliance sampling program, all wells are also sampled and analyzed quarterly under the BNL environmental surveillance program. Data collected under this program are consistent with the data reported in Tables 3-5 and 3-6. This additional testing goes beyond the minimum SDWA testing requirements.

To ensure that consumers of on-site drinking water are informed about the quality of Laboratory-produced potable water, BNL annually publishes a Consumer Confidence Report (CCR) by the end of May, a deadline stipulated by the SDWA. This report provides information regarding BNL's source water, supply system, the analytical tests conducted, and the detected contaminants as 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

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

Compound	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Potable Distribution Sample	NYS DWS
Water Quality Indicators							
Ammonia ((mg/L)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	SNS
Chlorides (mg/L)	52	50	48	48	52	52	250
Color (units)	< 5	< 5	< 5	< 5	< 5	15	15
Conductivity (mmhos/cm)	231	210	230	317	349	284	SNS
Cyanide (mg/L)	< 20	< 20	< 20	< 20	< 20	< 20	SNS
MBAS (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	SNS
Nitrates (mg/L)	0.17	0.18	0.35	0.69	0.75	0.31	10
Nitrites (mg/L)	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.002	1
Odor (units)	0	0	0	0	0	0	3
pH (Standard Units)	5.9	5.9	6	6	6	7.1	SNS
Sulfates (mg/L)	12	12	13	12	13	9.17	250
Total coliform	ND	ND	ND	ND	ND	ND	Negative
Metals							
Antimony (mg/L)	< 5	< 5	< 5	< 5	< 5	< 5	6
Arsenic (mg/L)	< 5	< 5	< 5	< 5	< 5	< 5	50
Barium (mg/L)	0.042	0.039	0.027	0.042	0.04	0.034	2
Beryllium (mg/L)	< 1	< 1	< 1	< 1	< 1	< 1	4
Cadmium (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5
Chromium (mg/L)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.1
Fluoride (mg/L)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2.2
Iron (mg/L)	2.2*	4.4*	0.69*	0.02	0.01	0.13	0.3
Lead (mg/L)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	15
Manganese (mg/L)	0.25	0.1	0.03	< 0.01	< 0.01	0.17	0.3
Mercury (mg/L)	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	2
Nickel (mg/L)	< 0.005	0.012	< 0.005	< 0.005	< 0.005	< 0.005	SNS
Selenium (mg/L)	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	50
Sodium (mg/L)	30	26	28	26	32	32	SNS

(continued on next page)

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

Compound	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Potable Distribution Sample	NYS DWS
Silver (mg/L)	< 1	< 1	< 1	< 1	< 1	< 1	100
Thallium (mg/L)	< 2	< 2	< 2	< 2	< 2	< 2	2
Zinc (mg/L)	0.02	0.02	0.02	0.02	< 0.01	0.01	5
Radioactivity							
Gross alpha activity (pCi/L)	< 1.67	< 1.82	< 1.97	1.66	<1.58	NR	15
Gross beta activity (pCi/L)	< 1.98	< 2.22	< 2.29	< 2.28	< 2.44	NR	(a)
Radium-228 (pCi/L)	< 0.54	< 0.74	0.76	< 0.74	< 0.92	NR	5
Strontium-90 (pCi/L)	< 0.76	< 0.76	< 0.46	< 0.77	< 0.73	NR	8
Tritium (pCi/L)	< 230	< 234	< 234	< 228	< 232	NR	20,000
Other							
Alkalinity (mg/L)	20	16	22	38	26	56	SNS
Asbestos (M. fibers/L)	NR	NR	NR	NR	NR	< 0.20	7
Calcium (mg/L)	6.91	6.49	7.05	11	8.42	14	SNS
HAA5 (mg/L)	NR	NR	NR	NR	NR	0.017	0.06**
Residual chlorine - MRDL (mg/L)	NR	NR	NR	NR	NR	1.2	4
TTHM (mg/L)	NR	NR	NR	NR	NR	0.03	0.08**

Notes:
See Figure 7-3 for well locations.
Well 12 was not operational for 2010. No testing was completed during this time.
HAA5 = Five Haloacetic Acids
MBAS = Methylene Blue Active Substances
MRDL = Maximum Residual Disinfectant Level
ND = Not Detected
NR = Analysis Not Required
NS = Not Sampled
NYS DWS = New York State Drinking Water Standard
SNS = Drinking Water Standard Not Specified
TTHM = Total Trihalomethanes
* Water from these wells is treated at the Water Treatment Plant for color and iron reduction prior to site distribution.
** Limit imposed on distribution samples only.
*** A single sample tested positive for coliform. Upon retesting, all samples were negative.
(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.

form or electronically at *http://www.bnl.gov/bnlweb/pubaf/water/reports.htm.*

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

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

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	NYS DWS
	µg/L						
tert-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,4-trimethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
sec-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
4-Isopropyltoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
n-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloroform	2.4	1.3	2.3	9.2	0.8	1.7	50
Bromodichloromethane	2.7	< 0.5	< 0.5	6.2	< 0.5	< 0.5	50
Dibromochloromethane	3	< 0.5	< 0.5	3.3	< 0.5	< 0.5	50
Bromoform	0.7	< 0.5	< 0.5	0.8	< 0.5	< 0.5	50
Methyl tert-butyl ether	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50
Toxaphene	NR	< 1	< 1	< 1	< 1	< 1	3
Total PCB's	NR	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.5
2,4,5,-TP (Silvex)	NR	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	10
Dinoseb	NR	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	50
Dalapon	NR	< 1	< 1	< 1	< 1	< 1	50
Pichloram	NR	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	50
Dicamba	NR	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	50
Pentachlorophenol	NR	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	1
Hexachlorocyclopentadiene	NR	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	5
Bis(2-ethylhexyl)Phthalate	NR	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	50
Bis(2-ethylhexyl)Adipate	NR	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	50
Hexachlorobenzene	NR	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	5
Benzo(A)Pyrene	NR	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	50
Lindane	NR	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.2
Heptachlor	NR	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4
Aldrin	NR	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	5
Heptachlor Epoxide	NR	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.2
Dieldrin	NR	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	5
Endrin	NR	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2
Methoxychlor	NR	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	40
Chlordane	NR	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
2,4,-D	NR	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	50
Alachlor	NR	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2
Simazine	NR	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	50
Atrazine	NR	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	3
Metolachlor	NR	<0.75	<0.75	<0.75	<0.75	<0.75	50
Metribuzin	NR	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	50
Butachlor	NR	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	50
Propachlor	NR	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50

Notes:
See Chapter 7, Figure 7-3, for well locations.
For compliance determination with New York State Department of Health standards, potable water samples were analyzed quarterly for Principal Organic Compounds and annually for other organics by EcoTest Labs Inc., a New York State-certified contractor laboratory.
The minimum detection limits for principal organic compound analytes are 0.5 µg/L. Minimum detection limits for synthetic organic chemicals and micro-extractables are compound-specific, and, in all cases, are less than the New York State Department of Health drinking water standard.
Well 12 was offline and remained unused during 2012.
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

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.

The Laboratory maintains approximately 200 cross-connection control devices, including primary devices installed at interfaces to the potable water main, and secondary control devices at the point of use. In 2012, 129 cross-connection control units were tested, including primary and secondary devices. If a problem with a cross-connection device is encountered during testing, the device is repaired and re-tested to ensure proper function. Copies of the cross-connection device test reports are filed with SCDHS throughout the year.

3.7.3 Underground Injection Control (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.

In 2012, there were 23 Class V injection wells added and 30 former cesspools removed. Fourteen new UIC devices were installed at the NSLS-II site; three near Buildings 326 and 423, and six proposed at the Northeast Solar Energy Research Center site, which is currently under construction. All of the 23 UIC devices will be used solely for the disposal of storm water runoff. The 30 cesspools formerly served cottages used for housing students and visiting researchers; the cottages were demolished and cesspools sampled in late 2011. BNL review of the data in comparison with applicable regulatory action levels revealed that 13 of the 30 cesspools would require some level of remediation due to slightly elevated semi-volatile organic compound concentrations. This data was shared with Suffolk County Department of Health Services (SCDHS) Pollution Control for final determination of necessary remedial action. In early 2012, the cesspools were remediated by removing and properly disposing of the bottom two feet of soil. After remediation was completed, endpoint samples were collected to prove the remediation satisfactory and SCDHS provided approval to backfill all remaining cesspools.

In June 2010, an application was filed with EPA to renew the Class V UIC permit for the site. In August 2012, BNL received a letter from EPA indicating that addition or removal of UICs from the existing inventory would be "authorized by rule," pursuant to 40 CFR §144.24, however, it is still unclear if EPA intends on renewing BNL's Class V UIC permit. In addition to the UICs maintained for routine Laboratory discharges of sanitary waste and storm water, 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 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. BNL remained in full compliance with SPCC requirements in 2012.

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. These reports are submitted to the local emergency planning committee and the state emergency response commission. Community Right-to-Know requirements are codified under 40 CFR Parts 355, 370, and 372. The table on the following page summarizes the applicability of the regulations to BNL. The Laboratory complied with these requirements in 2012 through the submittal of reports under EPCRA Sections 302, 303, 311, and 312 for calendar year 2011. In 2012, through a Tier III report, BNL reported releases of lead (~46,470 pounds), mercury (~256 pounds), polychlorinated biphenyls (PCBs) (~6 pounds), benzo(g,h,i)perylene (<1 pound), and polycyclic aromatic compounds (<1 pound) for calendar year 2011. 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 by-products of the combustion of fuel oils. In 2012, 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 on-site 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 (i.e., 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.

During 2012, there were 42 spills, 15 of which met regulatory agency reporting criteria. The remaining 27 spills were small-volume releases either to containment areas or to other impermeable surfaces that did not exceed a reportable quantity. Table 3-7 summarizes each of the 15 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 two of the reported events were 5 gallons or less in volume. Eight of the releases occurred during Laboratory construction/operational activities, either by leaks from construction equipment (e.g. fork lifts, dump trucks, and street sweepers), vehicles, or from operational equipment. The two larger-volume petroleum-based releases included a 10 gallon spill of hydraulic oil from a failed hydraulic line on a fork lift and a discovery of approximately 55 gallons of hydraulic oil from a failed elevator jack during a code compliance inspection of a freight elevator pit in Building 725. In all cases, the releases were cleaned up to the satisfaction of NYSDEC.

Three of the releases required reporting to DOE through BNL's Occurrence Report Processing System (ORPS), a system for identifying, categorizing, notifying, investigating, analyzing, and reporting to DOE events or

conditions discovered on site. All three releases were associated with loss of refrigerant (Freon-11 and Freon-22) from air conditioning systems. New York State has very stringent release reporting requirements for certain chemicals. The reporting threshold for Freon-11 is one pound to the soil and for Freon-22, one pound to the air. Any release reported to an outside regulatory agency is reportable to DOE through ORPS unless specifically exempted (e.g., small volume releases of oil and ethylene glycol are exempt from ORPS reporting). In August 2012, BNL submitted a letter to NYSDEC requesting that refrigerant leaks of Freon 22 and Freon 113 to atmosphere from air conditioning and refrigeration units would not have to be reported in accordance with 6NYCRR Part 595 as long as the release was due to routine refrigeration equipment leaks discovered during preventative maintenance inspections or service calls. A summary of these types of releases would be included in the annual update to BNL's Spill Prevention Report submitted pursuant to 6 NYCRR 598.1(k) and annual Emission Statements submitted pursuant to BNL's Title V Facility Permit. NYSDEC approval of this request would exempt reporting of these types of release to DOE through BNL's ORPS. NYSDEC approval was still pending at the end of 2012.

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 or local 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. In April 2010, due to a directive from NYSDEC asserting their sole jurisdiction over petroleum storage at Major Oil Storage Facilities (MOSF), BNL had to update its MPF license to include an additional 54 petroleum storage facilities ranging from 100 to 10,000 gallons that were previously regulated by SCDHS under Suffolk County Sanitary Code Article 12. These storage facilities 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).

In March 2012, BNL received its renewed MPF license, which expires on March 3, 2017 and included a total of 63 petroleum storage facilities. During 2012, 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 2012, 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 February 14 and 15, 2012, NYSDEC conducted its annual inspection of all storage facilities included on the MPF license. Three conditions that required corrective action were

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 [ ]

Table 3-7. Summary of Chemical and Oil Spill Reports.

Spill No. and Date	Material and Quantity	ORPS Report	Source/Cause and Corrective Actions
12-02 1/10/12	HCFC-22 3 pounds	Yes	While replacing a refrigerant line on a split air conditioner unit servicing Building 1005, workers accidentally dislodged an active refrigerant line soldered to the line being replaced, causing the entire charge of HCFC-22 to be released into the building's alcove.
12-04 1/24/12	Lubricating oil & HCFC-22 60 pounds	Yes	While servicing a package A/C unit, the pressurized line failed causing the entire refrigerant charge of 60 pounds of HCFC-22 to be released to the air and lubricating oil to be discharged to adjacent soil. Contaminated soil and sorbent pads were containerized in a bucket for off-site disposal.
12-07 3/8/12	Hydraulic Fluid 0.5 gallons	No	While moving shielding block outside Building 933, a forklift leaked gear oil to soil. Impacted soil and recycled concrete aggregate was recovered and placed into two 55 gallon drums for off-site disposal.
12-08 3/21/12	CFC-11 100-200 pounds	Yes	During an inspection of the mechanical equipment room in Building 725, a pool of CFC-11 was discovered on the floor. The refrigerant had leaked from the corroded underside of a refrigerant vessel of a centrifugal chiller. Pooled refrigerant was captured using adsorbent pads and booms. The manway to the equipment room was opened to permit vapors to exit. Since the outside ambient temperature was less than the 74.7 ºF boiling point of CFC-11, there was some concern that vapors may have condensed below the manway and migrated to nearby soil. A soil sample was collected and results revealed that CFC-11 was less than method detection limits. Sorbent pads were containerized in a bucket for off-site disposal.
12-10 4/11/12	Gear Oil 12 quarts	No	Approximately 12 quarts of gear oil leaked from the rear differentials of a brush truck destroyed in an April 9 fire when BNL's Fire Department pulled the vehicle along a dirt path approximately 1.25 miles east from the point where the brush truck had been consumed by the fire. Contaminated soil recovered from the trail of oil left behind was shoveled into two 55-gallon drums for off-site disposal.
12-11 4/26/12	Mineral oil 1 quart HCFC-22 24 pounds	No	A compressor failure caused by an electrical short caused mineral oil from a package A/C unit to leak onto the pavement in front of Building 922. Absorbent material was used to pick up the mineral oil, which was swept up and containerized for off-site disposal. Approximately 24 pounds of HCFC-22 was released to the atmosphere.
12-12 4/19/12	Lubricating oil 3-4 ounces HCFC-22 20 pounds	No	A hairline fracture on a pressurized condenser line of a package air condition unit east of Building 1012 caused 3-4 ounces of lubricating oil to spray on the interior of the housing unit and left spots on the exterior of the fan housing. The leak was from a 1/4 inch hairline stress fracture in a high-pressure copper condenser line fitting thought to have been due to repeated vibrational loading. Twenty pounds of HCFC-22 was released to atmosphere. Adsorbent pads from cleanup of mineral oil from the interior and exterior of the equipment housing were placed in 5-gallon bucket for off-site disposal.
12-15 6/21/12	Hydraulic Fluid 10 gallons	No	While traveling northeast on Yale Road, a hydraulic line on a fork lift failed causing hydraulic fluid to leak to the road bed. Pans were placed under the vehicle to collect dripping fluid and Green Stuff® adsorbent was used to clean the roadway. Impacted soil adjacent to the road and adsorbent was recovered to two 55-gallon drums for off-site disposal. Ten gallons of hydraulic fluid recovered from the fork lift was placed into a separate drum.
12-16 6/21/12	Transmission Fluid <1 gallon	No	After a Laboratory vehicle accidentally hit the railing of a wheelchair ramp in front of Building 317, transmission fluid leaked onto the underlying pavement with a small amount impacting adjacent soil. Absorbent material used to clean the fluid and contaminated soil was placed in a 55-gallon drum for off-site disposal.
12-20 7/25/12	Hydraulic Fluid 4 gallons	No	Approximately four gallons of hydraulic fluid leaked to the ground from a failed hydraulic line as a dump truck was unloading concrete at the Borrow Pit. Contaminated soil and recycled concrete aggregate was excavated and staged within a dump trailer that was later transferred to four 55-gallon drums for off-site disposal.
12-21 8/1/12	Hydraulic Fluid 1 gallon	No	While transferring soil to the Laboratory's transfer station, hydraulic fluid leaked from the housing of a vacuum pump onto the platform of a Vacmaster 4000 road sweeper and to soil beneath the vehicle. A plastic tarp placed beneath the vehicle contained the leaking fluid. Contaminated soil was transferred to two 5-gallon pails and taken to a waste accumulation area for off-site disposal.
12-26 8/24/12	Hydraulic Fluid 0.5 gallon	No	Hydraulic fluid leaked onto the road and to adjacent soil from dump trailer hydraulic hose as it traveled on First Street north of Brookhaven Avenue. Adsorbent pads used to clean fluid from the pavement and contaminated soil was placed into two 55-gallon drums and taken to a waste accumulation area in Building 452 where is was subsequently bulked for off-site disposal.

(continued on next page)

Table 3-7. Summary of Chemical and Oil Spill Reports *(concluded).*

Spill No. and Date	Material and Quantity	ORPS Report	Source/Cause and Corrective Actions
12-38 11/30/12	Hydraulic Fluid 55 gallons	No	During a code compliance inspection of the Building 725 freight elevator pit ladder, a water/oil mixture was observed in the annular space around the elevator jack. A mixture of oil and murky water was pumped from the annular space into three 55-gallon drums. An oil absorbent pad was pushed down into the casing and wrapped around the exterior surface of the jack to capture residual oil that drained down the outer surface of the jack. A drift test of the elevator was conducted to determine whether oil was still actively leaking from the jack. After replacing packing around the jack and a jack wiper, a sight glass lowered into the elevator pit was used to confirm that residual oil present in the water column below the elevator casing was minimal.
12-40 12/14/12	Hydraulic Fluid 0.5 gallons	No	During a post-hurricane cleanup of debris and vegetation behind Berkner Hall, a hydraulic hose to the lifting bucket began leaking. A containment tray was placed beneath the leaking hose and the backhoe was transported to the Heavy Equipment Shop for repairs. Recovered soil was transferred to a 55-gallon drum for off-site disposal.
12-41 12/18/12	Compressor Oil 2 gallons	No	When power was restored after a power dip tripped off a compressor on the cryogenic helium tank located north of Building 912, a pressure relief valve to the tank opened releasing helium and a fine mist of compressor oil. Compressor oil settled on the side of the cryogenic pumping facility building, the side of the helium tank, and to the soil between the helium tank and the building. Contaminated soil was recovered and placed into two 55-gallon drums. Absorbent rags used to wipe clean oil from the exterior of the tank and building were deposited into another 55-gallon drum. To prevent the 250 psig relief valve from lifting, a new 240 psig pressure switch was tested and installed on the compressor skid that will cause the compressor to automatically shutdown as discharge pressure rises above 240 psig.

identified: the audible segment of the high-level alarm for one of the satellite fuel oil storage tanks failed to operate; the need to take level readings from the Automatic Tank Gauge for BNL's underground storage tanks before and after each delivery and compare the delivery tickets to ensure accuracy; and the identification of a minor piping leak under the regular gasoline pump at the on-site service station. All conditions were corrected in 2012 in accordance with NYSDEC directives.

3.8.5 Chemical Bulk Storage

Title 6 of the Official Compilation of the Codes, Rules, and Regulations of the State of New York (NYCRR) Part 597 requires that all aboveground tanks larger than 185 gallons and all underground tanks that store specific chemicals be registered with NYSDEC. The Laboratory holds a Hazardous Substance Bulk Storage Registration Certificate for six tanks that store treatment chemicals for potable water (sodium hydroxide and sodium hypochlorite). The tanks range in capacity from 200 to 1,000 gallons. In August 2012, BNL received a renewed Hazardous Substance Bulk Storage Registration Certificate that recognized a like-in-kind sodium hydroxide tank replacement/installation that was completed in Well House #11, which expires in July 2013.

NYSDEC conducted an inspection of the Chemical Bulk Storage facilities in February 2012 that identified two conditions that required corrective actions: stress cracks were noted in the transfer station containment floors for Tanks 634-02 and 635-04 that require repairs to ensure their ability to contain a release, and the common atmospheric vent for the tanks inside Building 624 was not terminated in secondary containment. Both of these conditions were evaluated and corrected in 2012 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 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 118 active storage facilities that are not regulated by NYSDEC and 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. The Laboratory 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 1 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 2010, BNL began proceedings to "close" the mixed hazardous/radioactive waste permitted storage facility, Building 870. The closure process included collecting subsurface soil samples from several locations within and outside the building to look for evidence of hazardous waste releases, and the preparation of a closure report. The building is no longer needed for waste storage and has been changed to a general storage building.

In July 2012, NYSDEC approved the closure of Building 870 enabling BNL to begin preparing a minor modification to its RCRA Permit to have all references to the building removed. The proposed minor modification package was submitted to NYSDEC in October 2012 for review, and the modification was approved by NYSDEC in December 2012.

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 2012.

The Laboratory has aggressively approached reductions in its PCB inventory, reducing it by more than 99 percent since 1993. The only known regulated PCB-contaminated piece of electrical equipment remaining on site is a one-of-a-kind klystron located in BNL's Chemistry Department.

3.11 PESTICIDES

The storage and application of pesticides (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. The Laboratory was in full compliance with the legislated requirements in 2012.

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 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 will allow for the eventual discharge of the tertiary treated wastewater directly to groundwater.

A 2011 permit for the installation of fencing and air conditioning platforms at the RHIC facility continues to remain open, pending completion of work.

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

In 2012, the Laboratory updated its list of endangered, threatened, and species of special concern (see Table 6-1 in Chapter 6). There are no federally recognized endangered species on the BNL site. 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), Swamp darter (T), Banded Sunfish (T), frosted elfin (T), little bluet (T), scarlet bluet (T), pine barrens bluet (T), northern harrier (T), stargrass (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 Laboratory updated its BNL Natural Resource Management Plan (NRMP) in October 2011. One component of the plan 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.

The 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. BNL is currently working with NYSDEC in developing a recovery plan for the frosted elfin.

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. In June 2005, the pine-barrens bluet, a threatened species, was 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, 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. In addition to the bird species mentioned above, 18 other bird species listed as species of special concern and two federally threatened species have been observed during spring and fall migrations.

The Laboratory has 28 plant species that are protected under state law: three 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 bald-rush. The other 18 species are considered to be "exploitably vulnerable," meaning that they may become threatened or endangered if factors that result in population declines continue. These plants are currently sheltered due to the large areas of undeveloped pine-barren habitat on site. 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. 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 construction and the conflict must be resolved. 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 of the Laboratory. Bald eagles are known to spend long periods of time on the north and south shores of Long Island. In general, the Laboratory has no concerns with eagles and has no specific management needs concerning them.

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 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 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) (July 16, 2012) and are consistent with the pre-approved authorized release limits set by DOE Order 458.1.

In 2012, excess materials such as scrap metal (228 tons) and electronics equipment (40 tons) were released to interested parties or to an offsite 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 2012.

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 2012, BNL was inspected by federal, state, or local regulators on 10 occasions. These inspections included:

- *Air Compliance*. NYSDEC did not perform a formal inspection of the Laboratory's air compliance program in 2012; however, NYSDEC was present during a portion of the annual relative accuracy test audit of the continuous emissions monitoring system at the CSF; there were no issues identified during this inspection.
- *Potable Water*. In July, SCDHS collected samples and conducted its annual inspection of the BNL potable water system. Identified deficiencies 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. In 2012, no performance or operational issues were identified. NYSDEC performed an annual surveillance inspection in February; there were no issues identified.
- *Recharge Basins*. SCDHS inspected several on-site SPDES-regulated outfalls in 2012; there were no issues identified.
- *Major Petroleum Facility*. The annual NYSDEC inspection of the MPF was performed in February 2012. 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 February 2012. See Section 3.8.5 for a discussion of the issues identified.
- *RCRA*. NYSDEC and EPA did not conduct any RCRA inspections in 2012.

3.15.2 DOE Assessments/Inspections

The DOE Brookhaven Site Office (BHSO) conducts environmentally-related assessments each year, some of which are supported by the DOE Chicago Office. In May 2012, BHSO conducted a Readiness Assessment for Transition of the BGRR and HFBR Long-Term Surveillance and Maintenance (S&M) Program. The purpose of the assessment was to review Brookhaven Science Associates (BSA) progress in implementing the BGRR and HFBR Long-Term S&M Transition Plan and to identify any issues or impediments to successfully transferring long-term stewardship responsibilities for the BGRR, HFBR, and completed Environmental Management Legacy Scope from the Laboratory's Environmental Restoration Projects to other organizations within BNL. The assessment consisted of verification of the completion of the required actions and development of an open action list, which will be monitored and tracked to completion through the Laboratory's assessment tracking system (ATS).

In July 2012, BHSO performed a surveillance audit of BNL's Response to the Building 705 Stack Drain Tank High-Level Alarm during a severe rainstorm on July 28, 2012. Rainwater that touches the interior surfaces of the stack becomes radioactively contaminated. This water is collected via a stack drain collection system and flows into a double-walled, underground storage tank. During the storm, the tank was overfilled and set off an alarm indicating that water entered the overfill containment sump and ultimately the interstitial space between the primary and secondary containment of the tank. Although there was no release of contaminated water to the environment as a result of this overfilling event, BHSO concluded that the alarm response was inadequate and recommended that BNL evaluate the event and consider potential vulnerabilities across the site where alarm response and notification procedures may be less than adequate. Following the assessment, the Laboratory identified several corrective actions to address the findings and tracked them to completion using BNL's ATS.

In June 2012, BHSO performed a surveillance audit of the Laboratory's SPDES Discharge Monitoring Report Preparation. The intent of the audit was to review BNL's process to track permit requirements, to ensure the correct wastewater samples are collected for analysis, the laboratory's contract for laboratory analyses, conduct quality assurance reviews of sample results, and to transpose results for reporting to NYSDEC. No findings were identified.

In November 2012, BHSO, with assistance from the Chicago Integrated Support Center, conducted an assessment of BNL's Packaging and Transportation Program, in accordance with DOE Order 460.2A, Departmental Materials Transportation and Packaging Management. DOE concluded that, overall, transportation operations at the Laboratory are performed as required and that BNL has been implementing improvements. However, DOE also concluded that the Laboratory needs to continue to focus on the implementation of additional corrective actions that were developed during previous self-assessments. BNL agreed to include any additional corrective actions resulting from this assessment into an existing corrective action plan that resulted from a previous assessment of on-site movements of hazardous and radioactive materials. Corrective actions will be tracked to completion through the Laboratory's ATS.

3.15.2.1 Environmental Multi-Topic Assessment

In 2012, 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 self-assessment focused on requirements related to liquid effluents, radiological and non-radiological air emissions, and storage and transfer of hazardous and nonhazardous materials. 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 subject areas identified two Noteworthy Practices, four Minor Non-Conformities, 10 Observations, and 15 Opportunities for Improvement. To prevent future occurrences of the findings from the assessment, a causal analysis was performed, followed by the development of a corrective action plan for the minor non-conformances. All corrective actions are being tracked to completion in BNL's ATS.

3.15.2.2 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 did not perform any inspection at BNL in 2012.

3.16 ENFORCEMENT ACTIONS AND AGREEMENTS

In addition to the rules and regulations discussed throughout this chapter, there were two existing agreements between BNL, DOE, and regulatory agencies that remained in effect and three Notices of Violation/Non-Compliance that were accessed in 2012. Table 3-8 lists the existing agreements with regulatory agencies that oversee Laboratory operations and provides more detail on the formal NOVs or enforcement actions that occurred throughout the year.

The NOVs associated with waste shipments to EnergySolutions were also reported to DOE through the BNL ORPS. Four other incidents occurred in 2012 that required reporting through ORPS. The incidents are summarized in Table 3-9. Causal analyses were performed for all incidents and corrective actions were taken to prevent recurrence of the issues.

Table 3-8. Existing Agreements and Enforcement Actions Issued to BNL, with Status.

Number	Title	Parties	Effective Date	Status
Agreements				
No Number	Suffolk County Agreement	SCDHS, DOE, and BNL	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 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 120 (also known as the Interagency Agreement or "IAG" of the Environmental Restoration Program)	EPA, DOE, and NYSDEC	05/26/92	Provides the framework, including schedules, for assessing the extent of contamination and conducting the BNL cleanup. 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). While all clean-up actions were completed in 2005, BNL continues to perform surveillance and maintenance of operating remediation systems and remediation of the BGRR and HFBR. All systems operated as required in 2012.
Notices of Violation/Enforcement Actions				
None	Notice of Violation	State of Utah and BNL	06/7/2012	On May 17, 2012, BNL received a Condition Report notification from EnergySolutions stating that two intermodals shipped from BNL were found to have free liquids in them, which were noncompliant with the EnergySolutions Waste Acceptance Criteria (WAC). Both waste shipments were from the Brookhaven Graphite Research Reactor (BGRR) Restoration Project and the cause was most probably rain infiltration into the containers during storage/transport. During the investigation of this occurrence, BNL received a Notice of Violation (NOV) issued by the Director of the Utah Division of Radiation Control, dated June 7, 2012, which assessed 475 points against BNL's Utah Generator Site Access Permit, but had no monetary fines associated with it. BNL assembled a team to perform fact finding, causal analysis, and determine corrective/preventative actions, which were all completed by June 14, 2012.
None	Notice of Non-Compliance	EPA and BNL	07/23/2012	On July 23, 2012, BNL received a notice of non-compliance of Subpart H, 40 CFR 61, National Emissions Standards for Hazardous Air Pollutants – radionuclides (radNESHAP) as a result of some findings from an inspection visit on July 12, 2012. In reviewing the Annual NESHAPs Report with Laboratory staff, the EPA inspector identified that BNL was reporting calculated dose to a hypothetical Maximally Exposed Individual (MEI) at the fence line and not a Maximally Exposed Off-Site Individual (MEOSI) at an actual point where there is a residence, school, business, or office, as required in Subpart H. In addition, the inspector noted that the wind rose data illustrated in BNL's Site Environmental Report and the wind file used in the CAP-88 calculations were inconsistent, which lead to incorrect identification of the MEOSI. BNL submitted a revised Annual Report on August 30, 2012, which addressed the two non-compliance findings, and on December 3, 2012, EPA concluded that BNL was in compliance with Subpart H.
None	Notice of Violation	State of Utah and BNL	08/17/2012	On August 17, 2012, BNL received a letter from the State of Utah's Division of Radiation Control citing a NOV for a non-compliant shipment that arrived at Energy Solutions of Utah. On July 23, 2012 a radioactive waste shipment consisting of magnets from CAD was sent via truck to Energy Solutions in Utah for disposal. The magnets were packaged in six IP-1 certified woven polyfiber packages called supersacks, and secured to the transport vehicle with chains. When the shipment arrived at Energy Solutions on July 30, 2012, a State of Utah inspector observed that some of the packages had tears in them. The packages were inspected prior to leaving BNL and did not have tears at that time. It is believed that the tears occurred during transportation from chafing between the padding placed between the super sacks and the chains. The packages did not lose any of their contents. As stated in the NOV, the damaged packages are a violation of 49 CFR 173.410(f). As such, the State of Utah assessed a penalty of 125 points against BNL's Utah Generator Site Access Permit, but had no fines associated with it. A causal analysis was performed and corrective actions were identified and completed to prevent recurrence of this violation.

Notes:
EPA = Environmental Protection Agency
NYSDEC = New York State Department of Environmental Conservation
ORPS = Occurrence Reporting and Processing System
SCDHS = Suffolk County Department of Health Services

Table 3-9. Summary of Other Environmental Occurrence Reports.

ORPS* ID: EM-BHSO-BNL-BNL-2012-0017	Date: 05/22/12
On May 17, 2012, BNL received a Condition Report notification from EnergySolutions stating that two intermodals shipped from BNL were found to have free liquids in them, which were noncompliant with the EnergySolutions Waste Acceptance Criteria (WAC). See Table 3-8 for more detailed information.	**Status:** Closed. Corrective actions identified and completed.
ORPS* ID: SC-BHSO-BNL-BNL-2012-0001	**Date: 01/12/12**
On January 10, 2012, while replacing a refrigerant line to an air conditioning (A/C) unit 1, located in the Building 1005B Alcove, the A/C Mechanics removed line set 1 when line set 2 (active line) unexpectedly ruptured causing an unplanned release of approximately 3 pounds of gaseous Freon 22® (R-22) into the atmosphere. The R-22 leak set off a nearby smoke detector which alarmed to the fire detection system. The Environmental Protection Division (EPD) was notified of the event by an Environmental, Safety, and Health Representative. An EPD Designee reported the incident to New York State Department of Environmental Conservation immediately as a non-routine release of regulated compounds, as is required by the State. The damaged line set was repaired by A/C Mechanics.	**Status:** Closed. Repairs completed and spill report submitted.
ORPS* ID: SC-BHSO-BNL-AGS-2012-0001	**Date: 01/24/12**
On January 24, 2012, Air Conditioning (A/C) technicians from BNL's Facility and Operations Directorate noticed an apparent leak from the compressor of the Building 1004A A/C unit, which is located outside the building on a concrete mat. The A/C technicians opened the unit covers and found that about 60 pounds of Freon 22 (R-22) refrigerant had leaked to the atmosphere from one of the two compressor units and about a quart of mineral oil, mixed in with the R-22 as a lubricant, had leaked to the surrounding soil at the concrete mat. The Environmental Protection Division reported the incident to Suffolk County, New York State Department of Environmental Conservation, and DOE as a non-routine release of regulated compounds, as is required. Spill to soil and concrete mat was cleaned up and repairs to the compressor were made.	**Status:** Closed. Repairs completed and spill report closed out.
ORPS* ID: SC-BHSO-BNL-BNL-2012-0008	**Date: 03/23/12**
On March 21, 2012, a Freon® (R-11) leak was discovered in Mechanical Equipment Room #2 within the National Synchrotron Light Source, Building 725. The Freon product was leaking from HVAC Trane Chiller unit number 2. The leak was discovered during a routine walk-through inspection of the area. It is believed that approximately 100 to 200 pounds of material was spilled. Upon discovery of the leak, the area was well ventilated through opening of two large louvers that open to the building exterior and adsorbent was placed around the spill to contain the liquid. It is believed that wear and rusting of connections resulted in containment failure and leakage of the R-11. The Environmental Protection Division reported the incident to Suffolk County, New York State Department of Environmental Conservation, and DOE as a non-routine release of regulated compounds, as is required. Soil samples outside the building and adjacent to the R-11 vapor exit point were taken and analyzed for R-11 content. No R-11 contamination was detected.	**Status:** Closed. Repairs completed and spill report closed out.
ORPS* ID: SC-BHSO-BNL-BNL-2012-0012	**Date: 04/10/12**
On April 9, 2012, BNL declared an Operational Emergency (OE) due to a brush fire near Building 1002 on the northern portion of the site at the Relativistic Heavy Ion Collider (RHIC) complex. The BNL Emergency Operations Center was activated, the Sewage Treatment Plant was evacuated as a precaution, and neighboring fire departments provided mutual aid assistance. The fire affected 300 acres and was brought under control. There was no damage to buildings on site. On April 10, 2012, it was discovered that a Manorville brush truck was destroyed the previous day by the fire while the truck was on BNL property (Northeast corner of BNL), which resulted in a release of petroleum to the soil. Environmental Protection Division personnel reported the incident to regulatory agencies and were involved in the preparation and implementation of the Recovery Management Plan.	**Status:** Closed. No corrective actions directly initiated by this one event, however, the Recovery Management Plan continues to be implemented.
ORPS* ID: SC-BHSO-BNL-BNL-2012-0025	**Date: 08/20/12**
On August 17, 2012, BNL received a letter from the State of Utah's Division of Radiation Control citing a Notice of Violation (NOV) resulting from the arrival of a Low Level Radioactive waste shipment in torn containers at EnergySolutions of Utah. See Table 3-8 for more detailed information.	Closed. Corrective actions identified and completed.

Notes:
* Reportable under the Occurrence Reporting and Processing System (ORPS), established by the requirements of DOE Order 231.1A.
ATS = Assessment Tracking System

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