

## Compliance Status

# 3

*Brookhaven National Laboratory is subject to more than 100 sets of federal, state, and local environmental regulations; numerous site-specific permits; 15 equivalency permits for operation of 13 groundwater remediation systems; and several other binding agreements. In 2011, 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 with fines, one in July and the second in August, totaling \$10,000, from the State of Utah for shipments of waste received at EnergySolutions that did not comply with the site's Waste Acceptance Criteria. In July, a small piece of lead that was used as shielding was found in a high integrity container that was previously used for transporting radioactive materials. Lead was not listed or approved under the waste profile for this shipment. In August, the concentration of radionuclides contained in a bin of dust removed from BNL's Brookhaven Graphite Research Reactor during demolition exceeded EnergySolutions Waste Acceptance Criteria and was, therefore, a violation of the EnergySolutions license.*

*Emissions of nitrogen oxides, carbon monoxide, and sulfur dioxide from the Central Steam Facility were all within permit limits. There were no unexpected opacity excursions noted during the year for either Boiler 6 or Boiler 7; opacity excursions 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 will be transferred to the Department of Defense Ozone Depleting Substances Reserve in 2012.*

*Monitoring of BNL's potable water system showed that all drinking water requirements were met. During 2011, most of the liquid effluents discharged to surface water and groundwater met applicable New York State Pollutant Discharge Elimination System permit requirements. Six minor excursions above permit limits were reported for the year; three occurred at the Sewage Treatment Plant (two for iron and one for total nitrogen load) and three pH excursions were recorded for discharges to recharge basins (one at Outfall 005 and two at Outfall 008). 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 2011. There were 18 reportable spills of petroleum products, antifreeze, or chemicals. While the total number of spills increased by three from 2010, the severity of releases were minor, and all releases were cleaned up to the satisfaction of NYSDEC.*

*BNL participated in 10 environmental inspections or reviews by external regulatory agencies in 2011. These inspections included Sewage Treatment Plant operations, waste water discharges to other regulated outfalls and recharge basins, hazardous waste management facilities, and the potable water system. Inspection of the Laboratory's petroleum storage facilities and chemical bulk storage areas was not performed by NYSDEC in calendar year 2011. 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 the Waste Management Facility
- Registration certificate from NYSDEC for tanks storing bulk quantities of hazardous substances

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

Regulator: Requirement	Regulatory Program Description	Compliance Status	Report Sections
EPA: 40 CFR 300 40 CFR 302 40 CFR 355 40 CFR 370	The Comprehensive Environmental Response, Compensation & Liability Act (CERCLA) provides the regulatory framework for remediation of releases of hazardous substances and remediation (including decontamination and decommissioning [D&D]) of inactive hazardous waste disposal sites. Regulators include EPA, DOE, and the New York State Department of Environmental Conservation (NYSDEC).	In 1989, 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 soil and water restoration portion of the cleanup project and entered the surveillance and maintenance mode. In 2011 the HFBR was transitioned to the long term surveillance and maintenance program managed by the Environmental Protection Division. Significant progress was made on the demolition of the BGRR in 2011, including completion of the graphite pile removal and significant progress on demolition of the bioshield. The BGRR is expected to transition to long term surveillance and maintenance by the end of 2012.	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 properties eligible for listing in the National Register of Historic Places, commonly known as the National Register. Such properties can be archeological sites or historic structures, documents, records, or objects. NHPA is administered by state historic preservation offices (SHPOs; in New York State, NYSHPO).  At BNL, structures that may be subject to NHPA include the 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 process and evaluated to determine 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: Requirement	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 six excursions, these discharges met the SPDES permit limits in 2011.	3.6
EPA: 40 CFR 141–149 NYSDOH: 10 NYCRR 5	The Safe Drinking Water Act (SDWA) and New York State Department of Health (NYSDOH) standards for public water supplies establish minimum drinking water standards and monitoring requirements. SDWA requirements are enforced by the Suffolk County Department of Health Services (SCDHS).	BNL maintains a sitewide public water supply. This water supply met all primary drinking water standards, 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 quantities, the Laboratory is subject to these requirements. BNL fully complied with all reporting and emergency planning requirements in 2011.	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 Safety Codes (SCSC) are more stringent than federal and state regulations.	The regulations require that these materials be managed in facilities equipped with secondary containment, overfill protection, and leak detection. BNL complies with all federal and state requirements and 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 <sup>(9)</sup> 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 floodplain/wetland review requirements. The New York State Fresh Water Wetlands and Wild, Scenic, and Recreational Rivers rules govern development in the state's natural waterways. Development or projects within a half-mile of regulated waters must have NYSDEC permits.	BNL is in the Peconic River watershed and has several jurisdictional wetlands; consequently, development of locations in the north and east of the site requires NYSDEC permits and review for compliance under DOE wetland/floodplain regulations. In 2011, 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 species, or cause adverse modification to a critical habitat.	BNL is host to numerous species of flora and fauna. Many species have been categorized by 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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## CHAPTER 3: COMPLIANCE STATUS

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

Regulator: Requirement	Regulatory Program Description	Compliance Status	Report Sections
U.S. Fish & Wildlife Service:  Migratory Bird Treaty Act 16 USC 703-712  The Bald and Golden Eagle Protection Act 16 USC 668 a-d	The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful. Birds protected under the act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and others, and includes their body parts (feathers, plumes etc), nests, and eggs.  The Bald and Golden Eagle Protection Act (BGEPA) prohibits any form of possession or taking of both bald and golden eagles.	Compliance with the MBTA and the BGEPA are documented through the BNL Natural Resource Management Plan. The plan includes provisions for enhancing local habitat through the control of invasive species, planting of native grasses as food sources, and construction of nesting sites. All construction activities, including demolition, are reviewed to ensure 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 adversely affect the health and safety of the public, workers, the environment, the intended purpose of DOE facilities, or the credibility of the Department. Included in the order are the requirements for the Occurrence Reporting and Processing of Operations Program (ORPS).	BNL prepares an annual Site Environmental Report and provides data for DOE to prepare annual NEPA summaries and other Safety, Fire Protection, and Occupational Health and Safety Administration (OSHA) reports. The Laboratory developed the ORPS Subject Area for staff and management who perform specific duties related to discovery, response, notification, investigation, and reporting of occurrences to BNL and DOE management. The ORPS Subject Area is supported by: Occurrence Reporting Program Description, Critiques Subject Area, Occurrence Categorizer's Procedure, and the ORPS Office Procedure.	All chapters
DOE: Order 414.1 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 environmental 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 timeframe requirements for staging and storing both routine and non-routine radioactive wastes.	The BNL Waste Certification Program Plan (WCPP) in the RWMB Program Description defines the radioactive waste management program's structure, logic, and methodology for waste certification. New or modified operations or activities that do not fall within the scope of the RWMB Program Description must be documented and approved before implementation. The Laboratory's RWMB Program Description describes the BNL policies, procedures, plans, and controls demonstrating that 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: Requirement	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 2011, a surveillance audit was conducted that found the BNL EMS to be robust.	Chapter 2
DOE: Order 458.1, Change 2	In February 2011, DOE released DOE Order 458.1, <i>Radiation Protection of the Public and Environment</i> , which replaced former Order 5400.5. The order establishes requirements to protect the public and the environment against undue risk from radiation associated with radiological activities conducted under the control of DOE pursuant to the Atomic Energy Act of 1954, as amended. The Order requires the preparation of an Environmental Radiation Protection Plan which outlines the means by which facilities monitor their impacts on the public and environment. Full compliance with the Order is required by August 2012.	Under former Order 5400.5, BNL maintained a robust environmental monitoring program to ensure its effluents and emissions did not impose undue risk to the public or environment. The Site Environmental Report is the vehicle by which we provide the monitoring information collected under this program. BNL is preparing an ERPP to document the implementation of the environmental monitoring requirements stipulated in the new order.	Chapters 4, 5, 6 & 8

## Notes:

CFR = Code of Federal Regulation

NYCRR = New York Codes, Rules, and Regulations

SCSC = Suffolk County Sanitary Code

- Seven radiological emission authorizations issued by the United States Environmental Protection Agency (EPA) under the National Emission Standards for Hazardous Air Pollutants (NESHAPs)
- Air emissions permit, issued by NYSDEC under Title V of the Clean Air Act (CAA) Amendments authorizing the operation of 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
- Fifteen equivalency permits for the operation of 13 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 waste water treatment facility 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 wastewater treatment facility to the Peconic River. Studies were completed to assess the sources of these metals and to evaluate the feasibility of achieving new discharge limits. A decision was made to divert the discharge of the sewage treatment plant away from the river and recharge the treated water to groundwater. Preliminary designs were completed in 2011 and submitted to NYSDEC and the Suffolk County Department of Health Services (SCDHS) for review. The modified treatment process is scheduled to be complete by September 2014, and a modified SPDES permit application to reflect this change will be prepared in 2012.

## CHAPTER 3: COMPLIANCE STATUS

**Table 3-2. BNL Environmental Permits.**

Issuing Agency	Bldg. or Facility	Process/Permit Description	Permit ID No.	Expiration or Completion	Emission Unit ID	Source ID
EPA - NESHAPs	510	Calorimeter Enclosure	BNL-689-01	None	NA	NA
EPA - NESHAPs	705	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	11-Feb-11	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	09-Mar-13	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	04-May-11	NA	NA
NYSDEC - SPDES Equivalency	598	Tritium Remediation System	1-52-009	04-May-11	NA	NA
NYSDEC - SPDES Equivalency	670	Sr-90 Treatment System	None	25-Feb-13	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	01-Aug-09	NA	NA
NYSDEC - SPDES Equivalency	855	Sr-90 Treatment System - BGRR/WCF	None	01-Jan-10	NA	NA
NYSDEC - SPDES Equivalency	TR 867	T-96 Remediation System	1-52-009	09-Mar-13	NA	NA
NYSDEC - Hazardous Substance	BNL	Bulk Storage Registration Certificate	1-000263	27-Jul-11	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
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

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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	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-12	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	Installation of Fiber Optic Cable	1-4722-00032/00142	17-Nov-13	NA	NA
NYSDEC - Water Quality	Site	Construction of Fences and Platforms at RHIC	1-4722-00032/00144	11-Jul-16	NA	NA

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

### 3.2.2.2 New York State (NYS) Wetlands and Wild Scenic, Recreational Rivers Act

Several actions continued and one new action commenced in 2011 that required permits under the New York State Wetland and/or Wild, Scenic and Recreational Rivers Act legislation. Continuation projects included construction of the Long Island Solar Farm (LISF) on site and the installation of a fiber-optic cable along the west side of the BNL property, which included

crossing the Peconic River. A new project to construct fences and access platforms for air conditioning units at the Relativistic Heavy Ion Collider (RHIC) was initiated in 2011.

### 3.2.2.3 CERCLA Groundwater Equivalency Permits

In 2011, BNL initiated a new equivalency permit application for the operation of a Freon-11 remediation system installed near

Building 96. In April, Freon-11 contamination was discovered down-gradient of a Freon storage trailer located at Building 452. Concentrations of Freon-11 in groundwater were in excess of ambient water quality standards and required treatment. An air stripper system and recovery well are being installed to remediate the contamination.

### 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 2011, environmental evaluations were completed for 85 proposed projects at BNL. Of those, 79 were considered minor actions requiring no additional documentation. Five projects were addressed by submitting notification forms to DOE, which determined that the projects were covered by existing “Categorical Exclusions” per 10 CFR 1021 or fell within the scope of a previous environmental assessment. One Environmental Assessment (EA) was conducted for Waste Water Treatment Modifications for improved effluent compliance. The EA received a finding of no significant impact.

### 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” requirements. Three of the boilers can burn either residual fuel oil or natural gas; Boiler 1A burns fuel oil only. In 2011, natural gas was the predominant fuel burned at the CSF. For boilers with maximum operating heat inputs greater than or equal to 50 MMBtu/hr (14.6 MW), the requirements establish emission standards for oxides of nitrogen ( $\text{NO}_x$ ). Boilers with a maximum operating heat input between 50 and 250 MMBtu/hr (14.6 and 73.2 MW) can demonstrate compliance with the  $\text{NO}_x$  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  $\text{NO}_x$  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 2011 confirmed that the fuel-bound nitrogen content met these requirements. Compliance with the 0.30 lbs/MMBtu NO<sub>x</sub> emission standards for boilers 6 and 7 was demonstrated by continuous emission monitoring of the flue gas. In 2011, NO<sub>x</sub> emissions from Boilers 6 and 7 averaged 0.091 lbs/MMBtu and 0.062 lbs/MMBtu, respectively. There were no known exceedances of the NO<sub>x</sub> 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 2011, the only 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 are not considered excess opacity readings because they are artificially induced when opacity attenuator filters are inserted across the opacity transmissometer light path during the calibration error tests.

### 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 standard practice at BNL, 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 2011,

nine pounds of R-12, 381 pounds of R-22, and 4 pounds of R-500 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 July 2011, condensation within a fire alarm panel of an unoccupied fan house in Building 913C caused a panel to malfunction and release 400 pounds of Halon 1301 from the fire suppression system. The system cylinders were not recharged, since the system is no longer required to protect the facility. Plans are being made to transfer excess Halon 1301, Halon 1211 cylinders, and the portable extinguishers currently in storage, to the Department of Defense Ozone Depleting Substances Reserve in the summer of 2012, in accordance with the Class I Ozone Depleting Substances Disposition Guidelines prepared by the DOE Office of Environmental Policy and Guidance.

### 3.5.2 Hazardous Air Pollutants

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

The following subsections describe BNL's compliance with NESHAPs regulations.

#### 3.5.2.1 *Maximum Available Control Technology*

In 2011, the Laboratory determined that 40 CFR 63 Subpart JJJJJ NESHAPs for Industrial, Commercial, and Institutional Boilers Area Sources would be applicable to BNL's four CSF Boilers and four satellite boilers. This rule is intended to reduce polycyclic organic matter, ethylene dichloride, and PCB emissions from oil fired boilers through best management practices that will improve the energy efficiency of larger boilers with heat input capacities greater than 10 MMBtu/hr and will also improve boiler combustion efficiencies. This rule establishes biennial tune-up requirements for all of BNL's boilers and one-time energy assessments for the four CSF boilers. An initial notice of applicability was subsequently transmitted to the EPA Region 2 office on June 24, 2011.

#### 3.5.2.2 *Asbestos*

In 2011, the Laboratory notified the EPA Region II office regarding removal of materials containing asbestos. During the year, 2,750 linear feet of pipe insulation, 39,365 square feet of siding material, and 150 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 the 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 2011 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  $\mu$ Sv) annual dose limit specified in 40 CFR 61 Subpart H (see Chapters 4 and 8 for more information on the estimated air dose). Using EPA modeling software, the dose to the hypothetical

maximally exposed individual resulting from BNL's airborne emissions in 2011 was 3.02E-01 mrem (3.0  $\mu$ Sv).

### 3.6 CLEAN WATER ACT

The disposal of wastewater generated by Laboratory operations is regulated under the Clean Water Act (CWA) as implemented by NYSDEC and under DOE Order 458.1, Radiation Protection of the Public and the Environment. The goals of the CWA are to achieve a level of water quality that promotes the propagation of fish, shellfish, and wildlife; to provide waters suitable for recreational purposes; and to eliminate the discharge of pollutants into surface waters. New York State was delegated CWA authority in 1975. NYSDEC has issued a SPDES permit to BNL to regulate wastewater effluents at 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 nine of 12 outfalls, as described below. See Figure 5-7 in Chapter 5 for the locations of BNL outfalls.

- Outfall 001 is used to discharge treated effluent from the Sewage Treatment Plant (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 the 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.

The modifications to the BNL SPDES permit finalized in June 2009 required that the Laboratory perform several additional studies in order to characterize contributing sources of wastewater to the STP and recharge basins. These studies included a Short-Term Monitoring Program to monitor waste waters discharged to permitted outfalls for specific contaminants identified by NYSDEC during the permit review; a Quantification and Removal Study to identify and quantify controllable sources of metals being discharged to the STP; and a Mercury Minimization Program to document past and proposed practices to reduce potential sources of mercury to the STP. Work was completed in January 2010, and a report detailing the findings was submitted to NYSDEC in July (D&B 2010). Studies identified several sources of metals upstream of the STP, including boiler blow-down from Building 610 (several metals), Buildings 463 and 555 (mercury), sanitary-only discharges, and the STP sand filters to be the most significant contributors of metals to the STP effluent. The studies then evaluated various treatment technologies and alternate discharge options to determine the most effective means to reduce impacts to the Peconic River. The preferred and recommended alternative is to replace the existing sand filters with free standing self-enclosed filtration units and to divert the discharge to on-site recharge basins. This alternative completely removes the STP discharge from the Peconic River and eliminates all contributions of metals (e.g., copper, iron, lead, nickel, mercury and zinc) to the river. 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. A NEPA Environmental Assessment was prepared in 2011 and a Finding of No Significant Impact was issued by DOE. Preliminary plans for the modified

treatment process were prepared and submitted to NYSDEC and SCDHS in 2011. Design will be finalized in 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 2011.

There were three excursions of the SPDES permit limits in 2011: two for iron and one for total nitrogen load. In January and February, the total iron concentrations in the wastewater effluent sample were reported at 0.49 and 0.43 mg/L respectively, which exceeded the SPDES limit of 0.37 mg/L. In June, the maximum total nitrogen load was calculated at 40 pounds per day, which exceeds the permit limit of 20 pounds per day. All other parameters were within permit limits.

Increased levels of iron in the STP effluent were identified in November 2010. Upstream sources of soluble iron were investigated 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.

In June 2011, mechanical problems with the modular aeration tank blower system were identified. This resulted in increased levels of nitrate in the effluent. While the nitrate concentration did not exceed the permit limit of 10 ppm, the

increased levels, along with higher summer flows, yielded a nitrogen load of 40 pounds per day. The system was repaired and the concentration of total nitrate dropped. Compliance with the load limit was demonstrated for the remaining five reporting periods in 2011. Review of the justification for the nitrogen load limit provided by NYSDEC showed that the limit should be an average, and not a maximum. BNL will continue to monitor the nitrogen levels, and if necessary, request a change to the limit should noncompliance with the 20-pound limit recur.

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 2011, 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 untreated organisms (i.e., controls). The test results are submitted to NYSDEC for review.

Testing in 2011 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 2012.

#### 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 three pH excursions reported for these outfalls in 2011; two at Outfall 008 and one for Outfall 005. Both of the affected outfalls receive primarily stormwater runoff. Investigation into the

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)	44	69	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	> 88	> 98	Monthly	85	0	100
Max. TSS (mg/L)	< 0.5	< 0.8	Twice Monthly	20	0	100
% TSS Removal	> 98	> 99	Monthly	85	0	100
Settleable solids (ml/L)	0	0	Daily	0.1	0	100
Ammonia nitrogen (mg/L)	< 0.1	0.36	Twice Monthly	1.5	0	100
Total nitrogen (mg/L)	1.04	9.02	Twice Monthly	10	0	100
Total nitrogen (lbs./day)	4	40	(May – October)	20 (b)	1	83
Total phosphorus (mg/L)	0.6	1.7	Twice Monthly	NA	0	100
Cyanide (mcg/L)	< 1.5	5.8	Twice Monthly	100	0	100
Copper (mg/L)	0.014	0.081	Twice Monthly	0.15	0	100
Iron (mg/L)	0.058	0.488 (a)	Twice Monthly	0.37	2	83
Lead (mg/L)	0.001	0.007	Twice Monthly	0.019	0	100
Mercury (ng/L)	45	110	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 (µg/L)	< 2	< 2	Twice Monthly	5	0	100
Nickel (mg/L)	0.002	0.006	Twice Monthly	0.11	0	100
Silver (mg/L)	< 0.001	0.003	Twice Monthly	0.015	0	100
Toluene (µg/L)	< 1	< 1	Twice Monthly	5	0	100
Zinc (mg/L)	0.017	0.143	Twice Monthly	0.1	0	100
1,1,1-trichloroethane (µg/L)	< 1	< 1	Twice Monthly	5	0	100
2-butanone (µg/L)	< 5	< 5	Twice Monthly	50	0	100
PCBs (µg/L)	< 0.03	< 0.05	Quarterly	NA	0	100
Max. Flow (MGD)	0.38	0.89	Continuous Recorder	2.3	0	100
Avg. Flow (MGD)	0.27	0.57	Continuous Recorder	NA	0	100
Avg. Fecal Coliform (MPN/100 ml)	< 1	2.5	Twice Monthly	200	0	100
Max. Fecal Coliform (MPN/100 ml)	< 2	4	Twice Monthly	400	0	100
HEDP (mg/L)	< 0.05	0.26	Monthly	NA	0	100
Tolytriazole (mg/L)	< 0.005	<< 0.005	Monthly	NA	0	100

**Notes:**

See Chapter 5, Figure 5-6, 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

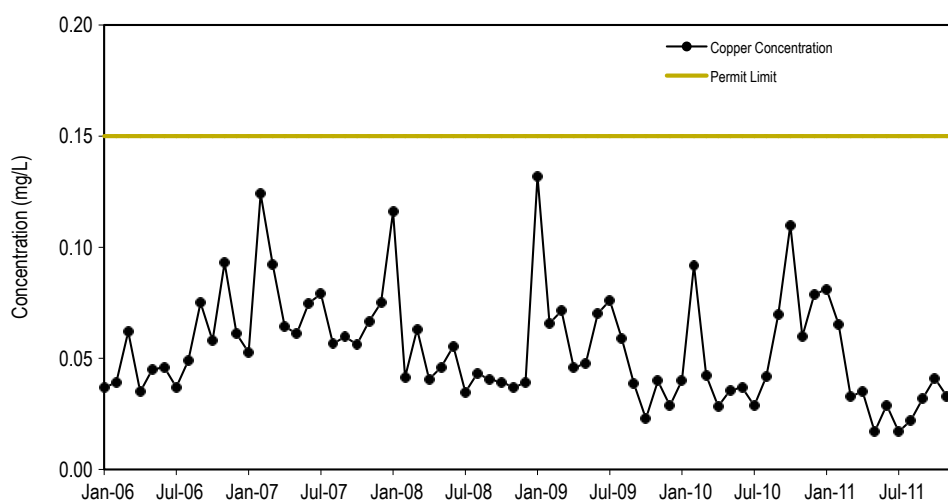
SPDES = State Pollutant Discharge Elimination System

SU = Standard Unit

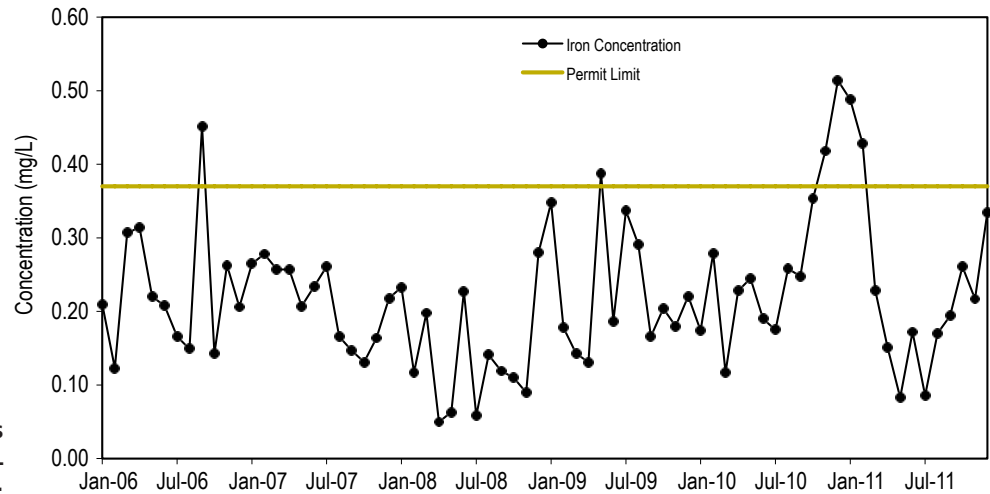
TSS = Total Suspended Solids

(a) Permit exceedances for iron were reported in two months (January and February). See Section 3.6.1 for an explanation of these permit exceedances.

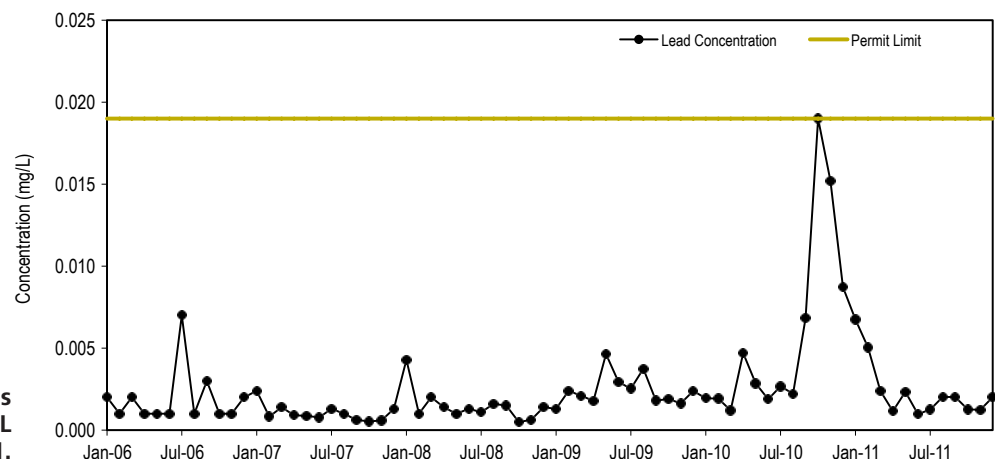
(b) A single permit exceedance for total nitrogen load was reported in June.

**Figure 3-1. Maximum Concentrations of Copper Discharged from the BNL Sewage Treatment Plant, 2006–2011.**

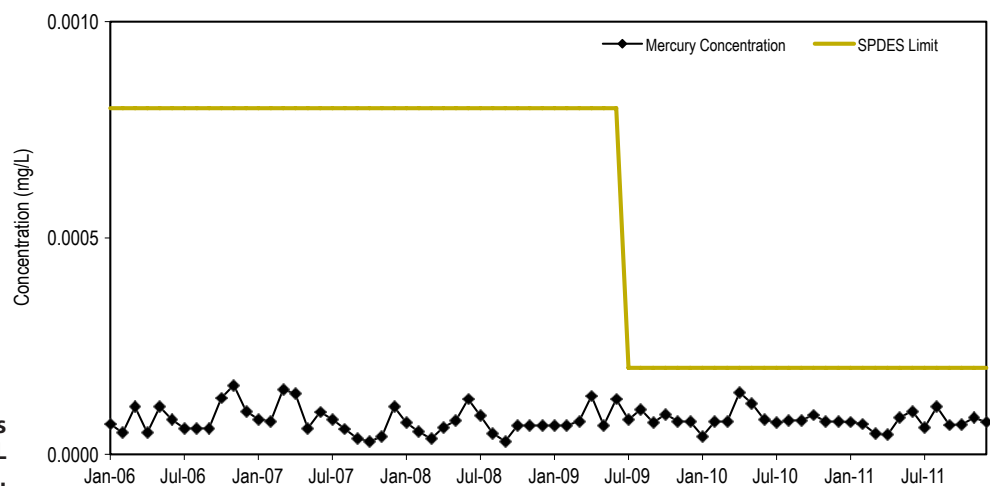
## CHAPTER 3: COMPLIANCE STATUS



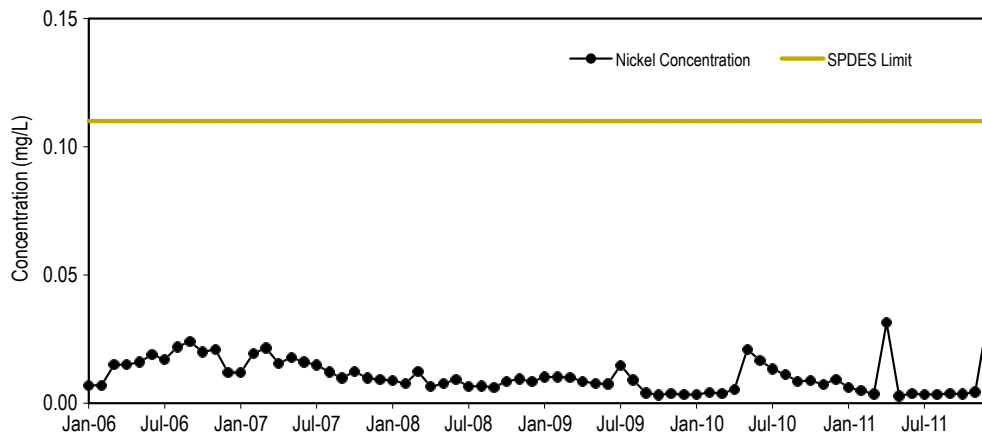
**Figure 3-2. Maximum Concentrations of Iron Discharged from the BNL Sewage Treatment Plant, 2006–2011.**



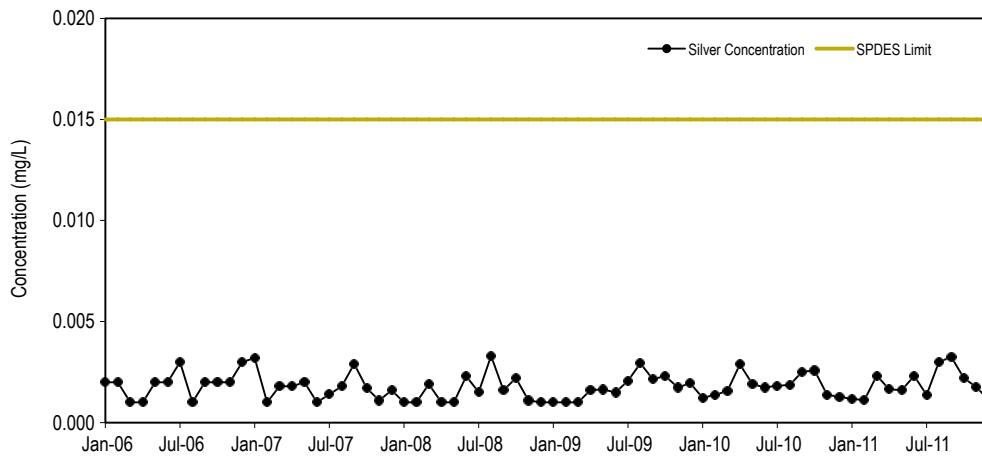
**Figure 3-3. Maximum Concentrations of Lead Discharged from the BNL Sewage Treatment Plant, 2006–2011.**



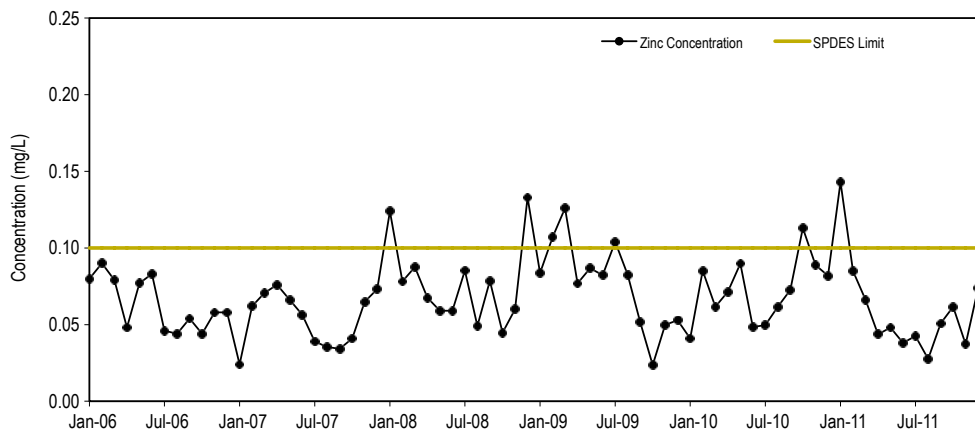
**Figure 3-4. Maximum Concentrations of Mercury Discharged from the BNL Sewage Treatment Plant, 2006–2011.**



**Figure 3-5. Maximum Concentrations of Nickel Discharged from the BNL Sewage Treatment Plant, 2006–2011.**



**Figure 3-6. Maximum Concentrations of Silver Discharged from the BNL Sewage Treatment Plant, 2006–2011.**



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, 2006–2011.**

cause of these excursions showed that run-off from the National Synchrotron Light Source II (NSLS-II) construction site had elevated pH. The pH of several standing puddles of water were measured and noted to be higher than 8.5 (standard units) SU. Examination of operations in the area of the puddles showed that recycled concrete aggregate and a small concrete batching operation were the likely contributors to these observations. By relocating the concrete batching operation away from the stormwater collection system, the pH of the run-off lowered.

### 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 2011) was 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 2011, 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 Water Treatment Plant 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 VOCs. At the point of consumption, drinking water complied with all NYS DWS during 2011. In addition to the compliance sampling program, all wells are also sampled and analyzed quarterly under the BNL

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	CR	CR			
	Min.	0.01	0.0003	0.09	0.09	0.04	0.08	0.001	0.0009	NA		
	Max.	1	0.26	0.7	0.7	0.12	0.2	3.4	1.3	NA	NA	NA
pH (SU)	Min.	6.8	7	6.4	6.7	6.6	6.8	6.4	6.8	NA		
	Max.	8.4	8.6	8.8	8.8	8.4	8.5	9.4	8.5	8.5, 9.0 (a)	3	100
Oil and grease (mg/L)	N	12	11	12	12	12	NR	10	10			
	Min.	<1.0	<1.1	<1.0	<1.0	<1.0	NR	<1.1	<1.0	NA		
	Max.	2.3	2.5	2.2	2.2	2.3	NR	3.3	3.5	15	0	100
Copper (mg/L)	N	NR	NR	4	NR	NR	NR	NR	4			
	Min.	NR	NR	<0.003 (T)	NR	NR	NR	NR	<0.001 (D)	NA		
	Max.	NR	NR	0.005	NR	NR	NR	NR	0.009 (D)	1.0	0	100
Aluminum (mg/L)	N	4	NR	NR	NR	NR	NR	4	4			
	Min.	<0.07 (T)	NR	NR	NR	NR	NR	0.2 (D)	<0.07 (D)	NA		
	Max.	0.2	NR	NR	NR	NR	NR	0.6 (D)	<0.7 (D)	2.0	0	100

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Table 3-4. Analytical Results for Wastewater Discharges to Outfalls 002, 005 – 008, and 011 (concluded).

Analyte		Outfall 002	Outfall 002B	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 008	Outfall 010	SPDES Limit	No. of Exceedances	% Compliance*
Lead, Dissolved (mg/L)	N	NR	NR	NR	NR	NR	NR	NR	4			
	Min.	NR	NR	NR	NR	NR	NR	NR	<0.0005	NA		
	Max	NR	NR	NR	NR	NR	NR	NR	0.0007	0.05	0	100
Vanadium, Dissolved (mg/L)	N	NR	NR	NR	NR	NR	NR	NR	4			
	Min.	NR	NR	NR	NR	NR	NR	NR	0.001	NA		
	Max	NR	NR	NR	NR	NR	NR	NR	0.005	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.	1.5	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.	1.6	NR	NR	NR	NR	NR	NR	NR	50	0	100
1,1,1-trichloroethane (µg/L)	N	4	NR	NR	NR	NR	NR	NR	NR			
	Min.	<1	NR	NR	NR	NR	NR	NR	NR	NA		
	Max.	<1	NR	NR	NR	NR	NR	NR	NR	5	0	100
1,1-dichloroethylene (µg/L)	N	NR	NR	NR	NR	NR	NR	NR	NR			
	Min.	NR	NR	NR	NR	NR	NR	NR	NR	NA		
	Max.	NR	NR	NR	NR	NR	NR	NR	NR	5	0	100
Hydroxyethyldiene- diphosphonic acid (mg/L)	N	4	4	4	4	4	NR	NR	NR			
	Min.	<0.05	<0.05	<0.05	<0.05	<0.05	NR	NR	NR	NA		
	Max.	<0.3	<0.05	<0.3	<0.3	<0.3	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 5-6, 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.

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 required 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 as a special edition of the Laboratory's weekly newsletter to all BNL employees and on-site residents, and is also available electronically at <http://www.bnl.gov/bnlweb/pubaf/water/reports.htm> and <http://www.bnl.gov/bnlweb/pubaf/bulletin.asp>.

In December 2011, BNL received a Notice of Violation (NOV) from SCDHS for failing to collect a representative well water sample from the five operating wells for radiochemical analysis in the third quarter. Review of the sampling schedule showed that sampling was not performed as scheduled; however, review of the schedule also showed that water samples were collected for metals analysis during the requisite monitoring period. Residual samples were recovered from the contract laboratory and were analyzed for radiological parameters. The NOV was rescinded after the data were reported to the SCDHS.

### 3.7.2 Cross-Connection Control

The SDWA requires that public water suppliers implement practices to protect the water supply from sanitary hazards. One of the safety requirements is to rigorously prevent cross-connections between the potable water supply and facility piping systems that may contain hazardous substances. Cross-connection control is the installation of control devices (e.g., double-check valves, reduced pressure zone valves, etc.)

at the interface between a facility and the domestic water main. Cross-connection control devices are required at all facilities where hazardous materials are used in a manner that could result in their introduction into the domestic water system, especially under low-pressure conditions. In addition, secondary cross-connection controls at the point of use are recommended to protect users within a specific facility from hazards that may be posed by intra-facility operations.

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 2011, 171 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 retested to ensure proper function. Copies of the cross-connection device test reports are filed with SCDHS throughout the year.

### 3.7.3 Underground Injection Control (UIC)

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

In 2011, there was one Class V injection well added and plans to remove 30 former cesspools were implemented. The new UIC will service an underground storm water retention system being installed at the Interdisciplinary Science Building currently under construction. The 30 cesspools formerly served cottages used for housing students and visiting researchers: the cottages were demolished in late 2011; consequently, the UICs are no longer needed.

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
<b>Water Quality Indicators</b>							
Ammonia ((mg/L)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	SNS
Chlorides (mg/L)	40	39	36	59	76	43	250
Color (units)	< 5	< 5	< 5	< 5	< 5	< 5	15
Conductivity (mmhos/cm)	212	217	163	289	310	253	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)	< 0.5	< 0.5	< 0.5	0.8	0.9	0.22	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	6	5.9	6.1	6	6.3	SNS
Sulfates (mg/L)	11	10	8	11	12	9	250
Total coliform	ND	ND	ND	ND	ND	1***	Negative
<b>Metals</b>							
Antimony (mg/L)	< 5	< 5	< 5	< 5	< 5	< 5	6
Arsenic (mg/L)	< 5	< 5	< 5	< 5	< 5	< 5	50
Barium (mg/L)	0.039	0.032	0.023	0.041	0.055	0.032	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)	2.1*	3.3*	2.2*	0.38	0.09	0.49	0.3
Lead (mg/L)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	15
Manganese (mg/L)	0.18	0.09	0.07	< 0.010	< 0.010	< 0.010	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)	22	20	19	26	42	25	SNS

(continued on next page)

## CHAPTER 3: COMPLIANCE STATUS

**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	0.01	0.01	0.03	5
<b>Radioactivity</b>							
Gross alpha activity (pCi/L)	< 2.98	< 2.98	3.09	< 2.96	< 2.97	NR	15
Gross beta activity (pCi/L)	< 2.48	< 2.28	< 2.77	< 2.38	< 2.31	NR	(a)
Radium-228 (pCi/L)	< 2.99	< 4.02	< 2.85	< 3.07	< 3.17	NR	5
Strontium-90 (pCi/L)	< 0.70	< 0.71	< 0.77	< 0.72	< 0.77	NR	8
Tritium (pCi/L)	< 231	< 229	< 232	< 231	< 228	NR	20,000
<b>Other</b>							
Alkalinity (mg/L)	18	14	20	32	26	50	SNS
Asbestos (M. fibers/L)	NR	NR	NR	NR	NR	< 0.20	7
Calcium (mg/L)	6.4	6.3	5.6	15	9.1	12	SNS
HAA5 (mg/L)	NR	NR	NR	NR	NR	0.013	0.06**
Residual chlorine - MRDL (mg/L)	NR	NR	NR	NR	NR	0.6	4
TTHM (mg/L)	NR	NR	NR	NR	NR	0.021	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.

In June 2010, an application was filed with EPA to renew the Class V UIC permit for the site. Renewal of the permit is still pending EPA approval.

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



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

	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	
Compound	µg/L						NYS DWS
Dichlorodifluoromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Vinyl Chloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2
Bromomethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Trichlorofluoromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1-dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Methylene Chloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
trans-1,2-dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1-dichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
cis-1,2-dichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
2,2-dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Bromochloromethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1,1-trichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Carbon Tetrachloride	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1-dichloropropene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2-dichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Trichloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2-dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Dibromomethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
trans-1,3-dichloropropene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
cis-1,3-dichloropropene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1,2-trichloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,3-dichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1,1,2-tetrachloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Bromobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,3-trichloropropane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
2-chlorotoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
4-chlorotoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,3-dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,4-dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2-dichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,4-trichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Hexachlorobutadiene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Tetrachloroethene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,1,2,2-Tetrachloroethane	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,3-trichlorobenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Benzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5

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# CHAPTER 3: COMPLIANCE STATUS

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

	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	
Compound	µg/L						NYS DWS
Toluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Ethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
m,p-xylene	< 1	< 1	< 1	< 1	< 1	< 1	5
o-xylene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Styrene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Isopropylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
n-propylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,3,5-trimethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
tert-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
1,2,4-trimethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
sec-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
4-Isopropyltoluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
n-butylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5
Chloroform	1.4	1.2	16.0	3.6	0.5	5	50
Bromodichloromethane	1.5	< 0.5	1.4	< 0.5	< 0.5	6.5	50
Dibromochloromethane	1.8	< 0.5	< 0.5	< 0.5	< 0.5	7.3	50
Bromoform	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	4.2	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

(continued on next page)

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

	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	
Compound	µg/L						NYS DWS
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 2011.

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

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 below.

### 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 2011.

In July 2002, EPA adopted significant

changes to the SPCC regulations that extended the requirements to previously unregulated facilities and provided some relief to existing covered facilities. These changes, among others, included extending the plan update deadline from 3 to 5 years, and specifying that containers smaller than 55 gallons need not be counted toward reaching SPCC applicability limits. In 2011, BNL performed a comprehensive 5-year review of the SPCC Plan and the associated Emergency Response Action Plan (ERAP). Revisions to the plans included improved drawings and strengthening of the training and security programs. Changes were minor and are meant to enhance an already well-defined SPCC and ERAP program at BNL. Hard copies of the revised plan were transmitted to the EPA and NYSDEC in May 2011.

### 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 below summarizes the applicability of the regulations to BNL. The Laboratory complied with these requirements in 2011 through the submittal of reports under EPCRA Sections 302, 303, 311, and 312 for calendar year 2010. In 2011, through the Tier III report, BNL reported releases of lead (~305,599 pounds), mercury (~107 pounds), polychlorinated biphenyls (PCBs) (~30 pounds), benzo(g,h,i)perylene (<1 pound), and polycyclic aromatic compounds (<1 pound) for calendar year 2010. Releases of lead, PCBs, and mercury were predominantly in the form of shipments of waste for off-site recycling or disposal. Releases of benzo(g,h,i)perylene and polycyclic aromatic compounds were as byproducts of the combustion of fuel oils. In 2011, 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 2011, there were 39 spills, 18 of which met regulatory agency reporting criteria. The remaining 21 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 18 reportable events, including a description of the cause and corrective actions taken. There were no long-term effects from these releases and no significant impact on the environment. All but three of the reported events were 5 gallons or less in volume. Eight of the releases occurred during construction activities, either by leaks from construction equipment or through discoveries made during excavation activities. The three large-volume releases varied from approximately 10 to 120 gallons. One of the three spills was the discovery of fuel-contaminated soil encountered during the demolition of Building 802. The second spill was the release of 37 gallons of silicon-based transformer oil caused by the failure of o-rings at electrical connections. The third spill was the catastrophic failure of piping from a helium compressor in Building 902. In all cases, the releases were cleaned up to the satisfaction of NYSDEC. Three of the releases required

#### 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
11-03 02/16/11	Diesel Fuel 0.5 gallons	No	A remediation contractor identified a leak from the fuel filter of the front-end loader being used to load soil into rail cars. The contractor stopped operations and repaired the unit. Impacted soil was containerized for off-site disposal.
11-05 3/01/11	Polypropylene glycol 2 gallons	No	During start-up operations of a new chiller, polyethylene glycol was released to the ground when the isolation valve between two units was opened, and allowing the glycol from one unit to drain into the second. The systems were re-plumbed and check valves were installed to prevent any recurrence of the event. Impacted soils were remediated and containerized for off-site disposal.
11-10 3/30/11	Diesel Fuel < 10 gallons	No	During demolition of Building 802, contaminated soil was encountered. The spill was presumed to be from a former fuel oil storage tank used to fuel a generator. The soil was excavated and containerized for off-site disposal.
11-12 4/15/11	Hydraulic Fluid 1 cup	No	A hydraulic hose ruptured on a crane at the National Synchrotron Light Source II (NSLS-II) construction site, spilling approximately 1 gallon of oil on the soil. The impacted soil was excavated and a tarp was put in place to capture residual dripping. Upon inspection, an estimated 5 gallons had collected on the tarp. Approximately 1 yard of soil was excavated and containerized for off-site disposal.
11-13 4/15/11	Diesel Fuel 3 gallons	No	Construction vehicles parked on asphalt at the NSLS-II construction site were discovered leaking fuel on the pavement. The leak had migrated off the pavement and onto soil. Twelve 55-gallon drums of impacted soil was removed from the site for off-site disposal.
11-14 4/20/11	Diesel Fuel < 1 pint	No	During transfer of concrete using a pumper truck, the contractor noticed fuel leaking from the vehicle. The operations were immediately stopped and the leaking vehicle repaired. Approximately 5 gallons of soil were removed for subsequent disposal.
11-15 4/27/11	Power Steering Fluid 1 cup	No	While driving a Laboratory-owned vehicle, the operator noticed the vehicle became hard to steer. Upon inspection, a leaking power steering hose was discovered. A spill tray was placed under the vehicle to collect additional spillage and the vehicle was repaired. Soil impacted by the release was collected and containerized for off-site disposal.
11-16 5/3/11	Hydraulic Fluid 1 gallon	No	While removing dead trees from wooded areas on site, a fitting on the lift of a front-end loader failed, resulting in the release of approximately 1 gallon of hydraulic fluid to the ground. The leak was repaired, and the impacted soil was removed and containerized for off-site disposal.
11-17 5/27/11	Ethylene Glycol 1 gallon	No	The water pump on a contractor's vehicle started leaking coolant. The vehicle was parked on pavement and a spill tray was placed beneath the vehicle to intercept further leakage. The vehicle was removed from the site for repairs. Impacted soil was collected and containerized for off-site disposal.
11-20 6/30/10	Hydraulic Fluid 4 gallons	No	During trash collection, a hydraulic hose on a contractor's vehicle ruptured, resulting in the release of 4 gallons of hydraulic fluid to the ground. Speedy Dry was placed on the spill to absorb the oil, which was collected and containerized for off-site disposal.
11-21 6/30/11	Diesel Fuel 1 gallon	No	During routine inspections of the NSLS-II construction area, oil-stained soil was discovered near the contractor trailers. According to NSLS-II contractor staff, a vehicle had been parked there for an extended period, during which fuel leaked to the soil. The impacted soil was excavated and containerized for subsequent off-site disposal.
11-22 7/8/11	Hydraulic Fluid 1 cup	No	During routine inspection of the NSLS-II site, open-topped drums were found covered by a tarpaulin. Inspection of the drums revealed that holes were punched in the sides near the bottom to permit water to drain from the drums. The drums contained oil-contaminated soil remediated during a different spill event. The water drained from the drums was contaminated with the oil. Impacted soil was removed and containerized for disposal. The three drums were repackaged for disposal.
11-25 7/15/11	Silicon Based Transformer Oil 37 gallons	Yes	During a routine preventive maintenance inspection on a transformer located at Building 197, leakage was observed at an o-ring sealing a fuse connection. Inspection showed that oil had seeped into the electrical service trench leading to the transformer and onto soil near and beneath the transformer. Contaminated soil and residual oil were collected and containerized for off-site disposal.
11-26 7/18/11	Silicon Based Transformer Oil <1 gallon	No	As an extent of condition to Spill 11-25, other silicon-based transformers were inspected for failed seals at the fuse electrical connections. The transformer at Building 726 had a similar failure at a gauge fitting. Approximately 1 gallon of silicon fluid was found to have leaked to the gravel ballast beneath the transformer. The impacted gravel was collected and containerized 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
11-30 9/14/11	U-Con LB-170-X Hydraulic Fluid 120 gallons	Yes	A pipe serving a helium compressor in Building 902 failed during overnight hours, resulting in a 100+ gallon release of hydraulic fluid from the system. The compressor is located in an isolated room with no floor drains or other conduits for release to the outdoors; consequently, all spillage was contained within the building. A minor amount of oil wept under the door, wetting the concrete apron outside the building. Due to the significance of the release, an outside oil recovery contractor was retained to remediate the release. All remediation residues were transported off-site for disposal.
11-31 9/13/11	Hydraulic Fluid < 1 cup	No	During performance testing of a new hydraulic hammer being used for demolition of the Brookhaven Graphite Research Reactor bioshield, a leak occurred when connecting the hydraulic hoses to the hammer. Oil dripped to the soil, making the release reportable. Impacted soil was removed and containerized for off-site disposal.
11-35 10/3/11	Freon 22 14.5 pounds	Yes	An air conditioning unit at Building 480 developed a leak of Freon 22 due to mechanical failure of a pipe. As Freon 22 is a gas at standard temperature and pressure, no mitigation was performed for the release. The air conditioning unit was drained, repaired, and placed back in service. This release is ORPs reportable due to the low de minimus for releases of R-22 in New York (1 pound).
11-37 10/21/11	Hydraulic Fluid 1 quart	No	A contractor-rented man lift leaked hydraulic fluid to soil from a failed hose. The unit was moved onto an impermeable surface to prevent further release to soil. All impacted soil was removed and containerized for off-site disposal. The man lift was repaired and placed back into service.

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. The three releases include the transformer and compressor releases described above and the release of Freon-22 from an air conditioning system in Building 480 (14.5 pounds). New York State has very stringent release reporting requirements for certain chemicals. The reporting threshold for Freon-22 is one pound. 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 all instances, any recoverable material was removed, spill absorbents were used to remove the residual product, and all materials were collected and containerized for off-site disposal. For releases to soil, contaminated soil was removed to the satisfaction of the State 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 December 2011, BNL completed a MPF license renewal application and updated its Environmental Compliance Report, which is intended to assist MOSF facility owners/operators in complying with applicable federal, state, and local regulations. During 2011, 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 2011, 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.

Due to busy schedules and competing priorities, NYSDEC was unable to perform its annual inspection of all storage facilities included on the MPF license in calendar year 2011. Results of the next inspection will be reported in 2012.

### 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 July 2011, BNL renewed its Chemical Bulk Storage (CBS) Registration in accordance with NYSDEC directives and received a Hazardous Substance Bulk Storage Registration Certificate in August 2011, which will not expire until July 2013. Due to busy schedules and competing priorities, NYSDEC was unable to perform its annual inspection of the registered CBS facilities in calendar year 2011. Results of the next inspection will be reported in 2012.

### 3.8.6 County Storage Requirements

Article 12 of the Suffolk County Sanitary Code regulates the storage and handling of toxic and hazardous materials in aboveground or underground storage tanks, drum storage facilities, piping systems, and transfer areas. Article 12 specifies design criteria to prevent environmental impacts resulting from spills or leaks, and specifies administrative requirements such as identification, registration, and

spill reporting procedures. In 1987, the Laboratory entered into a voluntary Memorandum of Agreement with SCDHS, in which DOE and BNL agreed to conform to the environmental requirements of Article 12. In April 2010, due to a directive from NYSDEC asserting their sole jurisdiction over petroleum storage at Major Oil Storage Facilities, SCDHS notified BNL that they will cease permitting activities (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 the NYSDEC. Currently, there are approximately 124 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. BSA 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. From 1994 to 2011, the Laboratory had managed its mixed wastes in accordance with a Site Treatment Plan developed under the Federal Facilities Compliance Act (1992) and enforced by NYSDEC. The purpose of the plan was to identify disposal paths for mixed wastes and provide a schedule for their disposal. As mixed waste generation on site has decreased significantly over the years and disposal capabilities became readily available, BNL has been able to dispose of mixed wastes in accordance with the requirements of its RCRA Permit. In 2011, the Laboratory requested from NYSDEC that it terminate the Site Treatment Plan and the associated consent order. Approval to terminate the plan was granted in 2011.

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 2011, additional information was submitted regarding analytical methods used for analyzing soil samples. The Laboratory has submitted all requested information to NYSDEC and is awaiting approval of its Closure Report for Building 870.

### 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 2011.

The Laboratory has aggressively approached reductions in its PCB inventory, reducing its PCB inventory 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. Pesticides are used at the Laboratory to control undesirable insects, mice, and rats; bacteria 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 to agricultural research fields and in 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, algicide, and herbicide use for the previous year. The Laboratory was in full compliance with the legislated requirements in 2011. However, an NOV was issued for an administrative violation in which documentation submitted



indicated that an applicator applied pesticides outside his certification; a review of applications showed that all were made in accordance with NYS requirements. Because the documentation was submitted officially by a BNL representative, the information could not be retracted (see Table 3-9 for details).

### 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 2011, a project to install fencing and air conditioning platforms at the RHIC required a new Wild, Scenic and Recreational River Systems Act permit. In order to better protect workers and the public, several of the air handling units around RHIC needed to be fenced. In addition to the installation of fencing, permanent platforms were to be installed over several of the exit alcoves in order to safely conduct routine maintenance on the air conditioners found at these locations.

The work to install a fiber optic line coming into the site along Upton Road was completed and the permit is scheduled for closure.

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 2010, 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), Swamp darter (T), Banded Sunfish (T), frosted elfin (T), little bluet (T), scarlet bluet (T), pime barrens bluet (T), northern harrier (T), stargrass (T), and stiff goldenrod (T). Although the tiger salamander is no longer the only state endangered species found at BNL, 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 at BNL. 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 additional protective measures are planned for the eastern box turtle or spotted turtle, as little activity occurs within their known habitat at the Laboratory. 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 20 plant species that are protected under state law. One is an endangered plant, the crested fringed orchid; two are threatened plants, the stiff goldenrod and stargrass; and two are rare plants, the narrow-leafed bush clover and long-beaked bald-rush. The other 15 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. Migratory birds are protected under the Migratory Bird Treaty Act. This protection includes protection 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 then 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 EXTERNAL AUDITS AND OVERSIGHT

### 3.14.1 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 2011, BNL was inspected by federal, state, or local regulators on ten occasions. These inspections included:

- *Air Compliance.* NYSDEC performed a formal inspection of the Laboratory's air compliance program in 2011. NYSDEC was also 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 these inspections.
- *Potable Water.* In August, SCDHS collected samples and conducted its annual inspection of the BNL potable water system. Identified deficiencies are being addressed by the Energy and Utilities Division.
- *Sewage Treatment Plant.* SCDHS conducts quarterly inspections of the Laboratory's STP to evaluate operations and sample the effluent. In 2011, 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 of the SPDES-regulated outfalls and

collected samples in 2011. There were no issues identified.

- *Major Petroleum Facility.* The annual NYSDEC inspection of the MPF was not performed in 2011. The inspection is scheduled for early 2012.
- *Chemical Bulk Storage Facilities.* The CBS facilities are inspected periodically by NYSDEC. The annual inspection was not performed in 2011 and is scheduled for early 2012.
- *RCRA.* EPA conducted an annual RCRA inspection in September 2011 and found BNL operations to be in compliance with requirements.

### 3.14.2 DOE Assessments/Inspections

The DOE Brookhaven Site Office (BHSO) conducts several environmentally-related assessments each year, some of which are supported by the DOE Chicago Office. In April 2011, BHSO performed a collaborative assessment of the Laboratory's waste characterization processes, including both radioactive and hazardous, in response to the 2010 State of Utah NOV regarding insufficient characterization of wastes generated by the cleanup program. The review showed several weaknesses in waste characterization, including inadequate support documentation and ineffective implementation of a corrective action following the 2010 waste characterization NOV. Additional corrective actions have been developed to address these findings.

In August 2011, BHSO conducted a second surveillance assessment of the BNL waste characterization processes. The review was restricted to radiological waste streams and looked at radioactive wastes generated by the Environmental Remediation Program (ERP) and the Brookhaven Linac Isotope Producer (BLIP) program. Overall, the assessment found that future ERP waste streams should be compliant with disposal site waste acceptance criteria and that BLIP waste streams were appropriately characterized. Several recommendations that were made to enhance and strengthen the waste characterization processes at BNL are being implemented.

In August 2011, BHSO also performed a

collaborative assessment with Brookhaven Science Associates on the NEPA process at BNL and within the BHSO. The assessment looked at NEPA implementation across all departments and divisions. Additionally, a review of cultural resource institutional awareness was included in the assessment scope. Knowledge of cultural resources was found to be deficient in the Integrated Facility Management System, and NEPA implementation was found to be strong in the scientific departments and at the institutional level. Some smaller projects were also found to be deficient in NEPA compliance, and training of newly hired engineers was identified as an opportunity for improvement. Administrative weaknesses were also identified, including out-of-date categorical exclusion updates.

#### *3.14.2.1 Environmental Multi-Topic Assessment*

In 2011, 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 Natural and Cultural resources and endangered species management. The Natural Resource and Endangered Species review included a review of and updating the BNL Natural Resource Management Plan. Additional actions aimed at preserving wildlife and enhancing endangered species habitats were identified and added to the plan for future implementation. The Cultural Resource review was performed as part of the NEPA review conducted in cooperation with BHSO (see above).

#### *3.14.2.2 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 performed an unannounced inspection at BNL in November 2011. There were no findings and one observation noted. The observation was to develop an approved vendor's

list for products and services used to manage waste being disposed of at the NNSS.

### **3.15 ENFORCEMENT ACTIONS AND AGREEMENTS**

In addition to the rules and regulations discussed throughout this chapter, Table 3-8 lists the existing agreements with regulatory agencies that oversee Laboratory operations, and lists formal NOV's or enforcement actions that occurred throughout the year. In May 2011, BNL was notified by EnergySolutions that a shipment of waste received in April did not meet the site's approved waste profile, stating that lead was found in a sea-land container of material to be disposed. The case was referred to the State of Utah and an NOV was issued to BNL on June 28, 2011. The NOV included a \$2,500 fine and assessed 800 points against the Laboratory's generator site access permit. The State of Utah retracted BNL's site access permit until such time as corrective actions had been implemented to prevent future violation. The waste consisted of a plastic high-integrity container that was formerly used to transport radioactive materials to Building 865. Lead was placed in the container for shielding purposes and was thought to have been removed prior to being offered for disposal. A small piece of lead (~10 pounds) was found in the bottom of the container at the disposal site. Corrective actions were implemented and the BNL site access permit was restored.

In July 2011, the Laboratory was notified by EnergySolutions that a shipment of waste from BNL's Brookhaven Graphite Research Reactor (BGRR) project exceeded the EnergySolutions waste acceptance limits for radioactivity. The waste was generated during the demolition of the graphite reactor and consisted of dust vacuumed from the baseplate of the pile. The waste characterization for the dust was assumed to be the same as that for the bulk graphite waste; however, upon detailed analysis, it was found to contain higher concentrations of radioactivity. An NOV from the State of Utah was issued on August 18, 2011, which included a fine of \$7,500 and assessed 650 points against BNL's site access permit, thereby suspending the Laboratory's ability to ship wastes to EnergySolutions.

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

Number	Title	Parties	Effective Date	Status
<b>Agreements</b>				
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.
No Number	Federal Facilities Compliance Agreement on Mixed Wastes	NYSDEC and DOE	1992 (updated annually)	The Federal Facilities Compliance Act (FFCA) requires that a site treatment plan to manage mixed wastes be written and updated annually. BNL is in compliance with this requirement.
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 2011.
<b>Notices of Violation/Enforcement Actions</b>				
None	Notice of Violation and Notice of Proposed Imposition of Civil Penalty	State of Utah and BNL	06/28/2011	A waste package, received at EnergySolutions on April 26, 2011, was found to contain a hazardous waste component in the form of lead pieces. The lead pieces were not included in or allowed under the waste profile the waste was shipped under, and they were not properly manifested as hazardous waste. As a result, the State of Utah Division of Radiation Control levied a fine of \$2,500 and assessed a total of 800 points against BNL's Generator Site Access Permit. In addition, BNL lost site access for future waste disposal. A causal analysis was performed, corrective actions were implemented, and site access was restored.
None	Notice of Violation and Notice of Proposed Imposition of Civil Penalty	State of Utah and BNL	08/18/2011	On July 1, 2011, BNL was notified that a box of radioactive waste shipped from the Brookhaven Graphite Research Reactor project to EnergySolutions on June 29, 2011, appeared to exceed their Waste Acceptance Criteria. On July 25, 2011, an analytical report from a commercial laboratory confirmed this preliminary data. The container was shipped back to the Laboratory in August 2011. The low-level radioactive waste consisted of graphite dust from the reactor pile mingled with a fixative as a dust control and pieces of metal. The event was determined to be ORPS reportable. A root cause investigation was commissioned which evaluated the causes of the mischaracterization and helped to define corrective actions to address them. A formal Notice of Violation from the State of Utah Division of Radiation Control was issued on August 18, 2011. Site access was restored on September 21, 2011.

## 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.

<b>ORPS* ID: BNL-BHSO-BNL-BNL-2011-0010</b>	<b>Date: 05/16/11</b>
A container of waste shipped to EnergySolutions in Clive, Utah, contained small pieces of lead. Lead was not included in the approved waste profile, which was a violation of the site's Waste Acceptance Criteria. A Notice of Violation was issued by the State of Utah. See Table 3-8 for more detailed information.	<b>Status:</b> Closed. All corrective actions have been completed.



## CHAPTER 3: COMPLIANCE STATUS

**Table 3-9. Summary of Other Environmental Occurrence Reports (concluded).**

<b>ORPS ID: SC-BHSO-BNL-BNL-2011-0011</b>	<b>Date: 05/19/11</b>
Freon-11 was detected in groundwater at concentrations requiring notification of regulatory agencies and remedial actions (max. 36,000 ppb). A specific source of the contaminant has not been identified. The most likely source was from spillage associated with a storage trailer. The plume has been investigated and a remediation system (air-stripper) and recovery well have been installed to treat the contaminated groundwater.	<b>Status:</b> Report is Final. Corrective actions are being tracked in ATS.
<b>ORPS* ID: SC-BHSO-BNL-BNL-2011-0035</b>	<b>Date: 12/19/11</b>
BNL received a Notice of Violation from the Suffolk County Department of Health Services for failure to collect all required samples for potable water monitoring; a quarterly sample for radium-228 analysis was not collected. After careful review of the sampling schedules and available residual samples, a sample meeting the analytical needs was identified and recovered for subsequent analysis. Upon transmittal of the analytical data, the Notice of Violation was rescinded.	<b>Status:</b> Report is Final. There were no corrective actions, since the NOV was rescinded.
<b>ORPS* ID: SC-BHSO-BNL-BNL-2011-0037</b>	<b>Date: 12/28/11</b>
On December 1, 2011, a BNL pesticide applicator received a Notice of Violation for submitting information to the New York State Department of Environmental Conservation (NYSDEC) indicating application of pesticides outside his license authorization. After reviewing the information, it was determined that the data submitted was not specific to the particular applicator and that all pesticides were applied per NYSDEC requirements. However, the Notice of Violation remained in effect because the documentation could not be retracted.	<b>Status:</b> Report is Final. Corrective actions are complete.
<b>ORPS* ID: EM-BHSO-BNL-BNL-2011-0017</b>	<b>Date: 07/06/11</b>
On July 1, 2011, the Laboratory was notified that a box of radioactive waste shipped from the BNL Brookhaven Graphite Research Reactor project to EnergySolutions on June 29, 2011, exceeded their Waste Acceptance Criteria. On July 25, 2011, an analytical report from a commercial laboratory confirmed the preliminary data. The container was shipped back to BNL the first week of August 2011. The low-level radioactive waste consisted of graphite dust from the reactor pile mingled with a fixative as a dust control, as well as pieces of metal. The event was determined to be ORPS reportable. A root cause investigation was commissioned, which evaluated the causes of the mischaracterization and helped to define corrective actions to address them.	<b>Status:</b> Closed. Corrective actions are being tracked in ATS.
<p>Notes:</p> <p>* Reportable under the Occurrence Reporting and Processing System (ORPS), established by the requirements of DOE Order 231.1A.</p> <p>ATS = Assessment Tracking System</p>	

Extensive corrective actions were implemented and site access was regained in late September 2011.

Both incidents were reported to DOE through the BNL ORPS. Three other incidents occurred

in 2011 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 the recurrence of the issues.

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