Chapter 3

Compliance Status

Brookhaven National Laboratory is subject to more than 50 sets of federal, state, and local environmental regulations; 65 site-specific permits; and several other binding agreements. In 2000, BNL operated in compliance with the majority of these requirements, and programs are in place to address areas for continued improvement.

Emissions of nitrogen oxides, carbon monoxide, and sulfur dioxide were all within permit limits. Approximately 3,300 pounds (1,500 kg) of ozone-depleting refrigerants were recovered for recycling. Monitoring of the BNL potable water system showed that the potable water supply met all regulatory requirements. Groundwater monitoring at the Major Petroleum Facility continues to demonstrate that current oil storage and transfer operations are not impacting groundwater quality. During 2000, liquid effluents discharged to surface water and groundwater met all New York State Pollutant Discharge Elimination System permit requirements with the exception of 11 excursions: 8 at the Sewage Treatment Plant and 3 at other outfalls. All permit excursions were reported to the New York State Department of Environmental Conservation (NYSDEC).

Fourteen reportable spills of petroleum products occurred onsite in 2000. The majority were less than ten gallons, and all were cleaned up or addressed to the satisfaction of the NYSDEC. In addition to petroleum spills, two other hazardous substances were released in amounts that required reporting to the appropriate regulatory agencies. These were a 5-gallon (18.9 liters) release of spent photographic developer and a leak of 8 pounds (3.6 kg) of mercury. Both spills were cleaned up immediately.

BNL underwent 13 environmental audits by external regulatory agencies in 2000. These included review of petroleum storage, hazardous waste operations, air emissions from the Central Steam Facility, and inspections of the Sewage Treatment Plant, outfalls/recharge basins, and potable water system. The NYSDEC hazardous waste inspection resulted in issuance of a Notice of Violation. Immediate corrective actions were taken to address all concerns. The Major Petroleum Facility was found to be in substantial compliance with the license; however, several minor issues were identified. Corrective actions were implemented to address these issues.

3.1 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

Brookhaven National Laboratory is subject to more than 50 sets of federal, state, and local environmental regulations; 65 site-specific permits; and several other binding agreements. The federal, state, and local environmental statutes and regulations that BNL operates under are summarized in Table 3-1, along with a discussion of BNL's compliance status with regard to each requirement.

3.2 ENVIRONMENTAL PERMITS

3.2.1 EXISTING PERMITS

Many processes and facilities at BNL operate under permits issued by environmental regulatory agencies. These permits include:

- State Pollutant Discharge Elimination System (SPDES) permit,
- Major Petroleum Facility (MPF) License,
- Resource Conservation and Recovery Act (RCRA) permit for the Waste Management Facility,
- Registration certificate from the New York State Department of Environmental Conservation (NYSDEC) for tanks storing bulk quantities of hazardous substances,
- NYSDEC certificates for two registered gasoline vapor recovery systems,
- Seven radiological emission authorizations issued under the National Emission Standards for Hazardous Air Pollutants (NESHAPs) by the U.S. Environmental Protection Agency (EPA),
- Forty-seven Certificates to Operate air emission sources from the NYSDEC,
- One NYSDEC NESHAPs permit for asbestos emissions from the Inhalation Toxicology Facility,
- Two permits for construction activities within the Peconic River corridor,
- An Underground Injection Control (UIC) Area permit for the operation of 90 wells,
- A permit for the operation of six domestic water supply wells.

Table 3-2 provides a complete listing of these permits. In addition to those listed, the operation of six groundwater pump and treat systems installed under the Interagency Agreement (Federal Facility Agreement under CERCLA 120, Admin Docket No. II-CERCLA-FFA-00201) is authorized under SPDES and air emission equivalency permits.

In addition to the operating permits, permits are periodically acquired for construction activities. These include well-point dewatering, freshwater wetland, and Wild, Scenic, and Recreational River System Act permits. In 2000, two permit applications were filed with the NYSDEC for work at the Relativistic Heavy Ion Collider (RHIC) facility. The projects included construction of a security fence around the perimeter of the RHIC and the extension of sanitary sewers to the RHIC facilities. Since both projects required crossing the Peconic River, freshwater wetlands, and Wild, Scenic, and Recreational River System Act permits were required.

3.2.2 NEW OR MODIFIED PERMITS, OR PERMIT MODIFICATION REQUESTS

3.2.2.1 STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM (SPDES)

The SPDES permit authorizes discharges from the BNL Sewage Treatment Plant (STP) to the Peconic River, and discharges of cooling and stormwater to recharge basins including those from the RHIC facilities. In November, the Laboratory submitted a request to change the cooling tower corrosion prevention additives. In accordance with the conditions of the permit, all corrosion control chemicals must be reviewed and approved by the NYSDEC. While it is believed that the proposed chemicals are more environmentally benign than existing products, the NYSDEC requested additional information regarding these additives. This review is still pending.

3.2.2.2 AIR

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). During 2000, BNL maintained two state air equivalency permits for environmental restoration projects conducted under CERCLA. These are:

- Operable Unit (OU) I: In December 1998, NYSDEC issued an equivalency permit for the operation of a high vacuum thermal desorption unit. The unit was approved for processing mercury-contaminated mixed soil waste recovered from the OU I Chemical Holes area. It was used from January through mid-summer 2000, at which time all of the waste had been processed.

Table 3-1. Federal, State, and Local Environmental Statutes and Regulations Applicable to BNL (CY 2000).

Regulator: Codified Regulation	Regulatory Program Description	Compliance Status	Report Reference 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 of inactive hazardous waste disposal sites.	In 1989 BNL entered into a tri-party agreement between EPA, NYSDEC, and DOE. Remediation of the BNL site is conducted by the Environmental Restoration Program in accordance with milestones established under this agreement.	2.3.9
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 evaluate 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 the NEPA requirements. The Laboratory has established sitewide procedures for the implementation of NEPA requirements.	3.3
Advisory Council on Historic Preservation: 36 CFR 60 36 CFR 63 36 CFR 79 36 CFR 800 43 CFR 7	The **National Historic Preservation Act** identifies, evaluates, and protects historic properties eligible for listing in the National Register of Historic Places. Historic properties can be archeological sites, historic structures, or historic document records or objects.	The Brookhaven Graphite Research Reactor (BGRR) complex and World War I trenches in the area of the Relativistic Heavy Ion Collider project have been determined to be eligible for inclusion in the National Register of Historic Places. The former Cosmotron building was identified as being potentially eligible in an April 1991 letter from the New York State Historic Preservation Officer (NYSHPO). Any activities involving these facilities are identified through the NEPA process and an evaluation is initiated to determine if the proposed action would impact the features that extend eligibility to these facilities. Some activities associated with the Decontamination and Decommissioning of the BGRR were determined to impact its eligibility, and mitigative actions are proceeding according to a Memorandum of Agreement between DOE and the NYSHPO. BNL is currently developing a Cultural Resource Management Plan to ensure compliance with applicable cultural resource regulations.	3.4
EPA: 40 CFR 50 – 80 40 CFR 82 NYSDEC: 6 NYCRR 200 –258 6 NYCRR 307	The **Clean Air Act** (CAA) and the New York State Environmental Conservation Laws regulate the release of air pollutants through the use of permits and air quality limits. Emissions of radionuclides are regulated by the EPA, under **National Emission Standards for Hazardous Air Pollutants** (NESHAPs) authorizations.	All air emission sources have permits or have been exempted under the New York State air program.	3.5
EPA: 40 CFR 109 –140 40 CFR 230 – 231 40 CFR 401 40 CFR 403 NYSDEC: 6 NYCRR 700 –703 6 NYCRR 750 –758	The **Clean Water Act** (CWA) and corresponding New York State Environmental Conservation Laws seek to improve the quality of surface waters by implementing a permitting program and establishing water quality standards. Wastewater discharges are permitted by NYSDEC.	Permitted discharges include treated sanitary waste, and cooling tower and storm water discharges. With the exception of eleven excursions, these discharges met the State Pollutant Discharge Elimination System permit limits in 2000.	3.6
EPA: 40 CFR 141 – 149 NYSDOH: 10 NYCRR 5	The **Safe Drinking Water Act** (SDWA) and New York State Department of Health standards for public water supplies establish minimum drinking water standards and monitoring requirements. Safe Drinking Water Act requirements are enforced by the Suffolk County Department of Health Services.	BNL maintains a sitewide public water supply. This water supply meets all primary and secondary drinking water standards as well as operational and maintenance requirements.	3.7
EPA: 40 CFR 112 40 CFR 328 40 CFR 355 40 CFR 370 40 CFR 372	The **Oil Pollution Act**, **Emergency Planning and Community Right-to-Know Act** (EPCRA), and the **Superfund Amendment Reauthorization Act** (SARA) require that facilities storing large quantities of petroleum products and/or chemicals prepare emergency planning documents and report the inventory of such chemicals to the EPA, State and Local emergency planning groups.	Since facilities at BNL store or use chemicals or petroleum in quantities exceeding threshold planning quantities, BNL is subject to these requirements. BNL is in full compliance with all emergency planning requirements.	3.8.1 3.8.2

(continued on next page)

Table 3-1. Federal, State, and Local Environmental Statutes and Regulations Applicable to BNL (CY 2000) *(concluded)*.

Regulator: Codified Regulation	Regulatory Program Description	Compliance Status	Report Reference Sections
EPA: 40 CFR 280 NYSDEC: 6 NYCRR 595 – 597 6 NYCRR 611 – 613 SCDHS: SCSC Article 12	Federal, state, and local regulations regulate the storage of chemicals and petroleum products to prevent releases of these materials to the environment.	BNL is subject to a vast set of regulations governing storage of chemicals, petroleum products, and wastes. 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 is working towards achieving full conformance to county codes.	3.8.4 3.8.5 3.8.6
EPA: 40 CFR 260 – 280 NYSDEC: 6 NYCRR 360 - 374	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. While almost all wastes are handled and disposed in accordance with federal and state requirements, audits identified several concerns. These were immediately addressed by corrective actions.	3.9
EPA: 40 CFR 700 – 766	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 NYSDEC: 6NYCRR 320 – 329	The **Federal Insecticide, Fungicide, and Rodenticide Act** (FIFRA) and corresponding New York State regulations govern the manufacture, use, storage, and disposal of pesticides and herbicides, as well as pesticide containers and residuals.	BNL employs New York State-certified pesticide applicators for the application of pesticides and herbicides on the site. Each applicator attends training as needed to maintain all certifications current. Annual reports detailing the types and quantity of pesticides applied are filed by each applicator each year by February 1st.	3.11
DOE: 10 CFR 1022 NYSDEC: 6NYCRR 662 6 NYCRR 663 6 NYCRR 666	DOE regulations govern compliance with floodplain/wetland review requirements. The **New York State Fresh Water Wetlands** and **Wild, Scenic, and Recreational Rivers** regulations govern development in natural water ways. Development or projects occurring within ½ mile of regulated waters are subject to permitting by the NYSDEC.	The BNL is located within the Peconic River watershed and has several jurisdictional wetlands; consequently development of locations in the north and east are subject to permitting by the NYSDEC and review for compliance under DOE wetland/floodplain regulations. During 2000, two projects were permitted under New York State programs.	3.12
U.S. Fish and Wildlife Service: 50 CFR 11 NYSDEC: 6 NYCRR 182	The **Endangered Species Act** and corresponding New York State regulation prohibit activities that would jeopardize the continued existence of an endangered or threatened species, or cause adverse modification to a critical habitat.	One New York State endangered species (the tiger salamander), three threatened (the banded sunfish, the swamp darter, and the stiff goldenrod), and eight species of special concern have been identified onsite. The Laboratory has prepared a Wildlife Resource Management Plan that outlines activities to protect species and enhance their habitats.	3.13

Notes:
CFR = U.S. Code of Federal Regulations
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
NYCRR = New York Codes, Rules, and Regulations
NYSDEC = New York State Department of Environmental Conservation
NYSDOH = New York State Department of Health
SCDHS = Suffolk County Department of Health Services
SCSC = Suffolk County Sanitary Code

- Operable Unit (OU) III: In November 2000, an equivalency permit application was submitted to the NYSDEC for a newly constructed in-well air stripping treatment system designed to remediate groundwater contaminated with volatile organic compounds in OU III. The application was prepared to demonstrate that anticipated airborne emissions associated with the system are properly controlled in conformance with 6 NYCRR 212 air pollution control requirements. The treatment system did not operate in 2000.

Clean Air Act Title V. Under the Clean Air Act (CAA), BNL is defined as a major source of criteria pollutant (NO_x, SO_x) emissions and is required to obtain a Title V operating permit. This permit will consolidate all emission sources and all applicable federal and state regulatory requirements into a single

Table 3-2. BNL Environmental Permits (CY 2000).

Building or Facility	Process/Equipment Designation Description	Permitting Agency and Division	Permit Number	Expiration Date
197	welding shop	NYSDEC-Air Quality	1-472200 3491 19704	04-01-00[a]
197	epoxy coating/curing exhaust	NYSDEC-Air Quality	1-472200 3491 19708	06-08-98[a]
206	cyclone G-10	NYSDEC-Air Quality	1-472200 3491 20601	04-01-00[a]
207	belt sander	NYSDEC-Air Quality	1-472200 3491 20701	04-01-00[a]
244	cyclone collector	NYSDEC-Air Quality	1-472200 3491 24401	01-28-99[a]
422	cyclone collector	NYSDEC-Air Quality	1-472200 3491 42202	11-29-96 [a]
422	cyclone collector	NYSDEC-Air Quality	1-472200 3491 42203	11-29-96 [a]
423	stage II vapor recovery	NYSDEC-Air Quality	1-472200 D365 WG	None [b]
423	welding hood	NYSDEC-Air Quality	1-472200 3491 42305	05-15-01
458	paint spray booth	NYSDEC-Air Quality	1-472200 3491 45801	04-23-97[a]
462	machining, grinding exhaust	NYSDEC-Air Quality	1-472200 3491 46201	11-29-96[a]
462	machining, grinding exhaust	NYSDEC-Air Quality	1-472200 3491 46202	11-29-96[a]
473	vapor degreaser & fume hood	NYSDEC-Air Quality	1-472200 3491 47301	03-22-96[c]
479	cyclone G-10	NYSDEC-Air Quality	1-472200 3491 47905	04-01-00[a]
490	Inhalation Toxicology Facility	NYSDEC-NESHAPs	1-472200 3491 49001	05-15-01
490	Inhalation Toxicology Facility	NYSDEC-Air Quality	1-472200 3491 49002	05-15-01[d]
490	lead alloy melting	NYSDEC-Air Quality	1-472200 3491 49003	05-15-01
490	milling machine/block cutter	NYSDEC-Air Quality	1-472200 3491 49004	05-15-01
510	metal cutting exhaust	NYSDEC-Air Quality	1-472200 3491 51002	09-30-98[a]
510	calorimeter enclosure	EPA - NESHAPs	BNL-689-01	None
526	polymer mix booth	NYSDEC-Air Quality	1-472200 3491 52601	04-01-00[a]
526	polymer weighing	NYSDEC-Air Quality	1-472200 3491 52602	04-01-00[a]
535B	plating tank	NYSDEC-Air Quality	1-472200 3491 53501	04-01-00[a]
535B	etching machine	NYSDEC-Air Quality	1-472200 3491 53502	04-01-00[a]
535B	PC board process	NYSDEC-Air Quality	1-472200 3491 53503	05-15-01
535B	welding hood	NYSDEC-Air Quality	1-472200 3491 53504	09-30-98[a]
555	scrubber	NYSDEC-Air Quality	1-472200 3491 55501	04-01-00[d]
555	scrubber	NYSDEC-Air Quality	1-472200 3491 55502	04-01-00[d]
610	combustion unit	NYSDEC-Air Quality	1-472200 3491 6101A	05-15-01
610	combustion unit	NYSDEC-Air Quality	1-472200 3491 61005	05-15-01
610	combustion unit	NYSDEC-Air Quality	1-472200 3491 61006	05-15-01
610	combustion unit	NYSDEC-Air Quality	1-472200 3491 61007	12-18-02
630	stage II vapor recovery	NYSDEC-Air Quality	1-472200 D366 WG	None[b]
703	machining exhaust	NYSDEC-Air Quality	1-472200 3491 70301	05-15-01
705	building ventilation	EPA – NESHAPs	BNL-288-01	None
820	accelerator test facility	EPA – NESHAPs	BNL-589-01	None
865	lead melting pot	NYSDEC Air Quality	472200 3491 86501	01-14-03
902	spray booth exhaust	NYSDEC-Air Quality	472200 3491 90201	09-30-98[a]
902	belt sander	NYSDEC-Air Quality	472200 3491 90202	05-15-01
902	sanding, cutting, drilling	NYSDEC-Air Quality	472200 3491 90203	05-15-01
902	brazing/soldering exhaust	NYSDEC-Air Quality	472200 3491 90204	05-15-01
902	painting/soldering exhaust	NYSDEC-Air Quality	472200 3491 90205	05-15-01
903	cyclone G-10	NYSDEC-Air Quality	472200 3491 90302	04-01-00[a]
903	brazing process exhaust	NYSDEC-Air Quality	472200 3491 90303	09-30-98 [a]
905	machining exhaust	NYSDEC-Air Quality	472200 3491 90503	05-15-01
919A	solder exhaust	NYSDEC-Air Quality	472200 3491 91903	05-15-01
922	cyclone exhaust	NYSDEC-Air Quality	472200 3491 92201	04-01-00[a]
923	electronic equipment cleaning	NYSDEC-Air Quality	submitted 3-93	status pending[e]
924	spray booth exhaust	NYSDEC-Air Quality	472200 3491 92401	09-30-98[f]
924	magnet coil production press	NYSDEC-Air Quality	472200 3491 92402	05-15-01
924	machining exhaust	NYSDEC-Air Quality	472200 3491 92403	05-03-98[a]
930	electroplating/acid etching	NYSDEC-Air Quality	472200 3491 93001	05-15-01[f]
930	bead blaster	NYSDEC-Air Quality	472200 3491 93002	05-15-01
AGS Booster	accelerator	EPA - NESHAPs	BNL-188-01	None
RHIC	accelerator	EPA - NESHAPs	BNL-389-01	None

(continued on next page)

Table 3-2. BNL Environmental Permits (CY 2000) *(concluded)*.

Building or Facility	Process/Equipment Designation Description	Permitting Agency and Division	Permit Number	Expiration Date
RTF		EPA - NESHAPs	BNL-489-01	None
REF/NFB		EPA - NESHAPs	BNL-789-01	None
CSF	major petroleum facility	NYSDEC-Water Quality	1-1700	03-31-02
SPDES	sewage plant & Other Outfalls	NYSDEC-Water Quality	NY-0005835	03-01-05
WMF	waste management	NYSDEC - Hazardous Waste	1-4722-00032/00102-0	07-12-05
BNL Site	chemical tanks- HSBSRC	NYSDEC - Bulk Storage	1-000263	7-27-01
BNL Site	Underground Injection Controls	EPA - Safe	NYU500001	02-11-11
RHIC	Security Fence	NYSDEC - Nat. Res.	1-4722-0032/00117	04-10-03
RHIC	Sewer Extension	NYSDEC - Nat. Res.	1-4722-0032/00123	07/31/04
Plant Engineering	Potable Water Wells	NYSDEC - Nat. Res.	1-4722-00032\00113-0	09/13/08

Notes:
AGS = Alternating Gradient Synchrotron
CSF = Central Steam Facility
EPA = U.S. Environmental Protection Agency
HSBSRC = Hazardous Substance Bulk Storage Registration Certificate
NESHAPs = National Emission Standards for Hazardous Air Pollutants
NYSDEC = New York State Department of Environmental Conservation
REF/NFB = Radiation Effects Facility/Neutral Beam Facility
RHIC = Relativistic Heavy Ion Collider
RTF = Radiation Therapy Facility
STP & RCB = Sewage Treatment Plant and Recharge Basins
WMF = (New) Waste Management Facility

[a] Permits for processes with past due expiration dates have been extended until NYSDEC approves BNL's Title V permit or until the NYSDEC reclassifies the processes as exempt and trivial pursuant to 6 NYCRR Part 201 provisions.
[b] NYSDEC has indicated the process is subject to registration only.
[c] The vapor/sonic degreaser and fume hood shared a common exhaust stack. The degreaser has been removed. The fume hood is still used for aerosol spray coating and wipe cleaning of parts.
[d] Process is not in service.
[e] Response to application never received from the NYSDEC. The process was also included in the BNL Title V permit application.
[f] Process removed from service.

document. The permit application was originally filed in December 1998. After completing an initial quality assurance review of the application, NYSDEC forwarded an Administrative Error Report to BNL in June 1999. The report identified administrative errors that BNL needed to address before the application could be considered complete. The administrative errors in the BNL application were corrected and some minor revisions were made to the application to capture emission sources that were identified during the Process Evaluation Project (see Chapter 2, Section 2.2.2 for a description of this project). An amended permit application was submitted to the NYSDEC in February 2000. Staff from the NYSDEC have examined the revised application and indicated that they expect to issue a draft Title V permit to BNL by the end of June 2001.

3.2.2.3 UNDERGROUND INJECTION CONTROL (UIC)

Under the Safe Drinking Water Act, BNL was required to apply for and obtain an Area Permit for underground injection control wells (e.g., drywells, cesspools, leaching pools). The application required the submittal of an Area permit application, a complete inventory of all UICs, and a map depicting the location of each of the UICs. An application was initially filed in December 1998 and revised in September 1999. The application was approved in August 2000 with the issuance of a draft permit. A final permit was issued in January 2001. This permit authorizes the operation of 90 UICs, including 86 stormwater drywells and 4 small sanitary systems.

3.3 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

NEPA regulations require federal agencies to follow a prescribed process to evaluate the impacts of proposed major federal activities on the environment. This process ensures that the proper level of environmental review is performed before an irreversible commitment of resources is made. During 2000, environmental evaluations were completed for 89 proposed projects. Of these, 71 were considered minor actions requiring no additional documentation. The remaining 18 projects were addressed through submission of Environmental Evaluation Notification Forms to the U.S. Department of Energy (DOE), all resulted in the determination that they were covered by existing Categorical Exclusions as defined by 10 CFR 1021.

Preparation of an Environmental Assessment to evaluate proposed upgrades to the National Synchrotron Light Source, Accelerator Test Facility, and the Source Development Lab continued in 2000.

3.4 NATIONAL HISTORIC PRESERVATION ACT AND ARCHAEOLOGICAL RESOURCE PROTECTION ACT

BNL is subject to several cultural resource laws, most notably the National Historic Preservation Act and the Archeological Resource Protection Act. These acts require federal agencies to identify, evaluate, and consider the effects of federal actions on historical and archeological sites eligible for listing or inclusion on the National Register of Historic Places. The sites may include historic structures, objects, documents, and Native American Indian lands.

The Laboratory currently has three structures or sites that have been determined to be either eligible for listing (the Brookhaven Graphite Research Reactor [BGRR] complex and the World War I training trenches associated with Camp Upton), or may be eligible (the Cosmotron). In January 2000 the New York State Historic Preservation Officer concurred with BNL's determination that WW II era Building 577, located at the Sewage Treatment Plant, was not eligible for listing on the National Register of Historic Places.

During 2000, activities associated with cultural resource management included the following:

- A contract was issued to perform an architectural inventory of BNL buildings and structures in order to identify and evaluate properties for their historic value. The field survey of approximately 440 BNL structures has been completed.
- The location of additional networks of WW I training trenches were identified in 2000. The Laboratory also researched holdings related to Camp Upton at both the Suffolk County Historical Society and the Longwood Public Library.
- A Memorandum of Agreement (MOA) for the Mitigation of the Decommissioning of the BGRR (Desmarais 2000) was approved and signed. BNL began developing the mitigation packages associated with the BGRR MOA, including initiating production of a BGRR history video documentary and contracting the services of a professional archivist to start development of a BGRR Researcher's Guide.
- The concept for a Camp Upton Historic Museum Complex was described in the *BNL Site Master Plan* issued in 2000 (BNL 2000). The museum complex was also designated as an official project of *Save America's Treasures,* which is a White House Millennium Council initiative partnered with the National Trust for Historic Preservation (Green 2000).
- Completion of the annual Department of Interior questionnaire regarding historic/cultural resources.

Additionally in 2000, a project work plan for the development of a Cultural Resources Management Plan was submitted to the DOE Brookhaven Area Office for review. A Cultural Resource Management Plan will provide standards for BNL to efficiently manage historic structures/objects located on BNL property (see Chapter 6, Section 6.9 for additional information).

3.5 CLEAN AIR ACT (CAA)

The objectives of the CAA (administered by the 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

BNL has a variety of nonradioactive air emission sources that are subject to federal or state regulations. The following subsections describe the most significant sources and the methods used by the Laboratory to comply with the applicable regulatory requirements.

3.5.1.1 REASONABLE AVAILABLE CONTROL TECHNOLOGY (RACT)

BNL has four boilers (Nos. 1A, 5, 6, and 7) located at the Central Steam Facility that are subject to NYSDEC RACT requirements. All boilers, except for 1A, are bi-fuel and can burn either residual fuel oil or natural gas. Natural gas was the predominant fuel burned in Boiler 6, while Boilers 5 and 7 burned mostly low nitrogen and sulfur content residual fuel oil.

RACT requirements establish emission standards for oxides of nitrogen (NO_x) for boilers with maximum operating heat inputs greater than or equal to 50 MMBtu/hr (14.6 MW). Compliance requirements are based upon the size of the boilers. Boilers with a maximum operating heat input between 50 and 250 MMBtu/hr (14.6 and 73.2 MW) can demonstrate compliance using periodic emissions tests or by using continuous emission monitoring equipment. Emission tests conducted in 1995 confirmed that BNL Boilers 1A and 5, both of which have maximum operating heat inputs less than 250 MMBtu/hr (73.2 MW), met the NO_x emission standards when burning low nitrogen and sulfur content residual fuel oil (below 0.3%). To ensure continued compliance, an outside contractor laboratory analyzed composite samples of fuel deliveries (collected quarterly) and confirmed that the fuel-bound nitrogen and sulfur content met these requirements. Compliance with the 0.30 lbs/MMBtu (130 ng/J) NO_x emissions standards for Boilers 6 and 7 was demonstrated by continuous emission monitoring of the flue gas. For the year 2000, NO_x emissions from Boilers 6 and 7 averaged 0.120 lbs/MMBtu (52 ng/J) and 0.232 lbs/MMBtu (101 ng/J), respectively, and there were no recorded exceedances of the NO_x emissions standard for either boiler.

3.5.1.2 OZONE DEPLETING SUBSTANCES

All refrigerant recovery and recycling equipment used by refrigerant service technicians is certified to meet refrigerant evacuation levels specified by 40 CFR 82.158. Under the preventative maintenance program, refrigeration and air conditioning equipment containing ozone-depleting substances is regularly inspected and maintained. As a matter of standard practice, if a refrigerant leak is found, technicians will either immediately repair the leak, or isolate the leak and prepare a work order for the needed repairs. This practice exceeds the leak repair provisions of 40 CFR 82.156.

Approximately 1,710 pounds (776 kg) of R-11, 12 pounds (5 kg) of R-12, and 434 pounds (197 kg) of R-22 refrigerants were recovered and reclaimed for future use from equipment that was serviced during 2000. More than 1,160 pounds (526 kg) of R-11 were recovered and sent out for reclamation when a 165-ton (149.7 metric tons) and a 350-ton (317.5 metric tons) centrifugal chiller were dismantled and replaced with new 320-ton (290.3 metric tons) and 450-ton (408.2 metric tons) R-123 chiller units, respectively.

3.5.1.3 HALON

Halon 1211 and 1301 are extremely efficient fire suppressants but are no longer acceptable extinguishing media due to their impact on the earth's ozone layer. In 1998 BNL purchased recovery/recycling equipment to comply with the halon recovery and recycling requirements of the CAA, 40 CFR 82 Subpart H. Halon recovery/recycling devices are used when portable fire extinguishers or fixed systems are removed from service and during periodic hydrostatic testing of halon cylinders. In 2000, the device was used to recover Halon 1211 from one portable fire extinguisher that was taken out of service and replaced with an ABC dry chemical extinguisher.

3.5.2 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS)

In 1970 the CAA established standards to protect the general public from pollutants that may result in an increase in mortality or an increase in serious irreversible or incapacitating illnesses. These regulations, known as NESHAPs, were updated significantly in 1990. To protect against the effects of these pollutants, EPA developed a program to limit emissions of 189 toxic air pollutants. This program includes a list of regulated contaminants, a schedule for implementation of 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

During preparation of the BNL Title V Phase II application, the Laboratory reviewed existing state and federal regulations administered under the CAA to determine applicability to BNL activities and operations. Based on this review, it was concluded no proposed or promulgated Maximum Available Control Technology standards were applicable to BNL operations. Additional evaluation conducted in 2000 determined that no Maximum Avail-

able Control Technology standards were applicable to anticipated emissions from proposed activities or operations.

3.5.2.2 ASBESTOS

As required, BNL provided advance notice to the EPA Region II office regarding the demolition of three structures, none of which were constructed with asbestos containing materials. The Laboratory also provided the EPA with an annual notice of unscheduled small renovations for 2000 involving asbestos containing materials. During 2000, 821 linear feet (299 meters) of asbestos-containing pipe insulation and 23 square feet (2.1 square meters) of asbestos-containing surface material were removed and disposed of in accordance with requirements.

3.5.2.3 RADIOACTIVE AIRBORNE EMISSIONS

Emissions of radiological contaminants are evaluated, and if necessary monitored, to ensure that there is no impact to the environment resulting from these emissions. A full description of the monitoring conducted in 2000 is provided in Chapter 4. All data pertaining to radioactive air emissions and dose calculations were transmitted to EPA on schedule, in fulfillment of the June 30 annual reporting requirement. In 2000, the maximum offsite dose due to airborne radioactive emissions from the Laboratory continued to be far below the 10 mrem (100 μSv) annual dose limit specified in 40 CFR 61 Subpart H (see Chapter 4 for more information on the estimated air dose). The dose to the maximally exposed individual resulting from airborne emissions, calculated using EPA's CAP88-PC (CAA Assessment Package-2000) model, was 0.18 mrem (1.8 μSV) (see Section 8.2.4).

3.6 CLEAN WATER ACT (CWA)

The disposal of wastewater by Laboratory operations is regulated under the CWA, as implemented by NYSDEC and under DOE Order 5400.5 (1990). The goal of the CWA is 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. The NYSDEC SPDES permit regulates wastewater effluents at BNL. This permit establishes release concentration limits and specifies monitoring requirements.

The BNL SPDES permit was renewed in September 1999 with an effective date of March 1, 2000. This permit provides monitoring requirements and specifies effluent limits for 12 of 14 outfalls:

- Outfall 001 is the discharge of treated effluent from the Sewage Treatment Plant (STP) to the Peconic River.
- Outfalls 002, 002A, 002B, 003, 004, 005, 006A, 006B, 008, 010, and 011 are recharge basins used for the discharge of cooling tower blowdown, once-through cooling water, and/or stormwater. There was no monitoring of Outfalls 002A and 002B in 2000 since the RHIC cooling towers operated infrequently. No monitoring requirements are imposed for Outfall 011.
- Outfall 007 receives backwash water from the potable Water Treatment Plant filter building.
- Outfall 009 consists of numerous subsurface and surface wastewater disposal systems that receive predominantly sanitary waste, and steam- and air-compressor condensate discharges. There are no monitoring requirements imposed for this outfall.

See Figures 5-2 and 5-7 in Chapter 5 for locations of BNL outfalls.

Each month BNL prepares a Discharge Monitoring Report that reports monitoring data, evaluates compliance with permit limitations and identifies corrective measures taken to address permit excursions. This report is submitted directly to the NYSDEC central and regional offices, and the Suffolk County Department of Health Services.

3.6.1 OUTFALL 001 - SEWAGE TREATMENT PLANT (STP)

Sanitary and process wastewater generated by Laboratory operations is conveyed to the STP for treatment prior to discharge to the Peconic River. The STP provides tertiary treatment of sanitary and process wastewater (i.e., biological reduction of organic matter and reduction of nitrogen). This treatment process became fully functional in 1998. Chapter 5, Section 5.2 provides a detailed description of the treatment process.

A summary of the non-radiological monitoring results for the STP discharge at Outfall 001 is provided in Table 3-3. The

relevant SPDES permit limits are also shown. BNL monitors the STP discharge for over 100 parameters monthly and well over 200 parameters quarterly. While BNL documents better than 99% overall compliance with effluent limits, there were eight reported exceedances of SPDES permit limits in 2000. Inorganic excursions were the most predominant type of permit exceedance in 2000. Excursions were as follows:

- *Zinc*. Zinc in the STP discharge exceeded permit limits on four occasions, two in May and two in December. The source of the zinc excursions is currently under investigation. One potential source being reviewed is the sewage piping system upgrades started in late 1999. This project involved the removal of roots, the cleaning of the lines, and the replacement or relining of pipes with a fiberglass sleeve in damaged areas. Experimental and operational sources are also being reviewed to ensure wastewater is being properly managed at the source.
- *Iron*. Iron was detected in June at a concentration of 0.5 mg/L. Iron was most likely due to discharge of natural sediments released during excavation of sand filters.
- *Percent Suspended Solids (TSS) Removal*. There was one permit excursion for TSS removal in 2000. The BNL SPDES permit requires that 85% of all incoming suspended solids be removed during the treatment process. Due to low levels of solids in the influent, 85% reduction cannot always be documented due to the limitations of the analytical methods.
- *Average and Maximum Fecal Coliform*. The BNL STP uses ultraviolet light disinfection for bacteriological control. This process has operated uninterrupted since its installation in 1998 and has proven highly effective for control of bacteria. However a single sample collected in 2000 exhibited a fecal coliform concentration of 900 MPN/100 ml. Due to the high efficiency of the disinfection system and its proven performance and continuous operation, this excursion is suspect and may be the result of cross contamination or contamination of sample collection containers or equipment.
- *Perchloroethylene*. While not required by permit, the BNL monitors the STP discharge for 38 organic compounds monthly. With the exception of low level detections of disinfection by-products (e.g., chloroform) organic compounds are not detected in the discharge. In June, a single sample exhibited perchloroethylene at 31 μg/L. This finding was reported to the NYSDEC and exceeds the New York State ambient water quality standards of 5 μg/L. While perchloroethylene is routinely detected in commercial spot removers, the STP process should remove this contaminant. Based upon STP operational history and review of BNL operations, this result is suspected of resulting from cross contamination either during sample collection or analysis. BNL will continue to monitor for perchloroethylene as part of its routine monitoring program.

Figures 3-1 through 3-6 plot five-year trends for the maximum monthly concentrations of iron, lead, mercury, silver, nickel, and zinc in the STP discharge.

3.6.1.1 CHRONIC TOXICITY TESTING

The SPDES permit requires that the Laboratory conduct whole effluent toxicity testing to ensure that chemicals present in the STP effluent are not toxic to aquatic organisms. The chronic toxicity testing program was initiated in 1993 and continued in 2000. Samples were collected and tested quarterly. The program consists of performing seven-day chronic toxicity tests on two fresh water organisms: water fleas (*Ceriodaphnia dubia*) and fathead minnows (*Pimephales promelas*). Sets of ten animals were exposed to varying concentrations of the STP effluent (100, 50, 25, 12.5, and 6.25%) for seven days in each test. During testing, the size of fish and/or rate of reproduction for the water flea were measured and compared to untreated organisms (i.e., controls). The test results were submitted to NYSDEC for review.

The toxicity data showed there was no acute toxicity exhibited for either organism, nor were any chronic effects, such as changes in growth weight, noted for the minnow. However, in September the rate of reproduction for the water fleas raised in the pure STP effluent was lower than the control group. To assess the reproduction rates of natural organisms in the Peconic River, samples of river water were collected upstream of the STP discharge and analyzed simultaneously in June. The reproduction rates in the pure river water were just over 2 neonates (i.e., offspring) per surviving female

Table 3-3. Analytical Results for Wastewater Discharges to Sewage Treatment Plant Outfall 001 (CY 2000).

Analyte	Min.	Max.	Min. Monitoring Frequency	SPDES Limit	No. of Exceedances	% Compliance*
Max. Temperature (°F)	52	77	Daily	90	0	100
pH (SU)	5.8	7.7	Continuous Recorder	Min. 5.8 Max. 9.0	0	100
Avg. 5-Day BOD (mg/L)	< 2	5	Twice Monthly	10	0	100
Max. 5-Day BOD (mg/L)	< 2	8	Twice Monthly	20	0	100
% BOD Removal	> 83	97	Monthly	85	0[a]	100
Avg. TSS (mg/L)	< 4	< 4	Twice Monthly	10	0	100
Max. TSS (mg/L)	< 4	< 4	Twice Monthly	20	0	100
% TSS Removal	> 73	99	Monthly	85	1[b]	92
Settleable Solids (ml/L)	0.0	0.0	Daily	0.1	0	100
Ammonia Nitrogen (mg/L)	< 0.05	1.1	Twice Monthly	2	0	100
Total Nitrogen (mg/L)	5.8	8.0	Twice Monthly	10	0	100
Total Phosphorus (mg/L)	0.4	1.5	Twice Monthly	NA	0	100
Cyanide (μg/L)	< 10	< 10	Twice Monthly	100	0	100
Copper (mg/L)	0.04	0.06	Twice Monthly	0.15	0	100
Iron (mg/L)	0.01	0.5	Twice Monthly	0.37	1[c]	96
Lead (mg/L)	< 0.001	0.005	Twice Monthly	0.019	0	100
Nickel (mg/L)	0.003	0.01	Twice Monthly	0.11	0	100
Silver (mg/L)	0.001	0.006	Twice Monthly	0.015	0	100
Zinc (mg/L)	0.01	0.15	Twice Monthly	0.1	4[d]	86
Mercury (mg/L)	< 0.0001	0.0002	Twice Monthly	0.0008	0	100
Toluene (μg/L)	< 1	< 1	Twice Monthly	5	0	100
Methylene Chloride (μg/L)	< 1	< 1	Twice Monthly	5	0	100
1,1,1-Trichloroethane (μg/L)	< 1	< 1	Twice Monthly	5	0	100
2-Butanone (μg/L)	< 1	< 5	Twice Monthly	50	0	100
PCBs (μg/L)	< 0.065	0.053	Quarterly	NA	0	100
Max. Flow (MGD)	0.6	1.9	Continuous Recorder	2.3	0	100
Avg. Flow (MGD)	0.5	0.7	Continuous Recorder	NA	0	100
Avg. Fecal Coliform (MPN/100 ml)	< 2	451	Twice Monthly	200	1[e]	96
Max Fecal Coliform (MPN/100 ml)	< 2	900	Twice Monthly	400	1[e]	96

Notes:
See Chapter 5, Figure 5-7 for location of Outfall 001.
* % Compliance = [(Total No. Samples – Total No. Exceedances) / Total No. of Samples] x 100
BOD = Biological Oxygen Demand
MGD = Million Gallons per Day
MPN = Most Probable Number
NA = Not Applicable
SU = Standard Unit
TSS = Total Suspended Solids

[a] The calculated % BOD removal was greater than 83 percent in November. The 5-day BOD results were below the analytical detection limit, and, therefore, the actual percent removal cannot be precisely determined.

[b] A permit exceedance occurred in April due to low levels of solids entering the sewage treatment plant. STP effluent levels of suspended solids were below the permit limits. The February percent removal could not be accurately determined due to the low concentration measured in the influent and effluent to the sewage treatment plant.

[c] A permit exceedance occurred in June of 2000. An investigation revealed that the Plant Engineering Division had performed tests within the sand filter beds at the Sewage Treatment Plant during the last part of May. The filter beds contain elevated levels of iron and therefore this is the most probable cause of the permit violation.

[d] There were permit exceedances in May and December of 2000. The December 2000 violations were most probably due to sewer upgrades being performed onsite during November and December.

[e] A permit exceedance occurred in January of 2000. In 1997 the Sewage Treatment Plant was equipped with an ultraviolet disinfection system, which results in low to nondetectable levels of coliform in the effluent. It is, therefore, thought that the violation was due to contaminated glassware or sampling equipment.

Other: A permit exceedance occurred in June of 2000 at the STP effluent for perchloroethylene. Since this is an unpermitted contaminant, the Laboratory cannot discharge this chemical in any concentration. While perchloroethylene is present in many commercially available spot removers, the STP process should remove this contaminant. Since over the last five years there has never been a detection of this compound, the data is questionable.

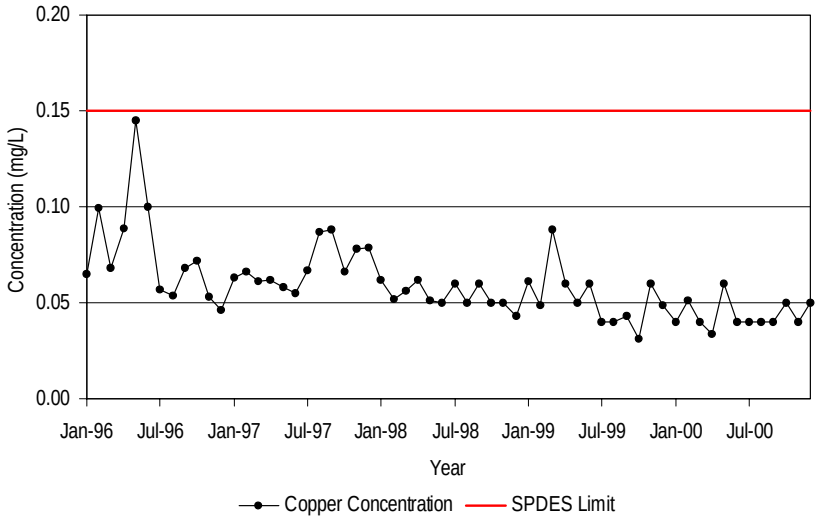


Figure 3-1.
Maximum Concentration of Copper Discharged From the BNL Sewage Treatment Plant, 1996-2000.

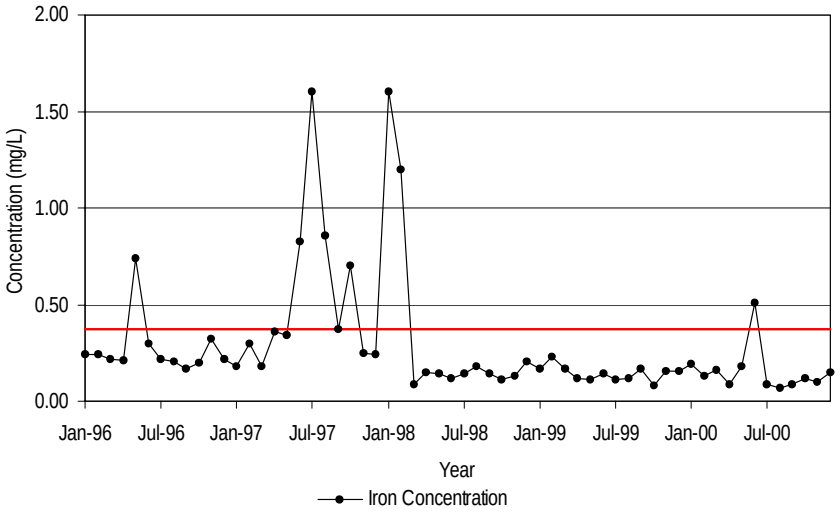


Figure 3-2.
Maximum Concentration of Iron Discharged From the BNL Sewage Treatment Plant, 1996-2000.

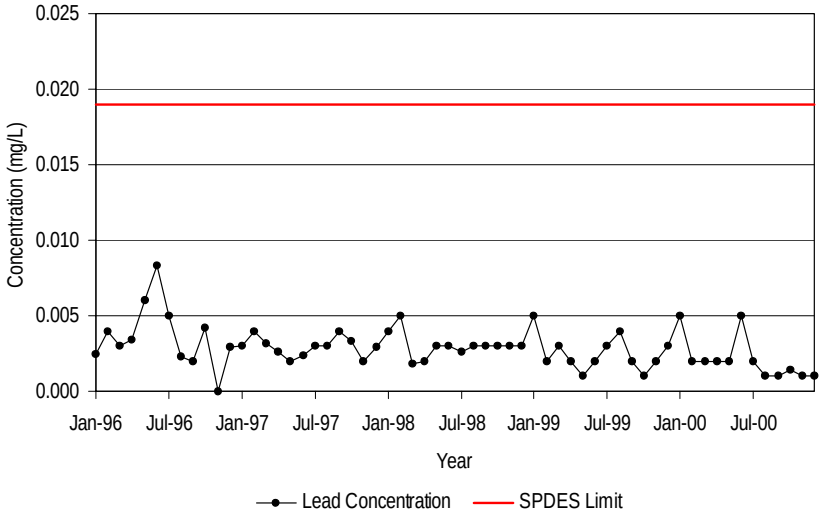


Figure 3-3.
Maximum Concentration of Lead Discharged From the BNL Sewage Treatment Plant, 1996-2000.

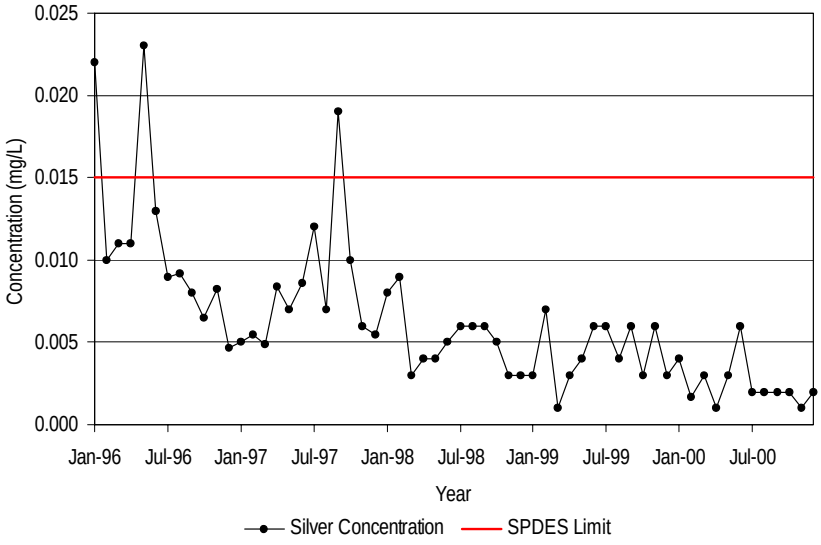


Figure 3-4.
Maximum Concentration of Silver Discharged From the BNL Sewage Treatment Plant, 1996-2000.

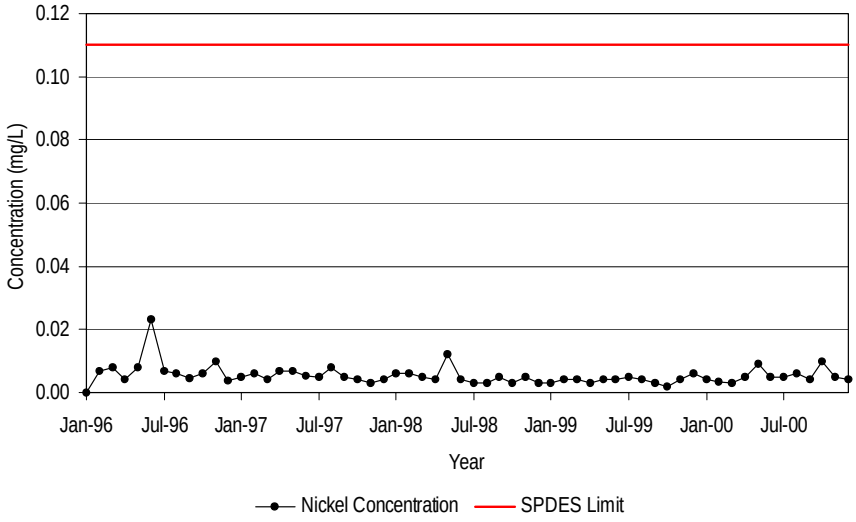


Figure 3-5.
Maximum Concentration of Nickel Discharged From the BNL Sewage Treatment Plant, 1996-2000.

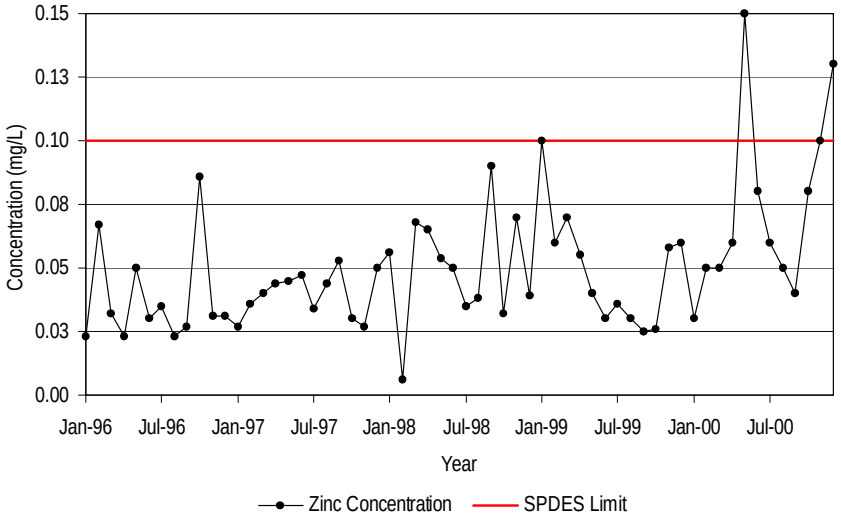


Figure 3-6.
Maximum Concentration of Zinc Discharged From the BNL Sewage Treatment Plant, 1996-2000.

with a survival rate of 40%. Data for the June STP samples showed survival to be 90% with over 15 neonates per organism. These data show that the Peconic River upstream of the STP had a mild negative impact on water flea survival and reproduction when evaluated in an analytical setting.

3.6.2 OUTFALLS 002 - 008 AND 010 — RECHARGE BASINS AND STORMWATER

Outfalls 002 - 008 and 010 discharge 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. There are no monitoring requirements imposed for Outfalls 009 and 011. Monitoring of Outfall 002B was not performed in 2000 and monitoring of Outfall 002A was only conducted in February due to limited operation of the RHIC facility cooling water systems. Table 3-4 summarizes the monitoring requirements along with performance results for 2000.

There were three excursions at these outfalls in 2000. Two were for exceeding effluent limits (oil and grease in Outfall 008, and pH at Outfall 003) and one was for failure to obtain a monitoring result. Elevated pH in the BNL domestic water system was the most probable cause of the pH excursion in Outfall 3. To increase the pH of domestic water and reduce the corrosivity of the water system, hydroxides (either calcium or sodium) are added to the well water. Occasionally, excess lime or caustic is inadvertently added to the system, which results in a slightly elevated pH. The discharge of slightly alkaline wastewater would not be expected to have detrimental effects on groundwater due to the naturally acidic conditions of Long Island groundwater systems. Parking lot runoff from private automobile discharges is the most probable source of the oil and grease violation. The failure to collect and analyze one wastewater sample from Outfall 008 was due to a sampling oversight. Procedures have been established to conduct a closer review of monthly sampling requirements and schedules to prevent any recurrence of this violation.

3.7 SAFE DRINKING WATER ACT (SDWA)

The distribution and supply 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 by the Suffolk County Department of Health Services (SCDHS). Since BNL provides potable water to more than 25 full-time residents, it is subject to the requirements for a public water supply. Monitoring requirements are prescribed annually by SCDHS, and a *Potable Water Sampling and Analysis Plan* (Chaloupka 2000a) is prepared to comply with these requirements. The 1996 amendments to the SDWA required preparation of a source water assessment for all sources of public drinking water. In December 2000, the BNL source water assessment was prepared in satisfaction of this requirement (Bennett *et al.* 2000). The Source Water Assessment is designed as a management tool to further protect the sole source aquifer system underlying the BNL site.

3.7.1 POTABLE WATER

BNL maintains six groundwater wells for onsite distribution of potable water. Groundwater is treated with activated carbon or air stripping to remove volatile organic compounds to meet drinking water standards. Groundwater from three of the six wells is also treated to reduce naturally occurring iron. Figure 3-7 shows the treatment process used for removing iron from groundwater.

BNL monitors the potable wells regularly for bacteria, inorganics, organics, and pesticides as required by NYSDOH regulations. BNL also voluntarily monitors drinking water supplies for radiological contaminants. Tables 3-5 and 3-6 provide the potable water supply monitoring data for 2000. Color and iron exceeded drinking water standards in samples collected from three of the wells prior to distribution. Treatment at the Water Treatment Plant effectively reduced these levels to below drinking water standards. At the point of consumption, all drinking water supplies complied with primary drinking water standards during 2000. Iron was detected in a routine distribution sample collected in July at a concentration of 0.35 mg/L, which slightly exceeds the drinking water standard of 0.30 mg/L. Iron occurs naturally in groundwater and is regulated as an aesthetic contaminant and at high concentrations can lead to staining of laundered clothing and porcelain

Table 3-4. Analytical Data for Wastewater Discharges to Outfalls 002 - 008 and 010 (CY 2000).

Analyte		Outfall 002	Outfall 003	Outfall 004	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 008	Outfall 010	SPDES Limit	No. of Exceed.	% Comp.
Flow	N	CR	CR	CR	CR	CR	CR[a]	CR	11	11			
(MGD)	Min.	0.1	0.1	0.001	0.1	0.0004	0.001	0	0.001	0.0003	NA	NA	
	Max.	0.3	1.1	0.2	0.4	0.3	0.3	0.6	0.9	2.1	NA	NA	
pH	Min.	6.3	6.2	5.9	6.2	6.6	6.8	6.6	6.4	6.3	NA	NA	
(SU)	Max.	8.5	10.1	7.6	8.5	8.9	8.4	7.5	7.9	7.8	8.5, 9.0[b]	1	96
Oil and	N	12	12	NR	12	12	12	NR	11	11			
Grease	Min.	< 5	< 5	NR	< 5	< 5	< 5	NR	< 5	< 5	NA	NA	
(mg/L)	Max.	6.3	6.1	NR	5.9	6.1	6.6	NR	17.3	11.1	15	1	99
Copper	N	NR	NR	NR	4	NR	NR	NR	NR	NR			
(mg/L)	Min.	NR	NR	NR	0.004	NR	NR	NR	NR	NR	NA	NA	
	Max.	NR	NR	NR	0.02	NR	NR	NR	NR	NR	1.0	0	100
Zinc	N	NR	4	NR	NR	NR	NR	NR	NR	NR			
(mg/L)	Min.	NR	0.003	NR	NR	NR	NR	NR	NR	NR	NA	NA	
	Max	NR	0.02	NR	NR	NR	NR	NR	NR	NR	5	0	100
Iron (total)	N	NR	NR	NR	NR	NR	NR	9	NR	NR			
(mg/L)	Min.	NR	NR	NR	NR	NR	NR	80	NR	NR	NA	NA	
	Max.	NR	NR	NR	NR	NR	NR	375	NR	NR	NA	0	100
Iron (dissolved)	N	NR	NR	NR	NR	NR	NR	9	NR	NR			
(mg/L)	Min.	NR	NR	NR	NR	NR	NR	0.2	NR	NR	NA	NA	
	Max.	NR	NR	NR	NR	NR	NR	1.4	NR	NR	NA	0	100
Chloroform	N	4	NR	NR	NR	NR	NR	NR	NR	NR			
(µg/L)	Min.	< 1	NR	NR	NR	NR	NR	NR	NR	NR	NA	NA	
	Max.	< 1	NR	NR	NR	NR	NR	NR	NR	NR	7	0	100
Bromo-	N	4	NR	NR	NR	NR	NR	NR	NR	NR			
dichloromethane	Min.	< 1	NR	NR	NR	NR	NR	NR	NR	NR	NA	NA	
(µg/L)	Max.	< 1	NR	NR	NR	NR	NR	NR	NR	NR	5	0	100
1,1,1-trichloroethane	N	4	4	4	NR	NR	NR	NR	3[c]	NR			
(µg/L)	Min.	< 1	< 1	< 1	NR	NR	NR	NR	< 1	NR	NA	NA	
	Max.	< 1	< 1	< 1	NR	NR	NR	NR	< 1	NR	5	1	93
1,1-dicloroethylene	N	NR	NR	4	NR	NR	NR	NR	3[c]	NR			
(µg/L)	Min.	NR	NR	< 1	NR	NR	NR	NR	< 1	NR	NA	NA	
	Max.	NR	NR	< 1	NR	NR	NR	NR	< 1	NR	5	1	93
Dibromo-nitrilo-	N	NR	4	NR	NR	NR	NR	NR	NR	NR			
propionimide	Min.	NR	< 0.005	NR	NR	NR	NR	NR	NR	NR	NA	NA	
(mg/L)	Max.	NR	< 0.005	NR	NR	NR	NR	NR	NR	NR	0.5	0	100
Hydroxyethylidene-	N	4	4	NR	4	4	4	NR	NR	NR			
diphosphonic Acid	Min.	< 0.05	< 0.05	NR	< 0.05	< 0.05	< 0.05	NR	NR	NR	NA	NA	
(mg/L)	Max.	< 0.05	0.06	NR	0.05	0.006	0.05	NR	NR	NR	0.5	0	100
Tolyltriazole	N	4	4	NR	4	4	4	NR	NR	NR			
(mg/L)	Min.	< 0.005	< 0.005	NR	< 0.005	< 0.005	< 0.005	NR	NR	NR	NA	NA	
	Max.	< 0.005	< 0.005	NR	< 0.005	0.06	< 0.005	NR	NR	NR	0.2	0	100

Notes:
See Chapter 5, Figure 5-7 for locations of outfalls.
There are no monitoring requirements for Outfall 009 and Outfall 011.
CR = Continuous Recorder
MGD = Million Gallons per Day
Max. = Maximum value
Min. = Minimum value
N = Number of samples
NA = Not Applicable
NR = Analysis Not Required
SU = Standard Unit

[a] Flow estimated for part of year due to damaged equipment resulting from a lightning strike.
[b] pH limit is 8.5 for Outfalls 004, 005, 008, and 010. pH limit is 9.0 for Outfalls 002, 003, 006A, 006B, and 007.
[c] Quarterly samples for volatile organic analysis were not collected in June due to sampling error.

How Does BNL Produce Its Drinking Water?

Drawn from wells tapped into Long Island's Glacial Aquifer, BNL's drinking water last year, as in the past, was in full compliance with all county, state, and federal regulations.

In fact, the Lab's Plant Engineering (PE) Division, which is responsible for the Lab's drinking water, is proud to report that Brookhaven's water system has not violated any water quality standard.

So, how does the Lab produce drinking water which is purified, safe, and high quality? And who produces it?

This water is produced with pride by the staff of BNL's Water Treatment Facility (WTF) of the Plant Engineering Division, using what is identified as "federal public water system No. 511891." This community water system is the only source on site of what is called potable water for BNL's transient and resident population of 3,500 people.

The centerpiece of the Lab's drinking water system is the Water Treatment Facility (WTF), located in and around Bldg. 624 on Upton Road. The WTF was built in 1963 to remove iron and manganese from the Lab's source water, but the facility has undergone a series of upgrades over the years, most recently in 1995-96.

While there are six drinking water wells on site, the water from only three wells (numbered 4, 6, and 7) is delivered to the WTF because that water is high in iron. Water from the other three wells (numbered 10, 11, and 12) is low in iron, so that water is distributed directly, after passing through activated carbon filters.

Drinking water production is the role and responsibility of Water System Supervisor Tony Ross, who holds a New York State Department of Health (NYSDOH) grade IA certification. He is assisted by seven water treatment engineers, each having a NYSDOH grade IIA certification. They are: Steve Barcelo, Tom Boucher, Chris Hanley, Jack Kulesa, Richard Lutz, Phil Pizzo, and Joe Tullo. WTF operations are overseen by William Chaloupka, PE Assistant Manager of Operations & Environment. - Marsha Belford

The flow of water through the Lab's supply system and the on-the-job performance of the WTF staff are shown in photos by Roger Stoutenburgh and described below.

1A

1A. WELLS 4, 6, and 7: provide source water high in iron that is "finished" at BNL's Water Treatment Facility (WTF). At one of these wells, Phil Pizzo performs preventive maintenance on pump motor.

1B

1B. CARBON FILTRATION AT WELLS 10, 11, and 12: removes any volatile organic compounds before the low-iron water from these wells directly enters the drinking water distribution system. Noting the pressure of the carbon filtration system is Richard Lutz.

2

2. CHLORINATION: of water from Wells 4,6, and 7 is performed at this point to kill bacteria and oxidize the iron in the water. Iron removal by oxidation and filtration reduces the water's iron concentration from 3 to 4 milligrams per liter (mg/l) to the "finished" water's 0.03 mg/l. Inspecting a liquid sodium hypochlorite storage tank is Joe Tullo.

3

3. AERATION TANK: reduces carbon dioxide gas and aids in the oxidation of iron. At the aeration tank, Steve Barcelo (right) describes the action to Frank Masia.

Figure 3-7. Potable Water Treatment at BNL
(Reproduced with permission from The Bulletin [BNL 2001a]).

4

4. LIME: is added after aeration (no. 3) and before retention (no. 6) to raise the pH and soften the water. Feeding lime into the hopper is Steve Barcelo.

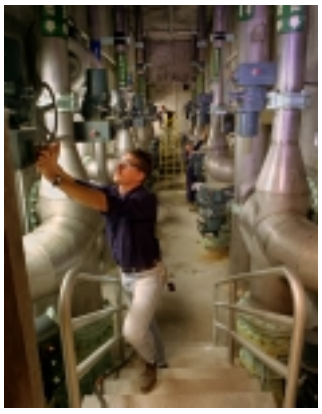
5

5. POLYMER: is also added to the water after aeration to aid in a process called flocculation, whereby very small hydroxide particles stick together to form larger particles, called floc, which are more easily settled and removed (see no. 6). The polymer is mixed with the water in a rapid-mix tank. Steve Barcelo (left) is seen measuring the polymer, while Tom Boucher prepares to mix.

6

6. RETENTION TANK: holds the water long enough to allow the chemicals time to react and form floc. To aid in the formation of floc, the water is then sent to a slow-mix tank. At the retention tank are: (from left) Steve Barcelo, Jack Kulesa (who is checking for floc particles), and Richard Lutz, plus Frank Masia.

7



7. FILTRATION: is performed, using what is called a rapid sand filter made up of eight filter cells containing sand and anthracite. Inspecting the valves in the filtration valve gallery are: (front to back) Jack Kulesa, Richard Lutz, and Steve Barcelo.

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8. WET WELL: stores the filtered water before it is pumped into the air-stripping towers. While Jack Kulesa (background) is seen inspecting the wet-well pump seals, Richard Lutz works on a check valve.

9. AIR-STRIPPING TOWERS: remove any volatile organic compounds (VOCs) from the water undergoing the WTF process by spraying the water down over whiffle ball-like fill while air flows upward through the water spray. Inspecting the towers from the top is Steve Barcelo. Frank Masia looks on from below.

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10. CLEAR WELL: stores what is now called "finished" water before its final chlorination and distribution. Seen taking a water sample at the clear well are Jack Kulesa (right) and Richard Lutz (left).

11. HIGH-SERVICE PUMPS: send the finished water from the WTF to the two water towers on site. Adjusting the flow rate of a high-service pump is Steve Barcelo.

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12. ONE-MILLION-GALLON WATER STORAGE TOWER: as viewed from its base, is the larger of the Lab's two water towers. Built in 1985, and located at Cornell and North Sixth Street, this tank is 126 feet above the ground; its bowl is 75.5 feet in diameter. Located next to Police Headquarters, Bldg. 50, the other water storage tank holds 300,000 gallons and was built for the U.S. Army in 1941, when the site was Camp Upton. Water from the two towers is delivered on site via 45 miles of distribution pipe, which is a mix of cast iron dating from World War II Camp Upton, transite, plastic, and cement-lined ductile iron. When distribution pipe is added or replaced, cement-line ductile iron is used.

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13. TESTING THE QUALITY OF BNL'S DRINKING WATER: at the WTF is Tom Boucher. The Lab's drinking water is tested in various locations weekly, monthly, quarterly, semi-annually, and annually, depending upon the specific test. Test samples are analyzed by certified laboratories, and results are reported to the Suffolk County Department of Health Services, which conducts its own annual tests of all county water systems. In addition, the results are delivered to BNL's Environmental Services Division, which ensures that the Lab's water is in compliance with all applicable regulations. The results are summarized in the Lab's annual Water Quality Consumer Confidence Report (BNL 2001b).

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For answers to frequently asked questions about BNL's drinking water quality, go to www.bnl.gov/bnlweb/pubaf/water/waterFAQ.pdf

Table 3-5. Potable Water Wells and Potable Distribution System: Bacteriological, Inorganic Chemical, and Radiological Analytical Results (CY 2000).

Compound	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Well No. 12	Potable Distribution Sample	NYS DWS
Water Quality Indicators								
Total Coliform	ND	ND	ND	ND	ND	ND	ND	Negative
Color (Units)	40*	50*	20*	5	< 5	< 5	5	15
Odor (Units)	0	0	0	0	0	0	0	3
Cyanide (μg/L)	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NS
Conductivity (mmhos/cm)	105	84	116	184	291	311	221	NS
Chlorides (mg/L)	17.5	12.3	20.7	11.0	21.9	12.3	23.2	250
Sulfates (mg/L)	26.4	16.8	< 5.0	7.7	< 5.0	< 5.0	11.6	250
Nitrates (mg/L)	0.26	0.20	0.32	0.21	0.50	0.41	0.57	10
Nitrites (mg/L)	0.10	0.10	< 0.01	0.02	< 0.01	< 0.01	< 0.01	1.0
Ammonia (mg/L)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	NS
pH (Standard Units)	6.0	6.0	6.0	6.1	6.1	6.8	7.0	NS
MBAS (mg/L)	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	NS
Metals								
Antimony (μg/L)	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 5.9	6.0
Arsenic (μg/L)	1.8	0.8	1.1	< 0.8	< 0.8	< 0.8	< 3.0	50
Barium (mg/L)	0.03	0.02	0.02	0.02	0.03	0.02	0.02	2.0
Beryllium (μg/L)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 3.0	4.0
Cadmium (μg/L)	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 5.0	5.0
Chromium (mg/L)	0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	0.1
Fluoride (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2.2
Iron (mg/L)	6.4 *	4.6 *	1.6 *	0.3	0.01	0.02	0.35	0.3
Lead (μg/L)	1.3	3.6	< 0.5	2.1	0.8	< 0.5	2.2	15
Manganese (mg/L)	0.2	0.08	0.06	0.01	0.001	<0.001	0.2	0.3
Mercury (μg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.2	2.0
Nickel (mg/L)	< 0.002	0.005	0.003	< 0.002	< 0.002	< 0.002	0.004	0.1
Selenium (μg/L)	1.0	0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 5.0	50.0
Sodium (mg/L)	12.4	8.9	11.6	13.4	14.4	11.5	32.2	NS
Silver (μg/L)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	100
Thallium (μg/L)	0.7	0.5	< 0.5	< 0.5	0.6	0.8	< 1.9	2.0
Zinc (mg/L)	0.005	0.02	0.005	0.02	0.005	0.002	0.03	5.0
Radioactivity								
Gross Alpha Activity (pCi/L)	1.1	1.3	< 1.1	1.0	< 1.1	< 1.1	NR	15.0
Beta (pCi/L)	13.1	6.1	3.3	2.8	5.2	5.2	NR	50.0
Tritium (pCi/L)	< 353	< 353	< 353	< 353	< 353	< 353	NR	20,000
Strontium-90 (pCi/L)	< 0.7	< 0.6	< 0.7	< 0.4	< 0.7	< 0.6	NR	8.0
Other								
Asbestos (M. Fibers/L)	NR	NR	NR	NR	NR	NR	< 0.7	7
Calcium (mg/L)	NR	NR	NR	NR	NR	NR	10.5	NS
Alkalinity (mg/L)	NR	NR	NR	NR	NR	NR	60.4	NS

Notes:
See Chapter 7, Figure 7-5 for well locations. This table contains the maximum concentration (minimum pH value) reported by the analytical laboratory.
MBAS = Methylene Blue Active Substances
ND = Not Detected
NR = Analysis Not Required
NS = Drinking Water Standard Not Specified
NYS DWS = New York State Drinking Water Standard
* Wells are treated at the WTP for color and iron reduction prior to site distribution.

fixtures. There are no health effects associated with iron consumed at this level. Section 7.4 of Chapter 7 provides additional data on environmental surveillance testing performed on potable wells. This additional testing exceeds the minimum SDWA testing requirements.

3.7.2 CROSS-CONNECTION CONTROL

The SDWA requires that public water suppliers implement practices to protect the public water supply from sanitary hazards, including the protection of potable water supply connections to systems containing

Table 3-6. Potable Water Wells: Analytical Results for Principal Organic Compounds, Synthetic Organic Chemicals, Pesticides, and Micro-Extractables (CY 2000).

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Well No. 12	NYS DWS
	μg/L							
Dichlorodifluoromethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Chloromethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Vinyl Chloride	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	2
Bromomethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Chloroethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Fluorotrichloromethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,1-dichloroethene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Dichloromethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
trans-1,2-dichloroethene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,1-dichloroethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
cis-1,2-dichloroethene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
2,2-dichloropropane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Bromochloromethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,1,1-trichloroethane	< MDL	< MDL	0.5[a]	< MDL	0.5	1.3	< MDL	5
Carbon Tetrachloride	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,1-dichloropropene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,2-dichloroethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,1,2-trichloroethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,2-dichloropropane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Dibromomethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
trans-1,3-dichloropropene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
cis-1,3-dichloropropene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,1,2-trichloroethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Trihalomethanes	4.3	4.9	1.5	7.2	3.3	< MDL	1.0	100
1,3-dichloropropane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Chlorobenzene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,1,1,2-tetrachloroethane	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Bromobenzene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,2,3-trichloropropane	ND	ND	ND	ND	ND	ND	ND	5
2-chlorotoluene	ND	ND	ND	ND	ND	ND	ND	5
4-chlorotoluene	ND	ND	ND	ND	ND	ND	ND	5
1,3-dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	5
1,4-dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	5
1,2-dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	5
1,2,4-trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	5
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	5
1,2,3-trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	5
Benzene	ND	ND	ND	ND	ND	ND	ND	5
Toluene	ND	ND	ND	ND	ND	ND	ND	5
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	5

(continued on next page)

Table 3-6. Potable Water Wells: Analytical Results for Principal Organic Compounds, Synthetic Organic Chemicals, Pesticides and Micro-Extractables (CY 2000) *(continued)*.

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Well No. 12	NYS DWS
	µg/L							
m-xylene	ND	ND	ND	ND	ND	ND	ND	5
p-xylene	ND	ND	ND	ND	ND	ND	ND	5
o-xylene	ND	ND	ND	ND	ND	ND	ND	5
Styrene	ND	ND	ND	ND	ND	ND	ND	5
Isopropylbenezene	ND	ND	ND	ND	ND	ND	ND	5
n-propylbenzene	ND	ND	ND	ND	ND	ND	ND	5
1,3,5-trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	5
tert-butylbenzene	ND	ND	ND	ND	ND	ND	ND	5
1,2,4-trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	5
sec-butylbenzene	ND	ND	ND	ND	ND	ND	ND	5
p-isopropyltoluene	ND	ND	ND	ND	ND	ND	ND	5
n-butylbenzene	ND	ND	ND	ND	ND	ND	ND	5
methyl tert. Butylether	ND	ND	ND	ND	ND	ND	ND	50
Lindane	ND	ND	ND	ND	ND	ND	ND	0.2
Heptaclor	ND	ND	ND	ND	ND	ND	ND	0.4
Aldrin	ND	ND	ND	ND	ND	ND	ND	5
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	0.2
Dieldrin	ND	ND	ND	ND	ND	ND	ND	5
Endrin	ND	ND	ND	ND	ND	ND	ND	0.2
Methoxychlor	ND	ND	ND	ND	ND	ND	ND	40
Toxaphene	ND	ND	ND	ND	ND	ND	ND	3
Chlordane	ND	ND	ND	ND	ND	ND	ND	2
Total PCB's	ND	ND	ND	ND	ND	ND	ND	0.5
2,4,5,-TP (Silvex)	ND	ND	ND	ND	ND	ND	ND	10
Dinoseb	ND	ND	ND	ND	ND	ND	ND	50
Dalapon	ND	ND	ND	ND	ND	ND	ND	50
Pichloram	ND	ND	ND	ND	ND	ND	ND	50
Dicamba	ND	ND	ND	ND	ND	ND	ND	50
Pentachlorophenol	ND	ND	ND	ND	ND	ND	ND	1
Hexachlorcyclopentadiene	ND	ND	ND	ND	ND	ND	ND	5
Di(2-ethylhexyl)Phthalate	ND	ND	ND	ND	ND	ND	ND	50
Di(2-ethylhexyl)Adipate	ND	ND	ND	ND	ND	ND	ND	50
Hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND	5
Benzo(A)Pyrene	ND	ND	ND	ND	ND	ND	ND	50
Aldicarb Sulfone	ND	ND	ND	ND	ND	ND	ND	SNS
Aldicarb Sulfoxide	ND	ND	ND	ND	ND	ND	ND	SNS
Aldicarb	ND	ND	ND	ND	ND	ND	ND	SNS
Oxamyl	ND	ND	ND	ND	ND	ND	ND	50
3-Hydroxycarbofuran	ND	ND	ND	ND	ND	ND	ND	50
Carbofuran	ND	ND	ND	ND	ND	ND	ND	40

(continued on next page)

Table 3-6. Potable Water Wells: Analytical Results for Principal Organic Compounds, Synthetic Organic Chemicals, Pesticides and Micro-Extractables (CY 2000) *(concluded)*.

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Well No. 12	NYS DWS
	μg/L							
Carbaryl	ND	ND	ND	ND	ND	ND	ND	50
Total Aldicarbs	ND	ND	ND	ND	ND	ND	ND	SNS
Glyphosate	ND	ND	ND	ND	ND	ND	ND	50
Diquat	ND	ND	ND	ND	ND	ND	ND	50
Ethylene Dibromide	ND	ND	ND	ND	ND	ND	ND	0.05
Dibromochloropropane	ND	ND	ND	ND	ND	ND	ND	0.2
2,4,-D	ND	ND	ND	ND	ND	ND	ND	50
Perchlorate	ND	ND	ND	ND	ND	ND	ND	SNS
Alachor	ND	ND	ND	ND	ND	ND	ND	2
Simazine	ND	ND	ND	ND	ND	ND	ND	50
Atrazine	ND	ND	ND	ND	ND	ND	ND	3
Metolachor	ND	ND	ND	ND	ND	ND	ND	50
Metribuzin	ND	ND	ND	ND	ND	ND	ND	50
Butachlor	ND	ND	ND	ND	ND	ND	ND	50
Propachlor	ND	ND	ND	ND	ND	ND	ND	50

Notes:
See Chapter 7, Figure 7-5 for well locations.
For compliance determination with New York State Department of Health standards, potable water samples were analyzed quarterly during the year by H2M 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 standards.
< MDL = Less than the minimum detection limit for the analyte in question
ND = Not detected at the minimum detection limit
SNS = Drinking water standard not specified
NYS DWS = New York State Drinking Water Standard
WTP = Water Treatment Plant
[a] The water obtained from Wells 4, 6, and 7 is treated at the WTP prior to site distribution. The concentration of 1,1,1-trichloroethane in the WTP effluent met all drinking water standards.

hazardous substances (i.e., cross-connections). Such practices include the implementation of a rigorous cross-connection control program. Cross-connection control is the preferred method of protecting a public water system and includes the installation of cross-connection control devices at the interface between a facility and the domestic water main. Installation of cross-connection control devices is required at all facilities where hazardous materials are used in a manner that could result in the introduction of these hazardous substances into the domestic water system, especially under low pressure conditions. In addition, secondary cross-connection controls at the point of use are also recommended to protect users within a specific facility from hazards that might be posed by intrafacility operations.

BNL has installed and maintains over 150 cross-connection control devices at interfaces to the potable water main and secondary control devices at the point of use. All cross-connection control units were tested in 2000. All problems found were corrected, and the devices were retested to ensure proper functioning.

3.7.3 UNDERGROUND INJECTION CONTROL

UIC is regulated under the SDWA. UICs at BNL include drywells, cesspools, septic tanks, and leaching fields, all of which are classified by EPA as Class V injection wells. Proper management of UIC devices is key to the protection of underground sources of drinking water. In New York State, the UIC program is implemented through EPA, since the NYSDEC did not adopt UIC regulatory requirements (New York regulates discharges

of pollutants to cesspools under the SPDES program). Under the EPA's UIC program, all Class V injection wells must be included in an inventory maintained with the agency.

During 2000, the project to inventory and close unnecessary UICs continued with 43 UICs officially closed between 1999 and 2000. The closure of the UICs included the collection and analysis of bottom sediment samples and submittal of formal documentation to EPA requesting closure authorization. One of the 43 UICs required mitigation of low-level petroleum contamination prior to closure. Additionally, samples collected from septic tanks located at Buildings 1006, 1008, and 1010 were found to have elevated concentrations of metals and/or organics that required remediation prior to their closure. Closures of Building 1006 and 1008 UICs were completed in 2000. The Building 1010 UIC closure is expected to be completed in 2001. The 90 remaining UICs were inventoried and included in the UIC Area Permit application submitted to EPA for approval in September 1999. The UIC Area Permit was issued in January 2001, as discussed in Section 3.2.2.3 of this chapter.

3.8 SPILL PREVENTION, EMERGENCY PLANNING, AND REPORTING

Several federal, state, and local regulations address management of storage facilities containing chemicals, petroleum, and other hazardous materials. These regulations include specifications for storage facilities, release reporting requirements, and release planning document requirements. The following subsections describe BNL's compliance with these regulations.

3.8.1 OIL POLLUTION ACT AND SPILL PREVENTION CONTROL AND COUNTERMEASURES (SPCC) PLAN

The Laboratory must maintain a SPCC Plan as a condition of its Major Petroleum Facility License and as required by the Oil Pollution Act. This plan is part of BNL's emergency preparedness program and outlines mitigating and remedial actions that would be taken in the event of a major petroleum release. The plan also provides information regarding the design of storage facilities, release prevention measures, and maps detailing the location of all storage facilities. The SPCC Plan is filed with NYSDEC, EPA, and DOE. The plan is updated triennially and was last updated in December 2000 (Chaloupka 2000b). BNL remained in full compliance with the SPCC requirements in 2000.

BNL also maintains a facility response plan that outlines emergency response procedures implemented in the event of a worst-case discharge of oil. The EPA reviewed this plan in 2000 and identified several technical deficiencies and formatting issues. Response to the deficiencies was handled in two phases. Phase I addressed simple changes to the plan, including providing cross-referencing to address format issues and updating outdated information. Phase II was a complete plan update that was submitted to EPA in December as part of the SPCC Plan.

3.8.2 EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA) AND THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III REPORTING REQUIREMENTS

The Emergency Planning and Community Right-to-Know Act (EPCRA) (42 USC 11001) and Title III of the Superfund Amendments and Reauthorization Act (SARA), require reporting of inventories and releases of certain chemicals that exceed specific storage thresholds 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. BNL fully complied with these requirements in 2000 through the submittal of the required reports under EPCRA Sections 302-303, 311-312. During 2000, the Part 313 Toxic Release Inventory thresholds were significantly lowered from 10,000 (4,500 kg) to 10 pounds (4.5 kg) for mercury and polychlorinated biphenyls (PCBs). Consequently, reporting for these two classes of chemicals is required for 2000. In total, 21 pounds (9.5 kg) of mercury and 917 pounds (412.7 kg) of PCBs will be reported under the Form R Toxic

Applicability of EPCRA to BNL

302-303:	Planning Notification	Yes[X]	No[ ]	Not Required [ ]
304:	EHS Release Notification	Yes[ ]	No[ ]	Not Required [X]
311-312:	MSDS/Chemical Inventory	Yes[X]	No[ ]	Not Required [ ]
313:	TRI Reporting	Yes[X]	No[ ]	Not Required [ ]

Release Inventory report which will be submitted by July 1, 2001.

There were no releases of extremely hazardous substances reported under Part 304 during 2000.

3.8.3 SPILL RESPONSE, REPORTABLE RELEASES, AND OCCURRENCES

When a spill of hazardous material occurs, BNL personnel are required to immediately notify the onsite Fire Rescue Group who are trained to respond to such releases. The initial step in spill 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 its reportability. Any release of petroleum products to soils or surface water is reportable to both NYSDEC and SCDHS. In addition, releases of petroleum products greater than 5 gallons (18.9 liters) to outdoor impermeable surfaces or containment areas are also reported. Spills of chemicals in quantities greater than CERCLA reportable quantities are reportable to the National Response Center, NYSDEC, and SCDHS. Remediation of the spill is conducted as necessary to restore the site. For example, if a piece of heavy equipment ruptured a hydraulic line, resulting in a release of hydraulic oil to the soil, immediate actions would be taken to stop the leak, and then the contaminated soil would be excavated and containerized for offsite disposal.

During 2000, there were 57 spills, of which only 16 met external agency reporting criteria. Ten of the reportable releases involved very small volumes of petroleum that reached soils. New York State has a zero tolerance level for releases of oils to soil or water; consequently, spills of just an ounce to soil is reportable. Seven of the ten reported releases resulted from failed hydraulics on heavy equipment or lawn mowers. To prevent future releases, a pollution prevention project was initiated to replace petroleum oils with vegetable-based oils in several of these machines and to replace standard hydraulic hoses with braided stainless steel hoses. The remaining spills were either small volume releases to soil, or releases to containment areas. There were four larger oil spills reported during 2000 that were more than 50 gallons (189.3 liters) each. These included two releases to containment areas (Buildings 1005 and 479) and one release to the floor of Building 912. The last spill was the discovery of non-PCB oil under a tank located near Building 750. This tank was installed in 1965 as an emergency holding tank for reactor secondary cooling water. The oil was purposely added to the soil to prevent corrosion to the underside of the tank. The remaining two spills involved the release of photodeveloper at Building 197 and the release of 8 pounds (3.6 kg) of mercury from a gauge removed from the former Brookhaven Graphite Research Reactor Instrument House. All spills were remediated or otherwise addressed to the satisfaction of NYSDEC; all contaminated residuals were collected, containerized, and disposed.

Table 3-7 provides information on the reportable spills including the date of the spill, material involved, and quantity released. It also includes a summary of the cause and corrective actions taken, and notes whether the spill was reportable to DOE through the Occurrence Reporting and Processing System (ORPS).

In addition to the four chemical or oil spills noted in Table 3-7 as reported through ORPS, there were ten other incidents that were environmental in nature reported to DOE through ORPS. These included:

- Discovery of four groundwater contaminant plumes from various Laboratory facilities. Two of these involved radiological constituents found at the Alternate Gradient Synchrotron facility. The other two plumes involved the detection of volatile organic compounds: one at the public service station and one at Building 830. See Table 3-8 for a description of each.
- Two incidents were related to the handling of hazardous wastes. The first was the incomplete characterization of soils shipped for disposal at Envirocare of Utah, and the second was the issuance of a Notice of Violation for concerns identified during the 2000 annual hazardous waste inspection by the New York State Department of Environmental Conservation.
- Two incidents involved storage of wastewater in tanker trailers containing low levels of radiological contaminants.

Table 3-7. Summary of Chemical and Oil Spill Reports (CY 2000).

BNL Spill Number	Date	Material	Quantity	Report*	Source/Cause and Corrective Actions
00-06	2/11/00	Compressor Oil	≈100 gallons	No	Mechanical failure of a helium compressor oil pump bearing resulted in the release of oil to an area immediately below compressor skid unit in Bldg. 1005H. Spill was contained to immediate area by concrete lip.
00-09	3/7/00	Motor Oil	< 4 quarts	No	Due to an apparent rupture of the oil filter on a private car, oil spilled onto pavement and soil. Speedi-Dri™ was used to absorb the oil from the pavement. Impacted soil was removed and containerized for offsite disposal along with other spill residuals.
00-14	4/11/00	Mercury	≈ 8 pounds	Yes CH-BH-BNL-BNL-2000-0008	Mercury was spotted leaking from a salvage dumpster near Bldg. 704 when a scrap metal vendor attempted to load the dumpster for transit. The mercury leaked from a differential pressure sensor on one of two instruments that had been removed from Bldg. 708 Instrument House and placed in the dumpster for disposal. A metal powder was applied to small pools of mercury that had accumulated on the asphalt pavement outside the dumpster to form an amalgam that was subsequently recovered using a mercury vacuum. The instruments associated with the spill were removed from the dumpster and the mercury within was drained. Beads of mercury on the floor of the dumpster were also recovered with the mercury vacuum. All recovered wastes, including the two instruments, were containerized for offsite disposal.
00-16	4/27/00	Hydraulic Fluid	2 pints	No	A hydraulic line broke on a lawn mower on the lawn east of Bldg. 750. Site Maintenance repaired the mower, and the soil was removed and containerized for offsite disposal.
00-18	5/5/00	Hydraulic Fluid	2-3 quarts	No	While mowing the grass area adjacent to Bldg. 750 (HFBR) cooling tower, a hydraulic hose broke spraying oil, which was under pressure. The operator immediately noticed it and drove the mower to the asphalt and parked the vehicle. Spill pads, Speedi-Dri™,and a 5-gallon bucket were used to minimize additional leakage. Impacted grass and soil were excavated and containerized for offsite disposal.
00-22	5/16/00	Hydraulic Fluid	< 1 pint	No	While driving the lawnmower down Rochester Street, the operator noticed a sudden spray of oil from the engine. The operator immediately pulled the vehicle off the road. Upon inspection, a pinhole leak was identified in a hydraulic hose. Fire/Rescue responded and placed Speedi-Dri™ on the material that had spilled on the road. An absorbent pad and a drip pan were placed under the broken line to catch any additional drips. Impacted soils and other spill residuals were excavated and containerized for offsite disposal.
00-25	6/8/00	Hydraulic Fluid	< 5 gallons	No	While mowing the field behind Bldg. 599, a hydraulic line disconnected resulting in a release of fluid to the grass. The hose was repaired and a sod-cutter used to recover oil-contaminated soils.
00-30	7/15/00	Hydraulic Fluid	≈ 2 gallons	No	Hydraulic fluid leaked to the ground when a hydraulic line on a backhoe failed. A pan was placed under the vehicle until it was removed for repair. Contaminated soil was excavated and placed into a 55-gallon drum for offsite disposal. Oil collected in the drip pan was appropriately disposed.
00-32	7/15/00	Compressor Oil	< 1 gallon	Yes CH-BH-BNL-BNL-2000-0015	Compressor oil leaked onto the basement floor of Bldg. 901 West when a water-cooled air compressor overheated. Some oil discharged from the compressor found its way into an open floor drain in the room that discharged to the BNL STP. A pump was used to recover about one quart of oil caught in the floor drain trap. Spill absorbents were used to remediate the spill. There was no impact to the STP.

(continued on next page)

Table 3-7. Summary of Chemical and Oil Spill Reports (CY 2000) *(concluded)*.

BNL Spill Number	Date	Material	Quantity	ORPS Report*	Source/Cause and Corrective Actions
00-33	7/16/00	Compressor Oil	≈ 7 gallons	No	Compressor oil leaked onto the floor from a helium compressor stored in Bldg. 919. Apparently, the oil began leaking when personnel working in the area accidentally dislodged a ¼-inch hydraulic line. Fire Rescue personnel responded and used absorbent pads and Speedi-Dri™ to recover the spilled product. Contaminated absorbent materials were placed in a 55-gallon drum for offsite disposal.
00-34	7/27/00	Machine Oil	62 gallons	Yes CH-BH-BNL-BNL-2000-0017	During inspection of an access sump for the 70" Vertical Turret Lathe, oil was found. Sixty-two gallons of oil were recovered from the sump. Spill absorbents were used to remove all traces of residual oil. All collected oil and spill absorbents were containerized for offsite disposal.
00-47	10/10/00	Hydraulic Fluid	< 1 pint	No	A contractor was operating an excavator to demolish the HFBR cooling towers when BNL staff noticed a hydraulic line leaking fluid. Most of the oil was contained within a low spot on the equipment but a small volume (described as a few drops) contacted soil. The equipment was stopped and moved onto the pavement. The spill was cleaned up with Speedi-Dri™ and placed into a container. The contractor took ownership of the spill cleanup waste for disposal.
00-48	10/11/00	Oil	Not Determined	No	HFBR aboveground storage tank FA-310 was demolished during the week of October 9, 2000. As anticipated, oil-impregnated soil was found under the base of the tank. In the 1960s, oil was mixed into the soil as a standard construction practice to prevent corrosion to the underside of the steel tank bottom. Removal of the contaminated soils will be completed in 2001.
00-49	10/17/00	Photodeveloper	< 1 gallon	Yes CH-BH-BNL-BNL-2000-0022	The waste transfer line used to transport spent photographic fixer solution from inside Bldg. 197 to the outdoor haz-store shed (portable Bldg. 791) clogged, forcing waste solution out a line vent on the side of Bldg. 197. Solution spilled to the asphalt surface below and on a small patch of soil. Speedi-Dri™ was applied to affected the area and collected by the Fire/Rescue Group for proper disposal.
00-51	11/1/00	Hydraulic Fluid	< 1 gallon	No	A hydraulic line on a front-end loader ruptured, resulting in a release of approximately 1 gallon of hydraulic fluid to the ground. Plant Engineering recovered and containerized all impacted soils.
00-55	12/18/00	Transformer Oil	50 gallons	No	A compression fitting failed on a line leading from a high voltage transformer oil surge tank in Bldg. 912. The spill was cleaned up using absorbent pads and the contaminated absorbents shipped for offsite disposal.

*ORPS Report: Release is reportable to the U.S. Department of Energy under the requirements of DOE Order 232.1A, Occurrence Reporting and Processing of Operations Information.

- One incident involved a spontaneous fire at a CERCLA waste staging area caused by interaction of chemicals removed from former chemical burial sites.
- One incident involved a waste storage tank that overflowed into secondary containment at Building 801 due to a faucet that was left open.

Table 3-8 provides a description for each occurrence. All incidents were addressed through the identification and implementation of corrective actions geared towards the root cause. The groundwater incidents are discussed in further detail in Chapter 7. There were no offsite environmental consequences arising from the ORPS incidents.

3.8.4 MAJOR PETROLEUM FACILITY (MPF) LICENSE

The storage of 2.3 million gallons (8.7 million liters) of petroleum products (principally No. 6 fuel oil) subjects BNL to licensing by NYSDEC. BNL maintains a Major Petro-

leum Facility License for the storage and transfer of oil at the Central Steam Facility. During 2000, BNL remained in full compliance with license requirements. The license requires BNL to monitor groundwater in the vicinity of the seven active aboveground storage tanks that range in size from 60,000 to 600,000 gallons (227,000 to 2,270,000 liters). The license also requires that BNL conduct monthly inspections of storage facilities including testing leak detection and high level monitoring systems, testing secondary containment systems, and periodic inspections of tank integrity. Groundwater monitoring consists of monthly checks for floating products, and twice-yearly tests for semivolatile organic compounds. In 2000, no contaminants or floating products were found in groundwater wells that monitor the MPF. (See Chapter 7 for additional information on groundwater monitoring results.)

Due to scheduling conflicts, an inspection of this facility was not conducted by NYSDEC in 2000, but was performed in January 2001. The inspection noted two conditions that required immediate corrective actions and three conditions requiring corrective actions prior to pending operations. The two conditions requiring immediate action were performance testing of the impressed current cathodic protection system, and inspection of "tell-tales" on Tanks 9 and 10. Tell-tales are access ports installed in the interstitial space of the tank bottoms (these tanks have two bottom layers of steel to prevent leakage to the environment). Both corrective actions were completed within 30 days of the date of inspection. Two of the three remaining corrective actions must be completed prior to returning Tanks 5 and 6 to service. These are the repair of piping and the installation of color-coding at the fill ports. Color-coding of the fill ports was completed within seven days of the inspection. Piping upgrades are expected to be completed by December 2001. The last action was a reminder that in-depth integrity testing of the secondary containment liners is due in June 2001.

3.8.5 CHEMICAL BULK STORAGE

All underground tanks, and all aboveground tanks larger than 185 gallons (700.3 liters) that store specific chemical substances listed in 6 NYCRR 597, must be registered with NYSDEC. BNL holds a Hazardous Substance Bulk Storage Registration Certificate. In total, BNL has 18 registered tanks: 17 aboveground tanks storing water treatment chemicals (for cooling towers, wastewater, or potable water treatment) and one for storing gallium trichloride used in neutrino experiments. The tanks range in size from 475 to 2,000 gallons (1,800 to 7,600 liters). During 2000, three tanks storing cooling water treatment reagents at the High Flux Beam Reactor were drained and will be placed into a "permanently out of service" status until they are removed.

3.8.6 SUFFOLK COUNTY SANITARY CODE ARTICLE 12

Article 12 of the Suffolk County Sanitary Code, administered by the SCDHS, regulates the storage and handling of toxic and hazardous materials in above or underground storage tanks, drum storage facilities, piping systems, and transfer areas (i.e., storage facilities). It specifies design criteria to prevent environmental impacts resulting from spills or leaks. It also specifies administrative requirements, such as labeling for identification purposes, registration, and spill reporting procedures. In 1987, BNL entered into a voluntary Memorandum of Agreement with the SCDHS in which DOE and BNL agreed to conform to the environmental requirements of Article 12.

BNL has 526 active and more than 300 inactive storage facilities listed in the Suffolk county tanks database. Another 48 storage facilities associated with environmental restoration activities conducted under the CERCLA program that are not regulated under Article 12 are included in the county database. BNL storage facilities listed in the database include those storing fuel (some of which are also regulated under the MPF license), wastewater, chemicals, and those used in support of laboratory research.

At of the end of 2000, 131 of the active tanks listed in the Suffolk County database fully conformed with all Article 12 administrative, maintenance, and technical requirements. Approximately 395 active tanks require administrative corrective actions (e.g., corrected registrations, submittal of as-built design plans to SCDHS, proper labeling, etc.) or maintenance (e.g., replacement of light bulbs). Less than one-quarter of these facilities were found to be in technical nonconfor-

Table 3-8. Summary of Other Environmental Occurrence Reports (CY 2000).

ORPS* ID	Date of Occurrence	Occurrence Description	Status
CH-BH-BNL-BNL-2000-0002	1/27/00	Soils removed during the chemical/glass holes project were disposed of by Envirocare of Utah. Prior to shipping, the waste was characterized for chemical and radiological content. However, analysis performed by Envirocare did not corroborate data supplied by BNL. A full evaluation of waste characterization procedures and verification of waste determination was conducted.	Closed: All corrective actions have been completed.
CH-BH-BNL-AGS-2000-0001	2/9/00	An expanded Geoprobe™ survey of a former beam catcher (E-20) located at the AGS confirmed impacts to groundwater from activated soils. Tritium and sodium-22 were found at concentrations two times greater than drinking water standards. Corrective actions included construction of a cap over the affected soils and installation of permanent monitoring wells down stream of the catcher.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2000-0005	3/11/00	A fire occurred at the waste staging area for the chemical/glass holes project. It is speculated that straw that was intermixed with shredded waste ignited due to increased biodegradation of the waste during a warm day. The polyethylene sacks holding the waste were consumed in the fire. A hazard assessment was performed of remaining debris and corrective measures were implemented to prevent recurrence.	Closed: All corrective actions have been completed.
CH-BH-BNL-AGS-2000-0003	4/11/00	During continued evaluation of potential source areas at the AGS, Geoprobes™ installed at the former U-line beam stop identified tritium concentrations two times greater than drinking water standards. The area was capped to prevent further migration of contaminants to groundwater and permanent monitoring wells installed to monitor the facility.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2000-0010	4/25/00	While a tanker trailer was being used for consolidation of wastewater generated during groundwater investigation activities, dunnage was placed beneath the front jacks of the trailer for support. After approximately 40% of the trailer was filled, the jack stands had shifted forward approximately 4 inches, offsetting the load on the dunnage. There were no releases or other accidents resulting from this incident. A Lessons Learned was prepared and field engineers instructed in the findings of this occurrence.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2000-0012	6/16/00	During routine monitoring of wells located downgradient of the public service station (Bldg. 630), petroleum hydrocarbons were detected in groundwater. The source of these contaminants is apparently historical operations. An investigation was conducted to ensure that current operations were not contributing to the detection of contaminants in groundwater.	Open: While the ORPS report has been accepted by DOE, there are several corrective actions that remain open. These will be completed in accordance with a preestablished schedule. All milestones have been met.
CH-BH-BNL-BNL-2000-0014	6/30/00	A Notice of Violation was issued by NYSDEC for deficiencies in hazardous waste management practices identified during the 2000 annual hazardous waste compliance inspection. Since most deficiencies were administrative, they were immediately corrected during the inspection. A critique was held to prevent recurrence.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2000-0018	8/11/00	During a routine survey of the D-waste tanks (wastewater containing low-levels of radioactivity) in Bldg. 801, technicians noted that one of the tanks had overflowed onto the floor. The cause was attributed to a custodian faucet that drained to the D-waste system that was left running. A spring loaded valve was installed to automatically shut the water off.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2000-0020	8/29/00	While moving a tanker trailer containing tritiated wastewater, a technician noticed water splashing from the top access hatch. Closer inspection showed that the hatch had not been secured and was not checked before moving the tanker. Water that reached the pavement evaporated and any residual wiped from the truck exterior and the truck decontaminated. The tanker trailer was enroute to an offsite treatment facility. Procedures were established to ensure that all tankers are secured prior to movement.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2000-0027	12/7/00	Volatile organic compounds were detected in monitoring wells downgradient of Bldg. 830. While the monitoring wells have been sampled since 1989, volatile organic compounds were not detected. During 2000, significant changes to groundwater movement in this area resulted from changes in potable water use. It is speculated that the changes in flow direction are responsible for the recent detection of VOCs in this well. An investigation is underway to ensure that current facility operations are not contributing to this finding. Geoprobe™ wells will be installed to verify the source.	Open: Full characterization of the groundwater plume is ongoing and an investigation into possible sources is ongoing. The investigation is progressing under a preestablished schedule.

*ORPS Report: Release is reportable to the U.S. Department of Energy under the requirements of DOE Order 232.1A, Occurrence Reporting and Processing of Operations Information.

mance with Article 12 requirements (e.g., no secondary containment, no high-level detection). BNL has an ongoing program to upgrade and/or replace existing storage facilities. In 2000, BNL established a project plan to achieve full conformance with Article 12 requirements. The project will provide administrative and technical improvements to approximately 115 active storage facilities. Other upgrades are being addressed through labeling and filing of addendums to the BNL tank inventory (i.e., filing tank registrations), which will continue through 2003.

3.9 RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

The Resource Conservation and Recovery Act (RCRA) regulates hazardous wastes that could present risks to human health or the environment if mismanaged. The regulations are designed to ensure that hazardous wastes are managed from "cradle to grave," that is, from the point of generation to final disposal. In New York State, the RCRA program is delegated to NYSDEC by EPA, but EPA retains an oversight role. BNL is considered a large quantity generator and has a RCRA permit to store hazardous wastes for one year prior to offsite shipment for treatment and disposal. As noted in Chapter 2, BNL has a number of 90-day storage and satellite accumulation areas.

On June 14, 2000, the NYSDEC conducted its annual inspection of the BNL hazardous waste management operations. The NYSDEC issued a notice of violation for seven administrative deficiencies identified during the course of the inspection. Five were immediately corrected before the end of the inspection. The remaining two issues concerned the placement of a waste accumulation area and quality control sampling in accordance with BNL's *Waste Analysis Plan*. Documentation was provided confirming that BNL had addressed all dificiencies noted to the satisfaction of the NYSDEC.

3.9.1 FEDERAL FACILITIES COMPLIANCE ACT (FFCA) SITE TREATMENT PLAN FOR MIXED WASTE

Mixed wastes are considered both hazardous (under RCRA) and radioactive. The FFCA, issued in 1992, requires DOE to work with local regulators to develop a site treatment plan to manage mixed waste. Development of the plan has two purposes: (1) to identify available treatment technologies and disposal facilities (DOE or commercial) able to manage mixed waste produced at federal facilities, and (2) to develop a schedule for treatment and disposal of these waste streams.

BNL updates its Site Treatment Plan for mixed wastes (BNL 1997) annually and submits it to the NYSDEC. The update documents the current mixed waste inventory and describes efforts undertaken to seek new commercial treatment and disposal outlets for various waste streams. Treatment options for most of the mixed waste currently in storage have been identified, and most of the current inventory will be shipped offsite for treatment and disposal in 2001. BNL will continue to update the treatment plan for wastes with no identified disposal pathway.

3.10 TOXIC SUBSTANCE CONTROL ACT (TSCA)

The storage, handling, and use of PCBs (Polychlorinated Biphenyls) are regulated under the Toxic Substances Control Act (TSCA). Capacitors manufactured prior to 1970 that are believed to be oil filled are handled as if they contain PCBs, even when the existence of PCBs cannot be verified through an investigation of manufacturer's records. All equipment containing PCBs must be inventoried, with the exception of small capacitors (less than 3 pounds [1.35 kg]) and items where the concentration of the PCB source material is less than 50 parts per million. This inventory is updated by July 1 of each year. All PCB-containing articles and/or PCB-contaminated equipment must be labeled. BNL responds to any PCB spill in accordance with emergency response procedures. BNL was in compliance with TSCA requirements in 2000. The Laboratory's authorization from EPA to conduct research using PCBs expired on July 31, 2000. The one research project involving PCBs was discontinued, and was reported to EPA. No PCB research was conducted at BNL in 2000.

3.11 FEDERAL INSECTICIDE FUNGICIDE AND RODENTICIDE ACT (FIFRA)

The storage and application of pesticides (insecticides, rodenticides, herbicides, algicides, etc.) is regulated under The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Pesticides at BNL are used to

control undesirable insects, mice, and rats; to control 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 onsite. Herbicide use is minimized wherever possible (e.g., through spot treatment of weeds). All pesticides are applied by Laboratory-employed New York State-certified applicators. By February 1, each applicator files an annual report with NYSDEC detailing insecticide/herbicide use for the previous year.

BNL is in full compliance with FIFRA requirements. In 2000, BNL initiated an integrated pest management review of herbicide and insecticide application practices. In cooperation with the Cornell Cooperative Extension Service, the Laboratory is evaluating opportunities to further reduce pesticide use. Integrated pest management seeks to minimize the application of pesticides by the use of improved prevention and inspection techniques for pest identification rather than broad application, and by the use of reduced-risk pesticides. The review will be completed in the summer of 2001.

3.12 FLOODPLAINS/WETLANDS AND WILD, SCENIC, AND RECREATIONAL RIVERS AND OTHER SPECIAL PERMITS

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

Activities that could require review under the natural resource protection program, including floodplain/wetland review requirements, 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 impact 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, BNL must comply with the permit conditions.

Two activities continued in 2000 that required special permits. The first project was construction of a security fence and improvements to a perimeter road at the RHIC facility. The second project was construction of pumping stations and extension of sanitary mains throughout the RHIC facility. Both projects involved crossing the Peconic River in at least one location. The fencing project was completed in June 2000. The sewer extension project is still in progress and is expected to be completed by the end of 2001.

3.13 ENDANGERED SPECIES ACT

In 1999, NYSDEC revised its list of endangered, threatened, and "species of special concern." The tiger salamander (*Ambystoma t. tigrinum*) is the only state endangered species found at BNL. Tiger salamanders are listed in New York State as endangered 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 bait and pet trade, water level fluctuations, pollution, and general disturbance of breeding sites. BNL has prepared a Wildlife Management Plan (Naidu 1998) that formalizes the strategy and actions needed to protect 14 confirmed tiger salamander breeding locations identified onsite. The strategy includes identifying and mapping habitats, monitoring breeding conditions, improving breeding sites, and controlling activities that could negatively impact breeding.

The banded sunfish (*Enneacanthus obesus*) and swamp darter (*Etheostoma fusiforme*) are found in the Peconic River drainage areas onsite at BNL. Both are listed as state threatened species within New York State. The reason for this status is that the only remaining populations of these fish in New York are on eastern Long Island. Measures being taken by BNL to protect the banded sunfish and swamp darter and their habitat include:

- eliminating, reducing, or controlling pollutant discharges,
- upgrading the STP to reduce nitrogen loading in the Peconic (completed in 1998),

- monitoring populations and water quality,
- maintaining adequate flow in the river to enable the fish to survive drought, and
- controlling disturbances.

BNL also has eight species onsite that are listed as "species of special concern." Species of special concern 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. The species of special concern found at BNL include the marbled salamander (*Ambystoma opacum*), the spotted turtle (*Clemmys guttata*), the eastern box turtle (*Terrapene carolina*), the eastern hognosed snake (*Heterodon platyrhinos*), the horned lark (*Eremophila alpestris*), the whip-poor-will (*Caprimulgus vociferus*), the vesper sparrow (*Pooecetes gramineus*), and the grasshopper sparrow (*Ammodramus savannarum*). Management efforts taken 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 onsite. The eastern hognosed snake has only been seen onsite once, in 1994 (LMS 1995). BNL will be evaluating bird populations as part of the management strategy outlined in the Wildlife Management Plan. Data concerning species of special concern will be used appropriately in making management decisions regarding those species. In addition to the above bird species, 19 other bird species listed as species of special concern and two federally threatened species have been observed onsite or flying over the site during spring and fall migrations.

BNL has 17 plant species protected under state law. One is a threatened plant, stiff goldenrod (*Solidago rigida*), and one is a rare plant, narrow-leafed bush clover (*Lespedeza augustifolia*). The other 15 species are considered to be "exploitably vulnerable," which means that they may become threatened or endangered if causal factors resulting in population declines continue. These plants are currently protected at BNL due to the large areas of undeveloped pine barren habitat onsite. Locations of these rare plants must be determined, populations estimated, and management requirements established. Management of protected plants will be included in the future revisions of the Wildlife Management Plan. See Chapter 6 for more information.

3.14 EXTERNAL AUDITS AND OVERSIGHT

A number of federal, state, and local agencies oversee BNL activities. BNL was inspected by federal, state, or local regulators on at least 13 occasions in 2000. These inspections are summarized below. Since 1998, the SCDHS has had two full-time staff members stationed at BNL. They perform routine inspections of facilities and inspect storage facility removals and installations as part of their everyday activities. In addition to external audits and oversight, BNL has a comprehensive self-assessment program as described in Section 2.1.7 of Chapter 2.

3.14.1 INSPECTIONS BY REGULATORY AGENCIES

- *Hazardous Waste*. NYSDEC conducted a RCRA/hazardous waste compliance inspection in June 2000. See Section 3.9 for information regarding this inspection.
- *Air Compliance*. NYSDEC conducted an annual inspection of the Central Steam Facility in February 2000. No findings or issues were identified during this inspection. In January 2000, EPA Region II performed a site inspection to evaluate the status of NESHAPs compliance. Areas inspected included facilities at the AGS, RHIC, the BGRR Decommissioning Project, and the Sewage Treatment Plant. The inspection identified the need to perform a NESHAPs evaluation on the sand filter beds at the Sewage Treatment Plant. This evaluation has been completed.
- *Potable Water*. SCDHS conducts annual inspections of the BNL potable water system to collect samples and ensure that facilities are maintained. There were no findings in 2000. All sample results were within drinking water standards, except for iron, which is naturally occurring. As noted in Section 3.7.1, BNL treats the drinking water supply to remove iron prior to consumption.
- *Sewage Treatment Plant (STP).* SCDHS conducts quarterly inspections of the BNL STP. In 2000, no performance or operational issues were identified during these inspections.

- *Recharge Basins.* As part of SCDHS oversight, quarterly inspections of recharge basins and other SPDES outfalls are conducted by the SCDHS. In 2000, four inspections were conducted. While there were no SPDES issues identified during these inspections, a concern over soil quality at Outfall 005 was raised. Screening for PCBs showed all levels to be less than EPA action levels for soils.
- *Major Petroleum Facility (MPF).* The MPF is inspected annually by NYSDEC. This inspection was conducted in January 2001. See Section 3.8.4 for a discussion of this inspection.

3.14.2 INSPECTIONS BY DEPARTMENT OF ENERGY: HEADQUARTERS, CHICAGO AND BROOKHAVEN AREA OFFICE

DOE Headquarters

DOE Headquarters conducted a review of the Laboratory's overall performance in 2000 as part of a condition contained in the BSA-DOE contract. This review consisted of evaluation of a number of environmental metrics, including the amount of waste produced, number of SPDES permit excursions, releases, etc. The Laboratory exceeded the expectations established by DOE. See Chapter 2 for more information.

DOE Chicago Operations Office

In May 2000, the DOE Chicago Operations Office conducted a verification of BNL's Integrated Safety Management System (ISMS). This comprehensive assessment verified the adequacy of BNL's ISMS in fulfilling the requirements of DOE Policy 450.4 (1996), *Safety Management System Policy* and Department of Energy Acquisition Regulation 970.5204-2 (DEAR 1997), *Integration of Environment, Safety, and Health into Work Planning and Execution*. BNL was the first multi-program Laboratory to achieve verification of ISM with no deficiencies.

Noteworthy practices identified in the verification report [DOE 2000] and the ISMS approval letter included the following:

- The Laboratory's program for clear assignment of Roles, Responsibilities, Accountabilities, and Authorities (R2A2). This program facilitates awareness responsibilities related to Environment, Safety, and Health (ES&H) activities. The R2A2 program also defines the basis to set employee performance goals and measures.
- Demonstrated strong commitment and leadership by BNL senior management to work in a formally agreed-upon partnership with DOE to achieve a shared vision, critical outcomes, performance goals, and objectives and achieve excellence in implementing a mature ISMS.
- The Laboratory's Standards Based Management System (SBMS). The SBMS is a web-based document management system that provides the means to deliver Laboratory policies and procedures. It ensures easy access for Laboratory personnel as well as the interested public.
- The Laboratory's Environmental Management System (EMS). BNL's EMS conforms to ISO 14001 standards, with added emphasis on compliance assurance, community outreach, and pollution prevention. At the time of the verification, BNL had achieved ISO 14001 registration of the RHIC project and was on schedule for registration of other major Laboratory facilities. (Note: Since the ISMS verification, the ISO 14001 registration has been achieved for the major facilities.)

DOE Brookhaven Area Office

The DOE Brookhaven Area Office continued to strengthen their oversight program during 2000 and conducted compliance assessments on lead safety, affirmative procurement, and a review of the environmental subject area regulatory drivers. Several concerns, and areas for improvement were identified during these assessments. Corrective action plans were prepared and are being implemented to address all issues.

3.14.3 ENFORCEMENT ACTIONS AND MOAs

No new consent orders were issued to BNL in 2000. A notice of violation was issued by NYSDEC as a result of the annual RCRA inspection (see discussion in Section 3.9). EPA and DOE signed a voluntary MOA on March 23, 1998, which is discussed in Chapter 2. During 2000, BNL continued to be in full compliance with the terms of the MOA. All existing enforcement actions and MOAs are listed in Table 3-9, along with a summary of their status. BNL believes that it has fully complied with the terms and conditions listed in these actions and has

Table 3-9. Existing Agreements and Enforcement Actions Issued to BNL with Status.

Number	Title	Parties	Effective Date	Status
Enforcement				
Not Applicable	Notice of Noncompliance - Toxic Substances Control Act	EPA and DOE	02/12/98	All required information was submitted to EPA on 10/6/98. The Waste Management Division implemented a revised Hazardous Waste Control Form in 1999. There was no additional activity regarding this Notice in 2000, and efforts have been taken to close it.
Index No. 113-98-01	Compliance Order - Clean Air Act	EPA and DOE	02/24/98 (date of receipt by DOE)	BNL, DOE, and EPA met in May 1998 to review and clarify the issues presented in this Order. Documentation necessary to support Laboratory operations was submitted to EPA prior to the issuance of the Order. There has been no further activity since 1998.
Docket No. UIC-AO-98-01	Administrative Order on Consent – Safe Drinking Water Act	EPA and DOE	03/4/98	This Order was finalized in September 1999. All corrective measures were completed by September 30, 1999, and a draft permit was issued by EPA in August 2000. Upon issuance of the finalized permit, the order was terminated.
CI-8975-03-99	Letter of Complaint	NYSDEC and BNL	03/24/99	NYSDEC cited BNL two administrative and one technical noncompliances with hazardous waste regulations. Specifically, late submittal of a closure certificate for the former Hazardous Waste Management Facility, a missing land disposal restriction code on a manifest, and the unavailability of a communication device in a 90-day storage area. All deficiencies were corrected and a penalty of $2,250 was paid to NYSDEC in 1999. Official closure of this Letter of Complaint is expected from NYSDEC in early 2001.
Not Applicable	Notice of Violation - Resource Conservation and Recovery Act (RCRA)	NYSDEC	06/14/00	A Notice of Violation was issued for deficiencies in hazardous waste management practices. These deficiencies were noted during the 2000 annual hazardous waste compliance inspection conducted by the NYSDEC. This NOV was officially closed by NYSDEC in 2000.
Agreements				
Not Applicable	Suffolk County Agreement	SCDHS, DOE, and BNL		Originally signed on 9/23/87 this Agreement was developed to ensure that the storage and handling of toxic and hazardous materials at BNL is in conformance with the environmental and technical requirements of Suffolk County codes.
Not Applicable	Federal Facilities Compliance Agreement (FFCA) on Mixed Wastes	NYSDEC and DOE	1992 (Updated Annually)	The 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" on 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, RCRA, and the National Environmental Policy Act. All IAG scheduled milestones were met in 2000.
Not Applicable	NYSDEC Stipulated Agreement for NYSDEC Spill No. 96-11117	NYSDEC and BNL	12/2/97	The Laboratory entered into an agreement with the NYSDEC to investigate an unknown source of petroleum contamination on the south side of Building 326 which was discovered during the removal of a propane tank. Monitoring wells were installed and monitored until the spring of 2000 to determine if there were any impacts to groundwater. No impacts were identified and the spill was attributed to historic operations. The NYSDEC concurred with BNL's recommendation to cease monitoring.
Not Applicable	Memorandum of Agreement (MOA) By and Between the U.S. Environmental Protection Agency and the U.S. Department of Energy	EPA and DOE	03/23/98	BNL is currently in full compliance with the terms of the MOA. See Chapter 2 for further discussion.

Notes:
EPA = U.S. Environmental Protection Agency
DOE = U.S. Department of Energy
NYSDEC = New York State Department of Conservation
SCDHS = Suffolk County Department of Health Services

submitted supporting documentation to the regulatory agencies. The Laboratory continues to work with the regulators to close these actions as expeditiously as possible.

REFERENCES

Bennett, D., D. Paquette, K. Klaus, W. Dorsch. 2000. *Brookhaven National Laboratory Source Water Assessment for Drinking Water Supply Wells.* BNL-52608. Brookhaven National Laboratory, Upton, New York. December 2000.

BNL. *1997. BNL Site Treatment Plan.* Brookhaven National Laboratory, Upton, New York. January 1997.

BNL. 2000. *Brookhaven National Laboratory Site Master Plan.* Brookhaven National Laboratory, Upton, New York, November 2000.

BNL. 2001a. Belford, M., *How Does BNL Produce Its Drinking Water? The Bulletin.* 55 (18):2. May 25, 2001. Brookhaven National Laboratory, Upton, New York.

BNL. 2001b. "2001 BNL Water Quality Consumer Confidence Report." *The Bulletin.* Special Supplement, May 25, 2001. Brookhaven National Laboratory, Upton, New York.

Chaloupka, W. 2000a. *Brookhaven National Laboratory 2000 Annual Potable Water Sampling Plan.* Brookhaven National Laboratory, Upton, New York. January 21, 2000.

Chaloupka, W. 2000b. *Brookhaven National Laboratory Spill Prevention Control and Countermeasure Plan.* Brookhaven National Laboratory, Upton, New York. December 15, 2000.

DEAR 970.5204-2. 1997. *Integration of Environment, Safety, and Health into Work Planning and Execution.* Department of Energy Acquisition Regulation. U.S. Department of Energy, Washington, D.C. June 1997.

Desmarais, R. 2000. "MOA Between BHG and New York State Historic Preservation Office Concerning Decommissioning Project." DOE Letter to E.A. Zimmerman, BNL May 3, 2000.

DOE. 2000. *Integrated Safety Management System Assessment of the BNL, Verification.* U.S. Department of Energy, Chicago, May 2000.

DOE Order 5400.5. 1990. *Radiation Protection of the Public and the Environment.* U.S. Department of Energy, Washington, D.C. Change 2: 1-7-93.

DOE Policy 450.4. 1996. *Safety Management System Policy.* U.S. Department of Energy, Washington, D.C. 10-15-96.

EPA. *2000. Federal Facilities Agreement Under CERCLA 120.* Administrative Docket Number II-CERCLA-FFA-00201.

Green, T. 2000. *Save America's Treasures,* Letter to J. Marburger, BNL. November 30, 2000.

Lawler, Matusky, & Skelly Engineers (LMS). 1995. *Phase II Sitewide Biological Inventory Report.* Prepared for the Office of Environmental Restoration, Brookhaven National Laboratory, Upton, New York.

Naidu, J. 1996. *Brookhaven National Laboratory Wildlife Management Plan.* Brookhaven National Laboratory, Upton, NY. December 28, 1998.

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