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; 8 equivalency permits for operation of groundwater remediation systems; and several other binding agreements. In 2001, 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 1,725 pounds 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 affecting groundwater quality. During 2001, liquid effluents discharged to surface water and groundwater met all New York State Pollutant Discharge Elimination System permit requirements with the exception of six excursions at the Sewage Treatment Plant and six at other outfalls. The 12 permit excursions were reported to the New York State Department of Environmental Conservation.

Ten reportable spills of petroleum products occurred on site in 2001. The majority were less than one gallon, and all were cleaned up or addressed to the satisfaction of the state. In addition to petroleum spills, one ethylene glycol spill that exceeded New York State limits and two heat exchange fluid spills that were greater than five gallons were reportable to the state and Suffolk County. BNL underwent 13 environmental audits by external regulatory agencies in 2001. These audits included reviews of petroleum and chemical storage, hazardous waste operations, and air emissions from the Central Steam Facility, as well as inspections of the Sewage Treatment Plant, outfalls and recharge basins, and the potable water system. Of the 1,200 New York State hazardous waste compliance requirements, BNL met all but two, receiving a notice of violation for two administrative deficiencies. Immediate corrective actions were taken to address both concerns. The Major Petroleum Facility was found to be in substantial compliance with the license, although several minor issues were identified. Corrective actions were implemented to address these issues. Similarly, minor nonconformances were identified during the Chemical Bulk Storage inspection conducted by the state. Corrective actions have been identified and the Laboratory continues to work with the New York State Department of Environmental Conservation to resolve open items.

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; 8 equivalency permits for operation of groundwater remediation systems; 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. Table 3-2 provides a complete list of the existing permits, which are briefly described below:

- 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
- Two NYSDEC certificates for 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 NYSDEC Certificates to Operate air emission sources
- One NYSDEC 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
- Eight equivalency permits (four air and four SPDES) for the operation of groundwater remediation systems installed under the Interagency Agreement (Federal Facility Agreement under CERCLA 120, Admin. Docket No. II-CERCLA-FFA-00201).

3.2.2 New or Modified Permits and Requests

3.2.2.1 State Pollutant Discharge Permits

The State Pollutant Discharge Elimination System permit authorizes discharges from the BNL Sewage Treatment Plant (STP) to the Peconic River, and discharges of cooling water and stormwater to recharge basins, including discharges from RHIC facilities. In November, BNL submitted a request to revise the SPDES permit. These revisions included: deletion of Outfalls 002A and 004, since the operations contributing to these releases either ceased or were redirected to another point source; construction of two new recharge basins for increased drainage capacity to prevent overloading of existing basins; increased monitoring to include metals analyses for three existing discharges (Outfalls 002, 008, and 010); decreased monitoring for Outfall 007, as evaluation of iron releases from the Water Treatment Plant has shown no detrimental impact on the environment; and decreased monitoring for corrosion control chemical residuals for Outfall 003, since cooling tower discharges have ceased. Additionally, in June 2001 NYSDEC approved a request that had been made in late 2000 for the use of new corrosion control chemicals in several cooling tower systems.

3.2.2.2 Air Emissions Permits

Air emissions permits are granted by the New York State Department of Environmental Conservation. Permits are issued either as "equivalency" permits for restoration projects conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or as changes to the BNL Title V draft operating permit, which is expected to be issued in final form in January 2002. Permitting activities for 2001 are discussed below.

CERCLA. In July, BNL submitted an equivalency permit application to NYSDEC for a newly constructed air stripping treatment system in Operable Unit III. The treatment

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

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 among EPA, NYSDEC, and DOE. Remediation of the BNL site is conducted by the Environmental Restoration Program in accordance with milestones established under this agreement.	2.3.4.8
Council for Env. Quality: 40 CFR 1500 - 1508 DOE: 10 CFR 1021	The **National Environmental Policy Act** (NEPA) requires federal agencies to follow a prescribed process to 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 documents, records, or objects.	The High Flux Beam Reactor, 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 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 stormwater discharges. With the exception of twelve excursions, these discharges met the State Pollutant Discharge Elimination System permit limits in 2001.	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. SDWA 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 EPA, the 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 3.8.3

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

Regulator: Codified Regulation	Regulatory Program Description	Compliance Status	Report Reference Sections
EPA: 40 CFR 280 NYSDEC: 6 NYCRR 595 – 597 6 NYCRR 611 – 613 SCDHS: SCSC Article 12	Federal, state, and local regulations govern the storage of chemicals and petroleum products to prevent releases of these materials to the environment.	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 toward 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 waterways. Development or projects occurring within ½ mile of regulated waters are subject to permitting by NYSDEC.	BNL is located within the Peconic River watershed and has several jurisdictional wetlands; consequently, development of locations in the north and east is subject to permitting by NYSDEC and review for compliance under DOE wetland/floodplain regulations. During 2001, 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 on site. 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

system was designed to remediate groundwater contaminated with volatile organic compounds (VOCs) that flows toward the site's south boundary. The application stated that anticipated airborne emissions associated with the system will be properly controlled in conformance with 6 NYCRR 212 air pollution control requirements. NYSDEC approved the application in October and the treatment system began operating in November.

Clean Air Act Title V. Under the Clean Air Act Amendments of 1990 (CAAA), BNL is defined as a major emission source of criteria pollutants (NO_x, SO_2) and is required to obtain a Title V operating permit. This permit will consolidate all emission sources and all applicable

Table 3-2. BNL Environmental Permits.

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]

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

Building or Facility	Process/Equipment Designation Description	Permitting Agency and Division	Permit Number	Expiration Date
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
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	sewer extension	NYSDEC - Nat. Res.	1-4722-0032/00123	07/31/04
STP	sewer upgrades	NYSDEC – Nat. Res.	1-4722-00032/00127	06/01/05
Plant Engineering	potable water wells	NYSDEC - Nat. Res.	1-4722-00032\00113-0	09/13/08
CERCLA Projects				
Ou III; So. Boundary and Middle Rd.; Bldg. 518	groundwater treatment system	NYSDEC – SPDES Equiv. NYSDEC – Air Equiv.	1-51-009	3/30/02
Bldg. 868	groundwater treatment system	NYSDEC – Air Equiv.	NA	NA
TR-829	carbon tetrachloride groundwater remediation	NYSDEC – SPDES Equiv.	1-51-009	NA
OS-1	off-site groundwater treatment system	NYSDEC – Operating	NA	NA
OU I; Bldg. 598	groundwater treatment	NYSDEC – SPDES Equiv. NYSDEC – Air Equivalency	1-52-009	10/06
Bldg. 598	tritium pump and recharge	NYSDEC – SPDES Equiv.	1-52-009	3/30/02

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
NA = Not Available or Not Applicable

[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.

federal and state regulatory requirements into a single 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 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 for a description of this project). An amended permit application was submitted to NYSDEC in February 2000 and a notice of complete application was issued to BNL on August 6, 2001. This notice was subsequently published in local newspapers and the public was given an opportunity to comment on the draft permit through September 21. During the public comment period, BNL reviewed the draft permit and requested several minor revisions. No other comments were received by NYSDEC, and EPA did not offer any objections to the terms and conditions of the draft permit. During the last week of December, NYSDEC informed BNL that they expected to address BNL's proposed changes to the draft permit and issue a final Title V operating permit in January 2002.

3.2.2.3 Underground Injection Control Permit

Under the Safe Drinking Water Act, BNL was required to apply for and obtain an Area Permit for Underground Injection Control (UIC) wells (*e.g.*, drywells, cesspools, and leaching pools). The application required the submittal of an Area permit application, a complete inventory of all UICs, and a map depicting their location. An initial application was filed in December 1998 and revised in September 1999. The application was approved in August 2000 with 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. Several changes to the permit occurred in 2001, essentially due to changes in the reported inventory. During 2001, thirteen UICs were closed and applications were filed for the installation of four new devices.

3.3 NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act (NEPA) regulations require federal agencies to evaluate the effects of proposed major federal activities on the environment. The prescribed evaluation process ensures that the proper level of environmental review is performed before an irreversible commitment of resources is made. During 2001, environmental evaluations were completed for 165 proposed projects. Of these, 112 were considered minor actions requiring no additional documentation. The remaining 53 projects were addressed through the submission of Environmental Evaluation Notification Forms to the U.S. Department of Energy. Fifty-two of these evaluations resulted in the determination that they were covered by existing Categorical Exclusions, as defined by 10 CFR 1021. DOE determined that one project, White-tailed Deer Management at BNL, would require an Environmental Assessment (EA). An EA evaluating proposed upgrades to the National Synchrotron Light Source, Accelerator Test Facility, and the Source Development Lab was completed in 2001. Based on the analyses in the EA, DOE issued a Finding of No Significant Impact, determining that the proposed action did not constitute a major federal action significantly affecting the quality of the human environment; therefore, the preparation of an Environmental Impact Statement (EIS) was not required.

3.4 HISTORIC PRESERVATION AND ARCHAEOLOGY

BNL is subject to several cultural resource laws, most notably the National Historic Preservation Act (NHPA) and the Archeological Resource Protection Act (ARPA). 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.

In October 2001, the New York State Historic Preservation Officer concurred with BNL's determination that the High Flux Beam Reactor (HFBR) complex was eligible for listing on the National Register of Historic Places. BNL

has two additional structures or sites that have been determined to be eligible for listing: the Brookhaven Graphite Research Reactor (BGRR) complex and the World War I training trenches and foxholes associated with Camp Upton. During 2001, additional activities associated with NHPA and ARPA compliance included the following:

- In February 2001, BNL accepted receipt of the *Architectural Inventory of the Brookhaven National Laboratory* (Bernstein 2001). BNL had contracted with an off-site vendor to perform an architectural survey to identify and evaluate BNL properties for their historic value. Information developed from this document will be used to identify buildings and structures that may be eligible for listing on the National Register of Historic Places.
- BNL continued to develop documentation associated with the "Memorandum of Agreement (MOA) for the Mitigation of the BGRR Decommissioning" (Desmarais 2000). Production of a video documentary detailing the history of the BGRR occurred in 2001. The contract, which utilized the services of a professional archivist to inventory and appraise BGRR-related records and to develop a *BGRR Researcher's Guide*, was completed in December 2001.
- The annual Department of Interior questionnaire regarding historic and cultural resources was completed.
- In September 2001, the DOE Brookhaven Area Office issued a Federal Archeological Permit to an off-site contractor to perform an archeological survey before the proposed installation of a natural gas pipeline. The authorized period for fieldwork was September 6, 2001 to October 30, 2001.

Chapter 6 contains additional information related to cultural resource management activities.

3.5 CLEAN AIR ACT

The objectives of the Clean Air Act (CAA) that is administered by EPA and NYSDEC are to improve or maintain regional ambient air quality through operational and engineering controls on stationary or mobile sources of air pollution. Both conventional and hazardous air pollutants are regulated under the CAA.

3.5.1 Conventional Air Pollutants

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 BNL to comply with the applicable regulatory requirements.

3.5.1.1 Boiler Emissions

BNL has four boilers (Nos. 1A, 5, 6, and 7) at the Central Steam Facility that are subject to NYSDEC Reasonably Available Control Technology (RACT) requirements. Three of the boilers can burn either residual fuel oil or natural gas; Boiler 1A burns fuel oil only. Natural gas was the predominant fuel burned in Boiler 6, whereas Boilers 5 and 7 burned mostly low nitrogen and sulfur content residual fuel oil.

For boilers with maximum operating heat inputs greater than or equal to 50 MMBtu/hr (14.6 MW), RACT requirements establish emission standards for oxides of nitrogen (NO_x). 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 are in this size category, met the NO_x emission standards when burning low nitrogen and sulfur content residual fuel oil (below 0.3 percent). 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 NO_x emissions standards for Boilers 6 and 7 was demonstrated by continuous emission monitoring of the flue gas. For the year 2001, NO_x emissions from Boilers 6 and 7 averaged 0.110 lbs/MMBtu and 0.245 lbs/MMBtu, respectively, and there were no known exceedances of the NO_x emissions standard for either boiler.

3.5.1.2 Ozone-Depleting Substances

Refrigerants. 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 at BNL, if a refrigerant leak is found, technicians will either immediately repair the leak or isolate it and prepare a work order for the needed repairs. This practice exceeds the leak repair provisions of 40 CFR 82.156.

Approximately 600 pounds of R-11, 2 pounds of R-12, 1,119 pounds of R-22, and 5 pounds of R-123 refrigerants were recovered and reclaimed for future use from equipment that was serviced during 2001. Two 650-ton R-11 centrifugal chillers were taken out of service when Building 555 was connected to the Central Chilled Water Facility for comfort cooling. The refrigerant in these two chillers will be recovered and sent to a refrigerant reclamation facility in 2002.

Halon. Halon 1211 and 1301 are extremely efficient fire suppressants but are no longer acceptable, due to their effect on the earth's ozone layer. In 1998, BNL purchased equipment to comply with the halon recovery and recycling requirements of the CAA, 40 CFR 82 Subpart H. Halon recovery and recycling devices are used when portable fire extinguishers or fixed systems are removed from service and during periodic hydrostatic testing of halon cylinders. In 2001, the Halon 1211 device was used to recover 120 pounds of Halon 1211 from seven portable fire extinguishers that were taken out of service and replaced with ABC dry chemical extinguishers. The recovered Halon 1211 was transferred to a storage tank and is now included in BNL's static inventory.

3.5.2 Hazardous Air Pollutants

In 1970, the Clean Air Act established standards to protect the general public from pollutants that may lead to death or an increase in irreversible or incapacitating illnesses. The National Emissions Standards for Hazardous Air Pollutants, known as NESHAPs, were updated significantly in 1990. EPA developed a program to limit the emissions of 189 toxic air pollutants. This program includes a list of regulated contaminants; a schedule for implementing control requirements; aggressive, technology-based emission standards; industry-specific requirements, special permitting provisions; and a program to address accidental releases. The following subsections describe BNL's compliance with NESHAPs regulations.

3.5.2.1 Maximum Available Control Technology

During preparation of the BNL Title V Phase II application, BNL 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 that no proposed or promulgated Maximum Available Control Technology standards apply to BNL operations. Additional evaluation conducted in 2001 determined that no Maximum Available Control Technology standards apply to anticipated emissions from proposed activities or operations.

3.5.2.2 Asbestos

As required, BNL provided notice to the EPA Region II office regarding the removal of materials that contained asbestos. During 2001, 335 linear feet of asbestos-containing pipe insulation and 10,966 square feet of asbestos-containing surface material were removed and disposed of in accordance with EPA requirements.

3.5.2.3 Radioactive Airborne Emissions

Emissions of radiological contaminants are evaluated and, if necessary, monitored to ensure that they do not affect the environment. A full description of the monitoring conducted by BNL in 2001 is provided in Chapter 4. BNL transmitted all data pertaining to radioactive air emissions and dose calculations to EPA on schedule, in fulfillment of the June 30 annual reporting requirement. In 2001, the maximum off-site dose due to airborne radioactive emissions from the Laboratory continued to be far below the 10 mrem (100 μSv) annual dose limit specified in 40 CFR 61 Subpart H. (See Chapter 8 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 0.137 mrem (1.4 μSV) (see Chapter 8 for more information).

3.6 CLEAN WATER ACT

The disposal of wastewater generated by BNL operations is regulated under the Clean Water Act (CWA), as implemented by NYSDEC and under DOE Order 5400.5 (1990). The goals of the CWA are to achieve a level of water quality that promotes the propagation of fish, shellfish, and wildlife; to provide waters suitable for recreational purposes; and to eliminate the discharge of pollutants into surface waters. New York State was delegated CWA authority in 1975. NYSDEC issues a SPDES permit to regulate 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 and an expiration date of March 1, 2005. This permit provides monitoring requirements and specifies effluent limits for 12 of 14 outfalls, as described below:

- Outfall 001 is the discharge of treated effluent from the STP to the Peconic River.
- Outfalls 002, 002A, 002B, 003, 004, 005, 006A, 006B, 008, 010, and 011 are recharge basins used to discharge cooling tower blowdown, once-through cooling water, and/or stormwater. There was no monitoring of Outfall 002A and very limited monitoring of 002B in 2001 because 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 the 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 Sewage Treatment Plant

Sanitary and process wastewater generated by BNL operations is conveyed to the Sewage Treatment Plant for processing before being discharged 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 provides a detailed description of the treatment process. In 2000, BNL initiated an improvement project at the STP that continued into 2001. This project involves replacing or relining 16,000 lineal feet of piping, constructing a new aerobic solids digester, relining holdup ponds used to hold wastewater suspected of containing contaminants at concentrations that could jeopardize the STP effluent quality, and repairing or replacing piping that serves the sand filtration system.

A summary of the nonradiological 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 more than 100 parameters monthly and well over 200 parameters quarterly. BNL's compliance with effluent limits earned a score of more than 99 percent overall, but there were six reported exceedances of SPDES permit limits in 2001: five for zinc and one for ammonia nitrogen. 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 Zinc Excursions

Excursions for zinc were recorded from January through March. Investigation of these excursions showed that they were attributed to two sources, both of which were a result of sewer line rehabilitation work. The first and most significant source was from the removal of residual sludge from the sewer lines prior to line

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

Analyte	Min.	Max.	Min. Monitoring Frequency	SPDES Limit	No. of Exceedances	% Compliance*
Max. Temperature (°F)	46	81	Daily	90	0	100
pH (SU)	5.8	7.2	Continuous Recorder	Min. 5.8 Max. 9.0	0	100
Avg. 5-Day Biological Oxygen Demand (BOD) (mg/L)	1	7	Twice Monthly	10	0	100
Max. 5-Day BOD (mg/L)	< 2	17	Twice Monthly	20	0	100
% BOD Removal	> 86	> 97	Monthly	85	0	100
Avg. Total Suspended Solids (TSS) (mg/L)	< 4	4.5	Twice Monthly	10	0	100
Max. TSS (mg/L)	< 4	5	Twice Monthly	20	0	100
% TSS Removal	> 89	100	Monthly	85	0	100
Settleable Solids (ml/L)	0.0	0.0	Daily	0.1	0	100
Ammonia Nitrogen (mg/L)	< 0.1	2.9	Twice Monthly	2	1[(a)]	96
Total Nitrogen (mg/L)	5.4	10	Twice Monthly	10	0	100
Total Phosphorus (mg/L)	0.9	1.8	Twice Monthly	NA	0	100
Cyanide (μg/L)	< 10	< 10	Twice Monthly	100	0	100
Copper (mg/L)	0.03	0.07	Twice Monthly	0.15	0	100
Iron (mg/L)	0.15	0.30	Twice Monthly	0.37	0	100
Lead (mg/L)	< 0.001	0.009	Twice Monthly	0.019	0	100
Nickel (mg/L)	0.003	0.006	Twice Monthly	0.11	0	100
Silver (mg/L)	< 0.001	0.003	Twice Monthly	0.015	0	100
Zinc (mg/L)	0.02	0.21	Twice Monthly	0.1	5[(b)]	82
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	2	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	< 0.065	Quarterly	NA	0	100
Max. Flow (MGD)	0.5	0.7	Continuous Recorder	2.3	0	100
Avg. Flow (MGD)	0.4	0.6	Continuous Recorder	NA	0	100
Avg. Fecal Coliform (MPN/100 ml)	< 2	90	Twice Monthly	200	0	100
Max. Fecal Coliform (MPN/100 ml)	< 2	130	Twice Monthly	400	0	100

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
MGD = Million Gallons per Day
MPN = Most Probable Number
NA = Not Applicable
SU = Standard Unit
[(a)] A permit exceedance occurred in October of 2001. The results received from the New York State-certified analytical laboratory exceeded the permit limit, although, BNL process control test results for the same water sample were below the limit. Since routine monitoring of the Sewage Treatment Plant effluent shows ammonia concentrations to be significantly below the permit limit of 2.0 mg/L, the permit exceedance data is questionable.
[(b)] There were permit exceedances in January, February, and March of 2001. The violations are probably due to sewer upgrades being performed on site during this time.

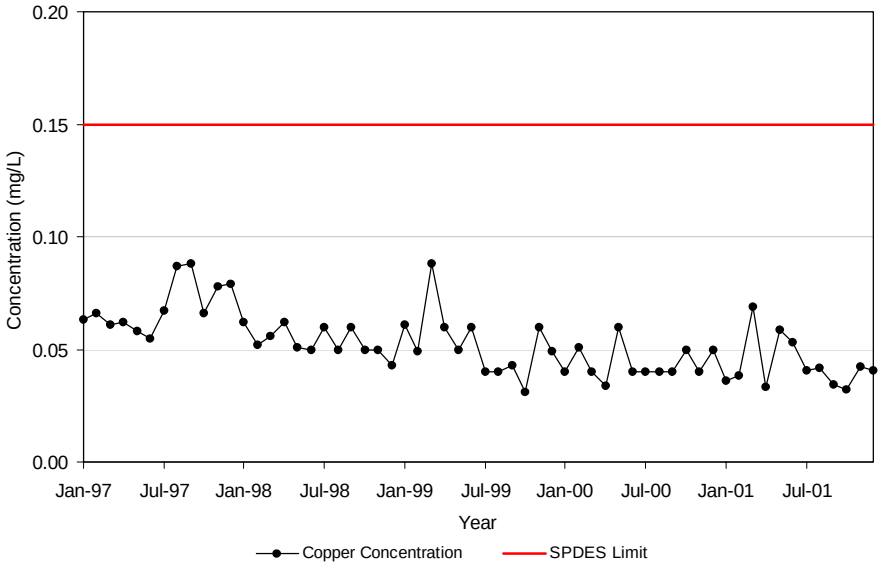

Figure 3-1. Maximum Concentration of Copper Discharged from the BNL Sewage Treatment Plant, 1997–2001.

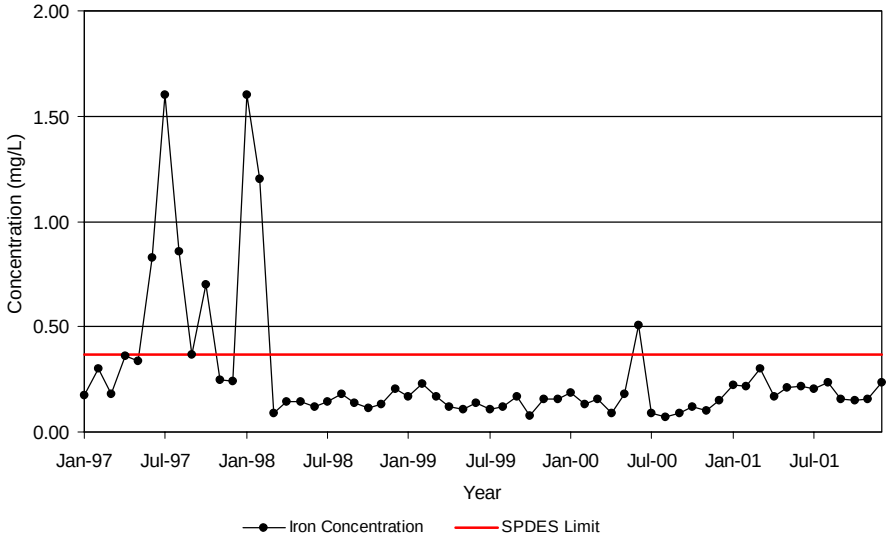

Figure 3-2. Maximum Concentration of Iron Discharged from the BNL Sewage Treatment Plant, 1997–2001.

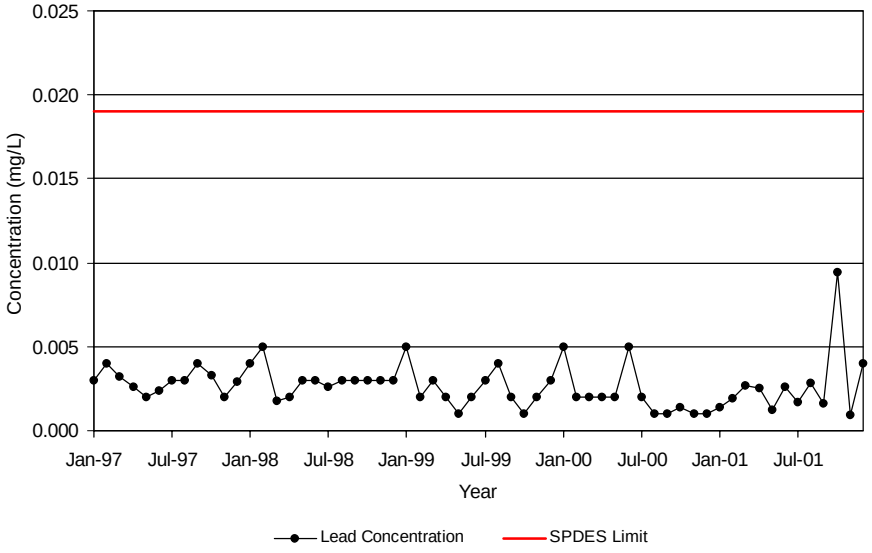

Figure 3-3. Maximum Concentration of Lead Discharged from the BNL Sewage Treatment Plant, 1997–2001.

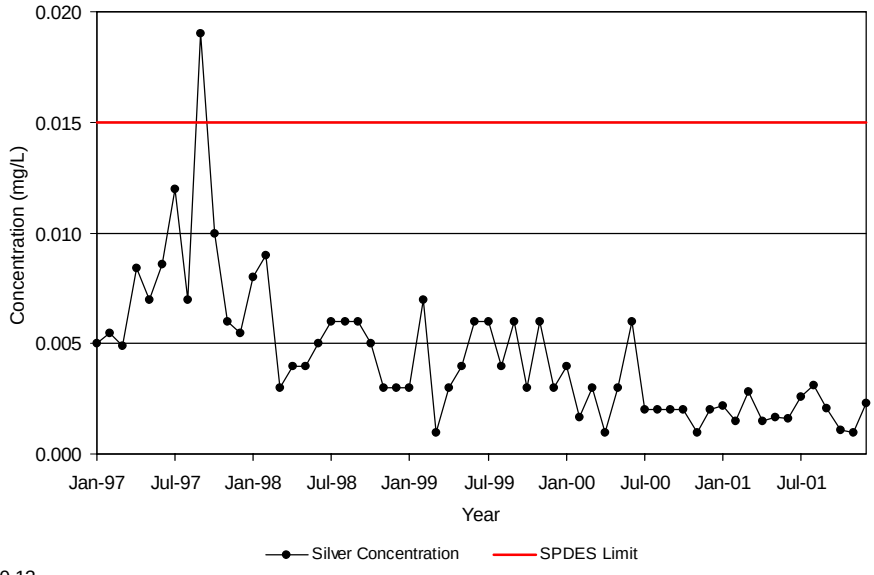

Figure 3-4. Maximum Concentration of Silver Discharged from the BNL Sewage Treatment Plant, 1997–2001.

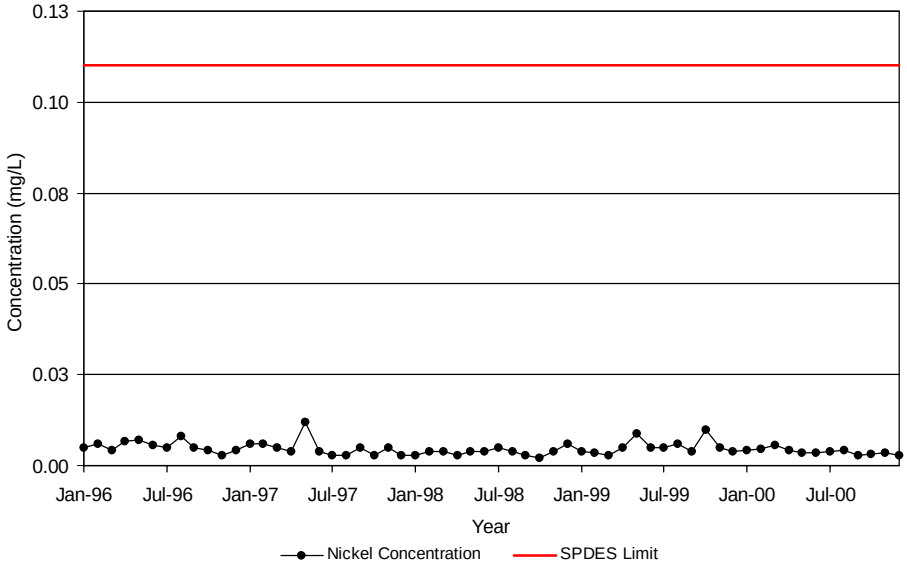

Figure 3-5. Maximum Concentration of Nickel Discharged from the BNL Sewage Treatment Plant, 1997–2001.

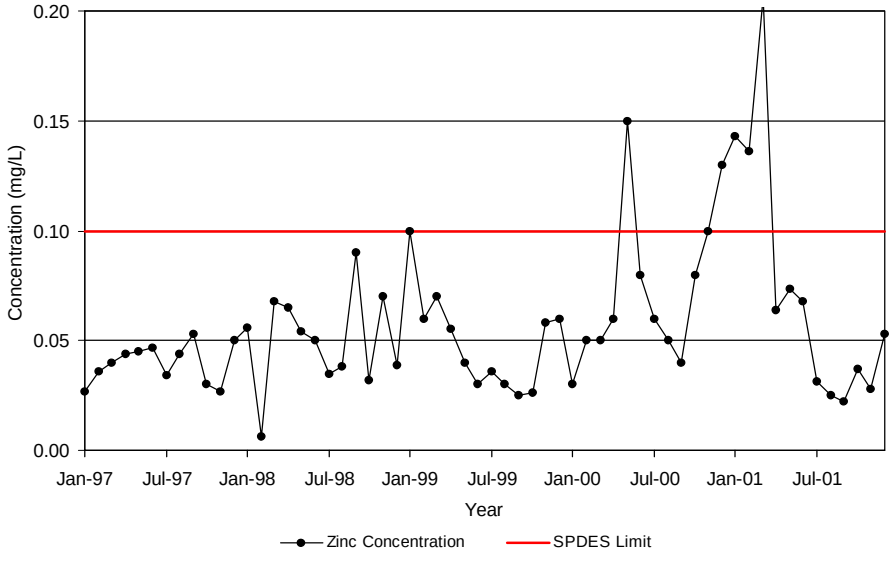

Figure 3-6. Maximum Concentration of Zinc Discharged from the BNL Sewage Treatment Plant, 1997–2001.

replacement. Analysis of the sludge showed it to contain several parts per million of soluble zinc. It is theorized that the zinc dissolved in the wash water used to clean the sewer lines became trapped in the sludge within the clarifiers at the STP. The zinc was then slowly released over several months in the STP effluent. The second source of soluble zinc was the slip lining materials that were used during the sewer line rehabilitation project. Zinc compounds were used in the fabrication of the liner material to prevent the polyethylene from becoming too rigid. Although this was a minor source, it probably contributed to the zinc load in the influent to the sewer plant. When the sewer project ended, the concentration of zinc in the STP effluent returned to normal levels.

3.6.1.2 Ammonia

A sample of STP effluent collected on October 8, 2001 exhibited an ammonia concentration of 2.94 mg/L. This value exceeded the SPDES permit limit of 2.0 mg/L. However, an aliquot of this sample collected by the BNL STP operators on October 8, 2001, as part of routine in-house process control testing, exhibited an ammonia concentration of 0.02 mg/L, and therefore the excursion was considered suspect. There were no other excursions of ammonia found in subsequent samples.

3.6.1.3 Heat Exchange Fluid Loss

In March, the Environmental Services staff was notified of a loss of heat exchange fluid from the Building 902 cooling tower. Building 902 houses several large compressors used in a helium cryogenic cooling system that is used for testing magnets used in facilities like the RHIC. A heat transfer fluid (UCON LB-170X) is used to cool the compressors. The hot heat exchange fluid is cooled using a "shell and tube" heat exchanger, which is cooled by recirculated cooling water provided by the Building 902 cooling tower. To reduce corrosion potential and minimize the buildup of scale, the conductivity of the water in the cooling tower is monitored. When needed, clean water is automatically added to the tower, causing the displaced water to overflow to the sanitary sewer.

In March of 2001, a tube in the heat exchanger failed, releasing approximately 20 gallons of heat exchange fluid to the cooling tower. The tower was secured to prevent further releases and STP staff were notified of the release. Examination of the STP showed that the fluid was evident in the discharge to the Peconic River as a white, persistent foam. To prevent continued release, the STP was placed in a diversion mode and the discharge was collected in the holdup ponds for evaluation. According to information from the fluid manufacturer, the heat exchange fluid has low aquatic toxicity and naturally degrades in 28 days. Analysis of the material contained in the holdup pond showed no detectable fluid after four weeks. The water was subsequently pumped back to the head of the treatment plant for treatment and release. The incident was reported to NYSDEC, DOE, and other regulatory agencies; it was not classified as a permit exceedance.

3.6.1.4 Chronic Toxicity Testing

BNL's SPDES permit requires that "whole effluent toxicity" tests be conducted to ensure that chemicals present in the STP effluent are not toxic to aquatic organisms. BNL's chronic toxicity testing program began in 1993 and continued through 2001. Samples were collected and tested quarterly. The program consists of performing seven-day chronic toxicity tests on two freshwater organisms: water fleas (*Ceriodaphnia dubia*) and fathead minnows (*Pimephales promelas*). Sets of ten organisms are exposed to varying concentrations of the STP effluent (100, 50, 25, 12.5, and 6.25 percent) 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.

In 2001, two of the four tests for water flea reproduction and one test for minnow survival revealed toxicity. Comparison of chemical data to the toxicity data gave no indication of any single element or compound that would have contributed to these observations. BNL is continuing to work with NYSDEC to evaluate the data and determine the next steps toward monitoring.

3.6.2 Recharge Basins and Stormwater

Outfalls 002 through 008 and Outfall 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. No monitoring requirements were imposed for Outfalls 009 and 011. Due to the infrequent discharge from cooling towers at the RHIC, there was limited monitoring of Outfall 002B in 2001. Additionally, there were no samples collected from Outfall 002A. Outfall 002A was connected to Outfall 002 during 2001 and a request was made to NYSDEC to delete this discharge from the BNL SPDES permit. Table 3-4 summarizes the monitoring requirements and performance results for 2001.

There were six excursions at these outfalls in 2001. Five were for exceedance of effluent limits for hydroxyethylidene-diphosphonic acid, one at each of five outfalls. Since all results occurred during the same monitoring period (October 2001) and the compound was detected in a discharge known to not contain the compound, the results were considered suspect. Followup sampling in December showed all levels to be within limits. The last exceedance was for pH measured at Outfall 005. Elevated pH in the BNL domestic water system was the most probable cause of the pH excursion. To increase the pH of domestic water and reduce the corrosivity of the water system, hydroxides (either calcium or sodium) were added to the well water. Discharges to Outfall 005 follow an asphalt swale for several hundred yards before intercepting the monitoring station. During dry weather, evaporation results in higher pH levels in the water when measured at the monitoring station. All measurements taken upstream of the asphalt swale show pH levels consistent with that of drinking water. The discharge of slightly alkaline wastewater would not have detrimental effects on groundwater, due to the naturally acidic conditions of Long Island's groundwater.

Several changes to the monitoring requirements were proposed for these outfalls in 2001. These changes include deleting Outfalls 002A and 004, reducing the monitoring at Outfalls 003

Table 3-4. Analytical Results for Wastewater Discharges to Sewage Treatment Plant Outfalls 002–008 and 010.

Analyte		Outfall 002	Outfall 002B	Outfall 003	Outfall 004	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 08	Outfall 10	SPDES Limit	No. of Exceed.	% Comp.
Flow (MGD)	N	CR	CR	CR	CR	CR	CR	CR [a]	CR	12	11			
	Min.	0.003	<0.0001	0.2	0.004	0.2	0.08	0.04	0.2	0.001	0.001	NA		
	Max.	0.1	0.004	0.9	0.01	0.3	0.1	0.7	0.6	9	0.5	NA		
pH	Min.	6.2	6.7	6.0	5.5	5.8	6.4	6.7	6.0	5.8	6.1	NA		
(SU)	Max.	8.5	7.9	8.0	6.2	8.9 [c]	8.7	8.4	7.3	7.8	7.5	8.5, 9.0 [b]	1	98
Oil and Grease (mg/L)	N	12	3	12	NR	12	12	12	NR	12	11			
	Min.	< 5	< 5	< 5	NR	< 5	< 5	< 5	NR	< 5	< 5	NA		
	Max.	< 5	< 5	9.9	NR	5.5	5.2	5.4	NR	6.2	7.2	15	0	100
Copper (mg/L)	N	NR	NR	NR	NR	4	NR	NR	NR	NR	NR			
	Min.	NR	NR	NR	NR	< 0.002	NR	NR	NR	NR	NR	NA		
	Max.	NR	NR	NR	NR	0.006	NR	NR	NR	NR	NR	1.0	0	100
Zinc (mg/L)	N	NR	NR	3	NR	NR	NR	NR	NR	NR	NR			
	Min.	NR	NR	< 0.002	NR	NR	NR	NR	NR	NR	NR	NA		
	Max	NR	NR	0.005	NR	NR	NR	NR	NR	NR	NR	5	0	100
Iron (total) (mg/L)	N	NR	NR	NR	NR	NR	NR	NR	10	NR	NR			
	Min.	NR	NR	NR	NR	NR	NR	NR	81.9	NR	NR	NA	NA	
	Max.	NR	NR	NR	NR	NR	NR	NR	624	NR	NR	NA	0	100

(continued on next page)

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

Analyte		Outfall 002	Outfall 002B	Outfall 003	Outfall 004	Outfall 005	Outfall 006A	Outfall 006B	Outfall 007	Outfall 08	Outfall 10	SPDES Limit	No. of Exceed.	% Comp.
Iron (dissolved)	N	NR	NR	NR	NR	NR	NR	NR	10	NR	NR			
(mg/L)	Min.	NR	NR	NR	NR	NR	NR	NR	0.04	NR	NR	NA	NA	
	Max.	NR	NR	NR	NR	NR	NR	NR	1.9	NR	NR	NA	0	100
Chloroform	N	4	NR	NR	NR	NR	NR	NR	NR	NR	NR			
(µg/L)	Min.	< 1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	NA	
	Max.	< 1	NR	NR	NR	NR	NR	NR	NR	NR	NR	7	0	100
Bromo-	N	4	NR	NR	NR	NR	NR	NR	NR	NR	NR			
dichloromethane	Min.	< 1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	NA	
(µg/L)	Max.	< 1	NR	NR	NR	NR	NR	NR	NR	NR	NR	5	0	100
1,1,1-trichloroethane	N	4	NR	4	2	NR	NR	NR	NR	12	NR			
(µg/L)	Min.	< 1	NR	< 1	< 1	NR	NR	NR	NR	< 1	NR	NA	NA	
	Max.	< 1	NR	< 1	< 1	NR	NR	NR	NR	< 1	NR	5	0	100
1,1-dicloroethylene	N	NR	NR	NR	2	NR	NR	NR	NR	12	NR			
(µg/L)	Min.	NR	NR	NR	< 1	NR	NR	NR	NR	< 1	NR	NA	NA	
	Max.	NR	NR	NR	< 1	NR	NR	NR	NR	< 1	NR	5	0	100
Dibromo-nitrilo-	N	NR	NR	0 [d]	NR	NR	NR	NR	NR	NR	NR			
propionimide	Min.	NR	NR	NA	NR	NR	NR	NR	NR	NR	NR	NA	NA	
(mg/L)	Max.	NR	NR	NA	NR	NR	NR	NR	NR	NR	NR	0.5	0	100
Hydroxyethylidene-	N	4	1	0 [d]	NR	4	4	4	NR	NR	NR			
diphosphonic Acid	Min.	< 0.05	0.9	NA	NR	< 0.05	< 0.05	< 0.05	NR	NR	NR	NA	NA	
(mg/L)	Max.	1.2 [e]	0.9 [e]	NA	NR	0.9 [e]	1.0 [e]	1.0 [e]	NR	NR	NR	0.5	5	71
Tolyltriazole	N	4	4	0 [d]	NR	4	4	4	NR	NR	NR			
(mg/L)	Min.	< 0.005	< 0.005	NA	NR	< 0.005	< 0.005	< 0.005	NR	NR	NR	NA	NA	
	Max.	< 0.005	< 0.005	NA	NR	< 0.005	< 0.005	< 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, 002B, 003, 006A, 006B, and 007.
[c] The sampling technician did not immediately notify the compliance staff of exceedance as per Laboratory procedures, therefore an investigation into the validity of the pH concentration could not be performed.
[d] Due to the removal of the High Flux Beam Reactor cooling towers there was no discharge of treatment chemicals and therefore sampling was not performed for this compound.
[e] Positive detection of this compound is suspect due to detection at a sampling station with no discharge of treatment chemicals and conflicting analytical results for duplicate samples sent to multiple analytical laboratories.

and 007, and increasing the monitoring at Outfalls 002, 008, and 010. Additional monitoring has been proposed for these outfalls because inorganics (primarily aluminum and lead) were detected under the BNL Environmental Surveillance Program (See Chapter 5). During 2001, BNL confirmed the presence of a significant area of lead contamination at Outfall 010, attributable to historic operations at the Central Steam Facility. The contaminated area is being investigated and will be addressed once it has been fully delineated.

3.7 SAFE DRINKING WATER ACT

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). Because BNL provides potable water to "more than 25 full-time residents," it is subject to the same requirements as a public water supplier. Monitoring requirements are prescribed annually by SCDHS, and a *Potable Water Sampling and Analysis Plan* (Chaloupka 2001) 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 for Drinking Water Supply Wells* was prepared in satisfaction of this requirement (Bennett *et al.* 2000). The 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 on-site distribution of potable water. To meet drinking water standards, groundwater is treated with activated carbon or air stripping to remove volatile organic compounds. 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.

As required by NYSDOH regulations, BNL monitors the potable wells regularly for bacteria, inorganics, organics, and pesticides. BNL also voluntarily monitors drinking water supplies for radiological contaminants. Tables 3-5 and 3-6 provide the potable water supply monitoring data for 2001. 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 2001. Chapter 7 provides additional data on environmental surveillance tests 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. One of the safety requirements is to rigorously prevent connections between the potable water supply and systems containing hazardous substances ("cross-connections"). Cross-connection control is the installation of control devices at the interface between a facility and the domestic water main. Cross-connection control devices are required at all facilities where hazardous materials are used in a manner that could result in their introduction into the domestic water system, especially under low-pressure conditions. In addition, secondary cross-connection controls at the point of use are also recommended to protect users within a specific facility from hazards that might be posed by intrafacility operations.

BNL has installed and maintains more than 150 cross-connection control devices at interfaces to the potable water main, and secondary control devices at the point of use. Approximately 120 cross-connection control units were tested in 2001, including primary and secondary devices. All problems found were corrected, and the devices were retested to ensure proper functioning.

3.7.3 Underground Injection Control

Underground injection control wells are regulated under the SDWA. UICs at BNL include drywells, cesspools, septic tanks, and leaching

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.

8

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.

9

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.

10

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.

11

12

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).

13

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 (Maximum Concentration, Minimum pH Value).

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)	NA	40*	30*	< 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 (μmhos/cm)	120	125	135	168	255	262	285	SNS
Chlorides (mg/L)	NA	14.4	22.2	19.7	27.3	14.5	26.0	250
Sulfates (mg/L)	NA	8.0	8.0	8.1	8.5	8.2	7.8	250
Nitrates (mg/L)	NA	0.31	0.21	0.33	0.38	0.40	0.25	10
Nitrites (mg/L)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.0
Ammonia (mg/L)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	SNS
pH (Standard Units)	6.1	6.1	5.9	6.1	6.0	6.0	6.3	SNS
MBAS (mg/L)	NA	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	SNS
Metals								
Antimony (μg/L)	NA	< 5.9	< 5.9	< 5.9	< 5.9	< 5.9	< 5.9	6.0
Arsenic (μg/L)	NA	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	50
Barium (mg/L)	NA	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2.0
Beryllium (μg/L)	NA	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	4.0
Cadmium (μg/L)	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	5.0
Chromium (mg/L)	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1
Fluoride (mg/L)	NA	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.2
Iron (mg/L)	NA	4.00*	1.62*	0.04	0.04	< 0.02	0.17	0.3
Lead (μg/L)	NA	< 1.0	1.1	< 1.0	< 1.0	< 1.0	6.2	15
Manganese (mg/L)	NA	0.07	0.05	< 0.01	< 0.01	< 0.01	0.12	0.3
Mercury (μg/L)	NA	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2.0
Nickel (mg/L)	NA	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.1
Selenium (μg/L)	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	50.0
Sodium (mg/L)	NA	8.9	11.6	15.6	14.0	10.8	14.0	SNS
Silver (μg/L)	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	100
Thallium (μg/L)	NA	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	2.0
Zinc (mg/L)	NA	< 0.02	< 0.02	0.04	< 0.02	< 0.02	0.04	5.0
Radioactivity								
Gross Alpha Activity (pCi/L)	< 0.76	1.67	1.38	NA	< 0.83	2.49	NR	15.0
Gross Beta Activity (pCi/L)	< 2.15	2.98	< 2.37	NA	< 2.37	3.12	NR	50.0
Tritium (pCi/L)	< 315	< 315	< 315	NA	< 315	< 315	NR	20,000
Strontium-90 (pCi/L)	< 0.37	< 0.37	< 0.50	NA	0.7	< 0.42	NR	8.0
Other								
Asbestos (M. Fibers/L)	NR	NR	NR	NR	NR	NR	< 0.25	7
Calcium (mg/L)	NR	NR	NR	NR	NR	NR	11.0	SNS
Alkalinity (mg/L)	NR	NR	NR	NR	NR	NR	39.0	SNS

Notes:
See Chapter 7, Figure 7-5 for well locations.
MBAS = Methylene Blue Active Substances
NA = Not Analyzed due to well shutdown
ND = Not Detected
NR = Analysis Not Required
SNS = Drinking Water Standard Not Specified
NYS DWS = New York State Drinking Water Standard
WTP = Water Treatment Plant
* Wells are treated at the WTP for color and iron reduction prior to site distribution.

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

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	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
Methylene Chloride	< 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	< MDL	< MDL	< MDL	< MDL	< 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
Trichloroethene	< 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	3.7	2.4	< MDL	1.5	< MDL	0.6	0.7	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	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
2-chlorotoluene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
4-chlorotoluene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,3-dichlorobenzene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,4-dichlorobenzene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,2-dichlorobenzene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,2,4-trichlorobenzene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Hexachlorobutadiene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
1,2,3-trichlorobenzene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Benzene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Toluene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5
Ethylbenzene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	5

(continued on next page)

Table 3-6. Potable Water Wells: Analytical Results for Principal Organic Compounds, Synthetic Organic Chemicals, Pesticides, and Micro-Extractables *(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				
Tetrachloroethene	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL
m-xylene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
p-xylene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
o-xylene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
Styrene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
Isopropylbenezene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
n-propylbenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
1,3,5-trimethylbenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
tert-butylbenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
1,2,4-trimethylbenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
sec-butylbenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
p-isopropyltoluene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
n-butylbenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
methyl tert. Butylether	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Lindane	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	0.2
Heptaclor	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	0.4
Aldrin	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
Heptachlor Epoxide	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	0.2
Dieldrin	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
Endrin	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	0.2
Methoxychlor	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	40
Toxaphene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	3
Chlordane	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	2
Total PCB's	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	0.5
2,4,5,-TP (Silvex)	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	10
Dinoseb	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Dalapon	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Pichloram	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Dicamba	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Pentachlorophenol	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	1
Hexachlorcyclopentadiene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
Di(2-ethylhexyl)Phthalate	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Di(2-ethylhexyl)Adipate	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Hexachlorobenzene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	5
Benzo(A)Pyrene	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Aldicarb Sulfone	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	SNS
Aldicarb Sulfoxide	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	SNS
Aldicarb	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	SNS
Oxamyl	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50

(continued on next page)

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

Compound	WTP Effluent	Well No. 4	Well No. 6	Well No. 7	Well No. 10	Well No. 11	Well No. 12	NYS DWS
				μg/L				
3-Hydroxycarbofuran	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Carbofuran	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	40
Carbaryl	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Methonmyl	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	SNS
Glyphosate	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Diquat	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Ethylene Dibromide	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	0.05
1,2-dibromo-3-chloropropane	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	0.2
2,4,-D	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Perchlorate	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	SNS
Alachor	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	2
Simazine	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Atrazine	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	3
Metolachor	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Metribuzin	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Butachlor	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	50
Propachlor	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	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
SNS = Drinking Water Standard not specified
NYS DWS = New York State Drinking Water Standard
WTP = Water Treatment Plant

pools, all of which are classified by EPA as Class V injection wells. Proper management of UIC devices is vital for protecting underground sources of drinking water. In New York State, the UIC program is implemented through EPA, since 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 2001, BNL continued the process of closing numerous UICs. These included devices located at Buildings 703 (one device), 901 (one device), 907 (two devices), 908 (two devices), 1005 (three devices), 1006 (two devices), and 1007 (two devices). Additionally, due to the presence of contaminants above Suffolk County Department of Health Services Action Levels, devices located at Buildings 1002, 1010, and 1012 were closed in 2001 by the removal of the septic tanks. Due to the unavailability of storm water management systems, applications were filed to install new UICs at several locations, including Buildings 120 and 908. The UIC inventory on file with EPA will be updated as these devices are installed.

3.8 SPILL PREVENTION, EMERGENCY PLANNING, AND REPORTING

Several federal, state, and local regulations address the management of storage facilities containing chemicals, petroleum, and other hazardous materials. These regulations include

specifications for storage facilities, and requirements for release planning documentation and release reporting. The following subsections describe BNL's compliance with these regulations.

3.8.1 Preventing Oil Pollution and Spills

BNL must maintain a Spill Prevention Control and Countermeasures (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 release prevention measures, the design of storage facilities, and maps detailing their locations. The SPCC Plan is filed with NYSDEC, EPA, and DOE. The plan is updated triennially and was last updated in December 2000 (Chaloupka 2000). BNL remained in full compliance with the SPCC requirements in 2001.

BNL also maintains a facility response plan that outlines emergency response procedures to be implemented in the event of a worst-case discharge of oil. 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, which included revising outdated information and providing cross-references to address the formatting issues. Phase II was a complete plan update that was submitted to EPA in December as part of the SPCC Plan.

3.8.2 Local and State Reporting Requirements

The Emergency Planning and Community Right-to-Know Act (EPCRA) (42 USC 11001, *et seq.*) and Title III of the Superfund Amendments and Reauthorization Act (SARA) require that facilities report 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 2001 through the submittal of the required reports under EPCRA Sections 302, 303, 311, and 312. During 2000, the Part 313 Toxic Release Inventory thresholds were significantly lowered from 10,000 pounds to just 10 pounds for mercury and polychlorinated biphenyls (PCBs). Consequently, in 2001, BNL was required to submit reports for these two classes of chemicals. In total, 21 pounds of mercury and 917 pounds of PCBs were reported in the Form R Toxic Release Inventory Report, which was submitted on June 29, 2001. For 2001, the Section 313 reporting threshold for lead was similarly reduced from 10,000 pounds to 1 pound. Reporting for 2002 will therefore include mercury, PCBs, and lead.

There were no releases of extremely hazardous substances reported under Part 304 during 2001.

Applicability of EPCRA to BNL

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

3.8.3 Spills and Releases

When a spill of hazardous material occurs, BNL personnel are required to immediately notify the on-site 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 EPA, NYSDEC, and SCDHS. In addition, releases of petroleum products greater than five gallons to outdoor impermeable surfaces or containment areas are reported to the SCDHS. 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 were to rupture a hydraulic line and release hydraulic oil to the soil, immediate actions would be taken to stop the leak. The contaminated soil would then be excavated and containerized for off-site disposal.

During 2001, there were 51 spills, of which only 13 met external agency reporting criteria. The remaining releases were either small-volume releases to containment areas or other impermeable surfaces, or were gaseous releases that did not exceed a reportable quantity. Nine of the 13 reported releases involved very small volumes (< 10 gallons) of petroleum or ethylene glycol that reached soils. New York State has a "zero tolerance" level for releases of oils to soil or

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

BNL Spill Number	Date	Material	Quantity	ORPS Report*	Source/Cause and Corrective Actions
01-03	1/29/01	Oil and antifreeze	2 quarts	No	A BNL employee discovered an oily substance on the snow and frozen ground behind Bldg 50. BNL employees applied absorbent and containerized the spilled material for proper disposal.
01-11	3/9/01	Hydraulic fluid	35 gallons	Yes (CH-BH-BNL-PE-2001-0001)	While the hydraulic-powered cable winch of a BNL electrical line truck was in use, a hydraulic hose failed, releasing oil to the snow and asphalt; this was worsened by moderate rain. Spill absorbents were used to recover the spilled material and was containerized for proper disposal. Additional oil was recovered as the snow melted.
01-14	3/21/01	Antifreeze	< 1 quart	No	A Caterpillar metal crusher was being used near Bldg. 445, when the operator noticed coolant leaking from the equipment. A small patch of contaminated soil was recovered for proper disposal.
01-16	4/18/01	UCON Heat Exchange Fluid	115 –120 gallons	No	The cryogenics control room of RHIC received an alarm indicating that a compressor had shut down. A failure of a steel nipple and brass fitting on the sample tap of a redundant compressor pump resulted in a loss of approximately 115 – 120 gallons of UCON LB-170-X lubricating fluid to the pumping skid below. The recovered fluid and absorbent materials were disposed of properly.
01-17	5/16/01	Hydraulic fluid	< 1 quart	No	While land just west of Bldg. 477 was being graded, a hydraulic line for the lift on a John Deere pay loader failed, releasing hydraulic fluid to the ground. BNL employees applied absorbent and containerized the spilled material for proper disposal.
01-18	5/22/01	Transmission fluid	~3.5 gallons	No	A steel hose on the BNL garbage truck failed, releasing ~3.5 gallons of transmission fluid onto asphalt and gravel surfaces. Due to steady rain, the material was dispersed. Absorbents were used to recover the fluid for proper disposal. The storm drains in the vicinity were diked, and inspection of the associated recharge basin did not reveal any contamination.
01-21	6/19/01	Transformer oil	10 – 20 gallons	No	A transformer at the Bldg. 930 transformer yard failed, resulting in the release of 10 – 20 gallons to the containment structure and the surrounding soil. BNL employees recovered the oil and contaminated soil and containerized it for proper disposal.
01-22	6/27/01	Engine oil	< 1 quart	No	During an Exit Readiness Evaluation for Building 820A, a plastic tub filled with what appeared to be motor oil was discovered on the south side of the building. Rain caused the oil to overflow the tub and spill onto the soil and bluestone driveway. The oil and contaminated soil were containerized for proper disposal.
01-28	8/8/01	Hydraulic fluid	< 1 gallon	No	During transport, a Grove man-lift released hydraulic fluid to the roadway and grassy surrounding area. The contaminated grass was removed and containerized with the spill absorbent for proper disposal.
01-30	8/11/01	UCON Heat Exchange Fluid	~20 gallons	No	A cryogenics group technician inadvertently removed the plate from a solenoid valve assembly while the system was pressured. This resulted in a release of approximately 20 gallons of atomized fluid to the air and pumping skid below. The lubricant was recovered with absorbent material and containerized for proper disposal.

(continued on next page)

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

BNL Spill Number	Date	Material	Quantity	ORPS Report*	Source/Cause and Corrective Actions
01-41	10/3/01	Hydraulic fluid	5 — 10 gallons	No	The operator of the on-site service station alerted BNL employees to a problem with a lift at the service station. A service technician was called to inspect the lift and discovered there had been a release of ~5 — 10 gallons of hydraulic fluid since the last inspection in July of 2001. The lift was drained and removed from service. In calendar year 2002, the lift will be replaced by an aboveground lift, and any impacted soils will be remediated and properly disposed.
01-43	10/12/01	Hydraulic fluid	~2 quarts	No	A hydraulic fitting on a front-end loader broke while loading scrap wood into a dumpster for off-site disposal. Oil sprayed onto a portion of the wood and the ground adjacent to the dumpster. The contaminated wood was removed and containerized with spill absorbent for proper disposal.
01-47	11/1/01	Hydraulic fluid	~ 1 gallon	No	As radiologically contaminated waste was being moved within the railcar loading area, a leak in the hydraulic system of the front-end loader was discovered. A pan was subsequently placed beneath the loader to capture any dripping fluid. Since the spill occurred within a posted radioactive material controlled area, contaminated soil was treated as mixed waste. BNL employees excavated the contaminated soil and transferred it to the railcar for proper 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.

water; consequently, spills of any amount to soil are reportable.

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).

Five of the nine reported small-volume releases resulted from failed hydraulics on heavy equipment. During 2001, a pollution prevention project was initiated to replace petroleum-based oils with vegetable-based oils in several of the BNL lawn mowers and to replace standard hydraulic hoses with braided stainless steel hoses. There were no reported releases in 2001 from BNL lawn mowers. The program will be expanded in 2002 to include hydraulic lift mechanisms and other heavy equipment, (*e.g.*, the BNL garbage truck). The four remaining small-volume spills were associated with motor vehicle operations or accidents.

There were four larger spills reported during 2001 that exceeded 10 gallons each. These included two releases of heat transfer fluid to the Building 1005H containment area beneath the pumps used in the RHIC cryogenic system, a release from a transformer, and a hydraulic oil spill from the BNL electrical line truck.

Twelve other environmental incidents were reported to DOE through ORPS as described below and in Table 3-8:

- Historical cesium-137 contamination was discovered in the soil floor of the basement of Building 704.
- Three incidents were related to the handling of radiologically contaminated materials. The first was a shift in load during the lifting of large sections of concrete ductwork that was being removed from the BGRR. The load fell onto the hydraulic controls of the platform trailer, resulting in a release of hydraulic fluid to the pavement. The second incident occurred while a container of dry radioactive waste was being moved at Building 650. The container fell from the forklift, spilling some contents to the roadway. The last incident involved finding a drum of radiologically contaminated waste in a shipment of nonradiological waste. There was no spread of radiological contamination from any of these incidents.
- One incident involved the overflow of the D-

Table 3-8. Summary of Other Environmental Occurrence Reports.

ORPS* ID	Date of Occurrence	Occurrence Description	Status
CH-BH-BNL-BNL-2001-0002	1/29/01	Phase II of the BGRR Decommissioning Project includes removal of the primary air-cooling ducts with subsequent disposal. During the critical lift of section No. 4, the 287,000-lb. section became unstable and fell onto the hydraulic controls of the heavy-duty platform trailer that was to be used to transport it. An Internal Review committee completed an investigation into the cause of the load shift during the rigging operation.	Closed: All corrective actions have been completed.
CH-BH-BNL-PE-2001-0001	3/9/01	Plant Engineering tower linemen positioned the line truck to unplug nozzles in the Air Stripping Tower at Bldg. 598. When the vehicle became stuck in the fresh snow, the on-board hydraulic winch was used to free the truck. During this use, a hydraulic hose failed, resulting in a 15-gallon oil spill. Absorbent material was used to recover the spill material, which was contained by the snow and underlying roadway.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2001-0007	3/15/01	On Monday, 3/12/01, a loss of heat transfer fluid from the primary compressor system in Bldg. 902 was noted. The system uses a fluid-to-water heat exchanger as part of an open loop cooling tower system. During the investigation into the loss, transfer fluid was detected in the cooling tower basin, which overflows to the STP. The STP operators were notified and reported a heavier than usual foam at the plant and effluent to the Peconic River. A decision to divert the STP to the lined holding ponds was made, even though the material had a low aquatic toxicity and biodegrades in 28 days. On 3/14/01, the primary compressor was isolated and the STP was placed on line.	Closed: All corrective actions have been completed.
CH-BH-BNL-HFBR-2001-0003	4/25/01	Samples of soil that forms the floor of a basement room in Bldg. 704 were found to contain 229 pCi/g Cs-137, exceeding the 23 pCi/g remediation goal established by EPA and NYSDEC. The Fan House Facility (Bldg. 704) is shared by both the HFBR and BGRR, although the primary design function was to house exhaust fans, ductwork, and other equipment for the BGRR, which ceased operation in 1968. Normal operations of the HFBR cannot cause an airborne release of Cs-137 and no physical pathway exists that could cause contamination generated by the HFBR to be deposited in this location. Therefore, the contamination can only be attributed to past operation of the BGRR. A Preliminary Assessment /Site Investigation plan was developed for the soil contamination in accordance with the CERCLA process.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2001-0011	5/3/01	On 5/2/01, the Sensaphone leak detection system within Bldg. 801 registered two separate leaks. Upon investigation, the D-waste tank system was not found to be leaking. Early on 5/3/01, a third alarm was received for a different part of the system. Upon investigation, radiologically contaminated water was found in the neutralization cell. Investigation revealed a partial clog of the D waste pipes, causing a backup of wastewater into all system pipes. A leak in a joint of one pipe occurred when the backed-up water reached that location. The joint was subsequently repaired.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2001-0014	6/18/01	During the movement of a B-25 container containing dry radioactive material, the load shifted. This caused the container to flip over, dislodge its cover, and spill its contents on the ground. The Emergency Services division was called, as per the procedures for chemical/oil spills. Referring to the Emergency Action levels, the event was characterized as an Operational Emergency. This required off-site notification to the DOE Chicago Office and the Suffolk County Fire, Rescue, and Emergency Services Department. The container was uprighted 4 hours later, at which time the operational emergency was terminated. A critique was held to determine the direct and contributing causes, as well as appropriate corrective actions.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2001-0016	7/5/01	A comprehensive 5-day hazardous waste inspection was conducted by NYSDEC on June 6 – 14, 2001. On July 5, 2001, a Notice of Violation was received for two administrative deficiencies noted during the inspection. Approximately 1,200 compliance points were checked during the in-depth inspection. A critique was completed to determine the direct and contributing causes of the two administrative deficiencies.	Closed: All corrective actions have been completed.

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Table 3-8. Summary of Other Environmental Occurrence Reports *(concluded)*.

ORPS* ID	Date of Occurrence	Occurrence Description	Status
CH-BH-BNL-BNL-2001-0020	7/25/01	A portion of the waste generated from remediation of the BGRR aboveground ducts was shipped to a waste processor in Oak Ridge, Tennessee during 9/22 – 10/9/00. The material was categorized and manifested as radioactive low-specific activity. When preparing to ship the balance of waste inventory, the Waste Management Division (WMD) revised the evaluation of the material and reclassified the waste as bulk PCB product waste. The analysis and subsequent reclassification of the shipment was documented in a Waste Management Division Nonconformance Report dated 6/18/01. EPA was notified on 7/25/01 of the discrepancy in a format other than a routine report, resulting in an occurrence report. A critique was completed to determine the direct and contributing causes.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2001-0022	8/10/01	It was discovered that the federal and New York state reportable quantities for spills of ethylene glycol differ. The federal reportable quantity is 5,000 pounds, whereas the state's reportable quantity is 1 pound; the federal was increased in 1998. A review of ethylene glycol spills from 1998 through 2001 found five spills of antifreeze which should have been reported to NYSDEC, as required by 6 NYCRR 595.3, but were not. The ethylene glycol and other contaminants released during each of the unreported spills was immediately remediated, therefore there were no environmental impacts. The Oil/Chemical Spill Response procedure was updated and all response team members were trained.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2001-0025	9/19/01	A Medical Department researcher had radiologically contaminated shoes and neglected to detect this contamination during a personal survey after completing work on 9/18/01. A post work survey on 9/19/01 by a health physics technician revealed contamination in the laboratory, the medical building's hallways, an office, another building on site, and the researcher's personal vehicle. The researcher's radiological qualifications were suspended until an extensive retraining program was completed to reinforce the requirements and expectations associated with radiological work involving dispersible material.	Closed: All corrective actions have been completed.
CH-BH-BNL-AGS-2001-0002	8/10/01	A disk in the liquid helium line used to cool the superconducting magnets within the RHIC complex burst. This resulted in a release to the environment of 380,000 cubic feet of helium valued at $26,600. An investigation of the event found that elevated system pressure had occurred due to the shut-off of several compressors in the helium refrigeration system from a remote workstation, not the cryogenic control room.	Open: While the ORPS report has been accepted by DOE, one corrective action remains open. It involves the retraining of cryogenic personnel on revised operating procedures, which were finalized in May of 2002.
CH-BH-BNL-BNL-2001-0029	11/11/01	A shipment of low-level radioactive waste from the BGRR project was identified by the truck driver as being overweight following a tire blowout and subsequent weighing of the conveyance in transit to final disposal. The tractor, trailer, and load was estimated well below the 80,000-lb. DOT limit, but when weighed, the total weight was found to be 82,400 lbs.	Closed: All corrective actions have been completed.
CH-BH-BNL-BNL-2001-0034	12/13/01	A truck preparing to transfer nonradioactive waste off site went through the vehicle radiological monitor prior to exiting the site. The monitor detected radiological activity and alarmed. A survey identified radioactive material in a 55-gallon drum, which was subsequently labeled as radioactive waste.	Closed: All corrective actions have been completed.

*Occurrence 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.

waste piping system in Building 801. A clog caused a backup of water into the piping system and a release of radiologically contaminated wastewater to the secondary containment.

- One incident involved the release of heat exchange fluid into the Building 902 cooling tower. The tower overflowed into the BNL sanitary sewer. Further information is provided in Section 3.6.
- One incident involved the issuance of a notice of violation by NYSDEC for deficiencies identified during the annual RCRA inspection.
- One incident involved incomplete waste characterization for the shipment of the BGRR concrete duct sections. Upon further evaluation, PCBs were identified in surface paints, thereby making the waste PCB "bulk product waste" in addition to being radioactive.
- One incident involved the release of 380,000 cubic feet of helium gas from the RHIC due to the failure of a rupture disk. Total cost for this loss exceeded $25,000.
- One incident involved reporting ethylene glycol releases to NYSDEC. Under NYS requirements, any ethylene glycol spill of greater than 1 pound requires reporting, whereas the reportable quantity under federal rules is 5,000 pounds. Five releases of glycol exceeded the state's deminimus levels, but were well below the federal reporting criteria.
- One incident involved the spread of radioactive material via contamination of a researcher's shoes.
- One incident involved the overweight shipment of nonradiological waste. The vehicle exceeded the maximum load restriction by 2,400 pounds.

All incidents were addressed through the identification and implementation of corrective actions geared toward the root cause. No off-site nor on-site environmental consequences arose from the ORPS incidents.

3.8.4 Major Petroleum Facility License

The storage of 2.3 million gallons of petroleum products (principally No. 6 fuel oil) subjects BNL to Major Petroleum Facility licensing by NYSDEC. BNL maintains an MPF License for storing and transferring oil at the Central Steam Facility. During 2001, BNL remained in full compliance with license requirements, which require 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. The license also requires that BNL inspect storage facilities monthly and test the systems for leak detection, high level monitoring, and secondary containment. Tank integrity is also checked periodically. Groundwater monitoring consists of monthly checks for floating products and twice-yearly tests for semivolatile organic compounds. In 2001, no contaminants or floating products were found in groundwater wells that monitor the MPF. See Chapter 7 for additional information on groundwater monitoring results.

The petroleum facility is inspected annually by NYSDEC. The 2001 annual inspection was conducted in January. 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 conditions were corrected within 30 days of the date of inspection. Two of the three remaining corrective actions were required before Tanks 5 and 6 could be returned to service. These actions were to repair piping and install color coding at the fill ports. Color coding of the fill ports was completed within seven days of the inspection. Piping upgrades were completed in December.

The third "corrective" action was a reminder that indepth integrity testing of the secondary containment liners was due in June. This testing was performed under contract by a consulting engineering firm. The tests found that four of the six containment areas were in substantial compliance with the secondary containment system requirements. Minor maintenance issues were identified and immediately corrected. The liner in the berm serving Tank 4, a 300,000-gallon storage

tank of No. 6 fuel oil, was found to be deteriorated in several areas and in need of replacement. This work was completed by November 30. The last berm, serving Tank 12 (60,000 gallons of No. 2 fuel oil) did not meet state guidance permeability rates of 1 x 10^{-6} cm/sec. This issue is under further discussion with NYSDEC.

3.8.5 Chemical Bulk Storage

All underground tanks, and all aboveground tanks larger than 185 gallons 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. During 2001, three tanks storing cooling water treatment chemicals at the High Flux Beam Reactor were placed into a "permanently out of service" status and will remain that way until they are removed. Additionally, a tank storing water treatment chemicals at Building 600 was replaced with a smaller tank, thereby removing the need to register this facility.

In February, NYSDEC conducted its first inspection of the BNL chemical storage facilities. This inspection revealed four deficiencies in the management of these systems. The deficiencies included an administrative finding on the location of test reports, inadequate secondary containment for chemical transfers, labeling of valve positions, and fire protection for tanks that were subject to melting. All issues have been resolved with the exception of secondary containment for transfers. Construction designs have been submitted to NYSDEC; issues regarding containment for the transfer hoses are still being negotiated.

3.8.6 County Storage Requirements

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

BNL has 478 active and more than 390 inactive storage facilities listed in the Suffolk County Tanks Database. Also included in the county database are another 41 storage facilities associated with environmental restoration activities conducted under the CERCLA program that are not regulated under Article 12. BNL storage facilities listed in the database include those storing fuel (some of which are also regulated under the MPF license), wastewater, and chemicals, as well as those used in support of laboratory research.

At the close of 2001, 147 of the active tanks listed in the Suffolk County database fully conformed with all Article 12 administrative, maintenance, and technical requirements. Approximately 173 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). Fewer than 15 percent of the active facilities were found to be in technical nonconformance with Article 12 requirements (*e.g.*, no secondary containment, no high-level detection).

BNL has an ongoing program to upgrade or replace existing storage facilities and to meet with representatives of SCDHS regularly to discuss storage issues. In April 2001, BNL initiated a project plan to achieve full conformance with Article 12 requirements. This Article 12 Improvements Project is primarily divided into two major tasks. The first task involves designing and constructing modifications to storage facilities that require technical upgrades to bring them into conformance with Article 12. The second task will involve preparing as-built design plans for many other existing storage facilities on site that already conform to Article 12 standards. Final plans and specifications for tanks that require upgrades were submitted to SCDHS for review

and approval in December 2001; construction activities were scheduled to begin in February or March of 2002. Overall, the project will provide administrative and technical improvements to approximately 115 active storage facilities. Other upgrades continue to be addressed through labeling and filing of addendums to the BNL tank inventory (*i.e.*, filing tank registrations), which will continue through 2003.

In an effort to continuously improve BNL operations and minimize impacts to the environment, revisions to the Storage and Transfer of Toxic or Hazardous Materials laboratory procedure, which primarily addresses SCDHS Article 12 regulations, were initiated in 2001. This procedure includes measures for handling groundwater and surfacewater runoff from outdoor storage or work areas (*e.g.*, excess material storage yards, welding areas, shielding storage areas). Design guidelines and requirements for planning, operating, and decommissioning an outdoor storage or work area are included in these revisions.

3.9 RESOURCE CONSERVATION AND RECOVERY ACT

The 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, with EPA retaining an oversight role. BNL is considered a large-quantity generator and has a RCRA permit to store hazardous wastes for one year prior to off-site shipment for treatment and disposal. As noted in Chapter 2, BNL has a number of 90-day storage and satellite accumulation areas.

On June 16, 2001, NYSDEC conducted its annual inspection of the BNL hazardous waste management operations and issued a notice of violation for two administrative deficiencies. One item was corrected during the inspection. The other item involved the location of collection points for managing waste batteries. Documentation was provided confirming that BNL had satisfactorily addressed all the noted deficiencies.

3.9.1 Mixed Wastes

Mixed wastes are materials that are both hazardous (under RCRA guidelines) and radioactive. The Federal Facilities Compliance Act (FFCA), issued in 1992, requires that DOE 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) that are able to manage mixed waste produced at federal facilities, and 2) to develop a schedule for treating and disposing of these waste streams.

BNL updates its *Site Treatment Plan for Mixed Wastes* (BNL 1997) annually and submits it to 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 now in storage have been identified, and most of the current inventory will be shipped off site for treatment and disposal in 2002. BNL will continue to update the treatment plan for wastes that have no identified disposal pathway.

3.10 POLYCHLORINATED BYPHENYLS

The storage, handling, and use of PCBs are regulated under the Toxic Substance and 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 capacitors containing less than three pounds of dielectric fluid and items with a concentration of PCB source material of less than 50 parts per million. This inventory is updated by July 1 of each year. All PCB-containing articles 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 2001.

3.11 PESTICIDES

The storage and application of pesticides (insecticides, rodenticides, herbicides, algicides,

etc.) are 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 on site. Herbicide use is minimized wherever possible (*e.g.*, through spot treatment of weeds). All pesticides are applied by BNL-employed New York State-certified applicators. By February 1, each applicator files an annual report with NYSDEC detailing insecticide and herbicide use for the previous year.

BNL is in full compliance with FIFRA requirements. In 2001, BNL initiated an integrated pest management review of herbicide and insecticide application practices. In cooperation with the Cornell Cooperative Extension Service, the Laboratory evaluated 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 showed that BNL's current pest management programs constitute a complete integrated pest management control strategy that has resulted in limited use of chemicals in all of the areas that were considered.

3.12 WETLANDS AND RIVER 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 by NYSDEC as either scenic or recreational under the Wild, Scenic, and Recreational River System Act. BNL also has six areas regulated as wetlands and a number of vernal (seasonal) pools on site. Construction or modification activities performed within these areas require permits from NYSDEC.

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

In 2001, two activities that required special permits were initiated and one ongoing activity was continued. The first new project consists of upgrading the Sewage Treatment Plant by constructing a new solids digester, demolishing the existing digester, relining the holdup ponds, and repairing or replacing piping that serves the sand filter beds. This project is expected to continue into the early part of 2002. The second new project is the construction of a new recharge basin within the RHIC ring, which is expected to start in 2002. The continuation project involved extending the BNL sanitary sewer to the RHIC area of the site. All sewer extension work was completed in June.

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 the 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 on site. The strategy includes identifying and mapping habitats, monitoring breeding conditions, improving breeding sites, and controlling activities that could negatively affect breeding.

The banded sunfish *(Enneacanthus obesus)* and swamp darter *(Etheostoma fusiforme)* are found in the Peconic River drainage areas on site at BNL. Both are listed as 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 that are being taken by BNL to protect the banded sunfish and swamp darter and their habitat include the following:

- Eliminating, reducing, or controlling pollutant discharges
- Upgrading the STP to reduce nitrogen loading in the Peconic River
- Monitoring populations and water quality
- Maintaining adequate flow in the river to enable the fish to survive drought
- Controlling disturbances to the river and adjacent banks.

The frosted elfin *(Callophrys irus)* is a small, amber-colored butterfly that depends on lupine. In the past, a population has utilized an area of lupine on BNL grounds. This habitat still exists and it is assumed that the butterfly is still present. Management of this habitat and surveys for this butterfly are being added to BNL's natural resource management program.

BNL also has eight species on site 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 on site. The eastern hognosed snake has only been seen on site 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 bird species mentioned above, 19 other bird species listed as species of special concern and two federally threatened species have been observed on site 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, the 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 factors that result in population declines continue. These plants are currently sheltered at BNL due to the large areas of undeveloped pine barrens habitat on site. Locations of these rare plants must be determined, populations estimated, and management requirements established. Management of protected plants will be included in the *Natural Resource Management Plan* currently under development. See Chapter 6 for more information.

3.14 EXTERNAL AUDITS AND OVERSIGHT

BNL was inspected by federal, state, or local regulators on at least 13 occasions in 2001. These inspections are summarized in Section 3.14.1. Since 1998, Suffolk County has had two full-time staff members at BNL to perform inspections. In 2001, this staff was reduced to one full-time and one part-time position, due to decreased activity. In addition to external audits and oversight, BNL has a comprehensive self-assessment program, which includes conducting Labwide compliance reviews. During 2001, BNL conducted a NEPA program review in conjunction with DOE-BAO, and a liquid effluent evaluation.

3.14.1 Inspections by Regulatory Agencies

- *Hazardous Waste.* NYSDEC conducted a RCRA/hazardous waste compliance inspection in June 2001. See Section 3.9 for information regarding this inspection.
- *Air Compliance.* NYSDEC conducted an annual inspection of the Central Steam

Facility in March 2001. No issues were identified during this inspection.

- *Potable Water.* SCDHS conducts annual inspections of the BNL potable water system to collect samples and ensure that facilities are maintained. There were no issues in 2001. 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*. SCDHS conducts quarterly inspections of the BNL STP. In 2001, no performance or operational issues were identified during these inspections. Additionally, in July, NYSDEC conducted a routine inspection, during which facility operations were evaluated and effluent samples collected. No issues were identified during this inspection.
- *Recharge Basins.* As part of SCDHS oversight, three inspections are conducted annually of recharge basins and other SPDES outfalls. In 2001, SCDHS completed their scheduled inspections and collected samples during two of the three assessments. No issues were identified during these inspections.
- *Major Petroleum Facility.* The MPF is inspected annually by NYSDEC. This inspection was conducted in January 2001 (see Section 3.8.4).
- *Chemical Bulk Storage.* In February, NYSDEC conducted its first inspection of the storage facilities regulated under the NYS Chemical Bulk Storage Program. The four deficiencies are described in Section 3.8.5.

3.14.2 Inspections by DOE

DOE Headquarters (EH-10) conducted an assessment of the Laboratory's Price Anderson Acts Amendment (PAAA) program. Overall, the assessment concluded that the BNL PAAA program is generally established, formalized by procedure, and is in general conformance with DOE expectations. Ten areas for improvement were noted and a corrective action plan was prepared to address the issues. The Chicago Operations Office conducted no assessments during 2001. The DOE Brookhaven Area Office (BAO) continued to provide oversight of BNL programs during 2001 and conducted compliance assessments on Cross-Connection Control and the NEPA program. The results of each assessment are summarized below.

3.14.2.1 Cross-Connection Control Assessment

The BAO assessment of the BNL Cross-Connection Control Program evaluated BNL's compliance to Safe Drinking Water Act requirements, associated State guidance, and adherence to BNL sitewide procedures (*i.e.*, Standards Based Management System Subject Areas). The results of this assessment identified four Concerns, six Findings, six Observations, and one Noteworthy Practice. The four Concerns identified during this assessment included improper design of cross-connection control device replacements; not performing annual testing for devices located in inaccessible areas; errors in completion of the reporting forms; and nonadherence to Labwide procedure requirements. All six of the Findings were attributed to deficiencies in design approvals and design details. The Noteworthy Practice identified the Operational Readiness Review (a walk-through inspection by specialists in safety, environmental, and plant engineering) as a good opportunity to identify cross-connection control deficiencies prior to facility occupancy.

3.14.2.2 NEPA Program Assessment

The NEPA Program assessment was performed in collaboration with BNL and DOE-BAO staff. The purpose of this assessment was to review and evaluate the status of selected projects for agreement with associated NEPA documentation. Two of the projects reviewed had undergone revisions after their initial NEPA reviews, with new environmental aspects being identified. It was determined that neither the BNL NEPA nor DOE-BAO NEPA coordinators had been informed of these revisions. The assessment report stated that both project revisions would likely have been considered to be within the scope of the original NEPA documents, but that qualified NEPA reviewers should have determined that fact. Recommendations for improvement were noted in the report and are being reviewed for implementation.

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	2/12/98	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 2001, and efforts have been taken to close it. Since all actions have been completed, BNL is considering this Notice of Noncompliance complete.
Index No. 113-98-01	Compliance Order—Clean Air Act	EPA and DOE	2/24/98	BNL, DOE, and EPA met in May 1998 to review and clarify the issues presented in this Order. Documentation necessary to support BNL operations was submitted to EPA prior to the issuance of the Order. Since there has been no further activity since 1998, BNL is considering this Order completed.
Docket No. UIC-AO-98-01	Administrative Order on Consent - Safe Drinking Water Act	EPA and DOE	3/4/98 (date of receipt by DOE)	The final Underground Injection Control area permit was received by BNL in January 2001. With the issuance of the permit, the Order on Consent was terminated.
CI-8975-03-99	Consent Order	NYSDEC and BNL	3/24/99	NYSDEC cited BNL for two administrative and one technical noncompliance 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. A letter from NYSDEC was received in July 2001 indicating that BNL was in compliance with the agreement and the issue was resolved.
Not Applicable	Notice of Violation—Resource Conservation and Recovery Act	NYSDEC	6/16/01	A Notice of Violation was issued for deficiencies in hazardous waste management practices. These deficiencies were noted during the 2001 annual hazardous waste compliance inspection conducted by NYSDEC. This Notice was effectively closed in 2001.
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 conform 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 2001.
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

3.14.3 Enforcement Actions and Memos

No new consent orders were issued to BNL in 2001. 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 Memorandum of Agreement on March 23, 1998, which is discussed in Chapter 2. During 2001, 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 submitted supporting documentation to the regulatory agencies. The Laboratory continues to work with the regulators to close these actions as expeditiously as possible.

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