

## *Executive Summary*

The 2002 Site Environmental Report (SER) is prepared in accordance with DOE Order 231.1, “*Environment, Safety and Health Reporting*,” and summarizes the status of Brookhaven National Laboratory’s (BNL) environmental programs and performance and restoration efforts, as well as any impacts, both past and present, that Laboratory operations have had on the environment. The document is intended to be technical in nature. A summary of the report is also prepared as a separate document to provide a general overview and includes a CD version of the full report.

Operated by Brookhaven Science Associates (BSA) for the Department of Energy (DOE), BNL manages its world-class scientific research with particular sensitivity to environmental and community issues. BNL’s motto, “Exploring Life’s Mysteries... Protecting its Future,” reflects BNL’s management philosophy to fully integrate environmental stewardship into all facets of its missions, with a healthy balance between science and the environment.

### **ENVIRONMENTAL MANAGEMENT SYSTEM**

BSA takes environmental stewardship very seriously. As part of their commitment to environmentally responsible operations, an Environmental Management System (EMS) was established at BNL that ensures environmental issues are systematically identified, controlled, and monitored. It also provides mechanisms for responding to changing environmental conditions and requirements, reporting on environmental performance, and reinforcing continual environmental improvement.

The Laboratory’s EMS was designed to meet the rigorous requirements of the globally recognized International Organization for Standardization (ISO) 14001 Environmental Management Standard, with additional emphasis on

compliance, pollution prevention, and community involvement. BNL was the first U.S. DOE Office of Science Laboratory to become officially registered to the ISO 14001 standard, in July 2001. Annual audits conducted by NSF-International Strategic Registrations, LTD, an accredited ISO 14001 registrar, are required to maintain the registration. In 2002, an EMS Surveillance Audit determined that BNL remains in conformance with the ISO 14001 Standard. The audit identified one major non-conformance, one opportunity for improvement, and strong evidence of continual improvement, including 12 noteworthy practices.

### **ENVIRONMENTAL MANAGEMENT PROGRAMS**

BNL’s Environmental Management Program consists of several Laboratory-wide and facility-specific environmental programs. The cornerstone of BNL’s programs for environmental management is its Environmental Stewardship Policy, which states the Laboratory’s intentions and principles regarding overall environmental management and provides a framework for planning and action. The stewardship policy is posted throughout the Laboratory and on the BNL website and is included in all training programs for new employees.

BNL has an extensive program in place to ensure full compliance with all applicable environmental regulatory requirements and permits. BNL must comply with more than 50 sets of federal, state, and local regulations, as well as numerous site-specific permits. The Laboratory is committed to achieving and maintaining full compliance with these environmental requirements and agreements. In 2002, the New York State Department of Environmental Conservation (NYSDEC) granted BNL’s request to modify its State Pollutant Discharge Elimination System (SPDES) permit, which reduced monitoring at

several outfalls. Also in 2002, BNL's request for a final Title V permit was issued from NYSDEC. This permit consolidated all applicable federal and state requirements for BNL's regulated emission sources into a single document.

The goal of BNL's Groundwater Protection Management Program is to ensure that plans for groundwater protection, management, monitoring, and restoration are fully defined, integrated, and managed in a cost-effective manner that is consistent with federal, state, and local regulations. Since the beginning of active groundwater remediation in 1997, BNL has removed more than 3,000 pounds of volatile organic compounds by treating nearly 5.5 billion gallons of groundwater.

BNL's Pollution Prevention Program was established to seek ways to eliminate waste and toxic materials. Pollution prevention is integrated into all planning and decision making at the Laboratory. In 2002, pollution prevention projects saved more than \$1.5 million and resulted in the reduction or reuse of over 2 million pounds of waste. Also in 2002, BNL was selected as one of five winners of "Environmental Facility of the Year" by *Environmental Protection* magazine. The magazine noted that the winners "used innovative approaches to protect the environment while simultaneously boosting their companies' bottom lines."

Wastes generated at the Laboratory are managed at a state-of-the-art facility designed especially for the management of hazardous, industrial, radioactive, and mixed wastes. In 2002, there was a significant reduction in the quantity of wastes generated from routine operations. Nonroutine waste generation varies from year to year depending on restoration activities.

The goals of BNL's Water Conservation Program are to reduce the consumption of potable water and to reduce the impact of clean water discharges on Sewage Treatment Plant operations. In 2002, water consumption was down from 2001 levels, with an overall reduction of 52 percent. BNL's water supply met all primary potable water requirements.

BNL's Energy Management Group works to reduce BNL's energy use and costs by identifying cost-effective, energy-efficient products; monitoring energy use and utility bills; and assisting in

obtaining the least expensive energy sources possible. In 2002, due to fuel purchasing strategies, BNL saw an overall cost avoidance of \$15,000. BNL also received \$235,000 for new energy conservation projects.

The Facility Review Project of 1997 was a comprehensive examination of all site facilities, existing or demolished, to identify any past or current activities that could potentially degrade the environment. In 2000, the Facility Review Disposition Project Plan (BNL 2000a) was approved; this provided the mechanisms needed to rank risk, to schedule, and to resolve the issues identified during the Facility Review Project. In 2002, significant progress was made to disposition the remaining open operational and legacy issues that the Facility Review Project identified. Of the original 1,675 issues identified, only 36 legacy issues remain open. All other issues were either closed or their management was transferred to an existing program or project.

The Environmental Restoration Group oversees the Laboratory's Superfund activities. Restoration monitoring is used to determine the overall impacts of past operations, to delineate contamination, and to ensure that removal actions are effective and that remediation systems are performing as designed. As part of its goal to complete on-site and off-site cleanup of contamination from past disposal practices, BNL addressed some of its legacy issues in 2002 by completing remediation, restoration, and construction of several groundwater monitoring projects, and completing a Pilot Study of remediation technologies for the Peconic River, Operable Unit V.

The Natural and Cultural Resource Management Program is a result of a merger, in 2002, of the former Natural Resource Program and the newer Cultural Resource Program. The Natural Resource Program was designed to promote stewardship of the natural resources found at the Laboratory, as well as to integrate natural resource protection with BNL's mission. Goals include protecting and monitoring the ecosystem, conducting research, and communicating with Laboratory staff and the public.

The Upton Ecological and Research Reserve was established in November 2000, when DOE

dedicated 530 acres of BNL property as an ecological research reserve to be managed by the U.S. Fish & Wildlife Services. A technical advisory group (TAG) was then formed to assist with decisions on research objectives. In 2002, TAG awarded multiple research grants to investigate important local ecological issues.

A Cultural Resource Management Plan was undertaken because, under the National Historic Preservation Act and the Archeological Resource Protection Act, BNL is required 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. In 2002, BNL continued to identify, assess, and document BNL's historic and cultural resources. Also in 2002, the New York Historic Preservation Officer concurred with BNL's determination that ten World War II era buildings were not eligible for listing on the National Register of Historic Places. Additional activities included completion of a draft Brookhaven Graphite Research Reactor (BGRR) video documenting the history of the BGRR, and cultural resource surveys of World War I training trenches and foundations on site.

In 2002, 114 proposed projects underwent environmental evaluations for compliance with the National Environmental Policy Act (NEPA). Of these projects, 101 were minor actions requiring no additional documentation and 13 projects were addressed through the submission of Environmental Evaluation Notification Forms. All of the projects received categorical exclusions.

#### **ENVIRONMENTAL MONITORING**

BNL has a comprehensive, sitewide Environmental Monitoring Program that identifies potential pathways for exposure to the public and the environment; evaluates what impact BNL activities may be having on the environment; and ensures compliance with environmental permit requirements. In 2002, there were a total of 5,381 sampling events of groundwater, potable water, precipitation, air, plants and animals, soil, sediment, and discharges. The three components to the environmental monitoring program include compliance, restoration, and surveillance monitoring.

*Compliance monitoring* is conducted to ensure that wastewater effluents, air emissions, and groundwater monitoring data comply with regulatory and permit limits. An overview of compliance in 2002 includes: emissions of nitrogen oxides and carbon monoxide were within permit limits; approximately 1,000 pounds of ozone-depleting refrigerants were recovered for recycling; monitoring of the BNL potable water system showed that the potable water supply met all primary drinking water requirements; groundwater monitoring at the Major Petroleum Facility continued to demonstrate that current oil storage and transfer operations are not affecting groundwater quality; and liquid effluents discharged to surface water and groundwater met all New York State Pollutant Discharge Elimination System permit requirements with the exception of two excursions at the Sewage Treatment Plant and three at other outfalls. The five permit excursions were reported to NYSDEC. There were 19 spills of petroleum products reportable to outside regulatory agencies; 17 were less than 10 gallons and all were cleaned up or addressed to the satisfaction of NYSDEC.

BNL underwent 12 environmental audits by external regulatory agencies in 2002. Of the more than 1,000 New York State hazardous waste compliance requirements, BNL met all but three, receiving a Preliminary Finding and Administrative Complaint. Immediate corrective action was taken to address one of the three issues. The two remaining issues are being reviewed by BNL management and counsel to determine their validity and applicability to BNL.

*Restoration monitoring* is performed to determine the overall impact of past operations, to delineate the real extent of contamination, and to ensure that removal actions are effective and that remedial systems are performing as designed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA). In 2002, progress in cleanup and prevention activities for groundwater remediation were tracked by sampling 745 monitoring wells during over 2,000 individual sampling events. Six on-site groundwater remediation systems removed 720 pounds of

VOCs and returned more than one billion gallons of clean water to the aquifer. Progress was shown by the reduced contaminant concentrations and the decreasing size of the groundwater contaminant plumes.

*Surveillance monitoring* is used to assess potential environmental impacts resulting from routine facility operations and includes the collection of ambient air, surface water, groundwater, flora, fauna, and precipitation samples which are analyzed for radiological, organic, and inorganic contaminants. Routine reviews of data collected by thermoluminescent dosimeters (devices to measure radiation exposure) are also performed under this program.

BNL operations discharge treated wastewater to surface waters via the Sewage Treatment Plant (STP) or to groundwater recharge basins. Analytical data for 2002 showed that the average gross alpha and beta activity levels in the STP were well below drinking water standards. Tritium releases to the Peconic River continue to decline and cesium-137 and strontium-90 were detected infrequently in the effluent at levels significantly less than the drinking water standard.

Environmental monitoring continues to determine whether current or historical activities are affecting BNL's natural resources. In 2002, deer and fish sampling results were consistent with previous years. Local farm-grown produce, and vegetables grown in the BNL garden plot, continue to support historical analyses that there are no Laboratory-generated radionuclides in the farm produce.

An evaluation of potential radiological dose above natural background levels to uninvolved workers, members of the public, and the environment determined that impact from BNL operations was minimal and well below regulatory limits. Radiological dose to aquatic and terrestrial biota was also assessed and was found to be insignificant and comparable to natural background radiation levels. Ten on-site remediation and waste management projects were evaluated for radiological emissions to the environment, and the dose impact from all the projects was determined to be below regulatory limits.

## **QUALITY ASSURANCE**

BNL uses its on-site Analytical Services Laboratory and four off-site, contract laboratories to analyze its environmental samples. All of the off-site laboratories are certified by New York State and are subject to oversight that includes state and national performance evaluation testing, review of quality assurance programs, and audits.

BNL received a combined score of 96.2 percent "Overall Satisfactory" for the 573 radiological and nonradiological performance evaluation tests carried out in 2002. BNL's "Overall Satisfactory" score in radiological testing was 97 percent, an improvement over 2001. In nonradiological performance evaluation testing under the New York State Environmental Laboratory Approval Program for potable and nonpotable water, BNL received a "Satisfactory" rating of 96.8 percent.

The multilayered components of quality assurance monitored at BNL ensure that all analytical data reported in the SER are reliable and of high quality.

## **COMMUNICATION, OUTREACH, AND COMMUNITY INVOLVEMENT**

BNL's solid knowledge regarding its potential environmental vulnerabilities and current operations come from programs such as the Facility Review Project, process evaluations, the work planning and control system, groundwater protection, environmental restoration, and information management systems that were designed to improve the Laboratory's environmental systems and performance. In 2002, the Laboratory continued to openly communicate with its employees, neighbors, regulators, and other interested stakeholders on environmental issues and plans, and progress involving Laboratory operations and environmental restoration activities.

In 2002, BNL hosted more than 29,000 visitors, including students and community members. Events such as the Environmental Services Division "Summer Sunday" provided visitors with an opportunity to learn about BNL's environmental research. BNL's participation in the Heckscher Spring Festival provided a unique opportunity to promote environmental responsibility and appre-

ciation to the public, along with other local organizations. BNL's annual celebration of Earth Day featured an on-site 4K race with proceeds forwarded to charity. The Environmental Stewardship Award Ceremony recognized employees who have demonstrated outstanding efforts in environmental stewardship. The annual "Your Environment" art contest provided students from local schools with an opportunity to create a poster

depicting the importance of environmental stewardship with regard to Long Island's environment. The three winning posters were selected for inclusion in the 2002 SER Summary.

Part of BNL's EMS includes a commitment to continual improvement in communication. The Laboratory continues to pursue mechanisms to communicate data in a more user friendly, visual, and timely manner.