# *Executive Summary*

Throughout the scientific community, Brookhaven National Laboratory (BNL) is renowned for its leading-edge research in physics, medicine, chemistry, biology, materials, and the environment. BNL is committed to supporting its world-class scientific research with an internationally recognized environmental protection program. The *1999 Site Environmental Report* (SER) summarizes the status of the Laboratory's environmental programs and performance, including the steady progress towards cleaning up the site and fully integrating environmental stewardship into all facets of the Laboratory's mission.

BNL is located on 5,265 acres of pine barrens in Suffolk County in the center of Long Island, New York. The Laboratory is situated above a sole source aquifer at the headwaters of the Peconic River; therefore, protecting ground and surface water quality is a special concern. Approximately 3,600 acres of the site are undeveloped and serve as habitat for a wide variety of animals and plants, including one New York State endangered species, the tiger salamander, and two New York State threatened species, the banded sunfish and the stiff goldenrod. Monitoring, preserving, and restoring these ecological resources is a high priority for the Laboratory.

## ENVIRONMENTAL PROGRAMS

The calendar year 1999 represented the first full year of operation under the management of Brookhaven Science Associates. In 1999, BNL achieved significant improvements in its environmental performance. As a result of the Process Evaluation Project, the Laboratory now has an unprecedented level of knowledge of current operations and potential environmental vulnerabilities. Additionally, the Laboratory is openly and routinely communicating with neighbors, regulators, employees, and other interested parties on issues and progress.

BNL continues to develop, implement, and enhance an Environmental Management System that is consistent with the International Standards Organization (ISO) 14001 Standard, with increased emphasis in the areas of compliance assurance, pollution prevention, and community outreach. Most notably in 1999, one of the major scientific facilities at BNL, the Relativistic Heavy Ion Collider, was officially certified to the ISO 14001 Standard by an independent accredited registrar. The Relativistic Heavy Ion Collider is the first Long Island-based organization and the first Department of Energy (DOE) Office of Science facility to achieve this level of recognition.

BNL continues its strong commitment to pollution prevention. Through the Process Evaluation Project, the Laboratory has identified new waste reduction opportunities. In 1999, pollution prevention projects saved over $1,600,000 and reduced, recycled, or reused over 16,000,000 pounds of materials, including 12,850,000 pounds of water conserved through chiller replacement.

## COMPLIANCE WITH ENVIRONMENTAL REGULATIONS

BNL is subject to more than 50 sets of federal, state, and local environmental regulations; 60 site-specific permits; and a number of other binding agreements. The Laboratory is committed to achieving and maintaining full compliance with these environmental requirements and agreements. In 1999, BNL operated in compliance with the vast majority of applicable regulations, and programs are in place to address areas for improvement. The Laboratory also achieved additional reductions in emissions that can affect global warming and acid rain, such as nitrogen oxides, carbon monoxide, and sulfur dioxide. Four portable extinguishers were taken out of service and 68 pounds of Halon 1211 were recovered for reuse. Approximately 1,700 pounds of ozone-depleting refrigerants were also recovered for recycling.

With the exception of two minor pH excursions, all discharges complied with the effluent limitations specified in the New York State Pollutant Discharge Elimination System permit. Nine reportable spills of petroleum products subject to offsite regulatory reporting requirements occurred; all were cleaned to the satisfac-

tion of the New York State Department of Environmental Conservation. BNL's potable water system met all drinking water requirements.

Laboratory operations and environmental protection programs were reviewed and audited extensively by a number of organizations in 1999. The U.S. Environmental Protection Agency, New York State Department of Environmental Conservation, and the Suffolk County Department of Health Services conducted compliance inspections; the Department of Energy conducted audits and program reviews; and BNL conducted a number of self-assessments. No citations resulted from 1999 inspections.

### ENVIRONMENTAL MONITORING

BNL maintains a comprehensive monitoring program, including ambient and emission-point air monitoring stations, river water checkpoints, and a large network of groundwater monitoring wells. The monitoring system provides the information to ensure compliance with regulatory and permit conditions, as well as the early detection and correction of unexpected conditions.

During 1999, BNL collected and analyzed about 5,000 environmental samples. Total air emissions and radiological air quality met Clean Air Act and DOE standards in 1999. In 1999, BNL collected groundwater samples from 589 monitoring wells during 2,122 individual sampling events. Six known significant volatile organic compound plumes and eight radionuclide plumes were tracked and evaluated. Due to enhancements in the groundwater monitoring system, a narrow, previously unknown tritium plume was discovered near a beam deflector at the Alternating Gradient Synchrotron. The plume is now being carefully monitored. During 1999, average gross alpha and beta activity at the Sewage Treatment Plant outfall was within the range typical of background surface waters. Very low levels of Cesium-137 continue to be found in the STP effluent due to historical operations. All wastewater effluents met applicable discharge standards for organic and inorganic parameters.

BNL has a wildlife management program to protect and manage flora and fauna and their habitats. Local deer and fish are monitored for contamination from historical activities. Consistent with data from previous years, deer residing on the BNL site had concentrations of cesium-137 higher than those observed in offsite deer. The New York State Department of Health conducted a risk evaluation and concluded that the low levels of contamination do not justify imposing any restrictions on hunting near BNL. Fish collected from the Peconic River at the BNL boundary continue to show radionuclide concentrations that are slightly higher than control samples, though 1999 data are consistent with a pattern of decreasing concentration levels expected to continue over time. There was no sampling for local farm grown produce in 1999; however, during the previous ten years of monitoring, no Laboratory-generated radionuclides have ever been detected.

### ENVIRONMENTAL RESTORATION

During 1999, five onsite and one offsite groundwater remediation systems removed approximately 634 pounds of volatile organic compounds and returned approximately 757 million gallons of treated water to the Upper Glacial aquifer. Remediation systems are decreasing volatile organic compound concentrations near the southern boundary of the site. Other significant restoration activities are ongoing.

### RADIOLOGICAL DOSE ASSESSMENT

The evaluation of potential radioactive dose to the public showed that radiological dose attributable to Laboratory operations was far below the limits established by federal regulations. Direct measurement of external radiation levels confirmed that exposure rates at the site boundary were consistent with background levels observed throughout New York State. The ambient air radiation measured in the vicinity was within natural background level. Consumption of local fish and deer would also result in exposure well below EPA limits. There is no significant dose from drinking water.

The hypothetical Maximally Exposed Individual, defined as residing at the northeast boundary of BNL, breathing the air, and consuming 15 pounds of fish and 64 pounds of deer meat from onsite sources would receive 4.58 mrem per year of the total effective dose equivalent from inhalation and ingestion pathways. This is an extremely unlikely worst case scenario, but was calculated to show that the dose from all pathways would still be less than 5 percent of the 100 mrem per year dose

limit set by DOE for the general public . The average annual dose from man-made, cosmic, terrestrial, and ingestion paths, and radon is 360 mrem.

### QUALITY ASSURANCE

BNL follows strict quality control measures for its environmental monitoring programs, and the analytical data presented in this report are of high quality. Quality control is ensured in both the collection and analysis of environmental samples. The Laboratory uses its onsite Analytical Services Laboratory (ASL) and four offsite contractor laboratories to analyze environmental samples. The oversight of laboratory analyses involves proficiency testing, auditing, and ensuring adherence to a quality assurance program. All analytical laboratories are New York State-certified. The two primary laboratories reporting radiological analytical data in this SER each scored between 90 and 100 percent satisfactory results in both state and federal performance evaluation programs. For nonradiological performance evaluation testing, the ASL and the three BNL contractor laboratories each scored over 90 percent in the New York State Environmental Laboratory Approval Program evaluations.

### OUTREACH AND COMMUNICATION

BNL conducted a number of public outreach activities including presentations and meetings with the public; regular communications with the local, state, and federal regulators and elected officials; and routine interactions with the business and educational community. In 1999, BNL hosted more than 20,000 student visitors and another 4,900 people visited the Laboratory through its Summer Sunday programs. To highlight the cutting-edge environmental research conducted at the Laboratory and provide information regarding cleanup initiatives, the Laboratory hosted an Environmental Fair, which drew over 3,000 visitors.

### CONCLUSION

The last two years have been a turning point for BNL, and this SER documents the progress the Laboratory has made during 1999 in achieving its environmental stewardship goals. The problems that resulted from the Laboratory's first 50 years of operations cannot be fixed in one year, but BNL is now on the right path to continue its world-class research in an environmentally responsible culture and in a clean, restored environment.

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The Environmental Services field sampling team sampling one of the many wells onsite: *(pictured from left to right) Lawrence Lettieri, Richard Lagattolla, and Carlee Beecher (William Rizzitello is not pictured).*

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