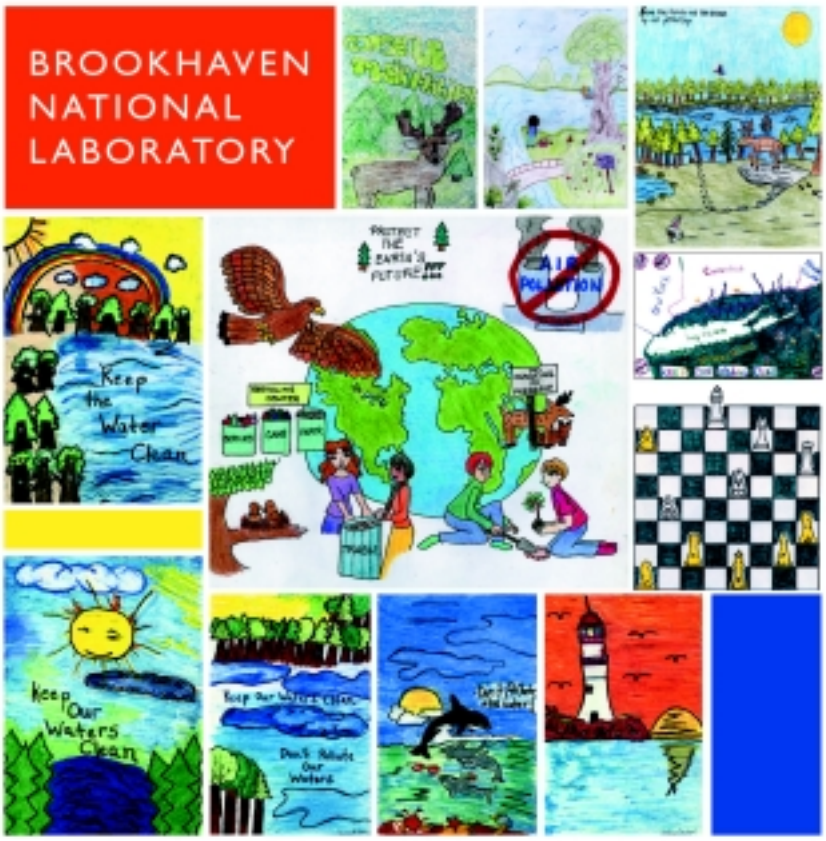
BNL-52626

EXPLORING EARTH'S MYSTERIES
...PROTECTING ITS FUTURE



Site Environmental Report 2000

September 2001

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A Message

from the Laboratory Director

Brookhaven National Laboratory operates on more than 5,000 acres of the diverse and lovely environment of eastern Long Island. Our environmental reach, however, extends far beyond that. We exert our broader influence not only through the basic and applied research we perform, but also through the example we set in managing our own environment. As Laboratory Director, I take this responsibility for environmental stewardship very seriously.

The Laboratory is beginning to see results from the major commitments we have made to protect our environment. We now have nine facilities with Environmental Management Systems registered under the prestigious ISO 14001 standard, and expect to have Labwide registration by the summer of 2001. We continue to increase our recycling efforts and reduce our generation of routine wastes. In 2000, the Laboratory collected over 336 tons of paper for recycling; and from 1993-2000, we reduced routine hazardous waste generation by 81%, mixed waste by 67%, and radioactive waste by 57%. We have seen continued improvements in our compliance and a significant reduction in our environmental vulnerabilities. The 530-acre Upton Ecological and Research Reserve was dedicated in November 2000 and will support ecological research and habitat enhancement.

Brookhaven National Laboratory continues to address historical issues under an ongoing Facility Review Project and the large scale Environmental Restoration Program. I am committed to an expedited cleanup of our site as well as stewardship of our natural resources. Our Groundwater Protection Program focuses on preventing impacts to groundwater and restoring groundwater quality.

The Laboratory is openly communicating with neighbors, regulators, employees, and other interested parties on environmental issues and progress. We realize that we must continue to deliver on our commitments and set in place a permanent environmental stewardship strategy for the Laboratory. As we continue to demonstrate improvements in our environmental performance, we are regaining the trust of our regulators and neighbors. I am proud to be able to say that we are conducting world-class research in an environmentally responsible manner.

John H. Marburger

John H. Marburger, *Laboratory Director*


Keep Our Waters Clean
Don't Pollute
Our
Waters

Executive Summary

Brookhaven National Laboratory (BNL) strives for excellence in both its science research and its facility operations. BNL manages its world-class scientific research with particular sensitivity to environmental and community issues through its internationally recognized Environmental Management System (EMS) and award-winning community relations program. The *Site Environmental Report 2000* (SER) summarizes the status of the Laboratory's environmental programs and performance, including the steady progress towards cleaning up the Laboratory site and fully integrating environmental stewardship into all facets of BNL's mission. BNL's motto, "Exploring Earth's Mysteries... Protecting its Future," describes how the Laboratory approaches its work, with balance between science and the environment.

One of the newest initiatives at the Laboratory, the Upton Ecological and Research Reserve, will permanently preserve 530 acres (212 hectares) of the Long Island Central Pine Barrens, a unique ecosystem of forests and wetlands. The Reserve sets aside 10% of BNL property for conservation and ecological research through a partnership between the U.S. Department of Energy (DOE) and the U.S. Fish and Wildlife Service. The Reserve provides habitat for approximately 27 endangered, threatened, or species of special concern, including the state-endangered eastern tiger salamander, state-threatened banded sunfish, and swamp darter, along with a number of other species found onsite, such as the wild turkey and red-tailed hawk.

ENVIRONMENTAL PROGRAMS

BNL continues to implement an EMS consistent with the International Organization for Standardization ISO 14001, with increased emphasis on compliance assurance, pollution prevention, and community outreach. The goal of BNL's EMS is to ensure that programs are managed in an environmentally responsible manner in order to protect the ecosystem and human health. In 1999, the Relativistic Heavy Ion Collider became the first Long Island-based organization and the first DOE Office of Science facility to achieve ISO 14001 registration. In September 2000, eight other BNL facilities were registered, with plans for the balance of the Laboratory to achieve registration by June 2001.

The Laboratory's Pollution Prevention/ Waste Minimization Program is an essential facet of the EMS. The BNL pollution prevention program goes beyond DOE pollution prevention goals, and represents an ongoing effort to make pollution prevention and waste minimization an integral part of the BNL operating philosophy. In 2000, BNL reduced, reused, or recycled more than 1,683 tons (1,527 metric tons) of hazardous, radioactive, and industrial wastes; reduced its overall water use by 63.5 million gallons (240 million liters); and used 26% less energy per square foot than in 1985. In total, pollution prevention projects saved over $2 million during the year.

The Facility Review Disposition Project ranks, schedules, and dispositions environmental issues identified during the 1997 review of all facilities at BNL. By the end of the calendar year, 130 of the top priority issues were resolved, and efforts to close the remaining issues in a prioritized manner continue.

COMPLIANCE WITH ENVIRONMENTAL REGULATIONS

BNL is subject to more than 50 sets of federal, state, and local environmental regulations, 65 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 2000, BNL operated in compliance with the majority of these requirements, and programs are in place to address areas for improvement. Emissions of nitrogen oxides, carbon monoxide, and sulfur dioxide were all within permit limits. With the exception of 11 minor instances of State Pollutant Discharge Elimination System nonconformance, all discharges complied with

BNL's permit limits during 2000. Sixteen reportable spills occurred. All but four involved less than ten gallons, and all were cleaned up to the satisfaction of the New York State Department of Environmental Conservation. Two other reportable spills of hazardous materials (photographic materials and mercury) were cleaned up immediately.

BNL operations and environmental protection programs were extensively reviewed and audited by outside organizations in 2000. External audits in 2000 included the New York State Department of Environmental Conservation review of petroleum storage, hazardous waste, and air emissions from the Central Steam Facility. BNL took immediate corrective actions in response to a Notice of Violation issued by the state after the hazardous waste inspection. Several minor issues were identified at the Major Petroleum Facility and corrective actions are being taken. The Suffolk County Department of Health Services conducted routine site inspections, quarterly inspections of the Sewage Treatment Plant, and the annual potable water system inspection. The Laboratory's potable water system met all drinking water standards. Comprehensive evaluations conducted by an independent ISO 14001 registrar and DOE headquarters verified and validated the adequacy of BNL's Environmental and Integrated Safety Management Systems.

ENVIRONMENTAL MONITORING

The Laboratory maintains a comprehensive environmental monitoring system, including air monitoring stations, river water checkpoints, and a network of 683 groundwater monitoring wells. The monitoring system provides information to ensure compliance and for early detection and correction of unexpected conditions.

During 2000, BNL collected and analyzed over 6,000 sampling events. That number does not include samples taken to characterize wastes for disposal purposes or nonroutine samples collected in support of environmental restoration characterization activities. Fourteen groundwater plumes, including four plumes identified under BNL's comprehensive groundwater monitoring improvements project, were tracked, evaluated, and remediated as necessary.

In 2000, the Brookhaven Medical Research Reactor, the High Flux Beam Reactor, and the Brookhaven Linear Accelerator Isotope Producer were the most significant contributors to the site's radiological air emissions. Total radionuclide emissions were consistent with those of recent years. Total air emissions and radiological air quality met Clean Air Act and DOE standards. Due to rising natural gas prices, the Central Steam Facility relied more on fuel oil to meet the heating and cooling of BNL's major facilities than in 1999. As a result, annual facility emissions of particulate matter, nitrogen oxides, and sulfur dioxide increased, although they remained below 1996 levels and were well below permit limits.

ENVIRONMENTAL RESTORATION

During 2000, the Environmental Restoration Program excavated and shipped 2,640 cubic yards (2020 cubic meters) of radiologically contaminated landscape soils and 1,100 cubic yards (841 cubic meters) of PCB-contaminated soil to licensed offsite disposal facilities. This radiological contamination was the result of historical use of soils that had been removed from a former onsite waste storage facility and used as landscaping fill, while the PCB contamination originated from leaking drums in this former drum storage area. Another 1,000 cubic yards (764 cubic meters) of soil and debris from the glass holes excavation was shipped offsite for disposal.

BNL completed construction and testing of a new onsite groundwater treatment system located in a former scrap yard and drum storage area. During 2000, six groundwater remediation systems removed approximately 700 pounds (318 kg) of volatile organic compounds and returned approximately 1.0 billion gallons (3.8 billion liters) of treated water to the Upper Glacier aquifer. Approval of the Operable Unit III Record of Decision in June 2000 cleared the way for the construction of additional treatment systems on and off Laboratory property.

Decommissioning of the Brookhaven Graphite Research Reactor continued in 2000 with the removal of large cooling fans, the Pile Fan Sump, and associated contaminated soils. This research reactor operated from 1950 – 1969, and is now being addressed as part of a nationwide DOE effort to clean up legacy waste.

RADIOLOGICAL DOSE ASSESSMENT

There was minimal radiological dose impact above natural background levels to the members of the public and the environment from BNL operations. The ambient external doses measured on the BNL site and in the neighboring area were very similar to each other. 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 3.28 mrem/yr (32.8 μSv) 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 4% of 100 mrem/yr 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 (3,600 μSv). Therefore, radioactive dose to the public from BNL activities is minimal.

Various remediation projects that had the potential to discharge radionuclides into the air in excess of 1% of the National Emissions Standard for Air Pollutants were also evaluated as diffuse sources. Although engineering and other radiation protection controls were implemented, an evaluation for NESHAPs was completed and the emissions were treated as continuous sources. There were five projects that fell under this category and the cumulative effective dose equivalent from all sources was 0.11 mrem (1.1 μSv).

This year's dose to the aquatic and terrestrial biota was also evaluated and no radiological doses to the aquatic animals, terrestrial plants, or terrestrial animals were recorded from BNL operations.

QUALITY ASSURANCE

The BNL Analytical Services Laboratory performs approximately 5,000 radiological and nonradiological (chemical) analyses per year on environmental samples, and administers contracts with four offsite contractor laboratories. All laboratories are certified by New York State for the tests they perform for BNL. Quality control is maintained through daily instrument calibration, efficiency, background checks, and testing for precision and accuracy. The two primary laboratories reporting radiological analytical data each scored between 89% and 96% satisfactory results in both state and federal performance evaluation programs. For nonradiological performance evaluation testing, the Analytical Services Laboratory and the three contractor laboratories each scored over 92% in the 2000 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, federal regulators, and elected officials; and routine interactions with the business and educational community. In 2000, BNL hosted more than 35,000 including visitors to the Laboratory through its Summer Sunday program. To highlight BNL's commitment to environmental stewardship, the Environmental Services Division organized a week long series of activities including presentations, contests, recycling demonstrations, and a four-mile race through the pine barrens onsite.

CONCLUSION

The last three years have been a turning point for BNL and this Site Environmental Report documents the progress BNL continues to make in achieving its environmental stewardship goals. The Laboratory is focusing on conducting world-class research in an environmentally responsible manner, while cleaning up and restoring the environment.

Site Environmental Report 2000 Team

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Not Pictured: Marcia Allocco, Robert Brown, John Burke, Mary Daum, William Dorsch, Peter Genzer, Timothy Green, Elizabeth Ginty, Amy Hafer, Jennifer Higbie, Balwan Hooda, Keith Klaus, Eric Klug, Kathryn Lancaster, Lisa Muench, and Glen Todzia.

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