

Executive Summary

Brookhaven National Laboratory (BNL) is managed on behalf of DOE by Brookhaven Science Associates (BSA), a partnership between the Research Foundation for the State University of New York on behalf of Stony Brook University and Battelle. For almost 70 years, the Laboratory has played a lead role in the DOE Science and Technology mission and continues to contribute to the DOE missions in energy resources, environmental quality, and national security. BNL manages its world-class scientific research with particular sensitivity to environmental issues and community concerns. The Laboratory's Environmental, Safety, Security and Health (ESSH) Policy reflects the commitment of BNL's management to fully integrate environmental stewardship into all facets of its mission and operations.

BNL prepares an annual Site Environmental Report (SER) in accordance with DOE Order 231.1B, Environment, Safety and Health Reporting. The report is written to inform the public, regulators, employees, and other stakeholders of the Laboratory's environmental performance during the calendar year in review. Volume I of the SER summarizes environmental data; environmental management performance; compliance with applicable DOE, federal, state, and local regulations; and performance in restoration and surveillance monitoring programs. BNL has prepared annual SERs since 1971 and has documented nearly all of its environmental history since the Laboratory's inception in 1947.

Volume II of the SER, the Groundwater Status Report, also is prepared annually to report on the status of groundwater protection and restoration efforts. Volume II includes detailed technical summaries of groundwater data and treatment system operations, and is intended for regulators and other technically oriented stakeholders. A brief summary of the information contained in Volume II is included in Chapter 7, Groundwater Protection.

Both reports are available in print and as downloadable files on the BNL web page at <https://www.bnl.gov/esh/env/ser/>.

ENVIRONMENTAL MANAGEMENT SYSTEM

The Laboratory's Integrated Safety Management System (ISMS) incorporates management of Environment (i.e., environmental protection and pollution prevention), Safety, and Health (ES&H) issues into all work planning. BNL's ISMS ensures that the Laboratory integrates DOE's five Core Functions and seven Guiding Principles into all work processes. These

processes contributed to BNL's achievement of registration under both the International Organization for Standardization (ISO) 14001 Standard (for the Laboratory's Environmental Management System [EMS]) and the Occupational Health and Safety Assessment Series (OHSAS) 18001 Standard (for the Laboratory's Safety and Health Program). Both standards require an organization to develop a policy, create plans to

implement the policy, implement the plans, check progress and take correction actions, and review the system periodically to ensure its continuing suitability, adequacy, and effectiveness.

An EMS was fully established at BNL in 2001 to ensure that environmental issues are systematically identified, controlled, and monitored. The EMS also provides mechanisms for responding to changing environmental conditions and requirements, reporting on environmental performance, and reinforcing continual environmental improvement. The cornerstone of the Laboratory's EMS is the ESSH Policy. The policy makes clear the Laboratory's commitments to environmental stewardship, the safety and health of employees, and the security of the site. Specific environmental commitments in the policy include compliance, pollution prevention, conservation, community outreach, and continual improvement. The policy is posted throughout the Laboratory and on the BNL website. It also is included in all training programs for new employees, guests, and contractors.

The Laboratory's EMS was designed to meet the rigorous requirements of the globally recognized ISO 14001 Environmental Management Standard. BNL was the first DOE Office of Science Laboratory to become officially registered to this standard. BNL was also the first Office of Science Laboratory to achieve registration under the OHSAS 18001 Standard. Each certification requires the Laboratory to undergo annual audits by an accredited registrar to assure that the systems are maintained and to identify evidence of continual improvement. In June 2016, an EMS and OHSAS reassessment audit determined that BNL remains in conformance with both standards.

Executive Order (EO) 13639, *Planning for Federal Sustainability in the Next Decade*, establishes goals for federal agencies and focuses on greenhouse gas (GHG) reduction across the government. In addition to guidance, recommendations, and plans, which must be prepared by specific due dates, EO 13693 has set numerical targets for agencies. DOE Order 436.1, *Departmental Sustainability*, provides requirements and responsibilities for managing sustainability within DOE to ensure facilities are working towards sustainability goals established in its Strategic

Sustainability Performance Plan (SSPP) pursuant to EO 13639. Each DOE facility is required to have a Site Sustainability Plan (SSP) in place detailing the strategy for achieving these long-term goals and due dates, and to provide an annual status. The requirements influence the future of the Laboratory's EMS program and have been incorporated into BNL's SSP.

The Laboratory's Pollution Prevention (P2) Program is an essential element for the successful implementation of BNL's EMS. The P2 Program reflects the national and DOE pollution prevention goals and policies, and represents an ongoing effort to make pollution prevention and waste minimization an integral part of the Laboratory's operating philosophy. Pollution prevention and waste reduction goals have been incorporated as performance measures into the DOE contract with Brookhaven Science Associates and into BNL's ESSH Policy. The overall goal of the P2 Program is to create a systems approach that integrates pollution prevention and waste minimization, resource conservation, recycling, and affirmative procurement into all planning and decision making.

The implementation of pollution prevention opportunities, recycling programs, and conservation initiatives continues to reduce both waste volumes and management costs. In 2016, these efforts resulted in more than \$1.6 million in cost avoidance or savings and approximately 7.9 million pounds of materials being reduced, recycled, or reused annually. In addition, seven new Pollution Prevention proposals were funded in 2016, investing approximately \$11,000. Anticipated annual savings from these projects are estimated at approximately \$18,000, for an average payback period of slightly less than one year.

Chapter 2 of this report describes the elements and implementation of BNL's EMS and P2 Program.

BNL'S ENVIRONMENTAL MANAGEMENT PROGRAM

BNL's Environmental Management Program consists of several Laboratory-wide and facility-specific environmental monitoring and surveillance programs. These programs identify potential pathways of public and environmental exposure and evaluate the impacts BNL activities may have on

the environment. An overview of the Laboratory's environmental programs and a summary of performance for 2016 is provided below.

COMPLIANCE MONITORING PROGRAM

BNL has an extensive program in place to ensure compliance with all applicable regulatory and permit requirements. The Laboratory must comply with more than 100 sets of federal, state, and local environmental regulations; numerous site-specific permits; 12 equivalency permits for the operation of groundwater remediation systems; and several other binding agreements. In 2016, the Laboratory operated in compliance with most of the requirements, and any instance of noncompliance was reported to regulatory agencies and corrected expeditiously.

Emissions of nitrogen oxides, carbon monoxide, and sulfur dioxide from the Central Steam Facility (CSF) were all well within permit limits in 2016. The only recorded excess opacity measurements occurred during quarterly quality assurance tests of the opacity monitors for Boilers 6 and 7. All of the excursions were documented in quarterly Site-Wide Air Emissions and Monitoring Systems Performance Reports submitted to the New York State Department of Environmental Conservation (NYSDEC).

In 2016, there were no discharges of Halon 1211 from portable fire extinguishers or Halon 1301 from accidental or fire induced activation of fixed fire suppression systems. Halon portable fire extinguishers continue to be removed and replaced by dry-chemical or clean agent units as part of an ongoing program to phase out the use of chlorofluorocarbons as extinguishing agents.

Monitoring of BNL's potable water system indicated that all drinking water requirements were met during 2016. Most of the liquid effluents discharged to surface water and groundwater also met applicable New York State Pollutant Discharge Elimination System permit requirements. Three excursions above permit limits were reported for the year; two non-compliance events for ammonia occurred at the Sewage Treatment Plant (STP), and one non-compliance event was reported for Tolytriazole at Outfall 002 (HN). The permit excursions were reported to NYSDEC and the Suffolk County Department

of Health Services and corrective measures were taken. Groundwater monitoring at the Laboratory's Major Petroleum Facility continued to demonstrate that current oil storage and transfer operations are not affecting groundwater quality.

Efforts to minimize impacts of spills of materials continued in 2016. There were 23 spills and only five met regulatory agency reporting criteria. The severity of releases were minor, and all releases were cleaned up to the satisfaction of NYSDEC.

BNL participated in ten environmental inspections or reviews by external regulatory agencies in 2016. These inspections included a NYSDEC inspector observation of the Annual Relative Accuracy Test Audit of the CSF Continuous Emissions Monitoring System (CEMS); an annual inspection of the BNL potable water system; a quarterly inspection of the STP to evaluate operations and sample the effluent; an inspection of all Petroleum and Chemical Bulk Storage facilities; and a Consolidated Multi-Media Inspection by EPA. Immediate corrective actions were taken to address any issues raised during these inspections.

The DOE Brookhaven Site Office (BHSO) continued to provide oversight of BNL programs during 2016 and participated as an observer of the BSA Multi-Topic Assessment of BNL's environmental protection programs. The scope of the assessment focused on ensuring the National Environmental Policy Act (NEPA) and Cultural Resources programs were in compliance with DOE, BSA, and regulatory agency expectations. The assessment identified two Noteworthy Practices, two Observations, and five Opportunities for Improvement. Except for the noted Observations, the assessed programs as a whole were found to be in conformance with applicable BNL Standards-Based Management System and external regulatory requirements. A causal analysis was performed and a corrective action plan was prepared for the identified observations to address the issues. Progress on the actions was tracked to closure in BNL's Institutional Assessment Tracking System.

Chapter 3 of this report describes BNL's Compliance Program and status in further detail.

AIR QUALITY PROGRAM

BNL monitors radioactive emissions at three facilities on site to ensure compliance with the

requirements of the Clean Air Act. EPA regulations require continuous monitoring of all sources that have the potential to deliver an annual radiation dose greater than 0.1 mrem to a member of the public; all other facilities capable of delivering any radiation dose require periodic confirmatory sampling.

During 2016, Laboratory facilities released a total of 10,426 curies of short-lived radioactive gases. BNL's Brookhaven Linac Isotope Producer (BLIP) is the only facility subject to EPA's continuous monitoring requirements. Oxygen-15 (half-life: 122 seconds) and carbon-11 (half-life: 20.4 minutes) emitted from the BLIP constituted more than 99.99 percent of radiological air emissions on site.

The Laboratory conducts ambient radiological air monitoring to verify local air quality and to assess possible environmental and health impacts from BNL operations. Samples collected from air monitoring stations around the perimeter of the site were analyzed for tritium and gross alpha and beta airborne activity. Results for 2016 continued to demonstrate that on-site radiological air quality was consistent with air quality measured at locations in New York State that are not located near radiological facilities.

Various state and federal regulations governing non-radiological releases require facilities to conduct periodic or continuous emissions monitoring to demonstrate compliance with emission limits. The CSF is the only BNL facility that requires monitoring. In 2016, emissions of nitrogen oxides, carbon monoxide, and sulfur dioxide from the CSF were all well within permit limits. The only recorded excess opacity measurement occurred during quarterly quality assurance tests of the opacity monitors for Boilers 6 and 7. All of the excursions were documented in quarterly Site-Wide Air Emissions and Monitoring Systems Performance Reports submitted to NYSDEC.

To accrue savings from fuel purchases, BNL's Central Steam Facility drew down existing supplies of residual fuel oil in the Major Petroleum Facility storage tanks by burning 804,380 gallons of residual fuel, providing 21 percent of the heating and cooling needs of the Laboratory's major facilities in 2016. As a result, emissions of particulates, oxides of nitrogen, and sulfur dioxide

increased from 2015 levels.

Chapter 4 of this report describes BNL's Air Quality Program and monitoring data in further detail.

WATER QUALITY SURVEILLANCE PROGRAM

Wastewater generated from BNL operations is treated at the STP before it is discharged to nearby groundwater recharge basins. Some wastewater may contain very low levels of radiological, organic, or inorganic contaminants. Monitoring, pollution prevention, and vigilant operation of treatment facilities ensure that these discharges comply with all applicable regulatory requirements and that the public, employees, and the environment are protected.

In 2016, the average gross alpha and beta activity levels in the STP discharge were within the typical range of historical levels and well below New York State Drinking Water Standards (NYS DWS). Tritium was not detected above method detection limits throughout the year. There was also no detection of cesium-137 (Cs-137), strontium-90 (Sr-90), or other gamma-emitting radionuclides attributable to BNL operations. The STP is also monitored for non-radiological contaminants. In 2016, monitoring of the STP effluent showed that organic and inorganic parameters were within State Pollutant Discharge Elimination System (SPDES) effluent limitations and other applicable standards.

Stormwater and cooling water discharges to recharge basins are sampled throughout the year and analyzed for gross alpha and beta activity, gamma-emitting radionuclides, and tritium. Each recharge basin is a permitted point-source discharge under the Laboratory's SPDES permit. In 2016, the average concentrations of gross alpha and beta activity in stormwater and cooling water discharged to recharge basins were within typical ranges and no gamma-emitting radionuclides were detected. Disinfection byproducts continue to be detected in the discharges at concentrations just above the method detection limit due to the use of chlorine and bromine for the control of algae and bacteria in potable and cooling water systems. Inorganics (i.e., metals) were detected; however, their presence is due primarily to sediment runoff in stormwater discharges.

The on-site portions of the Peconic River were dry throughout 2016 due to drought conditions. When available, radiological data from Peconic River surface water sampling show that the average concentrations of gross alpha and gross beta activity from on-site locations (one sample) were indistinguishable from off-site and control locations, and all detected levels were below the applicable NYS DWS. No gamma-emitting radionuclides attributable to Laboratory operations were detected, and tritium was not detected above method detection limits in any of the samples. Samples collected upstream, downstream, and at control locations demonstrated that elevated amounts of aluminum and iron are associated with natural sources.

Chapter 5 of this report describes BNL's Water Quality Surveillance Program and monitoring data in further detail.

NATURAL AND CULTURAL RESOURCE MANAGEMENT PROGRAM

The BNL Natural Resource Management Program was designed to promote stewardship of the natural resources found on site and to integrate natural resource management and protection with the Laboratory's scientific mission. The goals of the program include protecting and monitoring the ecosystem on site, conducting research, and communicating with the public, stakeholders, and staff members regarding environmental issues.

BNL conducts routine monitoring of flora and fauna to assess the impact, if any, of past and present activities on the Laboratory's natural resources. Generally, deer sampled on site or within 1 mile of the Laboratory contain higher concentrations of cesium-137 (Cs-137) than deer sampled from more than 1 mile off site. This is most likely because on-site deer consume small amounts of contaminated soil and graze on vegetation growing in soil where elevated Cs-137 levels are known to exist.

In 2016, Cs-137 concentrations in deer meat samples were obtained from six deer on site with a range of values from 0.03 pCi/g, wet weight, to 1.69 pCi/g, wet weight, and an arithmetic average of 0.41 pCi/g, wet weight. The wet weight concentration is before a sample is dried for analysis and is the form most likely to be consumed. Dry

weight concentrations are typically higher than wet weight values. The highest on-site sample in 2016 (1.69 pCi/g, wet weight) was about 22 percent lower than the highest on-site sample reported in 2015 (1.92 pCi/g, wet weight) and 7 times lower than the highest level ever reported in 1996 (11.74 pCi/g, wet weight).

Cs-137 concentrations in off-site deer meat samples are typically separated into two groups: samples taken within 1 mile of BNL (two samples) and samples taken farther away (two samples). Concentrations in meat samples taken within 1 mile ranged from 0.04 pCi/g, wet weight, to 0.16 pCi/g, wet weight, with an arithmetic average of 0.10 pCi/g, wet weight. Because deer on site may routinely travel up to 1 mile off site, the arithmetic average for deer taken on site and within 1 mile of the Laboratory is also calculated; for 2016, this was 0.33 pCi/g, wet weight. The two deer sampled from greater than 1 mile from BNL had Cs-137 concentrations ranging between 0.08 pCi/g, wet weight, to 0.13 pCi/g, wet weight, with an arithmetic average of 0.11 pCi/g, wet weight.

BNL maintains an ongoing program for collecting and analyzing fish from the Peconic River and surrounding freshwater bodies. With removal of discharges to the river, monitoring is dependent on presence of water supporting fish populations that will allow taking fish of sufficient size for sampling without impacting the population. Due to lack of water and fish within the on-site portions of the Peconic River, no fish were sampled in 2016.

During 2016, grassy vegetation samples were collected from 12 locations around the Laboratory and a control location at the NYSDEC hunter check station in Ridge, New York. All samples were analyzed for Cs-137. Cs-137 content in vegetation ranged from non-detectable to 0.08 pCi/g, wet weight. Only one of the 12 samples and the control location sample had detectable levels of Cs-137. All values were consistent with historic monitoring. Monitoring results for grassy vegetation is utilized for the annual dose to biota analysis reported in Chapter 8.

Soil sampling was conducted at the same 12 locations where the grassy vegetation was collected and analyzed for Cs-137. Cs-137 concentrations in soils ranged from non-detectable to 0.88 pCi/g,

dry weight. These values were also consistent with past soil monitoring results.

During 2016, precipitation samples were collected quarterly at air monitoring Stations P4 and S5 and analyzed for total mercury. Historically and through 2015, BNL analyzed precipitation for radiological content. However, with no emissions of significantly long-lived radionuclides from Laboratory operations, the monitoring program objectives were modified to remove testing of precipitation for radiological content beginning in 2016. Mercury concentrations in precipitation have been measured at BNL since 2007. Analysis of mercury in precipitation is conducted to document mercury deposition that is attributable to off-site sources. This information is compared to Peconic River monitoring data and aids in understanding the distribution of mercury within the Peconic River watershed. Mercury was detected in all of the precipitation samples collected at both sampling stations. Mercury ranged from 1.84 ng/L at station S5 in January to 19.1 ng/L at station P4 in July. This range is one twelfth to three fourths of the highest value measured in precipitation, 24.6 ng/L, recorded in 2013.

The Laboratory sponsors a variety of educational and outreach activities involving natural resources. These programs are designed to help participants understand the ecosystem and to foster interest in science. Wildlife programs are conducted at BNL in collaboration with local agencies, colleges, and high schools. Ecological research is also conducted on site to update the current natural resource inventory, gain a better understanding of the ecosystem, and guide management planning.

In 2016, BNL hosted 14 student interns and two faculty members within the Natural Resources program. Two of the interns worked with a faculty member from SUNY Westbury and two interns worked with a faculty member from Hofstra University as part of the BNL Visiting Faculty Program (VFP) and 10 interns participated in research associated with various projects including several related to the Long Island Solar Farm (LISF) on site.

The VFP team from SUNY Westbury focused their research on developing new acoustic monitoring tools for identifying buzz pollinators

(bumble bees), and developed libraries of buzz patterns for known species. A second VFP team gathered basic information on small mammals, tick loads, and the incidence of Lyme disease in the ticks. This work is being done in preparation for coyotes (*Canis latrans*) migrating to Long Island. Once established, coyotes are expected to alter ecosystems due to competition with other carnivores.

Work associated with the LISF involved tracking 24 eastern box turtles outfitted with transmitters to determine home range sizes. Many of the turtles were captured in or near the LISF in order to determine if they utilize habitats found in the facility. Interns also conducted surveys in and around the LISF to study the relationship and impacts of this facility on the local ecosystem. Paired small mammal trapping grids looked at variations in small mammal populations both inside and outside of the LISF to compare recruitment of small mammals from the forest to the immediate interior of the solar farm (one grid on either side of the LISF fence).

BNL utilizes prescribed fire as part of its forest management. To accurately develop burn plans, data on vegetation and fuel loads is necessary. Summer interns worked to collect and analyze fuel loads within current and planned burn units. Summer interns also continued acoustic monitoring work for bats to document presence/absence of the northern long-eared bat and other species on site.

In 2016, BNL continued to participate in several events in support of ecological education programs including: providing on-site ecology tours; hosting the Long Island Natural History Conference; participation in the Ninth Annual Pine Barrens Discovery Day held at the Wertheim National Wildlife Refuge; and assisting the Central Pine Barrens Commission on “A Day in the Life of the Rivers,” which allowed students from multiple school districts to acquire environmental and biological data from nine different rivers on Long Island. On separate days, over 30 partner organizations and agencies, 47 schools, and over 2,400 students collected scientific information for analysis to be used to portray the status of the rivers and estuary systems. These events provide students hands-on experience with field

techniques in catching fish, invertebrate sampling, biodiversity inventory, and water chemistry. In addition, BNL is in the 13th year of the Open Space Stewardship Program (OSSP) and worked with 30 schools and over 3,000 students in 2016. The OSSP enables students to engage in activities to solve problems within their local community through scientific discovery, conservation, and stewardship. The effort integrates outdoor research with school curricula in language arts, civics, community service, and media arts. Participation in OSSP creates an opportunity for many students to enhance their educational expectations, as well as to promote the realization that a career in science and technology is accessible with the proper academic coursework and interaction with teachers and field experts who have a passion for discovery and mentorship.

The Laboratory also hosts the annual New York Wildfire & Incident Management Academy, offered by NYSDEC and the Central Pine Barrens Commission. Using the Incident Command System of wildfire management, this academy trains firefighters in the methods of wildland fire suppression, prescribed fire, and fire analysis. BNL has developed and is implementing a Wildland Fire Management Plan that includes the use of prescribed fire for fuel and forest management, and is working with NYSDEC to conduct growing season fires in northern and eastern sections of the BNL property. Although growing season prescribed fires were planned for 2016, extended drought conditions prevented their implementation.

Chapter 6 of this report describes BNL's natural and cultural resources in further detail.

GROUNDWATER PROTECTION MANAGEMENT PROGRAM

BNL has made significant investments in environmental protection programs over the past 20 years and continues to make progress in achieving its goal of preventing new groundwater impacts and remediating previously contaminated groundwater. No new impacts to groundwater quality were discovered during 2016. The Laboratory's extensive groundwater monitoring well network is used to evaluate progress in restoring groundwater quality, to comply with regulatory

permit requirements, and to monitor active research and support facilities where there is a potential for environmental impact.

During 2016, BNL collected groundwater samples from 669 permanent monitoring wells and 34 temporary wells during 1,642 individual sampling events. Nine groundwater remediation systems removed 63 pounds of volatile organic compounds (VOCs) and returned approximately 914 million gallons of treated water to the Upper Glacial aquifer. Since the beginning of active groundwater remediation in December 1996, the treatment systems have removed 7,455 pounds of VOCs by treating over 25 billion gallons of groundwater. Also during 2016, two groundwater treatment systems removed approximately 0.8 millicurie of Sr-90 while remediating approximately 23 million gallons of groundwater. Since 2003, BNL has removed approximately 31.7 millicuries of Sr-90 from the groundwater while remediating nearly 190 million gallons of groundwater. As a result of the successful operation of these treatment systems, significant reductions in contaminant concentrations have been observed in a number of on- and off-site areas.

During 2016, the North Street East System, OU I South Boundary Treatment System, and the HFBR Tritium Pump and Recharge System remained in standby mode because they met their active remediation goals for reduction of contaminant concentrations. The Building 452 Freon-11 Groundwater Treatment System was placed in standby mode in March 2016. A period of standby monitoring for the plumes associated with these treatment systems will be performed to detect any rebound of contaminant concentrations.

Chapter 7 of this report provides an overview of this program, and the SER Volume II, *Groundwater Status Report*, provides detailed descriptions, data, and maps relating to all groundwater monitoring and remediation performed in 2016.

RADIOLOGICAL DOSE ASSESSMENT PROGRAM

The Laboratory routinely reviews its operations to ensure that any potential radiological dose to members of the public, workers, and the environment is "As Low As Reasonably Achievable" (ALARA). The potential radiological dose to members of the public is calculated at an off-site

location closest to an emission source as the maximum dose that could be received by an off-site individual, defined as the “maximally exposed off-site individual” (MEOSI). The dose to the MEOSI is the sum total from direct and indirect dose pathways via air immersion, inhalation of particulates and gases, and ingestion of local fish and deer meat. In 2016, the total effective dose (TED) of 3.16 mrem (32 μ Sv) from Laboratory operations was well below the EPA and DOE regulatory dose limits for the public, workers, and the environment.

To measure direct radiation from Laboratory operations, 49 environmental thermoluminescent dosimeters (TLDs) were deployed on site, of which 9 were placed in known radiation areas and 18 off-site areas. An additional 30 TLDs were placed in a lead-shielded container for use as reference and control TLDs for comparison purposes. The average dose of all TLDs showed there was no additional contribution above the natural background radiation to on- and off-site locations from BNL operations.

Dose to aquatic and terrestrial biota were also evaluated and found to be well below DOE regulatory limits. In summary, the overall dose impact from all Laboratory activities in 2016 was comparable to that of natural background radiation levels.

Chapter 8 of this report describes the BNL Radiological Dose Assessment Program and monitoring data in further detail.

QUALITY ASSURANCE PROGRAM

The multilayered components of the BNL Quality Assurance (QA) Program ensure that all analytical data reported in this report are reliable, of high quality, and meet quality assurance and quality control objectives. Samples are collected and analyzed in accordance with EPA methods and BNL standard operating procedures that are designed to ensure samples are representative and the resulting data are reliable and defensible. Quality control in the analytical laboratories is maintained through daily instrument calibrations, efficiency and background checks, and testing for precision and accuracy. Data are verified and validated as required by project-specific quality objectives before being used to support decision making.

In 2016, the Laboratory used five off-site contract analytical laboratories to analyze environmental samples. All analytical laboratories were certified by NYSDOH for the tests they performed for BNL, and were subject to oversight that included state and national performance evaluation (PE) testing, review of QA programs, and audits.

Based on the data reviews, data validations, and results of the independent PE assessments, the chemical and radiological results documented in this report are of acceptable quality.

Chapter 9 of this report describes the BNL Quality Assurance/Quality Control Program in further detail.