Executive Summary

Brookhaven National Laboratory (BNL) is managed on behalf of the Department of Energy (DOE) by Brookhaven Science Associates (BSA), a partnership between Stony Brook University and Battelle, and six core universities: Columbia, Cornell, Harvard, Massachusetts Institute of Technology, Princeton, and Yale. For over 75 years, the Laboratory has played a lead role in the DOE Science and Technology mission and continues to contribute to the DOE's missions in energy resources, environmental quality, and national security. BNL manages its world-class scientific research operations with 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 its environmental history since the Laboratory's inception in 1947.

Volume II of the SER, the Groundwater Status Report, is also 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 summary of the information contained in Volume II is included in Chapter 7, Groundwater Protection, of this volume.

Both reports are readily available as downloadable files on the BNL web page at 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, health, and quality (ESH&Q) 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 the International Organization for Standardization (ISO) 14001 Standard for Environmental Management Systems (EMS). The standard requires an organization to develop a policy, create plans to implement the policy, implement the plans, check progress and take corrective actions, and review the system periodically to ensure its continuing suitability, adequacy, and effectiveness.

An EMS was established at BNL and has been fully registered to the ISO Standard since 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 commitment to environmental stewardship, the safety and health of its employees, and the security of the site. Specific environmental commitments in the policy include compliance, sustainability, conservation, community outreach, and continual improvement. The policy is posted throughout the Laboratory and on the BNL website. It is also included in all training programs for new employees, guests, and contractors. BNL continues to seek opportunities and implement efficient business practices into site operations and infrastructure.

The Laboratory achieves certification to the standard by undergoing annual audits by an accredited third-party registrar who ensures that the Lab's EMS is maintained and continually improved. In 2024, BNL's third-party registrar conducted a certification assessment of the Lab to the ISO 14001 Standard with no nonconformances identified. BNL was recertified as conforming to the ISO 14001 EMS Standard on September 20, 2024.

The Laboratory's Pollution Prevention (P2) Program is an essential element for the successful implementation of BNL's EMS. The P2 Program reflects 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 BSA and 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 2024, the P2 Program resulted in nearly $1.6 million in cost avoidance or savings and resulted in the reduction or reuse of approximately 1,500 tons of waste. The program has funded 14 new proposals reducing spill risk, plastic waste in laboratories, promoting the use of bio-friendly alternative products, and overall environmentally environmentally efficient business practices. As a testament to its strong environmental programs, BNL earned its first GreenSpace Silver Award for meeting environmental criteria in a Research Lab renovation project.

The Laboratory continually evaluates water conservation as part of facility upgrades or new construction initiatives. These efforts include more efficient and expanded use of chilled water for cooling and heating/ventilation and air conditioning (HVAC) systems to reduce use of once-through cooling water for other systems. Water use was reduced by half over the last ten years—a reduction of nearly a half billion gallons per year.

In 2024, BNL used 296 million kilowatt hours (kWh) of electricity, 67,128 gallons of fuel oil, 15,118 gallons of propane, and 554 million cubic feet of natural gas. Also, in 2024 BNL's energy supply included 120,014 megawatts (MW) of clean, renewable hydropower energy, 552,447 kWh of on-site generated solar photovotaic (PV), and 24 million kWh of purchased renewable energy certificates (RECs). The Laboratory will consider seeking alternative energy sources pending directives and funding from the administration. BNL continues to address legacy environmental issues and openly communicates with neighbors, regulators, employees, and other interested parties on environmental issues and cleanup progress on-site. During 2024, BNL hosted in-person/virtual meetings of the Community Advisory Council (CAC), tours, a virtual speakers bureau, and monthly interagency calls with regulators. BNL is committed to transparency and open communication with its internal and external stakeholders.

Chapter 2 of this report further describes these and other energy efficiency efforts, as well as implementation of BNL's EMS and P2 Program, in more detail.

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 2024 are 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; 11 equivalency permits for the operation of groundwater remediation systems; and several other binding agreements.

In 2024, the Laboratory was in compliance with most regulatory requirements. Instances of noncompliance were reported to regulatory agencies and corrected expeditiously, or a plan was put in place to come into compliance. Emissions of nitrogen oxides, carbon monoxide, and sulfur dioxide from the Central Steam Facility (CSF) were well within permit limits in 2024. Recorded excess opacity measurements from CSF boilers were investigated and documented in quarterly Site-Wide Air Emissions and Monitoring Systems Performance Reports and submitted to the New York State Department of Environmental Conservation (NYSDEC).

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 in 2024. The last remaining 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.

BNL's drinking water system continues to remain in compliance with all applicable county, state, and federal regulations regarding drinking water quality, monitoring, operations, and reporting. The liquid effluents discharged to surface water and groundwater also met applicable New York State Pollutant Discharge Elimination System (SPDES) permit requirements with no noncompliance events occurring for any of the permitted outfalls.

Groundwater monitoring at the Laboratory's Major Petroleum Facility (MPF) continued to demonstrate that current oil storage and transfer operations are not affecting groundwater quality. Efforts to implement release prevention measures and minimize impacts of spills of materials on a site-wide basis continued in 2024. There were ten spills in 2024, two of which met regulatory agency reporting criteria.

In 2024, there were eight site inspections by federal, state, or local regulators. These inspections included Sewage Treatment Plant (STP) operations, and all Lab-wide SPDES Discharge Outfalls, Resource Conservation and Recovery Act (RCRA) Department of Environmental Conservation (DEC) Part 373 Permitted Hazardous Waste Management Facilities, Underground Storage Tanks, and the potable water system. Immediate corrective actions were taken to address all compliance issues raised during these inspections.

The DOE Brookhaven Site Office (BHSO) performs routine inspections, assessments, and surveillances of BNL operations to ensure continual improvement and success in meeting the Laboratory's mission. In 2024, BHSO performed four surveillances of waste management activities with the purpose of evaluating performance in accordance with existing Technical Work Documents or Standard Operating Procedures (SOPs). BHSO also participated as an observer of the BSA Multi-Topic Assessment of BNL's management of hazardous and universal waste. BHSO participation comprised of observing BSA's scoping, assessment conduct, and reporting. Any findings were reviewed, analyzed, and were addressed, as appropriate, to prevent any future nonconformances.

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 to ensure compliance with the requirements of the Clean Air Act. Environmental Protection Agency (EPA) regulations require continuous monitoring of all sources that have the potential to deliver an annual radiation dose greater than 0.1 millirem (mrem) to a member of the public; all other facilities capable of delivering any radiation dose require periodic confirmatory sampling. During 2024,

BNL facilities released a total of 22,040 curies (Ci) of short-lived radioactive gases. Oxygen-15 and Carbon-11 emitted from the Brookhaven Linear Particle Accelerator (LINAC) Isotope Producer (BLIP) constituted 99.9% of the site's radiological air emissions.

Radiological emissions at the BLIP, High Flux Beam Reactor (HFBR), and Radionuclide Research and Production Laboratory (RRPL) are continuously monitored. The glass-fiber filtration system for BLIP captures samples of airborne particulate matter released, and the RRPL has a membrane-type filter suited for the capture and detection of alpha-emitting isotopes as well as beta-emitting isotopes. The filters are collected and analyzed for gross alpha and gross beta activity. At the decommissioned HFBR, monthly analysis of silica gel samples from continuous emissions monitoring is also conducted. The average gross alpha and beta airborne activity concentration levels for samples collected from the BLIP exhaust stack were 0.001 and 0.016 picocuries per cubic meter (pCi/m^3), respectively. Annual average gross alpha and beta airborne activity concentration levels for samples collected from the RRPL were 0.001 and 0.006 pCi/m^3, respectively, and well below standards. 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 gross alpha and beta airborne activity. In 2024, average gross alpha and beta airborne activity levels for the four monitoring stations were 0.002 and 0.015 pCi/m^3, respectively.

Airborne tritium in the form of tritiated water (HTO) is monitored throughout the BNL site. In 2024, samples were collected from four site perimeter monitoring stations to assess the potential impacts from the Laboratory's two tritium sources. The average tritium concentrations at all the sampling locations were less than the typical minimum detection limits, ranging from 2.8 to 8.8 pCi/m^3.

Because natural gas prices were comparatively lower than fuel oil prices throughout the year, BNL's CSF used natural gas to meet 98% of the heating and cooling needs of the Laboratory's major facilities. As a result, emissions of particulates, oxides of nitrogen, sulfur dioxide, and volatile organic compounds were well below the respective regulatory permit criteria pollutant limits.

In 2024, there were two recorded excess opacity measurements at the CSF and one recorded excess nitrogen oxide (NO_x) measurement. The recorded excess opacity readings occurred on Boiler 6 and were due to fuel meter/fan auto control issues, while the recorded excess NO_x measurement was due to the restart of Boiler 6. During 2024, BNL upgraded cooling water systems as part of the program.

For a more in-depth discussion on the Laboratory's energy reduction efforts and BNL's Air Quality Program, monitoring data, and other GHG reduction efforts, refer to Chapter 2 and Chapter 4 of this report, respectively.

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.

Monitoring results for 2024 indicate that the average gross alpha and beta activity levels in the STP discharge (EA, Outfall 001) were well below New York State Drinking Water Standards (NYSDWS). Tritium was detected above the minimum detectable concentration (MDC) in the STP discharge in September 2024 with the annual average concentration being 98.3 ± 66.5 pCi/L; no cesium-137 (Cs-137), strontium-90 (Sr-90), or other gamma-emitting nuclides attributable to Laboratory operations were detected. Non-radiological monitoring of the STP effluent showed that all organic and inorganic parameters were within SPDES effluent limits or 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. The average gross alpha and beta concentrations 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 at low concentrations in discharges to recharge basins due to the use of chlorine and bromine to control algae and bacteria in potable and cooling water systems. Inorganics (e.g., metals) were also detected; however, their presence is due primarily to sediment runoff in stormwater discharges.

Radiological data from Peconic River surface water sampling show that the average concentrations of gross alpha activity were indistinguishable from background. Gross beta activity from on-site locations were higher than control locations, however all detected levels were below the applicable NYSDWS. No gamma-emitting radionuclides attributable to Laboratory operations were detected either upstream or downstream of the former STP outfall, and tritium was not detected above MDCs in any of the surface water samples.

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 (NRMP) is designed to protect and manage flora and fauna and the ecosystems in which they exist. The Laboratory's natural resource management strategy is based on understanding the site's resources and maintaining compliance with applicable regulations.

The goals of the program include protecting, monitoring, and, where possible, restoring the ecosystems, conducting research, and communicating with employees and the public on ecological issues. BNL focuses on protecting both Federal and New York State threatened and endangered species on-site, as well as continuing the Laboratory's leadership role within the greater Long Island Central Pine Barrens ecosystem. Monitoring to determine whether current or historical activities are affecting natural resources is also part of the program.

BNL has administrative processes in place to protect on-site habitats and natural resources. Activities to eliminate or minimize negative effects on endangered, threatened, or sensitive species are either incorporated into Laboratory procedures or into specific program or project plans. The Laboratory also monitors or manages other populations, including species of interest, to ensure that they are sustained and to control invasive species. The main goal of the NRMP is to ensure proper stewardship of BNL natural resources is established and maintained, and as a testament to the program the deer, vegetation, and soil sampling results were consistent with the previous years' results. To evaluate Cs-137 in deer, BNL has established a routine on- and off-site deer sampling program.

In 2024, a total of 15 deer were taken through fortuitous sampling from car-deer accidents both on- and off-site, and population reductions of the deer herd on the BNL site. The highest Cs-137 level in an on-site sample was 0.42 picocuries per gram (pCi/g), wet weight was twice that of the highest on-site sample reported in 2023 (0.21 pCi/g, wet weight) and 28 times lower than the highest level ever reported in 1996 (11.74 pCi/g, wet weight). Deer taken greater than one mile from the Lab were all non-detect for Cs-137.

The New York State Department of Health (NYSDOH) formally considered the potential public health risks associated with elevated Cs-137 levels in on-site deer and determined that neither hunting restrictions nor formal health advisories are warranted (NYSDOH 1999). In 2024, a total of 123 deer were taken during population reductions and representative samples were sent for analysis, of which all tested well below the 1.0 pCi/g, wet weight administrative limit for Cs-137 set by BNL for release of meat for consumption. A total of 2,623 pounds of meat was donated to the Island Harvest Food Pantry and a local wildlife rehabilitator.

Grassy vegetation samples were collected from ten locations around the Laboratory and a control location in Ridge, New York. All samples were analyzed for Cs-137. Nine vegetation samples were non-detect for Cs-137;

the remaining sample had a Cs-137 level of 0.35 pCi/g, dry weight. Five soil samples collected along with the vegetation samples were undetected or levels of Cs-137 indistinguishable from background. The remaining six samples had Cs-137 levels ranging from 0.04 to 0.64 pCi/g, dry weight. All values were consistent with historic monitoring and knowledge of cleanup areas. Monitoring results for grassy vegetation and soils were utilized for the annual dose to biota analysis reported in Chapter 8.

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. During 2024, precipitation samples were collected quarterly at two air monitoring stations. Mercury was detected in all the precipitation samples, with concentrations ranging from 3.74 nanograms per liter (ng/L) to 13.3 ng/L. The 13.3 ng/L concentration is three times lower than the highest value of 45.1 ng/L, recorded in 2017.

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 2024, 13 interns completed projects related to bat acoustic monitoring, small mammal trapping, black turpentine beetle activity in pitch pine restoration treatments, fire and insect communities in pine barrens, wildlife camera trapping, and the impacts of fire and forest microclimates on tick populations. BNL continued its active support of ecological education programs by hosting the Day in the Life of a River Program which ran from September 19 to November 1, 2024. This program is a place-based educational experience where students and teachers collaborate with environmental professionals to collect scientific information to obtain a snapshot of the health of Long Island rivers and creeks. The Day in the Life of a River is a collaboration between the Central Pine Barrens Commission, the NYSDEC, and BNL, which is supported by experts from the U.S. Geological Survey, the Town of Brookhaven, Trout Unlimited, New York State Parks, and others.

The overriding goal of the Cultural Resource Management Program is to ensure that proper stewardship of BNL historic resources is established and maintained. Additional goals of the program include maintaining compliance with various historic preservation and archeological laws and regulations and ensuring the availability of identified resources for research and interpretation. The Cultural Resource Management Plan was updated in 2023 and guides the management for all the Laboratory's historical resources to include buildings, structures, World War I (WWI) earthwork features, the Camp Upton Historical Collection, scientific equipment, photo/audio/video archives, and institutional records.

In 2024, the Lab and DOE developed artwork and content for five kiosks to meet compliance with Memoranda of Agreement (MOA) for the Brookhaven Medical Research Reactor (BMRR) Stack Removal project, Discovery Park (which included the 1960s Era Apartments Demolition project), and the 1940s Water Tower Demolition project. New display cases were installed in Berkner Hall to exhibit objects relating to Camp Upton history, and new curatorial cabinets were purchased for the curation of objects and ephemera related to BNL's science history and its military history as Camp Upton. Public outreach included contributions to the Bellport-Brookhaven Historical Society's 2024 summer exhibit, *The Innovators: Inventors and Scientists of Bellport*, and history presentations at local libraries. The Lab also hired a new full-time Cultural Resource Manager to meet the growing regulatory needs for compliance with the National Historic Preservation Act.

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

Groundwater Protection Management Program

BNL implements aggressive pollution prevention measures to protect groundwater resources and uses an extensive groundwater monitoring well network to verify that prevention and restoration activities are effective. During 2024, BNL collected groundwater samples from 765 permanent monitoring wells and 41 temporary wells. Seven groundwater remediation systems removed 41 pounds of volatile organic compounds (VOCs) and returned approximately 753 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 7,914 pounds of VOCs by treating almost 33 billion gallons of groundwater.

In October 2022, BNL started the operation of the Current Firehouse Per- and Polyfluoroalkyl Substances (PFAS) Remediation System and the Former Firehouse PFAS Remediation System was started in January 2023. Since the start of their operations, the systems have removed approximately 1.3 pounds of total PFAS while treating 666 million gallons of groundwater. Also, one groundwater treatment system removed approximately 0.1 millicurie of Sr-90 while remediating approximately 7 million gallons of groundwater. Since 2003, BNL has removed approximately 34.9 millicuries of Sr-90 from the groundwater while remediating approximately 297 million gallons of groundwater. As a result of the successful operation of these treatment systems, significant reductions in contaminant concentrations have occurred in on- and off-site areas.

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 2024.

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 from direct and indirect dose pathways via air immersion, inhalation of particulates and gases, and ingestion of local fish and deer meat.

In 2024, the total effective dose (TED) to the MEOSI from Laboratory operations was less than 2.5% of the dose limit of 100 mrem in a year required by DOE Order 458.1, and well below all other EPA and U.S. DOE regulatory dose limits for the public, workers, and the environment. The effective dose equivalent (EDE) from air emissions is calculated using a dose modeling software program promulgated by the EPA. As such, the EDE from air emissions was estimated at 1.67 mrem (16.7 micro Sieverts [μSv]) to the MEOSI in 2024. The BNL dose level from the inhalation pathway was 16.7% of the EPA’s annual regulatory dose limit of 10 mrem (100 μSv). In addition, the dose from the ingestion pathway was estimated as 0.61 mrem (6.1 μSv) from the consumption of deer meat. The on-site portion of the Peconic River had water only sufficient to support a few fish. Therefore, no fish were collected. As a result, there was no measured dose attributed to BNL legacy Cs-137 levels in fish in the Peconic River. In summary, the total annual dose to the MEOSI from all pathways was estimated at 2.28 mrem (22.8 μSv), which is less than 2.5% of DOE’s 100-mrem limit. The aggregate population dose was 9.8 person-rem among approximately six million people residing within a 50-mile radius of the Laboratory. On average, this is equivalent to a fraction of an airport whole body scan per person.

Dose to the maximally exposed individual (MEI) on-site (outside of radiological controlled work areas), calculated from thermo-luminescent dosimeter (TLD) monitoring records, was 4 ± 2 mrem above natural background radiation levels, also well below the 100-mrem DOE dose limit. The average annual external dose from ambient sources on-site was 64 ± 8 mrem (640 ± 80 μSv), while the dose from off-site ambient sources was 62 ± 8 mrem (620 ± 80 μSv). Both on- and off-site external dose measurements include the contribution from natural

terrestrial and cosmic background radiation. A statistical comparison of the average doses measured using 53 on-site TLDs and 16 off-site TLDs showed that there was no external dose contribution from BNL operations distinguishable from the natural background radiation level. Additional TLDs were used to measure on-site areas known to receive radiation dose slightly above the natural background radiation. Doses 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 2024 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 Asssurance Program

The multi-layered components of the BNL Quality Assurance/Quality Control (QA/QC) Program ensure that all environmental monitoring samples are representative, and data within this report are reliable and of high quality and meet quality assurance and quality control objectives. Samples are collected and analyzed in accordance with EPA methods and BNL SOPs that are designed to ensure samples are representative and the resulting data are reliable and defensible. QC at the analytical laboratories is maintained through daily instrument calibrations, efficiency, 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 2024, environmental samples were analyzed by five contract analytical laboratories, whose selection is discussed in Section 9.3.1 in Chapter 9. All samples were analyzed according to EPA-approved methods or by standard industry methods where no EPA methods are available (e.g., for Tolyltriazole). The most common QC issue encountered during 2024 was the detection of low-level contamination in the trip, field, and method blanks used in VOC analyses.

Environmental monitoring samples were collected as specified in the Environmental Monitoring Plan Update (BNL 2024) and project-specific work plans. BNL uses SOPs that are consistent with industry and regulatory standards for the collection of environmental samples, including groundwater, surface water, soil, sediment, air, flora, and fauna. During sample collection, field sampling technicians used calibrated field instrumentation for parameters such as conductivity, dissolved oxygen, pH, temperature, and turbidity. To ensure the integrity of samples, chain-of-custody (COC) was maintained and documented for all samples collected. These procedures are outlined in EM-SOP 109, “Chain-of-Custody, Storage, Packaging, and Shipment of Samples” (BNL 2020).

Environmental monitoring data are subject to data verification and, in certain cases, data validation when the data quality objectives of the project require this step. The data verification process involves checking for common errors associated with analytical data, while data validation involves a more extensive process. Validation includes all the verification checks, as well as checks for common errors, including instrument calibration that was not conducted as required, internal standard errors, transcription errors, and calculation errors.

The data validations, data verifications, and Data Quality Objectives (DQOs) checks conducted on analytical results at BNL are designed to eliminate any data that fails to meet the DQOs of each project. The results of the independent Performance Evaluation assessments and assessments of contractor laboratories summarized in this chapter are also used to assess the quality of the results. Therefore, the data used in this SER are of acceptable quality.

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