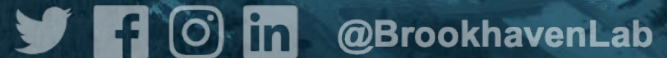




2023 Site Environmental Report (Vol.1): An Overview

Community Advisory Council Meeting
Jason Remien
Manager, Environmental Protection Division

October 10, 2024

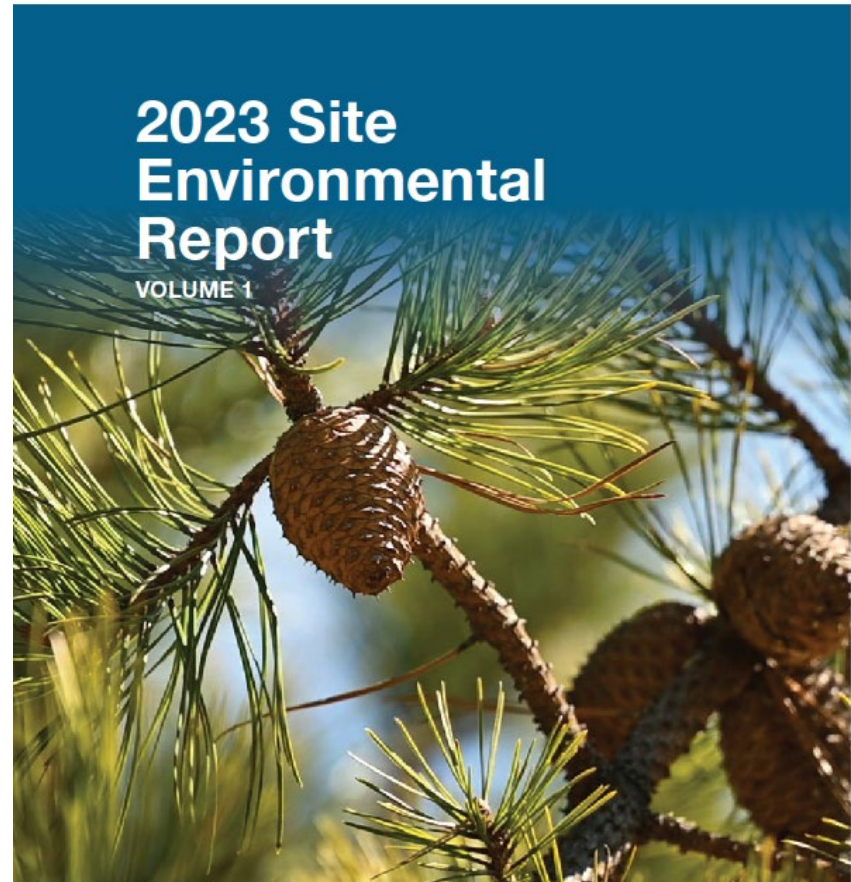


Purpose of the Site Environmental Report (SER)

- **Required by DOE and prepared in accordance with DOE Order 231.1B, *Environment, Safety and Health Reporting*.**
- **Documents compliance with DOE O 458.1 and 436.1A.**
- **Official record of BNL's environmental impact**
 - Serves as an historical record; BNL has been preparing SERs since 1971.
 - Frequently used to respond to Freedom of Information requests.
- **Serves as the principal environmental communications vehicle**
 - Distribution includes DOE, DOE Laboratories, regulators, local libraries, and interested stakeholders.
 - Available as a downloadable file on the BNL web page and in limited hardcopy
- **Showcases BNL's excellence as a leader in the reporting field**

About This Year's Cover/Inside Cover

- Pitch pine is the predominant pine species in Long Island's Central Pine Barrens.
- Pine barrens and inhabiting species have evolved over thousands of years to thrive in the presence of frequent fires.
- Prescribed fires at BNL help to promote fire adapted species in the ecosystem, increase biodiversity, and reduce the risk of wildfires to BNL and neighboring communities.
- Widespread pitch pine mortality due to southern pine beetle demonstrates how important forest management is to maintain healthy pine barrens.



2023 SER Table of Contents & Chapter SME's

■ SER Volume I

- Executive Summary (L. Brooks)
- Chapter 1 – Introduction (L. Brooks/A. Engel)
- Chapter 2 – Environmental Management System (D. Bauer)
- Chapter 3 – Compliance Status (J. Remien)
- Chapter 4 – Air Quality (D. Engelhardt)
- Chapter 5 – Water Quality (J. Haskins/T. Green)
- Chapter 6 – Natural and Cultural Resources (K. Schwager/T. Green)
- Chapter 7 – Groundwater Protection (B. Dorsch/D. Paquette)
- Chapter 8 – Radiological Dose Assessment (T. Welty)
- Chapter 9 – Quality Assurance (L. Singh)

■ SER Volume II

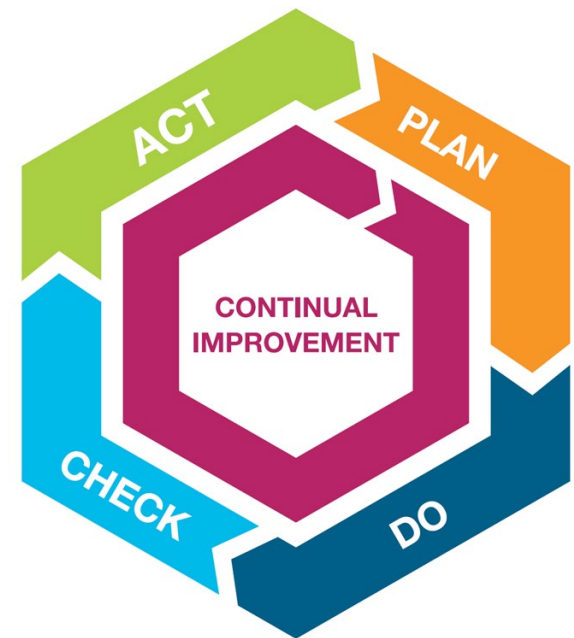
- Groundwater Status Report
 - Groundwater Protection Group



Chapter 2 - Environmental Management System (EMS) ISO 14001

- **External surveillance assessment was conducted to determine BNL's conformance to the ISO14001 EMS Standard. (Certification assessment was completed during 2024)**
 - The system remains fully integrated and effective.
 - One nonconformance was identified regarding expired training.
- **Pollution Prevention (P2) Program**
 - The P2 Program provided \$18K of funding for 10 proposals.
 - Cost avoidance or savings of over \$1.1 million.
 - Approximately 1.4 million lbs. of materials being reduced, recycled, or reused.
 - Landfill diversion rate: 92%* (DOE Goal – 50%)
 - Received Green Electronics EPEAT Award, eighth DOE GreenBuy Gold Award, and a third GreenBuy Superior Award.
 - Received BNL's first GreenSpace Bronze Award
 - BNL is first SC Lab to get both Green Buy and Green Space in the same year.

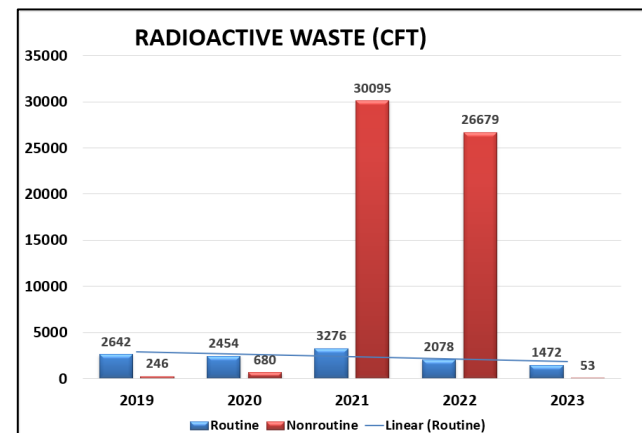
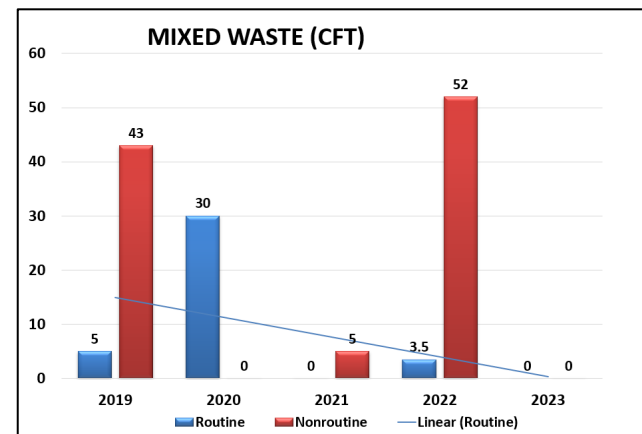
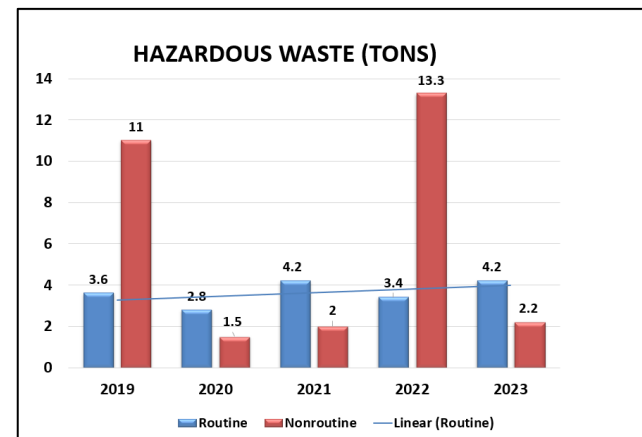
* Includes 80% of MSW going to a Waste-to-Energy Facility as opposed to a landfill.



Chapter 2 - Waste Generation

- Routine hazardous waste increases with returning and growing staff.
- No mixed waste was generated during 2023.
- Routine radioactive waste generation is mostly from medical isotope production with very little nonroutine waste generated as no radiological facilities were decommissioned.

2023	Routine	Nonroutine
Hazardous	4.2 Tons	2.2 Tons
Mixed	0 ft ³	0 ft ³
Rad	1,472 ft ³	53 ft ³



Chapter 2 - Energy Management & Conservation

2023 Accomplishments

- Clean energy supply includes:
 - 119 million kWh clean hydropower energy offsetting 70,310 MT CO₂e.
 - NSERC generated 558,689 kWh of electricity offsetting 330 MT CO₂e.
 - 24 million kWh purchased renewable energy certificates.
- Piloting energy reinvestment program funding energy-saving infrastructure improvement (e.g., energy saving upgrades @ Chilled Water Facility in 2023)
- Scoping a Utility Master Plan to ensure future utility improvements are consistent with Net Zero goals.
- BNL saves >\$2M burning low-carbon natural gas compared to high-carbon oil for heat.
- The Chilled Water Facility uses a 3.2-million-gallon chilled water storage tank to create/store chilled water at night for use at peak times.
- Several other energy savings programs continue (e.g., new meter installations, light bulb replacements)



■ 2023 Statistics (parenthetical values are 2022 data for comparison)

- 241 (258) million kilowatt hours of electricity
- 152,000* (382,000*) gallons of fuel oil
- 13,488 (9,748) gallons of propane
- 475 (568) million ft³ feet of natural gas

*Burned #6 oil due to NYS ban. Burned #2 oil for tank testing.

Assessing Opportunities for Net-Zero Goals

Chapter 2 - Other Topics

- **Environmental Restoration**

- **BGRR/HFBR**

- Continued long-term surveillance and maintenance.

- **Groundwater Treatment Systems**

- Discussed in Chapter 7 and SER Volume 2, Groundwater Status Report.

- **Communication and Community Involvement**

- In 2023, BNL updated stakeholders on the following issues:
 - Update on the Lab's Medical Isotope Program.
 - Lab efforts in reducing single use plastics.
 - Climate scientists' efforts using modeling to predict future energy demands.
 - Continued updates on the characterization and progress of treatment of PFAS and 1,4 Dioxane in groundwater.
 - Update of the Lab's Natural & Cultural Resources programs including deer and fire management and impacts from the southern pine beetle.

- **Environmental Monitoring Program**

- Performed **6,253 sampling events** of groundwater, potable water, precipitation, air, flora and fauna, soil, sediment, and discharges.



Chapter 3 - Compliance Status Overview

- **BNL must comply with multiple permits, including Title V, NESHAPS, SPDES, Tank Storage, SDWA, and RCRA**
 - No new or updated permits in 2023
- **131 proposed projects reviewed for NEPA**
 - 126 projects were considered minor actions requiring no additional documentation.
 - Five projects required submittal of notification forms to DOE and determined to be covered by existing "Categorical Exclusions" or fell within scope of a previous environmental assessment.
- **Potable Water**
 - Usage decreased slightly from 2022 (335 MG vs. 349).
 - Full compliance with regulations.
- **Tanks**
 - No regulatory (EPA or NYSDEC) inspections in 2023.



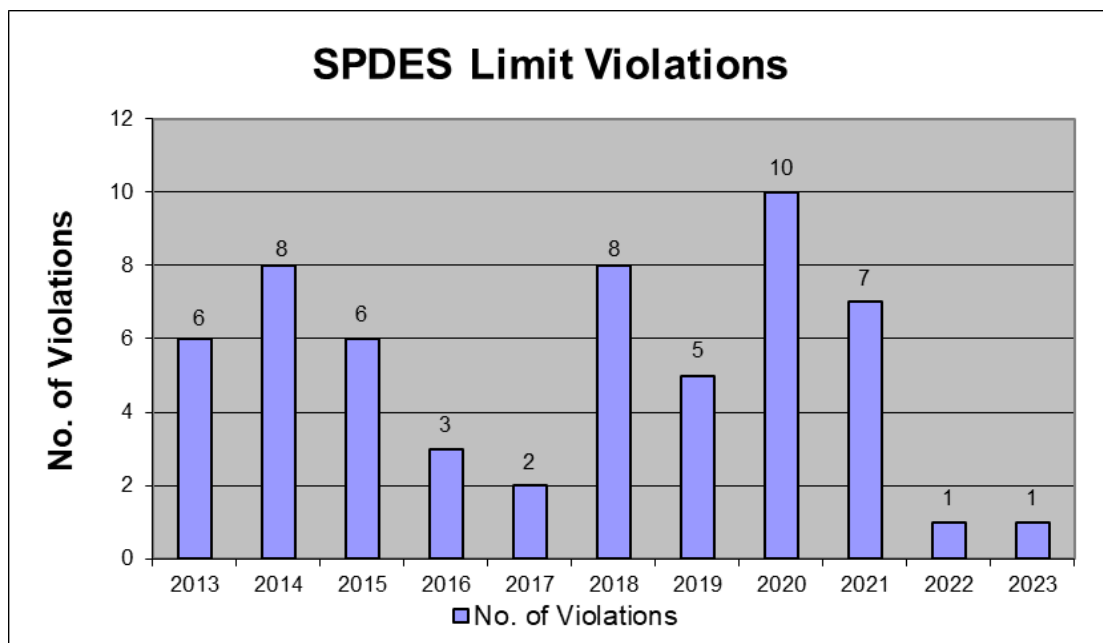
2024 BROOKHAVEN NATIONAL LABORATORY Water Quality CONSUMER CONFIDENCE REPORT



Chapter 3 - Overview (continued)

■ SPDES

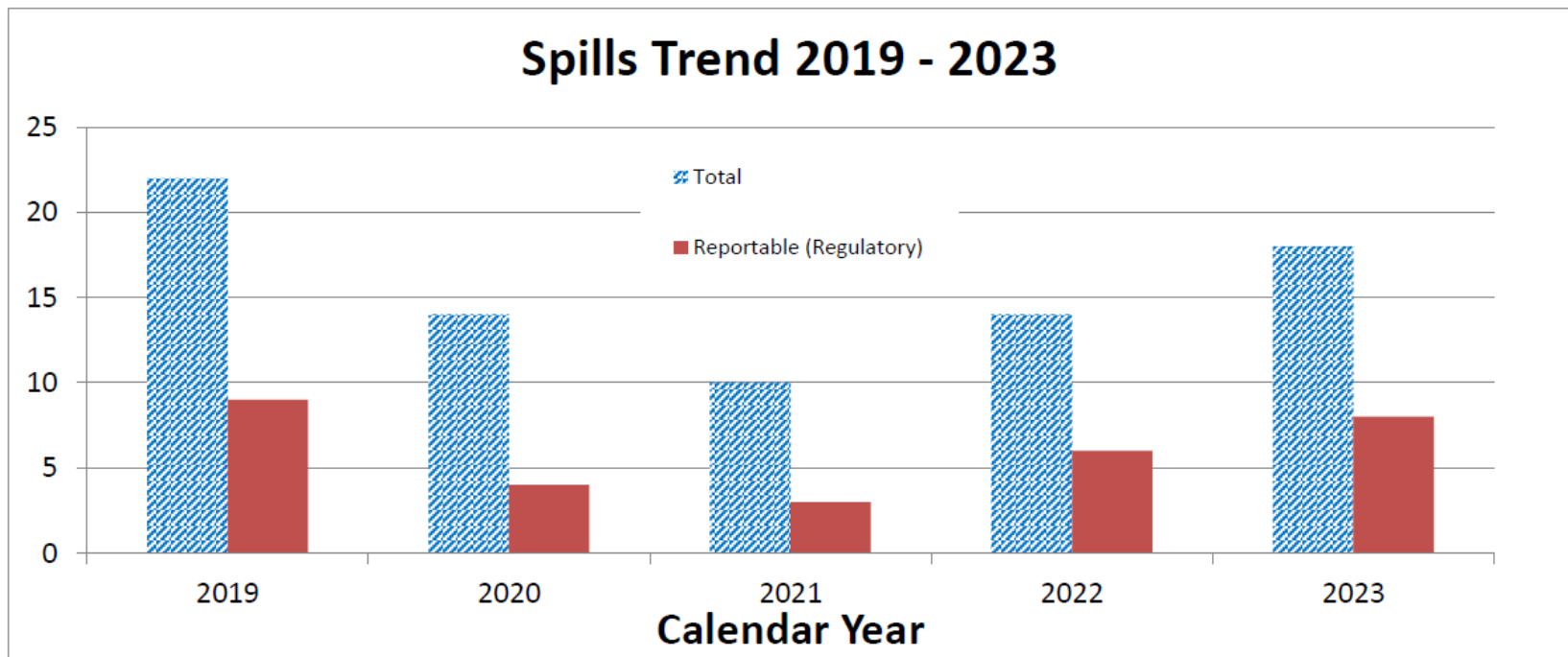
- One permit excursion for oil and grease concentration (Outfall 006B, HT-E).
- Cause of this excursion was due to the improper disposal of oil-containing equipment (e.g., capacitors, resistors, vacuum pumps, heat exchangers) in a scrap metal dumpster during housekeeping activities.
- Cleanup efforts were successful in addressing this release and follow-up field inspections and sampling of the outfall confirmed oil and grease was non-detect.



Chapter 3 - Spills and Reportable Incidents

- **18 spills in 2023**

- Eight of those spills met regulatory criteria.
 - Most were less than a gallon, related to mechanical issues (e.g., hydraulic hose failures, failed fittings, vehicle gas tank), and were cleaned up immediately.



Chapter 3 - Inspections and Assessments

External Inspections



- **NYSDEC (RCRA):** In September 2023, the NYSDEC conducted an inspection of RCRA hazardous waste activities at BNL. A Notice of Violation (NOV) letter and report was received, which indicated two violations pertaining to the management/labeling of florescent lamp wastes. Both violations were immediately corrected, satisfying the conditions of the NOV.



- **SCDHS (STP, potable water):** No issues identified during SPDES inspections and corrective actions for any minor deficiencies identified during potable water system inspection were established and communicated with SCDHS and were addressed by the Laboratory's Energy & Utilities Division.

Chapter 3 - Inspections and Assessments



- **DOE Assessments/Inspections**
 - In 2023, BHSO participated as an observer of Brookhaven Science Associates (BSA) Multi-Topic Assessment of BNL's environmental protection programs.
- **Internal Assessments (Environmental Multi-Topic)**
 - In 2023, the Environmental Protection Division planned for and executed a programmatic self-assessment on Environmental Monitoring of Historical Contamination and Soil Activated Areas, which included compliance with the Accelerator Safety Subject Area and associated organization level procedures.
 - Compliant with the relevant requirements and resulted in:
 - One Noteworthy Practice, no Nonconformances or Observations, and four Opportunities for Improvement.
 - Corrective actions for the identified opportunities for improvement were tracked to closure.



Chapter 4 - Air Quality (Radiological)

■ Radiological Emissions Monitoring

■ Three facilities monitored for radionuclide releases:

- BLIP, Radioisotope Research and Production laboratory (RRPL), and HFBR.
- Total radionuclides released in 2023: **29,813 Ci** (14,116 Ci in 2022).
 - BLIP emissions of short-lived radioactive gases O-15 and C-11 accounted for 99.99% of total (Half life: O-15 = 122 seconds, C-11 = 20.4 min).

■ Ambient Air Monitoring

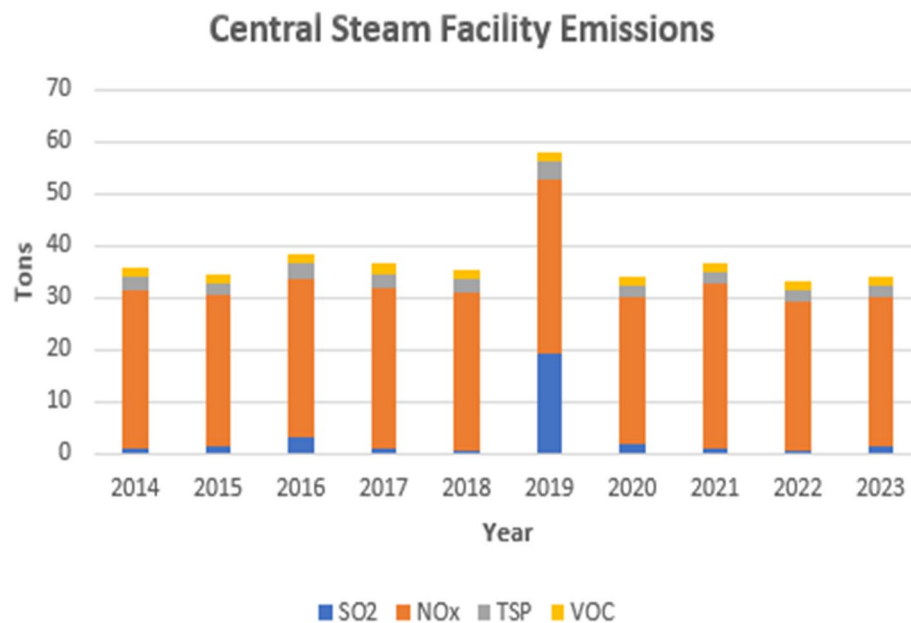
■ Radiological air quality monitored at four on-site locations around the perimeter of the site

- Gross alpha and beta concentrations consistent with natural background.
- Average tritium concentrations at or less than minimum detectable concentration (MDC).



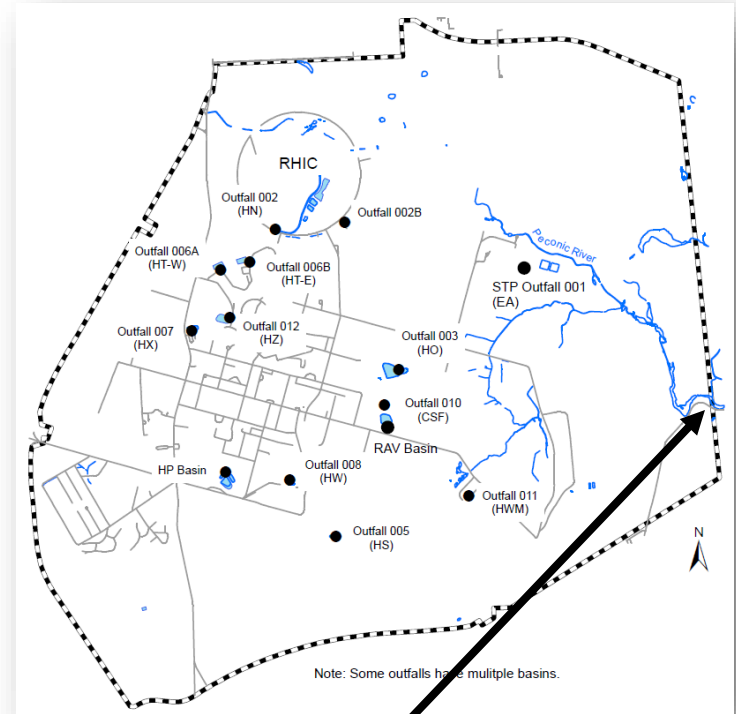
Chapter 4 - Air Quality (Non-Radiological)

- **Continuous Emissions Monitoring System required for Central Steam Facility Boilers 6 & 7**
 - One NO_x limit exceedance for Boiler 6.
 - (4) 6-min period opacity exceedances for Boiler 7.
 - Fuel oil use: 310,557 gals. #2 oil, 70,276 gals. #6 oil (342,454 gals. #6 oil in 2022)
 - SO₂, NO_x, TSP, and VOC emissions well under respective permit limits of 445, 159, 113.3, and 39.7 tons.



Chapter 5 - Water Quality (Radiological Monitoring)

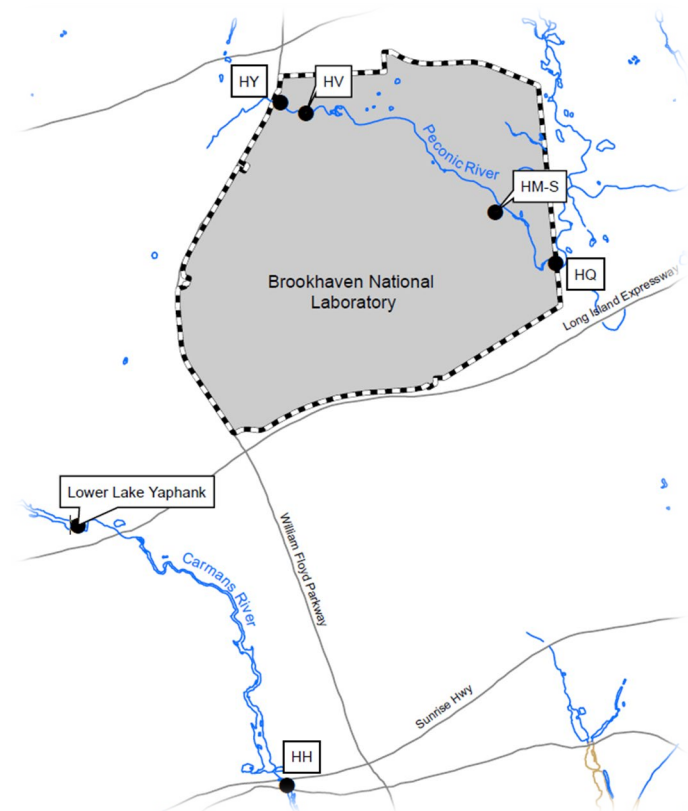
- Tritium was not detected above the minimum detectable concentration (MDC) in any of the surface water samples.
- No gamma-emitting radionuclides attributable to Laboratory operations were detected in any recharge basins.
 - Natural products only
- Peconic River had no flow off site in 2023 (8th year of dry conditions); radiological values measured onsite (Sr-90, gross alpha, gross beta) were all comparable to historical levels and can be attributed to worldwide fallout or natural products.



Upstream of Monitoring Station HQ

Chapter 5 – Water Quality (Non-Radiological Monitoring)

- **Sewage Treatment Plant**
 - Full compliance was met entire year.
- **Recharge Basins**
 - All metals complied with the respective water quality or groundwater discharge standards.
 - VOCs – low concentrations of disinfectant (bromine and chlorine) by-products seen in basins HO, HT-W and HN.
 - All water quality analytes were within effluent standards.
- **Peconic River**
 - Some metals exceed ambient water quality standards
 - Filtration of samples often showed source of inorganics to be suspended sediment
 - Iron and aluminum are attributable to natural sources.
 - No VOCs detected above minimum detection limits (MDLs).
 - Water quality data was consistent for locations sampled.



Chapter 6 - Natural and Cultural Resources

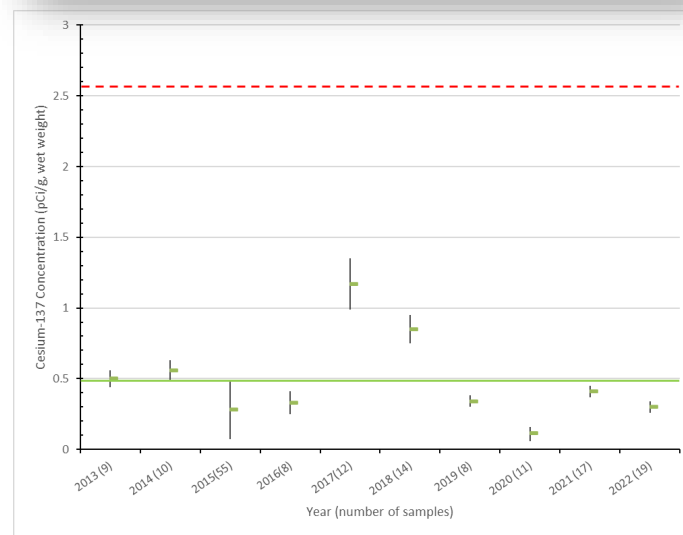
■ Natural Resource Management

- Deer Management
 - End of 2022 population ~350 deer
 - Population reduction of 106 deer
 - End of 2023 population ~400 deer
 - Epizootic Hemorrhagic Disease likely contributed to population reduction.
- Two prescribed fires totaling 37 acres conducted in May 2023.
- Internships returned to in-person
 - Five summer interns worked on fire effects of bat species diversity, and camera and small mammal trapping.



■ Surveillance Monitoring

- Cs-137 in deer had similar results as past years - highest value 0.24 pCi/g, wet weight, 1/4 north of Lab entrance.
- Ten-year trend shows decline; 2023 on-site average in meat was 0.08 pCi/g, wet weight, with ten-year on-site average being 0.44 pCi/g, wet weight.
- Average of 10 deer samples taken in cull was 0.06 pCi/g, wet weight.



Ten-Year Trend of Cs-137 Concentrations in Deer Meat, dashed line is pre-cleanup avg. (2.57 pCi/g, wet weight), solid line is 10-year avg. 0.44 pCi/g wet weight.

Chapter 6 - Cultural Resource Management

- **New York State Historic Preservation Officer (NYSHPO)**
 - Completed MOA for demolition of 1940s era water tower.
 - Committee established to develop kiosks highlighting the history of BNL and the Science User Support Center (SUSC), the Labs newest building under construction.

The Roads to Camp Upton

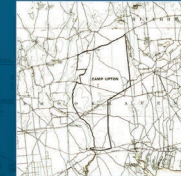
After the United States entered World War I in 1917, the nation quickly built up its army and trained soldiers. Sixteen cantonments were soon established across the country. Camp Upton was one of them.

On June 20, 1917, Major O'K Meyers of the U.S. Army Quartermaster Corp received orders to inspect property in Yaphank, New York, which would become the future Camp Upton. Within days, the Army contracted the Thompson-Starrett Company to build a cantonment that could support 40,000 people. Construction soon began.

At that time, this area was heavily forested. The Long Island Rail Road's nearest station, Yaphank, was approximately four miles southwest. Two roads, consisting of dirt "two-tracks," led to Camp Upton: Longwood Road, which today becomes Princeton Avenue at the entrance to Brookhaven National Laboratory, and the Road to Ridge, which is now Upton Road.

To report for duty, the first recruits at Camp Upton walked from the Yaphank train station. Most, likely, traveled along Longwood Road.

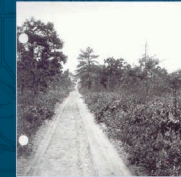
Whether entering from Longwood Road or the Road to Ridge, the walk to Camp Upton was often a dusty or muddy trek.



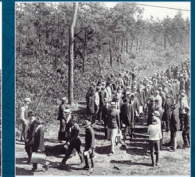
Camp Upton outlined on a lease map in 1917



Longwood Road circa 1916



Upton Road circa 1918



Army inductees on the hike to Camp Upton from Yaphank Station

Service and Science

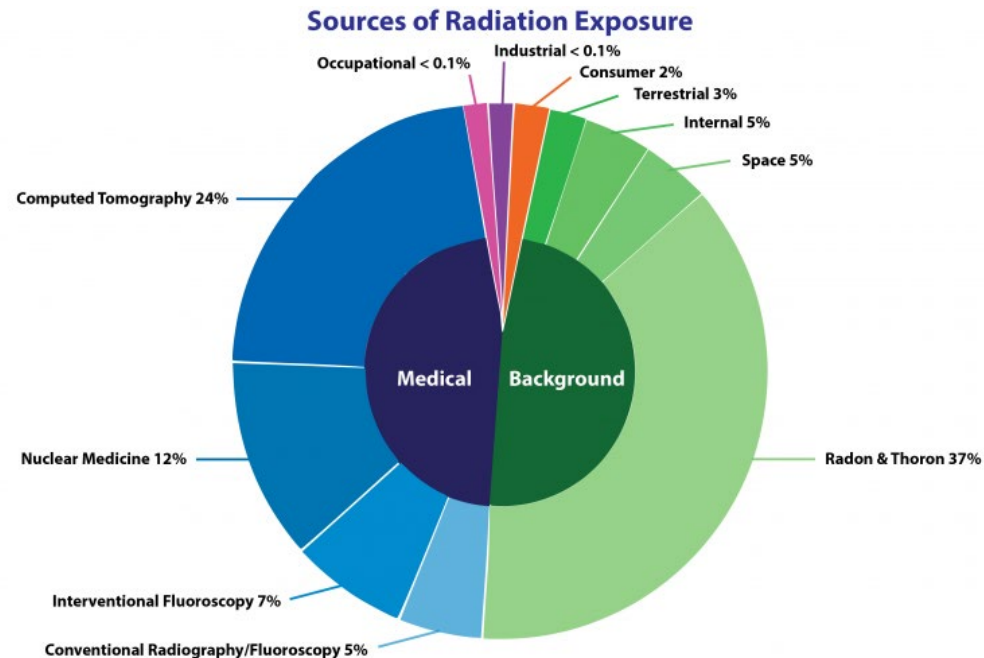


Office of
Science



Chapter 8 - Radiological Dose Assessment

- **Ambient external dose (TLDs)**
 - 62 mrem on site and 61 mrem off site (includes cosmic and terrestrial background)
 - No external dose contribution from BNL operations
- **Total effective dose to the Maximally Exposed Off-site Individual (MEOSI) in 2023 from inhalation (2.57 mrem) and ingestion (0.35 mrem) pathways was 2.92 mrem**
- **Well Below Regulatory Limits**
 - EPA: 10 mrem/year (air pathway)
 - NYSDOH: 10 mrem/year (ingestion pathway)
 - DOE: 100 mrem/year (from all pathways)



Average dose to individual is **620 mrem/year**

From NCRP Report No. 160, "Non-Occupational Ionizing Radiation Exposure of the Population of the United States" (2009)

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