



2019 Site Environmental Report

Community Advisory Council

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Environmental Protection Division, Manager

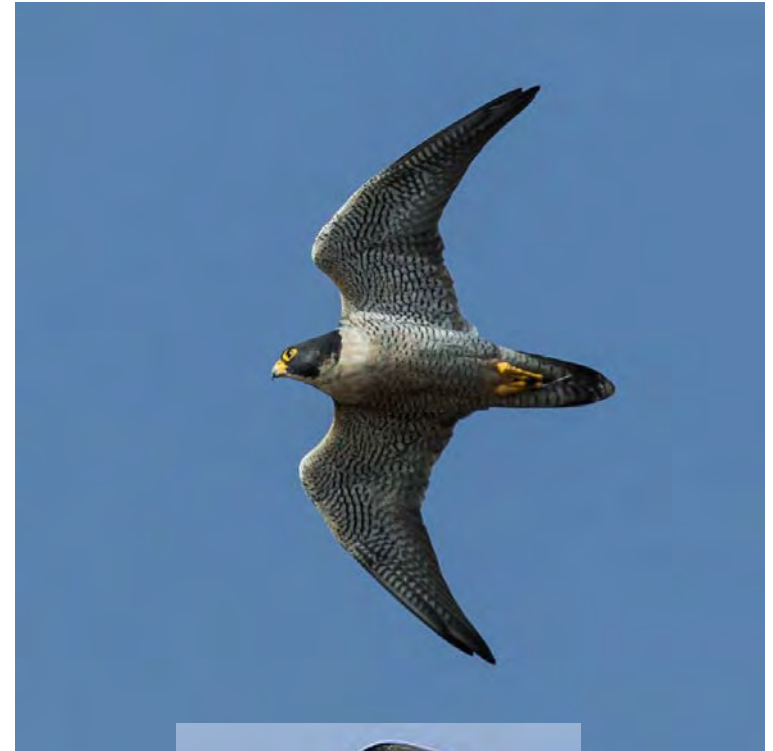
October 8, 2020

BROOKHAVEN
NATIONAL LABORATORY



A Note on This Year's Cover

- This year's cover photo was taken by Lab employee Rodger Hubbard (NSLS-II).
- Hubbard observed the bird at "the entrance to the picnic area in an old oak tree that was recently trimmed. He had just finished a meal of a wood duck which I missed but found the remains."
- Peregrine falcons are still listed as endangered in New York State due to historic declines associated with DDT.
- Off Federal Endangered list in 1999
- Falcons were confirmed nesting on the HFBR stack in 2019.
 - They had been seen in earlier years but had not nested.
 - The birds utilized an abandoned raven's nest and the pair raised and fledged three chicks.



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Purpose of the Annual Site Environmental Report (ASER)

- **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 436.1.
- **Official record of BNL's environmental impact for calendar year 2019**
 - 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 ASER reporting field**

Keeping you informed...

- **We frequently bring topics of interest to the CAC's attention well before the SER is published**

- **2019 SER Topics covered at CAC meetings included:**
 - ✓ Groundwater Cleanup Updates
 - ✓ Emerging Contaminants of Concern (PFAS and 1,4-dioxane)
 - ✓ Natural Resource Management Updates
 - ✓ Deer Management
 - ✓ Demolition and Removal of the Stack

2019 SER - Table of Contents/Chapter Authors

■ SER Volume I

- Executive Summary (A. Aponte)
- Chapter 1 – Introduction (A. Aponte)
- Chapter 2 – Environmental Management System (D. Bauer)
- Chapter 3 – Compliance Status (J. Remien)
- Chapter 4 – Air Quality (J. Williams)
- Chapter 5 – Water Quality (T. Green and J. Remien)
- Chapter 6 – Natural and Cultural Resources (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 Group (approved by regulators August 2019)



Chapter 2 - Environmental Management System (EMS) ISO 14001

- **External assessment verified continued conformance to ISO14001 Standard during 2019**
 - The system is fully integrated and effective.
 - The external assessment by ERM CVS certified the Laboratory to the 2015 standard and identified several strengths and no nonconformances.
- **Pollution Prevention (P2) Program**
 - Cost avoidance of over \$3.1 million in FY 2019
 - Reduced/recycled/reused 1.6 million lbs. of industrial, sanitary, & hazardous waste
 - The Lab's annual recycling rate was 55% (DOE Goal – 50%)
 - Received Green Electronics EPEAT Award, DOE's GreenBuy Award, and a second GreenBuy Prime Award



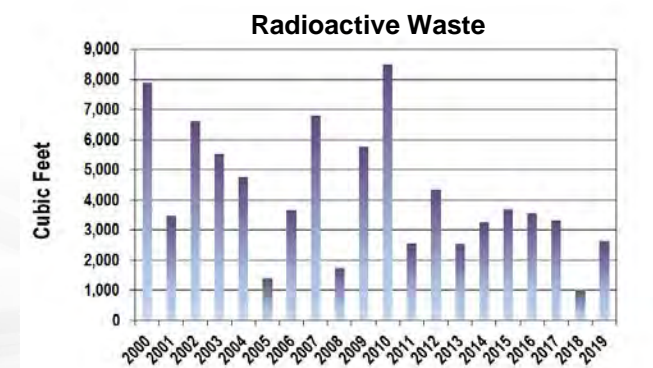
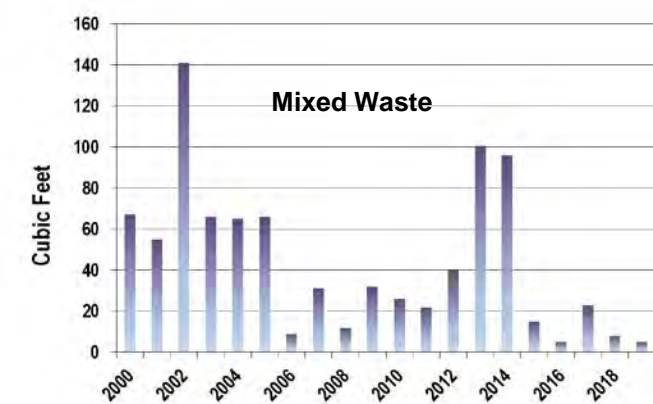
ACTION
FOR
EARTH

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Chapter 2 - Waste Generation

- Hazardous waste from routine operations in 2019 stayed consistent with 2018 generation rates.
- Mixed waste generation decreased from 2018 rates.
- Non-routine waste generation in 2019 mainly consisted of hazardous waste associated with the demolition of modular buildings attached to Buildings 526 and 902.
- Site improvement activities are causing an uptick in hazardous waste generation rates.

2019	Routine	Nonroutine
Hazardous	3.6 Tons	4 Tons
Mixed	5 ft ³	8 ft ³
Rad	2,642 ft ³	1,021ft ³



Chapter 2 - Energy Management & Conservation

2019 Notable Accomplishments

- Electric load reduction curtailment programs reduced electric demand by 25 MW, saving approximately \$1M.
- The Long Island Solar Farm annual output was 50.6 million kWh and resulted in an avoidance of approximately 33,000 tons of carbon.
- Northeast Solar Energy Research Center generated 1,018,429 million kWh of electricity.
- Eighth full year of a 10-year contract that includes 15 MW of renewable nearly zero GHG hydropower. This contract saved \$27.7 million in 2019.
- 20 million kWh purchased renewable energy certificates
- Overall facilities' energy usage for 2019 was approximately 27 percent less than in 2003, producing annual savings of \$2.4 million.

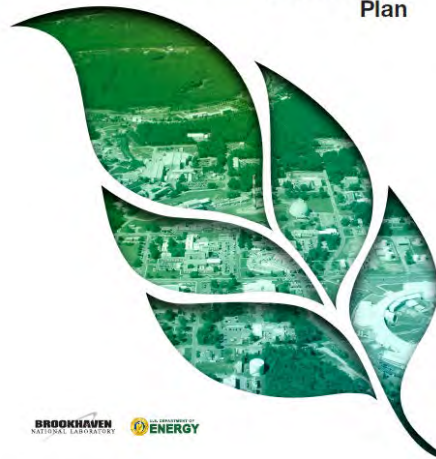


View of the Northeast Solar Energy Research Center (NSERC)

▪ 2019 Statistics (parenthetical values are 2018 data for comparison)

- 269 (263) million kilowatt hours of electricity
- 100,698 (61,565) gallons of fuel oil
- 13,411 (16,071) gallons of propane
- 599 (645) million ft³ feet of natural gas

FY 2020 Site
Sustainability
Plan



BROOKHAVEN NATIONAL LABORATORY ENERGY

Chapter 2 - Other Topics

■ Environmental Restoration

■ BGRR/HFBR

- Continued long-term surveillance and maintenance, including repair to the window gaskets, replacing the broken glass on the east bay window, repair trim around the entry door to the below ground ducts, removal of vegetation, and sealing of cracks in the engineered cap.

■ Groundwater Treatment Systems

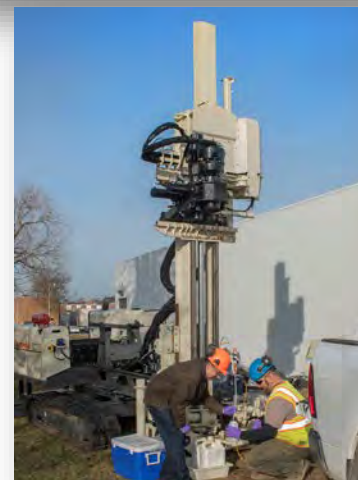
- Discussed in Chapter 7 and SER Volume 2, Groundwater Status Report

■ Communication and Community Involvement

- In 2019, BNL updated stakeholders on the following issues:
 - Peconic River post cleanup surveillance; Cesium-137 in deer, terrestrial vegetation, and soil
 - Status of the groundwater contaminant plumes and remediation systems; completion of modifications to the Western South Boundary treatment system;
 - EDB; cleanup of contaminated soil; plans for the demolition of the HFBR Stack; continued characterization of PFAS and 1,4 Dioxane in groundwater; cooperative agreement with SCDHS to sample wells for PFAS and 1,4-dioxane.

■ Environmental Monitoring Program

- Performed 8,865 sampling events of groundwater, potable water, precipitation, air, flora and fauna, soil, sediment, and discharges



Chapter 3 - Compliance Status Overview

- **BNL must comply with numerous permits, including a Title V permit authorizing operation of >130 emission sources**
- **168 additional projects reviewed for NEPA**
 - 166 considered minor actions
 - Two Environmental Evaluation Notification Forms; both categorically excluded
- **Potable Water**
 - Usage decreased from 2018
 - Iron sampling violation at Water Treatment Plant in June 2019
 - Preparing for emerging contaminants drinking water standards
- **Tanks**
 - NYSDEC inspection of registered Petroleum Bulk Storage Facilities on June 25, 2019, resulted in a Notice of Violation (NOV) for three aboveground storage tanks at the Laboratory's diesel tank farm (STO-651)



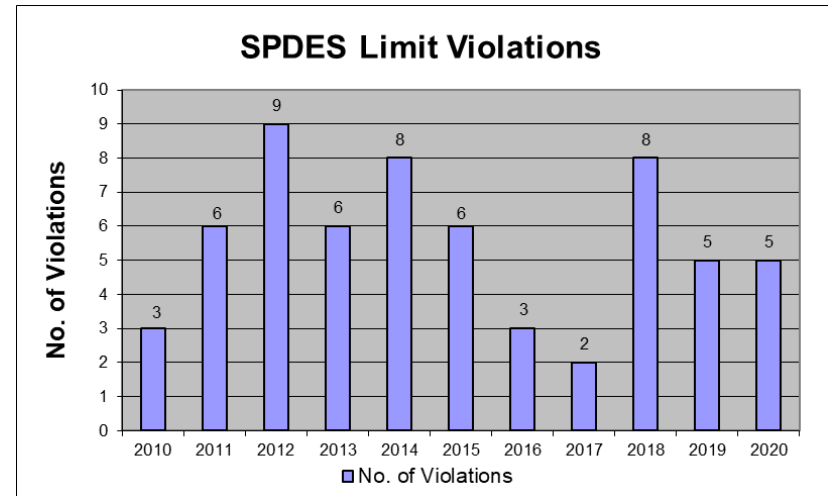
Chapter 3 - Overview (continued)

■ SPDES

- Five permit excursions (Sewage Treatment Plant [STP])
 - All Tolyltriazole (TTA)
- Investigation into cause(s) of these exceedances and corrective actions have been on-going since TTA was first detected at STP in January 2018

Cause(s)

- NYSDOH Legionella Disease prevention regulations enforced in 2015.
- Much lower flow conditions at the STP.
- Sheer number of cooling towers and chilled water systems (no alternative corrosion inhibitor products for copper systems).

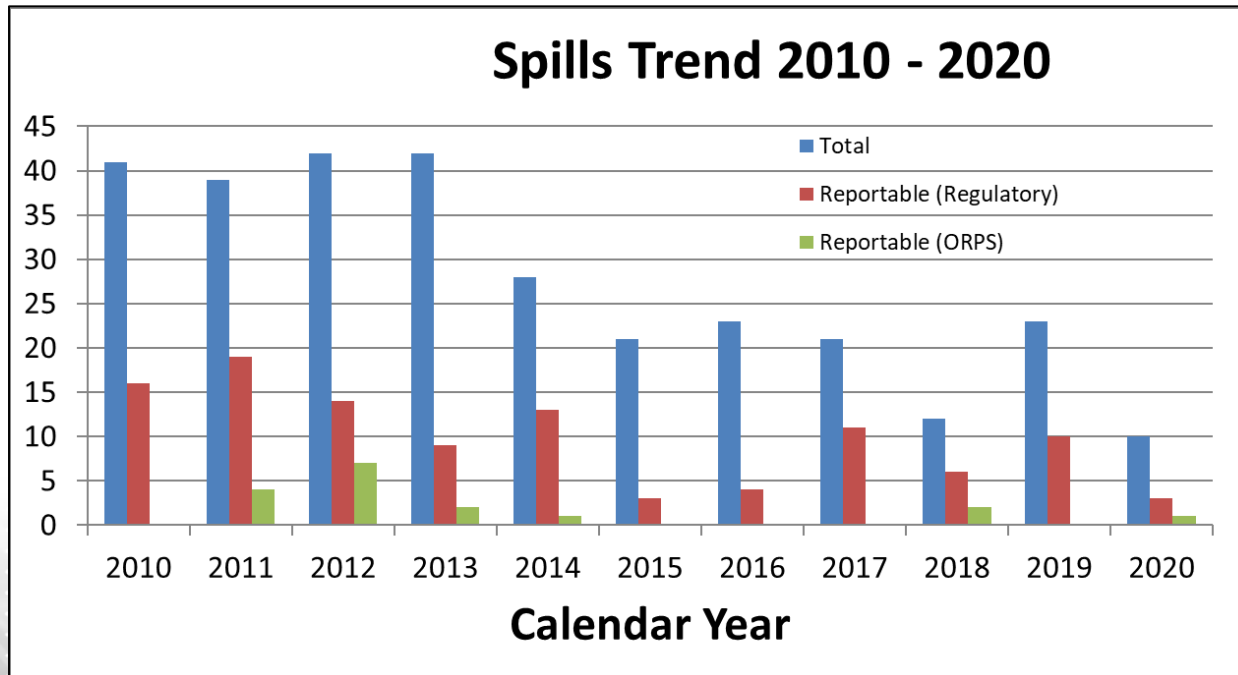


Corrective Actions

- Decreased control limits for TTA
- Continued collection of “In-House” process control samples of STP Effluent
- Accelerated installation of automated chemical control systems
- Conducted volume studies of all cooling tower systems
- Initiating a pilot study at Chilled Water Facility using a new chemical identified that does not contain TTA; will take time to determine if this product is effective.

Chapter 3 - Spills and Reportable Incidents

- **23 spills in 2019**
 - Ten of those spills met regulatory criteria
 - Five (5) <1 gallon
 - Two (2) associated with legacy PCB spill
 - Three (3) > 1 gallon
 - Lawn mower hydraulic leak (~8 gallons)
 - Transformer leaking gasket (~2 gallons)
 - New compressor oil leak (~2 gallons)



Chapter 3 - Inspections and Assessments

External Inspections



- **EPA:** Unannounced Resource Conservation and Recovery Act Compliance inspection in September. No concerns or findings identified.

NYSDEC

- Air: No issues identified during full compliance evaluation of regulated emission sources at BNL.
- State Pollutant Discharge Elimination System: No issues identified during annual surveillance inspection.
- Petroleum/Chemical Bulk Storage: NOV received for missing solenoid and operating valves on aboveground tanks at diesel tank farm.



- **SCDHS (STP, potable water):** No issues identified at STP (quarterly); F&O addressing identified potable water deficiencies.



Chapter 3 - Inspections and Assessments



■ DOE Assessments/Inspections

- Radiological NESHAPs compliance surveillance (No findings)
- Assessment of BNL's Packaging and Transportation Program (Strong program with no significant programmatic deficiencies, 4 Level 3 Findings, 5 Observations, 3 Improvement Opportunities, 4 Best Practices, and 1 Noteworthy Practice)

■ Internal Assessments (Environmental Multi-Topic)

- Activated Soil Cap Inspections Assessment reviewed Collider-Accelerator Department's (C-AD's) implementation of measures to minimize groundwater pollution caused by soil activation (1 Observation and 9 Opportunities for Improvement)
- Waste Management (Hazardous, Industrial, and Radiological)
 - Haz/Ind. – 1 Noteworthy Practice, 3 Opportunities for Improvement, 1 Observation, and 6 Non-Conformances
 - Rad – 1 Opportunity for Improvement and 2 Non-Conformances

■ Nevada National Security Site (NNSS)

- The Laboratory continues to be a certified NNSS waste generator.
- The NNSS performed a remote tabletop surveillance of the BNL Radioactive Waste program from July 9 to July 10, 2019.
- The assessment resulted in no observations against BNL's Waste Certification Program, enabling BNL continued access to the NNSS for radioactive waste disposal



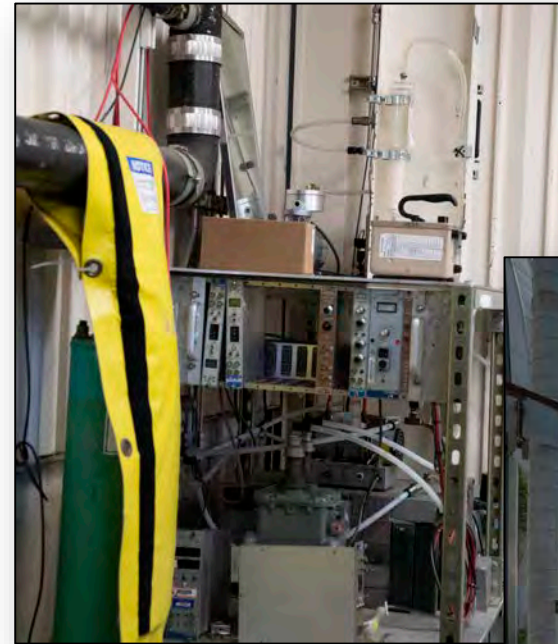
Chapter 4 - Air Quality (Radiological)

■ Radiological Emissions Monitoring

- Three facilities monitored for radionuclide releases:
 - BLIP, Building 801 Target Processing Lab, and HFBR
 - Total radionuclides released: 19,022 Ci (23,035 Ci in 2018)
 - 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 typical minimum detection limits (MDLs)

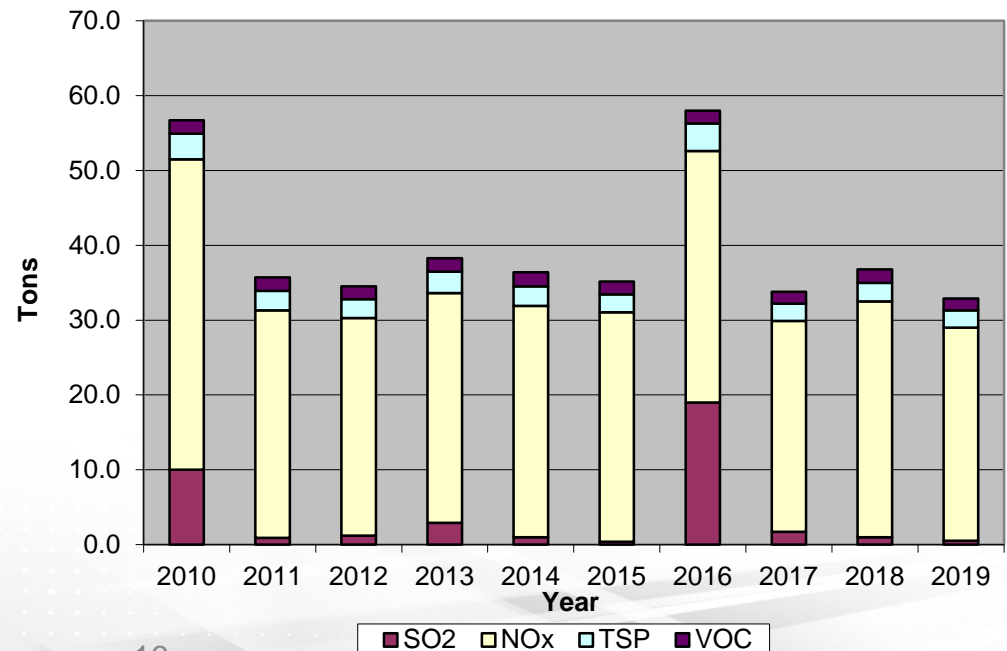


Chapter 4 - Air Quality (Non-Radiological)

- **Continuous Emissions Monitoring System required for Central Steam Facility Boilers 6 & 7**
 - No NO_x limit exceedances
 - (5) 6-min period opacity exceedances for Boilers 6 & 7
 - Fuel oil use: 15,559 gals (36,044 gals in 2018)
 - SO₂, NO_x, TSP, and VOC emissions well under respective permit limits of 445, 159, 113.3, and 39.7 tons



Central Steam Facility Emissions



Chapter 5 - Water Quality (Radiological Monitoring)

- Tritium less than MDL in all sample locations
 - All samples at STP were less than MDL and well below DWS of 20,000 pCi/L
 - Total released calculated conservatively based on upper 95% CI - 0.001 Ci
- No gamma-emitting nuclides attributable to BNL detected
 - Natural products only
- Peconic River onsite held water with flow off site into June. Flow stopped in July with water levels declining through the remainder of the year (just opposite of 2018); radiological values (Sr-90, gross alpha, gross beta) were all comparable to historical levels and can be attributed to worldwide fallout or natural products.



Monitoring Station HM-N

Chapter 5 – Water Quality (Non-Radiological Monitoring)

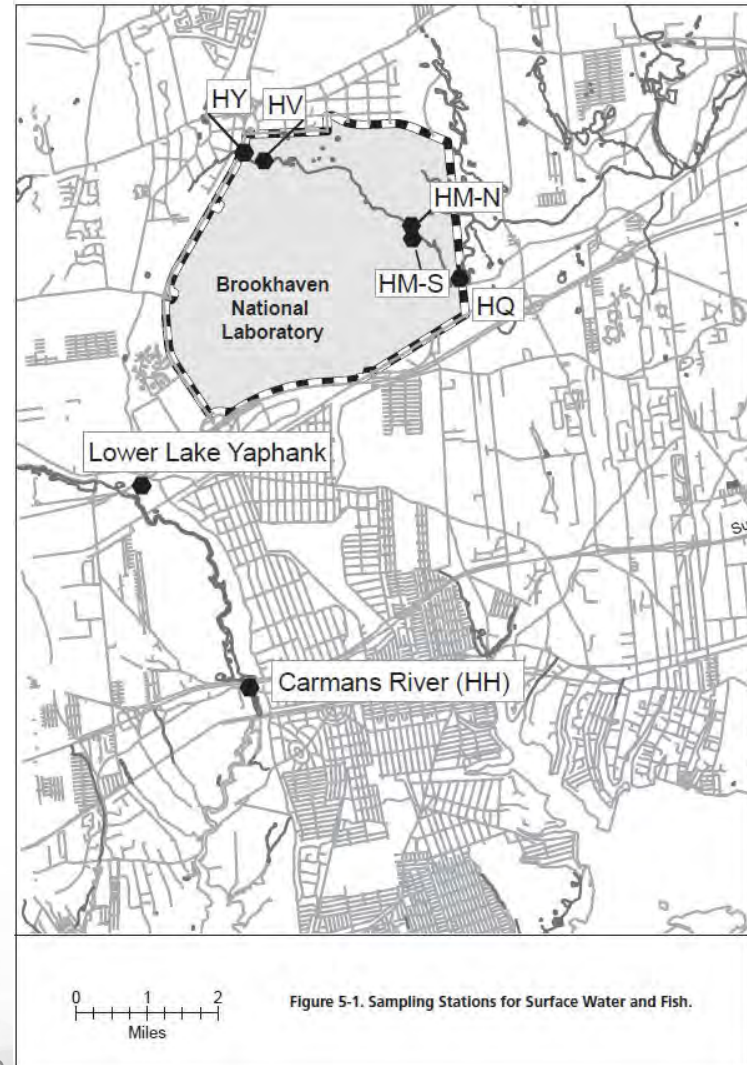
- **Sewage Treatment Plant**
 - Full compliance was met with exception of Tolyltriazole exceedances
- **Recharge Basins**
 - All metals complied with the respective water quality or groundwater discharge standards.
 - Low concentrations of disinfection byproducts were detected just above MDLs in several of the basins (associated with potable water discharges).
 - No VOCs were detected above method detection limits in any of the recharge basins.
 - All water quality analytes were within effluent standards.



Sampling STP Effluents

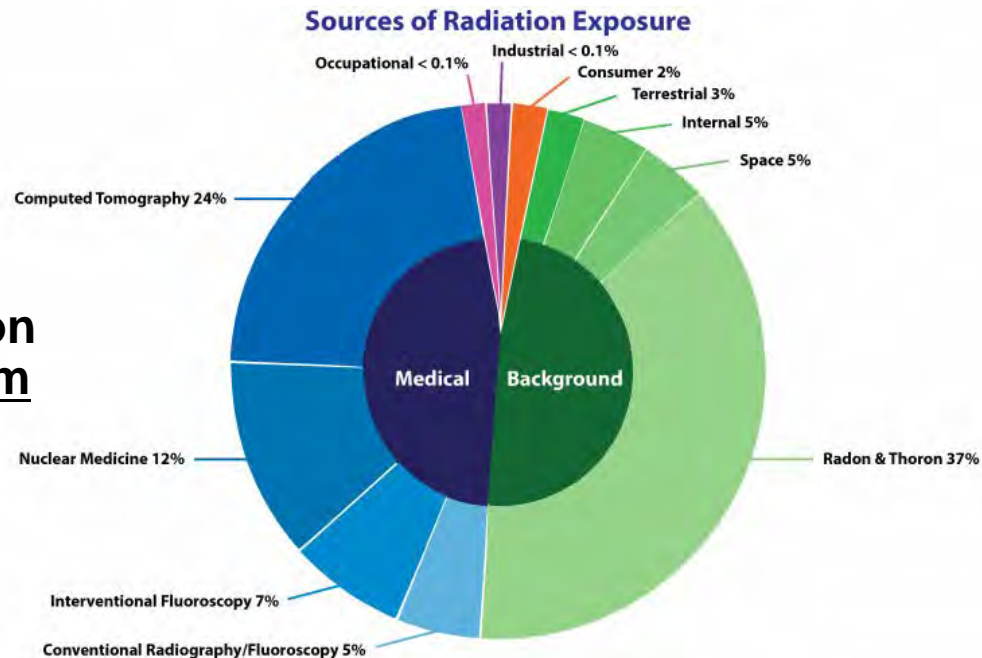
Chapter 5 – Water Quality Non-Radiological Monitoring (continued)

- **Peconic River**
 - Water quality data was consistent for locations sampled.
 - Some metals exceed ambient water quality.
 - Filtration of samples often showed source of inorganics to be suspended sediment.
 - Iron and aluminum are attributable to natural sources.
 - No VOCs detected above contract Laboratory's MDLs.



Chapter 8 - Radiological Dose Assessment

- **Ambient external dose (TLDs)**
 - 62 mrem on site and 59 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 2019 from inhalation (1.3 mrem) and ingestion (1.5 mrem) pathways was 2.8 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)

Future Presentations

- **Chapter 6: Natural and Cultural Resources (November)**
- **Chapter 7: Groundwater Protection (November)**

QUESTIONS?