

BROOKHAVEN NATIONAL LABORATORY
Site Environmental Report **2018**
VOLUME 1



2018 Site Environmental Report Overview

Community Advisory Council

September 12, 2019

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Environmental Protection Division
Manager

BROOKHAVEN
NATIONAL LABORATORY



Purpose of the Annual 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 Order 436.1, Departmental Sustainability**
 - Requires DOE sites to maintain an Environmental Management System (EMS). An EMS specifies requirements for conducting general surveillance monitoring to evaluate the effects, if any, of site operations.
 - **DOE Order 458.1, Radiation Protection of the Public and Environment**
 - Requires DOE site to maintain surveillance monitoring for determining radiological impacts to the public and environment.
- **Official record of BNL's environmental impact for calendar year 2018**
 - Serves as an historical record; BNL has been preparing SERs since 1971.
 - Can be 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.
- **Will be available as a downloadable file on the BNL web page and in limited hardcopy (after 9/30/19)**

Keeping you informed...

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

- **2018 SER Topics covered at CAC meetings included:**
 - ✓ Natural Resource Management Updates
 - ✓ Groundwater Cleanup Updates
 - ✓ Peconic River Supplemental Cleanup
 - ✓ Deer Management
 - ✓ Emerging Contaminants of Concern (PFAS and 1,4-dioxane)

2018 SER

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- **SER Volume I**

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- **SER Volume II**

- 2018 Groundwater Status Report – Groundwater Protection Group

Chapter 2 - Environmental Management System (EMS) ISO 14001

- **External assessment verified continued conformance to ISO14001 Standard during 2018**
 - The system is fully integrated and effective. The external assessment by ERM CVS certified the Laboratory to the 2015 standard and identified several strengths (well-designed operator aids) and no nonconformances.
- **Pollution Prevention (P2) Program**
 - Cost avoidance of over \$3.8 million in FY 2018
 - Reduced/recycled/reused 3.2 million lbs. of industrial, sanitary, & hazardous waste
 - The Lab's annual recycling rate was 69% (DOE Goal – 50%)
 - Received the Green Electronics EPEAT Award

Sustainable Acquisition Success Story:



Turbo-Separator:

Allowed the recycling and reuse of 24K gallons of Blasocut in 2018, saving \$86K in purchase of new product as well as associated waste disposal costs.

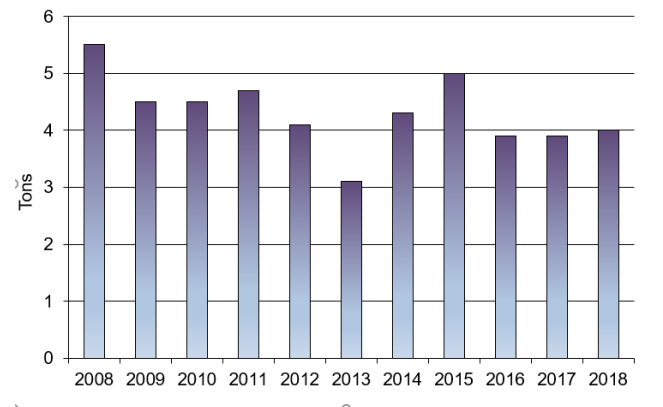


Chapter 2 - Waste Generation

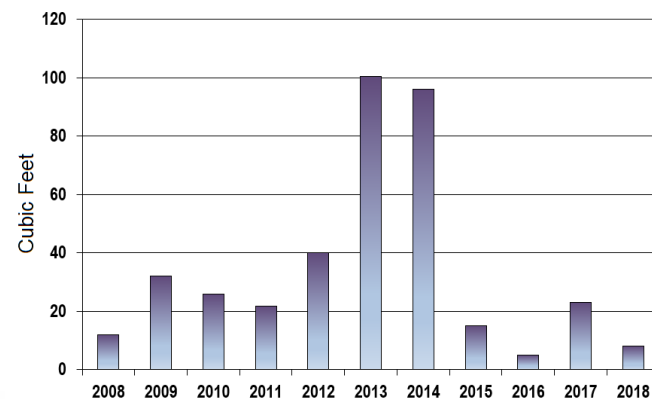
- As a result of research and cleanup activities, BNL generated regulated waste requiring careful handling and disposal.
- In 2018, BNL generated the following types and quantities of waste. Hazardous waste generation remains constant while radioactive and mixed waste volumes fluctuate within normal operating parameters.

2018	Routine	Nonroutine
Hazardous	4 Tons	5 Tons
Mixed	8 ft ³	40 ft ³
Rad	1,021 ft ³	1,052 ft ³

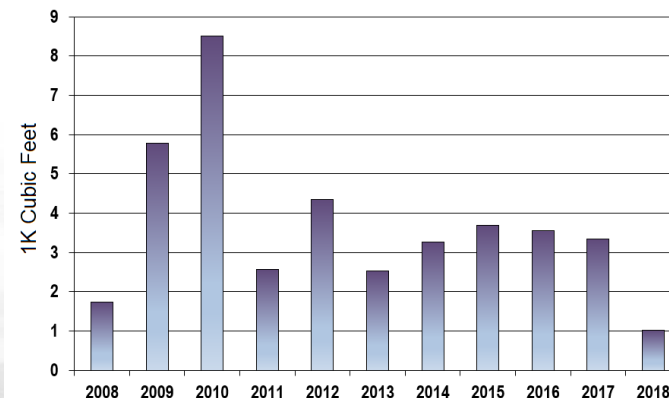
Hazardous Waste



Mixed Waste



Radioactive Waste

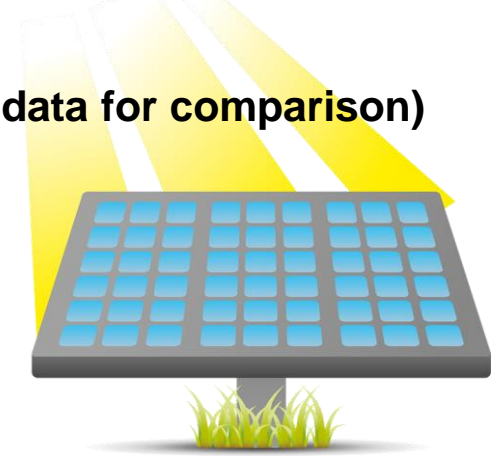


Chapter 2 - Energy Management & Conservation

- **2018 Statistics** (parenthetical values are 2017 data for comparison)
 - 263 (270) million kilowatt hours of electricity
 - 61,565 (105,000) gallons of fuel oil
 - 16,071 (14,591) gallons of propane
 - 645 (565) million ft³ feet of natural gas

BROOKHAVEN NATIONAL LABORATORY

FY 2019 Site Sustainability Plan



U.S. DEPARTMENT OF ENERGY Office of Science

BROOKHAVEN NATIONAL LABORATORY

Other Notable Accomplishments

- Electric load reduction curtailment programs – reduced electric demand by 25 MW, saving approximately \$1M
- Northeast Solar Energy Research Center (NSERC) generated 1.1 million kWh of electricity
- NYPA Power Contract: 7th full year of a 10-year contract that includes 120 million kWh of renewable (nearly zero GHG) hydropower
 - This contract saved \$27.7 million in 2018
- 62.6 million kWh purchased renewable energy certificates

Chapter 2 - Other Topics

- **Environmental Restoration**
 - **BGRR/HFBR**
 - Continued long-term surveillance and maintenance
 - Submitted petition for closure of the HFBR Tritium Pump & Recharge System
 - Planning underway for stack demolition in 2020
 - **Groundwater Treatment Systems**
 - Discussed in Chapter 7 and SER Volume 2, Groundwater Status Report
- **Communication and Community Involvement**
 - Emerging Contaminants of Concern (PFAS and 1,4-dioxane) Updates
 - Environmental/Groundwater Updates
 - Western South Boundary Treatment System Modification
 - North Street East Ethylene Dibromide (EDB) Plume
 - Building 811 Soil Remediation
 - BNL Overview – From Camp Upton to BNL
 - BNL Prescribed Fire Program
 - 2017 Site Environmental Report
 - Natural & Cultural Resources Update
 - HFBR Stack D&D Progress
- **Environmental Monitoring Program**
 - 5,390 sampling events of groundwater, potable water, precipitation, air, flora and fauna, soil, sediment, and discharges



Chapter 3 - Compliance Status Overview

- BNL must comply with 30 permits, including a Title V permit authorizing operation of >130 emission sources
- 138 additional projects reviewed for NEPA
 - 135 considered minor actions
 - Three Environmental Evaluation Notification Forms; two categorically excluded and one determination still being made
- **Potable Water**
 - Usage similar to 2016 & 2017
 - Iron exceedance at WTP in June 2018
- **Tanks**
 - Due to favorable past performance on past audits and strong overall program, NYSDEC exempted the Laboratory from its annual inspection in 2018.



2019 BROOKHAVEN NATIONAL LABORATORY Water Quality CONSUMER CONFIDENCE REPORT

BNL publishes an annual water quality report to provide on-site drinking-water consumers with an overview of the Lab's water quality during the previous calendar year. The purpose of this report is to inform you about where your water comes from; what analytical tests are conducted, what they reveal; how the results compare to New York State standards; and to educate you about the importance of preventative measures. Educated consumers are more likely to help protect their drinking water sources.

With the exception of an iron exceedance at the Water Treatment Plant in June, BNL's drinking water and the supply and distribution system were in compliance with all applicable county, state, and federal regulations regarding drinking-water quality, monitoring, operations, and reporting in 2018.

Overseeing the Lab's water supply system, which includes five wells dedicated to pumping drinking water and the on-site Water Treatment Plant, BNL's Energy & Utilities (EU) Division is committed to providing over 3,000 employees, facility users, contractors, and guests annually with safe drinking water. BNL's drinking water is regularly tested using an independent laboratory approved by the New York State Department of Health (NYSDOH). Analytical data are reviewed by the Lab's Environmental Protection Division (EPD) to ensure that testing results comply with all applicable regulatory standards. In addition, EU and EPD work with BNL's Groundwater Protection Group to make sure our potable-water supply is not adversely impacted by possible groundwater contamination or remediation operations.



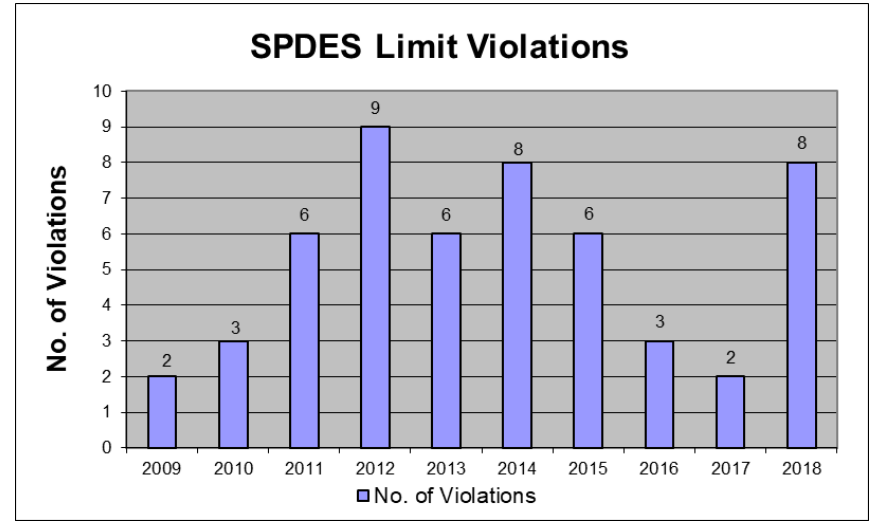
For questions about this report, or to speak with someone regarding your drinking water, please contact:

- Christopher Bruno, P.E. Manager, BJ Division (631) 344-8262
- Jason Remien EPD Manager (631) 344-3477
- Suffolk County Department of Health Services (631) 852-5810

Chapter 3 - Overview (continued)

■ SPDES

- 8 permit excursions (STP)
 - (1) Total Nitrogen
 - (7) Tolytriazole (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.
- Shear number of cooling towers and chilled water systems (No alternative corrosion inhibitor products for copper systems).



Corrective Actions

- Decreasing the control limits for TTA.
- Initiated the collection of “In-House” process control samples of STP Effluent.
- Accelerated the installation of automated chemical control systems.
- A survey was performed to determine which equipment does not contain any copper tubes.
- Volume studies of all cooling tower systems were conducted.
- Looking for frost protection chemical that does not contain TTA.

Chapter 3 - Spills and Reportable Incidents

- **12 spills in 2018**

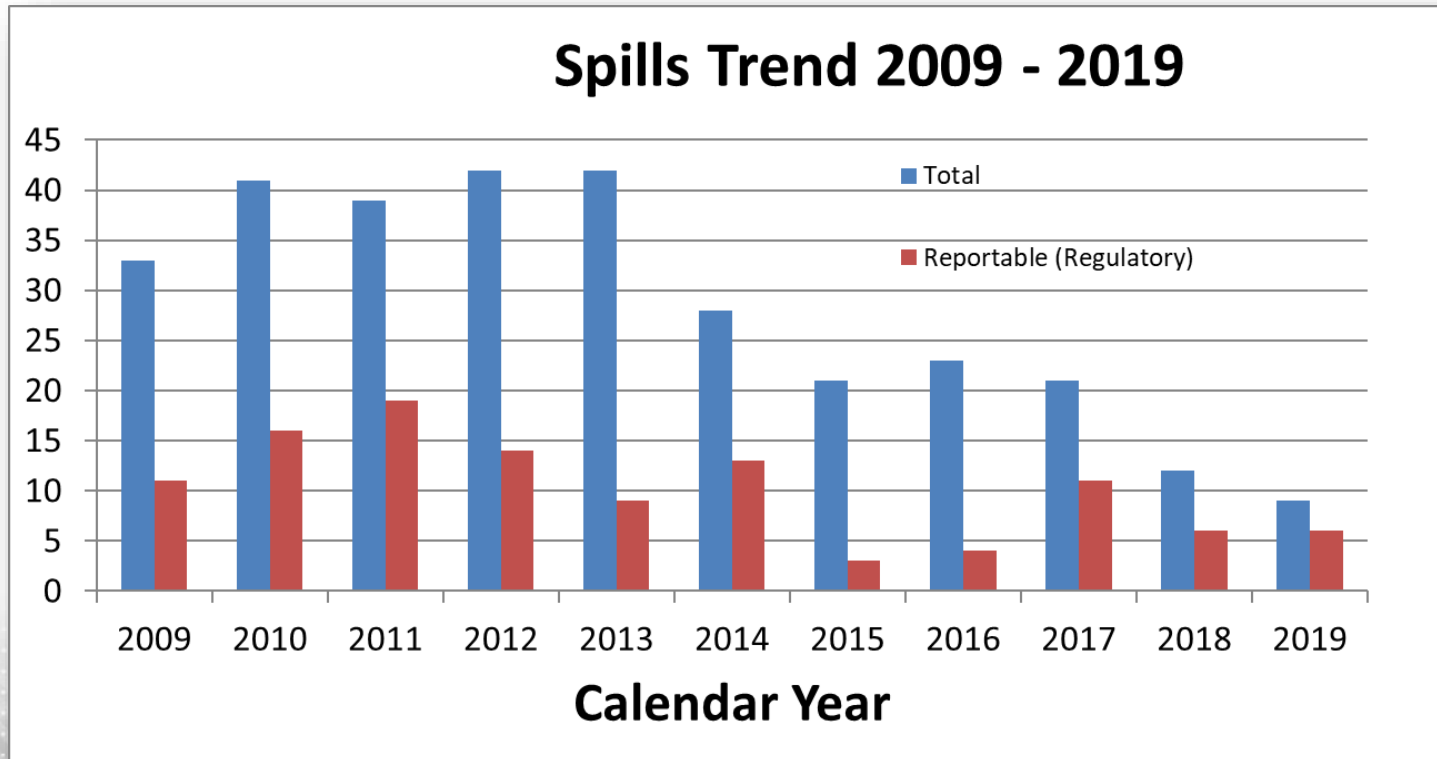
- Six (6) spills reportable to NYSDEC

- Three (3) >1 gallon

- Front End Loader Hydraulic Leak (~4 gallons)

- Bldg. 555 Freight Elevator (~18 gallons)

- Sodium Hydroxide Spill into Secondary Containment (~260 gallons)



Chapter 3 - Inspections and Assessments

External Inspections



- **EPA:** Unannounced RCRA Compliance inspection and Clean Water Act (CWA) field inspection. Both inspections did not identify any deficiencies.



- **NYSDEC**
 - Air: No issues identified during facility tour of regulated emission sources at BNL.
 - SPDES: No issues identified during annual surveillance inspection.



- **SCDHS (STP, potable water):** No issues identified at STP (quarterly), potable water deficiencies identified are being addressed by F&O. No findings during annual industrial SPDES inspection/sampling in June.

DOE Assessments/Inspections

- Radiological Posting Surveillance at Building 865 (No findings)
- BLIP waste transfer operations (One minor, Level 3 finding)

Internal Assessments (Multi-Topic)

- Planned programmatic self-assessments of three Groundwater Protection Group programs (Historical Contamination, Activated Soil Cap Inspection, and Environmental Data Quality) were not implemented due to competing priorities related to managing the Emerging Contaminants of Concern issue

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: 23,035 Ci (10,660 Ci in 2017)
- 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 MDLs

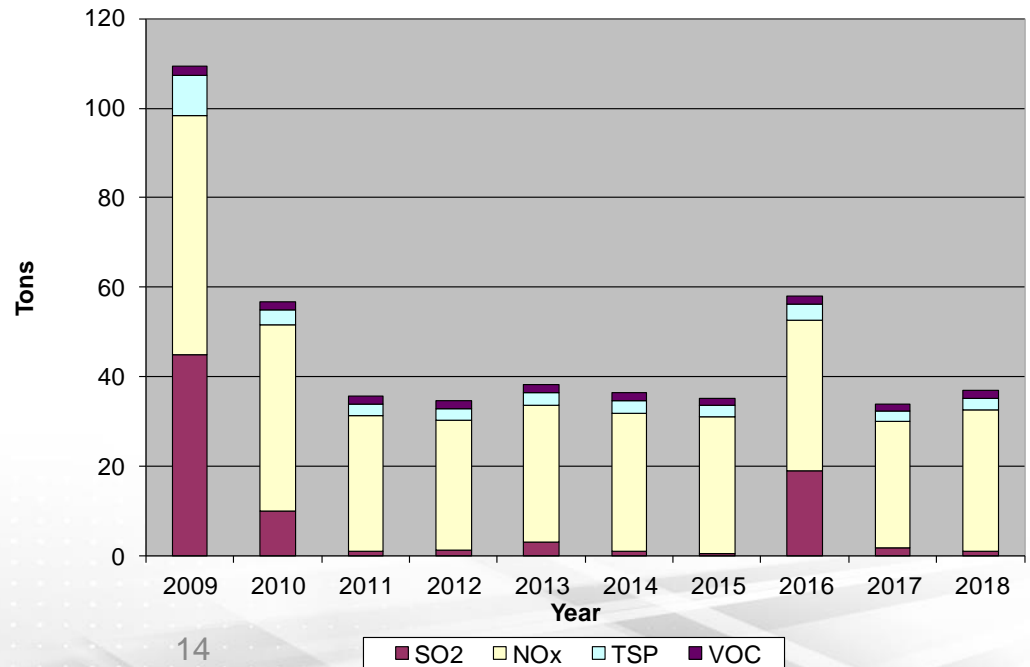


Chapter 4 - Air Quality (Non-Radiological)

- **Continuous Emissions Monitoring System required for Central Steam Facility Boilers 6 & 7**
 - No NO_x limit exceedances
 - (21) 6-min period opacity exceedances for Boilers 6 & 7
 - Fuel oil use: 36,044 gals (65,070 gals in 2017)
 - 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 was mostly dry through first half of year, by year's end was flowing off-site; 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 Tolytriazole 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



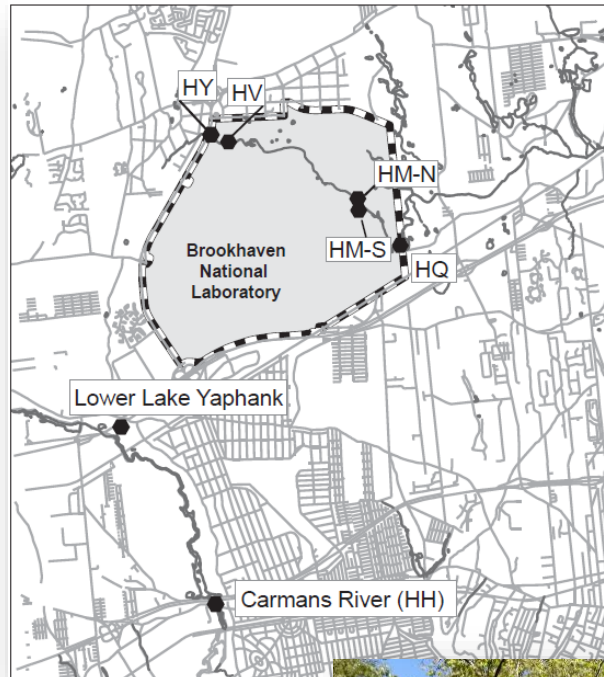
Sampling STP Effluents

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 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

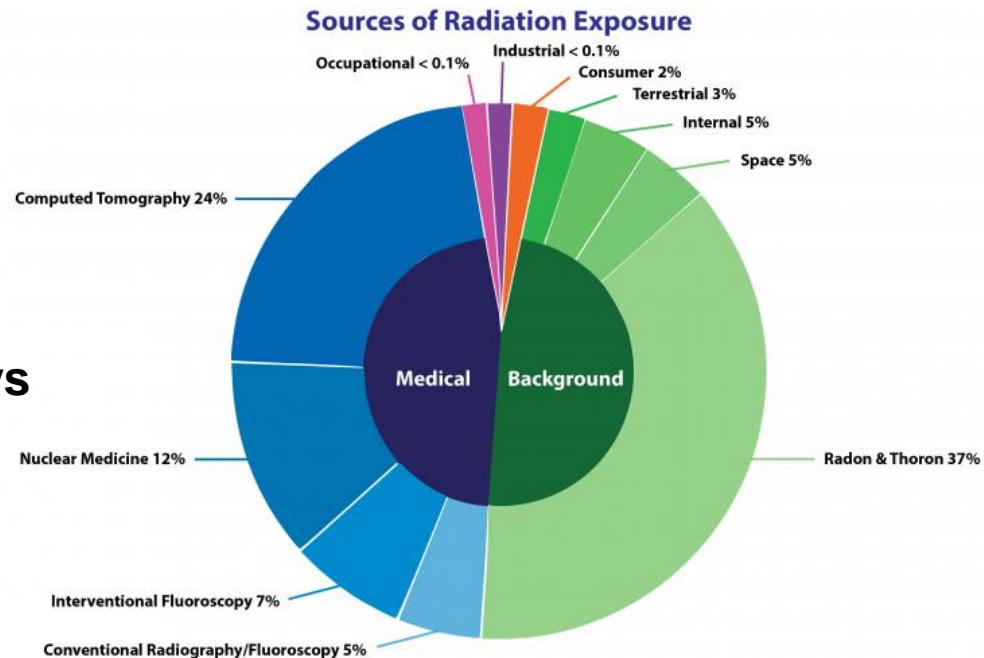
■ Ambient external dose (TLDs)

- 66 mrem on site and 64 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 2018 from inhalation /immersion (1.6 mrem) and ingestion (3.4 mrem) pathways was 5.0 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 (October)**

QUESTIONS?