

2011 Site Environmental Report



*Brookhaven National Laboratory
Community Advisory Council
October 11, 2012*

BROOKHAVEN
NATIONAL LABORATORY

a passion for discovery



Purpose of the Annual Site Environmental Report

- **Required by DOE and prepared in accordance with DOE Order 231.1, 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 2011**
 - Serves as an historical record; BNL has been preparing SERs since 1971
 - Frequently used to respond to Freedom of Information (FOI) requests
- **Serves as the principal environmental communications vehicle**
 - Distribution includes DOE, DOE Laboratories, regulators, local libraries, and interested stakeholders
 - Over 100 hardcopies and 100 CD versions requested and distributed last year
- **Available as a downloadable file on the BNL web page, in hardcopy, and as a summary booklet that includes a CD version of the full report, including SER Volume II, Groundwater Status Report**

Meeting Purpose

- **We bring topics of interest to the CAC's attention well before the SER is published.**
- **Meetings that covered topics in the 2011 SER include:**
 - New York State SPDES Permit Renewal
 - Sewage Treatment Plant permit modification/Environmental Assessment
 - Groundwater Updates
 - Freon 11 Investigation
 - Annual Peconic River Monitoring
 - BGRR and HFBR decommissioning projects
 - Natural and Cultural Resources

2011 SER

Table of Contents/Chapter Authors

- **SER Volume I**

- Executive Summary – Karen Ratel
- Chapter 1 – Introduction/Karen Ratel
- Chapter 2 – Environmental Management System/Peter Pohlot and Karen Ratel
- Chapter 3 – Compliance Status/Bob Lee
- Chapter 4 – Air Quality/Jeff Williams
- Chapter 5 – Water Quality/Jason Remien
- Chapter 6 – Natural and Cultural Resources/Tim Green
- Chapter 7 – Groundwater Protection/Bill Dorsch and Douglas Paquette
- Chapter 8 – Radiological Dose Assessment/Benny Hooda
- Chapter 9 – Quality Assurance/John Burke

- **SER Volume II**

- Groundwater Status Report – LTRA Group (submitted to DOE and regulators for approval mid June 2012)

Chapter 2 - Environmental Management System (EMS) ISO 14001

- **EMS Recommended for continued certification by NSF, June 2011**
 - **1 Minor Nonconformance:** Misidentified or omitted aspects for the NASA Space Radiation Laboratory
 - **3 Opportunities for Improvement:**
 - Clarify that the “core” environmental aspect category of waste generation includes solid wastes (cardboard, recyclables, food waste, trash, etc.) in the Environmental Aspects and Impact Subject area
 - Mid-century modern furniture may have significant LEED value
 - Consider safety awareness training for student mentors
 - **6 Noteworthy Practices**

Chapter 2 – Pollution Prevention (P2) Program

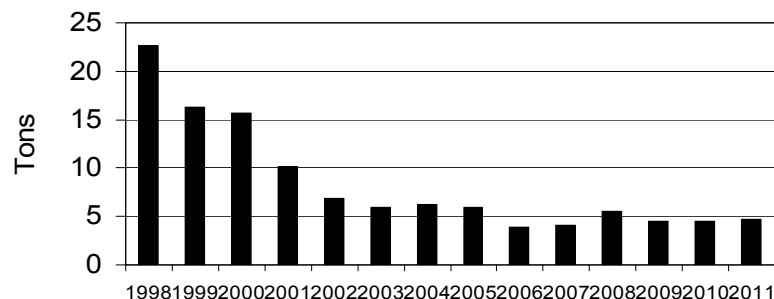
- **Cost avoidance of over \$2.1 million in FY 2011**
 - Reduced/recycled/reused 15.7 million lbs. of industrial, sanitary, hazardous, and rad waste
- **Projects implemented in 2011 = \$21,000**
 - 12 proposals submitted, 3 funded
 - Annual cost savings ~ \$20,300 from new projects
 - Average payback ~ 1 year



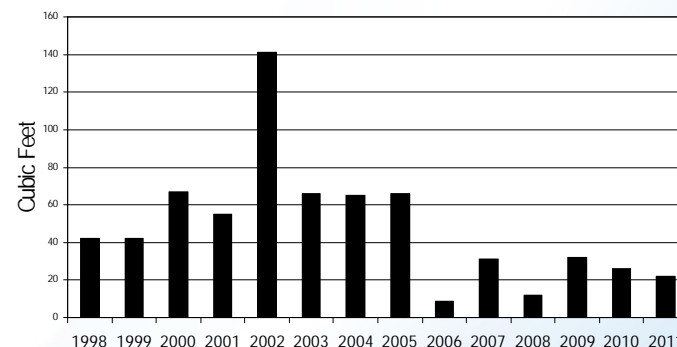
Chapter 2 – Waste Generation

- As a result of research and cleanup activities, BNL generated regulated waste requiring careful handling and disposal
- In 2011, BNL generated the following types and quantities of waste (trend noted)

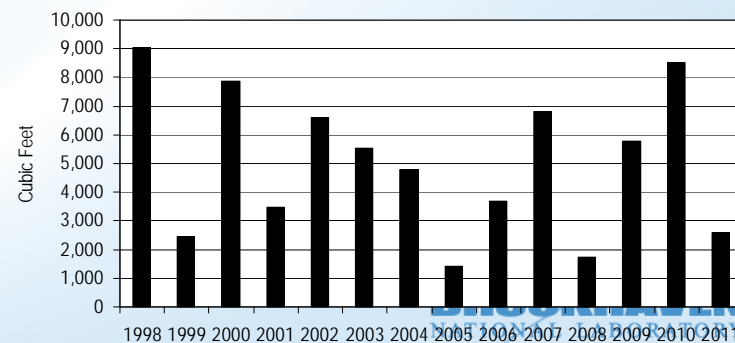
Hazardous Waste



Mixed Waste



Radioactive Waste

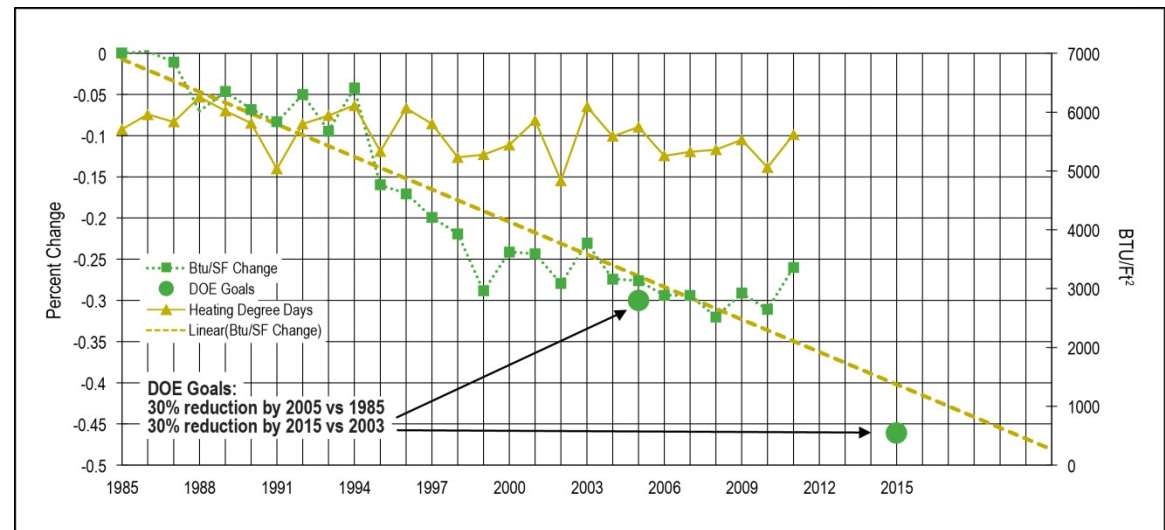


Chapter 2 – Energy Management & Conservation

■ 2011 Statistics

- 271 million kilowatt hours of electricity
- 75,000 gallons of fuel oil
- 21,000 gallons of propane
- 647 million ft³ feet of natural gas
- Energy use per square foot was ~ 4% less than in 2003 (SSP goal is 30% by FY 2015)
- Continued development of a sitewide Utility Energy Saving Contract that will reduce overall energy intensity by 11% and save over \$2 million/year in energy costs

Building Energy Performance
BTU/FT² Change % vs. Baseline Years



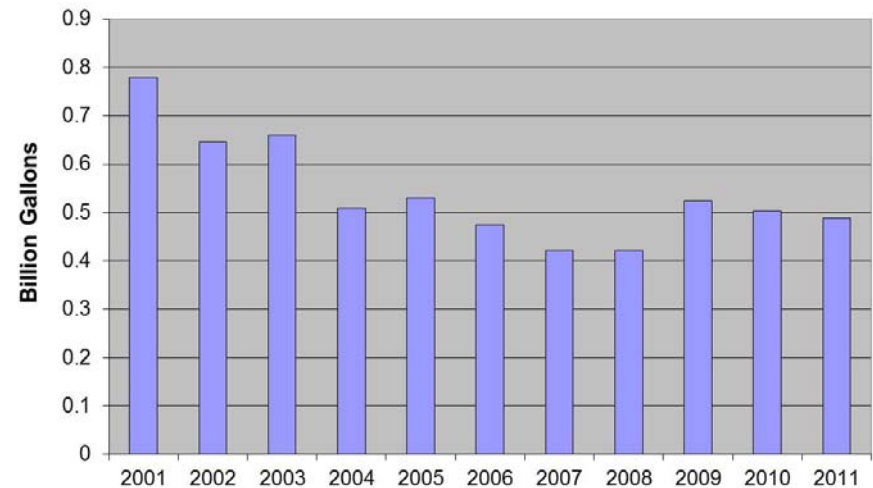
■ EO 13514/DOE O 436.1

- Establishes aggressive sustainability goals
- Requires preparation of a Site Sustainability Plan (SSP) to target actions to meet the goals
- Summary of goals and status of BNL's SSP provided in Chapter 2

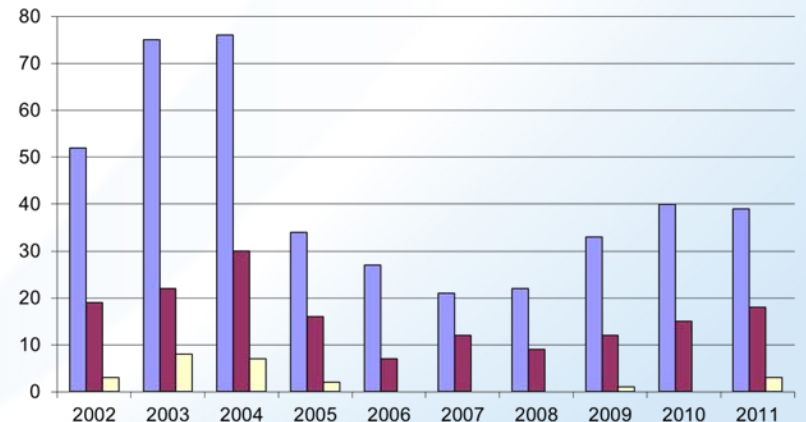
Chapter 3 – Compliance Status Overview

- **NEPA - 85 projects reviewed**
 - 79 considered minor actions
 - 5 Environmental Evaluation Notification Forms; all categorically excluded or fell within scope of existing EA
 - EA for STP Modifications for improved effluent compliance; received a finding of no significant impact
- **Potable Water**
 - 14M gallons lower than 2010
 - Still significantly higher than 2007 baseline year
 - Complied with all drinking water requirements
- **39 spills in 2011**
 - 18 spills reportable to NYSDEC
 - 3 significant and reportable to DOE
 - Transformer Failure (37 gallons)
 - Compressor Failure (120 gallons)
 - Freon-22 Release (14.5 pounds)
 - Increase due to spills attributable to construction activities.

Annual Potable Water Consumption



Total Number of Spills



■ Total ■ Reportable (Regulatory) □ Reportable (ORPS)

Chapter 3 – Inspections and Assessments

- **Occurrence Reports**
 - **Notices of Violation**
 - Two issued by State of Utah for waste shipments to EnergySolutions (Shipments did not meet Waste Acceptance Criteria)
 - Lead found in a container formerly used for transporting radioactive materials
 - Bin of dust from BGRR had higher than expected levels of radioactivity
 - **Freon 11 detected in Groundwater**

- **External Inspections**
 - **EPA RCRA:** EPA found BNL operations to be in compliance with requirements
 - **SCDHS (STP, public water):** No issues identified
 - **NYSDEC**
 - Major Petroleum Facility/Chemical Bulk Storage: No inspections in 2011
 - Air: No deficiencies during 2 inspections
 - SPDES: No deficiencies identified during annual surveillance inspection

- **Internal Assessments**
 - **DOE-BHSO:** Assessment of Laboratory's Waste Characterization Processes
 - Weaknesses identified in waste characterization.
 - Recommendations made to enhance and strengthen the process.
 - **DOE-BHSO/BSA:** NEPA Process and Cultural Resource Institutional Awareness
 - NEPA implementation strong in the scientific departments and at institutional level.
 - Training of newly hired engineers identified as an opportunity for improvement.
 - Knowledge of cultural resources was found to be weak in some areas.
 - **Corrective action plans prepared to address all assessment findings**

Chapter 3 and 5 – Water Quality Monitoring

■ Sewage Treatment Plant

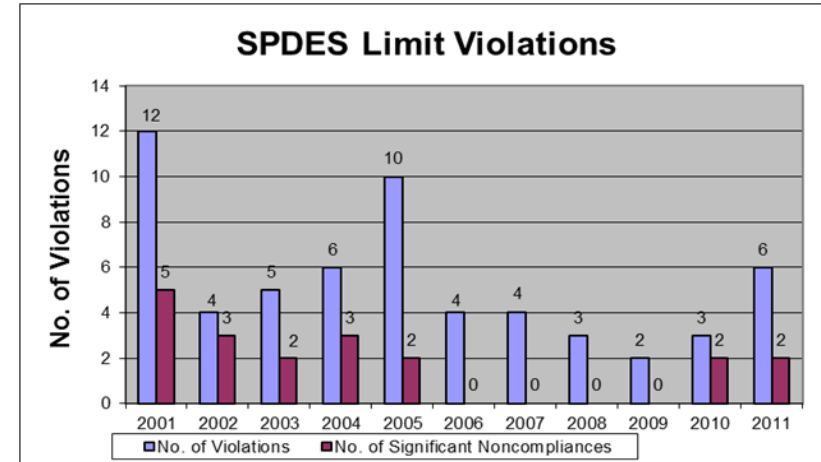
- SPDES: 3 permit excursions 2 for Iron and 1 for total nitrogen load
- Tritium detected only once above the MDA
 - Maximum concentration of 320 ± 130 pCi/L
 - Annual average - 43 pCi/L (~24% MDL)
 - Total released - 0.015 Ci
- Cs-137/Sr-90 remain undetected

■ Recharge Basins

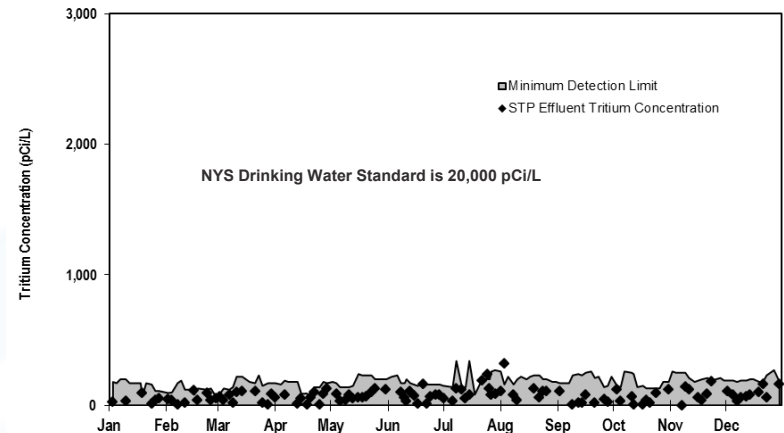
- SPDES: 3 pH excursions (runoff from construction sites)
- No gamma emitters detected
 - Natural products only
- Tritium detected in single sample at Basin HT-W at low level (520 ± 160 pCi/L)
- Elevated gross alpha/beta results observed at Basin HW (due to high sediment content)

■ Peconic River

- Tritium detected at trace levels in single sample
- Metals consistent with SPDES limits, but higher than ambient water quality standards



Tritium Concentrations in Effluent from the BNL Sewage Treatment Plant (2011)



Chapter 4 – Air Quality (Radiological)

■ Radiological Monitoring

- Brookhaven Linear Isotope Producer, Building 801 Target Processing Lab, HFBR
 - Total radionuclides released: 5,793 Ci (6,066 Ci in 2010)
 - BLIP emissions accounted for 99.99% of total
- BGRR: Continuous monitoring of contamination control enclosure, November 2010 to November 2011 (0.35 Ci tritium released)

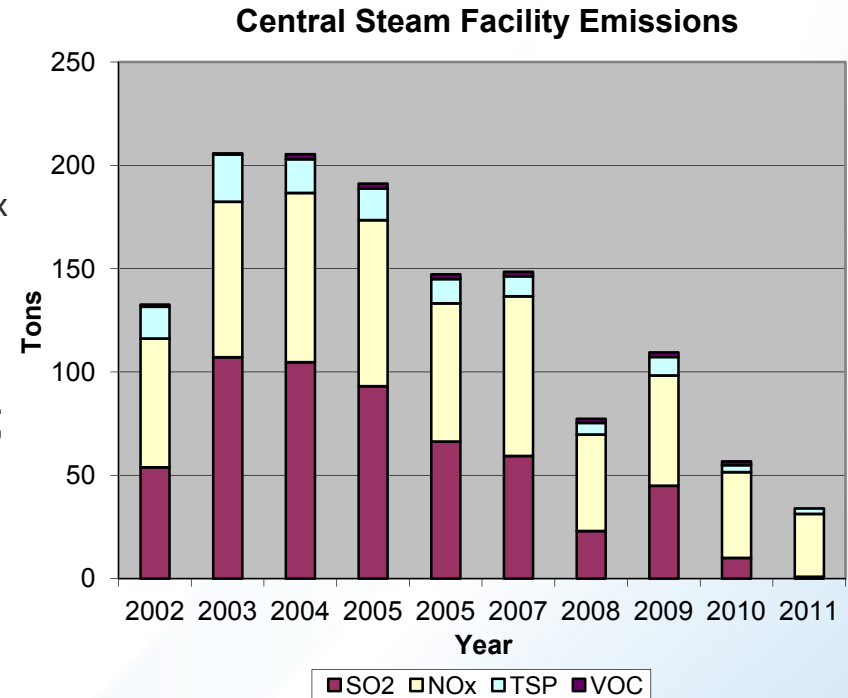
■ Ambient Air Monitoring

- Radiological air quality monitored at nine on-site locations around the perimeter of the site:
 - Gross alpha and beta concentrations consistent with natural background
 - Average tritium concentration less than MDLs



Chapter 4 – Air Quality (Non-Radiological)

- **Continuous emissions monitoring required for Central Steam Facility Boiler Nos. 6 & 7**
 - No measured exceedances of NO_x limits
 - No Boiler 6 or 7 opacity exceedances
 - Residual fuel oil use (31,490 gals); 416,000 gallons less than 2010
 - SO₂, NO_x, TSP, and VOC emissions well under respective permit limits.



Chapter 8 - Radiological Dose Assessment

- **Ambient external dose (TLDs)**
 - 68 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 hypothetical MEI in 2011 from inhalation, immersion, and ingestion pathways was 6.38 mrem**
- **Well Below Regulatory Limits**
 - EPA: 10 mrem (air pathway)
 - NYSDOH: 10 mrem (ingestion pathway)
 - DOE: 100 mrem (from all pathways)