

2010 Site Environmental Report



*Brookhaven National Laboratory
Community Advisory Council
January 12, 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 231.1B, 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 program for 2010**
 - 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 200 hardcopies and 200 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 2010 SER include:**
 - New York State SPDES Permit Renewal
 - Sewage Treatment Plant permit modification
 - 2nd Site-wide CERCLA Five-Year Review
 - Building 96 Remedy
 - Groundwater Updates
 - Annual Peconic River Monitoring
 - BGRR and HFBR decommissioning projects
 - Natural and Cultural Resources

Chapter 2: Environmental Management System-ISO 14001 and Occupational Safety and Health Management System-OHSAS 18001

- **EMS/OHSAS recommended for continued recertification by NSF, June 2010**
 - **17 noteworthy practices**
 - Laboratory-wide: Management at all levels from Director's Office, Directorate, down to Division and Department Chairs, demonstrated detailed knowledge of and support for the E/OSH management system.
 - **No non-conformances; noteworthy level of success**
 - **8 Opportunities for Improvement**

Chapter 2: Pollution Prevention (P2) Program

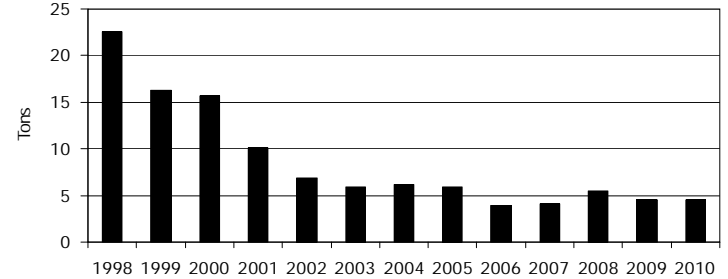
- **Cost avoidance of over \$1.9 million in FY 2010**
 - Reduced/recycled/reused 9.1 million lbs. of industrial, sanitary, hazardous, and rad waste
- **Funds invested in FY2010 = \$30,400**
 - 10 proposals submitted, 3 funded
 - Annual cost savings ~ \$20,800 from new projects
 - Replacement of mercury thermometers in C-A Water Systems
 - Propylene/Ethylene Glycol Recycling System
 - Portable Used Oil Separation/Filtration System



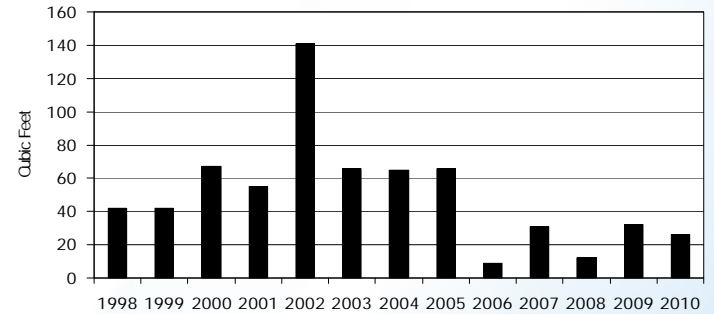
Chapter 2: Waste Generation

- As a result of research and cleanup activities, BNL generated regulated waste requiring careful handling and disposal
- In 2010, BNL generated the following types and quantities of waste (trend noted):
 - Routine Operations
 - Hazardous Waste: 4.5 tons - steady
 - Mixed Waste: 26 ft³ - down
 - Radioactive Waste: 8,518 ft³ – up (CA shielding materials)
 - Nonroutine Operations (ER and BNL)
 - Hazardous Waste: 40.8 tons - up
 - Mixed Waste: 1,779 ft³ - up
 - Radioactive Waste: 153,359 ft³ – up
- Pollution Prevention innovations continue to reduce the amount and toxicity of wastes produced on site

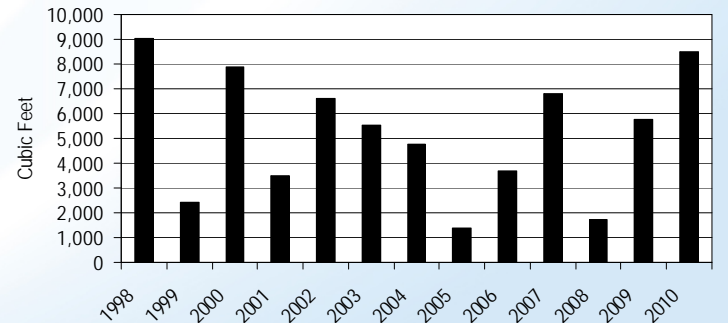
Hazardous Waste



Mixed Waste



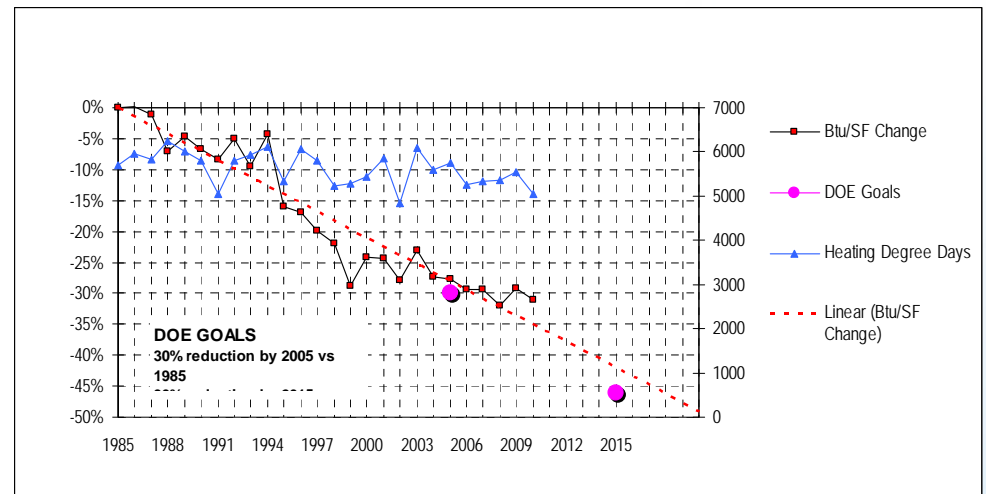
Radioactive Waste



Chapter 2: Energy Management & Conservation

- **E.O. 13514/DOE O 430.2b**
 - Establishes aggressive sustainability goals
 - Requires preparation of a Site Sustainability Plan to target actions to meet the goals
 - Summary of goals and status of BNL's SSP provided in Chapter 2

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



- **2010 Statistics**
 - 272 million kilowatt hours of electricity
 - 0.68 million gallons of fuel oil
 - 25,000 gallons of propane
 - 537 million ft³ feet of natural gas
- Energy use per square foot was ~ 8% less than in 2003 (SSP goal is 30% by FY15)
- Continue to develop sitewide UESC that will reduce overall energy intensity by 11% and save over \$2 million/year in energy costs

Chapter 3: Compliance Status

■ NEPA

- **75 additional projects reviewed for NEPA**
 - 72 minor actions
 - 3 Environmental Evaluation Notification forms; two categorically excluded, Sewage Treatment Plant upgrade requires an Environmental Assessment

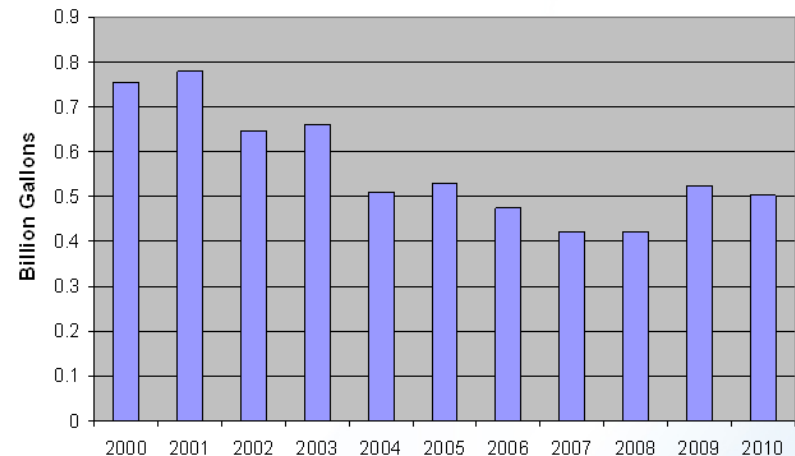
■ Potable Water

- 21M gallons lower than 2009
- Complied with all drinking water requirements

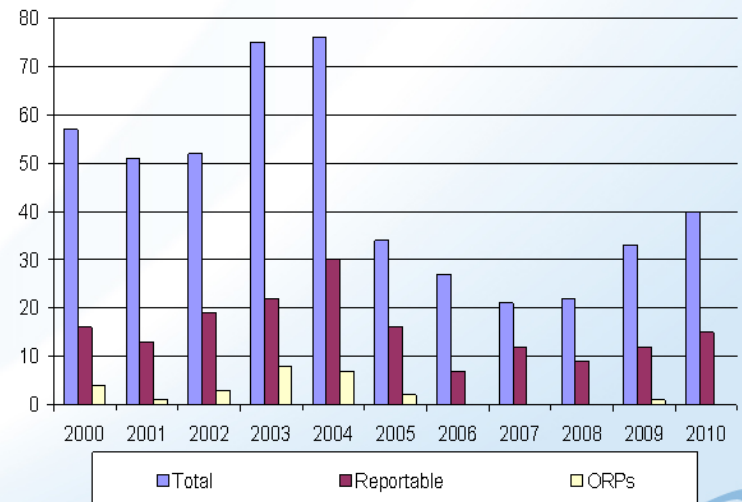
■ 40 spills in 2010

- 21% increase over 2009
- 15 spills reportable to NYSDEC
- No ORPS reportable releases
- Increase due to spills attributable to construction activities
- Most releases petroleum or vehicle related.

Annual Potable Water Consumption



Total Number of Spills



Chapter 3: Inspections and Assessments

- **External Inspections**
 - **EPA RCRA:** No deficiencies
 - **SCDHS (Article 12, STP, public water):** Minor maintenance deficiencies
 - **NYSDEC**
 - Major Petroleum Facility: Minor deficiencies
 - Chemical Bulk Storage: Minor deficiencies
 - Air: No inspection, inspectors present during Relative Accuracy Test Audit, no findings
 - RCRA: No deficiencies
 - SPDES: Minor recommendations

- **Internal Assessments**
 - **DOE-BHSO/CO:** Compliance with Spill Prevention Control and Countermeasures Plan requirements
 - Overall SPCC plan is consistent with federal requirements
 - Several suggestions made to improve the document
 - **DOE-BHSO/CO:** Environmentally Preferable Purchasing (follow-up)
 - No new issues identified
 - BNL still behind schedule in its improvement plan implementation
 - **DOE-BHSO/CO:** Greenhouse Gas Inventory review
 - BNL's inventory is consistent with Federal guidance
 - Recommendation suggested to improve inventory methodology
 - **Corrective action plans prepared to address all assessment findings**

Chapters 3 and 5: Water Monitoring

■ Sewage Treatment Plant

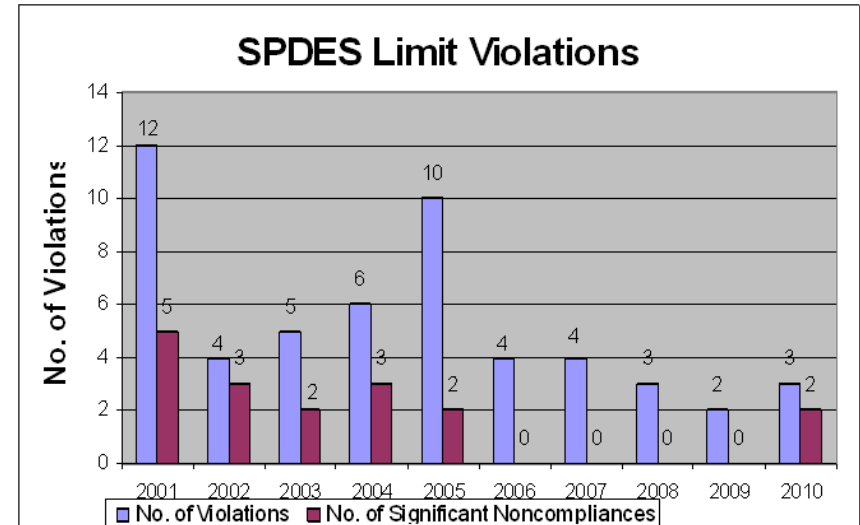
- SPDES - 3 permit excursions
 - 2 for total iron: increased levels of Fe^{+2} in influent; source unknown. Continued into February 2011; increased aeration reduced levels
 - 1 for total nitrogen load; new requirement for 2010
 - Tritium detected only once in 2010 Maximum concentration of 370 pCi/L just above MDA (310 pCi/L) and with high uncertainty (>50%)
 - Annual average - 41 pCi/L (~22% MDL)
 - Total released - 0.015 Ci
- Cs-137/Sr-90 remain undetected

■ Recharge Basins

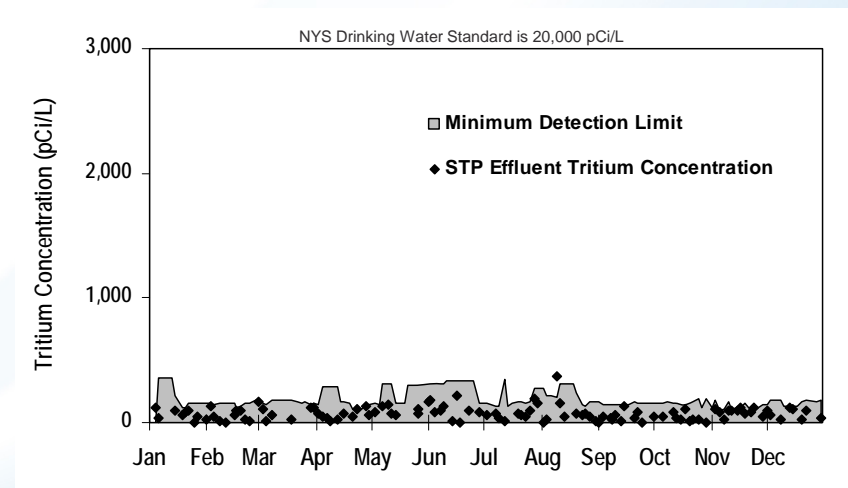
- No gamma emitters detected
 - Natural products only
- No Tritium detected above MDL
- Elevated gross alpha/beta results observed at Basin HW (false positive due to high sediment content)

■ Peconic River

- Tritium – not detected above MDL in any surface water samples
- Metals consistent with SPDES limits, but higher than ambient water quality standards



Tritium Concentrations in Effluent from the BNL Sewage Treatment Plant (2010)



Chapter 4: Air Quality (Radiological)

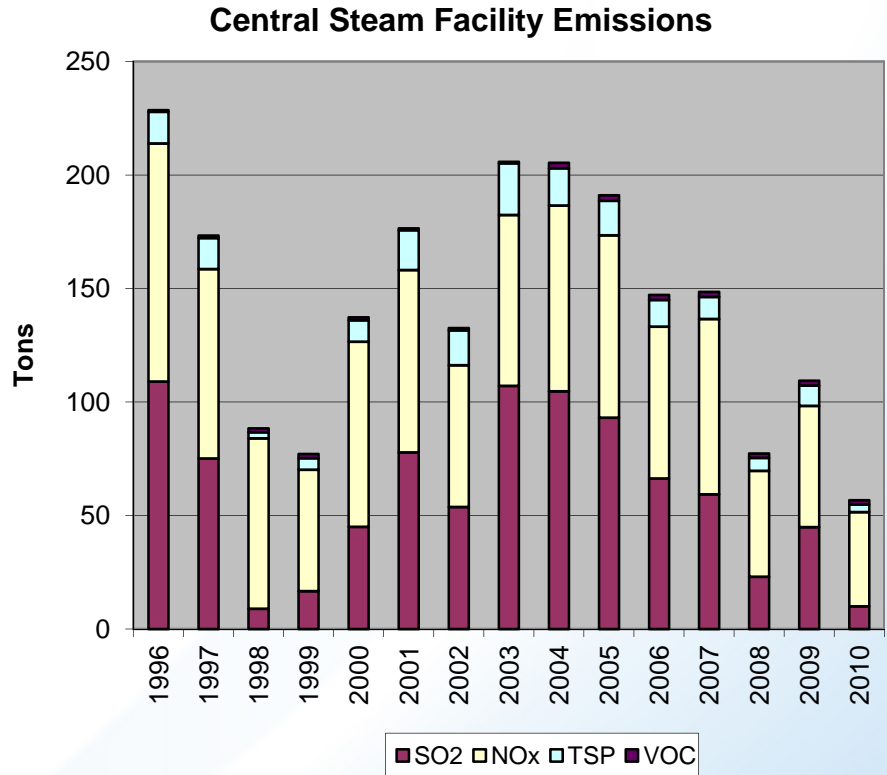
- **Radiological Monitoring**
 - Brookhaven Linear Isotope Producer
 - Building 801 Target Processing Lab
 - HFBR
 - Total radionuclides released: 6,066 Ci (1,833 Ci in 2009)
 - BLIP emissions account for 99.9% of total
- **Ambient Air Monitoring**
 - All monitoring results are consistent with background and historical measurements
 - No impacts to other environmental media



Chapter 4: Air Quality (Non-Radiological)

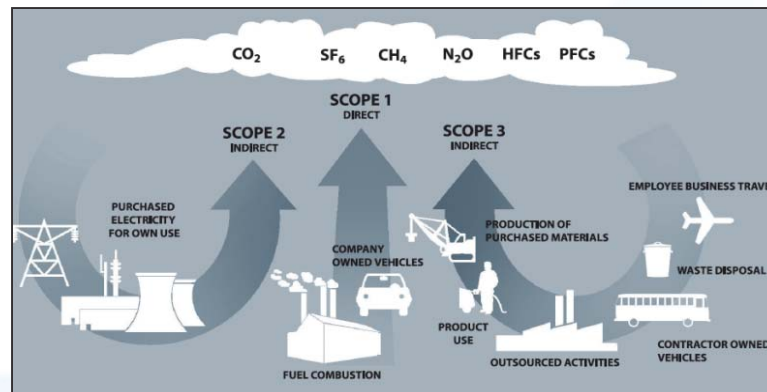
■ Continuous emissions monitoring required for Central Steam Facility Boiler Nos. 6 and 7

- No measured exceedances of NO_x limits
- No Boiler 6 opacity exceedances
- One measured Boiler 7 opacity exceedance from supply fan tripping off
- Fuel oil use (447,472 gallons); 1.46 million gallons less than 2009
- SO₂, NO_x, TSP, and VOC emissions well under respective permit limits of 445, 159, 113.3, and 39.7 tons



Chapter 4 – Air Quality (Non-Radiological)

- **Site Sustainability Plan Greenhouse Gas (GHG) Emissions Goals**
 - Reduce Scope 1 & 2 by 28% by FY 2020 (205,542 MtCO₂e)
 - Reduce Scope 3 by 13% by FY 2020 (20,000 MtCO₂e)
- **Scope 1 & 2 GHG Reduction Actions**
 - BP Solar Farm (28,000 MtCO₂e)
 - 20 MW Combined Heat & Power Plant (75,000 MtCO₂e)
- **Scope 3 GHG Reduction Actions**
 - Two airline mileage reduction goals proposals
 - 2% per year from FY 2011 to FY 2020 using FY 2008 baseline
 - 3% per year from FY 2011 to FY 2020 using FY 2010 baseline
 - Selected proposal will be support by travel guidelines



Chapter 8: Dose Assessment

- **Ambient external dose (TLDs)**
 - 66 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 MEI in 2010 from inhalation, immersion, and ingestion pathways was 5.93 mrem**
 - **Air Pathway: inhalation and immersion**
 - Effective dose to MEI was 9.20E-1 mrem
 - **Ingestion Pathway**
 - Fish (consumption of 15 lbs.) - effective dose was 0.11 mrem
 - Deer meat (consumption of 64 lbs.) - effective dose was 4.9 mrem
 - Drinking water (Suffolk County Water Authority) - no dose contribution

Chapter 8 - Radiological Dose Assessment (continued)

- **Below Regulatory Limits**

- EPA – 10 mrem (air pathway)
- NYSDOH – 10 mrem (ingestion pathway)
- DOE – 100 mrem (from all pathways)

- **NESHAPs Compliance**

- Dose impact from operations well below the regulatory limits

- **Dose to aquatic and terrestrial biota (DOE-STD-1153)**

- Aquatic animals: $2.50E-04$ mGy/day (DOE Limit: 10 mGy/day)
- Riparian animals: $2.90E-03$ mGy/day (DOE Limit: 10 mGy/day)
- Terrestrial animals: $1.78E-02$ mGy/day (DOE Limit: 1 mGy/day)
- Terrestrial plants: $1.68E-03$ mGy/day (DOE Limit: 1 mGy/day)