

**Brookhaven National Laboratory EM Project(s)**  
**Baseline Summary**  
**June 2008**

**BACKGROUND**

Brookhaven National Laboratory (BNL) is a USDOE Office of Science (SC) owned multi-disciplinary scientific research center located in the center of Suffolk County on Long Island, about 60 miles east of New York City. The Atomic Energy Commission (AEC) established BNL on the site of the U.S. Army's former Camp Upton in 1947. The AEC's objective was to build a regional laboratory that could provide researchers with powerful tools too costly for their home institutions to build and maintain.

BNL was added to New York State's list of Inactive Hazardous Waste sites in 1980 and to the federal National Priorities List in 1989 as a result of soil, groundwater, and surface water sediment contamination from past operations. A tri-party Federal Facilities Compliance Agreement, also known as the IAG, was subsequently negotiated between the DOE, the United States Environmental Protection Agency (USEPA) Region II, and the New York State Department of Environmental Conservation (NYSDEC). This IAG integrates the requirements of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the corrective action requirements of the Resource Conservation and Recovery Act, DOE cleanup authorities under the Atomic Energy Act, and any corresponding New York State regulations. The IAG became effective in 1992.

**SCOPE DESCRIPTION**

The EM mission at Brookhaven National Laboratory addresses the accelerated cleanup of contaminated areas. In fiscal year 2005 EM Brookhaven Site Office (BHSO) oversaw the completion of remediation of soils, groundwater and the Peconic River, and placed residual contamination in a safe and stable condition. Critical Decision 4 was approved in FY 2006. Currently sixteen long-term groundwater systems are in place, and are continuously maintained for proper operation. Other required activities include monitoring of three capped landfills and the Peconic River. Ongoing Soil and Groundwater EM Operations and Maintenance (O&M) activities will continue until the EM Mission is complete at the Site at which time all current EM liability will be transferred to the Office of Science (the Site's landlord).

The EM mission also includes the decontamination and decommissioning (D&D) of several surplus nuclear reactor and non-reactor facilities, and the disposal of legacy waste. In fiscal year 2007 the EM BHSO was successful in establishing Performance Measurement Baselines (PMB) for the D&D of two dormant nuclear reactors and it is planned to complete one project in FY 2010 and the other in FY 2020. Details are described below in the Scope Description.

**PROJECT MANAGEMENT**

Based on the direction from EM Headquarters, Brookhaven National Laboratory office developed the near-term baseline for each of its projects. These project baselines have undergone an independent review to verify the reasonableness of the scope, cost, and schedule

for each project. An approved near-term baseline reflects the identified scope that can reasonably be accomplished for the identified cost in the identified time period if near-term baselines are funded as profiled and contingency funds are provided as required during project execution. It also establishes the baseline as an acceptable point from which to track and control future change. The review and approval process accommodates the likely changes in the EM complex, site priorities and funding plans. These changes could affect both near-term (within the next five years) and life-cycle cost, schedule and scope. Such future changes may be required to comply with applicable environmental legal obligations while maintaining essential functions necessary to protect human health, the environment and national security; reflect funding different from the baseline assumptions; incorporate technological advances; realize specific programmatic risks; or implement programmatic business cases. Because the cleanup extends beyond the near-term, out-year planning estimates (ranges) have also been developed and independently reviewed.

## LIST OF PROJECTS

The Brookhaven National Laboratory EM program consists of three projects/four PBSs as shown below: The Near-Term Baseline (NTB) for these projects is from FY 2008 – FY 2012 and the Out Year Planning Estimate Range (OPER) is from FY13 through FY 2020.

Project/PBS	Date Approved	
	Near Term Baseline (NTB)	Out Year Planning Estimate Range (OPER)
BRNL-0030, Soil and Groundwater Remediation	CD-4 approval in FY 2006	Project Completed
BRNL-0040, Brookhaven Graphite Research Reactor	December 3, 2007	December 3, 2007
BRNL-0041, High Flux Beam Reactor	November 15, 2007	November 15, 2007
BRNL-0100, Community and Regulatory Support (Not a Project; New York State Grant for Site support)	Not Applicable	Not Applicable

## PROJECT SCOPE

### BRNL-0030 – Soil and Groundwater Remediation

This PBS addresses previous response actions taken on environmental media and some building structures that became contaminated with radioactive and chemical substances at Brookhaven National Laboratory and continued operations, monitoring and institutional controls. Historical practices, discharges, and past spills resulted in groundwater, sediment, and soil contamination at the Laboratory, which is located in Suffolk County, New York. As a result, on and off-site groundwater are contaminated with volatile organic compounds, in addition to onsite groundwater contaminated with radionuclides. Historical discharges from the Laboratory's Sewage Treatment Plant have resulted in elevated levels of mercury, in Peconic River sediments both on and off-site. Some on-site soils were contaminated with radionuclides and chemicals (primarily mercury). Cleanup was conducted either as a removal action or under one of several Record of Decisions in accordance with the Comprehensive Environmental Response, Compensation and Liability Act and under an Interagency Agreement, which serves as the Federal Facility Agreement among the DOE, the United States Environmental Protection Agency and New York State. The DOE Environmental Management agreed upon end-state of this PBS is that sixteen groundwater treatment systems would be built and operational, and all required non-

reactor facility decontamination and decommissioning, soil remediation and Peconic River cleanup would be completed by September 30, 2005. Cleanup consists of treating groundwater both on and off site, continued monitoring, source term removal, and natural attenuation. All soil cleanups, tank removals, landfill caps and remediation of the Peconic River have been completed and all related wastes have been disposed of off-site. All sixteen groundwater treatment systems are either built and operating, or have completed their mission and have been shut-down and/or decommissioned. The planned construction end state for this project was successfully achieved as noted above in September 2005. Continuing activities such as groundwater monitoring and treatment system operations and maintenance are underway per the Record of Decision agreements to meet drinking water standards within 30 years. Groundwater cleanup is Brookhaven's highest priority because it is located above Long Island's sole source aquifer, and will continue to be monitored by our Interagency Agreement.

### **BRNL-0040 – Brookhaven Graphite Research Reactor**

The Brookhaven Graphite Research Reactor (BGRR) is one of two Brookhaven Environmental Management Completion Projects (BEMCPs) that will be completed at BNL. The BGRR PMB was provided to the Department of Energy (DOE) by Brookhaven Science Associates (BSA) in August 2007 and provided a description of the work, cost plan and schedule to complete the remaining BGRR work included in PBS-CH-BRNL-0040. This PMB includes the work required to fulfill the DOE's responsibilities under the BGRR Record of Decision (ROD) that was approved on March 17, 2005. This work includes:

- The removal of the graphite pile.
- The removal of the biological shield.
- Transportation and disposal of all project wastes.
- Installation of an engineered water infiltration barrier around the BGRR reactor building (i.e. Building 701).
- Regulatory closeout of the construction phase of the BGRR project.
- BGRR surveillance and maintenance through DOE acceptance of BSA's transition document package, and BGRR facility turn over to Long-Term Environmental Operations, Safety and Security (LEOSS).
- Environmental, Safety and Health (ES&H) and management oversight and support of project activities throughout the period of performance.

### **BRNL-0041 – High Flux Beam Reactor**

The High Flux Beam Reactor (HFBR) Near-Term PMB provides a description of the work, cost plan and schedule to complete various HFBR decommissioning tasks included in PBS-CH-BRNL-0041. This work includes:

- Completion of CERCLA decision-making through final DOE and regulatory approval of the HFBR ROD.
- Completion of Control Rod Blade and beam plug removal.
- Completion of Waste Loading Area cleanup.
- Completion of near-term activities required to prepare the HFBR facility for interim safe-storage. This includes the remaining physical isolation of mechanical systems to reduced sources of energy and water in the confinement building, and the removal of lithium arsenite from the confinement building refrigeration plant.

- HFBR surveillance and maintenance throughout the DOE-directed period of performance (i.e. FY 2008 through FY 2012).
- ES&H and management oversight and support of project activities throughout the period of performance.

The thorough and documented transfer of the HFBR facility to the BNL operating organization for interim safe-storage including the conduct of an Exit Readiness Evaluation is also included in the PMB.

Supplemental information provided with the PMB includes HFBR Planning Packages for the anticipated out-year work that will be required to complete the HFBR project. The HFBR Planning Packages are consistent with the proposed remedial alternative in the Proposed Remedial Action Plan (PRAP), and the execution of this out-year work is scheduled to occur during FYs 2018, 2019 and 2020. This work includes:

- Demolition of all fan house structures, systems and components, including foundation walls and contaminated soils beneath the building
- D&D of the stack structure including the base down to the support pedestal
- Permanent isolation and removal of the underground contaminated utility line and underlying soils.

### **BRNL-0100 – Community and Regulatory Support**

Brookhaven National Laboratory (BNL) is listed on the National Priorities List. This PBS assists New York State in carrying out its oversight responsibilities in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the federal facility agreement, also known as the Brookhaven Interagency Agreement among the DOE, the United States Environmental Protection Agency, and the New York State Department of Environmental Conservation for response actions taken at BNL. This project will continue until the CERCLA cleanup activities, as identified in the Brookhaven National Laboratory Performance Management Plan (August 2002) and site Records of Decision, are completed.

### **PROJECT COST**

(dollars in thousands)

Cost Element	Project Number			
	BRNL-0030 (Proposed)	BRNL-0040	BRNL-0041	BRNL-0100 (Proposed)
1. Prior Year Costs (1997-2007)	\$201,943	\$63,863	\$18,750	\$2,744
2. Total Near-Term Baseline (50% Confidence Level)	\$40,103	\$43,776	\$9,934	\$750
3. Unfunded Contingency	0	\$10,024	\$1,866	0
4. Performance Baseline (80% Confidence Level)	0	\$53,800	\$11,800	0
5. Out Year Planning Estimate Range	\$67,327	\$2,500 – \$5,000	\$21,100 – \$47,200	\$1,200
6. <b>Total Life Cycle Cost</b>	\$309,373	\$122,663	\$77,750	\$4,694





# SUMMARY NEARTERM BASELINE SCHEDULE; BRNL-0041, High Flux Beam Reactor







