ACTION MEMORANDUM
BROOKHAVEN GRAPHITE RESEARCH REACTOR
PILE FAN SUMP
REMOVAL ACTION

Revision 1

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I. PURPOSE

The purpose of this Action Memorandum is to document the decision by the U.S. Department of Energy (DOE) to conduct a time-critical removal action to remove the Pile Fan Sump (PFS), its associated piping, and contaminated soils adjacent to Building 801 at Brookhaven National Laboratory (BNL). This action is being taken to coincide with a modification to the system for a Suffolk County Article 12 upgrade that will take the sump out of service.

This action is being undertaken as a time-critical removal action in accordance with the Interagency Agreement among the DOE, the U.S. Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (NYSDEC), and with Suffolk County Department of Health Services under Article 12. This action will be consistent with the final remedial actions that will be documented in the Brookhaven Graphite Research Reactor (BGRR) Record of Decision. Work will be conducted in accordance with the National Contingency Plan [1] (NCP, 40 CFR 300).

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

1. Physical location

Brookhaven National Laboratory is located in Upton, Suffolk County, New York, near the geographic center of Long Island (Figure 1). The site encompasses 5,300 acres, 75 percent of which is wooded. The remainder is developed and contains office buildings, various large research facilities, and parking lots. The BNL site, formerly occupied by the U.S. Army as Camp Upton during World Wars I and II, was transferred to the Atomic Energy Commission in 1947, to the Energy Research and Development Administration in 1975, and to the Department of Energy in 1977. It has been used as a National Laboratory since 1947. The BNL site is owned by the DOE and is operated by Brookhaven Science Associates (BSA).

Brookhaven National Laboratory carries out basic and applied research in the following fields: high-energy nuclear physics and solid-state physics; fundamental material and structure properties and the interaction of matter; nuclear medicine; biomedical and environmental sciences; and, selected energy technologies. Major operating facilities include the High Flux Beam Reactor (HFBR), the Brookhaven Medical Research Reactor, the National Synchrotron Light Source, and the Alternating Gradient Synchrotron.

2. Removal Site Evaluation

This removal action concerns low-level radioactive contamination within the soils and piping associated with the PFS that supports the BGRR and the HFBR (Figure 2).

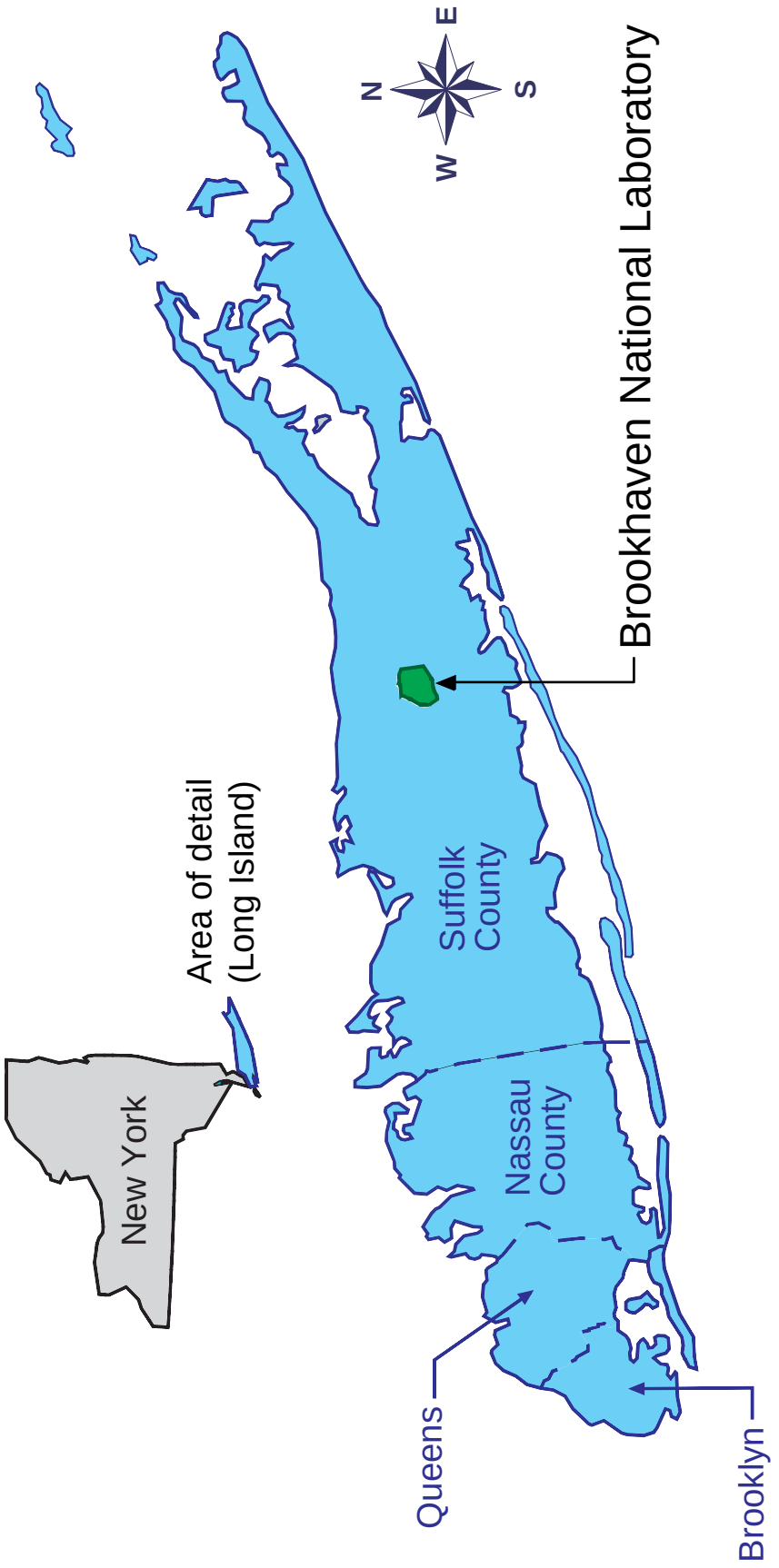

Figure 1. Brookhaven National Laboratory located in Upton, Suffolk County, New York

Figure 2. Loactoin of the Pile Fan Sump

Thecontamination was initially discovered in 1996 as part of a site-wide effort to identify environmental vulnerabilities. At that time, rainwater was found to be collecting in the sump from the surrounding pavement and filling it to a level where there was obvious penetration to the surrounding soils, where the water then escaped to the environment. This site is designated Area of Concern (AOC) 9D [2]. Under this action the PFS, contaminated soils, and about 250 feet of the associated piping systems are to be removed to coincide with modifications made to comply with the Suffolk County Article 12. These modifications are being undertaken during the summer and fall of 1999 to re-route the HFBR / BGRR stack drains.

During the Operable Unit III Remedial Investigation [3], the PFS was identified as a potential source for a Strontium-90 groundwater plume in the area. Additionally, Geoprobe™ soil samples taken in early 1998 indicated Cesium-137 in the soil (142 pCi/g) near one of the sumps penetrations and lesser amounts of Strontium-90 and gross alpha- and beta-contamination.

3. Release or Threat of Release into the Environment of a Hazardous Substance, Pollutant, or Contaminant

Following the shutdown of BGRR the liquid level monitoring of the PFS was stopped at an unknown time for unknown reasons. Subsequent collection of rainwater from the 705 stack drains and the roadway above the PFS, as well as the Building 704 floor drains caused the sump to fill and overflow. This overflow condition leaked radioactively contaminated water to the adjacent soil column. This problem was discovered in 1997, the water was removed, and routine monitoring and pumping of the sump resumed. See B.1 below for additional information.

B. Other Actions To Date

1. Previous Actions

Water and sludge were removed from the PFS and piping and the interior surfaces inspected between December 1997 and March 1998. Following this, a new weather-tight cover was installed on the PFS to prevent further intrusion of rainwater. Also, instrumentation was installed in the PFS to continually monitor the water level. During an inspection of the sump in March 1998, a piping penetration point was observed which allowed leakage to the soil column. This leakage was a probable source of soil contamination.

2. Ongoing Action

The water level in the sump is monitored continually and maintained at a normal level to avoid leakage to the soil column.

3. Planned Actions

A Suffolk County Article 12 compliance project is being planned to take the PFS out of service in the autumn of 1999. The scope of this project will be revised to include the removal of the PFS, its piping, and contaminated soil adjacent to the sump structure.

C. National Priorities List Status

Brookhaven National Laboratory was added to the National Priorities List in 1989. An Interagency Agreement under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and applicable New York State regulations was negotiated between DOE, the EPA and NYSDEC. The Interagency Agreement became effective in May 1992 and governs the environmental restoration program at BNL.

III. THREATS TO PUBLIC HEALTH OR WELFARE AND THE ENVIRONMENT: STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The threats posed by the empty sump and piping and the adjacent contaminated soil are time-critical based on four pieces of information: 1) the existing Strontium-90 plume information on Operable Unit III groundwater; 2) know leakage from the pipe penetration during high water events; 3) known source of contaminated sludges in the PFS; and 4) results of geoprobes in vicinity of PFS that indicates low levels of radioactivity in the soil column. The appropriateness of the removal action is based on two of the eight factors listed in 40 CFR 300.415 (b) (2) [4] of the regulations implementing the National Contingency Plan.

1. Actual or potential exposure to nearby populations, animals or the food chain from hazardous substances, pollutants, or contaminants, and

2. Actual or potential contamination of drinking-water supplies or sensitive ecosystems.

The BNL site is located above a sole-source aquifer, as designated by EPA under the Safe Drinking Water Act, and groundwater is the primary source of drinking water in the area. The groundwater also is classified by New York State as Class GA under 6 NYCRR Part 703 [5], the best usage of which is a source of potable-water. Strontium-90 contaminants identified from work on Operable Unit III have been found in the groundwater on-site.

B. Threats to the Environment

The major threat to the environment is on-site migration of contaminants, uptake by the local fauna and flora, and contamination migration into surrounding soils.

IV. DETERMINATION OF ENDANGERMENT

If the actual or threatened releases of pollutants and contaminants from this site are not mitigated by taking the response action selected in this action memorandum, they pose imminent and substantial endangerment to the environment.

V. PROPOSED ACTION AND ESTIMATED COSTS

A. Removal Action Objectives

The proposed action is to excavate and remove the PFS, its associated piping, and soils with the goal of achieving the cleanup levels developed for Operable Unit 1 [6-8] for future residential use and the Applicable or Relevant Appropriate Requirements (ARAR) addressed in Section V.D. The sump and its associated piping will be removed and disposed of as radioactive waste at a DOE-approved waste facility. The soils surrounding the sump and piping will be surveyed to determine if or where the PFS/piping had leaked. Soils with combined radioactive concentrations that would result in exceeding the 15mRem/year exposure limit will be excavated and disposed of at a DOE-approved facility. This removal action is being undertaken to prevent low-level radioisotopes migrating into surrounding soils and groundwater. Performance of an interim action for this purpose is specifically referred to in the EPA's Office of Solid Waste and Emergency Response (OSWER) Interim Final Guidance on Preparing Superfund Decision Documents Directive 9355.3-02 [9].

All criteria required by DOE Order 435 "Radioactive Waste Management" [10] shall be met during this action. Because the expected contaminants of concern are primarily radiological, all waste generated from this Removal Action is expected to be radiological waste. However, there is a chance small volumes of hazardous or mixed waste could be generated. As stated above, all waste will be disposed of in a DOE-approved waste facility. The exact disposal location will be based on final waste designation. The current plan is to use a commercial disposal facility such as EnviroCare of Utah.

B. Contribution to the Remedial Performance

The BGRR Decommissioning Project will address AOC 9 through several removal actions under the "Policy on Decommissioning Department of Energy Facilities Under CERCLA" (dated 5/22/95) [11]. In the future, a Record of Decision will be developed to document the long-term closeout of AOC 9 based on the results of these actions undertaken as part of the BGRR Project. The proposed removal action addresses source removal, and therefore is consistent with and contributes to the long-term objectives of the Record of Decision for AOC 9.

C. Description of Alternative Technologies

Because the PFS, piping and soil, are contaminated with radioactivity and possibly minor chemical contaminants, the number of practical and suitable treatments that can be applied are limited. Technologies for in-situ solidification of the areas of contamination are available and their effectiveness is well documented, but they are cost-prohibitive compared with excavation and removal.

D. Applicable or Relevant and Appropriate Requirements

The National Contingency Plan [1] Section 300.430 (e)(9)(iii)(B) requires that the selected remedy (BGRR Decommissioning Project) attains the Federal and State ARARs or that a waiver of an ARAR is obtained. This removal action will meet the following ARAR's to the extent practicable.

Chemical-Specific ARARs

The chemical-specific ARARs that the Removal Action will meet are listed below:

1. 6 NYCRR Part 212 [12], General Process Emission Sources: This State regulation will be followed to determine the need for air-emission control equipment.

2. RCRA (40 Code of Federal Regulations parts 260-268) [13]: These Federal regulations define hazardous wastes. All wastes classified as hazardous will be handled, stored, and disposed of off-site at a permitted facility in accordance with these regulations.

3. New York State Hazardous Waste Regulations (6 NYCRR Part 370 - 373) [14]: These regulations define hazardous wastes in New York State. All wastes classified as hazardous will be handled, stored, and disposed of off-site at a permitted facility in accordance with these regulations.

Location-Specific ARARs

No location-specific ARARs were identified.

Action-Specific ARARs

The action-specific ARAR's that this Removal Action will meet are listed below:

1. 10 Code of Federal Regulations Part 835 [15]: This regulation establishes the requirements for controlling and managing radiologically contaminated areas at DOE sites.

2. RCRA (40 Code of Federal Regulations parts 260-268): As described above.

3. New York State Hazardous Waste Regulations (6 NYCRR Part 370 - 373): As described above.

4. Clear Air Act (42 U.S.C Section 7401, et seq.) [16] and National Emissions Standards for Hazardous Air Pollutants (40 Code of Federal Regulations) [17]: This Act regulates and limits the emissions of hazardous air pollutants, including radionuclides.

To Be Considered Guidance

In implementing this Removal Action, the following important guidance will be considered. Guidelines that are not promulgated and are not legally binding:

1. NYSDEC's Division of Air Guidelines for Control of Toxic Ambient Air Contaminants, Air Guide 1: This guide will be used to assess the impacts of air emissions and to assist with evaluating the need for having air-emissions control equipment.

2. NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) "Remediation Guideline for Soils Contaminated with Radioactive Materials" (#4003), September 1993 [18]: This memorandum contains State guidance for remediating radiologically contaminated soils. The State's value of 10 mRem/year above background serves as an additional goal for remediation that will be evaluated during field excavation work.

3. NYSDEC's Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Remediation Objectives and Remediation Levels (# 4046), January 1994 [19].

4. DOE's Order 5400.5 [20] and draft 10 Code of Federal Regulations 834 "Radiation Protection of the Public and the Environment" [21]: This order, and its current draft rulemaking, contains the requirements and guidance for the developing radiological soil-remediation levels at DOE sites.

5. DOE Order 435 "Radioactive Waste Management" [10]: This order provides guidance and requirements for management and disposal of radioactive waste generated at DOE facilities.

6. U.S. EPA's Establishment of Clean-Up Levels for CERCLA Sites with Radioactive Contamination. OSWER Directive 9200.4-18, August 1997 [22]. This directive recommends an allowable exposure to radionuclides to 15mrem/year as consistent with EPA's acceptable risk range.

E. Project Schedule

This removal action will be close coupled with the Article 12 Compliance Project that takes the PFS out of service. Consequently, the actual start date depends on the progress of that project. Major tasks include preparing the PFS Removal Plan, carrying out the work, sampling and analyzing after it is finished, disposing of the waste, and issuing a closeout report. The project is scheduled to begin in September 1999.

F. Estimated Costs

Work Plan Preparation and Project Execution Costs	$153,000
Waste Disposal Costs	$56,000
Sample Analysis and Closure Reporting	$26,000
Total Estimated Costs	$235,000

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

A delayed action or no action will increase the potential for the contaminant to migrate deeper into the soil column, as well as to increase uptake by local fauna and flora. Delaying action will potentially increase the scope and cost of the project as larger volumes of soil will become affected.

VII. PUBLIC PARTICIPATION

Public participation for the PFS Removal Action includes issuing a public notice and publishing an article in the Brookhaven Bulletin. These activities will coincide with the submission of this Action Memorandum to the Administrative Record. Roundtables scheduled before beginning the project in July will discuss work on the PFS. Once this Action Memorandum has been issued, a public notice of its availability will be published in *Newsday* (regional distribution) and in *Suffolk Life*. Simultaneously, a copy of the public notice will be sent to BNL's Environmental Restoration Division Community Relations mailing list (approximately 3,000 addresses).

VIII. OUTSTANDING POLICY ISSUES

The future use of the BGRR land has not been determined. The goal of this action is to prepare the land for residential use after 50 years of institutional control by the DOE.

IX. ENFORCEMENT

The site is owned by DOE and operated by Brookhaven Science Associates. The DOE will fund the source control disposal entirely. The Removal Action will be conducted in accordance with CERCLA and National Contingency Plan requirements, the Interagency Agreement Executive Order 12580 [23], applicable New York State regulations, and Suffolk County Article 12.

X. RECOMMENDATION

This decision document recommends a time-critical removal action of the Pile Fan Sump at the BGRR at the Brookhaven National Laboratory in Upton, New York. This removal action also will include the associated piping and soils that may be contaminated with hazardous- and radioactive-materials above the cleanup levels established to limit future exposure to 15 mRem/year, to meet future land-use criterion, and to protect the groundwater. This decision document was developed in accordance with CERCLA as amended, and is consistent with the National Contingency Plan.

XI. REFERENCES

1. 40 CFR 300, National Contingency Plan.

2. Letter from Mary Logan (EPA) to G. Malosh (DOE/BHG), Subject: Brookhaven National Laboratory, BGRR (letter dated 3/23/99).

3. Final Operable Unit III Remedial Investigation Report, International Technology Corporation, March 1, 1999.

4 40 CFR 300.415 (b) (2), National Oil & Hazardous Substance Pollution Contingency Plan.

5. New York State General Process Emissions Sources 6 NYCRR Part 703.

6. "Final Report, Radiological Risk Assessment of Operable Units 1/VI, Brookhaven National Laboratories," prepared for CDM by Afftrex Ltd. Under contact No. NYC002-5109-CS, 1996.

7. "Brookhaven National Laboratory Chemical/Animal Pits and Glass Holes, Final Evaluation of Alternatives Report, Volume 1", prepared for BNL by CDM Federal Programs Corporation, under contract No. 739174, Document No. 5109-017-FR-BCRR, 1997.

8. "Brookhaven National Laboratory Final Feasibility Study Report Operable Unit 1 and Radiologically-Contaminated Soils," prepared for BNL by CDM Federal Programs Corporation, under contract No. 739174, Document No. 5109-020-FR-BCVJ, 1999.

9. Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-02, Interim Final Guidance on Preparing Superfund Decision Documents dated June 1, 1989, Available from National Technical Information Service (NTIS), Order No. PB 91-921265.

10. United States Department of Energy, DOE Order 435 "Radioactive Waste Management."

11. "Policy on Decommissioning Department of Energy Facilities Under CERCLA" (dated 5/22/95).

12. New York State General Process Emissions Sources, 6 NYCRR Part 212.

13. 40 CFR Parts 260-268, Hazardous Waste Management System (RCRA).

14. New York State Hazardous Waste Regulations (6 NYCRR Part 370 - 373).

15. 10 CFR Part 835, Occupational Radiation Protection.

16. Clear Air Act (42 U.S.C Section 7401, et seq.).

17. National Emissions Standards for Hazardous Air Pollutants (40 CFR).

18. NYSDEC Technical and Administrative Guidance Memorandum (TAGM), "Remediation Guideline for Soils Contaminated with Radioactive Materials" (#4003), September 1993.

19. NYSDEC Technical and Administrative Guidance Memorandum: Determination of Soil Remediation Objectives and Remediation Levels (# 4046), January 1994.

20. DOE Order 5400.5, Radiation Protection of the Public and the Environment.

21. Draft 10 CFR Part 834, "Radiation Protection of the Public and the Environment."

22. U.S. EPA Establishment of Clean-Up Levels for CERCLA Sites with Radioactive Contamination. Office of Solid Waste and Emergency Response (OSWER) Directive 9200.4-18, August 1997.

23. Interagency Agreement Executive Order 12580.

C (MB):/WORD/ACTION MEMORANDA/PILE FAN SUMP