HFBR Public Comment Period: Thursday, January 10, 2008 to Monday, March 17, 2008

The Proposed Remedial Action Plan for the

High Flux Beam Reactor

at Brookhaven National Laboratory

I. INTRODUCTION

The purpose of this Proposed Remedial Action Plan (Proposed Plan, or PRAP) is threefold: to describe the preferred remedial alternative for ***decommissioning*** the High Flux Beam Reactor (HFBR), to explain the reasons this remedy is preferred over the other alternatives considered, and to encourage public comment before a final remedy is selected.

Operating from 1965 to 1996, the High Flux Beam Reactor (domed complex, bottom left) was constructed solely for scientific research, providing neutrons for materials science, chemistry, biology, and physics experiments.

The HFBR was a research reactor that operated at Brookhaven National Laboratory (BNL) between 1965 and 1996. Used solely for scientific research, the HFBR provided neutrons for experiments in materials science, chemistry, biology, and physics. During a routine maintenance shutdown in 1996, tritium from the ***spent fuel*** canal was found in groundwater south of the reactor. Investigations revealed that the source of the tritium was a small leak in the canal where spent reactor fuel was stored. Operations at the HFBR were suspended and the Department of Energy (DOE) considered what to do. All of the spent fuel was removed and sent to DOE's Savannah River Site in 1998. In November 1999, DOE announced it was permanently closing the reactor.

This Proposed Plan is required as part of the ***Comprehensive Environmental Response, Compensation, and Liability Act*** (CERCLA). In 1980, BNL was placed on New York State's list of inactive hazardous waste disposal sites by the New York State Department of Environmental Conservation (NYSDEC). This designation was in response to contamination from earlier in the site's history, which stretches back to World War I. In 1989, BNL was listed by the U.S. Environmental Protection Agency (EPA) on the ***National Priorities List*** of sites to be remediated. For these reasons, all cleanup projects at BNL comply with CERCLA under the dual oversight of EPA and NYSDEC, through an Interagency Agreement.

The community has played and continues to play an important role in selecting cleanup alternatives for BNL. Because the proposed remedy for the HFBR may be modified or a different alternative may be selected, based on public input, the public is encouraged to comment on all the alternatives. Written comments on the HFBR Proposed Plan will be accepted during a public comment period, beginning Thursday, January 10, 2008 and ending Monday, March 17, 2008. For your convenience in submitting written comments, an addressed comment sheet is included.

Inside This Proposed Plan

PLEASE NOTE: Technical and administrative terms are used throughout this Proposed Remedial Action Plan. When these terms are first used, they are printed in ***bold italics.*** Explanations of these terms, document references, and other notes are provided in the margin.

decommissioning: safe removal of a facility from service and reduction of residual radioactivity to an acceptable level, usually through decontamination and dismantlement of the facility structures, systems and components.

spent fuel: used (or "spent") fuel elements that are still radioactive even after they are no longer useful as fuel.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): the federal law that establishes a program to identify, evaluate, and remediate sites where hazardous substances may have been released, leaked, poured, spilled, or dumped into the environment.

National Priorities List: a formal listing of the sites that have been identified for possible cleanup. Sites are ranked by the EPA based on their potential for affecting human health and the environment.

Feasibility Study (FS): a process for developing, evaluating, and comparing remedial alternatives, using data gathered during site characterization. An FS defines the objectives of the remedial action and analyzes in detail the remedial action alternatives.

Record of Decision (ROD): documents the final remedy selected for the site, and includes a responsiveness summary, which addresses comments received on the Proposed Plan during the public comment period. When the ROD is finalized, remedial design and remedial action begin.

Administrative Record: contains the documents, including technical reports, which form the basis for selection of a final remedy and acts as a vehicle for public participation.

confinement building: a structure designed to house the reactor and associated research equipment, and prevent the release of radioactive material.

radionuclides: atoms that either are naturally unstable or have become unstable. The atom moves to a more stable state ("decays" or "disintegrates") by giving off radiation.

During the public comment period, there will be two information sessions (on March 4, 2008), where interested community members are invited to speak with project staff to learn more about the HFBR alternatives and the proposed remedy. DOE and BNL will also hold a formal public meeting on March 6, 2008 to present the conclusions of the HFBR ***Feasibility Study*** and this Proposed Plan and receive comments on the proposed remedy. For more information regarding the information sessions and public meeting, please see Section IX.

After the public comment period, DOE will select a final remedy for the HFBR, with the approval of EPA and the concurrence of NYSDEC. (Note: The HFBR project is tracked as OU 9 by NYSDEC). The decision will be formalized in a document called the ***Record of Decision*** (ROD). The ROD will contain a Responsiveness Summary, which will summarize all public comments and provide the responses to them. These documents will be available for public review at the ***Administrative Record*** repository locations, listed in Section X.

II. BACKGROUND

Established in 1947, BNL is now operated and managed for DOE's Office of Science by Brookhaven Science Associates, a limited-liability company founded by the Research Foundation of the State of New York, and Battelle, a nonprofit, applied science and technology organization. One of the 10 DOE national laboratories, BNL conducts research in the physical, biomedical, and environmental sciences, as well as in energy technologies and national security. The Laboratory also builds and operates major scientific facilities available to university, industry, and government researchers. For more information about BNL, go to www.bnl.gov.

The Laboratory is located in the Town of Brookhaven in Suffolk County on Long Island, approximately 60 miles east of New York City (Figure 1). Approximately 1.4 million people reside in Suffolk County, and slightly more than 450,000 reside in the Town of Brookhaven. The BNL site occupies about 5,300 mostly-wooded acres in Suffolk County. Many of the Laboratory's facilities are near the center of the site, in a developed portion that covers about 1,700 acres. The HFBR is in this central portion of the BNL property. The reactor complex covers about 13 acres, which is less than one-hundredth of BNL's total area.

The HFBR complex consists of a domed reactor ***confinement building*** (Figure 2), several smaller ancillary buildings, and the distinctive red-and-white striped stack. These structures are visible in the cover photo and are shaded on the map in Figure 3. Portions of the confinement building structures, systems and components are contaminated with ***radionuclides*** and also contain nonradioactive hazardous materials. There are also some underground piping systems that are contaminated with radionuclides.

Figure 1. Map of Long Island showing BNL Suffolk County, New York

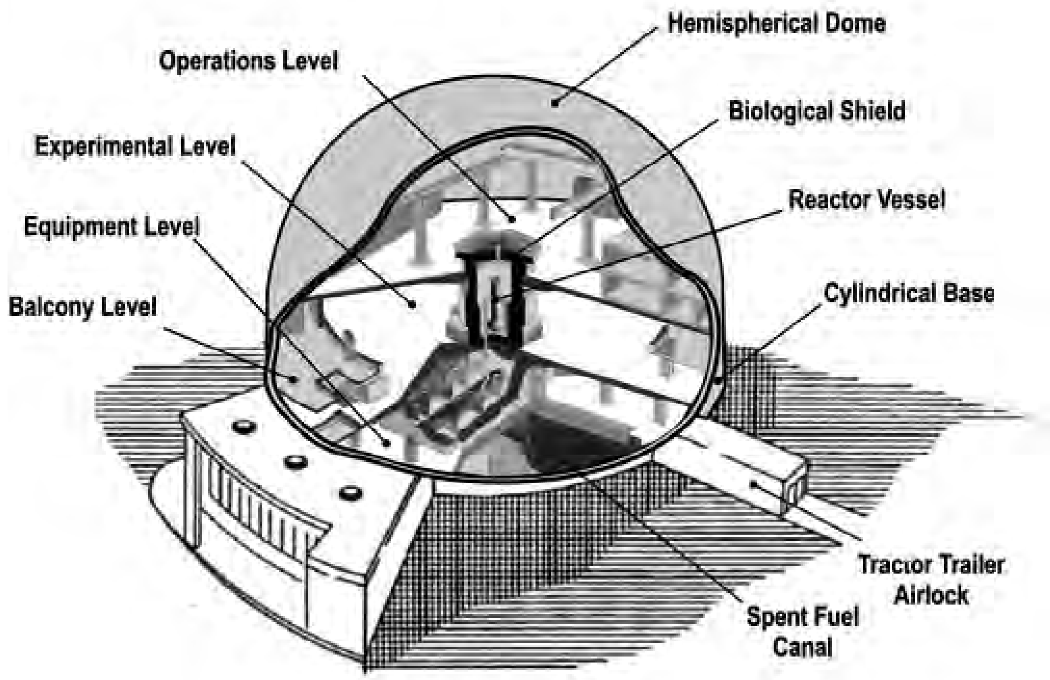

Figure 2. HFBR Confinement Building (Building 750)

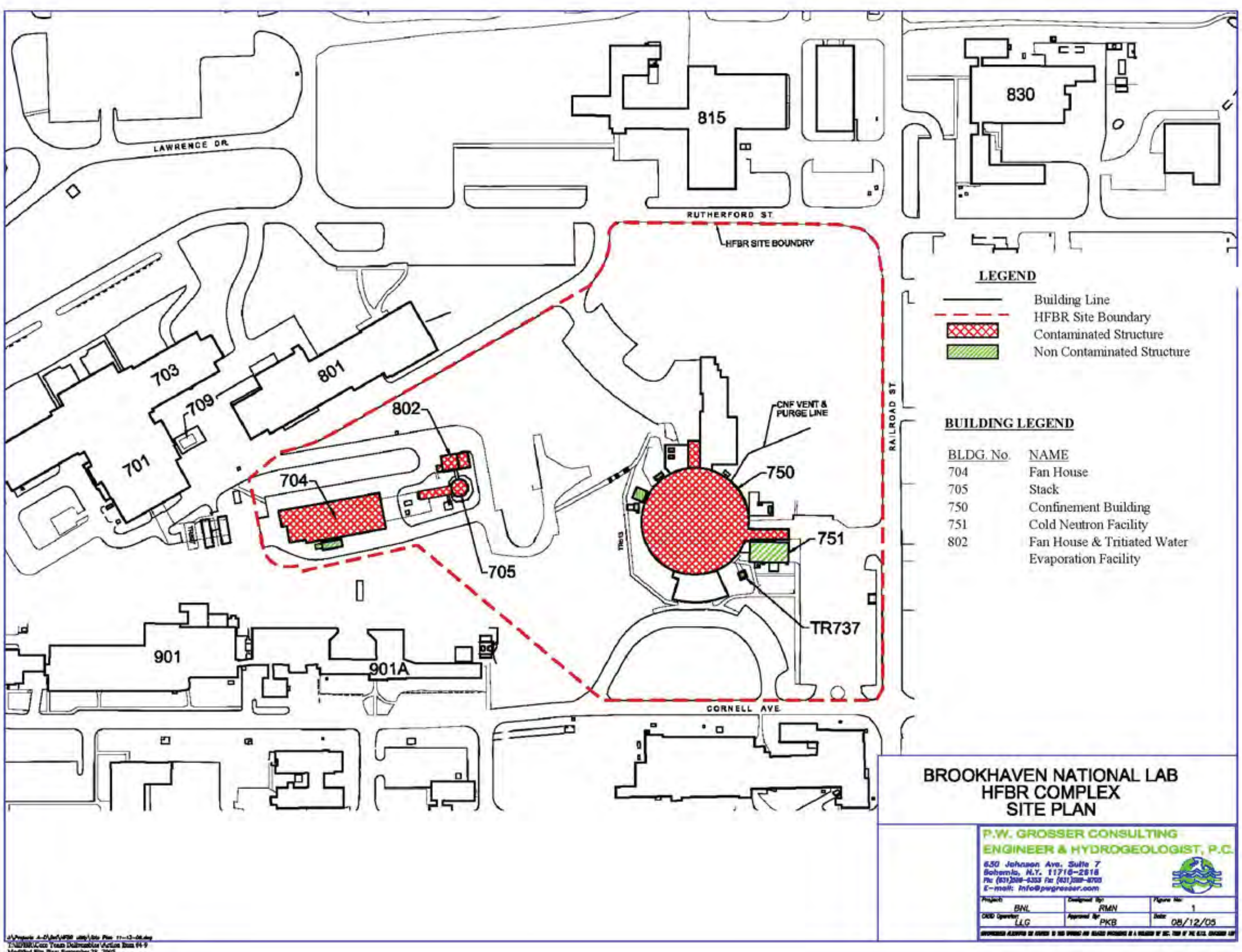

Figure 3. HFBR Complex

III. SITE CHARACTERISTICS

Due to past operations, the HFBR complex contains approximately 65,000 ***curies*** (Ci) of ***radioactive*** material (as of January 1, 2007), primarily nuclear ***activation products*** such as iron-55 (Fe-55), cobalt-60 (Co-60), nickel-63 (Ni-63), europium-154 (Eu-154), and europium-155 (Eu-155). Most (more than 99 percent) of this radioactive material is in the form of activation products, contained within the metal and concrete of the activated components (reactor internals, control rod blades, reactor vessel, thermal shield biological shield and beam plugs) (Figures 4, 5 and 6). The radiation dose rates associated with these activated components are very high. For example, the calculated radiation dose rate at a distance of one foot from the reactor internals is more than 35,000 rem per hour. At a distance of one foot, the dose rate is as high as 13,000 rem per hour from a single control rod blade.

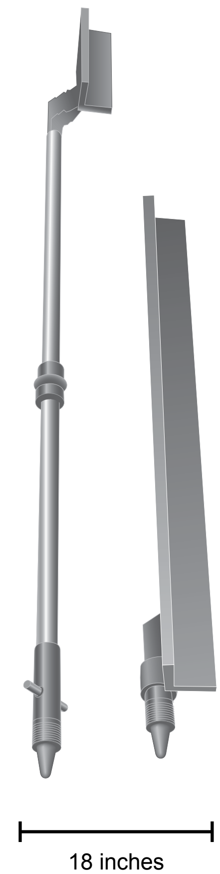

Figure 4. Control Rod Blades

In addition, much smaller amounts of radioactivity, about 45 curies, are also contained inside the HFBR confinement building. Almost all of this radioactive material is contained within closed piping systems and components, and consists primarily of ***tritium***, Co-60, and Fe-55. Most of the areas inside the confinement building are essentially free of contamination. Smaller amounts of radioactivity, totaling less than 1 curie, are in ancillary buildings/facilities such as the stack and the fan house, which also served the Brookhaven Graphite Research Reactor (BGRR) during its operating life. The contamination in these shared facilities consists mostly of cesium-137 (Cs-137), strontium-90 (Sr-90), and tritium.

The soil surrounding the HFBR is generally free of contamination. Tritium contamination is detected in soil directly below the confinement building, and there are indications of tritium in groundwater downgradient of the HFBR. The groundwater is now being monitored under the ***Operable Unit*** (OU) III Record of Decision. Limited areas of soil contamination are in the basement of and

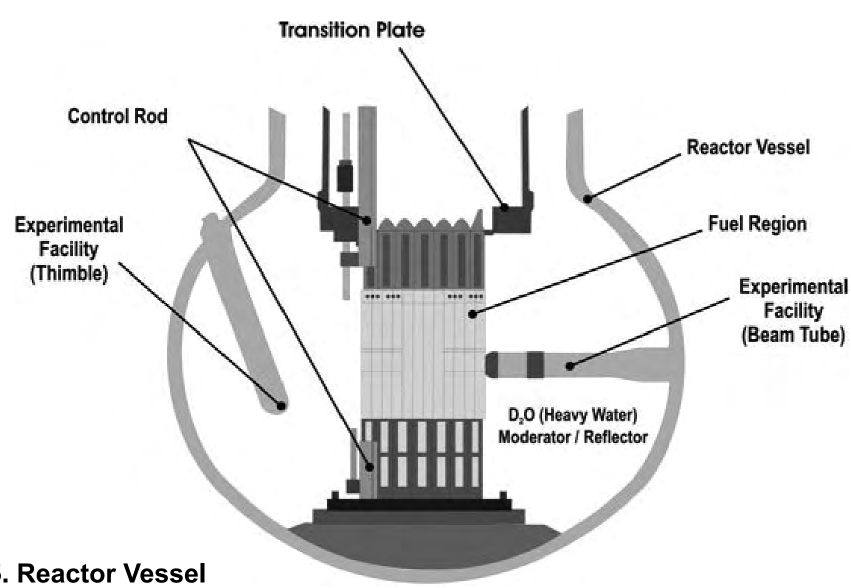

Figure 5. Reactor Vessel

curie: named for the radiation pioneers Pierre and Marie Curie, this is a unit of measure for materials based on the number of nuclear disintegrations per second. One curie (Ci) = 37 billion disintegrations per second. One thousandth of a curie is a millicurie.

radioactive: describes a material with an unstable nucleus that decays by emitting ionizing radiation, usually in the form of alpha particles, beta particles, or gamma rays. The resultant material may or may not be radioactive also. The time required for half the nuclei of a radioactive sample to decay is called the half-life period. The shorter the half-life period, the sooner the material will lose most of its instability. Half-life periods for the dominant ***radioisotopes*** associated with the HFBR are as follows:

radioisotope	half-life, years	radioisotope	half-life, years
cesium-137 (Cs-137)	30.2	iron-55 (Fe-55)	2.7
cobalt-60 (Co-60)	5.3	nickel-63 (Ni-63)	100
europium-154 (Eu-154)	8.8	strontium-90 (Sr-90)	28.1
europium-155 (Eu-155)	5	tritium (H-3)	12.3

Source: Half-life periods from the DOE Office of Environmental Management Web site

activation products: materials whose nuclei have become unstable through exposure to neutrons. They have a different number of neutrons than the common form of the material, and they are radioactive because the balance between the protons and neutrons is unstable and will lead to the emission of radiation.

radioisotope: an unstable "isotope" (a variant of an element that has a different number of neutrons than usual). The number in the suffix indicates the mass of that element and the total number of particles in the nucleus.

tritium: a radioisotope of hydrogen (H) with one proton and two neutrons. The standard chemical abbreviation is therefore H-3.

downgradient: "downstream" in terms of groundwater flow.

Operable Units (OUs): within a site, groups of areas containing the same or similar contamination. The areas within one OU are not necessarily adjacent. Six OUs have been designated at BNL. The plans for remediating an OU are developed in accordance with an Interagency Agreement (IAG) among EPA, NYSDEC, and DOE (in the case of BNL), and are detailed in a Record of Decision (ROD).

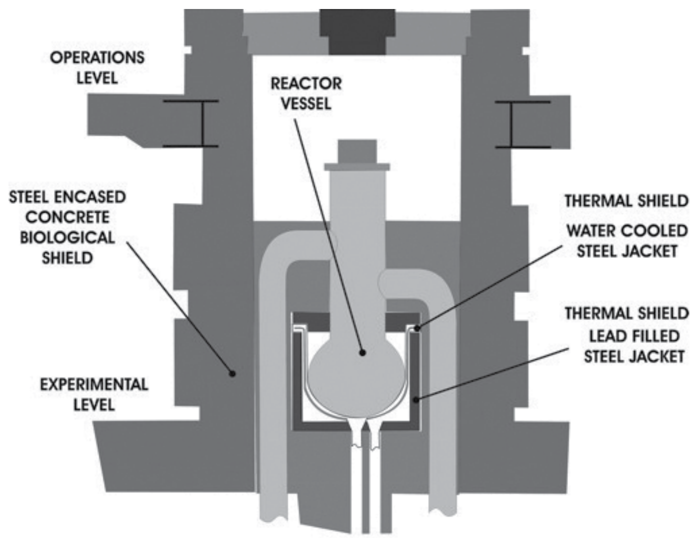

Figure 6. Reactor Vessel, Thermal Shield, and Biological Shield

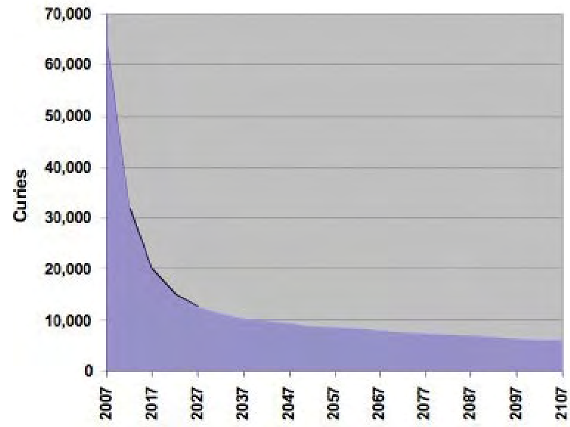

Figure 7. HFBR Radiological Inventory

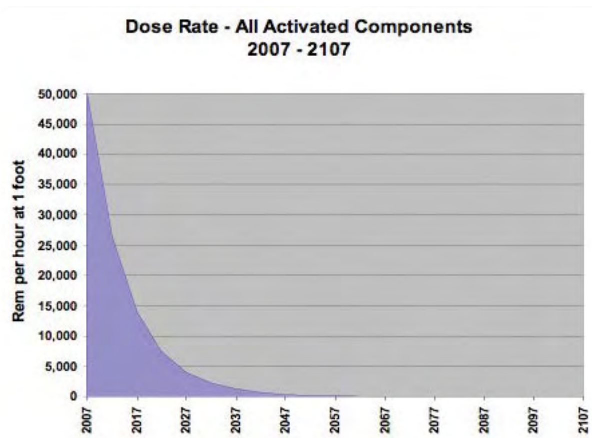

Figure 8. HFBR Dose Rate Reduction (2007-2107)

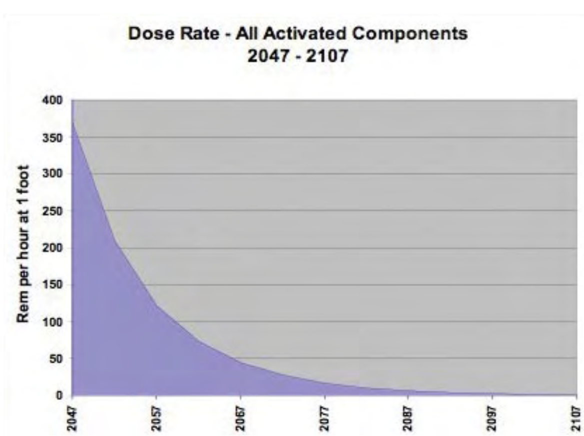

Figure 9. HFBR Dose Rate Reduction (2047-2107)

near the fan house and the stack, and in small areas around the HFBR confinement building. This localized contamination consists of tritium, Cs-137, Sr-90, and Co-60.

Short-lived radionuclides (with half-lives below 10 years) dominate the radiological inventory at the HFBR complex. There is a significant and relatively rapid reduction in the radiological inventory as a result of natural radioactive decay, even if no remedial actions are taken (Figure 7). There is also a corresponding reduction in the high present-day radiation dose rates associated with the activated components (Figures 8 and 9).

A summary of the quantities of radioactive material in the activated components, contaminated structures, components and underground ducts/pipelines, and contaminated soils (based on activation analyses, characterization and other investigations) is presented in Table 1.

In addition to radioactive contamination, there are also non-radioactive hazardous materials in the HFBR complex. Certain chemicals and hazardous materials were used during the construction and operation of the HFBR. They include PCBs, asbestos and lead in materials of construction, organic solvents for degreasing equipment, and elemental mercury in certain instruments used in facility operations. Non-radioactive hazardous materials found in the HFBR complex include the following:

- Asbestos-containing material (ACM) intrinsic to older floor and ceiling tiles, in gaskets, pipe and wiring insulation, switchgear spark arrestors, and roofing materials
- PCBs intrinsic to original paint, and hydraulic fluids
- Lead intrinsic to paint, lead blocks and dust, shielding, and batteries
- Other heavy metals of concern including zinc that was frequently detected, and cadmium and beryllium that were found sporadically
- Sampling for mercury revealed negative results but mercury is intrinsic to capacitors, light ballasts, gearboxes, and in motor-operated valve lubricating oils

Table 1. Location of HFBR Radiological Inventory (as of January 2007)

Component	Description	Radioactivity (curies)
Activated Components		
Reactor Vessel	Aluminum reactor vessel, which contains the reactor internals and control rod blades.	380
Reactor Internals	Several small components within the reactor vessel were constructed of aluminum and/or stainless steel.	16,387
Control Rod Blades	Control rod blades (CRB) are located inside the reactor vessel. They are constructed of stainless steel and contain europium oxide, and dysprosium oxide.	21,900
Thermal Shield	The thermal shield surrounds the lower reactor vessel and is inside the biological shield. It is made of carbon steel and lead.	24,876
Biological Shield	The biological shield is constructed of special high density concrete. The shield is 8 ft thick and shields personnel in the HFBR confinement building from the radiation from activated components. The inner portions of the biological shield contain most of the radioactivity.	125
Beam Plugs	Cylindrical steel plugs that provided shielding from the activated components. They are stored inside special shielded containers in the confinement building.	847
Contaminated Structures, Components and Underground Ducts/Pipelines		
HFBR Systems and Components	The primary coolant system and connecting piping systems contain most of the remaining activity; the major radionuclides are tritium, Co-60, Fe-55, and Ni-63.	45
Structures inside the HFBR Confinement Building	The structures and components inside the confinement building include those on the operations level, experimental level, and equipment level. The floors and walls are generally not contaminated, and there are few radiation areas. The radiologically controlled areas are posted with signs and there is limited access.	Tritium: <0.1 Other: <0.01
Stack (Building 705)	The stack served both the HFBR and the BGRR. There is contamination on the inner surface of the stack. Most of the radioactivity is Cs-137 and Sr-90 from the BGRR.	0.03
Fan House (Building 704)	The fan house has been in use supporting both the HFBR and BGRR. Portions of the fan house are contaminated with Cs-137, Sr-90, and tritium, including sections of a concrete below-grade duct and the soil in the basement. Most radioactivity is related to BGRR operations.	0.10
Fan House (Building 802)/ Tritium Evaporation Facility	The Building 802 fan house directs air discharges from several facilities to the stack. The tritium evaporation facility is no longer in service. Surveys show low levels of contamination.	< 0.01
Stack underground ventilation ducts and lines	The ducts from Building 750, Building 801 and Building 802 are contaminated. Short sections of the ducts from Building 901 and Building 701 are also contaminated where they are connected to the stack or to other interconnecting ductwork.	<0.1
D/F waste line	This double-walled underground pipeline that runs between Building 750 and Building 801 is contaminated with Co-60 and tritium.	<0.1
Sanitary sewage line from the HFBR	The sanitary sewage line is contaminated with tritium, C0-60, Ni-63 and Cs-137.	<0.1
Contaminated Soils		
Soils under Building 704 - fan house	Soil contamination in the soil floor of the basement containing up to 33 pCi/g Sr-90, and 217 pCi/g Cs-137. The detection of these radionuclides indicates the source to be the BGRR.	<0.1
Soils around Building 705 - stack	Cs-137 concentrations slightly above background levels (the highest sample was 6.4 pCi/g).	<0.01
Soils under Building 750	Soil concentrations up to 47 pCi/g tritium, and up to 7,130 pCi/liter tritium (equivalent to about 7.1 pCi/g) in the groundwater.	<1.0
Soils around the HFBR complex	Twenty-one isolated areas of contamination were initially identified during site characterization. Because of their limited size, many of these areas were actually cleaned up during characterization. Remaining soil contamination areas are posted in accordance with BNL procedures.	<0.01

- Solvents, degreasers, lubricants, oils and petrochemicals intrinsic to equipment such as motors and compressors
- Sodium Hydroxide (NaOH) and Sulfuric Acid (H_2SO_4) were used for water treatment
- Lithium arsenite used in the confinement building air conditioning system
- Suspected trace amounts of cadmium nitrate and gadolinium nitrate on the operations level due to spills

IV. BASIS FOR REMEDIAL ACTION

As shown in Section III, the HFBR complex contains a large quantity of radioactive materials, including the activated components. There are also non-radiological hazardous materials of construction that were originally used to build the HFBR complex.

There is no immediate threat to human health and the environment associated with these radiological and non-radiological materials. Several physical barriers and administrative requirements control personnel exposure to these materials. These barriers also prevent the spread of contamination to the environment. Surveillance and maintenance (S&M) of the HFBR complex ensures the effectiveness of these physical barriers, and land use and institutional controls (LUICs) restrict access and control personnel exposure to the remaining radiological and non-radiological hazards in the HFBR complex.

Although the quantity of radioactive material and radiation levels will be reduced over time as a result of natural radioactive decay, the radiological and non-radiological hazards would remain as a potential threat to human health and the environment for an indefinite period of time. This potential threat warrants remedial action in order to provide long-term and future protection of human health and the environment from:

- Activated components in the confinement building, and radioactive and hazardous materials in other structures, systems, and components in the HFBR complex that could result in unacceptable human or environmental exposure
- Non-fixed (removable or loose) radiological contamination or hazardous materials in the HFBR complex that could result in unacceptable release of contamination to the environment
- Contaminated soils around the HFBR complex that could result in unacceptable human or environmental exposure
- Contamination in soils that could impact groundwater at unacceptable levels

V. REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) of the HFBR decommissioning project are to control, minimize, or eliminate:

- All routes of future human and/or environmental exposure to radiologically contaminated facilities or materials.
- The potential for future release of non-fixed radiological or chemical contamination to the environment.
- All routes of future human and/or environmental exposure to contaminated soils.
- The future potential for contaminated soils to impact groundwater.

VI. REMEDIAL ACTION ALTERNATIVES

Four HFBR remedial action alternatives have been identified. They are:

- Alternative A: No Additional Action
- Alternative B: Phased Decontamination and Dismantlement (D&D)
- Alternative C: Phased D&D with Near-term Control Rod Blade Removal
- Alternative D: Near-term D&D

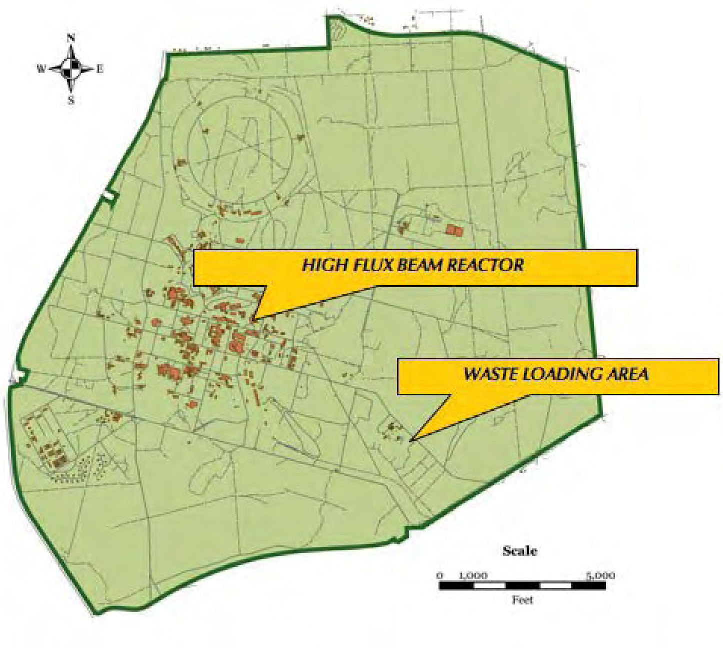

Figure 10. Map of the BNL site, showing the location of the HFBR and Waste Loading Area

The four remedial action alternatives were developed with the involvement of representatives from DOE, EPA, NYSDEC, New York State Department of Health, and Suffolk County Department of Health Services. Comparisons of the four alternatives can be found in Tables 2 and 3, and the preferred alternative is discussed in Section VIII. The public is invited to comment on any or all of the alternatives. Additional detail can be found in the Feasibility Study for the HFBR and other documents in the Administrative Record found in repositories listed on page 20.

As further described below, all four alternatives include the following common elements: remediation of the Waste Loading Area (WLA); actions to remove contaminated materials and equipment from the HFBR that have already been completed; and the use of LUICs.

Waste Loading Area

The WLA is an area along the eastern boundary of the Former Hazardous Waste Management Facility (FHWMF). It was left in place with contaminated soil. The remediation of this area (approximately two acres) was transferred to the HFBR project scope. Cleanup of the WLA using the dose-based cleanup goal and methodology specified for the FHWMF in the Operable Unit I ROD is in progress.

Actions Already Completed

All four remedial alternatives include the actions that have been completed:

- The spent fuel was removed and sent to an off-site facility (1998).
- The primary coolant (heavy water) was removed and sent to an off-site facility (2001).
- Scientific equipment was removed and is being reused or has been sent to an off-site disposal facility (2003).
- Shielding and chemicals were removed and are being reused at BNL and other facilities (2000--2005).
- The cooling tower superstructure was dismantled and disposed of as waste in 1999.
- The confinement structure and spent fuel canal were modified to meet Suffolk County Article 12 requirements (2004).
- Stack monitoring facility (Building 715) was dismantled and removed (2006).
- Cooling tower basin and pump/switchgear house (Buildings 707/707A) were dismantled and removed (2006).
- Water treatment house (Building 707B) was dismantled and removed (2006).
- Cold neutron facility (Building 751) contaminated systems were removed and the clean building has been transferred to another BNL site organization for re-use (2006).
- Guard house (Building 753) was dismantled and removed (2006).

The cost to complete this work totals $25 million.

Land Use and Institutional Controls

LUICs are included as part of each of the four remedial alternatives. LUICs limit future land use and include other administrative controls to ensure that the remedy remains protective of human health and the environment. For example, there would be restrictions on excavation or any other physical activities that could disturb residual contamination at the HFBR complex. Administrative controls included in these LUICs would also restrict future land use of the HFBR complex commensurate with the nature and extent of the residual hazards and risks. A periodic report to NYSDEC would be required, certifying that the institutional and engineering controls put in place were unchanged from the previous certification, and that nothing had occurred to impair their ability to protect public health or the environment. The LUICs implemented at BNL are described in more detail in the HFBR FS and in the Land Use Controls Management Plan (included in the Administrative Record) developed by DOE and reviewed and approved by EPA and NYSDEC. The effectiveness of these LUICs would be evaluated and included in the CERCLA 5-Year Reviews that are to be conducted by DOE and reviewed and concurred by EPA and NYSDEC.

Alternative A: No Additional Action

Alternative A, No Additional Action, is used as a baseline alternative and is required to be considered under CERCLA. The removal of radioactive materials would be limited to those actions already taken. This alternative relies on HFBR surveillance and maintenance (S&M) to maintain the structures that are now in place and serving as physical barriers that control personnel radiation exposure and prevent the spread of contamination to the environment. LUICs would be used to ensure that activities on the site or future land use do not affect the overall effectiveness of this remedy. The current radiological inventory of 65,000 curies would remain in place and any future reductions would be the result of radioactive decay. The following activities would occur under Alternative A:

- Continued implementation of surveillance and maintenance
  - Periodic physical examination of the confinement building and interior structures, including inspection for water infiltration
  - Routine maintenance of the confinement building, and repair of deficiencies found during confinement building inspections to preserve the physical barriers that contain the radioactive materials in the HFBR complex
  - Continuation of air effluent monitoring
  - Groundwater monitoring and response actions would continue in accordance with the OU III ROD
  - Periodic reporting to EPA and NYSDEC
- Continued implementation of land use and institutional controls
  - HFBR access control
  - Restrictions on excavation or any other physical activities that could disturb residual contamination at the HFBR complex
  - Controls to ensure that future land use does not result in potential threats to human health and the environment.
  - Periodic certification to NYSDEC

The long-term effectiveness of this remedy would be evaluated and documented on an annual and 5-year recurring cycle.

Because there is no limit on the required duration of S&M and LUICs, the total cost and occupational dose for this remedy cannot be estimated.

Alternatives B, C, and D: Complete Removal of the HFBR Complex

All three of the remaining alternatives (B, C and D) include the dismantlement and removal of the entire HFBR complex with the possible exception of the subsurface concrete structures of the confinement building base mat and the stack foundation.

The common elements among Alternatives B, C and D are listed below:

- Dismantlement and disposal of ancillary buildings, and confirmation and/or cleanup of associated soils
  - Fan house (Building 704) and stack (Building 705)
  - Fan house (for Building 801) and tritium evaporation facility (Building 802)
- Removal of contaminated ducts and underground piping systems including the confirmation and/or cleanup of associated soils and disposal
- Removal of control rod blades and disposal
- Removal of beam plugs and disposal
- Removal and disposal of other activated components
  - Reactor vessel
  - Reactor internals
  - Thermal shield
  - Biological shield
- Removal and disposal of confinement building (Building 750) including all structures, systems, and components
- Confirmation and/or cleanup of accessible HFBR complex contaminated soils
- Continued implementation of surveillance and maintenance
  - Periodic physical examination of the confinement building and interior structures, including inspection for water infiltration. (Alternatives B and C only)
  - Routine maintenance of the confinement building, and repair of deficiencies found during confinement building inspections in order to preserve the physical barriers that contain the radioactive materials in the HFBR complex. (Alternatives B and C only)
  - Continuation of air effluent monitoring. (Alternatives B and C only)
  - Groundwater monitoring and response actions would continue in accordance with the OU III ROD
  - Periodic reporting to EPA and NYSDEC
- Continued implementation of land use and institutional controls
  - HFBR access control
  - Restrictions on excavation or any other physical activities that could disturb residual contamination at the HFBR complex
  - Controls to ensure that future land use does not result in potential threats to human health and the environment
  - Periodic certification to NYSDEC

The long-term effectiveness of these remedies would be evaluated and documented on an annual and 5-year recurring cycle.

As shown, there are many similarities among Alternatives B, C, and D, and the physical end states for these three alternatives are the same. As explained below and summarized in Table 2, the timing of the dismantlement and removal activities is different for each of these alternatives.

Alternative B: Phased D&D

- Removed by 2020
  - Ancillary buildings and associated soils
  - Ducts, underground piping and associated soils
- Removed after a decay period, not to exceed 65 years following the finalization of the HFBR ROD
  - Control rod blades
  - Beam plugs
  - Other activated components
  - Confinement building
  - HFBR complex contaminated soils

Alternative C: Phased D&D with Near-Term Control Rod Blade Removal

- Removed by 2020
  - Ancillary buildings and associated soils
  - Ducts, underground piping and associated soils
  - Control rod blades
  - Beam plugs
- Removed after a decay period, not to exceed 65 years following the finalization of the HFBR ROD
  - Other activated components
  - Confinement building
  - HFBR complex contaminated soils

Alternative D: Near-Term D&D

- Removed by 2026
  - Ancillary buildings and associated soils
  - Ducts, underground piping and associated soils
  - Control rod blades
  - Beam plugs
  - Other activated components
  - Confinement building
  - HFBR complex contaminated soils

Table 2. End-states and Timeframes

	ALTERNATIVES			
	A	B	C	D
End State	Everything remains as is	Everything removed	Everything removed	Everything removed
Ancillary Buildings and Associated Soils	Everything remains as is	By end of FY 2020	By end of FY 2020	By end of FY 2026
Ducts, Underground Piping, and Associated Soils	Everything remains as is	By end of FY 2020	By end of FY 2020	By end of FY 2026
Control Rod Blades and Beam Plugs	Everything remains as is	After a decay period, not to exceed 65 years	By end of FY 2020	By end of FY 2026
Other Activated Components	Everything remains as is	After a decay period, not to exceed 65 years	After a decay period, not to exceed 65 years	By end of FY 2026
Confinement Building	Everything remains as is	After a decay period, not to exceed 65 years	After a decay period, not to exceed 65 years	By end of FY 2026
HFBR Complex Contaminated Soils	Everything remains as is	After a decay period, not to exceed 65 years	After a decay period, not to exceed 65 years	By end of FY 2026

For activated components involving short-lived radioisotopes (other than control rod blades), decay-in-storage results in the substantial reduction in dismantlement and waste management risks, hazards, project complexity, and cost. This decay period was defined as that period of time by which the dose rate at one foot from the large activated components (reactor vessel, thermal shield, and biological shield) would fall below the 100 mrem/hr High Radiation Area threshold. This would permit the use of conventional demolition techniques allowing workers to come within close proximity to the components. Using the characterization results, each of these components was evaluated to determine when its dose rate at one foot fell below 100 mrem/hr. The limiting component turned out to be the thermal shield for which the dose rate falls below the threshold in about 65 years. Based on the reduction in risks, hazards, complexities and costs that could be expected, the decay period for Alternatives B and C was established as a period not to exceed 65 years following the finalization of the HFBR ROD.

VII. EVALUATION OF ALTERNATIVES

There are nine CERCLA evaluation criteria that must be considered in the selection of a remedial action alternative. These evaluation criteria are summarized in the box on the next page and later discussed with regard to the HFBR.

The nine CERCLA criteria are divided into three groups:

Threshold Criteria: Overall protection of human health and the environment and compliance with ARARs are threshold requirements that the remedial alternative must meet in order to be eligible for selection.

Balancing Criteria: The five primary balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. These are used to compare the tradeoffs among remedial alternatives.

Modifying Criteria: State and community acceptance are modifying criteria that must be considered in remedy selection.

The two modifying criteria, state acceptance and community acceptance, are not included in the evaluation of HFBR alternatives at this time. Instead, comments received during the public comment period will be used to assess the remedial action alternatives under these criteria.

SUMMARY OF CERCLA EVALUATION CRITERIA

Criterion 1
Overall Protection of Human Health and the Environment is the primary objective of the remedial action and addresses whether a remedial action provides adequate overall protection of human health and the environment. This criterion must be met for a remedial alternative to be eligible for consideration.

Criterion 2
Compliance with Applicable or Relevant and Appropriate Requirements addresses whether a remedial action will meet all the applicable or relevant and appropriate requirements, and other federal and state environmental statutes, or provides grounds for invoking a waiver of the requirements. This criterion must be met for a remedial alternative to be eligible for consideration.

Criterion 3
Long-Term Effectiveness and Permanence refers to the magnitude of the residual risk and the ability of a remedial action to maintain long-term, reliable protection of human health and the environment after remedial goals have been met.

Criterion 4
Reduction of Toxicity, Mobility, or Volume through Treatment refers to an evaluation of the anticipated performance of the treatment technologies that may be employed in the remedy. Reduction of toxicity, mobility, and/or volume contributes to overall protectiveness.

Criterion 5
Short-Term Effectiveness refers to the evaluation of the speed with which the remedy achieves protection. It also refers to any potential adverse effects on human health and the environment during the implementation of the remedial action.

Criterion 6
Implementability refers to the technical and administrative feasibility of a remedial action, including the availability of the materials and services needed to implement the selected solution.

Criterion 7
Cost refers to an evaluation of the capital, operation and maintenance, and monitoring costs for each alternative.

Criterion 8
State Acceptance indicates whether New York State concurs with the analyses and preferred alternative, as described in the Feasibility Study and the Proposed Plan.

Criterion 9
Community Acceptance assesses the response of the general public to the analyses and preferred alternative, as described in the Proposed Plan. Comments received during the public comment period, and at the information sessions and public meeting are an important indicator of community acceptance. The remedial action can be selected only after consideration of public comments.

Table 3. Comparison of the Remedial Alternatives.

Consideration		Alternative A	Alternative B	Alternative C	Alternative D
Total radiological inventory–2007		65,000 curies	65,000 curies	65,000 curies	65,000 curies
Total radiological inventory reduction		57,000 curies*	65,000 curies	65,000 curies	65,000 curies
Criterion 1: Overall protection of human health and the environment		Medium	High	High	High
Criterion 2: Compliance with applicable or relevant and appropriate requirements		Low**	High	High	High
Criterion 3: Long-term effectiveness and permanence		Medium	High	High	High
Criterion 4: Reduction of toxicity, mobility, or volume through treatment		NA	NA	NA	NA
Criterion 5: Short-term effectiveness		High	High	High	Low
Criterion 6: Implementability		High	High	High	Low
Criterion 7:	Total estimated cost	Indeterminate	$142 M	$144 M	$205 M
	Cost of work completed	$25 M	$25 M	$25 M	$25 M
	Additional capital cost estimate***	$1 M	$110 M	$112 M	$176 M
	S&M, and LUIC cost estimate	Indeterminate	$7 M	$7 M	$4 M
Occupational Dose		Indeterminate	3 Person-rem	4 Person-rem	20 Person-rem

* Including reductions from natural radioactive decay over a period of 68 years

** Implementation of this alternative involves the indefinite storage of radioactive material and would be in conflict with New York State regulations regarding the siting of LLRW disposal facilities.

*** Includes Waste Loading Area cleanup cost of $1 M

**** Alternatives are rated High, Medium or Low against CERCLA criteria based on evaluation that follows

Criterion 1: Overall Protection of Human Health and the Environment

As shown in Section III, most (more than 99 percent) of the HFBR radioactive material is in the form of activated concrete and steel components. In their existing locations and configuration, there are several physical barriers that are inherently effective in preventing human exposure to the radiation associated with these components or the potential spread of radioactive material to the environment:

- The radioactive material is actually a part of the activated concrete and steel components. In this form, the radioactive material is immobile because it is bound up within these components as an intrinsic part of their materials of construction. In this form, the radioactive material is inherently non-dispersible.
- The reactor internals and control rod blades, the HFBR components with the highest radiation dose rates, are encased in the 2-inch thick HFBR reactor vessel.
- The 8-foot thick heavily steel reinforced concrete biological shield surrounds the reactor vessel and thermal shield.
- All of these components are physically located above grade within the steel and concrete HFBR confinement building.

In their non-dispersible and stable state, and with these multiple barriers in place, these components do not pose a threat to human health or the environment. S&M and LUICs are required to ensure the continued effectiveness of these barriers.

Alternative A would leave the HFBR complex in its present physical state. Because of the stability of the radioactive materials and the protective barriers, this remedy is currently protective of human health and the environment. However, the remaining activated components constitute a radiation hazard that would have to be managed for an indefinite period of time. In the absence of a plan to eventually remove these components, S&M and LUICs would likewise need to be maintained for this same indefinite period of time in order to ensure that this remedy remains protective. Although S&M can be provided and LUICs maintained for a finite duration, uncertainties arise as to whether these same protective measures can be effectively maintained for an indefinitely long period of time. Such uncertainties relate to the durability of institutions to implement the S&M program and enforce the LUICs. Alternative A is unique among the four alternatives in this respect, and because of this weakness, it is rated as MEDIUM under this criterion.

Alternatives B, C, and D all provide for the complete removal of all of the HFBR radioactive structures, systems, and components. In all cases, S&M and LUICs will be required for finite but different durations:

- Alternative B involves the ***safe storage*** of the confinement building and the activated components for a decay period, not to exceed 65 years following the finalization of the HFBR ROD. Following safe storage, these remaining structures and components would be removed over a 3-year period. S&M and LUICs would be required through this 68-year period. The cleanup after the dismantlement of the confinement building would satisfy the dose-based cleanup goal of 15 mrem per year based on the methodology specified in the OU I ROD. There will be no need for any additional period of LUICs.
- Alternative C includes the near-term removal of the control rod blades and beam plugs by the end of 2020. However, this interim action would not have any effect on the safe storage duration required for the other activated components. Therefore, S&M and LUICs are also required for the same durations as Alternative B.
- Alternative D results in the dismantlement and removal of the HFBR complex by the end of 2026. S&M would be required through this eight year period, and LUICs may be required for an additional 50 years because of the small residual soil contamination allowable under the dose-based cleanup goal of 15 mrem per year (for residential use) and methodology specified in the OU I ROD.

safe storage: placing the facility in a safe, stable condition and maintaining it in that state until it is subsequently decontaminated and dismantled.

As shown, a finite period of S&M and LUICs is required for all three of these alternatives. The difference in these periods (58 years for Alternative D, and 68 years for Alternatives B and C) is inconsequential to the overall protectiveness of the three remedies because of the inherent physical stability of the activated components. The continuation of the HFBR S&M program and LUICs that are already in place for other remedies at BNL would ensure the protectiveness of these remedies during this interim period of time.

All three of these remedies include the complete removal of the HFBR complex. Therefore, from a long-term perspective, all three remedies are protective of human health and the environment. Based on the foregoing, Alternatives B, C, and D were all rated as HIGH for protection of human health and the environment.

Criterion 2: Compliance with Applicable or Relevant and Appropriate Requirements

Alternative A involves the storage of radioactive materials for an indefinite period of time, which would be in conflict with New York State regulations regarding the siting of low level radioactive waste disposal facilities. Aside from this, all four alternatives comply with applicable or relevant and appropriate requirements. Therefore, Alternative A is rated as LOW and Alternatives B, C, and D are rated HIGH for compliance with applicable or relevant and appropriate requirements.

Criterion 3: Long-Term Effectiveness

Alternative A would leave the HFBR complex in its present physical state. Because of the stability of the radioactive materials and the protective barriers, this remedy is currently protective of human health and the environment. However, the remaining activated components constitute a radiation hazard that would have to be managed for an indefinite period of time. In the absence of a plan to eventually remove these components, S&M and LUICs would likewise need to be maintained for this same indefinite period of time in order to ensure that this remedy remains protective. Although S&M can be provided and LUICs can be maintained for a finite duration, uncertainties arise as to whether these same protective measures can be effectively maintained for an indefinitely long period of time. Such uncertainties relate to the durability of institutions to implement the S&M program and enforce the LUICs. Alternative A is unique among the four alternatives in this respect, and because of this weakness, it is rated as MEDIUM for long-term effectiveness.

Alternatives B, C, and D all provide for the complete removal of all of the HFBR radioactive structures, systems and components. Based on the foregoing, Alternatives B, C and D are all rated as HIGH in terms of long-term effectiveness.

Criterion 4: Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives considered include treatment to reduce the toxicity, mobility, or volume of contaminants. Therefore, this criterion is not applicable to the analysis of alternatives.

Criterion 5: Short-Term Effectiveness

Alternative A, involving no further action other than control and monitoring, poses few uncertainties and implementation risks and is rated HIGH under this criterion. This remedy is limited to the continued use of S&M and LUICs. As described under Criterion 1, above, more than 99 percent of the remaining radiological inventory is in a physically safe and stable form. With no physical dismantlement activity, this remedial alternative would not involve disturbing these highly radioactive activated components or any significant implementation risks. Therefore, Alternative A is rated as HIGH in terms of short-term effectiveness.

Under Alternative B, all of the activated components with high dose rates would be removed only after they were allowed to decay to levels that would essentially eliminate their present day radiological risks and hazards during remediation. These components would be maintained in their inherently stable form as the radiation levels are reduced through their radioactive decay. As in the case of Alternative A, this alternative would not involve implementation risks and hazards associated with segmenting, handling, packaging and transporting the activated components with high dose rates because the radiation dose rates will have decayed to safe and manageable levels by the end of the safe storage period. The remaining project risks and hazards would be limited to those of a non-radiological nature that are germane to any large construction (i.e. demolition) project. Because Alternative B does not involve significant implementation risks, it was also rated as HIGH in terms of short-term effectiveness.

Under Alternative C all of the dismantlement activities to remove and dispose of the activated structures, components and the confinement building would involve standard and field proven nuclear reactor decommissioning and demolition techniques. The near-term CRB removal would involve underwater handling and packaging and would utilize available tools, equipment and work processes. Since Alternative C does not involve significant radiological and transportation risks and hazards, it was also rated as HIGH in terms of short-term effectiveness.

In contrast to Alternatives A, B and C, Alternative D involves the near-term segmentation, handling, packaging, transportation and disposal of activated components with high dose rates. From a worker and transportation risk standpoint, this represents a significant difference from Alternatives A, B, and C. Alternative D would require more than 30 individual cask shipments of radioactive waste resulting from activated component removal. The segmentation of these components would generate significant quantities of dispersible cutting fines with high dose rates. In a dispersible form, these secondary wastes pose additional personnel radiation exposure risks, and the potential risk of cross-contaminating the confinement building that is essentially free of contamination at this time. In summary, Alternative D involves considerable radiological and transportation risks and hazards in comparison with the other alternatives. Because of these radiological and transportation risks and hazards, the short-term effectiveness of Alternative D is rated as LOW in terms of short-term effectiveness.

Criterion 6: Implementability

Remaining Alternative A activities include the continuation of S&M and LUICs. These protective measures involve field-proven work practices, engineered safeguards and administrative controls. There are no implementability issues or concerns, and Alternative A is therefore rated as HIGH under this criterion.

Under Alternative B, the HFBR confinement building and activated components would be removed only after the high radiation dose rates have declined to manageable levels during the safe storage period. The radiological risks and hazards under Alternative B would be reduced, and simple, field-proven demolition methods would be employed to complete the physical dismantlement of the HFBR complex. Therefore, Alternative B is also rated as HIGH in terms of implementability.

Alternative C is comparable to Alternative B. Under Alternative C, the CRBs and beam plugs would be removed near-term using the available tools, equipment and work processes. CRB removal would be completed in one or two shipments. The remaining large activated components would be removed after the high radiation dose rates have declined to manageable levels. As with Alternative B, simple field-proven demolition methods would be all that is required to complete the physical dismantlement of the remaining structures, systems and components. Because implementation of this alternative is comparable to that for Alternatives A and B, Alternative C is rated as HIGH under this criterion.

Alternative D includes the near-term decontamination, dismantlement, and disposal of the entire HFBR complex including all structures, systems, and components. Unlike Alternatives A, B and C dismantling and disposing of the activated reactor components while they are still highly radioactive would involve significant implementation issues and challenges as summarized below:

- Workers cutting apart the large activated components (reactor vessel, thermal shield and biological shield) would not be able to come near them. In fact, at these dose rates, the work would need to be performed remotely and underwater. The water would serve both as a radiation shield and as a way to minimize the dispersion of radioactive material. Water containment structures would have to be designed and built around the existing contaminated structures and components. Special tools, processes, and equipment would need to be designed, fabricated, and tested. Workers would have to be trained and qualified to perform these activities. Controls would have to be established to monitor and limit the amount of contamination in the water so it would continue to function as a radiation shield. A system to control water contamination levels and clarity would also be needed. Although there is industry experience with this kind of work, each project is highly dependent on the specific site conditions.
- The underwater segmentation of activated components would generate significant quantities of dispersible fine particles with high dose rates as well as contaminated water requiring processing, transportation and disposal. It is estimated that these segmentation activities would generate 100,000 gallons of contaminated water requiring processing and disposal as low-level radioactive waste (LLRW).

- The high dose rates would require the use of special (Type B) shipping casks for waste transportation to a disposal site. The capacity of these casks is limited. Therefore, the large activated components would need to be cut into small pieces. This would require the use of remotely operated tools and equipment and increase the amount of underwater material handling, further complicating the underwater work. More than 30 shipments of radioactive waste would be required.

Alternative D implementation challenges and issues represent a significant increase from those described under Alternatives A, B and C. Therefore, the implementability of Alternative D is rated as LOW in terms of implementability.

Criterion 7: Cost

The total estimated costs, including capital, S&M, and LUICs across the project life cycle are:

Alternative A	Indeterminate
Alternative B	$142 million
Alternative C	$144 million
Alternative D	$205 million

VIII. PREFERRED ALTERNATIVE

There are advantages and disadvantages to each of the remedial alternatives. After evaluating the alternatives against the CERCLA criteria, Alternative C, Phased Decontamination and Dismantlement with Near-term Control Rod Blade Removal, is proposed as the preferred alternative to achieve the remedial action objectives described in this Proposed Plan.

This alternative and Alternative B, Phased Decontamination and Dismantlement, are the only alternatives to be rated high in terms of all five CERCLA criteria for which relative ratings were established: overall protection of human health and the environment, compliance with applicable or relevant and appropriate requirements, long-term effectiveness, short-term effectiveness, and implementability. Both alternatives include the near-term (by 2020) removal of the ancillary structures, contaminated underground ducts and piping, and associated soils; the complete removal of the HFBR complex (with the possible exception of the subsurface concrete structures of the confinement building base mat and stack foundation) after a decay period not to exceed 65 years; and the continuation of S&M and the use of LUICs during the decay period to ensure the protection of human health and the environment.

Alternative C also includes near-term removal of control rod blades and beam plugs (containing 35 percent of the current HFBR radioactive material inventory) at an incremental cost of $2 million. Therefore, Alternative C was chosen as the preferred alternative.

IX. COMMUNITY PARTICIPATION: PUBLIC MEETINGS AND COMMENT

To ensure that community expectations are considered in selecting the remedy for the HFBR, DOE encourages the public to submit its comments on the Proposed Plan during the formal public comment period, which runs from Thursday, January 10, 2008, through Monday, March 17, 2008.

If you wish to learn more about the Proposed Plan, to meet the project staff and ask questions, or to submit your written input on the plan in person, please join us at one of the following gatherings. At the public meeting, the conclusions of the HFBR Feasibility Study and the Proposed Plan will be presented.

Information Sessions

Tuesday, March 4, 2008, noon - 2 PM
Brookhaven National Laboratory
Berkner Hall, Room D

Tuesday, March 4, 2008, 7 - 9 PM
Brookhaven National Laboratory
Berkner Hall, Room B

Public Meeting

Thursday, March 6, 2008, 7–9 PM
Large Conference Room
Medical Department, Building 490
Brookhaven National Laboratory

To submit your written comments before the end of the formal public comment period on Monday, March 17, 2008, please do one of the following:

e-mail: tellDOE@bnl.gov

fax: (631) 344-3444

mail: Mr. Michael Holland
U.S. Department of Energy - Brookhaven Site Office
Attn: HFBR Decommissioning Project
P.O. Box 5000
Upton NY 11973

For your convenience in mailing your comments, an addressed comment sheet is included in this document.

X. ADMINISTRATIVE RECORD REPOSITORY LOCATIONS

The High Flux Beam Reactor Characterization Reports, Feasibility Study, and all Administrative Record documents can be found at the following locations:

U.S. EPA Region II	**Brookhaven National Laboratory**	**Mastic - Moriches - Shirley Community Library**
Records Room 290 Broadway, 18th floor New York, NY 10007-1866 (212) 637-4308	Research Library, Bldg. 477 Upton, NY 11973 (631) 344-3483 or (631) 344-3489	407 William Floyd Parkway Shirley, NY 11967 631-399-1511
For access to the records at BNL, please call 48 hours in advance.		

XI. REFERENCES

WMG, 2007a, Final Characterization for Brookhaven National Laboratory High Flux Beam Reactor, WMG Report 6117-RE-072, prepared by WMG Inc. February 2007.

DAQ, 2007, Calculation of HFBR Activated Components Activity and Dose Rates, prepared by DAQ, Inc. February 2007

WMG, 2007b, HFBR CRB and Beam Plug Removal, Handling, Packaging, and Disposal Concepts Study, WMG Report 7002-RE-073, prepared by WMG, Inc. January 2007

PW Grosser 2005a, High Flux Beam Reactor & Balance of Plant Supplemental Characterization Summary, prepared by PW Grosser Consulting June 2005

DAQ, 2007, Brookhaven National Laboratory High Flux Beam Reactor Characterization Summary Report, Rev. 1, prepared by DAQ, Inc. February 2007

BNL, 2001, Brookhaven National Laboratory High Flux Beam Reactor Final Characterization Report, prepared by Brookhaven Science Associates for U.S. Department of Energy, Brookhaven Area Office, Upton New York, September 2001

PW Grosser, 2005b, High Flux Beam Reactor and Balance of Plant Structures Preliminary Assessment/Site Inspection Report, prepared by PW Grosser Consulting January 2005

PW Grosser, 2005c, Brookhaven National Laboratory Building 705 Stack Resolution of End-State, prepared by PW Grosser Consulting February 2005

DAQ, Inc., 2005, High Flux Beam Reactor: Building 751. Portable Structure 549, Interconnecting Ducts, Selected Components, & Soils Sampling and Analysis Report, prepared by DAQ, Inc., December 2005

BNL, 2007a, Land Use Controls Management Plan, Revision 3, prepared by Brookhaven Science Associates for the U.S. Department of Energy, July 2007

DOE, 2005, Letter from R. Rimando (DOE) to J. Lister (NYSDEC) and D. Pocze (EPA), Subject: Remedial Design Implementation Plan (RDIP), Operable Unit I, Area of Concern 1, Former Hazardous Waste Management Facility (FHWMF), September 30, 2005

BNL, 2006, Evaluation of HFBR Surveillance and Maintenance Alternative, prepared by Brookhaven Science Associates for the U. S. Department of Energy, Brookhaven Site Office, Upton, New York, April 2006

BNL, 2007b, Feasibility Study, Brookhaven High Flux Beam Reactor, Decommissioning Project, prepared by Brookhaven Science Associates for the U.S. Department of Energy, September 2007

BNL, 2007c, Action Memorandum, High Flux Beam Reactor, Removal Action for Waste Loading Area, prepared by Brookhaven Science Associates for the U.S. Department of Energy, October 26, 2007

XII. WHAT CAN YOU DO NEXT?

To ensure that you have the information that you need to understand the Proposed Plan for the High Flux Beam Reactor and to submit your comments on it, you are invited to:

- Review the Feasibility Study and other relevant documents in the Administrative Record at repository locations listed in Section X.
- Use the World Wide Web to access the fact sheet on the High Flux Beam Reactor cleanup, Feasibility Study, Proposed Plan and other information about environmental restoration activities at BNL at www.bnl.gov/hfbr, as well as to find other information about BNL at www.bnl.gov, which is BNL's homepage.
- Call the Community Relations Office at BNL, (631) 344-2277, to ask questions, request more information, or make arrangements for a briefing.
- Attend one of the information sessions and/or the public meeting described in Section IX.
- Contact the project managers at the U.S. Department of Energy, U.S. Environmental Protection Agency Region II, and/or the New York State Department of Environmental Conservation, listed on page 22.

Comment on this plan at the public meeting or submit your written comments by e-mail, fax, or mail to the addresses listed on the comment sheet before the end of the formal public comment period on Monday, March 17, 2008.

For more information about the Laboratory and/or its environmental restoration projects, contact:

Jeanne D'Ascoli
Community Relations Office
Building 130
Brookhaven National Laboratory
P.O. Box 5000
Upton NY 11973-5000
(631) 344-2277
dascoli@bnl.gov

BROOKHAVEN NATIONAL LABORATORY

To access the HFBR Fact Sheet, Feasibility Study, and the Proposed Plan please go to www.bnl.gov/hfbr

United States Department of Energy

The U.S. DOE is one of the three agencies identified in the Interagency Agreement that establishes the scope and schedule of remedial actions at Brookhaven National Laboratory. For additional information concerning DOE's role in preparing this Proposed Plan, please contact:

John Carter
U.S. Department of Energy
Brookhaven Site Office
Brookhaven National Laboratory
P.O. Box 5000
Upton NY 11973-5000
(631) 344-5195
jcarter@bnl.gov

United States Environmental Protection Agency

The U.S. EPA is one of the three agencies identified in the Interagency Agreement that oversees the scope and schedule of remedial actions at Brookhaven National Laboratory. For additional information concerning EPA's role, please contact:

Doug Pocze
U.S. Environmental Protection Agency
Region II
290 Broadway
New York NY 10007-1866
(212) 637-4432

New York State Department of Environmental Conservation

NYSDEC is one of the three agencies identified in the Interagency Agreement that oversees the scope and schedule of remedial actions at Brookhaven National Laboratory. For additional information concerning the state's role, please contact:

Chek Ng
New York State Department
of Environmental Conservation
625 Broadway
Albany NY 12233-7015
(518) 402-9620

Before mailing this comment sheet, please fold here and use clear tape to seal it closed. Thank you for your input.

Please put postage here and mail your comments to arrive before the end of the public comment period on Monday, March 17, 2008

TO: Michael Holland
U.S. Department of Energy
Brookhaven Site Office
Attn: HFBR Decommissioning Project
P.O. Box 5000
Upton NY 11973-5000

HFBR Public Comment Period: Thursday, January 10, 2008 to Monday, March 17, 2008

You Are Invited to Submit Your Comments On the Proposed Remedial Action Plan for the High Flux Beam Reactor at Brookhaven National Laboratory

Instructions:

To select the final remedy for the High Flux Beam Reactor at Brookhaven National Laboratory, the U.S. Department of Energy, U.S. Environmental Protection Agency, and the New York State Department of Environmental Conservation need your comments on the Proposed Plan discussed in this document. Please note your comments on this form (use additional sheets, if necessary) and return them by e-mail to tellDOE@bnl.gov, by fax to (631) 344-3444, or by mail to the address on the reverse side. Please sign and date the form and print your name and address at the bottom. ***However, you need not identify yourself for your comment to be considered.*** For consideration, your comments must be postmarked before the end of the formal public comment period on Monday, March 17, 2008. Thank you for your participation in this process.

The following information is not required for your comment to be considered.

your signature: ______________________

your name printed: ______________________

street address: ______________________

town, state, and zip code: ______________________

date: ______________________

Submit your comment by: e-mail to tellDOE@bnl.gov • fax to (631) 344-3444 • mail to the address on the reverse side