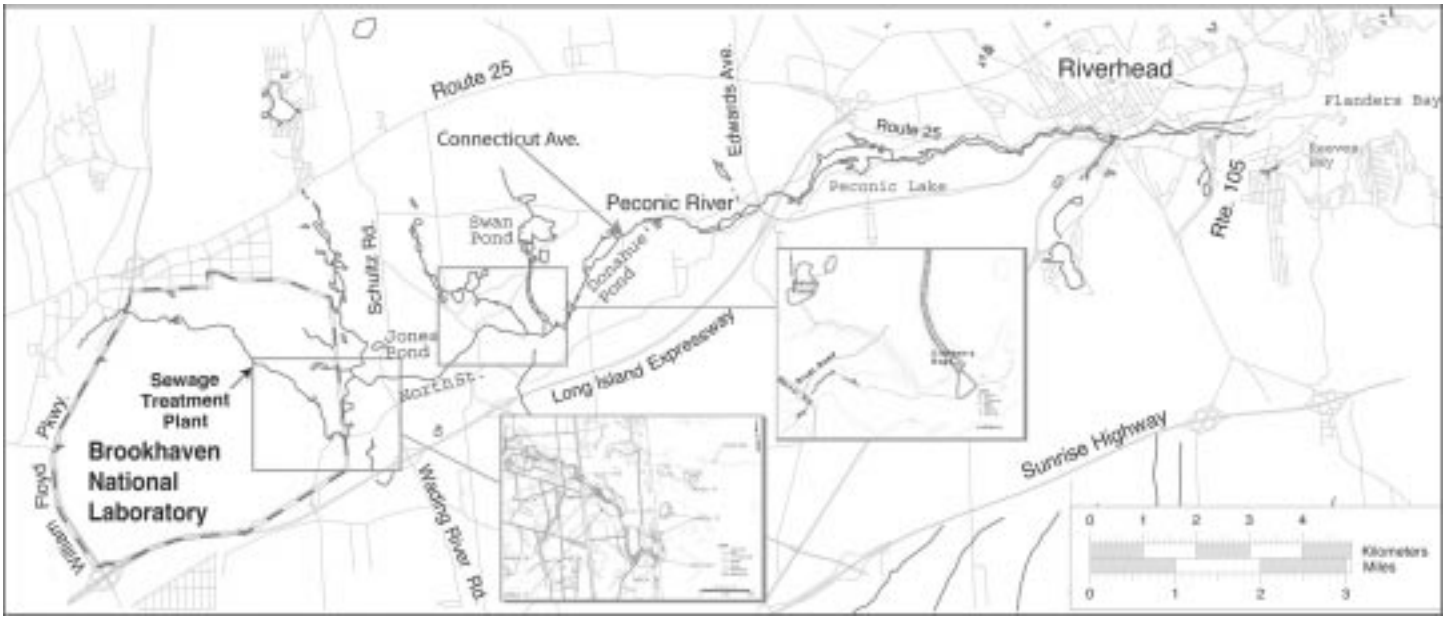
Proposed Plan for

Operable Unit V: Peconic River

Brookhaven National Laboratory



The Peconic River. The inset shows the area discussed in this document.

(*Note:* Technical and administrative terms are used throughout this Proposed Plan. When these terms are first used, they are printed in ***bold italics***. Explanations of these terms, document references, and other helpful notes are provided in the margins.)

I. Introduction

Brookhaven National Laboratory (BNL) is a U.S. Department of Energy (DOE) owned laboratory conducting research in physical, biomedical, chemical, and environmental sciences, as well as in selected energy technologies. Brookhaven Science Associates, a not-for-profit research management organization, operates BNL under a contract with DOE.

BNL is located 60 miles east of New York City, close to the geographic center of Suffolk County on Long Island, New York as shown in Figure 1. It is bordered on the west by the William Floyd Parkway, on the east by residential areas and parkland, on the north by residential areas, and on the south by the Long Island Expressway.

In 1980, BNL was placed on the New York State Department of Environmental Conservation (NYSDEC) list of Inactive Hazardous Waste Disposal Sites. In 1989, it was included on U.S. Department of Energy's (EPA) ***National Priorities List*** of Superfund Sites. BNL's inclusion on these lists was primarily due to the effects of discontinued past operations, some of which could impact Long Island's sole source aquifer. BNL has a total of 30 ***Areas of Concern*** (AOCs). These areas were grouped into six ***Operable Units*** for more effective management.

Some past operations and practices at BNL resulted in wastewater containing chemical and radiological contaminants being discharged to the Sewage

Inside This Plan

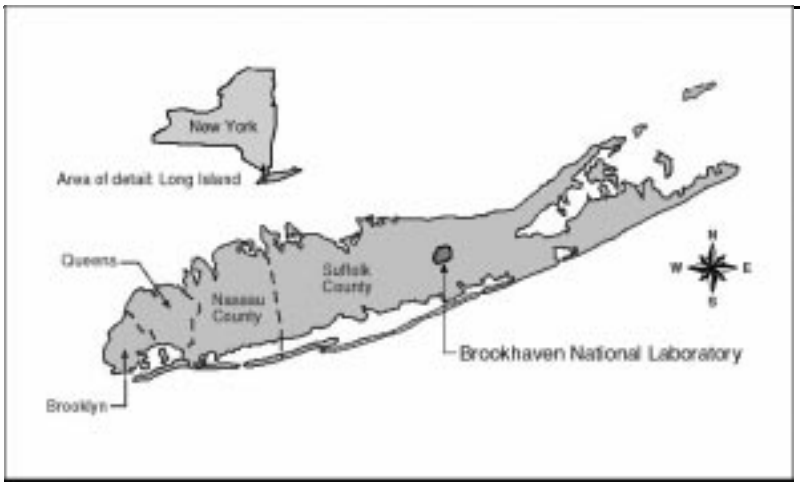


Figure 1. Location of Brookhaven National Laboratory on Long Island.

Treatment Plant (STP) that then discharges to the Peconic River. The discharges into the Peconic River and the contaminants adsorbed to the STP sand filter beds have been a source of contamination to the Peconic River sediment.

Radiologically and chemically contaminated sand and soil at the STP were excavated and disposed of at an appropriate off-laboratory disposal facility in compliance with the January 2002 *Operable Unit V STP* ***Record of Decision***. In addition, DOE has upgraded the STP and implemented programs to further reduce the discharge of contaminants to the Peconic.

Over the past several years, DOE and BNL have conducted extensive environmental investigations of Peconic River sediment, fish, and plants. The results of these investigations show that portions of the Peconic River on Laboratory property and some areas outside of the Laboratory as shown in Figures 2 and 3 should be cleaned up.

This ***Proposed Remedial Action Plan*** (PRAP) is required as part of the ***Comprehensive Environmental Response, Compensation, and Liability Act*** (CERCLA), often called the "Superfund Law". BNL is being cleaned up in accordance with the Superfund Law and with the oversight of EPA and NYSDEC through an Interagency Agreement. This PRAP addresses the Peconic River in what is referred to as Operable Unit V.

This Proposed Plan provides an overview of:

- the investigations conducted

- the river sediment cleanup alternatives considered

- the river sediment cleanup alternative proposed

This Proposed Plan incorporates extensive discussion and analysis by DOE, EPA, NYSDEC, New York State Department of Health (NYSDOH) and Suffolk County Department of Health Services (SCDHS).

BNL has already begun cleanup of the Peconic River on the BNL property. This interim action was proposed to the public and memorialized in an Action Memorandum dated January 20, 2004. The proposed onsite cleanup remedy is also incorporated in the PRAP together with the proposed off-site remedy.

DOE will recommend a cleanup remedy to the EPA and NYSDEC after the public comment period ends. DOE must then receive agreement on the proposed remedy from EPA and concurrence from NYSDEC. The decision will be formalized in a document called the Record of Decision (ROD).

The ROD will contain a Responsiveness Summary that will include all formal public comments and provide DOE's responses to them. These documents will be available for public review at the ***Administrative Record*** locations listed in Section XIV at the back of this Proposed Plan.

The formal public comment period for this document is from May 24,

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

Area of Concern (AOC) - A geographic area of BNL where there has been a release or the potential for a release of a hazardous substance, pollutant or contaminant including radionuclides

Operable Unit (OU) - An administrative designation grouping geographical portions of a site, specific site problems, or initial phases of an action. Operable Units may also consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site. BNL has six Operable Units.

Record of Decision (ROD) - This documents memorializes the regulators' decision on a selected remedial action, and includes the responsiveness summary and a bibliography of documents that were used to reach the remedial decision. When the ROD is finalized, remedial design and construction begin.

Proposed Remedial Action Plan - A document requesting public input on a proposed remedial alternative (cleanup plan).

2004 to June 25, 2004. Information on how to submit comments is on pages 7 and 24.

II. Background

A Proposed Plan for Operable Unit V was presented for public comment in the spring of 2000. Operable Unit V includes BNL's Sewage Treatment Plant (STP), abandoned sewers, groundwater related to STP operations, and the sediment in the upper portions of the Peconic River. With the exception of the Peconic River sediment cleanup, the public acknowledged all of the proposed cleanup decisions associated with Operable Unit V and the cleanup actions were accepted by the regulatory agencies. These decisions were finalized in a ROD issued in January 2002. The portion of the cleanup authorized by the ROD has been completed.

A decision about the cleanup of the Peconic River sediment was deferred as a result of input received during the previous public comment period. The initial Proposed Plan identified areas in the river where sediment would be removed, followed by restoration of the wetland areas. Concerns submitted by members of the public ranged from doing no cleanup at all to increasing the scope of the cleanup. There also was concern about the potential for wetland damage.

The public commented that the DOE and BNL needed to consider technologies that might be able to clean up the sediment with less disruption to the wetlands. The public also wanted additional sediment, fish, and vegetation sampling to provide better definition of the areas requiring cleanup. This information was considered necessary before public acceptance of a remedy.

The DOE and BNL responded by completing a number of actions to

Meetings

For meeting times and locations, see page 6.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - A 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; also known as Superfund.

Administrative Record - This record contains documents including correspondence, public comments, and technical reports upon which the regulators base their remedial action selection.

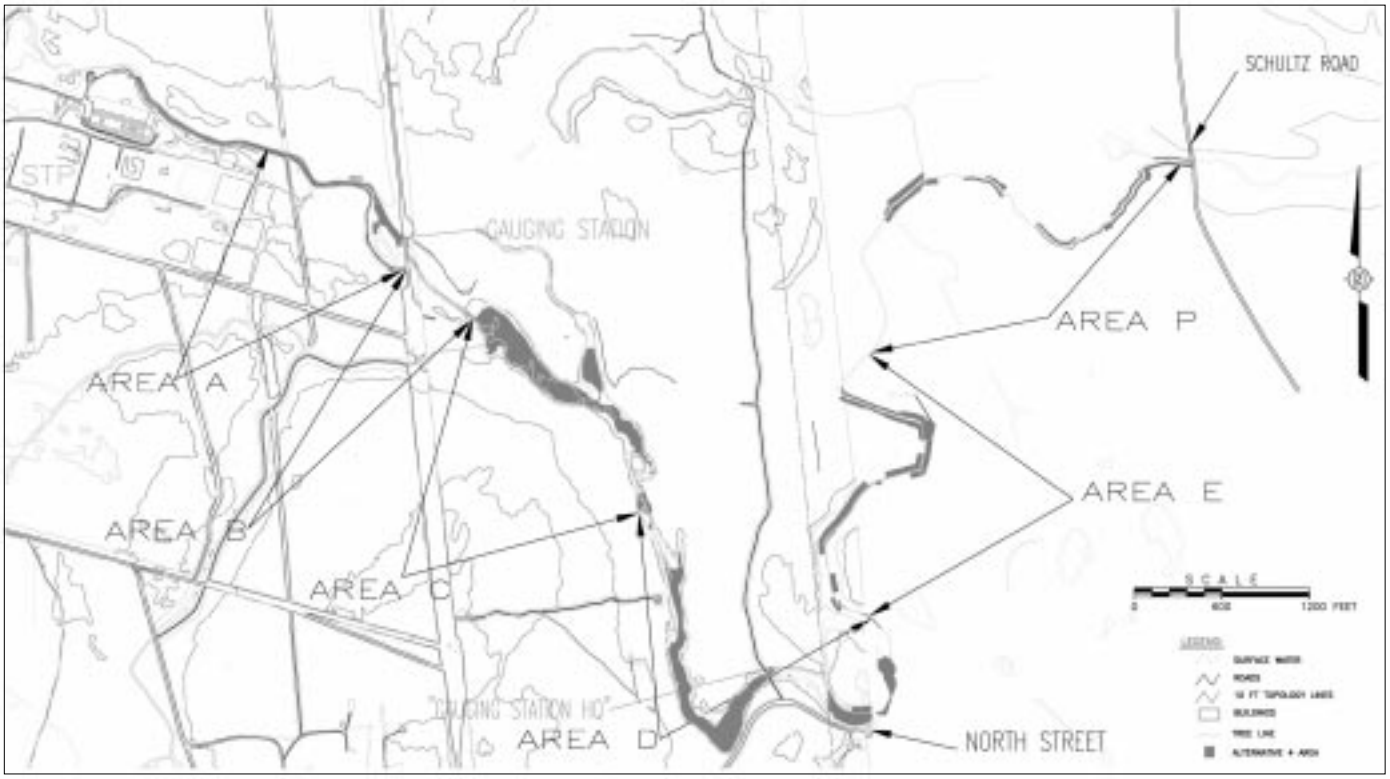


Figure 2. Cleanup Area

better understand the level and type of contamination in the sediment and investigated technologies that potentially could clean the sediment with less disruption to the wetlands. Specific actions are described below.

1. Additional soil, fish, and sediment samples were collected and analyzed between the summer of 2001 and fall of 2003 to better define the extent and type of contamination. In addition, vegetation samples were taken to evaluate the potential for native species to clean up the contaminants through natural processes.

2. In December 2000, a workshop was held that involved national and international environmental restoration companies. Regulatory agency staff, DOE and BNL staff, and community members attended the meeting. The workshop focused on the identification of alternative technologies that potentially could reduce wetland damage while achieving the necessary cleanup objectives. Four potential technologies emerged from this workshop to further evaluate. Two of the four evaluated technologies were then selected for pilot testing, vacuum guzzling and excavation followed by wetland restoration.

Details about these technologies and the pilot testing are available on the BNL website at the following address: http://www.bnl.gov/erd/Peconic/factsheets.html. The demonstrated effective technologies are now part of the cleanup alternatives presented here.

The pilot test results and additional site characterization were used in arriving at the proposed remedy. All of this information is contained within a variety of reports that are available to the public in the Administrative Record. Documents pertaining to the Peconic River sediment cleanup are listed in Section XV, References.

In the summer of 2003, it was decided to separate the on-Laboratory property and off-Laboratory property portions of the cleanup. Performing the on-Laboratory property work would give the project staff an opportunity to fine-tune processes and activities before beginning work on publicly owned off-Laboratory property.

The on-Laboratory property cleanup is being conducted under a non-time critical ***removal action***. The ***Action Memorandum*** was released for public comment in the fall of 2003. The Action Memorandum is available for public review in the Administrative Record libraries listed in Section XIII.

Removal Action - Those actions taken early and/or quickly to prevent, minimize, or mitigate damage to public health or the environment which may otherwise result from a release or threatened release of hazardous substances, pollutants, or contaminants.

Action Memorandum - A formal document that describes actions to be taken to remediate an area as part of a removal action.

PCBs - Polychlorinated biphenyls (PCBs) are among the contaminants of concern. PCBs were widely used as a fire preventative and insulator in transformers, capacitors, and hydraulic fluid because of their ability to withstand exceptionally high temperatures.

PCBs are considered probable human carcinogens and are linked to other adverse health effects such as developmental effects, reduced birth weights and reduced ability to fight infection.

PCBs are a group of chemicals consisting of 209 individual compounds, known as congeners. The congeners can have from one to ten chlorine atoms per molecule, each with its own set of chemical properties.

PCBs were sold in mixtures containing dozens of congeners. These commercial mixtures were known in the U.S. as aroclors.

III. Proposed Remedy

DOE and the regulators have concluded that portions of the upstream sediment in the Peconic River containing heavy metals and polychlorinated biphenyls (***PCBs***) will be cleaned up. The removal of these contaminants is appropriate to further protect human health and the ecosystem by reducing the bioaccumulation of mercury and PCBs in fish tissue. This conclusion is based on several years of study and open discussion with the regulatory agencies and community members.

Three principal goals of the cleanup are to:

- Remove sediment with elevated mercury levels

- Minimize the potential for contaminated sediment to migrate downstream

- Remove contaminated sediment from areas with preferential mercury ***methylation***

Four alternatives were considered to protect human health and the ecosystem by reducing the bioaccumulation of mercury and PCBs in fish tissue:

1. No action

2. Remove all sediment containing more than 1.06 ***parts per million*** (ppm) mercury

3. Remove all sediment containing more than 9.8 ppm mercury

4. Remove the sediment layer (approximately 6 to 12 inches) down to sand from depositional areas and from areas identified as preferential ***methylmercury*** sources

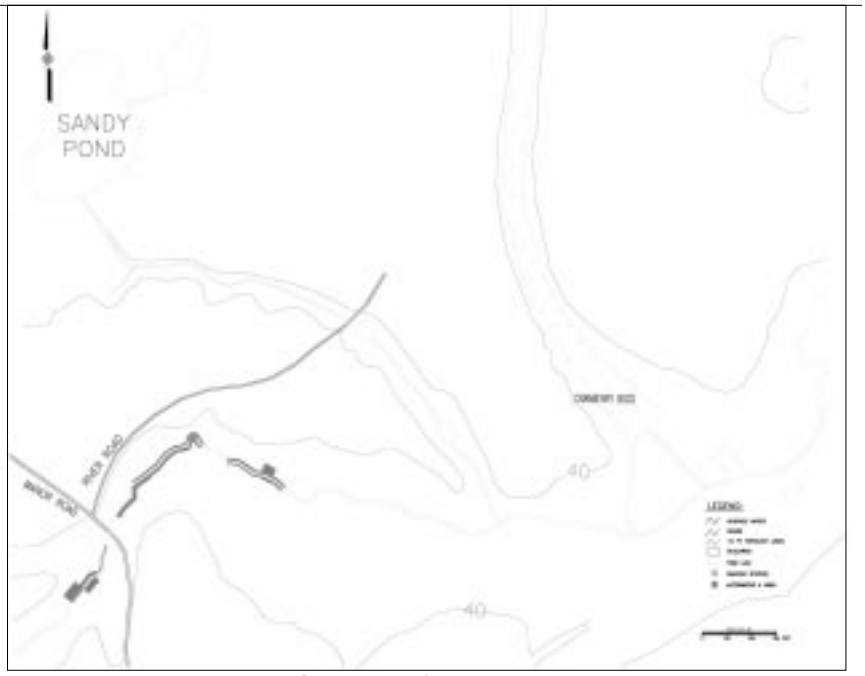


Figure 3. Cleanup Area

The last alternative was found to best fit the CERCLA criteria for cleanup. This alternative removes approximately 92 percent of the contamination. The details of the proposed remedy are provided below:

- On Laboratory property, the response actions selected in the Action Memorandum, dated January 20, 2004, will constitute the final action for this stretch of the Peconic River. The Action Memorandum states that sediment will be removed from designated depositional areas. These areas are illustrated on Figures 2 and 3. The goal is to remove sediment in these areas such that all mercury concentrations in the remediated areas are less than 2 ppm following the cleanup. Average mercury concentrations in the Peconic River sediment on Laboratory property will be reduced to less than 1 ppm.

- Off of Laboratory property and upstream of Schultz Road, sediment will be removed from designated depositional wetland areas and from areas identified as preferential methylmercury sources. These areas are illustrated on Figures 2 and 3. The sections of the river that will be cleaned up off of Laboratory property are all within Suffolk County parkland. The goal is to remove sediment in these areas such that all mercury concentrations in the remediated areas are less than 2 ppm following the cleanup. Average mercury concentrations in the Peconic River sediment in this section of the River (i.e., from the Laboratory boundary to Schultz Road) will be reduced to less than 0.75 ppm. This remedy has a more stringent cleanup target concentration off of BNL property than on Laboratory property. This will allow the greatest flexibility in the uses of the area as County parkland or in any future development.

- Off of BNL property and east of Schultz Road (i.e., immediately upstream and downstream of Manor Road), sediment will be removed from designated depositional areas. These areas are illustrated in Figures 2 and 3. The goal is to remove sediment in these areas such that all mer-

Methylation - The process by which elemental and inorganic mercury is converted to methylmercury.

Parts per million (ppm) - A ratio of the mass of a contaminant to the total mass of the contaminant and medium (usually soil or water). For example, 1 ppm of mercury can mean 1 gram of mercury in 1 million grams of soil.

Methylmercury - The form of organic mercury found in the environment, and the form that accumulates in both fish and human tissues.

Meetings

Roundtable Meetings

Cornell Cooperative Extension
423 Griffing Avenue
Riverhead, NY
June 3, 2004
7:00 - 9:00 p.m.

Berkner Hall, BNL
June 7, 2004
7:00 - 9:00 p.m.

Public Meeting

Berkner Hall, BNL
June 15, 2004
7:00 - 9:00 p.m.

All are invited to attend; a courtesy call to RSVP would be appreciated. Please call Keith Grigoletto of BNL at 631-344-8192.

All visitors to the Laboratory age 16 and older must present a photo ID.

cury concentrations in the remediated areas are less than 2 ppm following the cleanup. This action will reduce the concentration of mercury in the sediment between Schultz Road and Connecticut Avenue even further below 0.75 ppm.

- A construction-monitoring program will be implemented to ensure that the removal targets are reached and to preclude any unacceptable short-term effects to the water column.

- A monitoring program will be implemented to demonstrate the effectiveness of the cleanup. As part of this program, DOE will continue to evaluate all available data to determine if additional remediation is required to ensure the protection of human health and the environment. This program will include mercury and methylmercury water column sampling and fish sampling from the STP to Connecticut Avenue. This will include sampling in the spring and summer of 2004 to establish the baseline for the long term monitoring program.

Other metals, PCBs, and ***radionuclides*** that are co-located with the mercury will also be removed with the sediment.

In 2001, a temporary sediment trap was installed at the Laboratory property boundary to prevent any further migration of contaminants off Laboratory property until implementation of the remedy. This sediment trap will remain in place until the work on Laboratory property is completed and the remediated areas are fully vegetated. The goal is to remove this sediment trap to re-open the areas to fish migration no later than one year after the remedy is implemented. Growth of vegetation and total suspended solids in surface water will be monitored on a routine basis and the data evaluated prior to removal of the sediment trap.

A formal review of the long term monitoring data for mercury in the water column, sediment and fish tissue will be conducted at five-year intervals to assure that the remedy is effective.

IV. Implementation

The implementation of this remedy will take place in two phases:

Phase 1 will be completed in Summer 2004 and addresses sediment on Laboratory property. It incorporates comments from the public as reflected in the final Action Memorandum.

Phase 2 will address sediment that extends beyond the Laboratory boundary as shown in Figures 2 and 3 and will be completed in 2005. The scope of the second phase will only be finalized after consideration of public comments on this PRAP.

This phased approach will provide the best means for accelerating cleanup while ensuring that cleanup of the County parkland is effective.

Radionuclide - An element such as cesium-137 which breaks down to form another element and ionizing radiation due to its unstable nuclear structure.

V. Community Role in Selection Process

The community has and continues to play an important role in the selection of a cleanup alternative. DOE and BNL encourage public input to ensure that the decision on the proposed remedy for the Peconic River area of Operable Unit V effectively meets community needs as well as being pro-

tective of human health and the environment.

Written comments on the *Proposed Plan for Operable Unit V, Peconic River* will be accepted from May 24, 2004 through June 25, 2004. For your convenience, a pre-addressed comment sheet is included at the end of this document.

Interested community members may attend either of two information sessions to speak with project personnel and learn more about the proposed remedy. (Meeting times and locations are given on page 6.) DOE and BNL will also hold a public meeting on June 15, 2004 to present the conclusions of the ***Feasibility Study*** *Addendum* and this *Proposed Plan for Operable Unit V: Peconic River*, and receive public comments on the proposed remedy and the Action Memorandum.

A temporary dam and diversion pipe helped dry a portion of the river where vacuum guzzling was tested.

The final decision will be made in accordance with the Interagency Agreement after considering public comments. The public will be kept informed of progress during the removal action and remedy implementation phase.

VI. Summary of Remedial and Supplementary Investigations

Several investigations and studies were conducted to identify the nature and extent of soil, sediment, groundwater and surface water contamination. The investigation included:

- Geophysical and biological surveys
- Sampling of soil, groundwater, surface water, and sediment
- Chemical and radiological analyses
- Benthic invertebrate toxicity testing
- Fish bioaccumulation studies
- Methylmercury analyses of on- and off-Laboratory property Peconic River sediment and surface water
- Detailed pre-remedial design sampling from BNL to Connecticut Avenue
- Data validation
- Preparation of several reports listed in Section XIV

Based on community input received during the spring 2000 public comment period, additional sediment sampling was undertaken to better delineate the extent of contamination in the sediment on Laboratory property and off of the property upstream of Schultz Road . Additional fish tissue sampling was also conducted in areas of the river outside of Laboratory property to determine concentrations of contamination in edible fish tissue there. This effort included areas that were previously dry during prior sam-

Remedial Investigation/ Feasibility Study (RI/FS) - These studies are required by CERCLA to characterize the nature and extent of contamination due to past releases of hazardous and radioactive substances to the environment, to assess risks to human health and the environment from potential exposure to contaminants, and to evaluate cleanup actions.

Risk - An estimate of the probability that exposure to contamination at a release site will cause cancer development or noncarcinogenic health effects.

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund human health risk assessment estimates the "baseline risk." This is the estimate of the likelihood of adverse health effects occurring if no cleanup action were to be taken. To estimate this baseline risk at a Superfund property, EPA uses a four-step process:

Hazard Identification: This step identifies the contaminants of concern at the property in various media (i.e., surface water, air, soil, sediment) based on such factors as toxicity, frequency of occurrence, fate, and transport of the contaminants in the environment, concentration, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different ways that people might be exposed to the contaminants identified in the Hazard Identification are evaluated, including the concentration to which people might be exposed, and the potential frequency and duration of exposure. Using this information, two exposure scenarios can be calculated. A "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur can be calculated. A "central tendency" scenario, which portrays average human exposure, can also be calculated.

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pling events. All of the new and previous data were consolidated for further evaluation (see Section VII).

State and Federal standards, criteria, and guidance were reviewed to evaluate the nature and extent of contamination in soil, sediment, groundwater and surface water. Screening criteria used to identify contamination were derived from these requirements. These screening criteria are given in the Operable Unit V Remedial Investigation, completed in May 1998.

Metals, low levels of PCBs, and low levels of radionuclides were detected in Peconic River sediment. Concentrations were highest in surface sediment on Laboratory property and most prominent in the depositional areas located downstream of the STP (Areas A, B, C and D of Figure 2). Further evaluation of these contaminants for ***risk*** potential was completed, and is summarized in Section VII.

The following is a summary of the range of contaminants found in the Peconic River sediment and fish.

Peconic River Sediment

On Laboratory property, mercury (maximum 39.7 ppm), silver (maximum 380 ppm), and copper (maximum 1,490 ppm) were detected most often, and at the highest concentrations above the screening levels. Another contaminant of concern was the PCB aroclor-1254 (maximum 1.5 ppm). Contamination was highest in surface sediment and was most prominent in depositional areas downstream of BNL's STP.

Off of Laboratory property, contamination was generally higher in the ponded areas just downstream of BNL near North Street, in two small ponded areas midway between North Street and Schultz Road, and at Schultz Road where the restricted flow due to the culvert also promotes deposition.

Mercury contaminant concentrations decreased away from BNL and were found at much lower concentrations downstream of Schultz Road and trended toward background levels at Donahue's Pond.

An extensive investigation into the distribution of BNL related radionuclides in the Peconic River was also conducted. The radionuclides investigated included cesium-137, americium-241, and plutonium 239/240. The patterns of low-level radionuclides were similar to the pattern of the inorganic contaminants found and, therefore, are useful tracers of other BNL contaminants.

Because of the large area (approximately 20 acres) recommended for cleanup and the co-location of other contaminants with mercury in these areas, a large percentage of other Laboratory-related contaminants (e.g. metals, radionuclides, PCBs) will be removed with the mercury.

Peconic River Methylmercury Sampling

Methylmercury, sampling of which will be used to verify the effectiveness of cleanup activities, is an organic form of mercury. Mercury in this form is most available to bioaccumulate in the food chain. Samples taken in April, June, August, and November 2003 measured water flow and the levels of mercury, methylmercury, and total suspended solids (TSS) in the water at 12 to 14 locations along the Peconic River. The samples were taken upstream of the STP to Schultz Road, and at one control location off Laboratory property in the Connetquot River. In November 2003 an additional

seven water column stations were analyzed for methylmercury between Schultz Road and Connecticut Avenue.

Table 1 provides background and local mercury and methylmercury surface water data. The average New England background level for mercury in streams is from 1 to 5 parts per trillion (ppt). Average methylmercury concentrations in streams range from 0.05 to 0.3 ppt. Values in coastal streams are generally higher.

The peak mercury concentration (11,802 ppt) and methylmercury concentration (200 ppt) in Peconic River surface water were found at one on-Laboratory property location with high TSS. This location had the highest values of mercury, methylmercury, and TSS in all samples and will be remediated during the cleanup. Excluding this one location, the peak concentrations were 88.2 ppt mercury and 18.3 ppt methylmercury.

Table 1.
Summary of Average Mercury and Methylmercury Data

	Mercury (ppt)	Methylmercury (ppt)
New England average [1,2]	1-5	0.05-0.3
Connectquot	0.5-4.4	0.2-0.9
Peconic on Laboratory Property	4.8-11802	0.3-200
Peconic off Laboratory Property	1.8-20.9	ND[a]-18.3

[a] ND means "non-detect"

[1] *Chalmers, A. and D. Krabbenhoft, "Distribution of Total and Methyl Mercury in Water, Sediment, and Fish Tissue in New England Streams", American Geophysical Union (AGU), May 29-June 2, 2001, Boston, MA.*

[2] *Peckenhan, J.M., J.S. Kahl, and B. Mower, "Background Mercury Concentrations in Riverwater in Maine, USA", Environmental Monitoring and Assessment 89:129-152, 2003.*

Average concentrations generally decreased away from the STP. Methylmercury concentrations in the water generally were relatively constant on Laboratory property and showed an increase from the Laboratory property boundary to Schultz Road. On-site and off-site preferential methylation areas are included in the sections of the river proposed for cleanup below.

More information about river conditions may be found at http://www.bnl.gov/erd/Peconic/factsheets.html and in documents at the libraries listed in Section XIV.

Peconic River Fish

Fish collected from the Peconic River (mainly pickerel, creek chubsuckers, and bullhead catfish, and some sunfish and bass) were analyzed in one of two ways.

1. Some fish were prepared as "edible fish tissue samples." This means that they were big enough to be prepared as standard fillets that people would eat. Edible fish tissue samples are appropriate for evaluating human health concerns.

2. Other fish were analyzed as "whole body tissue samples." This means

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Toxicity Assessment: The toxicity assessment determines the types of adverse health effects associated with chemical exposures, and the relationship between the amount of exposure (dose) and the severity of effects (response). Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects. Some chemicals may cause both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines the previous steps to provide a quantitative assessment of risks. For cancer risks, EPA expresses the risks of the likelihood of an individual developing cancer as an upper bound probability. For example, a 10^{-4} cancer risk means a "one in ten-thousand excess cancer risk," or, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to the contaminants. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to one-in-a-million excess cancer risk). For non-cancer health effect, a hazard index is calculated. The key concept for the hazard index is that a "threshold level" (measured as a Hazard Index of 1) exists below which non-cancer health effects are not expected to occur.

that all parts of the fish were used in the sample. These samples include the head, skin, scales, fins, bones, and internal organs. Whole body tissue samples are used for evaluating the potential for effects on wildlife that may eat fish, ingesting them whole or eating most of the fish parts.

Fish collected from the Peconic River headwaters had bioaccumulated mercury and PCBs. The average concentrations measured in edible fish tissue samples collected in 2001 between North Street and Schultz Road was 0.62 ppm mercury and 0.023 ppm aroclor-1254. Laboratory property fish samples were collected during four events: 14 samples in 1996, 36 samples in 1997, and six samples from 1999 and 2000 Site Environmental Reports.

Fish were analyzed as whole body samples (skin, bones, head, and internal organs were included). The average concentrations in these samples were 0.68 ppm mercury and 1.77 ppm aroclor-1254. These samples were used to evaluate the potential risks to human health and the environment. More detail can be found in the Administrative Record.

Fish were also evaluated for radionuclides. Cesium-137, which is present around the world at low levels and also has been released in the BNL Sewage Treatment Plant effluent, was detected at elevated levels in fish from the areas being considered. These do not represent a health risk.

VII. Summary of Risks

Baseline risk assessment - An assessment required by CERCLA to evaluate potential risks to human health and the environment. This assessment estimates risks/hazards associated with existing and/or potential human and environmental exposures to contaminants at an area, assuming no remedial action is taken.

A ***baseline risk assessment*** evaluates potential risks from exposure to contaminants if no cleanup were conducted. A baseline risk assessment was conducted for Operable Unit V and was reported in the *Final Operable Unit V Remedial Investigation Report* (May 27, 1998). Another baseline risk assessment was conducted that addressed radiological concerns. It was reported in the *Final Operable Unit V Plutonium Contamination Characterization and Radiological Dose and Risk Assessment Report* (January 31, 2000) and included all radiological data from the Remedial Investigation Report as well as additional radiological data. The *Baseline Human Health Risk Assessment for the Peconic River* March 10, 2003) re-evaluated the potential risk related to the Peconic River from chemical contaminants and radionuclides based on additional data. The results from these combined studies are summarized here.

Human Health Risk Assessment

Hazard Index - An index used as a measure of the potential for site contaminants to present unacceptable noncarcinogenic toxic effects. When the hazard index is calculated to be greater than 1, there may be concern for potential noncarcinogenic effects.

Two categories of human health risks were addressed in the risk assessment for the Peconic River: risk of cancer and risk of non-carcinogenic toxicity. Federal guidelines set generally acceptable risk levels. Current Federal guidelines for acceptable carcinogenic risk, risks for an individual lifetime are in the range of one-in-ten-thousand ($1x10^{-4}$) to one-in-one-million ($1x10^{-6}$). The maximum ***Hazard Index*** is equal to one for non-carcinogenic toxicity. A Hazard Index greater than one indicates a potential for non-carcinogenic health effects.

Exposure Assumptions

Table 2, "Exposure Scenarios Considered," provides a summary matrix depicting the population types, exposure pathways, and contaminant sources

considered in the health risk assessment of 2003. The following provides a summary and the findings of that assessment.

An older child trespasser, who might come into contact with contaminated soil, sediment, and/or surface water in the Peconic River headwaters, was evaluated in developing the Current Land Use case.

Risks to current residents of all ages living along the Peconic River off of Laboratory property were evaluated for exposure to contaminants through the ingestion of groundwater and consumption of fish and deer meat, as well as exposure to contaminated sediment, soil, and surface water along the Peconic River off of Laboratory property.

A future resident living off of Laboratory property and a hypothetical resident living on Laboratory property along the Peconic River were evaluated for the Future Land Use case. The hypothetical future resident was assumed to be exposed to contaminants in soils along the Peconic River, sediment and surface water in the Peconic River, groundwater near the Peconic River, as well as contaminants in fish and deer meat, 50 years in the future. The results of the risk assessment as it pertains to the Peconic River are discussed below.

Table 2.

Exposure Scenarios Considered

	Current off-BNL property	Future off-BNL resident	Current on-BNL resident	Future on-BNL resident	Future off-BNL property	Resident Fisher	Non-resident fisher	Non-resident hunter	Trespasser
Groundwater									
drinking	X	X	a	X	X	X			
dermal contact	X	X	a	X	X	X			
inhalation	X	X	a	X	X	X			
Soil									
ingestion	X	X	a	X	X	X	b	b	X
dermal contact	X	X	a	X	X	X	b	b	X
inhalation	X	X	a	X	X	X	b	b	X
Sediment									
ingestion	X	X	a	X	X	X	b	b	X
dermal contact	X	X	a	X	X	X	b	b	X
inhalation	X	X	a	X	X	X	b	b	X
Surface Water									
ingestion	X	X	a	X	X	X	b	b	X
dermal contact	X	X	a	X	X	X	b	b	X
Fish	X	X		X	X		X		
Deer						X		X	

X = population considered
a = there are no on-Laboratory property residents in OU V
b = considered insignificant compared to residential exposures

Results

The cumulative cancer risks from consumption of fish and exposure to contaminants in the Peconic River for residents off of Laboratory property, anglers, hunters, and trespassers on Laboratory property near the Peconic River were all within or below the EPA risk range of $1x10^{-4}$ to $1x10^{-6}$. Non-cancer health hazard quotients exceeded 1.0 due to mercury in edible fish tissue for recreational anglers based on ***reasonable maximum exposure*** factors (eating 20 pounds per year of locally caught fish from the Peconic River) for the Current Land Use case.

Non-cancer health hazard quotients did not exceed 1.0 for adult residents that only occasionally consumed locally caught fish in the Peconic River (about five pounds per year). The non-cancer health hazard quotient for children who only occasionally consume fish (about five pounds per year) exceeded 1.0.

Reasonable Maximum Exposure (RME) - The highest exposure that is reasonably expected to occur. The intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures.

Cumulative cancer risks were above the EPA risk range of $1x10^{-4}$ to $1x10^{-6}$ in the Future Land Use case for hypothetical future anglers on Laboratory property and future residents living on Laboratory property who potentially consume, 20 pounds per year, locally caught fish in the Peconic River. The potential cancer risks are estimated due to PCBs in fish as measured in whole-body fish samples.

Receptor - Someone or something that may receive an exposure to contaminants.

Non-cancer health hazard quotients also exceeded 1.0 for these same hypothetical future ***receptors*** on Laboratory property due to mercury and PCBs in fish. Cancer risks were within or below the EPA range of $1x10^{-4}$ to $1x10^{-6}$ and non-cancer health hazard quotients were below 1.0 for future residents that do not consume locally caught fish in the Peconic River.

Ecological Risk Assessment

An Ecological Risk Assessment was performed in 1998 to determine if any contaminants posed an unacceptable risk to ecological receptors. Ecological receptors include any plants and animals that could be exposed to contaminants now or in the future.

Results

The assessment indicated that the benthic invertebrate community might be affected in the areas with the highest levels of copper, mercury, and silver. The assessment did not consider the limitation of bioavailability due to sediment or water chemistry factors. These factors may include reaction with other compounds, sulfide precipitation, and adsorption on clays.

The areas of greatest impact are located in the depositional areas on Laboratory property. Contaminant migration during periods of water flow has occurred and depositional areas off of Laboratory property also contain elevated levels of some contaminants.

Contaminants of concern - Contaminants detected at waste sites that present significant contributions to overall site risk. For the Peconic River, these include:
- **heavy metals** like mercury, silver, and copper
- **organic chemicals**like PCBs in on-site sediment
- **radionuclides** like cesium-137

The fish tissue study also indicated that most of the contaminants found in the sediment were not bioaccumulating in fish tissue. However, the main ***contaminants of concern*** (PCBs and mercury) bioaccumulated in the fish tissues relative to background concentrations, and were at concentrations that could have adverse impacts to human health, wildlife, and fish. The contaminant concentrations measured in whole body samples from the Peconic River were relevant since wildlife may consume whole fish.

Concentrations of radionuclides detected in surface water and sediment of the Peconic River were compared to benchmark values established for protection of aquatic life. All concentrations were many times lower than the benchmark values. This indicates that the radionuclides in the Peconic River do not pose a risk to aquatic life.

The food chain models determined that risks to the target species existed, particularly from mercury and PCBs. These contaminants, as measured in the tissue of fish on Laboratory property, pose the most risk to exclusively fish-eating species (for example, mink and belted kingfishers). The exposure of wildlife was modeled based on conservative assumptions, primarily consumption of only contaminated fish from on Laboratory property. Fish-eating wildlife feeding exclusively on contaminated fish could be exposed to contaminants at concentrations greater than the “No Observable Effect Levels,” though usually lower than the “Lowest Observable Ef-

fect Levels."

VIII. Actions To Date

The DOE and BNL completed numerous actions related to public concerns in developing this Proposed Plan. Presented here is a summary of those activities. Full reports are available in the Administrative Record.

First, additional fish and sediment samples have been obtained to provide greater certainty of the extent of contamination.

A workshop involving both national and international environmental restoration companies was convened at BNL in December 2000. The workshop, attended by regulatory agency staff, BNL and DOE project staff, other vendors, and community members, focused on the identification of alternative technologies that might be capable of reducing wetland damage while achieving the necessary cleanup.

Four potential technologies were selected for further evaluation by the project team, with input from community participants in the workshop. The four technologies were electrochemical remediation, phytoremediation with native plant species, vacuum guzzling, and sediment removal with subsequent wetland restoration.

The electrochemical remediation was judged to be inadequate to meet cleanup objectives. Phytoextraction with native species was evaluated; however, sampling indicated that the plants lacked the necessary characteristics to achieve cleanup. Vacuum guzzling and sediment removal followed by restoration were pilot-tested to verify their capabilities under Peconic River conditions.

Pilot studies were conducted during the spring of 2002 to evaluate two sediment removal technologies for use in the cleanup of the Peconic River. These pilot studies used a conservative sediment cleanup goal of 1 ppm mercury in order to ensure its ability to achieve the goals of the selected remedy.

The first pilot study demonstrated that the vacuum guzzler was effective in specific, limited cases. The second pilot study demonstrated that sediment removal and wetland restoration using conventional techniques was most effective. These two technologies are now part of the cleanup alternatives presented in this Proposed Plan. More information about these studies can be found at http://www.bnl.gov/erd/peconic.html and in the Administrative Record.

BNL maintains a proactive Pollution Prevention/Waste Minimization program to reduce the generation of wastes at the source. This also reduces and eliminates environmental impacts associated with current Laboratory operations. By implementing a source reduction program, contribution of contaminants to the BNL sanitary sewer and ultimately the Peconic River are being minimized.

BNL has also earned registration to ISO 14001, an internationally recognized standard for environmental stewardship.

IX. Basis for Cleanup

Administrative Record Locations

The Feasibility Study Report, Proposed Plan and all Administrative Record documents can be found at the following locations:

Longwood Public Library
800 Middle Country Road
Middle Island, NY 11953
Phone: (631) 924-6400

Mastics-Moriches-Shirley Community Library
407 William Floyd Parkway
Shirley, NY 11967
Phone: (631) 399-1511

Brookhaven National Lab
Research Library
Technical Information Division
Building 477A
Upton, NY 11973
(631) 282-3483

U.S. EPA — Region II
Administrative Records Room
290 Broadway, 16th floor
New York, NY 10001-1866
Phone: (212) 637-3185

The principal contaminant of concern is mercury. Mercury is found at elevated levels in both fish and sediment samples. Mercury may pose a human health or ecological concern. Other contaminants of concern include PCBs in on-site fish and silver and copper in the sediment that may pose an ecological concern.

Bioaccumulation of contaminants in fish does occur. Any cleanup action should focus on reducing this bioaccumulation in areas where people may catch and eat fish so as to be protective of human health.

Remedial action objectives - The cleanup objectives that must be met by any remedial alternative.

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information, standards such as "***applicable or relevant and appropriate requirements***" (ARARs), and risk-based contaminant levels. Three remedial action objectives were developed based on the evaluation of the nature and extent of contamination in soils, groundwater, surface water, and sediment, and on the assessment of chemical and radiological risks associated with exposure to potential contaminants of concern. The three objectives are:

- Protect human health through the reduction of BNL-related contaminants (e.g., mercury) in sediment.
- Reduce or mitigate, to the extent practical, existing and potential adverse ecological effects of contaminants in the Peconic River.
- Prevent or reduce, to the extent practical, the migration of contaminants off of the Laboratory facility or to areas where risk may become unacceptable.

Applicable or relevant and appropriate requirements (ARARs) - "Applicable" requirements mean those standards, criteria, or limitations promulgated under federal or state law that are required specific to a substance, pollutant, contaminant, act, location, or other circumstance at a CERCLA site.

"Relevant and Appropriate" requirements mean those standards, requirements, or limitations that address problems or situations sufficiently similar to those encountered at the CERCLA site such that their use is well suited to that particular site.

Average concentrations of mercury in fish tissue were less than 0.7 ppm. Removing mercury-contaminated sediment in the areas of the Peconic River that contribute significantly to the methylation of mercury and the subsequent bioaccumulation of mercury in fish should reduce the potential hazards to people who eat locally caught Peconic River fish and to wildlife that may consume Peconic River fish. Such areas are locations where sediment containing BNL contaminants have historically been deposited on and off Laboratory property, where methylation of mercury (which leads to bioaccumulation) is most likely to occur, and where conditions are capable of supporting fish. Additionally, there are areas that may contribute to the migration of contaminants to other areas of the river. Other metals, PCBs, and low-level radionuclides are largely co-located with mercury and would be removed when addressing these source areas.

X. Summary of Remedial Alternatives

CERCLA requires that remedies be protective of human health and the environment, be cost effective, comply with other statutory laws, and use permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. In addition, CERCLA includes a preference for treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

Alternative technologies were further investigated in response to concerns about the original Proposed Plan for the Peconic River sediment. Four alternatives were considered in the Feasibility Study Addendum as a result of those investigations and subsequent pilot studies. The four alternatives consist of one no action alternative and three cleanup alternatives. These alternatives

are briefly described below and then evaluated in the next section.

The three cleanup alternatives all involve:

- Removal of sediment using standard construction equipment (or vacuum guzzlers in appropriate areas),
- Dewatering and off-site disposal at an appropriate disposal facility.
- Restoration of habitat as applicable,
- Monitoring to verify the effectiveness of the cleanup, and
- Removal of the temporary sediment trap installed near the gauging station HQ after the remediated areas are fully vegetated.

Alternative summaries are provided below.

Alternative One: No Action: The No Action alternative is used as the baseline against which the other alternatives are evaluated and is required to be considered under CERCLA. The No Action alternative does not include any active cleanup activities. Long-term monitoring of surface water and sediment would be conducted under this alternative.

Alternative Two: This alternative would address sediment areas that contain mercury concentrations greater than 1.06 ppm. This value is a screening level used for identifying contamination potentially above acceptable levels.

This alternative consists of the dewatering of segments of the stream, followed by sediment removal using conventional earthmoving equipment or vacuum guzzlers where appropriate. The sediment that is removed would then be placed in a drying bed. Free liquids would be filtered, tested to assure they meet discharge requirements, and discharged back to the Peconic River. The dewatered sediment would then be shipped to an appropriate disposal facility.

Fish tissue, sediment, and surface water would be monitored following sediment removal.

This alternative would remove approximately 96 percent of the surface sediment mercury mass, 96 percent of PCBs mass, and 97 percent of cesium-137 mass. The concentrations of mercury would be reduced by an es-

Peconic River Working Group members inspect a portion of the river where a pilot test had been completed.

timated 91 percent, of PCBs by 69 percent, and of cesium-137 by 94 percent. Consequently, this alternative would be expected to significantly reduce bioaccumulation in fish and toxicity to aquatic life.

Alternative Three: This alternative would address sediment areas that contain mercury concentrations greater than 9.8 ppm, levels at which effects to aquatic organisms in the sediment could be expected. The sediment removal methods would be the same as described for Alternative Two. Following sediment removal, both edible fish tissue and whole body fish tissue samples would be monitored to evaluate any remaining risks to human health or wildlife. Sediment and surface water would also be monitored after cleanup, and methylmercury would be monitored in relation to remediated areas as well as areas not remediated. While this alternative was developed based on toxicity study results, it would also significantly reduce the areas of contamination.

This alternative would result in an estimated 66 percent removal in the mass of mercury in the surface sediment of the river between the Sewage Treatment Plant on Laboratory property and Schultz Road, a 76 percent removal in the mass of PCBs, and a 77 percent reduction in the mass of cesium-137. The concentrations of mercury would be reduced by an estimated 64 percent, of PCBs by 59 percent, and of cesium-137 by 75 percent. Consequently, this alternative would also be expected to significantly reduce bioaccumulation in fish and toxicity to aquatic life.

Alternative Four: This alternative deals with sediment on Laboratory property separately from sediment off Laboratory property. The average mercury concentration on BNL property after remediation would be less than 1 ppm, with a goal of no sample in any excavated area exceeding 2 ppm. The 1 ppm concentration is expected to protect human health and the environment under current conditions.

Tussock sedges, planted to revegetate a pilot study in March 2002, were blooming in June of the same summer.

This remedy would focus on a more stringent cleanup target concentration off of BNL property. This alternative would allow the greatest flexibility in the uses of the area as County parkland or any potential future development. Sediment would be removed from the ponded areas where methylation leading to bioaccumulation is most likely to occur, as well as other areas containing higher levels of contamination between the Laboratory property line and Connecticut Ave.

The average concentration of mercury with the sediment off of Laboratory property will be less than 0.75 ppm, with a goal of no sample in any excavated area exceeding 2 ppm.

The sediment removal methods are the same as described for Alternative Two. Edible fish tissue and whole body fish tissue samples will be monitored to evaluate any remaining risks to human health or wildlife following sediment removal. Sediment and surface water would also be monitored after cleanup. Methylmercury would be monitored in relation to remediated areas as well as areas not remediated.

This alternative will also address the areas both on and off Laboratory property that are likely to be significant sources of methylmercury leading to bioaccumulation in fish. Addi-

tional areas representing elevated levels of mercury will also be addressed in order to achieve the remedy's goals.

The result of this alternative would be an estimated 92 percent removal of the mass of mercury in the surface sediment in the river between the Sewage Treatment Plant on Laboratory property and Schultz Road, a 93 percent removal of the mass of PCBs, and a 91 percent removal in the mass of cesium-137. The concentrations of mercury would be reduced by an estimated 86 percent, PCBs by 70 percent, and cesium-137 by 88 percent. This alternative would therefore be expected to significantly reduce bioaccumulation in fish and toxicity to aquatic life.

XI. Analysis and Comparison of Alternatives

The U.S. EPA in 40 Code of Federal R

egulations Chapter I, Part 300 (Section 300.430(e)(9)(iii)) establishes nine evaluation criteria that must be considered in the selection of a remedial action alternative. These evaluation criteria and a brief description of their content are summarized below.

1. Overall Protection of Human Health and the Environment. Alternatives are to be assessed to determine whether they provide adequate long and short-term protection to human health and the environment.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). Alternatives are to be assessed to determine whether they attain applicable or relevant and appropriate requirements under federal and state environmental laws.

3. Long-Term Effectiveness and Permanence. Alternatives are to be assessed for the long-term effectiveness and permanence they afford. Factors include:

- The magnitude of residual risk remaining, considering volume, toxicity, mobility and propensity to bioaccumulate

- Adequacy and reliability of controls.

4. Reduction of Toxicity, Mobility, or Volume. Alternatives are to be assessed the degree to which alternatives employ recycling or treatment that reduce the toxicity, mobility, or volume of waste.

5. Short-Term Effectiveness. The short-term impacts of each alternative are to be assessed. Risk to the community, impacts to Laboratory property and workers, environmental impacts of the action, and the time needed to finish work are considered.

6. Implementability. The ease of implementing the alternative is to be assessed. Technical and administrative feasibility of an alternative, including the availability of materials, resources, and services required for cleanup, are considered.

7. Cost. The cost of alternative implementation is to be assessed. Costs include capital, operation, and maintenance.

8. State Acceptance. The alternatives evaluation should include consideration of the state's concerns and comments related to the ARARs.

For More Information

For more information on this project or Brookhaven National Laboratory's environmental restoration program in general, contact:

Jen Clodius
Community Relations
Brookhaven National Lab
Building 130
P.O. Box 5000
Upton, NY 11973-5000
(631) 344-2489
clodius@bnl.gov

United States Department Of Energy

The **U.S. Department of Energy (DOE**) is one of the three agencies identified in the Interagency Agreement, which establishes the scope and schedule of remedial investigations at BNL. The U.S. Environmental Protection Agency and the New York State Department of Environmental Conservation are the two others. Correspondence with DOE staff concerning this project can be found in the Administrative Record under Operable Unit V.

For additional information concerning DOE's role in preparing this proposed plan, contact:

John Carter
Community Affairs Director
U.S. Department of Energy
Brookhaven Site Office
P.O. Box 5000
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(631) 344-5195
jcarter@bnl.gov

Table 3. Estimated Average Post-Remediation Contaminant Levels[a]

Contaminant	Alt. One	Alt. Two	Alt. Three	Alt. Four
Mercury (ppm)	3.6	0.3	1.3	0.5
PCBs (ppm)	0.9	ND-0.03	ND-0.03	ND-0.03
Cs-137 (pCi/g)	7.0	0.4	2.0	0.8

Note: average PCB concentrations are difficult to estimate due to the presence of numerous samples with non-detectable (ND) levels.

[a] For comparison between alternatives, Alternative 4 only includes the area between the BNL STP and Schultz Road.

9. Community Acceptance. The alternatives evaluation includes consideration for community support, opposition, and reservation.

The DOE and BNL have compared all four Peconic River sediment remediation alternatives against these nine evaluation criteria. This detailed evaluation is provided in the Feasibility Study Addendum.

The average post remediation levels of contaminants expected to remain for each of these alternatives are compared below in Table 3. These values represent average concentrations in the surface sediment (top six inches) of both the remediated and non-remediated areas after cleanup and include the concentrations expected to be present in targeted cleanup areas after cleanup is completed.

Table 4 provides the cost and the percent removal of mercury, PCBs and cesium-137 for the various alternatives.

A brief summary of the analysis is provided below:

Table 4

Cost of Cleanup by Cleanup Alternative

Alternative	Area to be cleaned up (acres)	Cost	Mercury percent removal	PCBs percent removal	Cesium-137 percent removal
1	0	$0	0	0	0
2	20.4	$12,150,000	96	96	97
3	7.6	$5,821,000	66	76	77
4 (This alternative also includes an additional 2.4 acres in the Manor Road area with a Mercury concentration goal of less than 2 ppm following the cleanup)	19.8	$11,461,000	92	93	91

Note: To compare alternatives, the percent mercury removal is from the BNL STP and Schultz Road.

[a] This alternative also includes an additional 2.4 acres in the Manor Road area with a mercury concentration goal of less than 2 ppm following the cleanup.

Overall Protection of Human Health and the Environment: Alternative 1, No Action, does not provide overall protection to human health or the environment because no contamination is removed. The active remedial alternatives are all expected to provide overall protection of human health and the environment. The alternatives differ in the basis for and amount of contaminant removal.

Alternative 1 provides the greatest degree of protection to the wetlands in the short-term because no wetlands will be disturbed. Alternative 1 will not reduce toxicity of the sediment to benthic organisms or reduce risks caused by bioaccumulation of contaminants in the food chain because no contaminants are removed.

Alternative 2 provides the highest degree of disturbance to the wetlands since the greatest amount of

turbance to the wetlands and Alternative 3 the least. However, experience from the pilot studies indicates that the wetlands can be successfully restored.

Alternative 2 removes the most contaminants, Alternative 4 removes almost as much of the contaminants, and Alternative 3 the least. Alternative 4 also targets areas with high total levels of contamination and areas that contribute to bioaccumulation of mercury (methylation areas). Alternative 3 provides less reduction of risks caused by bioaccumulation of contaminants in the food chain.

Alternatives 2, 3 and 4 will also remove sediments containing the three contaminants (copper, mercury, and silver) found to show evidence of direct toxicity to aquatic life living in the sediment. Reduction would be to levels below those expected to cause adverse effects.

Compliance with ARARs: All cleanup alternatives comply with ARARs. Federal and New York State ARARs pertaining to excavation and restoration of the River will be met for Alternatives 2, 3 and 4.

Long-Term Effectiveness and Permanence: Alternative 1, No Action, is not permanent and not effective in the long term since contamination remains. Alternative 3 is not as effective in the long term because insufficient contaminant removal may allow continued risks to human health and the environment. Alternatives 2 and 4 are protective of human health in the long-term. Alternative 4 is more effective at preventing bioaccumulation of contaminants in the long-term. Long Term environmental impacts are mitigated by restoration of the wetlands and removal of project-required roads in Alternatives 2, 3 and 4. Pilot Studies performed in the Peconic River had demonstrated that the wetlands could be successfully restored.

Reduction of Toxicity, Mobility, or Volume: Alternative 1 does not reduce toxicity, mobility or volume. Alternatives 2, 3 and 4 reduce mobility since the contaminants are being removed from the River so that they cannot spread further, reduce toxicity by removing exposure pathways and reduce volume somewhat by drying the excavated sediments. Alternative 4, in particular, reduces toxicity by targeting the sediments that most contribute to accumulation in biota.

Short-Term Effectiveness. The execution of Alternatives 2, 3 and 4 adds no or minimal risk to the community or project workers. Construction type risks are easily controlled through adequate work planning and standard health and safety practices.

Implementability: Alternative 1 is the easiest to implement since it involves no action. The sediment removal and wetlands restoration technologies used in Alternatives 2, 3 and 4 have been demonstrated in Pilot Studies in the Peconic River and are implementable at the full-scale level.

Cost: Costs for each alternative are provided in Table 5. Alternative 4 and Alternative 2 costs are very similar (within $689,000). However, Alternative 4 cleanup extends two miles further downstream and has a greater reduction of potential risk to human health and disturbs less wetlands.

Additional acreage has been added to Alternative 4 based on extensive discussions with the regulators. The expansion will include the cleanup of an additional area of 2.4 acres at an estimated additional cost of $1,138,000.

Community Acceptance: The community has had full and active participation in the planning and development of the Peconic River restoration

Table 5.

Comparison of Alterniatves

	Baseline Net Cost	Total Area of Remediated Streambed	Streambed to be remediated (linear feet)	Percent Mercury Removal	Volume of sediment removed (cubic yards)
Alternative 1 No Action	$197,600	0	0	0	0
Alternative 2 Remove sediment containing mercury concentrations greater than 1.06 parts per million (ppm) from the Sewage Treatment Plant to Schultz Road	$12,150,000	20.4 acres	18,500	96	24,700
Alternative 3 Remove sediment containing mercury concentrations greater than 9.8 ppm from the Sewage Treatment Plant to Schultz Road	$5,821,000	7.6 acres	7,070	66	9,250
Alternative 4 Remove the sediment layer down to sand from depositional areas and from areas identified as preferential methylmercury sources. Achieve average mercury concentrations of less than 1.0 ppm on BNL property and less than 0.75 ppm off BNL property to Schultz Road. (*This alternative also includes an additional 2.4 acres in the Manor Road area with a mercury concentration goal of less than 2 ppm following the cleanup*.)	$11,461,000	19.8 acres	14,720	92	24,018

Note: To compare alternatives, the percent mercury removal is from the BNL STP to Schultz Road.

program. Community acceptance for this proposal will be determined after all public comments received during the public comment period are reviewed and will be documented in the Record of Decision. BNL will continue to work with the community through all phases of remedy implementation.

State Acceptance: Final State acceptance will be determined when the State concurs on the Record of Decision.

XII. Proposed Alternative

Expansion of Alternative Four to include areas adjacent to Manor Road, as shown in Figure 3, is proposed as the alternative that best addresses the CERCLA evaluation criteria, particularly Overall Protection of Human Health and the Environment. A summary of this Recommended Action is provided

in Table 5. This proposal is based on the results of the comparative analysis presented in the Feasibility Study Addendum and extensive discussion with the Suffolk County Department of Health Services. The expanded Alternative 4 option also meets community expectations to minimize impacts to the wetlands and upland areas. The expanded Alternative 4 substantially removes elevated levels of contaminants that could lead to transport of contaminants and bioaccumulation.

Suffolk County Legislator Michael Caracciolo, DOE Deputy Site Manager Frank Crescenzo, and BNL Project Manager Skip Medeiros examine a pilot-study area two years after the area was cleaned up and the wetland was restored.

XIII. Administrative Record Repository Locations

The *Feasibility Study Addendum*, *Proposed Remedial Action Plan*, *Baseline Human Health Risk Assessment*, and all Administrative Record documents can be found at the following locations:

Longwood Public Library
800 Middle Country Road
Middle Island, NY 11953
Phone: (631) 924-6400

Mastics-Moriches-Shirley Community Library
407 William Floyd Parkway
Shirley, NY 11967
Phone: (631) 399-1511

Brookhaven National Laboratory Research Library
Technical Information Division
Building 477A
Upton, NY 11973
Phone: (631) 344-3483

U.S. EPA — Region II Administrative Records Room
290 Broadway, 16th floor
New York, NY 10007
Phone: (212) 637-3185

How You Can Participate

Whether you are new to the BNL cleanup and are reviewing this type of document for the first time, or you are familiar with the Superfund process, you are invited to:

• **Read** this proposed plan and review additional documents in the Administrative Record file at Information Repository locations listed on pages 13 and 21, and access fact sheets and other information about the Lab and the cleanup process on the internet at http://www.bnl.gov/erd

• **Call** BNL Community Relations (631-344-5658) to ask questions, request information, or make arrangements for a briefing.

• **Attend** a public meeting or information session (listed on page 6).

• **Comment** on this plan at the meeting or submit written comments (see comment form on back cover).

• **Contact** the DOE Director of Community Affairs at BNL (see page 17).

XIV. References

The following reports and other documents pertaining to Operable Unit V are included in the Laboratory's Administrative Record. These documents contain information that will be used to determine the final remedy.

1. The *Operable Unit V Remedial Investigation Report* (1998) describes the nature and extent of contamination at the Laboratory property. The Baseline Risk Assessment portion of this document reports on the potential risk to human health and the environment, both now and in the future, in the absence of cleanup.

2. The *Plutonium Contamination Characterization and Radiological Dose and Risk Assessment Report* (2000) describes the results of additional sampling of Peconic River sediment, surface water, groundwater, and soils from the Laboratory's sewage treatment plant to the Route 105 bridge in Riverhead. It also includes data on sludge samples from a retired and capped former sewer line. These materials were analyzed for plutonium and other radionuclides. The radionuclide levels are within acceptable levels as established by the EPA.

3. The *Operable Unit V Feasibility Study* describes how the original cleanup options presented in 2000 were developed and evaluated.

4. The *Baseline Human Health Risk Assessment, Brookhaven National Laboratory Operable Unit V Peconic River* (2003) details the assumptions and conclusions for determining the potential for human health risk.

5. The *Feasibility Study* (1998) evaluates the various alternatives considered for cleanup of all areas of Operable Unit V.

6. The *Feasibility Study Addendum* (2002) provides a detailed evaluation of the potential for success of the technologies identified during the December 2000 Workshop.

7. The *Feasibility Study Addendum Operable Unit V Peconic River* issued concurrent with this PRAP in 2004, provides the basis for this Proposed Remedial Action Plan.

8. *Final Action Memorandum, Peconic River Removal Action for Sediment on BNL Property*, January 20, 2004, summarizes the on-site cleanup of the Peconic River.

(Fold here; please use clear tape to seal)

Michael Holland
U.S. Department of Energy-Brookhaven Site Office
P.O. Box 5000
Brookhaven National Laboratory
Upton NY 11973-5000

What's Your Opinion?

The U.S. Department of Energy wants to hear from you to help it effectively decide what actions to take at Brookhaven National Laboratory regarding:

Proposed Plan for Operable Unit V, Peconic River

> Please submit comments by 6/25/04 <

Comments:

Signature:

Name (print, please):

Address:

Date:

Thank you!

Comments may be emailed toPeconicRiver@bnl.gov, faxed to 631-344-3444, or this mailer may be used.