U. S. DEPARTMENT OF ENERGY
BROOKHAVEN NATIONAL LABORATORY
CERCLIS Number NY7890008975

FINAL
OPERABLE UNIT V
RECORD OF DECISION

For

Area of Concern 30 (Peconic River)

November 3, 2004

Prepared by

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I. DECLARATION OF THE RECORD OF DECISION

SITE NAME AND LOCATION

OPERABLE UNIT V
BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK
CERCLIS Number NY7890008975

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the selected remedial actions for the portions of Operable Unit V (OU V) pertaining to the Peconic River, Area of Concern 30 (AOC 30), at the Brookhaven National Laboratory (BNL) facility in Upton, New York. All other AOCs within the Operable Unit were addressed in the Sewage Treatment Plant ROD issued in January 2002.

The remedial actions were selected in accordance with the *Comprehensive Environmental Response, Compensation and Liability Act* of 1980 (CERCLA), as amended, (hereinafter jointly referred to as CERCLA), and are consistent, to the extent practicable, with the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan). This decision is based on the documents included in the Administrative Record for the BNL site.

The State of New York concurs with the selected remedial actions.

ASSESSMENT OF THE SITE

The response actions selected in this ROD are necessary to protect public health, welfare, or the environment from actual or threatened releases of hazardous substances into the environment

DESCRIPTION OF THE SELECTED REMEDY

Operable Unit V is one of six operable units at the BNL site. This ROD only addresses action for the Peconic River Area of Concern (AOC 30), which is designated Operable Unit V. Remedies for other AOCs and Operable Units are, or will be, selected in other RODs. This ROD documents remedies that are consistent with the overall site cleanup strategy for the BNL facility.

Several alternatives were evaluated for cleanup of the sediment in the Peconic River. Based on these evaluations, the U.S. Department of Energy (DOE) is proposing cleanup actions (called the remedy), which are summarized below. The public was invited to comment on the proposed remedies as well as on the other alternatives considered.

Based on an evaluation of the alternatives, and years of study, community interaction, and discussions with the regulatory agencies, DOE believes that the alternative for sediment cleanup that represents the best balance of the Environmental Protection Agency (EPA) remedy selection criteria is the removal of sediment in depositional areas and other areas that promote methylmercury production. These areas may pose a risk to aquatic organisms living in the sediment and may contribute significantly to the bioaccumulation of mercury in fish and the potential risks to human health and the environment. This includes sediment in the riverbed as well as adjacent wetlands where the potential for methylmercury production may be greatest.

The details of the selected remedy are provided below:

On Laboratory property, the response actions selected in the Action Memorandum Peconic River Removal Action for Sediment on BNL Property will constitute the final action for this stretch of the Peconic River.

The Action Memorandum Peconic River Removal Action for Sediment on BNL Property states that sediment will be removed from designated depositional areas on BNL property.

Outside Laboratory property, the response actions selected in the Action Memorandum Peconic River Removal Action for Sediment outside BNL Property will constitute the final action for the stretch of the Peconic River outside BNL property. The Action Memorandum Peconic River Removal Action for Sediment outside BNL Property states that sediment will be removed from designated depositional areas and preferential mercury methylation areas outside BNL property. The locations of these areas along the Peconic River are illustrated on Figure A. This alternative deals with sediment on Laboratory property separately from sediment off Laboratory property.

- The on-Laboratory cleanup areas are shown in Figure B. On Laboratory property, this alternative would focus on sediment in designated depositional areas. For the sections of the river on Laboratory property, the average mercury concentration after remediation will be less than 1 ppm, with a goal that all mercury concentrations in the remediated areas are less than 2 ppm following the cleanup. The 1 ppm limit is expected to protect human health and the environment under current conditions.

- The outside Laboratory cleanup areas are shown in Figures B and C. This remedy would focus on a more stringent cleanup target concentration outside BNL property. This alternative would also 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 mercury concentration within the sediment outside Laboratory property will be less than 0.75 ppm, with a goal that all mercury concentrations in the remediated areas are less than 2 ppm following the cleanup.

- 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. This will include near-term monitoring to establish the basis for the long-term monitoring program. 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 methylmercury water column sampling, sediment sampling and fish sampling and cover areas of interest on and off BNL property.

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. At that time, DOE will submit a notification for approval of the removal of the sediment trap to EPA and NYSDEC. 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.

The DOE does not envision any sale or transfer of property in the Peconic River area. If it were to occur, the sale or transfer of BNL property would meet the requirements of Section 120 (h) of CERCLA, as amended, Title 42 U.S. Code, Sec. 9620 to ensure that future users are not exposed to unacceptable levels of contamination.

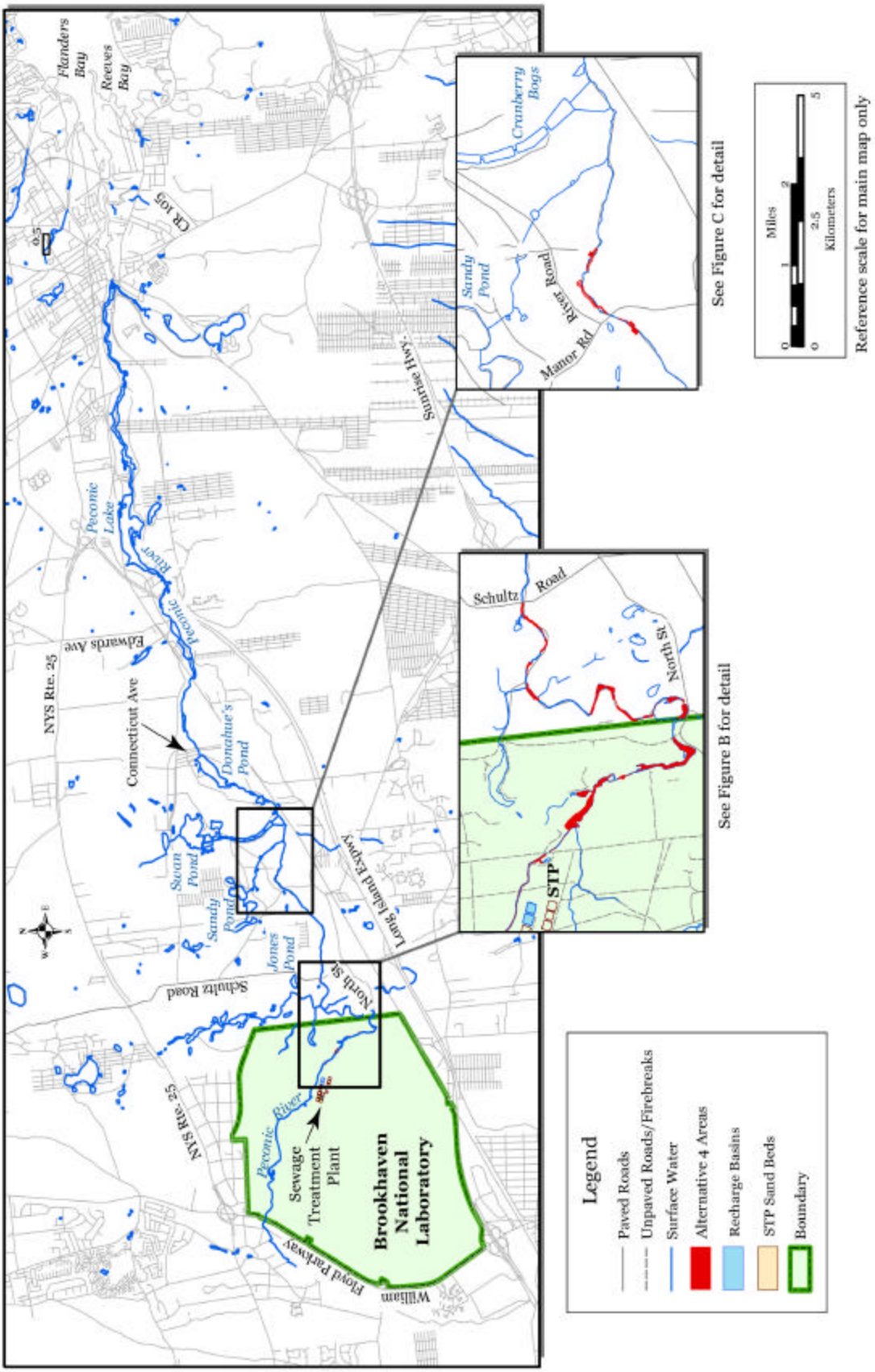


Figure A. The Peconic River. The sections of the river that will be cleaned up are indicated in the two call-out boxes. These two sections are shown in detail in Figures B and C.

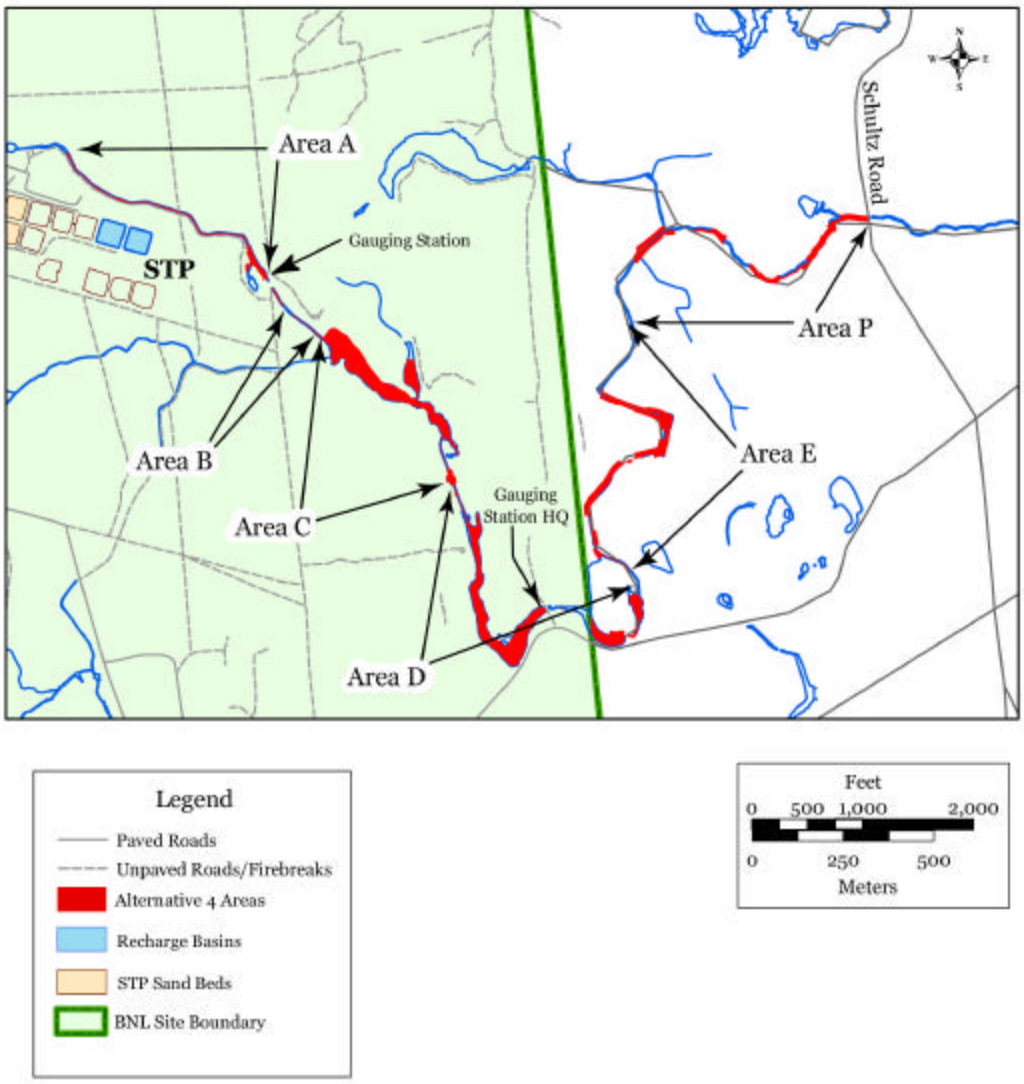


Figure B.
OU V Peconic River Cleanup Areas Between the BNL Sewage Treatment Plant and Schultz Road

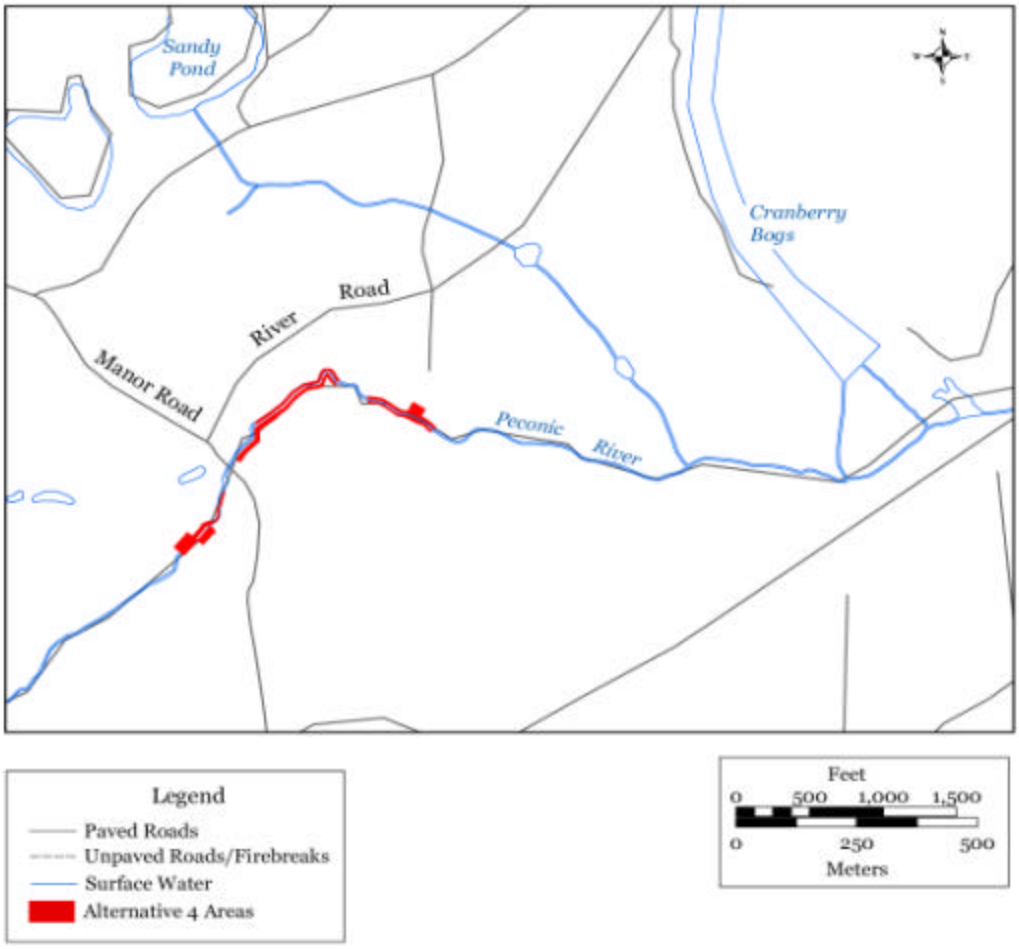


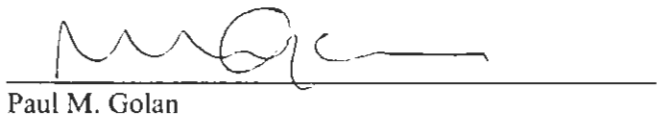
Figure C.
OU V Peconic River Cleanup Areas Adjacent to Manor Road

STATUTORY DETERMINATION

The selected remedies are protective of human health and the environment, comply with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial actions, and are cost effective. These remedies utilize permanent solutions and alternative treatment technologies to the maximum extent practical for this Site. Treatment of contaminated soil was not found to be practical. The evaluated remedies do not satisfy the statutory preference for treatment as a principal element. However, techniques that minimize waste volumes or further stabilize wastes to meet disposal facility waste acceptance criteria have been adopted through the use of physical drying and the use of Quiklime to reduce water content and the disposed sediment mass.

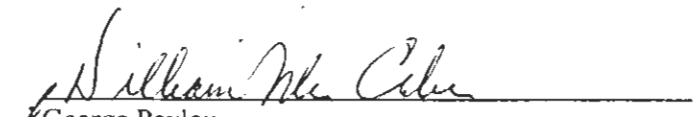
Because this remedy will result in some hazardous substances remaining in sediment, a review will be conducted annually for the first five years after the commencement of remedial action to ensure that the remedies continue to provide adequate protection of human health and the environment. Following each review and the formal Five-Year review, the need for additional action will be evaluated.

AUTHORIZING SIGNATURES



9.29.04
Date

Paul M. Golan
Acting Assistant Secretary for Environmental Management
U.S. Department of Energy



1-24-05
Date

George Pavlou
Director, Emergency & Remedial Response Division
U.S. Environmental Protection Agency – Region 2

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LIST OF ACRONYMS

ALARA	As Low as Reasonably Achievable
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
BNL	Brookhaven National Laboratory
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CTE	central tendency exposure
DOE	United States Department of Energy
ECL	Environmental Conservation Law
EPA	United States Environmental Protection Agency
FS	Feasibility Study
IAG	Interagency Agreement
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mrem	millirem
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NYCRR	New York State Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OU	Operable Unit
PCB	polychlorinated biphenyls
pCi/g	picoCuries per gram
ppm	parts per million
PRAP	Proposed Remedial Action Plan
RAO	Remedial Action Objective
RCRA	*Resource Conservation and Recovery Act*
RESRAD	RESidual RADioactive Material Guideline Computer Code
RME	reasonable maximum exposure
ROD	Record of Decision
SCDHS	Suffolk County Department of Health Services
STP	Sewage Treatment Plant
USC	United States Code
µg/L	micrograms per liter

II. DECISION SUMMARY

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Brookhaven National Laboratory (BNL) is a Federal facility owned by the U.S. Department of Energy (DOE). BNL conducts research in physical, biomedical, and environmental sciences and energy technologies.

BNL is located about 60 miles east of New York City, in Upton, Suffolk County, New York, near the geographic center of Long Island (Figure 1-1). Distances to neighboring communities from BNL are as follows: Patchogue 10 miles west-southwest, Bellport eight miles southwest, Center Moriches seven miles southeast, Riverhead 13 miles east, Wading River seven miles north-northeast, and Port Jefferson 11 miles northwest.

The BNL property, consisting of 5,321 acres, is an irregular polygon; each side is approximately 2.5 miles long. Figure 1-2 is a current land-use map of the BNL site. The developed portion of the site includes the principal facilities, which are located near the center of the site on relatively high ground. The developed portion is approximately 900 acres, 500 acres of which were originally developed for Army use. For the most part, the remaining 400 acres are occupied by various large research machine facilities. The outlying facilities occupy approximately 550 acres and include an apartment area, Biology Field, Former Hazardous Waste Management Area, Sewage Treatment Plant, firebreaks, and the Former Landfill Area. The terrain is gently rolling, with elevations varying between 40 to 120 feet above sea level. The land lies on the western rim of the shallow Peconic River watershed (Figure 1-3), with a tributary of the Peconic River rising in marshy areas in the northern section of the tract.

The sole-source aquifer beneath BNL comprises three water-bearing units: the Moraine and outwash deposits, the Magothy Formation, and the Lloyd Sand Member of the Raritan Formation. These units are hydraulically connected and make up a single zone of saturation with varying physical properties extending from a depth of five to 1,500 feet below the land surface. These three water-bearing units are designated as a "sole source aquifer" by the U.S. Environmental Protection Agency (EPA) and serve as the primary source of drinking water for Nassau and Suffolk Counties.

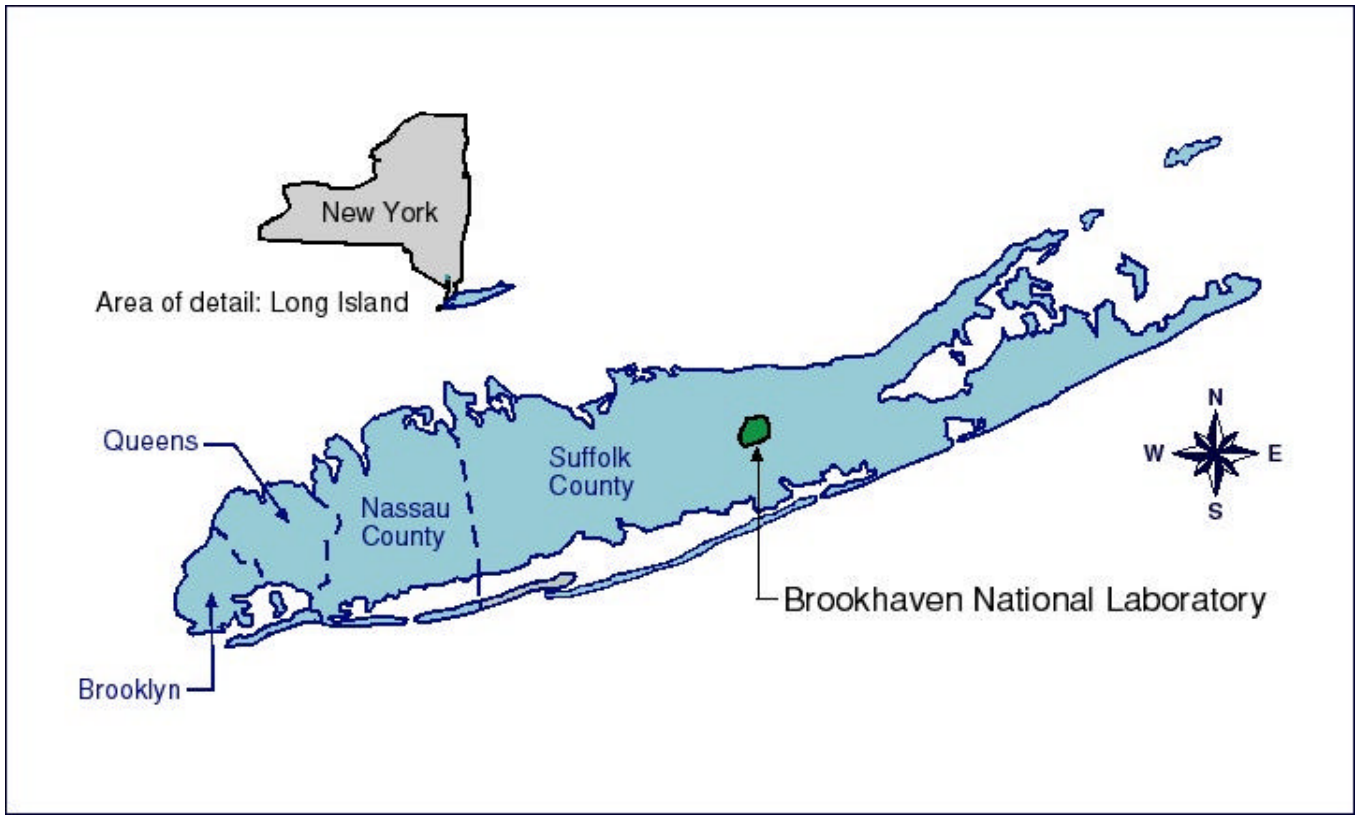

Figure 1-1. Regional Site Location Map

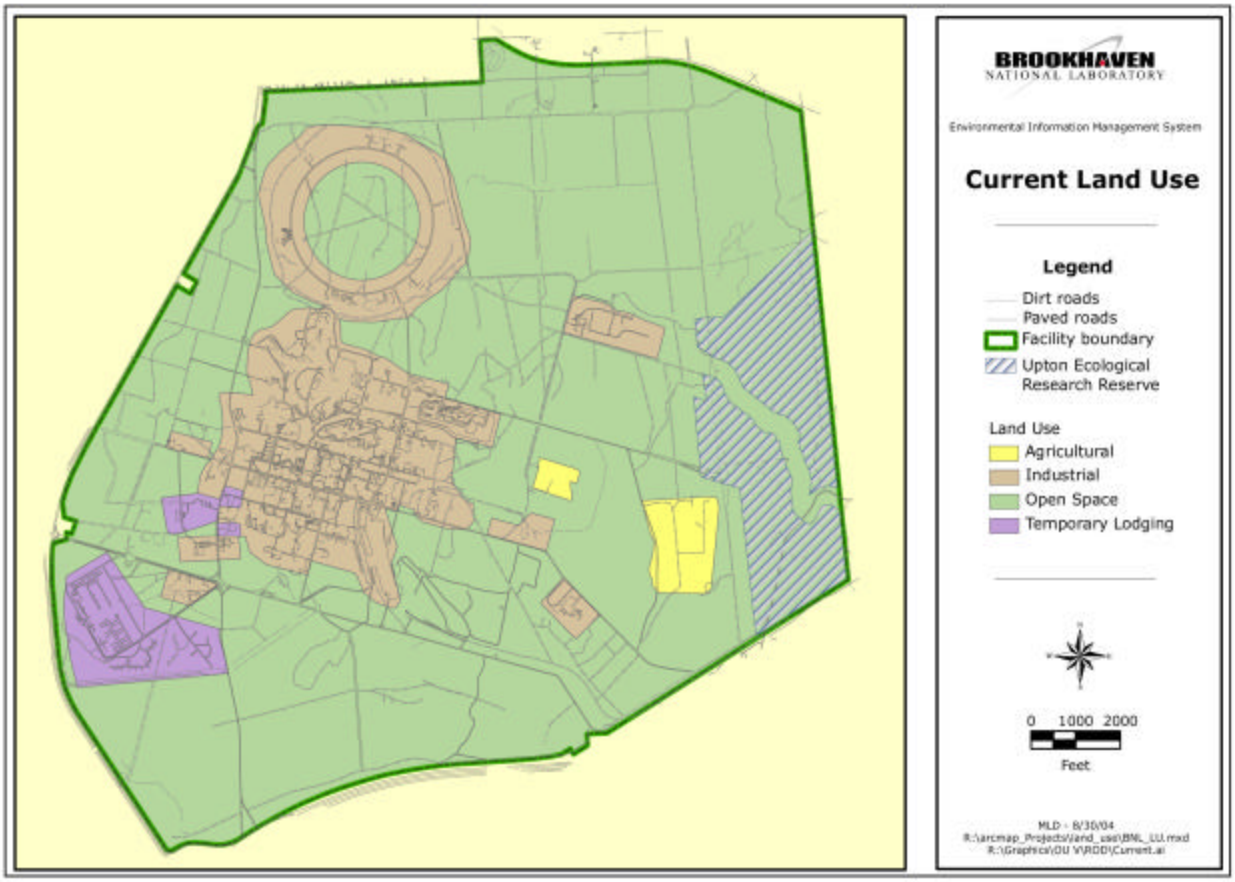

Figure 1-2. Current Land Use Map

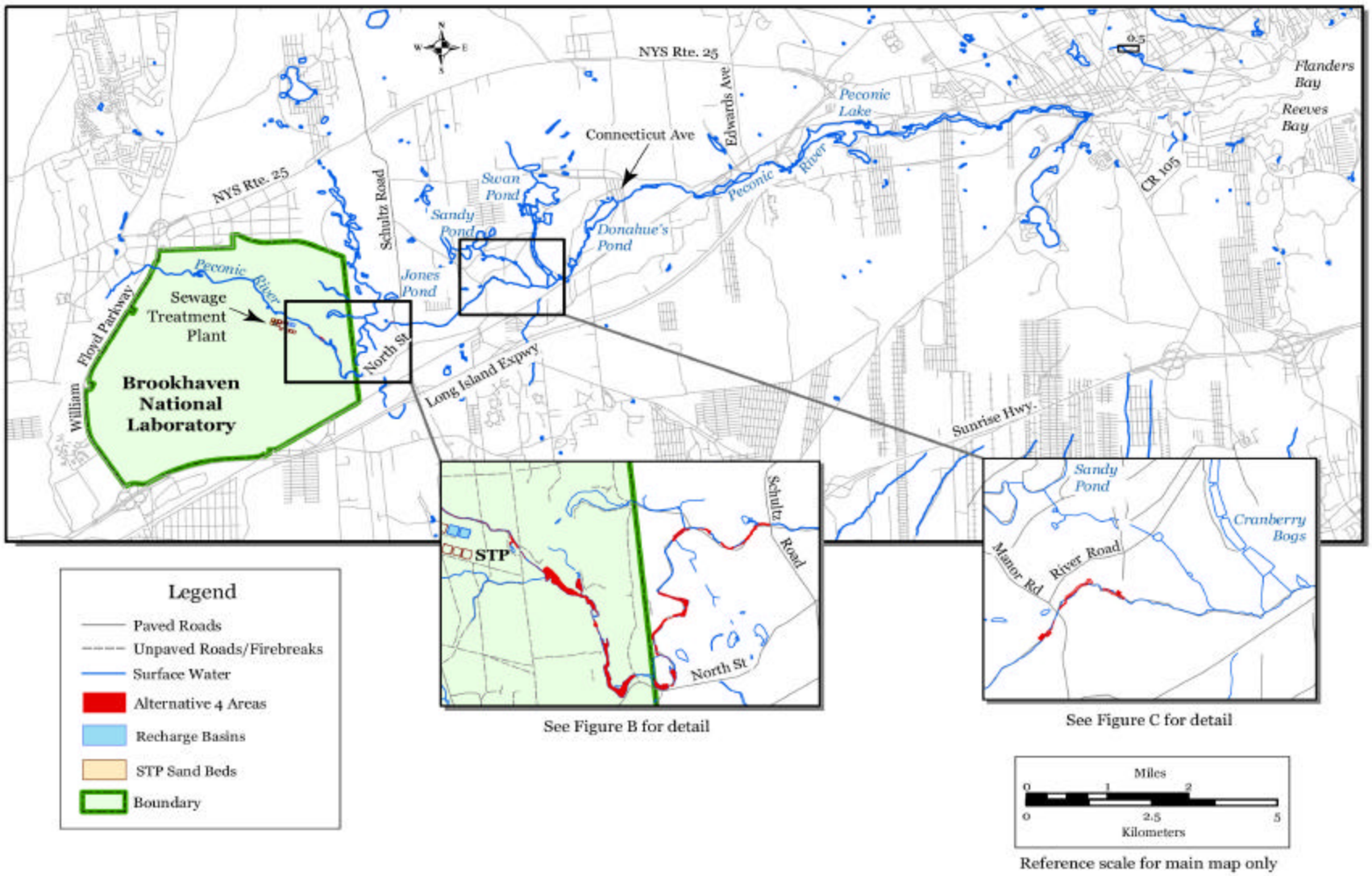

Figure 1-3. The Peconic River. The sections of the river that will be cleaned up are indicated in the two call-out boxes, These two sections are shown in detail in Figures B and C.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The U.S. Army occupied the BNL site, formerly Camp Upton, during World Wars I and II. Between the wars, the Civilian Conservation Corps operated the site. It was transferred to the Atomic Energy Commission in 1947, to the Energy Research and Development Administration in 1975, and to DOE in 1977.

In 1980, the BNL site was placed on New York State's Department of Environmental Conservation (NYSDEC) list of Inactive Hazardous Waste Sites. On December 21, 1989, the BNL facility was included on EPA's National Priorities List. Subsequently, the EPA, NYSDEC, and DOE entered into a Federal Facilities Agreement (herein referred to as the Interagency Agreement; [IAG]) that became effective in May 1992 (Administrative Docket Number: II-CERCLA-FFA-00201) to coordinate the cleanup. The IAG identified areas of concern that were grouped into operable units to be evaluated for response actions. The IAG requires a remedial investigation/feasibility study for Operable Unit V, pursuant to 42 United States Code (USC) 9601 et seq, to meet CERCLA requirements. The IAG also requires cleanup actions to address the identified concerns.

BNL's Response Strategy Document (SAIC 1992) grouped the identified areas of concern into seven operable units; several were subsequently combined. Remedial investigations and risk assessments were conducted to evaluate the nature and extent of contamination and the potential risks associated with the area of concern addressed in this ROD. A Feasibility Study (IT 1998) was prepared to evaluate the alternatives for remediating the contaminated groundwater, sediment and soil.

This ROD addresses the Peconic River (AOC 30) in OU V. Other AOCs in OU V include the Sewage Treatment Plant (AOC 4), the Sewer Lines (AOC 21) and the Eastern outside-Laboratory Tritium Plume (AOC 23); these were addressed in a separate ROD. A portion of the Peconic River AOC is located in the northeastern section of the Laboratory property along the eastern property boundary (Figure 2-1). The remainder of the Peconic River AOC is located along the Peconic River off BNL property (Figures 5-1 and 5-2).

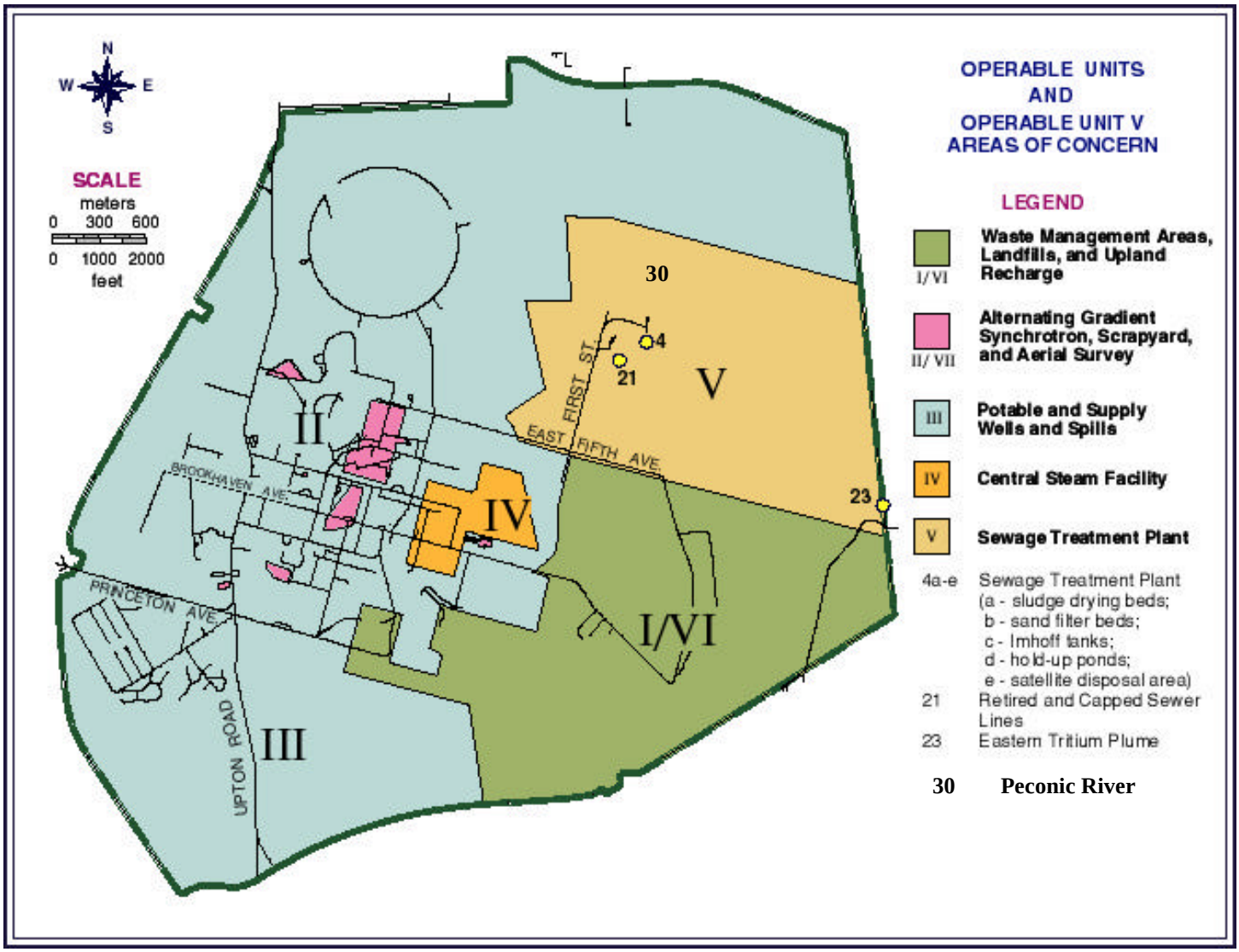

Figure 2-1. BNL Operable Units

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

A variety of activities are used to provide information and to seek public participation, including compilation of a stakeholder mailing list, community meetings, availability sessions, roundtables, working groups, site tours, workshops, and fact sheets. The Administrative Record, which documents the basis for removal and remedial actions, was established and is maintained at the libraries listed below.

Mastics-Moriches-Shirley Community Library
301 William Floyd Parkway
Shirley, NY 11967
631-399-1511

Brookhaven National Laboratory
Research Library, Bldg. 477A
Upton, NY 11973
631-344-3483

U.S. EPA - Region II
Administrative Record Room
290 Broadway, 18th Floor
New York, New York 10007
212-637-4308

Consistent with CERCLA guidance and State requirements, community involvement and participation have been solicited for all significant documents and decisions associated with this ROD. The final scope of work, risk assessment documents, remedial investigation reports, the feasibility study and the proposed plan were made available for public review.

Community involvement activities included the review of the *Operable Unit V Feasibility Study* (IT 1998b), the *Plutonium Contamination Characterization and Radiological Dose and Risk Assessment Report* (IT 2000) and the *Proposed Plan* (BNL 2000). A public comment period for the review of the OU V Proposed Plan began on February 15, 2000. An eight-page summary of the proposed plan was mailed to about 2,500 homes on the Environmental Restoration Division mailing list. Two roundtable meetings to discuss the proposed remedy were held on February 23rd and 29th at BNL and Riverhead High School, respectively. Over 30 members of the community attended these two meetings. A public meeting, attended by approximately 40 people, was held on March 2, 2000 in Berkner Hall Auditorium at Brookhaven National Laboratory. Copies of the Proposed Plan, the eight-page summary, and other related information material were available. Based on the concern of the community that adequate time is provided to conduct a comprehensive review and comment on this remedial action decision, a 60-day extension to the public comment period was granted. The public comment period ended on May 15, 2000.

In the spring of 2000, a proposed plan for the area known as Operable Unit V was presented for public comment. Operable Unit V includes BNL's Sewage Treatment Plant (STP), old sewage pipes no longer in service, groundwater related to sewage treatment plant operations, and sediment in the upper portions of the Peconic River. With the exception of the Peconic River sediment cleanup, the majority of the public accepted all of the cleanup decisions associated with OU V and the cleanup actions were accepted by the regulatory agencies. These decisions were finalized in a ROD issued in January 2002. Cleanup activities associated with these areas have been completed.

The decision for cleanup of the Peconic River sediment was deferred as a result of input received during the 2000 public comment period. The initial proposed plan identified depositional areas in the river

where sediment would be removed, followed by a restoration of the wetland areas as appropriate. 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. Inherent in the comments was the need to further evaluate technologies that might be able to clean the sediment with less disruption to the wetlands, and a request to conduct 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 could be achieved and a final decision could be made.

To develop the cleanup plan, and in response to the public concerns raised during the initial comment period, the DOE completed numerous actions to better delineate the contamination and to investigate technologies that might be able to clean the sediment with less disruption to the wetlands.

In December 2000, a workshop involving national and international remediation and environmental restoration companies was convened at BNL. The workshop, attended by regulatory agency staff, BNL and DOE project staff, other vendors, and many community members, focused on the identification of alternative technologies that might be capable of reducing wetland damage while achieving the necessary cleanup. Four technologies with promise emerged from this workshop as determined by the project staff with input from community participants in the workshop. The technologies worthy of further investigation included electrochemical remediation, phytoremediation with native plant species, vacuum guzzling, and sediment removal with subsequent wetland restoration.

Two technologies, vacuum guzzling and conventional sediment removal followed by restoration, were pilot tested to verify their capabilities under Peconic River conditions. 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. Details about these technologies and the pilot testing are available on the BNL website at the following address: http://www.bnl.gov/erd/peconic.html. Both of these technologies are now part of this ROD.

The attached Responsiveness Summary section for the Action Memorandum Peconic River Removal Action for Sediment on BNL Property (Appendix A) and Proposed Remedial Action Plan summarizes the written and oral comments and DOE's responses on the preferred alternatives.

Level of Community Support for the Proposed Alternative

During the original public comment period in January 2000, many comments were received on the OU V documents. Concerns submitted by members of the public regarding the Peconic River ranged from doing no cleanup at all to increasing the scope of the cleanup. There also was concern about the potential for wetland damage. As discussed in Section 3.0, all of the community concerns shared since the 2000 public meeting have been addressed. There were only six public comment letters received on the 2004 Proposed Plan and the comments ranged from strong support for the proposed remedy to recommended changes to restoration planning.

Changes in the Remedy Presented in the Feasibility Study and Proposed Remedial Action Plan

Several comments received during the public comment period addressed two aspects of the wetland restoration portion of the remedy. DOE has included the following details in the wetland restoration process:

1) Peconic River soil will be used to the maximum extent possible to restore grade in low-marsh areas. The soil will be obtained from open water sections of the river that have met cleanup goals following contaminant removal. The use of topsoil from sources other than the Peconic River will be minimized or eliminated to the maximum extent practicable.
2) Peconic River wetland plants obtained from remediated sections of the Peconic River on Laboratory property will be transplanted to restore cleaned up wetlands on Laboratory property and plants obtained from remediated sections of the river in Robert Cushman Murphy County Park to restore cleaned up wetlands in the Suffolk County parklands. The root systems of each transplant will be thoroughly washed of sediments prior to transporting to the transplant site. The use of plants obtained from a location other than the Peconic River area will be avoided to the maximum extent practicable.

4.0 SCOPE AND ROLE OF OPERABLE UNIT AND RESPONSE ACTION

This ROD deals with the remedy for the Peconic River, (OUV, AOC30). The remedy focuses on both the protection of the environment and the protection of human health in areas where people may be exposed to contaminants. Sediment that is contaminated with mercury will be removed to meet the cleanup goals in depositional areas (see Section 7.4) and sediment from areas identified as preferential mercury methylation areas will also be removed. This action will reduce the risk to the environment and also significantly reduce potential human health risks by diminishing mercury concentrations in fish. Mercury has been measured in edible fish tissue and a potential health hazard may exist for people and wildlife consuming fish from the upstream section of the Peconic River either on or off of Laboratory property. Sediment will be removed from the Peconic River using conventional sediment removal methods. Sediment removal will be followed by wetland restoration. This technique was successfully pilot-tested to verify its appropriateness for Peconic River conditions.

4.1 Interim Response Actions Authorized Through Action Memorandums

The DOE determined that expedited removal of the contaminated Peconic River sediments was an effective way to protect human health and the environment. Pursuant to this determination and in consultation with the EPA and NYSDEC, the DOE decided to undertake two removal actions in accordance with the BNL Interagency Agreement.

These removal actions are consistent with the final remedy and are being adopted as final actions in this Record of Decision.

Removal Action for Peconic River Sediments on BNL Property

This removal action was authorized by approval of the Action Memorandum for the Peconic River Removal Action for Sediment on BNL Property. This removal action was undertaken with the following objectives:

- Reduce site-related contaminants (e.g., mercury) in sediments to levels protective of human health.
- 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 the BNL property.

Completion of this removal action will be documented in a completion report.

Removal Action for Peconic River Sediments Outside BNL Property

This removal action was authorized by approval of the Action Memorandum for the Peconic River Removal Action for Sediment Outside BNL Property. This removal action was undertaken with the following objectives:

- 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 from locations outside BNL property to other areas where risk may become unacceptable.

Completion of this removal action will be documented in a completion report.

4.2 Remedial Actions within the Scope of this ROD

The scope of this ROD includes the remedial actions necessary for completion of the cleanup of the Peconic River (AOC 30). These actions include the excavation and removal of the contaminated sediment layer, dewatering of removed sediment, disposal of sediment at a licensed off-site landfill facility, and wetland restoration, as needed. Post-remediation sampling and long-term monitoring of surface water, sediment, and fish will be conducted to ensure remedy effectiveness.

Completion of the Peconic River remedial actions will be documented in a closeout report.

5.0 SUMMARY OF SITE CHARACTERISTICS

The main purposes of the Remedial Investigation (IT 1998a) were to determine the nature, magnitude, and extent of soil, sediment, groundwater, and surface water contamination from the AOCs included in Operable Unit V, and to characterize the potential health risks and environmental impacts of any contaminants present. The investigation included: geophysical and biological surveys, sampling of soil, groundwater, surface water, sediment and sewer pipes; chemical and radiological analyses; benthic invertebrate toxicity testing; fish bioaccumulation studies; and data validation. The contaminants analyzed for in the Remedial Investigation were metals, pesticides, polychlorinated biphenyls (PCBs), volatile organic compounds, semi-volatile organic compounds, and many radionuclides. An additional study (IT, 2000) further characterized the extent of radiological contamination, particularly for plutonium, in the Peconic River's sediment, surface water, and fish; in the soils of the sand filter beds/berms and adjacent areas at the STP; in the retired and capped sewer line; and in groundwater in the vicinity of the STP. Supplemental sediment sampling in 2001, 2002, 2003 and 2004 further characterized the extent of chemical contamination, as well as cesium-137 contamination, in the sediment of the Peconic River.

5.1 Identification of Contamination

Classification of the nature and extent of soil and groundwater contamination was based on screening criteria for chemicals and radiological constituents in various media. The specific screening criteria used for the BNL OU V study area are detailed in section 4.2 of the Remedial Investigation Report (IT 1998a). Whenever possible, established regulatory criteria known as "chemical-specific Applicable or Relevant and Appropriate Requirements" (ARARs) were used to screen the analytical data. ARARs were used as screening criteria for groundwater because State and/or Federal drinking-water standards exist for many chemicals. In the absence of ARARs, non-enforceable regulatory guidance values, known as "to be considered" criteria, or "TBCs" were used to screen the data. This was the case for soil, which has no established State or Federal ARARs. Radionuclides for which there are no individual ARAR or TBC concentrations were screened against site-specific levels calculated using a risk model (RESRAD ANL 1993) that allowed a dose limit of 15 millirem per year above background. Screening criteria for sediment were selected as the higher of site background levels or the most stringent sediment screening criteria available (e.g., NYSDEC sediment screening criteria, Long and McDonald (1995) screening criteria).

A more recent investigation that characterized radionuclides in soil, sediment, surface water, fish, and groundwater in OU V and the Peconic River included, for comparison, samples of surface water and sediment from a reference location (Connetquot River) and groundwater from wells located 18 to 30 miles west of BNL.

5.2 Summary of Nature and Extent of Contamination

Peconic River (AOC 30)

This ROD addresses the results of studies discussed in Section 5.0 above that are pertinent to the Peconic River sediment.

Based on community and regulatory 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 the Laboratory property and outside the Laboratory property upstream of Schultz Road. Additional fish tissue sampling was also conducted to determine edible fish tissue concentrations in areas outside of the Laboratory property and included areas that were previously dry during some of the prior sampling events.

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 Report and Risk Assessment Report*, completed in May 1998.

Elevated levels of metals and PCBs, and low levels of radionuclides, were detected in Peconic River sediment. Concentrations were highest in surface sediment on the Laboratory property and most prominent in the depositional areas on the Laboratory property located approximately 0.5 mile, 1 mile, and 1.5 miles downstream of the STP (Areas A, B, C and D of Figure 5-1). Sampling conducted between Schultz Road and Connecticut Avenue in 2003 confirmed the general downward trend in contaminant concentration; however three depositional areas directly upstream and downstream of Manor Road exceeded the cleanup levels and are indicated in Figure 5-2.

Peconic River Sediment

Fourteen inorganic contaminants were detected at concentrations greater than the sediment-screening levels. Of these, the metals mercury (maximum 39.7 parts per million [ppm]), silver (maximum 380 ppm), and copper (maximum 1490 ppm) were detected most often, and at the highest concentrations above the screening levels. Another analyte of concern was the PCB aroclor-1254 (maximum 1.5 ppm). Contamination was highest in surface sediment and was most prominent in depositional areas approximately 1 mile and 1.5 miles downstream of the STP. The sections of the river where contaminants exceeded cleanup levels are shown in Figures 5-1 and 5-2. The locations of these sections along the river are shown in Figure 1-3.

The presence of radionuclides in Peconic River sediment was also assessed. It was determined that radionuclides were present at levels that are below those requiring cleanup. Although the radionuclides are at levels not requiring cleanup, a large percentage will be removed with the other contaminants. Cesium-137, americium-241, and plutonium 239/240 are present at higher concentrations in the upstream Peconic River sediment than in the Connetquot River, a river with similar characteristics that is outside the influence of the BNL site. The maximum cesium-137 concentration in sediment on Laboratory property was 44.1 picoCuries per gram (pCi/g). The maximum concentrations for americium-241 and plutonium-239/240 in sediment were also found on the Laboratory property at 1.91 pCi/g and 0.158 pCi/g, respectively. Similar to the inorganic contaminants, the low-level radionuclides detected were highest in the surface sediment and were most prominent in the depositional areas.

Peconic River Fish

Fish collected from the Peconic River headwaters had bioaccumulated mercury and PCBs. The average concentrations measured in edible fish tissue samples outside the Laboratory property were 0.62 ppm mercury and 0.023 ppm aroclor-1254. Fish on the Laboratory property 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.

The radionuclide cesium-137 was also detected frequently in fish. It was found in higher concentrations in fish collected on the Laboratory property, and generally in slightly higher concentrations in the flesh and skin than in the bone and entrails. The highest activity of cesium-137 in fish was in a whole-body sample of pickerel taken on the Laboratory property (2.7 pCi/g). Naturally occurring uranium radionuclides were also detected in some of the fish samples, with highest activities in the inedible portions of fish.

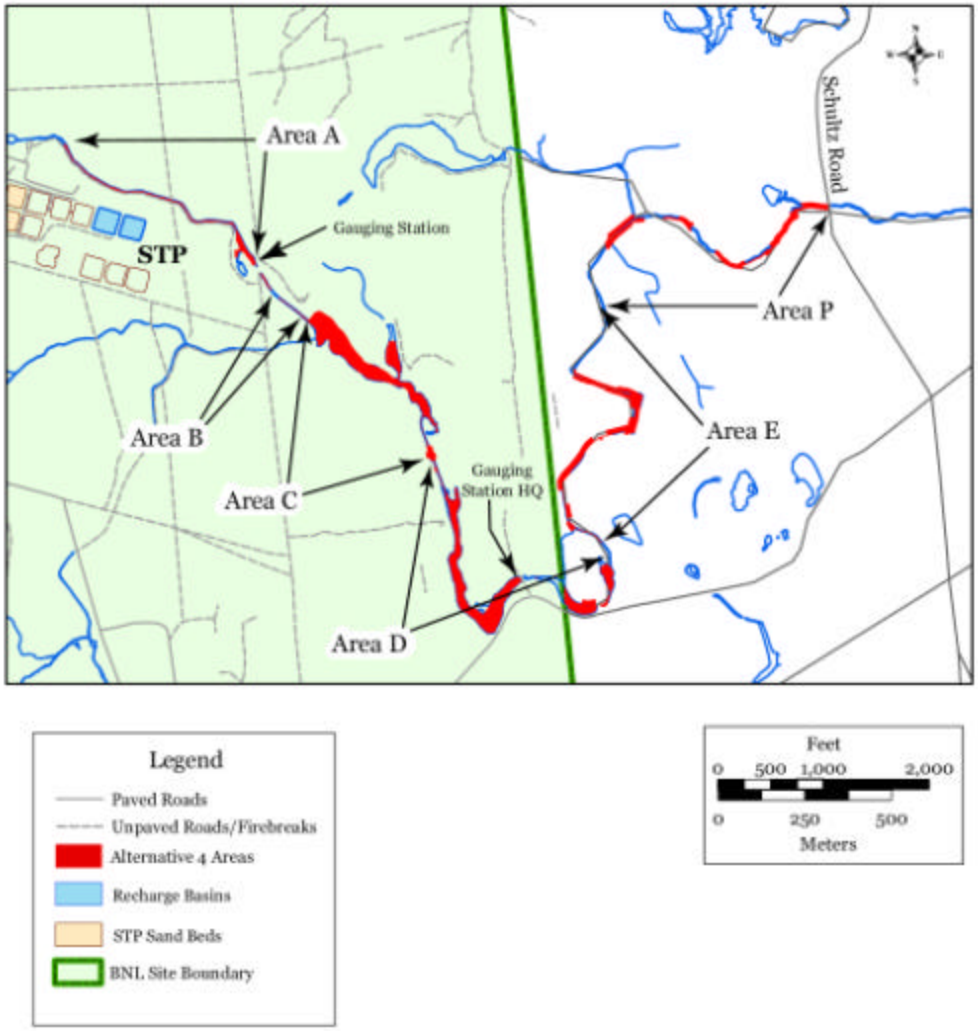

Figure 5-1
OU V Peconic River Cleanup Areas Between the BNL Sewage Treatment Plant and Schultz Road

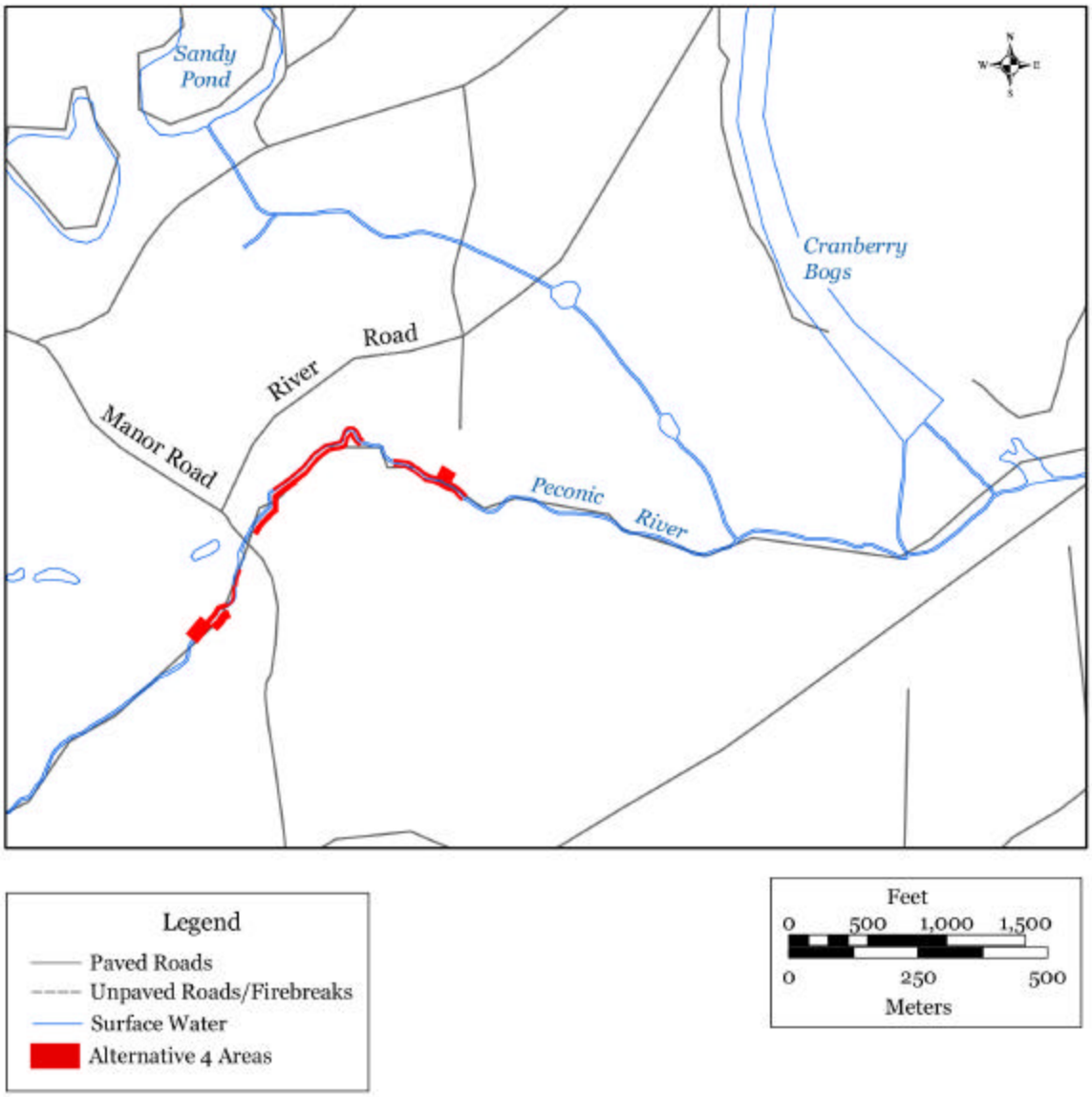

Figure 5-2.
OU V Peconic River Cleanup Areas Adjacent to Manor Road

6.0 SUMMARY OF SITE RISKS

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. Titled *Final Operable Unit V Plutonium Contamination Characterization and Radiological Dose and Risk Assessment Report* (January 31, 2000), it 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* (2003) re-evaluated the potential risk related to the Peconic River from chemical contaminants and radionuclides based on additional data collected pertaining to the Peconic River area.

Later reports were prepared in support of cleanup objectives. They are the *Peconic River Habitat Assessment and Fish Biomass Prediction Report* (January 2003), *A Report on the Estimation of Potential Water Levels in the Peconic River near Brookhaven National Laboratory Based on a Review of Hydrologic Data* (February 2003) and *Estimating the Amount of Consumable Fish Biomass in the Peconic River between the Brookhaven National Laboratory Sewage Treatment Plant and Schultz Road* (February 2003). The following sections rely on these assessments and reports in support of the remedial action objectives described in this ROD.

It should be noted that the principal focus of the risk summary, in support of the remedial actions, evaluates exposures to sediment, surface water, and fish in the Peconic River. However, soils near the river, groundwater in the vicinity of the river, and deer near or on the BNL site were also evaluated. Thus, except as noted in Table 6-1 below, the discussion of human health risks that follows focuses principally on sediment, surface water, and fish.

6.1 Human Health Risk Summary

The baseline human health risk assessment began with selecting contaminants of potential concern that could make a significant contribution to overall site risks. These contaminants include heavy metals like silver and mercury, PCBs, and radionuclides.

The baseline risk assessment evaluated the health effects that could result from exposure to contamination as a result of dermal contact, inhalation, and ingestion associated with current and potential future land use. Table 6-1 presents a summary of the exposure pathways considered for different receptors. Reasonable Maximum Exposure conditions were investigated for each potential receptor.

For Current Land Use, both a trespasser onto the Laboratory property and outside-Laboratory residents were evaluated. The trespasser was assumed to be an older child trespasser who might come into contact with contaminated soil, sediment, and/or surface water in the Peconic River headwaters. Risks to current outside-Laboratory residents of all ages living along the Peconic River 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 outside the Laboratory property.

For Future Land Use, future hypothetical residents living on the BNL site along the Peconic River were evaluated. The hypothetical future residents were 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, and fish and deer meat.

Two categories of human health risks were addressed in the risk assessment for OU V and the Peconic River: risk of cancer, and non-carcinogenic toxicity. Risk of developing cancer or non-cancer causing toxicity is expressed relative to Federal guidelines. The Hazard Index expresses the risk of toxicity from non-cancer causing contaminants. Current Federal guidelines establish an individual lifetime excess carcinogenic risk in the range of one-in-ten-thousand (1×10^{-4}) to one-in-one-million (1×10^{-6}) and a non-carcinogenic maximum Hazard Index equal to one, as a range in which to manage risks. A Hazard Index greater than one indicates a potential for non-carcinogenic health effects. For Current Land Use, total excess cancer risks, assuming reasonable maximum exposures (RME[1]), were greater than the EPA risk range of 1×10^{-4} to 1×10^{-6} for several receptors: the excess cancer risks to resident adults and young children were greater than 1×10^{-4} due to arsenic and trichloroethene in groundwater, and the excess cancer risks to adult and young children resident and non-resident angler/hunters were greater than 1×10^{-4} due to cesium-137 in deer meat. Total excess cancer risks for the current outside-Laboratory older children, and younger child non-resident angler/hunters were within or below the EPA risk range, as was the total excess cancer risk for current trespassers on Laboratory property.

Arsenic in groundwater is likely due to naturally occurring arsenic in the soil, and it is not thought to be site-related. Because the concentrations of arsenic in groundwater are below the groundwater standard of 25 micrograms per liter (µg/L), remedial action objectives that address arsenic in groundwater are not warranted. The groundwater standard for trichloroethene is 5 µg/L. Concentrations above the groundwater standard have been found in several groundwater samples as well as in samples of private wells, and a trichloroethene plume has been defined in the area. To assure future safe drinking water, residents along the river in this area have been provided connection to the public water supply, and monitoring of the groundwater quality in the area will continue. The elevated cesium-137 concentrations in deer are related more to other sources on BNL property than to the Peconic River. These other sources are being, or have been, remediated as parts of other OUs and are not addressed in this ROD. An active monitoring program is in place through which cesium-137 levels in deer are measured both on and outside Laboratory property.

Non-cancer health hazard quotients exceeded 1.0 for current outside-Laboratory residents and recreational anglers based on the assumed reasonable maximum exposure (RME) factors due to mercury in edible fish tissue. Also, the non-cancer health hazard quotient exceeded 1.0 for residential children due to PCBs in fish.

Under the Future Land Use Scenario, total cancer risks to future residents on the BNL facility who occasionally consume locally caught fish, future angler/hunters residing on the BNL facility, and future non- angler/hunters residing on BNL property were above the EPA risk range of 1×10^{-4} to 1×10^{-6}. Potential cancer risks are due to PCBs in fish as measured in whole-body fish samples (adequate edible fish tissue samples were not available for fish from sections of the Peconic River on BNL property) and cesium-137 in deer meat. Non-cancer health hazard quotients exceeded 1.0 for these same future receptors residing on the facility due to mercury and PCBs in fish as measured in whole-body fish samples. Cancer risks were within or below the EPA risk range of 1×10^{-4} to 1×10^{-6} and non-cancer health hazard quotients were below 1.0 for future residents living on the facility that do not consume locally caught fish or deer.

Non-cancer hazard quotients above 1.0 are due to mercury in fish for adults (2.5), young children (5.8) and older children (5.0) based on RME, but only for young children (1.7) and older children (1.4) based on central tendency exposures (CTE). PCB non-cancer hazard quotients are also above 1 from fish consumption by young children (2.1) and older children (1.9) as recreational anglers or in families of recreational anglers based on RME but not CTE.

For outside-Laboratory recreational anglers/hunters who are not riverside residents, the total excess cancer risk for any individual media is outside the EPA target range for adults consuming significant amounts of locally caught deer meat (1.1×10^{-4}). Non-cancer hazard quotients above 1.0 are due to mercury in fish for adults (2.5), young children (5.8) and older children (2.5) based on RME, but only for young children (1.7) and older children (1.4) based on CTE. PCB non-cancer hazard quotients are also above 1 from fish consumption by young children (2.1) and older children (1.9) as recreational anglers or in families of recreational anglers based on RME but not CTE. Again, though the excess cancer risk from consumption of deer meat was in excess of 1×10^{-4}, the total radiological dose was less than the EPA limit of 15 millirem (mrem) per year.

For outside-Laboratory residents who are not recreational anglers/hunters, the total excess cancer risk for any individual media is outside the EPA target range only for adults using groundwater as a drinking water source (1.9×10^{-4}). Non-cancer hazard quotients are greater than one based on RME exposure factors for young children from arsenic and trichloroethene in groundwater when used as a drinking water source (1.7 and 2.2, respectively).

For potential future residents living on the facility who are also recreational anglers and hunters and for potential future recreational anglers/hunters residing on the facility who are not riverside residents, the total excess cancer risk for adults (1.1×10^{-3}), young children (4.8×10^{-4}), and older children (4.2×10^{-4}) consuming a significant amount of locally caught fish and for adults consuming significant amounts of locally caught deer meat (1.1×10^{-4}) are outside the EPA target range of 1×10^{-4} to 1×10^{-6}. Non-cancer hazard quotients above 1.0 are due to mercury in fish for adults (3.1), young children (7.2) and older children (6.1) based on RME, but only for young children (1.8) and older children (1.6) based on CTE. PCB non-cancer hazard quotients are also above 1 from fish consumption by adults (58) young children (140) and older children (120) as recreational anglers or in families of recreational anglers based on RME as well as based on CTE (13, 30, and 24, respectively). Though the excess cancer risk from consumption of deer meat was in excess of 1×10^{-4}, the total radiological dose was less than the EPA limit of 15 mrem/year.

For outside-Laboratory residents who are not recreational anglers/hunters but may still consume locally caught fish, the total excess cancer risk for adults (2.7×10^{-4}), young children (2.5×10^{-4}), and older children (1.1×10^{-4}) consuming locally caught fish are outside the EPA target range of 1×10^{-4} to 1×10^{-6}. Non-cancer hazard quotients above 1.0 are due to mercury in fish for young children (3.7) and older children (1.6) based on RME. PCB non-cancer hazard quotients are also above 1 from fish consumption by adults (15) young children (71) and older children (31). Residents that are not recreational hunters/anglers are assumed to consume no locally caught fish under CTE.

Table 6-1. Exposure Scenarios Considered

	Current Outside-Laboratory	Future on-Laboratory resident	Current Outside-Laboratory	Future On-Laboratory Resident[a]	Current Outside-Laboratory	Future Outside-Laboratory	Current On-Laboratory Trespasser
Groundwater							
Drinking	X[3]	X	X[3]	X			
Dermal contact[1]	X[3]	X	X[3]	X			
Inhalation[2]	X[3]	X	X[3]	X			
Soil							
Ingestion	X	X	X	X	b	b	X
Dermal contact[1]	X	X	X	X	b	b	X
Inhalation	X	X	X	X	b	b	X
External radiation[1]	X	X	X	X	b	b	X
Sediment							
Ingestion	X	X	X	X	b	b	X
Dermal contact[1]	X	X	X	X	b	b	X
Inhalation	X	X	X	X	b	b	X
External radiation[1]	X	X	X	X	b	b	X
Surface Water							
Ingestion	X	X	X	X	b	b	X
Dermal contact[1]	X	X	X	X	b	b	X
Fish							
Consumption	X	X	X	X	X	X	
Deer							
Consumption			X	X	X	X	

X = population considered
a = there are no current on-Laboratory residents in OU V
b = considered insignificant compared to residential exposures
[1] dermal uptake is not applicable for radionuclides due to small permeability constants and additional shielding factors, whereas external radiation is only applicable for radionuclides.
[2] Inhalation from groundwater is only considered for volatiles.
[3] Exposure to groundwater is considered in the risk assessment even though public water hookups have been provided in the affected area.

6.2 Ecological Risk Summary

An Ecological Risk Assessment was performed 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.

The habitats of interest in OU V relevant to this ROD are the Peconic River headwaters and surrounding wetlands, pine-oak forests, and deciduous forests. The Peconic River and its drainage are considered a significant habitat, and portions of it are designated as a Scenic River by the State of New York. The Peconic River is part of a coastal plain stream habitat.

Coastal plain streams are low-gradient, low velocity, slightly acidic waters with a moderate-to-dense growth of aquatic vegetation. The waters are often darkly stained by tannic acids from fallen leaves. This vegetation is comprised of common aquatic plants that include pondweeds (*Potamogeton* sp.), water-starwort (*Callitriche* sp.), spiked bur-reed (*Sparganium* sp.), duckweed (*Lemna* sp.), and bladderwort (*Utricularia* sp.). The dense aquatic growth provides cover for fish and invertebrates, and forage for mammals such as muskrat (*Ondatra zibethica*) and white-tailed deer (*Odocoileus virginianus*). With the exception of the firebreak near the eastern boundary of the site and several stretches adjacent to herbaceous wetlands, the entire Peconic River channel on Laboratory property is moderately to heavily shaded by a tree canopy of red maple (*Acer rubrum*) and black gum (*Nyssa syvatica*).

Coastal stream flows are heavily influenced by groundwater level, with infiltration into the streambed from groundwater during periods of high rainfall and absorption of stream flow into the streambed during periods of low rainfall. The Peconic River, as a whole, is the largest groundwater-fed river in New York and the largest and most biologically diverse of any Long Island wetland system (Englebright, 1980). Like all streams in the Pine Barrens, the Peconic River is the exposed upper surface, or water table, of the region's vast underground reservoir the Peconic River may receive up to 95 percent of its freshwater volume from the water table (Englebright 1980).

During periods of low rainfall/runoff, the discharge from the BNL STP is gradually absorbed in the groundwater regime. Periodically, the stream flow has been observed to diminish and then cease at a point approximately 0.8 km (0.5 miles) east of the eastern firebreak. At these times, no flowing or standing water is present from this point downstream past the eastern property boundary.

Fish species most frequently encountered in this habitat in the Peconic River include pumpkinseed *(Lepomis gibbosus)*, chain pickerel (*Esox niger*), creek chubsucker (*Erimyzon oblongus*), and brown bullhead (*Ameiurus nebulosus*). In addition to fish species, eastern painted turtles (*Chrysemys picta picta*), common snapping turtles (*Chelydra serpentina*), common musk turtles (*Sternotherus odoratus*), and green frogs (*Rana clamitans melanota*) were observed in the Peconic River during site surveys (LMS 1995). Based on the literature reviews conducted by LMS (1995) and habitat requirements, spotted turtles (*Clemmys guttata*) were expected to occur in the river channel and in pools adjacent to the Peconic River. However, no living specimens were observed but spotted turtle shells and shell fragments were observed in the Peconic River-associated forested wetlands in OU V.

Among the protected wildlife found in the Peconic River basin are the tiger salamander (New York State status of "endangered"), spotted turtle (New York State status of "special concern"), banded sunfish (New York State status of "threatened"), and swamp darter (New York State candidate for "threatened status"). The Peconic River is one of only two locations in the State known to support a population of banded sunfish. The swamp darter's distribution in New York is limited to the eastern two-thirds of Long Island.

Four species of wildlife cited as unique (locally uncommon/color variants) are reported by the NYSDEC to occur in the Peconic River drainage: a polymorphic variety of the northern water snake (*Nerodia sipedon*), a population of lead-backed salamander (color variant of the red-backed salamander, *Plethodon cinerous*), the common musk turtle, and the river otter (*Lutra canadensis*). While these four species are not recognized as endangered, threatened, or of special concern by the NYSDEC, they are considered unique because the northern water snake and the lead-backed salamander are color variants of a common species and the musk turtle and river otter are locally uncommon but widespread in New York State. All four of these species have previously been reported a considerable distance downstream of the BNL site. On-Laboratory surveys in 1994 (LMS 1995) reported both the lead-backed salamander and the musk turtle on the BNL property.

Two of the plant species and eight fern species identified in the OU V region are protected in New York State under Environmental Conservation Law (ECL) 9-1503 and New York State Regulation 193.3, which states that "no one may knowingly pick, pluck, sever, remove or carry away (without the consent of the owner thereof) any protected plant." It should be noted that this is a distinct designation from rare, threatened, endangered, or special concern. The "protected" plant species found in OU V, spotted wintergreen (*Chimaphila maculata*) and lady's slipper (*Cypripedium acaule*), were found in the pitch pine forests north of the STP. The eight species of "protected" ferns found on site were the hayscented fern (*Dennestaedtia punctilobula*), shield fern (*Dryopteris sp.*), sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmunda cinnamomea*), Clayton's fern (*Osmunda claytoniana*), royal fern (*Osmunda regalis*), marsh fern (*Thelypteris palustris*), and Virginia chain fern (*Woodwardia virginica*). These were either directly observed in OU V (e.g., cinnamon fern and royal fern) or found at BNL in habitats common to OU V.

Ecological risks from sediment and surface water contaminants were examined through chemical and radiological analysis of water and sediment, benthic invertebrate toxicity tests, fish and invertebrate surveys, and fish bioaccumulation studies.

The following receptors were chosen as the focus of the ecological risk assessment:

- Benthic macroinvertebrates, because of direct exposure to sediment contaminants
- Aquatic macrophytes, because of direct exposure to surface water contaminants
- Vertebrate and invertebrate aquatic species, because of direct exposure to surface water contaminants
- Piscivorous fish, because of direct exposure to surface water contaminants and ingestion of contaminated prey
- Piscivorous wildlife, because of exposure to contaminants in fish as well as contaminants in surface water and sediment

These ecological receptors were identified as important because they occupy different trophic levels within the food web at OU V, they represent different feeding strategies, and they are exposed to the various environmental media at OU V either directly or indirectly.

The benthic invertebrate toxicity tests used common laboratory test organisms (midge and amphipod) to represent the overall benthic invertebrate community. These organisms were exposed to site sediment and the survival and growth of the organisms were measured. Toxic effects were found associated with some of the sediment samples with elevated contaminant levels. Food web models were used to predict the amount of contaminants that fish-eating wildlife may be exposed to if they eat fish from the portion of the Peconic River on the Laboratory property. The kingfisher (a fish-eating bird) and the mink (a fish-eating mammal) were used for the food web models as representative fish-eating wildlife. Based on the fish tissue concentrations, effects to wildlife were found to be possible.

Benthic toxicity tests using site sediment indicated that sediment values for mercury of 9.8 ppm, silver values of 98.9 ppm, and copper values of 310 ppm represent levels of contaminants beneath which toxicity to organisms in the Peconic River are not likely. The ecological risk assessment indicated that in the areas with the highest levels of copper, mercury, and silver, the benthic invertebrate community might be affected; however, in general, the sediment contaminants are somewhat limited in their bioavailability. The areas of impact are located in depositional areas on the Laboratory property. During periodic lack of flow outside the Laboratory property the amount of transport of contaminants downstream of BNL is reduced." However, contaminant migration during periods of water flow has occurred and depositional areas outside the Laboratory property also contain elevated levels of some contaminants.

The fish tissue study also indicated that most of the contaminants found in the sediment were not bioaccumulating in fish tissue. The main contaminants of concern that are bioaccumulating in fish tissues are PCBs and mercury.

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 potential risks to the target species existed, particularly from mercury and PCBs. These contaminants, as measured in the tissue of fish from on the Laboratory property, pose a potential 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-consuming 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 Effect Levels".

7.0 REMEDIAL ACTION OBJECTIVES

This section identifies the basis for taking remedial actions, the objectives of the remedial actions, land-use considerations and cleanup goals.

7.1 Basis for Response

The actual or threatened releases of hazardous substances from AOC 30 in OU V may present a risk to public health, welfare, or the environment if they are not addressed by implementing the remedial actions selected in this ROD. Based on the results of various studies and risk assessments, and on conservative assumptions, it was determined that concentrations of contaminants in fish may pose a health hazard to people consuming fish caught upstream of Schultz Road. It was also determined that contamination in sediment located in the depositional areas of the Peconic River headwaters may pose an ecological concern.

The principal contaminant of concern is mercury, which is found elevated in both fish and sediment samples and that may pose a human health concern. Other contaminants of concern include PCBs in fish, and silver and copper in the sediment that may pose an ecological concern. The levels of radionuclides detected in the Peconic River sediment and fish are at levels that do not require cleanup.

7.2 Remedial Action Objectives

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

- Reduce site-related contaminants (e.g., mercury) in sediment to levels protective of human health.
- Reduce or mitigate, to the extent practicable, existing and potential adverse ecological effects of contaminants in the Peconic River.
- Prevent, or reduce to the extent practicable, the migration of contaminants off the BNL facility to areas where risk may be unacceptable.

7.3 Land Use

BNL is currently used by the DOE as a research facility with associated support facilities and is expected to remain so for the foreseeable future. Access to the BNL property is currently restricted and controlled. It is assumed that this institutional control will continue for the foreseeable future.

A future land use study was undertaken and published by BNL in 1995 (BNL 1995). Potential land uses that could occur after BNL closes as a national laboratory were identified as a mix of open space, industrial/commercial, and recreational and residential uses. DOE's future land use for the Peconic River Area is expected to remain industrial/commercial for the foreseeable future.

7.4 Cleanup Goals

The average mercury concentration on BNL property after remediation would be less than 1 ppm, with a goal that all mercury concentrations in the remediated areas are less than 2 ppm following the cleanup. The 1 ppm concentration is expected to protect human health and the environment, under current conditions.

This remedy would focus on a more stringent cleanup target concentration outside 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 outside Laboratory property will be less than 0.75 ppm, with a goal that all mercury concentrations in the remediated areas are less than 2 ppm following the cleanup.

This will result in significant improvement in overall protection of human health because contaminated sediment presenting the greatest source of potential mercury (bioaccumulation in fish to which people could be exposed) would be removed. Monitoring of fish tissue concentrations will assure that potential health hazards are reduced to acceptable levels. Approximately 92 percent of the mass of mercury in the area from the STP to Schultz Road would be removed. Additionally, approximately 93 percent of the mass of PCBs and 91 percent of the mass of cesium-137 would be removed.

8.0 DESCRIPTION OF ALTERNATIVES

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

In response to concerns raised regarding the original proposed plan for the Peconic River sediment, alternative technologies were further investigated. As a result of those investigations and subsequent pilot studies, four alternatives were considered for cleanup of the Peconic River sediment in the Feasibility Study Addendum. These alternatives are briefly described below and then evaluated in the next section. The first is the No Action Alternative, and the other three alternatives all involve removal of sediment using standard construction equipment, dewatering and outside-Laboratory disposal at an appropriate disposal facility, restoration of habitat as applicable, monitoring to verify the effectiveness of the cleanup, and removal (after effectiveness of the cleanup has been demonstrated) of the temporary sediment trap installed near gauging station HQ.

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 involve 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 between the BNL Sewage Treatment Plant and Schultz Road. 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. 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 will be monitored following sediment removal.

Alternative 2 removes essentially all of the low marsh and sediment between the Sewage Treatment Plant and Schultz Road. This alternative would remove approximately 96 percent of the mass of mercury in surface sediment, 96 percent of PCBs mass, and 97 percent of cesium-137 mass between the BNL Sewage Treatment Plant and Schultz Road. The concentrations of mercury would be reduced by an estimated 91 percent, of PCBs by 69 percent, and of cesium-137 by 94 percent between the BNL Sewage Treatment Plant and Schultz Road. Consequently, this alternative would be expected to significantly reduce bioaccumulation in fish and toxicity to aquatic life.

To accomplish this remedial activity, 14-foot-wide access roads will be constructed as appropriate to access those areas requiring remediation. The total estimated area required for the drying beds is estimated to be 120,000 square feet. A total length of 18,500 linear feet of streambed or 20.4 acres would be remediated over a 124-day period resulting in the generation of 24,700 cubic yards of sediment at a total project cost of $12,150,000.

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.

To accomplish this remedial activity, 14-foot-wide access roads would be constructed as appropriate to access those areas requiring remediation. The total estimated area required for the drying beds is estimated to be 120,000 square feet. A total length of 7,070 linear feet of streambed or 8.7 acres would be remediated over a 47-day period resulting in the generation of 9,250 cubic yards of sediment at a total project cost of $5,281,000.

Alternative Four: This alternative deals with sediment on Laboratory property separately from sediment off Laboratory property. On Laboratory property, this alternative would focus on sediment in designated depositional areas. For the sections of the river on Laboratory property, the average mercury concentration after remediation will be less than 1 ppm, with a goal that all mercury concentrations in the remediated areas are less than 2 ppm following the cleanup. The 1 ppm limit is expected to protect human health and the environment under current conditions.

The outside Laboratory remedy would focus on a more stringent cleanup target concentration outside BNL property. This alternative would also 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 mercury concentration within the sediment outside Laboratory property will be less than 0.75 ppm, with a goal that all mercury concentrations in the remediated areas are less than 2 ppm following the cleanup.

The average concentration of mercury within the sediment outside Laboratory property would be less than 0.75 ppm, with a goal that all mercury concentrations in the remediated areas are less than 2 ppm following the cleanup.

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 87 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.

To accomplish this remedial activity, 14-foot-wide access roads would be constructed as appropriate to access those areas requiring remediation. The total estimated area required for the drying beds is estimated to be 120,000 square feet. A total length of 14,025 linear feet of streambed or 19.8 acres would be remediated over a 121-day period resulting in the generation of 24,000 cubic yards of sediment at a total project cost of $11,461,000.

Post-remedial monitoring of surface water and sediment will also be conducted to determine the effectiveness of the remedial effort, and to ensure that the deposition and downstream migration of contaminated sediment is not recurring. Additionally, following sediment removal, monitoring of both edible fish tissue and whole body fish tissue samples for mercury and PCBs will be performed to evaluate

any remaining risks to human health or wildlife. Wetland restoration will minimize the use of topsoil both on the Laboratory property and off the Laboratory property in Suffolk County Parklands. After excavation is complete and confirmatory samples have confirmed that cleanup goals have been met, soil will be removed from the open water areas of the river and used as fill in the cut lines. In addition, the use of plants with non-native genotypes for restoring the wetlands will be minimized or eliminated.

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

DOE has identified the preferred remedy by evaluating all of the alternatives for the Peconic River sediment against nine evaluation criteria established by EPA. The "Summary of Comparative Analysis of Sediment Alternatives," including advantages and disadvantages, can be found in Table 9-1 and described below.

1. Overall Protection of Human Health and the Environment addresses whether an alternative provides adequate long and short-term protection to human health and the environment, and describes how risks are eliminated, reduced, or controlled through treatment, engineering controls or institutional controls.

Alternative One does not provide overall protection to human health or the environment because no contamination is removed. It requires no disruption of the wetlands, forested areas, or biota, so it provides the greatest degree of protection to the wetland environment in the short-term. However, the contaminants present will remain and continue to be a source for bioaccumulation in fish presenting a potential health hazard to people or wildlife consuming locally caught fish in the Peconic River and will continue to impact ecological receptors. Contaminants will remain that may be subject to transport to other areas where they may pose additional unacceptable risks.

Alternatives Two, Three, and Four involve the removal of sediment and produce short-term disturbance to the wetlands. Alternative Two will remove sediment that could be toxic to benthic communities and will reduce the potential for bioaccumulation in fish that may pose a risk to people or wildlife consuming the fish or that may affect the fish themselves. Alternative Three will remove sediment that is expected to be toxic to benthic communities. Alternative Three will also reduce the potential for bioaccumulation in fish, though to a lesser degree than Alternative Two.

Alternative Four removes almost as much of the contaminants as Alternative Two and also provides the greatest risk reduction. Risk reduction will be reduced beyond that in Alternative Two because not only are elevated levels of mercury in the depositional area sediments removed, but also because Alternative Four targets areas that contribute to bioaccumulation of mercury in fish (methylation areas), but also that cleanup extends further downstream into areas that are more likely to be fished than the Alternative Two area. Figures5-1 and 5-2 identify the cleanup areas.

The levels of contaminants that would be expected to remain for each of these alternatives are compared in the Table 9-2. The values presented represent average concentrations for the Peconic River from the Sewage Treatment Plant to Schultz Road in the surface sediment (top six inches) of both the remediated and non-remediated areas after remediation and include the concentrations expected to be present in target areas after remediation is completed.

The concentrations of copper, mercury, and silver, which are co-located with mercury and PCBs, were found to show evidence of direct toxicity to aquatic life (Section 6.0, Ecological Risk Assessment) living in the sediment, would be reduced below the levels (based on site specific toxicity tests) that would be expected to cause adverse effects.

Table 9-1 Summary of Comparative Analysis of Sediment Alternatives

	Evaluation Criteria						
	1. Protective of Human Health and the Environment	2. Compliance with ARARs	3. Long-term Effectiveness	4. Reduction of Toxicity, Mobility, and Volume	5. Short-term Effectiveness	6. Implementability	7. Cost
Alternative One	Contaminants would remain and continue to bioaccumulate in fish and impact aquatic life	No chemical-specific ARARs.	Contaminants will remain in place. No permanent remedy.	Will not reduce toxicity or volume. Mobility may be reduced by slow natural means, such as deposition of clean sediment above the contaminated sediment.	No actions that may impact workers or surrounding communities.	Easiest to implement. No action required.	$197,600
Alternative Two	Removes sediment that may be toxic to aquatic life and reduces the potential for bioaccumulation.	No chemical-specific ARARs. Will comply with location-specific and action-specific ARARs.	Contaminated sediment removed that should reduce bioaccumulation to non-hazardous levels.	Although not a formal treatment, sediment removal reduces the volume, mobility, and toxicity of contaminated sediment that is available for bioaccumulation in fish or for direct exposure to aquatic life.	Pose minimal risk to workers during removal, remediation, and waste disposal. These can be minimized through standard health and safety practices.	No permits required. Not difficult to implement. Removal of sediment will cause a short-term wetland disturbance, but pilot studies have demonstrated that these can be easily restored.	$12,150,000

Table 9-1 Summary of Comparative Analysis of Sediment Alternatives (cont.)							
Alternative Three	Reduces potential for bioaccumulation in fish, though source areas may remain. Removes sediment that is expected to be toxic to aquatic life.	No chemical-specific ARARs. Will comply with location-specific and action-specific ARARs.	Contaminated sediment within wetland areas may remain that could continue to provide a source for potential fish bioaccumulation or for migration and redeposition.	Although not a formal treatment, sediment removal reduces the volume, mobility, and toxicity of contaminated sediment that is available for bioaccumulation in fish or for direct exposure to aquatic life.	Pose minimal risk to workers during removal, remediation, and waste disposal, and these can be minimized through standard health and safety practices.	No permits required. Not difficult to implement. Removal of sediment will cause a short-term wetland disturbance, but pilot studies have demonstrated that these can be easily restored.	$5,821,000
Alternative Four	Contaminants removed from potential significant bioaccumulation areas where human fish consumption is likely to occur. Removes Sediment toxic to aquatic life.	No chemical-specific ARARs. Will comply with location-specific and action-specific ARARs.	Contaminated sediment removed that should reduce bioaccumulation in fish that may be consumed by people to non-hazardous levels.	Although not a formal treatment, sediment removal reduces the volume, mobility, and toxicity of contaminated sediment that is available for bioaccumulation in fish or for direct exposure to aquatic life.	Pose minimal risk to workers during removal, remediation, and waste disposal, and these can be minimized through standard health and safety practices.	No permits required. Not difficult to implement. Removal of sediment will cause a short-term wetland disturbance, but pilot studies have demonstrated that these can be easily restored.	$11,461,000

Table 9-2. Average Concentrations After Remediation

	Alternative One	Alternative Two	Alternative Three	Alternative Four
Mercury (ppm)	3.63	0.34	1.32	0.46
PCBs (ppm)	0.9	ND-0.03	ND-0.03	ND-0.03
Cs-137 (pCi/g)	7.0	0.4	2	0.8
Copper (ppm)	318	8.1	50	15
Silver (ppm)	65	2.3	9.8	4.7

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

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) considers if a remedy meets all Federal and State ARARs, including provisions for invoking a waiver.

Federal and State Regulations have not been promulgated for the cleanup of contaminated sediment, and so there are no chemical-specific ARARs for the evaluated alternatives.

Federal and State regulations require that impacts to wetlands be minimized unless no other viable option exists. Although Alternatives Two, Three, and Four involve the disturbance of wetland areas, they will comply with location-specific ARARs because the wetlands will be restored, as applicable. The selected remedy must also meet the New York State stream protection regulation. 6 NYCRR Part 608 Use and Protection of Waters. These location-specific requirements include Federal requirements outlined in 40 Code of Federal Regulations (CFR) 6.302 (a, b, g) (Protection of Wetlands, Floodplain Management, Area Affecting Stream or River), 6 NYCRR Part 663 Freshwater Wetlands Permit Requirement and 6 New York Code, Rules, and Regulations (NYCRR) 666 (National Wild, Scenic or Recreational Rivers).

There are also a number of action-specific requirements that must be complied with prior to implementation of these alternatives. These include requirements for Dredge and Fill Operations (33 CFR 320.2), the National Pollution Discharge Elimination System (40 CFR 122), Discharge of Storm Water Runoff (40 CFR 122.26), and others.

3. Long-Term Effectiveness addresses the amount of remaining risk and the ability of an alternative to protect human health and the environment over time, once cleanup goals have been met.

Alternative One does not provide a permanent remedy. Under the No Action alternative, the contaminants will remain in place and rely on the occurrence of natural sedimentation (which is expected to be a slow process) to minimize the bioaccumulation in fish and the exposure of aquatic life to contaminated sediment.

Alternatives Two, Three and Four, involve the removal of contaminated sediment from the Peconic River. Alternative Three is not as effective in the long term because contaminated sediment within wetland areas

both on and outside the Laboratory property may remain that could continue to provide a mercury source for potential fish bioaccumulation or for migration and redeposition. Alternative Four is more effective at preventing bioaccumulation of contaminants in the long-term. Long-term environmental impacts are also mitigated by restoration of the wetlands and removal of project-required roads in Alternative Two, Three, and Four.

Since residual contamination will remain in the Peconic River with any remedy selected, monitoring will be used to assess the long-term effectiveness in meeting remedial action objectives. The results of the monitoring will be assessed as part of the five-year reviews, and the need for additional actions would be evaluated in the event of unacceptable residual risk.

4. Reduction of Toxicity, Mobility, or Volume addresses the anticipated performance of treatment that permanently and significantly reduces the toxicity, mobility, or volume of waste. None of the alternatives use treatment as a principal component. Although the sediment that is removed will be dewatered in a drying bed, no treatment to reduce the toxicity, mobility, or volume of the contaminants of interest will be performed. However, Alternatives Two, Three, and Four will reduce, through removal, the volume, toxicity, or mobility of the contaminants that may contribute to site risks. Alternative Four, in particular, reduces toxicity by targeting the sediment that most contributes to accumulation in biota. Alternative One will not reduce the volume or toxicity of the contaminants contained in the Peconic River sediment. The slow process of natural sedimentation of clean sediment above the contaminated sediment in Alternative One may potentially reduce the mobility and toxicity by separating the contaminants from potential receptors and transport mechanisms. Alternatives Two, Three, and Four will reduce the volume, mobility, and toxicity of contaminated sediment that is available for bioaccumulation in fish or for direct exposure to aquatic life. The volume of contaminated sediment removed is greatest for Alternative Two and least for Alternative Three. In each case, dewatering the removed sediment will reduce the volume of waste material. The mass of contaminant removed, however, is expected to be fairly similar under Alternatives Two and Four and less for Alternative Three (Table 9-3).

5. Short-Term Effectiveness addresses the impact to the community and site workers during construction or implementation, and includes the time needed to finish work.

Alternative One involves no remedial actions that have the potential to impact worker health and safety or the surrounding community. Alternatives Two, Three, and Four pose minimal risk to workers during removal, remediation, and waste disposal, and these can be minimized through standard health and safety practices. Other short-term environmental impacts are mitigated by performing work during the winter or when water levels are reduced and wildlife is either dormant or have a reduced presence.

6. Implementability addresses the technical and administrative feasibility of an alternative, including the availability of materials and services required for cleanup.

Alternative One takes the least effort to implement from a technical and administrative standpoint. The sediment removal and wetlands restoration technologies in Alternative Two, Three, and Four can be implemented as demonstrated by the pilot studies already conducted in the Peconic River, and are implementable at the full-scale level.

7. Cost: This section compares the differences in cost, including capital, operation, and maintenance costs. Cost estimates are based on present worth costs. For estimated current costs of the sediment remedial alternatives, see Tables 9-3 and 9-4, "Comparison of Alternatives." As indicated in Table 9-3, although the percentage contaminant removal in Alternatives Two and Four is similar, the cost of

Alternative Two is disproportionately higher than the other alternative, particularly when the cost per amount of contaminant removed is considered. The cost for Alternative Four is 20 percent less than Alternative two, but offers potentially better results in terms of reducing potential risk to human health and disturbs less wetlands. This is because not only does Alternative Four remove mercury-contaminated sediment from depositional areas, but it also removes mercury from sections of the river that favor the conversion of mercury to methylmercury. Methylmercury bioaccumulates in fish and fish consumption is the principal pathway for mercury to humans. Also, by cleaning up sections of the river close to Manor Road, Alternative Four cleans up a section of the river that is more likely to be fished than the Alternative Two sections of the river.

8. State Acceptance: New York State has agreed with the analyses and recommendations as described as the Feasibility Study Addendum and Proposed Plan.

9. Community Acceptance: The community has accepted the proposed remedy as amended in this ROD, as discussed in Section 3.0 and demonstrated in Part III of this document.

Table 9-3. Comparison of Alternatives

	Baseline Net Cost	Total Area of Remediated Streambed	Percent Mercury Removal	Percent PCB Removal	Percent Cesium-137 Removal	Volume of sediment removed (Cubic yards)
Alternative 1 No Action	$197,600	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	>96	>96	>97	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	66	76	77	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 ppmon 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	92	93	91	24,018

Note: Estimates for PCBs and Cs-137 are based on previous data only and previous estimated river dimensions. River total area has been found to be greater. River remediation area is also greater. Average concentration in newly defined areas was assumed to have the same concentrations as unremediated areas originally defined.
For comparability between all cleanup alternatives, Alternative Four Percent Removal numbers only represent the area being cleaned up between The Sewage Treatment Plant and Schultz Rd.

10.0 SELECTED REMEDY

Alternative 4 is selected as the alternative that best addresses the CERCLA evaluation criteria, particularly Overall Protection of Human Health and the Environment. A summary of this selected remedy is provided in Section 8 and Figures 5-1 and 5-2. The implementation of this remedy has taken place in two phases: the first phase addresses sediment on Laboratory property (Figure 5-1). The second phase addresses sediment that extends beyond the Laboratory boundary and upstream of Schultz Road (Figure 5-1) as well as three sections of the river in the Manor Road area (Figure 5-2). This phased approach provides the best means for accelerating cleanup while ensuring that cleanup of the County parkland is as effective as possible.

An "Action Memorandum Peconic River Removal Action for Sediment on BNL Property" was issued for public review in the fall of 2003 and placed in the Administrative Record in January 2004 to facilitate this phased approach. The Action Memorandum Peconic River Removal Action for Sediment on BNL Property is attached in Appendix A. An Action Memorandum is an authorization by DOE to start work under its Superfund response authorities. The Action Memorandum Peconic River Removal Action for Sediment on BNL Property was used to authorize work called a removal action for sections of the river on laboratory property. The removal action is consistent with the selected remedy (as modified by public comment), and allowed work to start on Laboratory property. This process is commonly used to accelerate and/or complete discrete portions of a larger response action.

The second phase was initiated under the Action Memorandum Peconic River Removal Action for Sediment Outside BNL Property (Appendix B). The second phase involved cleanup of the Peconic River downstream from and outside the BNL property as described above. The cleanup off the Laboratory property is also consistent with the selected remedy as described in this Record of Decision.

This ROD also finalizes the remedy for the sections of the Peconic River cleaned up under an interim removal action conducted under the Action Memorandum Peconic River Removal Action for Sediment on BNL Property and the Action Memorandum Peconic River Removal Action for Sediment outside BNL Property.

The selection of Alternative Four is based on the results of the comparative analysis presented in the *Feasibility Study Addendum* and extensive discussion with the regulatory community. The Alternative Four option also meets community expectations to minimize impacts to the wetlands and upland areas. Alternative Four substantially removes areas of elevated levels of contaminants that could lead to transport of contaminants and bioaccumulation in the future.

This alternative will provide significant mass removal of contaminants focused on protecting the ecosystem and reducing the bioaccumulation of mercury and PCBs in fish. This alternative will also be protective of human health and will provide the best balance of contamination removal versus impact to upland and wetland areas.

These removal actions have served to: 1) reduce the potential for continued migration of contamination on Laboratory property to outside Laboratory property and the migration of contamination outside Laboratory property to locations further downstream, 2) reduce the potential for bioaccumulation of contaminants in fish that may be captured in areas off Laboratory property or accessible areas on Laboratory property. The Action Memorandum Peconic River Removal Action for Sediment on BNL Property has also provided lessons learned useful in design of the cleanup for sections of the river outside Laboratory property in the County park land.

Approximately 92 percent of the mass of mercury in the surface sediment in the area from the STP to Schultz Road would be removed based on average concentrations measured in the surface sediment (top six inches). Additionally, it would be expected that 93 percent of the mass of PCBs (measured as aroclor-1254) would be removed from the sediment as well as 91 percent of the mass of cesium-137 as shown in Table9-3. This is expected to reduce the concentrations of mercury by 87 percent, PCBs by 70 percent, and cesium-137 by 88 percent. Potential human health exposure would be further reduced to levels that are protective of human health.

Alternative Four will result in the removal of contaminated sediment deemed to be toxic to aquatic life, based on the site-specific toxicity tests, and result in average concentrations of mercury similar to screening levels; thus, it is therefore protective of the environment. 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. At that time, DOE will submit a notification for approval of the removal of the sediment trap to EPA and NYSDEC. 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. Once Alternative Four is demonstrated to be effective in controlling contaminant migration, fate and transport, the temporary sediment trap installed near gauging station HQ will be removed. Sediment trapped behind the trap will be analyzed and removed, if applicable, prior to removal of the sediment trap. Although sediment removal activities would temporarily disturb wetlands, pilot studies conducted on the Peconic River have substantiated that the sediment removal techniques described for this alternative are effective at minimizing disturbance to sensitive wetland environments. Wetland restoration techniques have also been demonstrated to be effective through a pilot study. Furthermore, the results of the wetland restoration pilot studies have demonstrated that areas previously dominated by an invasive species can be restored with native species of wetland plants.

In summary, Alternative Four is selected for the following reasons:

Overall Protection of Human Health and the Environment: The alternative meets the remedial action objectives for protection of human health and the environment. Contaminated sediment presenting the greatest source of potential mercury bioaccumulation in fish to which people could be exposed would be removed, and average resulting concentrations would be similar to screening levels for protection of benthic organisms. Additionally, a lower average concentration goal is used for the area outside the Laboratory property to allow the County greater flexibility in its use as a parkland or in future development. Monitoring of fish tissue concentrations will assure that potential health hazards are reduced to acceptable levels. Approximately 92 percent of the mass of mercury in the surface sediment in the area from the STP to Schultz Road would be removed. Additionally, approximately 93 percent of the mass of PCBs and 91 percent of the mass of cesium-137 would be removed. Concentrations would be reduced by an estimated 87 percent for mercury, 80 percent for PCBs, and 88 percent for cesium-137.

Compliance with ARARs: There are no promulgated Federal or State standards for the cleanup of contaminated sediment. However, Federal and State regulations require that impacts to wetlands be minimized unless no other viable option exists. Consequently, the work will be conducted under a New York State Department of Environmental Conservation Equivalency permit to ensure that no ARARs are violated.

Pilot studies conducted on the Peconic River have substantiated that the sediment removal techniques described for this alternative are effective at minimizing disturbance to sensitive wetland environments. Wetland restoration techniques have also been demonstrated to be effective through a pilot study. Action-specific requirements such as requirements for Dredge and Fill Operations (33 CFR 320.2), the National

Pollution Discharge Elimination System (40 CFR 122), Discharge of Storm Water Runoff (40 CFR 122.26). Also Location-specific ARARS (6 NYCRR Part 663) for wetlands, (6 NYCRR Part 608) for stream protection, (6 NYCRR Part 666) for Wild and Scenic Rivers, and others must be met before implementing this alternative. See section 11.2 and Appendix C for detailed information related to ARARs and TBCs.

Long-term Effectiveness and Permanence: The removal of the targeted sediment will be an effective and permanent remedy for the long-term protection of wildlife and human health because contaminated sediment presenting the greatest source of potential mercury bioaccumulation in fish would be removed. Monitoring of fish tissue concentrations will assure that potential health hazards are at acceptable levels. This alternative would also result in the removal of contaminated sediment that poses a potential risk to the aquatic community. Alternative Four therefore provides a permanent remedy for the contaminants of interest that exist at concentrations deemed to be toxic to aquatic life. The long-term effectiveness of the cleanup will be monitored once annually for mercury, PCBs and cesium-137 in sediment and mercury and radionuclides in fish tissue. Fish collected on the laboratory property will also be analyzed for PCBs. Fish will be sampled in sections of the river on laboratory property when samples can be collected without negatively impacting the well being of the fish population. Monitoring for total mercury and methyl mercury in surface water will be performed twice annually (June and August). Sampling data will be reviewed through the CERCLA Five-Year Reviews process. Results through the first five years will be evaluated annually with EPA, DEC, and SCDHS and appropriate modifications will be made, as necessary, for subsequent sampling. In addition, pilot studies have demonstrated the effectiveness of wetland restoration following cleanup and replanting.

Reduction of Toxicity, Mobility, or Volume: This alternative, as with the other alternatives evaluated, does not meet the EPA's statutory preference for treatment as a principal component. Although the sediment that is removed will be dewatered in a drying bed, no treatment to reduce the toxicity, mobility, or volume of the contaminants of interest will be conducted. Therefore, the removed sediment will have essentially the same characteristics after excavation as it had in the stream. Failure to reduce the toxicity and mobility of the contaminants of interest may not be a concern since the removed sediment is anticipated to be characteristically non-hazardous.

The removal of the sediment layer will result in a significant reduction of toxicity, mobility and volume of the contaminated sediment presenting the greatest source of potential mercury bioaccumulation in fish. The sediment that remains after remediation poses an acceptable risk to humans and to the aquatic community within regulatory guidelines and will no longer serve as a significant source for mercury bioaccumulation in fish.

Short-term Effectiveness: The execution of this alternative may pose minor short-term risks to worker health and safety. Potential risks to workers include those generally associated with construction activities.

The execution of this alternative will also result in the short-term disturbance of wetlands and the associated aquatic community along the stream. However, remediation will be focused on the low water periods of the year (summer and fall) when potential adverse effects are minimal, thereby minimizing short-term effects. Potential impacts that will be minimized include sediment dispersal via bypassing stream flow during a low water period and use of sediment traps and potential wetland faunal impacts that will be minimized by the absence of seasonal migrants. Wetland restoration techniques have also been demonstrated to be effective through a pilot study. Some contaminant redistribution could occur as a result of sediment re-suspension during removal activities. However, redistribution of large amounts of contaminants is considered unlikely, as monitoring and mitigative measures such as silt curtains would be used to reduce such impacts.

Implementability: This alternative involves temporary stream/wetlands dewatering as necessary, sediment excavation. Sediment management involves dewatering of removed sediment with drying beds, and outside-Laboratory disposal. The implementability of this alternative has been demonstrated on a smaller scale in the Peconic River through the completion of the pilot studies.

Cost: The base cost of the selected remedy is approximately is $11,461,000. This cost estimate is based on the best available information regarding the anticipated scope of the selected remedy.

11.0 STATUTORY DETERMINATIONS

Remedy selection is based on CERCLA and its amendments, and the regulations contained in the National Contingency Plan. All remedies must meet the threshold criteria: protection of human health and the environment and compliance with ARARs. CERCLA also requires that the remedy use permanent solutions and alternative treatment technologies to the maximum extent practicable, and that the implemented action must be cost-effective. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

11.1 Protection of Human Health and the Environment

The baseline human health risk assessment concluded that a potential health hazard might exist for people who eat fish caught from the Peconic River upstream of Schultz Road. Potential health hazards were identified for recreational anglers that eat 6.5 pounds to 20 pounds of fish per year or residents that may occasionally consume fish and eat about 5 pounds per year. This potential risk is due to mercury in the edible portion of the fish tissue outside the Laboratory property and mercury and PCBs on the Laboratory property. Based on the concentrations measured in the fish, potential health hazards may exist at even lower consumption rates. Since this remedy will result in the removal of the sediment presenting the greatest source of mercury for bioaccumulation in fish to which people may be exposed, the potential health hazards from consuming fish from the upstream Peconic River are expected to be sufficiently reduced such that this remedy will be protective of human health. Monitoring of fish tissue concentrations will verify that potential health risks are reduced to acceptable levels by the actions outlined for this alternative.

The removal of the sediment in depositional areas and other areas of preferential mercury methylation will result in significant improvement in overall protection of human health because contaminated sediment presenting the greatest source of potential mercury bioaccumulation in fish to which people may be exposed would be removed. This alternative involves the removal of the unconsolidated sediment (approximately six to twelve inches) from selected locations by excavation using conventional earth moving equipment. Based on average concentrations measured in the surface sediment (top six inches) approximately 92 percent of the mercury in the area from the STP to Schultz Road would be removed. Additionally, it would be expected that 93 percent of the PCBs (measured as aroclor-1254) would be removed from the sediment as well as 91 percent of the cesium-137. The concentrations of mercury would be reduced by an estimated 87 percent, of PCBs by 80 percent, and of cesium-137 by 88 percent. Potential human health risks would be reduced to levels that provide safe levels for fish consumption

The ecological risk assessment reported that potential risks exist for aquatic organisms exposed to contaminated sediment or for wildlife that may feed on fish that have bioaccumulated contaminants. The removal of the contaminated sediment in depositional areas and the low level of residual concentrations will also result in the removal of contaminated sediment existing at levels that are deemed to be toxic to aquatic life, based on the site-specific toxicity tests, and is therefore protective of the environment. Since this remedy will result in lower fish tissue concentrations of contaminants, the reduction of contamination in these areas will also reduce the overall potential for exposure to fish-eating wildlife. Thus, this alternative is protective of wildlife. The execution of this remedial activity will result in the temporary disturbance of the wetland community. Although sediment removal activities would temporarily disturb wetland areas, pilot studies conducted on the Peconic River have substantiated that the sediment removal techniques described for this remedy are effective at minimizing disturbance to sensitive wetland environments. Wetland restoration techniques have also been demonstrated to be effective through a pilot study. Furthermore, the results of the wetland restoration pilot studies have demonstrated significant growth of native wetland plants within restored areas previously dominated by an invasive grass species.

Implementing the remedy will cause no unacceptable short-term risks or cross-media impacts.

11.2 Compliance with ARARs

The National Contingency Plan Section 300.430 (P) (5) (ii) (B) requires that the selected remedy attains the Federal and State ARARs or obtains a waiver of an ARAR. Detailed information on chemical-Specific, location-Specific and Action-Specific ARARs is presented in Appendix C.

11.2.1 Chemical-Specific ARARs

The chemical-specific ARARs that the selected remedies will meet are listed below.

1. Safe Drinking Water Act, Public Law 95-523, as amended by Public Law 96502, 22 USC 300 et seq National Primary Drinking Water Regulations (40 Code of Federal Regulations 141) and National Secondary Drinking Water Regulations (40 Code of Federal Regulations 143). This establishes maximum contaminant levels (MCL) and secondary MCLs for public drinking water supplies that are relevant and appropriate at the BNL facility.

2. New York Water Quality Standards, 6 NYCRR Part 703. This requirement establishes standards of quality and purity for groundwaters of the State.

3. Resource Conservation and Recovery Act (RCRA) (40 Code of Federal Regulations parts 260-268): Defines hazardous wastes. All wastes classified as hazardous will be handled, stored, and disposed of in accordance with these regulations. Hazardous wastes will be disposed of at a permitted facility.

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

11.2.2 Location-Specific ARARs

Location-specific ARARS such as 6 NYCRR Part 663 for wetlands, 6 NYCRR Part 608 for stream protection, 6 NYCRR Part 666 for Wild and Scenic Rivers, and others must be met before implementing this alternative. .

11.2.3 Action-Specific ARARs

The action-specific ARARs that the selected remedies will meet are listed below.

1. 10 Code of Federal Regulations Part 835. This regulation establishes the requirements for controlling and managing radiologically contaminated areas. Compliance with this regulation is required as of January 1996.

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

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

4. National Emissions Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 61, Subpart H.) This requirement sets forth the permitting process for remedial action.

5. 6 NYCRR Part 211. This regulation requires control of fugitive emissions from excavation and transport.

11.2.4 To Be Considered Guidance

In implementing the selected remedy, the following guidance will be considered.

1. U.S. EPA, May 1996, "Soil Screening Guidance: Technical Background Document," EPA/540/R-95/128, Appendix A, Generic Soil Screening Levels for Superfund. Soil remediation goal for mercury was developed using this guidance.

2. DOE Order 5400.5 and draft 10 Code of Federal Regulations 834 "Radiation Protection of the Public and the Environment": This order, and its current draft rule-making, were used to develop radiological soil-remediation levels for Operable Unit I and will apply to the soil remediation at the Sewage Treatment Plant. The basic public dose limit for exposure to residual radioactive material for DOE facilities such as BNL is 100 mrem/year above background plus application of the As Low As Reasonably Achievable (ALARA) policy. Based on BNL site-specific conditions and ALARA, 15 mrem/year above background was selected. This level is consistent with risk requirements under CERCLA.

3. NYSDEC Technical and Administrative Guidance Memorandum "Remediation Guideline for Soils Contaminated with Radioactive Materials" (#4003), September 1993. This memorandum contains State guidance for remediating radiologically contaminated soils. The State's value of 10 mrem/yr above background serves as an additional goal for remediation to be evaluated during remedial design and implementation.

11.3 Cost-Effectiveness

Based on the expected performance standards, the selected remedies were determined to be cost effective because they provide overall protection of human health and the environment, long- and short-term effectiveness, and compliance with ARARs, at an acceptable cost. Table 9-3 provides a cost summary of the selected remedies.

11.4 Use of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The National Contingency Plan prefers a permanent solution whenever possible. Although the selected remedy requires continued monitoring for, at a minimum, a period of five years, permanent solutions were sought to the maximum extent practicable. The Peconic River remedial action involves the removal and disposal of contaminated sediment that poses a potential risk to exposed populations, and, therefore, is a permanent remedy with respect to risk reduction. The waste generated from this remedial action will be disposed of in a licensed facility off the BNL property.

11.5 Preference for Treatment as a Principal Element

This alternative does not meet the EPA's statutory preference for treatment as a principal component. There will be no treatment to reduce the toxicity, mobility, or volume of the contaminants in soil. Because of the small volumes of soil involved and the contaminants of concern, treatment is not cost-effective.

11.6 Documentation of Significant Changes

Two changes to the remedy proposed in the PRAP have occurred. This ROD discusses the two modifications in the **Changes in the Remedy Presented in the Feasibility Study and Proposed Remedial Action Plan** subsection of Section 3.0. Neither of the two modifications changes the basic features of the remedy with respect to scope, performance or cost such that the remedy significantly differs from the original proposal in the Proposed Plan.

11.7 Five-Year Reviews

At the five-year reviews DOE and the regulatory agencies will review monitoring data for fish, surface water, sediment and wetland re-vegetation collected since completion of the remedial action to evaluate the effectiveness of the remedy in meeting the cleanup and restoration objectives. The potential need for additional actions will also be evaluated.

III Responsiveness Summary

Background on community involvement

The community involvement process for the Peconic River cleanup is – and has been – an integral part of making cleanup decisions.

2000 Proposed Remedial Action Plan: 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 sewer lines, groundwater related to STP operations, and the sediment in the upper portions of the Peconic River. The public comment period was originally scheduled to run from February 15 to March 15, 2000. Information sessions were held on February 23, 2000 (at BNL's Berkner Hall) and on February 29, 2000 (at Riverhead High School, Riverhead NY). The formal public meeting was held on March 2, 2000 at BNL's Berkner Hall.

The public comment period was extended to 90 days and concluded May 15, 2000. At that point, it was decided to separate the STP cleanup from the Peconic River cleanup. The STP Record of Decision (ROD) was issued in January 2002. The STP cleanup work has been completed.

A decision about the cleanup of the Peconic River sediment was deferred as a result of input received during the public comment period. 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 needed to further evaluate new innovative technologies that might be able to clean up the sediment with less disruption to the wetlands. The stakeholders also requested that additional sampling of sediment, fish, and vegetation be conducted to provide better definition of the areas requiring cleanup. The DOE responded by completing a number of actions to better understand the level and type of contamination in the sediment and also investigated several technologies that potentially could clean the sediment with less disruption to the wetlands.

Technology Workshop: To explore alternative technologies, a Workshop was held in December, 2000, 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 (electrochemical remediation, native wetland plant phytoremediation, vacuum guzzling and sediment removal followed by wetland restoration) 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).

Peconic River Working Group: Additionally, DOE and the Lab formed the Peconic River Working Group. Members included local residents, representatives of several Suffolk County agencies, members of groups who have a particular interest in the Peconic River, and representatives of the Lab's Citizens Advisory Council. The working group was formed in December, 2001, and was active until February, 2003. The working group closely followed the pilot projects in the river test areas. They also provided input on the risk assessment process, and discussed the wetland restoration plans with representatives of New York State Department of Environmental Conservation.

Outreach: Project staff has made multiple presentations to the Community Advisory Council, the Brookhaven Executive Round Table, the Peconic Estuary Program, Suffolk County Legislature's Community Oversight Committee, and various local civic associations. Additionally, documents and information about the project are regularly posted to the web at http://www.bnl.gov/erd/peconic.html.

Action Memorandum Peconic River Removal Action for Sediment on BNL Property): The on-Laboratory property cleanup was conducted under a non-time critical removal action.

The public comment period was conducted from September 22, 2003 through October 21, 2003. It was announced in *Newsday* and *Suffolk Life* with advertisements and legal notices.

The documents were placed in the Administrative Record and made available on the BNL web site on September 19, 2003. Fact sheets were also mailed to more than 2,500 stakeholders. Information sessions were held on October 7 and 15, 2003. Presentations were made to the Laboratory's Community Advisory Council and the Brookhaven Executive Round Table.

2004 Proposed Remedial Action Plan: The public comment period for the 2004 Feasibility Study Addendum and the Proposed Remedial Action Plan ran from May 24 through June 25, 2004. The comment period was announced in *Newsday* and *Suffolk Life*. Advertisements for information roundtables and the public meeting were placed in *Newsday*, *Suffolk Life*, and the *Times Review* and a BNL staff member canvassed neighborhoods and businesses near the cleanup area.

The EE/CA-AM and PRAP were placed in the Administrative Record, and on the BNL web site. Fact sheets were mailed to more than 2,500 stakeholders. Information sessions were held on June 3 (at Cornell Cooperative Extension in Riverhead, NY) and June 7, 2004 (at BNL's Berkner Hall). The formal public information session was held on June 15, 2004. Presentations were made to the Laboratory's Community Advisory Council and the Brookhaven Executive Round Table.

Public Comment Summary: A total of seven letters were received from the two Public Information Sessions and one Public Meeting. None of the letters opposed cleanup. The comments were grouped into four classes: 1) Support for the plan as proposed; 2) Concern about potential obstruction of a hiking trail; 3) Preference for maintaining the excavated sediment at BNL rather than disposing of it at a New York State approved Subtitle D landfill; 4) Posting signs along the Peconic River; 5) Use of native plants collected from the Peconic River to restore the Peconic River wetlands.

1) **Support for the plan as proposed**: Three of the seven letters supported the proposed cleanup. One letter strongly supported the proposed cleanup using Alternative Four and also supported several recommendations provided in the June 16, 2004 report entitled *Analysis of the Department of Energy's Proposed Cleanup Plan for the Peconic River at Brookhaven National Laboratory Site*, prepared by the Suffolk County Department of Health Services in conjunction with the Peconic River Community Oversight Committee. These additional recommendations are addressed in the Recommendation Response section below. A second letter wholeheartedly supported BNL's environmental cleanup and stewardship policy. A third letter personally preferred Alternative Two, but supported Alternative Four as "the best solution for the present time".

The recommendations referred to above include:

Recommendation: The results of the current methylmercury sampling effort should be used to determine if additional areas require remediation.
Response: Agreed. The results of ongoing methylmercury sampling will be used to evaluate if additional action is required

Recommendation: A high number of post-remediation confirmatory samples should be collected in order to demonstrate conformance with cleanup objectives.
Response: Agreed. One confirmation sample will be collected per 700 square feet. The areas to be sampled will include sections of the river that have been remediated and sections of the river for which initial data indicated that cleanup was not necessary. Approximately 2500 samples will be collected.

Recommendation: Strict engineering controls need to be in place prior to the commencement of excavation to ensure that contaminated sediments are not mobilized. A rigorous water column sampling regime downstream of excavation activities needs to be implemented to ensure that mobilization is not occurring.
Response: Agreed. Several engineering controls are in place to minimize the potential that sediment would be mobilized during the excavation process. 1) All water from the Sewage Treatment Plant (STP) and from the Peconic River upstream of the STP is diverted to a location downstream of the cleanup area. This allows the river to be dewatered and the sediment to be excavated in a relatively dry environment, thus preventing sediment suspension; 2) All excavation is performed within an area between two temporary dams to enhance dewatering and further prevent the suspension and downstream transport of sediment. Water that is removed from an excavation area is filtered before being returned to the river and is only returned to a section of the river that will be remediated. The water column downstream of the cleanup area is sampled weekly and analyzed for turbidity and twice weekly for total suspended solids. At the location where the bypass water discharges into the river, samples are collected twice weekly. At station HQ, samples are collected weekly for mercury, methylmercury and total suspended solids and five times per week for turbidity.

Recommendation: A long-term monitoring program to assess mercury and PCB levels in Peconic River fish should be implemented to assure the mitigation strategies.
Response: Agreed. Long-term monitoring of fish for mercury and PCBs will occur. The sample results will be used to evaluate cleanup success and potential additional actions.

Recommendation: To the greatest extent possible, plants with local native genotypes should be used for re-vegetating the wetlands.
Response: This recommendation is discussed in comment #5 on the following page.

Recommendation: Restoration of wetlands should be performed with the minimal use of topsoil to avoid the introduction of excess nutrients and weed seeds.
Response: Agreed. The use of topsoil will be minimized. In place of topsoil, clean fill will be collected from open water areas after post-cleanup confirmatory samples have been received and confirm that the cleanup goals have been met.

Recommendation: A long-term assessment of the re-established wetlands should be performed.
Response: Agreed. The re-established wetlands will be monitored for five years. At the Five-Year Review the need for additional monitoring will be evaluated.

2) **Concern about potential obstruction of a hiking trail:** One letter expressed a concern that cleanup of the Peconic River directly upstream of Manor Road had the potential to disrupt hiking on the closely adjacent Paumanok Trail.
Response: The Project Manager and the author of the letter walked down the trail site and the remediation site. Immediately upstream of Manor Road the Paumonok Trail parallels the river at distance from the river of approximately 15 – 25 feet for a distance of approximately 75 yards. The commenter was concerned that remediation activity would impact the trail. No cleanup operations will be conducted that impact the trail. A high visibility temporary fence will be erected along this section of the river to clearly separate the trail from the cleanup area. The fence will prevent hikers from straying into the cleanup area and prevent remediation activity from affecting the Paumonok Trail. It was agreed that site operations would be conducted without impacting the hiking trail and that hiker safety would not be compromised by remediation activities.

3) **Preference for maintaining the excavated sediment at BNL rather than disposing of it at a New York State approved Subtitle D landfill**: The New York State Department of Environmental Conservation (NYSDEC) has reviewed the characterization data for the sediment to be removed from the Peconic River. NYSDEC has determined that the sediment is non-hazardous and eligible for subtitle D disposal. The Pine Avenue Landfill in Niagara Falls New York has evaluated the sediment data against their Waste Acceptance Criteria and approved the disposal of the soil at their landfill. Two letters were received that opposed transporting the waste to the approved subtitle D landfill due to the cost of transportation and the waste could negatively impact the area in which it would be disposed. Both letters supported disposing the waste at BNL in a location that would serve as a visual reminder to avoid future activities that could result in environmental contamination.
Response: The suggestion to maintain the waste at BNL cannot be implemented because BNL is not approved as a waste storage or disposal site and lies above a sole source aquifer**.**

4) **Posting signs along the Peconic River:** One letter recommended posting signs along the Peconic River advising that consumption of Peconic River fish should be limited to no more than the current New York State fish advisory for all New York State freshwaters.
Response: The New York State Department of Health (NYSDOH) issues fish advisories for New York State sport fish because some sport fish contain chemicals at levels that may be harmful to health. There is a NYSDOH general advisory to eat no more than one meal (1/2 pound) of fish per week from all New York State fresh waters and some marine waters at the mouth of the Hudson River. When fish from a water body are found to have elevated contaminant levels, NYSDOH issues more restrictive advisories (EAT NONE or EAT NO MORE THAN ONE MEAL PER MONTH).

   NYSDOH has reviewed Peconic River fish contamination data and determined that the NYSDOH general advisory is appropriate for the Peconic River. Although NYSDOH does not require advisory posting (or encourage posting for waters like the Peconic River), when requested, NYSDOH assists interested municipalities, environmental and angler groups, etc., in developing appropriate advisory sign messages.

5) **Use of native plants collected from the Peconic River to restore the Peconic River wetlands:** This recommendation was received from several reviewers. The planning for the wetland restoration states that the plants to be used for wetland restoration will come from two sources: 1) transplants from within the Peconic River and 2) plants obtained from the Pinelands nursery in New Jersey. This recommendation is based on concern that plants from New Jersey do not have the genetic material to adapt to Peconic River conditions and that use of plants with a genotype that is not from the Peconic River has the potential to negatively impact the genetics of native Peconic River plants.
Response: BNL and DOE staff met with the principal proponent of this recommendation and evaluated both programmatic and potential genetic issues related to adopting the

recommendation. DOE has accepted the recommendation for both on-Laboratory and outside-Laboratory sections of the river and will strive to:

1. Minimize or eliminate the use of plants used in restoration that come form a source other than the Peconic River.
2. Maximize the use of plants that are transplanted from sections of the river not requiring remediation to sections of the river that have been remediated.
3. In addition, in response to a Suffolk County Parks Department request, the use of topsoil in wetland restoration will be eliminated and Peconic River soil recovered from open water sections of the river will be used after confirmatory sampling has demonstrated that cleanup goals have been met.

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APPENDIX A

APPENDIX B

APPENDIX C